

technologies are common elements in the production technologies of the computer and electronic industry.

- 3341 Computer and Peripheral Equipment Manufacturing7**
- Personal property [used in manufacturing and/or assembling electronic computers](#), such as mainframes, personal computers, workstations, laptops, and computer servers; and computer peripheral equipment, such as storage devices, printers, monitors, input/output devices and terminals.
- Personal property [used in manufacturing wire telephone and data communications equipment](#). These products may be standalone or board-level components of a larger system. Examples of products made by these establishments are [central office switching equipment](#), cordless telephones (except cellular), [PBX equipment](#), telephones, telephone answering machines, [LAN modems](#), [multi-user modems](#), and other [data communications equipment](#), such as bridges, hubs, routers, and gateways.
- 3343 Audio and Video Equipment Manufacturing 10**
- Personal property used in manufacturing electronic audio and video equipment for home entertainment, motor vehicle, public address and musical instrument amplifications. Examples of products made include video cassette recorders, televisions, stereo equipment, speaker systems, household-type video cameras, jukeboxes, and amplifiers for musical instruments and public address systems.
- 3344 Semiconductor and Other Electronic Components 5**
- Personal property [used in manufacturing semiconductors](#) and other components for electronic applications. Examples of products made by these establishments are capacitors, resistors, microprocessors, bare and loaded printed circuit boards, electron tubes, electronic connectors, and computer modems.
- Includes:
- [clean room equipment](#), [crystal growing equipment](#), [deionized water systems](#), [encapsulation equipment](#), photo mask and wafer manufacturing equipment, semiconductor chemical and gas systems, semiconductor electrical systems, and semiconductor test equipment.

3345	Navigation, Measuring, Medical, Control Instrument Manufacturing	7
	Personal property used in manufacturing navigational, measuring, electro medical, and control instruments. Examples of products made by these establishments are aeronautical instruments, appliance regulators and controls (except switches), laboratory analytical instruments, navigation and guidance systems, and physical properties testing equipment.	
335	Electrical Equipment, Appliance, and Component Manufacturing	15
	Personal property used to manufacture products that generate , distribute and use electrical power , such as electric lamp bulbs, lighting fixtures, small and major electrical appliances, electric motors, generators, transformers, switchgear apparatus, devices for storing electrical power (e.g., batteries), for transmitting electricity (e.g., insulated wire), and wiring devices (e.g., electrical outlets, fuse boxes, and light switches).	
336	Transportation Equipment Manufacturing	15
	Personal property used in production processes similar to those of other machinery manufacturing establishments - bending, forming, welding, machining, and assembling metal or plastic parts into components and finished products.	
	The section includes:	
3361	Motor Vehicle Manufacturing	
3362	Motor Vehicle Body & Trailer Manufacturing	
3363	Motor Vehicle Parts Manufacturing	
3365	Railroad Rolling Stock Manufacturing	
3364	Aerospace Product and Parts Manufacturing.....	15
	Personal property used in one or more of the following: (1) manufacturing complete aircraft, missiles, or space vehicles; (2) manufacturing aerospace engines, propulsion units, auxiliary equipment or parts; (3) developing and making prototypes of aerospace products; (4) aircraft conversion (i.e., major modifications to systems); and (5) complete aircraft or propulsion systems overhaul and rebuilding (i.e., periodic restoration of aircraft to original design specifications).	
	This section includes:	
	336412 Aircraft Engine and Engine Parts Manufacturing	
337	Furniture and Related Product Manufacturing	10
	Personal property used to make furniture and related articles, such as mattresses, window blinds, cabinets, and fixtures. The processes used in the manufacture of furniture include the cutting, bending, molding, laminating, and assembly of such materials as wood, metal, glass, plastics, and rattan.	

339 Miscellaneous Manufacturing 15

Personal property used in the manufacture of products as diverse as medical equipment and supplies, jewelry, sporting goods, toys, and office supplies.

33991 Jewelry and Silverware Manufacturing 15

Personal property used in: (1) manufacturing, engraving, chasing, or etching jewelry; (2) manufacturing metal personal goods (i.e., small articles carried on or about the person, such as compacts or cigarette cases); (3) manufacturing, engraving, chasing, or etching precious metal solid, precious metal clad, or pewter cutlery and flatware; (4) manufacturing, engraving, chasing, or etching personal metal goods (i.e., small articles carried on or about the person, such as compacts or cigarette cases); (5) stamping coins; (6) manufacturing unassembled jewelry parts and stock shop products, such as sheet, wire, and tubing; (7) cutting, slabbing, tumbling, carving, engraving, polishing, or faceting precious or semiprecious stones and gems; (8) re-cutting, re-polishing, and setting gem stones; and (9) drilling, sawing, and peeling cultured and costume pearls.

4 2 W H O L E S A L E T R A D E

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

423 Wholesale Trade Fixtures and Equipment 15

Trade fixtures (as opposed to fixtures) and equipment are used in establishments engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. Wholesalers sell merchandise to other businesses and normally operate from a warehouse or office. See also separate listings for specific types of equipment.

423440 Other Commercial Equipment Merchant Wholesalers (lockers (except refrigerated) merchant wholesalers) Example: Product Delivery Lockers retail and e-commerce.

423740, Refrigeration Equipment and Supplies Merchant Wholesalers (lockers, refrigerated, merchant wholesalers) Example: Product Delivery Lockers retail and e-commerce.

4 4 R E T A I L T R A D E

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

Includes the personal property for the following:

441	Motor Vehicle and Parts Dealers.....	15
442	Furniture and Home Furnishing Stores.....	15
443	Electronics and Appliance Stores.....	15
444	Building Material and Garden Equipment and Supply Stores	15
445	Food and Beverage Stores (including Convenience Stores)	15
446	Health and Personal Care Stores.....	15
447	Gasoline Stations	15
448	Clothing and Clothing Accessories Stores	15
451	Sporting Goods, Hobby, Book, and Music Stores	15
452	General Merchandise Stores.....	15
453	Miscellaneous Store Retailers, including	15
	4531 Florists	15
454	Non-store Retailers.....	15
	See also separate listings for specific types of equipment.	

4 8 T R A N S P O R T A T I O N A N D W A R E H O U S I N G

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

481	Air Transportation	20
	Personal property includes most airplanes; helicopters (rotorcraft); drones weighing over 50 pounds; and aircraft, all of which have a life of 20 years. There are some exceptions, which are itemized below.	
	Itemized Equipment	
	Kit built Aircraft	15
	Gliders	15
	Hot Air Balloons	15
	Experimental Aircraft.....	15
	Drones weighing 50 pounds or less.....	10

482	Rail Transportation.....	20
482112	Short Line Railroads	
	Itemized Equipment	
	Railroad Rolling Stock	20
483	Water Transportation	20
	Personal property used in providing inland water transportation of passengers and/or cargo on lakes, rivers, or intracoastal waterways.	
484	Truck Transportation	10
	Itemized Equipment	
	Light Trucks	7
	General freight Trucks	10
	Tractor-trailers	10
485	Transit and Ground Passenger Transportation	10
	Personal property includes equipment used in Transit and Ground Passenger Transportation. This industry includes a variety of passenger transportation activities, such as urban transit systems; chartered bus, school bus, and interurban bus transportation and taxis.	
	Itemized Equipment	
	Buses.....	15
	Automobiles, unlicensed	7
492	Couriers and Messengers	15
	Personal property used in the provision of intercity and/or local delivery of parcels. These articles can be described as those that may be handled by one person without using special equipment. Messengers, which usually deliver within a metropolitan or single urban area, may use bicycle, foot, small truck, or van.	
493	Warehousing and Storage.....	15
	Personal property used in operating warehousing and storage{XE "storage:} facilities for general merchandise, refrigerated goods, and other warehouse products. These establishments provide facilities to store goods. They do not sell the goods they handle.	

51 INFORMATION

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

511	Publishing Industries	15
	Personal property used in the publishing of newspapers, magazines, other periodicals, and books, as well as directory and mailing list and software publishing.	
512	Motion Picture Production and Sound Recording	7
	Personal property used in the production and/or distribution of motion pictures, videos, television programs, or commercials; in the exhibition of motion pictures; or in the provision of postproduction and related services. Sound recording machinery and equipment is used in producing and distributing musical recordings, in publishing music, or in providing sound recording and related services.	
	512131 Motion Picture Theaters	15
	Includes projection equipment, furniture and trade fixtures.	
515	Broadcasting and Telecommunications	<i>See Categories</i>
	51511 Radio Broadcasting.....	10
	Personal property used in broadcasting audio signals. These establishments operate radio broadcasting studios and facilities for the transmission of aural programming by radio to the public, to affiliates, or to subscribers. In recognition of the FCC change from analog to digital broadcasting equipment in radio, television, and cable industries, all analog equipment MAY be valued using a seven-year life. All other equipment will remain at the life indicated. The assessor will still be responsible for measuring obsolescence if any.	
	Itemized Equipment	
	Radio Production Equipment	7
	Service and Repair Equipment	10
	51512 Television Broadcasting	10
	Personal property used in broadcasting images together with sound. These establishments operate television broadcasting studios and facilities for the programming and transmission of programs to the public. In recognition of the FCC mandated change from analog to digital broadcasting equipment in radio, television, and cable industries, all analog equipment MAY be valued using a three-year life. All other equipment will remain at the life indicated. The assessor will still be responsible for measuring obsolescence if any.	
	Itemized Equipment	
	Television Production Equipment	7
	Service and Repair Equipment	10

517 Telecommunications See Itemized Equipment

Wired telecommunications personal property used in (1) operating and maintaining switching and transmission facilities to provide point-to-point communications via landlines, microwave, or a combination of landlines and satellite linkups or (2) furnishing telegraph and other non-vocal communications using their own facilities. Wireless telecommunications assets are used in operating and maintaining switching and transmission facilities that provide omni-directional communications via airwaves, such as cellular telephone or paging services. For handheld devices used to take electronic payments, see Point-of-Sale descriptions.

Itemized Equipment

Central Office Equipment, except computer-based switching equipment	15
Computer-based switching equipment	5
Distribution Plant (if personal property)	30
Fiber optic cable	15
Paging Systems	5
Microwave Systems, except towers	10
Station Equipment	10
Telephone equipment, including, telex, facsimile and Two-Way Radio	5
Cellular Telephones, Smartphones, Hand-helds, Tablets and POS Tablets, and PDAs.....	3

517110 Cable and Other Program Distribution See Itemized Equipment

Personal property used in distribution systems for broadcast programming. Head end assets are defined as the electronic control center -- generally located at the antenna site of a CATV system -- usually including antennas, preamplifiers, frequency converters, demodulators, modulators and other related equipment which amplify, filter and convert incoming broadcast TV signals to cable system channels. Microwave systems include assets such as antennas, transmitting and receiving equipment, and broad band microwave assets. Program origination equipment includes assets such as cameras, film chains, video tape recorders, lighting, and remote location equipment excluding vehicles. Service and test assets include oscilloscopes, field strength meters, spectrum analyzers, and cable testing equipment. Subscriber connection and distribution systems include assets such as trunk and feeder cable, connecting hardware, amplifiers, power equipment, passive devices, directional taps, pedestals, pressure taps, drop cables, matching transformers, multiple set connector equipment, and converters. In recognition of the FCC mandated change from analog to digital broadcasting equipment in radio, television, and cable industries all analog equipment MAY be valued using a seven-year life. All other equipment will remain at the life indicated. The assessor will still be responsible for measuring obsolescence if any.

Itemized Equipment

Coaxial Cable, installed inside buildings	15
Fiber Optic Cable	15
Head end Equipment, except towers	10
Microwave Systems, except towers	10
Program Origination Equipment	10
Satellite Dish Relay; Earth station equipment	10
Box converters having specialized computer components	3
Service and Test Equipment	10
Subscriber Connection and Distribution Systems	10

518 Internet Service Providers, Web Search Portals, and Data Processing Services

For life expectancy, please see Special Properties

Personal property assets used by Internet Service Providers, Web Search Portals, and Data Processing Services to provide: (1) access to the Internet; (2) search facilities for the Internet; and (3) data processing, hosting, and related services.

519 Other Information Services 15

Personal property assets used in supplying information, storing information, providing access to information, and searching and retrieving information. The main components of this group are news syndicates, libraries, and archives. It includes law and medical libraries.

5 3 REAL ESTATE, RENTAL, AND LEASING

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

532 Rental and Leasing Services 15

Personal property includes a wide array of tangible goods, such as automobiles, computers, consumer goods, and industrial machinery and equipment, to customers in return for a periodic rental or lease payment.

Itemized Equipment

Formal wear and costume rental	3
Bottled water Dispensers & Equipment	7
Furniture Rental & Leasing	7
Heavy equipment	<i>See Construction (Code 23)</i>
Lawn and Garden equipment	7

Linens and Uniforms	3
Musical Instrument rentals	7
Rent-to-Own Merchandise	7
Ski Equipment Rentals	7
Video Tapes	<i>See Special Properties</i>
<i>See also separate listings for specific types of equipment.</i>	

54 PROFESSIONAL, SCIENTIFIC, & TECHNICAL SERVICES

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

- See Itemized Equipment

Itemized Equipment

Laboratory equipment , except electronic and computerized	15
Laboratory equipment, electronic and computerized	7
Medical and law libraries (<i>See also other information services</i>).....	15
Photography	15
Professional and scientific equipment (<i>See also NAICS Code 3345</i>)	7
Professional libraries.....	15
Surveying Equipment	
GPS	7
Non-GPS	15

56 WASTE MANAGEMENT AND REMEDIATION SERVICES

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

5616 Investigation and Security Services	15
Personal property includes burglar and fire alarms and locking devices, along with equipment necessary for installation, repair, or monitoring services or (2) remote monitoring of electronic security alarm systems.	
Itemized Equipment	
Closed Circuit TV – Camera System	7
Firearms	20

	Locksmith Equipment, including:	
	Mechanical and electronic locking devices	20
	Safes and security vaults	20
5617	Services to Buildings and Dwellings	15
	Includes the fixtures and equipment for the following:	
	56171 Exterminating and Pest Control Services	
	56172 Janitorial Services	
	56173 Landscaping Services	
	56174 Carpet and Upholstery Cleaning Services	
	Itemized Equipment	
	Carpet Cleaning	15
	Lawn mowing Equipment	7
562	Waste Management and Remediation Services	10
	Personal property used in the collection, treatment, and disposal of waste materials. This includes establishments engaged in local hauling of waste materials; operating materials recovery facilities (i.e., those that sort recyclable materials from the trash stream); providing remediation services (i.e., those that provide for the cleanup of contaminated buildings, mine sites, soil, or ground water); and providing septic pumping and other miscellaneous waste management services.	
	Itemized Equipment	
	Garbage Dumpsters.....	10
	Portable toilets	10

6 2 HEALTH CARE AND SOCIAL ASSISTANCE

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

621	Ambulatory Health Care Services	15
	Personal property used by health practitioners in the provision of outpatient services, with the facilities and equipment not usually being the most significant part of the production process. Includes the fixtures and equipment for the following:	
	6211 Offices of Physicians	
	6212 Offices of Dentists	
	6213 Offices of Other Health Practitioners, including Chiropractors, Optometrists, Mental Health Practitioners, and Physical, Occupational, and Speech Therapists	

Medical and Dental Instruments Not Otherwise Noted in Special Properties, include:

All Portable Units of Same

Angiographic X-ray units	Mesoptometers
Chest X-ray Units	Microscopes
Dental X-ray Units	Portable X-ray Units
Exam tables and chairs	Radiographic X-ray Units
Fluorographic X-ray Units	Special Procedure X-ray Units
Lensometer	Sterilizers
Mammographic X-ray Units	

622	Hospitals	15
	Personal property used to provide inpatient health services, particularly specialized facilities and equipment that form a significant and integral part of the production process. <i>See list above for examples of equipment.</i>	
	<i>See also Special Properties for Medical Diagnostic and Medical Lab.</i>	
6244	Child Day Care Facilities	10
	Personal property used in providing day care of infants or children.	

71 ARTS, ENTERTAINMENT, AND RECREATION

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

711	Performing Arts, Spectator Sports, and Related	10
	Includes projection equipment, furniture and trade fixtures such as movable set props, aerial and acrobatic equipment, rigging, costumes, production lighting, and special effects equipment.	
	Itemized Equipment	
	Electronic Equipment including Sound Systems	7
	Seating, stages including fixed set designs, hydraulics, fountains	15
	Support operations, including equipment and furniture for dressing rooms, ticket booths, snack bars, offices	15 ⁸
	Water tanks.....	20 ⁹

⁸ May be considered to be real property fixtures. The cost may be established from Marshall & Swift.

711212	Car racing – race cars	3
713	Amusement, Gambling and Recreation Industries	15
	Personal property used to (1) operate facilities where patrons can primarily engage in sports, recreation, amusement, or gambling activities and/or (2) provide other amusement and recreation services, such as supplying and servicing amusement devices in places of business operated by others; operating sports teams, clubs, or leagues engaged in playing games for recreational purposes; and guiding tours without using transportation equipment.	
	Itemized Equipment	
	Amusement Park (does not include structures)	15
	Bowling Alley Pinsetters and Other Equipment	15
	Bowling Electronic Scoring Machines	7
	Gaming Equipment:	
	Electronic Slots, or Computers	7
	Player Tracking Systems	7
	Mechanical Slots.....	15
	Other	15
	Golf Carts, Electric	7
	Golf Course Machinery and Equipment, except Lawn Mowing Equipment.....	15
	Golf Course Lawn Mowing Equipment.....	7
	Juke Box.....	15
	Ski Area Equipment: Snow Cats and Packers	7
	Ski Rentals.....	7
	Video and Flipper Games	7

72 ACCOMMODATION AND FOOD SERVICES

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

721	Accommodation.....	15
	Personal property used in: (1) traveler accommodation, (2) recreational accommodation, and (3) rooming and boarding houses.	
	Itemized Equipment	
	Apartment Furnishings.....	15
	Hotel Furnishings.....	10

⁹ May be considered to be real property fixtures. The cost may be established from Marshall & Swift.

	Outdoor Patio Furnishings	7
	Fire and Security Equipment.....	15
	Health Spa Equipment: Manual	15
	Health Spa Equipment: Electronic	7
	Heavy Use Washers	7
	Linens, Glassware, Silverware, and Uniforms (not rented)	3
	Televisions.....	5
	Telephone Systems (<i>See also NAICS Code 517</i>)	5
722	Food Services and Drinking Places.....	15
	The industry groups are full-service restaurants; limited-service eating places; special food services, such as food service contractors, caterers, and mobile food services; and drinking places.	
	Itemized Equipment	
	Bar	15
	Coffee Brewing Equipment	15
	Walk-in Coolers (<i>See Also NAICS 311</i>)	15
	Linens, Glassware, Silverware, and Uniforms (not rented)	3
	Televisions, Digital.....	5
	Televisions, Analog.....	5
	Vending Machines	15

81 OTHER SERVICES

For the purposes of this manual, the following descriptions apply only to those items which can be classified as Personal Property. The designated life does not apply to Real Property or fixtures which have been converted to Real Property.

Establishments in this sector are primarily engaged in activities, such as equipment and machinery repairing, promoting or administering religious activities, grant making, advocacy, and providing dry cleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services.

811	Repair and Maintenance	15
	Personal property used to restore machinery, equipment, and other products to working order. These establishments also typically provide general or routine maintenance (i.e., servicing) on such products to ensure they work efficiently and to prevent breakdown and unnecessary repairs.	

Includes the fixtures and equipment for the following:

- 8111 Automobile Repair and Maintenance
- 811192 Car Washes
- 8112 Electronic & Precision Equipment
- 8113 Commercial Equipment Repair and Maintenance
- 8114 Personal and Household Goods Repair and Maintenance
- 81143 Footwear and Leather Goods Repair

Itemized Equipment

Auto Repair Diagnostic Equipment (Electronic)	7
Small Tools (See Hand Tools, NAICS 423120)	7
Welding Equipment.....	15
EV Charging Stations.....	15

812 Personal and Laundry Services..... 15

Includes the equipment and some trade fixtures for the following (See *Appendix D* for determination of real or personal property):

- 8121 Personal Care Services
- 81211 Hair, Nail and Skin Care Services
- 81219 Other, including Diet and Weight Reducing – Fitness
- 8122 Death Care Services
- 81221 Funeral Homes
- 81222 Cemeteries and Crematories
- 8123 Dry Cleaning and Laundry Services
- 81231 Coin-operated Laundries and Dry Cleaners
- 81232 Dry Cleaning and Laundry, except Coin-operated
- 8129 Other Personal Services
- 81291 Pet Care (except Veterinary)
- 81292 Photo-finishing

Itemized Equipment

Coin Laundries.....	15
Heavy Use Washers	7
Commercial Dry Cleaning Equipment.....	15

APPENDIX A

2025-26 PERSONAL PROPERTY MANUAL

NEVADA REVISED STATUTES AND NEVADA ADMINISTRATIVE CODE RELATED TO PERSONAL PROPERTY

(This listing may not be comprehensive. Please consult the statutes and regulations. You may find the statutes and regulations on the internet at <http://leg.state.nv.us/law1.cfm>).

Nevada Revised Statutes

NRS 361.013 “Billboard” defined. “Billboard” means a sign that directs attention to a business, commodity, service, entertainment or attraction that is sold, offered or exists at a location other than the premises on which the sign is located.

(Added to NRS by [1989, 1817](#))

NRS 361.028 “Manufactured home” defined. “Manufactured home” has the meaning ascribed to it in [NRS 489.113](#).

(Added to NRS by [2001, 1540](#))

NRS 361.029 “Mobile home” defined. “Mobile home” means a vehicular structure, built on a chassis or frame, which is designed to be used with or without a permanent foundation and is capable of being drawn by a motor vehicle. It may be used as a dwelling when connected to utilities or may be used permanently or temporarily for the advertising, sales, display or promotion of merchandise or services. The term does not include a recreational park trailer as defined in [NRS 482.1005](#).

(Added to NRS by [1989, 169](#); A [2001, 1727](#))

NRS 361.030 “Personal property” defined.

1. “Personal property” means:
 - (a) All household and kitchen furniture.
 - (b) All law, medical and miscellaneous libraries.
 - (c) All goods, wares and merchandise.
 - (d) All chattels of every kind and description, except vehicles as defined in [NRS 371.020](#).
 - (e) Stocks of goods on hand.
 - (f) Any vehicle not included in the definition of vehicle in [NRS 371.020](#).
 - (g) All locomotives, cars, rolling stock and other personal property used in operating any railroad within the State.
 - (h) All machines and machinery, all works and improvements, all steamers, vessels and watercraft of every kind and name navigating or used upon the waters of any river or lake within this State or having a general depot or terminus within this State.
 - (i) The money, property and effects of every kind, except real estate, of all banks, banking institutions or firms, bankers, moneylenders and brokers.
 - (j) All property of whatever kind or nature, except vehicles as defined in [NRS 371.020](#), not included in the term “real estate” as that term is defined in [NRS 361.035](#).

2. Gold-bearing and silver-bearing ores, quartz or minerals from which gold or silver is extracted, when in the hands of the producers thereof, shall not mean, not be taken to mean, nor be listed and assessed under the term “personal property” as used in this section, but are specially excepted therefrom, and shall be listed, assessed and taxed as provided by law. [Part 3:344:1953]—(NRS A 1963, 305, 1121; [1983, 1191](#); [2013, 3115](#))

NRS 361.035 “Real estate” and “real property” defined.

1. “Real estate” or “real property” means:
 - (a) All houses, buildings, fences, ditches, structures, erections, railroads, toll roads and bridges, or other improvements built or erected upon any land, whether such land is private property or property of this state or of the United States, or of any municipal or other corporation, or of any county, city or town in this state.
 - (b) Any mobile home, factory-built housing or manufactured home which meets the requirements of [NRS 361.244](#).
 - (c) The ownership of, or claim to, or possession of, or right of possession to any lands within this state.
 - (d) The claim by or the possession of any person, firm, corporation, association or company to any land.
2. The property described in subsection 1 must be listed under the head of “real estate.”
3. Except as otherwise provided in [NRS 361.2445](#), when an agreement has been entered into, whether in writing or not, or when there is sufficient reason to believe that an agreement has been entered into, for the dismantling, moving or carrying away or wrecking of the property described in subsection 1, the property must be classified as personal property, and not real estate.
4. For the purposes of this chapter, “real estate” or “real property” does not include leasehold or other possessory interests in land owned by the Federal Government on which land the Federal Government is paying taxes to the State of Nevada or is, pursuant to contractual obligation, paying any sum in lieu of taxes to the State of Nevada.
 [Part 3:344:1953]—(NRS A 1957, 358; 1975, 1655; [1979, 824](#); [1993, 1183](#); [1999, 3465](#))

NRS 361.045 Taxable property. Except as otherwise provided by law, all property of every kind and nature whatever within this state shall be subject to taxation.

[Part 1:344:1953; A 1954, 29; 1955, 340]

NRS 361.227 Determination of taxable value.

1. Any person determining the taxable value of real property shall appraise:
 - (a) The full cash value of:
 - (1) Vacant land by considering the uses to which it may lawfully be put, any legal or physical restrictions upon those uses, the character of the terrain, and the uses of other land in the vicinity.
 - (2) Improved land consistently with the use to which the improvements are being put.
 - (b) Any improvements made on the land by subtracting from the cost of replacement of the improvements all applicable depreciation and obsolescence. Depreciation of an improvement made on real property must be calculated at 1.5 percent of the cost of replacement for each year of adjusted actual age of the improvement, up to a maximum of 50 years.
2. The unit of appraisal must be a single parcel unless:
 - (a) The location of the improvements causes two or more parcels to function as a single parcel;
 - (b) The parcel is one of a group of contiguous parcels which qualifies for valuation as a subdivision pursuant to the regulations of the Nevada Tax Commission; or
 - (c) In the professional judgment of the person determining the taxable value, the parcel is one of a group of parcels which should be valued as a collective unit.
3. The taxable value of a leasehold interest, possessory interest, beneficial interest or beneficial use for the purpose of [NRS 361.157](#) or [361.159](#) must be determined in the same manner as the taxable value of the property would otherwise be determined if the lessee or user of the property was the owner of the property and it was not exempt from taxation, except that the taxable value so determined must be reduced by a percentage of the taxable value that is equal to the:
 - (a) Percentage of the property that is not actually leased by the lessee or used by the user during the fiscal year; and
 - (b) Percentage of time that the property is not actually leased by the lessee or used by the user during the fiscal year, which must be determined in accordance with [NRS 361.2275](#).
4. The taxable value of other taxable personal property, except a mobile or manufactured home, must be determined by subtracting from the cost of replacement of the property all applicable depreciation and obsolescence. Depreciation of a billboard must be calculated at 1.5 percent of the cost of replacement for each year after the year of acquisition of the billboard, up to a maximum of 50 years.
5. The computed taxable value of any property must not exceed its full cash value. Each person determining the taxable value of property shall reduce it if necessary to comply with this requirement. A person determining whether taxable value exceeds that full cash value or whether obsolescence is a factor in valuation may consider:
 - (a) Comparative sales, based on prices actually paid in market transactions.
 - (b) A summation of the estimated full cash value of the land and contributory value of the improvements.
 - (c) Capitalization of the fair economic income expectancy or fair economic rent, or an analysis of the discounted cash flow.

➤ A county assessor is required to make the reduction prescribed in this subsection if the owner calls to his or her attention the facts warranting it, if the county assessor discovers those facts during physical reappraisal of the property or if the county assessor is otherwise aware of those facts.

6. The Nevada Tax Commission shall, by regulation, establish:

(a) Standards for determining the cost of replacement of improvements of various kinds.

(b) Standards for determining the cost of replacement of personal property of various kinds. The standards must include a separate index of factors for application to the acquisition cost of a billboard to determine its replacement cost.

(c) Schedules of depreciation for personal property based on its estimated life.

(d) Criteria for the valuation of two or more parcels as a subdivision.

7. In determining, for the purpose of computing taxable value, the cost of replacement of:

(a) Any personal property, the cost of all improvements of the personal property, including any additions to or renovations of the personal property, but excluding routine maintenance and repairs, must be added to the cost of acquisition of the personal property.

(b) An improvement made on land, a county assessor may use any final representations of the improvement prepared by the architect or builder of the improvement, including, without limitation, any final building plans, drawings, sketches and surveys, and any specifications included in such representations, as a basis for establishing any relevant measurements of size or quantity.

8. The county assessor shall, upon the request of the owner, furnish within 15 days to the owner a copy of the most recent appraisal of the property, including, without limitation, copies of any sales data, materials presented on appeal to the county board of equalization or State Board of Equalization and other materials used to determine or defend the taxable value of the property.

9. The provisions of this section do not apply to property which is assessed pursuant to [NRS 361.320](#).

(Added to NRS by 1965, 1445; A 1969, 1451; 1975, 65, 1656; [1977, 1318](#); [1979, 79](#); [1981, 788, 789](#); [1983, 1047, 1884, 1885](#); [1987, 2075](#); [1989, 668, 1818](#); [1993, 2312](#); [1997, 1111](#); [1999, 1029](#); [2001, 842](#); [2003, 2758](#); [2009, 1216](#); [2013, 3116](#))

NRS 361.265 Written statement concerning personal property: Demand; contents; return of statement; valuation of unlisted property claimed by absent or unknown person; penalties.

1. To enable the county assessor to make assessments, he or she shall demand from each natural person or firm, and from the president, cashier, treasurer or managing agent of each corporation, association or company, including all banking institutions, associations or firms within the county, a written statement, signed under penalty of perjury, on forms and in the format prescribed by the county assessor of all the personal property within the county, owned, claimed, possessed, controlled or managed by those persons, firms, corporations, associations or companies. The signature required by this subsection may include an electronic signature as defined in [NRS 719.100](#).

2. The statement must include:

(a) A description of the location of any taxable personal property that is owned, claimed, possessed, controlled or managed by the natural person, firm, corporation, association or company, but stored, maintained or otherwise placed at a location other than the principal residence of the natural person or principal place of business of the firm, corporation, association or company;

(b) The cost of acquisition of each item of taxable personal property including the cost of any improvements of the personal property, such as additions to or renovations of the property other than routine maintenance or repairs, and the year in which each item of taxable personal property was acquired; and

(c) If the natural person, firm, corporation, association or company owns at least 25 mobile or manufactured homes that are being leased within the county for commercial purposes, and those homes have not been converted to real property pursuant to [NRS 361.244](#), the year, make or model, size, serial number and location of each such mobile or manufactured home.

3. The statement must be returned not later than July 31, except for a statement mailed to the taxpayer after July 15, in which case it must be returned within 15 days after demand for its return is made. Upon petition of the property owner showing good cause, the county assessor may grant one or more 30-day extensions.

4. If the owners of any taxable property not listed by another person are absent or unknown, or fail to provide the written statement as described in subsection 1, the county assessor shall make an estimate of the value of the property and assess it accordingly. If the name of the absent owner is known to the county assessor, the property must be assessed in that name. If the name of the owner is unknown to the county assessor, the property must be assessed to "unknown

owner,” but no mistake made in the name of the owner or the supposed owner of personal property renders the assessment or any sale of the property for taxes invalid.

5. If any person, officer or agent neglects or refuses on demand of the county assessor or his or her deputy to give the statement required by this section, or gives a false name, or refuses to give his or her name or sign the statement, the person, officer or agent is guilty of a misdemeanor.

[Part 5:344:1953]—(NRS A 1967, 558; 1969, 1452; [1981, 327](#); [1983, 519](#), [1193](#); [1985, 748](#); [1987, 531](#); [1989, 1820](#); [2003, 2761](#); [2005, 2656](#))

NRS 361.325 Nevada Tax Commission to establish valuations of mobile homes and land; property escaping taxation to be placed on assessment roll.

1. On or before the first Monday in June of each year, the Nevada Tax Commission shall:

(a) Fix and establish the valuation for assessment purposes of all mobile homes in the State.

(b) Classify land and fix and establish the valuation thereof for assessment purposes. The classification of agricultural land must be made on the basis of crop, timber or forage production, either in tons of crops per acre, board feet or other unit, or animal unit months of forage. An animal unit month is the amount of forage which is necessary for the complete sustenance of one animal unit for 1 month. One animal unit is defined as one cow and calf, or its equivalent, and the amount of forage necessary to sustain one animal unit for 1 month is defined as 900 pounds of dry weight forage.

2. The valuation of mobile homes and land so fixed and established is for the next succeeding year and is subject to equalization by the State Board of Equalization.

3. In establishing the value of new mobile homes sold on or after July 1, 1982, the Nevada Tax Commission shall classify them according to those factors which most closely determine their useful lives. In establishing the value of other mobile homes, the Commission shall begin with the retail selling price and depreciate it by 5 percent per year, but not below 20 percent of its original amount.

4. The Nevada Tax Commission shall cause to be placed on the assessment roll of any county property found to be escaping taxation coming to its knowledge after the adjournment of the State Board of Equalization. This property must be placed upon the assessment roll prior to the delivery thereof to the ex officio tax receiver. If such property cannot be placed upon the assessment roll of the proper county within the proper time, it must be placed upon the tax roll for the next ensuing year, in addition to the assessment for the current year, if any, and taxes thereon must be collected for the prior year in the same amount as though collected upon the prior year's assessment roll.

5. The Nevada Tax Commission shall not raise or lower any valuations established by the State Board of Equalization unless, by the addition to any assessment roll of property found to be escaping taxation, it is necessary to do so.

6. Nothing in this section provides an appeal from the acts of the State Board of Equalization to the Nevada Tax Commission.

[7:177:1917; A 1929, 299; 1939, 279; 1945, 78; 1953, 576]—(NRS A 1957, 314; 1963, 1123; 1967, 825; 1975, 1105, 1660, 1762; [1981, 859](#); [1983, 1195](#))

Nevada Administrative Code

NAC 361.1127 “Fixture” defined. ([NRS 360.090](#), [360.250](#)) “Fixture” means an item, other than a trade fixture, that was originally personal property which has been installed or attached to land or an improvement in a permanent manner. As used in this section, “installed or attached to land or an improvement in a permanent manner” means that:

1. Either:

(a) An item is attached to, imbedded in or permanently resting upon land or an improvement, or is attached by other means that are normally used for permanent installation, and cannot be removed without substantially damaging the item or the land or improvement with which it is being used; or

(b) The use or purpose of an item that is not otherwise physically annexed to land or an improvement is so adapted that it is:

(1) A necessary, integral or working part of the land or improvement;

(2) Designed or committed for use with the land or improvement; or

(3) So essential to the land or improvement that the land or improvement cannot perform its desired function without the nonattached item; and

2. A reasonable person would consider the item to be a permanent part of the land or improvement, taking into account annexation, adaptation and other objective manifestations of permanence, including, without limitation, whether:
 - (a) Removal of the item would destroy the item or cause significant damage to the real property to which it is installed or attached;
 - (b) The historic use of the item indicates an intention to leave the item in place;
 - (c) The terms of a written agreement between parties indicates the intention of a tenant or lessee to remove or transfer ownership of the item; or
 - (d) Ownership of the item would be conveyed with a transfer of the real property to which it is installed or attached.
- (Added to NAC by Tax Comm'n by R039-10, 8-13-2010, eff. 7-1-2012; A by R068-12, 9-14-2012)

NAC 361.11715 "Real property" defined. ([NRS 360.090](#), [360.250](#))

1. "Real property" has the meaning ascribed to it in [NRS 361.035](#) and includes:
 - (a) Land;
 - (b) Fixtures;
 - (c) Improvements;
 - (d) On-site enhancements; and
 - (e) Any rights, interests, benefits and privileges belonging or attached to the land.
2. The term does not include a trade fixture.

(Added to NAC by Tax Comm'n by R039-10, 8-13-2010, eff. 7-1-2012; A by R068-12, 9-14-2012)

NAC 361.130 Mobile or manufactured home. ([NRS 360.090](#), [360.250](#), [361.227](#), [361.2445](#), [361.325](#))

1. The taxable value of a mobile home or manufactured home which constitutes real property is the cost of replacement of the mobile home or manufactured home less depreciation and obsolescence.
 2. In determining the taxable value of a mobile home or manufactured home which constitutes personal property, each county assessor shall, if the mobile home or manufactured home was sold as new:
 - (a) Before July 1, 1982, value it at its retail selling price when sold to the original owner less depreciation at 5 percent per year, to a maximum depreciated value of 20 percent of its original retail selling price.
 - (b) On or after July 1, 1982, value it at replacement cost, when new, less depreciation. Replacement cost when new is the retail selling price to the original owner adjusted by factors reflected in the annual *Personal Property Manual*.
 ➤ Depreciation must be calculated pursuant to the schedule located in the annual *Personal Property Manual*. Additional depreciation and obsolescence may be calculated separately.
 3. The retail selling price of a mobile home or manufactured home includes all charges for transportation, installation, accessories, profit and overhead.
 4. If the owner of a mobile home or manufactured home which has been converted to real property wishes to convert the mobile home or manufactured home back to personal property, the county assessor shall provide the owner with a form for an affidavit of conversion which has been approved by the Commission and which must be recorded in the county recorder's office pursuant to [NRS 361.2445](#) before the mobile home or manufactured home may be removed from the tax rolls. The affidavit of conversion may include information concerning the cost of acquisition of the mobile home or manufactured home. All signatures required pursuant to [NRS 361.2445](#) to effectuate the conversion must be notarized.
 5. The county assessor shall value the mobile home or manufactured home as personal property upon satisfaction of all the requirements set forth in [NRS 361.2445](#) if the mobile home or manufactured home remains within the jurisdiction of the county assessor.
 6. If a mobile home or manufactured home which has been converted to real property is completely destroyed and removed from real property, the county assessor shall remove the mobile home or manufactured home from the tax roll.
- [Tax Comm'n, Property Tax Reg. part No. 2, eff. 1-14-82]— (NAC A 10-10-83; 6-29-84; 5-16-86; R031-03, 8-4-2004; R166-07, 6-17-2008)

NAC 361.1305 Billboards. ([NRS 360.090](#), [360.250](#), [361.227](#))

1. The taxable value of a billboard is the cost of replacement of the billboard less depreciation and obsolescence.
2. The cost of replacement of a billboard must be computed by multiplying the cost of acquisition to the current owner by the appropriate factor located in the annual *Personal Property Manual*. The factor that corresponds to the year the billboard was acquired must be used. Additional depreciation and obsolescence may be calculated separately.

(Added to NAC by Tax Comm'n, eff. 8-2-90; A by R031-03, 8-4-2004)

Determination of Taxable Value of Personal Property

NAC 361.1345 Definitions. ([NRS 360.090](#), [360.250](#), [361.227](#)) As used in [NAC 361.1345](#) to [361.139](#), inclusive, unless the context otherwise requires, the words and terms defined in [NAC 361.1351](#), [361.1355](#) and [361.1361](#) have the meanings ascribed to them in those sections.

(Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

NAC 361.1351 "Acquisition cost" and "original cost" defined. ([NRS 360.090](#), [360.250](#), [361.227](#)) "Acquisition cost" or "original cost" means the actual cost of property to its present owner, including, without limitation, the costs of transportation and the costs of installation.

(Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

NAC 361.1355 "Costs of installation" defined. ([NRS 360.090](#), [360.250](#), [361.227](#)) "Costs of installation" means the costs of direct labor, direct overhead and the capitalized expense of interest or imputed charges for interest which are necessary to make the property operational.

(Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

NAC 361.1361 "Personal Property Manual" defined. ([NRS 360.090](#), [360.250](#), [361.227](#)) "*Personal Property Manual*" means a manual for the valuation of personal property that is published by the Department annually pursuant to [NAC 361.1365](#).

(Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

NAC 361.1365 *Personal Property Manual: Publication; contents; approval; use.* ([NRS 360.090](#), [360.250](#), [361.227](#))

1. The Department will annually publish a *Personal Property Manual* which describes the methods and standards that must be used for the valuation of personal property. The manual must include, without limitation, annually updated:

(a) Cost-index factors that must be used in the conversion of acquisition cost into an estimate of replacement cost new;

(b) Expected-life schedules that indicate the category of expected life for each type of property or type of industry in which the property is used; and

(c) Percent-good tables which indicate the rate of depreciation that must be applied.

2. The *Personal Property Manual* must be approved by the Commission before publication. The Department, at least 1 month before presenting the manual to the Commission for approval, must disclose all proposed modifications to the manual and hold a public workshop on the modifications.

3. Each county assessor shall use the *Personal Property Manual* in determining the taxable value of personal property.

(Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

NAC 361.1371 Procedure for determination of taxable value. ([NRS 360.090](#), [360.250](#), [361.227](#))

1. The taxable value of personal property must be determined by adjusting the acquisition cost of the property by a cost-index factor and reducing the adjusted acquisition cost by an estimate of applicable depreciation. The taxable value so determined shall be deemed to be the indicator of value of replacement cost new less depreciation.

2. In determining taxable value, a county assessor shall use the schedules in the *Personal Property Manual* that show the cost-index factors, the rates of depreciation and the percent good by year. The assessor shall use the schedules by:

(a) Selecting the appropriate expected useful life of the personal property; and

(b) Selecting the appropriate cost-index factor, based on the year of acquisition of the property, and applying it to the acquisition cost of the property.

↳ The result shall be deemed to be the replacement cost new of the property.

3. The assessor shall select the method of applying depreciation to the personal property by either:

- (a) Multiplying the adjusted acquisition cost of the property by the rate of depreciation and subtracting the result from the adjusted acquisition cost; or
 - (b) Multiplying the adjusted acquisition cost of the property by the percent-good factor.
- The result from either approach shall be deemed to be the taxable value of the property.
(Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

NAC 361.1375 Determination of expected life, cost-index factors and depreciation. ([NRS 360.090](#), [360.250](#), [361.227](#))

1. Personal property must be categorized by the specific type of property that it is or by the type of industry in which it is used. Each category must be assigned to a schedule of expected life which is based on commonly available sources of information, including, without limitation, the life expectancy guidelines published by the Marshall and Swift Valuation Service and any other sources published in the *Personal Property Manual*.
 2. The cost-index factors published in the *Personal Property Manual* must be determined by calculating the average change in costs over time. The Department shall identify the sources used to calculate the average change.
 3. For purposes of calculating the amount of applicable depreciation, personal property must be assigned to one of the following expected lives:
 - (a) Three-year life;
 - (b) Five-year life;
 - (c) Seven-year life;
 - (d) Ten-year life;
 - (e) Fifteen-year life;
 - (f) Twenty-year life; or
 - (g) Thirty-year life.
 4. Depreciation must be calculated over the expected life of the personal property by using the declining balance method, except that tables which provide a method other than the declining balance method for calculating depreciation may be used if the tables have been approved by the Commission and included in the *Personal Property Manual*.
 5. For purposes of calculating the rate of depreciation, a residual amount of 5 percent must be used. Percent-good tables using a residual amount other than 5 percent may be adopted by the Commission if the Department has conducted a market study or has otherwise obtained information which indicates that a different residual amount is appropriate for the category in which the personal property is placed pursuant to subsection 1.
- (Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

NAC 361.138 Reported acquisition cost for leased equipment. ([NRS 360.090](#), [360.250](#), [361.227](#)) For leased equipment, the reported acquisition cost is the cost which the user of the property would incur if the equipment were purchased, less any discount customarily allowed by a seller.
(Added to NAC by Tax Comm'n, eff. 10-10-83; A by R034-03, 12-4-2003)

NAC 361.139 Personal property acquired with real property for lump sum; use of other valuation techniques. ([NRS 360.090](#), [360.250](#), [361.227](#))

1. In determining the taxable value of personal property which was acquired with real property for a lump sum, the assessor may refer to appropriate guides which list the cost of equipment to determine the value of the personal property in relation to the value of the real property. In addition, the assessor may estimate the age of the equipment by inspecting it or discussing the approximate value of the equipment with manufacturers, dealers or other persons in the business who have knowledge of the value of the equipment. The serial number, if it exists, may enable a manufacturer to determine the date of manufacture and the original cost.
2. If sufficient data is not otherwise available to establish acquisition cost, or if the assessor determines that a reported acquisition cost is not equal to the fair market value of the property at the time of acquisition plus any costs of transportation and costs of installation, the assessor may use any nationally recognized valuation technique to determine the acquisition cost, including, without limitation:
 - (a) Establishing the current cost of replacement of the property with new property by reference to current manufacturing costs. If the current cost of replacement is known, the assessor shall apply depreciation to that cost to determine the taxable value.

(b) Using a guide which lists the cost or a procedure recognized by businesses which use such equipment to determine the taxable value. Before such a guide or procedure may be used, an assessor must receive approval from the Executive Director.

(c) Using information based on current market data.

3. Upon request, the Division of Local Government Services of the Department will provide information on various guides which may be used to determine original cost.

(Added to NAC by Tax Comm'n, eff. 10-10-83; A 6-29-84; R034-03, 12-4-2003; R068-12, 9-14-2012)

NAC 361.11745 "Trade fixture" defined. ([NRS 360.090](#), [360.250](#)) "Trade fixture" means an item of personal property that:

1. Is installed or attached nonpermanently to real property by an owner or tenant for the purpose of conducting a business or trade and not for the enhancement of the real property to which it is installed or attached; and

2. Has a unique identity and function which is related to the business or trade for which it is installed or attached, and which is distinct from the real property to which it is installed or attached.

(Added to NAC by Tax Comm'n by R068-12, eff. 9-14-2012)

Excerpts from Department of Taxation Letter of Guidance

Letter dated December 2, 2004, responding to County Assessors' Question:

"In determining the proper amount of depreciation to be applied to personal property using the Department's Personal Property Manual, does the year of acquisition refer to a calendar year or a fiscal year?"

Short Answer:

The use of the year of acquisition is dependent on the fiscal year only with regard to the correct selection of the Personal Property Manual to be used. The year of acquisition is otherwise an actual date during a calendar year that indicates the age of the property to be used in the expected life tables.

(Please ask the department for a copy of the letter if you wish to read the entire discussion.)

APPENDIX B

2025-26 PERSONAL PROPERTY MANUAL

Methodology Used to Estimate Cost Indexes

The percent change in each index is measured between the current year and the prior year. The mean of the sum of the changes for each year of the expected life table is calculated and becomes the basis for the cost index to trend acquisition cost to a current replacement cost.

Sources Used to Estimate Cost Indexes

Producer Price Index (PPI)

The Producer Price Index (PPI) is a family of indexes that measures the average change over time in selling prices received by domestic producers of goods and services. PPIs measure price change from the perspective of the seller. This contrasts with other measures, such as the Consumer Price Index (CPI), that measure price change from the purchaser's perspective. Sellers' and purchasers' prices may differ due to government subsidies, sales and excise taxes, and distribution costs.

Data Source

- The PPI sample includes over 16,000 establishments providing approximately 64,000 price quotations per month supplemented with data from other sources for some areas.
- Establishments are selected for the PPI survey via systematic sampling of a list of all firms in the industry.
- Participation by firms is completely voluntary.
- Participating establishments report price data online through a secure website.
- Good and services included in the PPI are weighted by value-of-shipsments data contained in the 2017 economic censuses.
- Industries and products undergo systematic resampling as needed, to account for changing market conditions.

The Producer Price Index series reference has been updated from a Stage of Processing ID code to a Final Demand-Intermediate Demand Goods Index. The conversion may be found in an Index Concordance Table located at <http://www.bls.gov/ppi/fdidconcordance.htm>, which converts SOP3200, Capital equipment, to FD41312, Private capital equipment. The PPI Index using FD41312 may be found at <http://www.bls.gov/ppi/fdidsf16.htm>.

Consumer Price Indexes (CPI)

The consumer price index (CPI) is a measure of the average change over time in the prices paid by urban consumers or households for a market basket of consumer goods and services. The Bureau of Labor Statistics publishes CPIs for two population groups: (1) the CPI for Urban Wage Earners and Clerical Workers (CPI-W), which covers households of wage earners and clerical workers that comprise approximately 29 percent of the total population and (2) the CPI for All Urban Consumers (CPI-U) and the

Chained CPI for All Urban Consumers (C-CPI-U), which cover approximately 93 percent of the total population and include in addition to wage earners and clerical worker households, groups such as professional, managerial, and technical workers, the self-employed, short-term workers, the unemployed, and retirees and others not in the labor force.

The CPI represents all goods and services purchased for consumption by the reference population (CPI-U or CPI-W). BLS has classified all expenditure items into more than 200 categories, arranged into eight major groups. Major groups and examples of categories in each are as follows:

- FOOD and BEVERAGES (breakfast cereal, milk, coffee, chicken, wine, full-service meals and snacks)
- HOUSING (rent of primary residence, owners' equivalent rent, fuel oil, bedroom furniture)
- APPAREL (men's shirts and sweaters, women's dresses, jewelry)
- TRANSPORTATION (new vehicles, airlines fares, gasoline, motor vehicle insurance)
- MEDICAL CARE (prescription drugs and medical supplies, physicians' services, eyeglasses and eye care, hospital services)
- RECREATION (televisions, cable television, pets and pet products, sports equipment, admissions)
- EDUCATION AND COMMUNICATIONS (college tuition, postage, telephone services, computer software and accessories)
- OTHER GOODS AND SERVICES (tobacco and smoking products, haircuts and other personal services, funeral expenses)

Also included within these major groups are various government-charged user fees, such as water and sewerage charges, auto registration fees, and vehicle tolls. The CPI also includes taxes (such as sales and excise taxes) that are directly associated with the prices of specific goods and services. However, the CPI excludes taxes (such as income and Social Security taxes) not directly associated with the purchase of consumer goods and services.

The CPI does not include investment items, such as stocks, bonds, and life insurance. (These items relate to savings and not to day-to-day consumption expenses.)

The Consumer Price Index series ID reference is CUUR0400SA0, CUUS0400SA0 for area West Urban, All Items. The base period is 1982-84 = 100. The data may be found at http://data.bls.gov/pdq/SurveyOutputServlet?data_tool=dropmap&series_id=CUUR0400SA0,CUUS0400SA0.

Marshall Valuation Service

Marshall Valuation Service publishes a national average equipment cost index based on industry type. The Department measures the change in the index for each category of industry from the prior year.

Market Tests

In addition to the sources already cited, the Department conducts market tests to validate the results of applying the cost indices to particular items of personal property. The original cost of a selected sample of personal property items is trended using the proposed cost index conversion factor. The result of this calculation is compared to the actual average resale of the item obtained from various market research sources. The purpose of the market test is to ensure the proposed cost indices do not result in a value which exceeds full cash value. The market tests are also used to establish hypothetical market-based depreciation schedules. The sources of information for the market comparisons include the following:

- **N.A.D.A., The Manufactured Housing Cost Guide**, (Online Version) (J.D. Power) The Guide provides the average retail book value by manufacturer, model, and region of mobile home, with tables for options. Values are provided for homes one to fourteen years of age, and conversion tables for homes older than 14 years.
- **Aircraft Bluebook Price Digest Online**, (Online Version) (Price Digests, Informa Business Media, Inc., Overland Park, KS). The Bluebook provides representative average retail prices of fixed wing aircraft and helicopters.
- **Grounds Maintenance Equipment Blue Book Online**, (Online Version) (Price Digests, Informa Media, Overland Park, KS). The Blue Book provides the estimated average resale or retail price, excluding options of power equipment.
- **Powersport Vehicle Blue Book**, (Online Version) (Price Digests, Informa Business Media, Inc., Overland Park, KS). The Blue Book provides pricing in the powersports industry, including snowmobiles, personal watercraft, trailers, and motorcycles.
- **The Official Tractor Blue Book Online**, (Online Version) (Price Digests, Informa Business Media, Inc., Overland Park, KS). The Blue Book provides the estimated average resale or retail price, excluding options of power equipment.
- **Green Guide for Construction Equipment**, (Online Version) (Equipment Watch, 6151 Powers Ferry Road, Suite 200, Atlanta, GA 30339) The values in this guide are derived from a reporting system of equipment dealers, distributors, manufacturers, auctioneers and contractors. It is based on both surveys and averaging of actual sales. These volumes include Volume 1: Earthmoving Equipment, Volume 2: Lifting Equipment and Volume 3: Other Equipment (Compaction, Concrete and Crushers).
- **Orion Research Corporation**, (Roger Rohrs Publisher) (<http://www.usedprice.com>) The website is the electronic successor to the Orion Blue Book. It determines the used prices of computers and peripherals based on dealer surveys gathered nationwide. Dealers are asked to provide the “asking price,” “Selling price,” and “days to sell.” The used price is then calculated based on what an average store could sell the product for in 30 days or less. Orion Research states that this data is updated on an ongoing basis.

APPENDIX C

2025-26 PERSONAL PROPERTY MANUAL

Methodology Used to Estimate Expected Useful Life

The Department estimates the expected useful life of different types of personal property by surveying a variety of sources. Expected useful life is defined as the amount of time an item of personal property can be expected to last before it wears out, decays, gets used up, becomes obsolete, or loses its value from natural causes. The life is measured from the time the property is first put into service until it is retired from service or permanently withdrawn from use in a trade or business, or when the production of income ceases because the property has been sold, exchanged, converted to personal use, abandoned, or otherwise destroyed.

The Department does not have the resources available to perform its own mortality or actuarial studies. However, there are other sources that do perform this service. The sources itemized below include actuarial studies of the Internal Revenue Service, Marshall and Swift Costing Service, and the California State Board of Equalization. Also included are the surveys of several western states and certain industries.

Sources Used to Estimate Expected Useful Life

Marshall Swift Valuation Service, “Residential Cost Handbook”, (Marshall & Swift, L.P., December 2022) Costs ranges are based on averages created for the US and Canada, and other items listed are based on what is readily available today.

Marshall Swift Valuation Service, “Life Expectancy Guidelines,” (Marshall & Swift, L.P., January 2023)

Depreciable assets are listed by industry group and are extracted from U.S. Treasury Department Internal Revenue Service Publication 534 titled “Depreciation.” The Guidelines list ranges of life. In certain cases, the IRS was not the primary source. In those cases, the range of life is based on a composite of studies of equipment, bookkeeping practices and appraisers’ opinions as compiled from a consensus of recognized trade groups, suppliers and other interested parties. Computers and terminals are one example of an independent study conducted by Marshall & Swift.

Department of the Treasury, Internal Revenue Service, [Publication 946](#), “How to Depreciate Property,” and [Publication 534](#), “Depreciating Property Placed in Service Before 1987.”

These two publications specifically identify types of property and the expected useful life. For instance, an example of five-year property is computers and peripheral equipment.

Arizona:

Arizona Department of Revenue Personal Property Manual

California:

California Assessors' Handbook Section 581, January

California Assessors' Association Economic Life and Minimum Percent Good Table (Section IV)

California Assessors' Association Business Assessment Factors, January

Colorado:

Colorado Department of Local Affairs Personal Property Manual,

Montana:

Montana Department of Revenue Personal Property Depreciation Schedules and Trend Tables

New Mexico:

New Mexico Taxation and Revenue Department Business Personal Property Valuation Guidelines

Oregon:

Oregon Department of Revenue Personal Property Valuation Guidelines

Utah:

Utah State Tax Commission Recommended Personal Property Valuation Schedules and Registered Vehicle Uniform Fees

Washington:

Washington State Department of Revenue Personal Property Manual,

Personal and Industrial Property Valuation Guidelines,

Combined Trended Investment Tables for Personal and Industrial Property (Percent Good Indicators)

Wyoming:

Wyoming Department of Revenue Personal Property Valuation Manual,

Life, Trending, and Depreciation Tables

APPENDIX D

2025-26 PERSONAL PROPERTY MANUAL: VALUATION GUIDELINES

Exemptions from Property Taxes

Article 10, Section 1 of the Nevada Constitution requires the "valuation for taxation of **all** property, real, personal and possessory...." NRS 361.045 also provides that, except as otherwise provided by law, all property of every kind and nature whatever within this state shall be subject to taxation. Other statutes, however, grant exemptions to particular types of property. Some are granted exemption at face-value, and other types of property must qualify according to specific criteria in order to receive the exemption.

The types of exemptions range from partial exemptions granted to veterans, disabled veterans, surviving spouses and blind persons to exemptions from taxation for all real and personal property granted to governmental entities, religious, charitable and non-profit organizations, and individual organizations which are specifically cited. In many cases, the statutes specifically recite that the property must be used to carry out the legitimate function of the organization, and if not, the property becomes taxable.

For the types of exemptions which must go through a qualification process, the county assessors must collect, evaluate and process the various claims for property tax exemptions. Application forms which have been approved by the Nevada Tax Commission should be made available. Each form should request information regarding taxpayer contact information, the type of exemption being claimed, the property which the exemption, if granted, would affect, a statement or statements why the property qualifies for the exemption, and supporting documentation if necessary. The purpose of any form is to provide sufficient information to help assessors make a reasoned determination to approve or deny applications.

In the event a claim for exemption is ambiguous or open to interpretation, how the property is used may indicate whether or not an exemption applies. The general rule espoused by the courts is that strict construction of exemption statutes applies to exemptions for property held in private ownership but not to exemptions for public property where exemption is the rule and taxation the exception. 2 Thomas M. Cooley, *The Law of Taxation*, § 673 at 1414-15 (4th ed. 1924). Said another way, property held in private ownership must strictly comply with all the criteria established for the exemption because "taxation is the rule and exemption the exception." On the other hand, for property held by a public entity, the rule is reversed to say "exemption is the rule and taxation the exception."

The purpose in establishing a broad construction of exemption for public entities is to prevent an escalating spiral of unnecessary taxation and administrative costs with no benefit to the public. 16 Eugene McQuillin, *The Law of Municipal Corporations*, § 44.57 at 206 (3rd ed. 1994). If one governmental entity chooses to tax the property of another governmental entity, the governmental entity forced to pay taxes may have to levy and collect new taxes to meet the demands of the tax. 2 Cooley, *supra*, § 621 at 1313. The effect of such a tax spiral is that the public would be taxing itself to raise money to pay itself.

In cases where it is not clear whether an exemption should be granted, assessors should solicit legal advice from the county district attorney's (D.A.) office.

The attached chart lists the current status of specific exemptions available in the statutes, in alphabetical order.

Table of Exemptions

Legend:					
Due Date for Application:					
(1) No application required					
(2) One time only until status changes. The claim must be made by June 15 th . See <i>NRS 361.155 (1) and (3)</i>					
(3) Annually, by June 15 th . See <i>NRS 361.155 (1)</i>					
(4) Annually, by July 1 st . See <i>NAC 361.062</i>					
(5) Annually, by December 30 th . See <i>NRS 362.050</i>					
Exemption Type	NRS Reference	NAC Reference	Property Type	Due Date for Application See Legend	Explanation
Airport	361.061(1)		Real	(2)	Improvement of land by the public as an airport is a municipal purpose, whether or not the airport is owned or operated by a local government.
American Land Conservancy	361.111		Real	(2)	Real property including improvements is exempt if: the property is held for acquisition by a Federal, state or local government and the said government has agreed in writing to consider acquiring said real property; or if the property will be held indefinitely and vested in the listed conservancy organization. If the property is held for purposes of conservation for any entity other than the State or local government, the land must be assessed as first-class pasture. If the property is transferred for purposes other than conservation, taxes must be collected for each year it was exempt.

Exemption Type	NRS Reference	NAC Reference	Property Type	Due Date for Application See Legend	Explanation
American National Red Cross and Nevada Chapters	361.110		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also YMCA, YWCA, American National Red Cross, Salvation Army Corp, GSA, Camp Fire Girls, BSA, Sierra Arts Foundation, Nevada Museum of Art, Inc.</i>
Apprenticeship Programs	361.106		Both	(2)	Real and personal property of an apprenticeship program is exempt if (1) the property is held in a trust created by 29 U.S.C. § 186 or (2) is owned by a local or state apprenticeship committee and the program is operated by a qualifying organization and registered and approved by the state apprenticeship council.
Archaeological Conservancy	361.111, AB 209 (2007)		Real	(2)	See explanation under American Land Conservancy.
Architectural Barrier Removal for Disabled Persons	361.087		Real	(2)	Improvements to a residence occupied by a person with a disability are exempt. The person must claim the benefit by filing an affidavit setting forth the nature of the improvement and the date of making the improvement. See statute for examples.
Bank Deposits	Article 10		Personal	(1)	Articles of personal property deemed to represent an interest in real or personal property already assessed and taxed is exempt.
Bee Colonies	361.068		Personal	(1)	Bee colonies are exempt personal property.

Blind Persons	361.085		Both	(3)	Property of blind persons up to an assessed value of \$3,000, as modified by CPI, is exempt. The original affidavit of claim must be accompanied by a certificate from a physician certifying the person is blind. Renewal affidavits must be completed each year.
Boats	361.068		Personal	(1)	All boats are exempt.
Bonds	Article 10		Personal	(1)	Articles of personal property deemed to represent an interest in real or personal property already assessed and taxed is exempt.
Book Accounts	Article 10		Personal	(1)	Articles of personal property deemed to represent an interest in real or personal property already assessed and taxed is exempt.
Boulder City Museum and Historical Association	361.110		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also YMCA, YWCA, American National Red Cross, Salvation Army Corp, GSA, Camp Fire Girls, BSA, Sierra Arts Foundation.</i>
Boy Scouts of America	361.11		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also Nevada Museum of Art.</i>
Business Inventories & Consumables	361.068	361.065	Personal	(1)	Property consumed during the operation of the business, as differentiated from a component part of a manufactured item, is exempt. The property must meet the criteria listed in NAC 361.065.
Camp Fire Girls Inc.	361.11		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also Nevada Museum of Art.</i>
Campers, Slide-in & Shells	361.068		Personal	(1)	All slide-in campers and camper shells are exempt.

Carnival, Circus, Convention, Display, Exhibition, Fair	361.068		Personal	(1)	Personal property, transient in nature, owned by a non-resident and located in this state for use by or in a carnival, circus, convention, display, exhibition or fair is exempt. <i>See also transient personal property.</i>
Cost of collection	361.068		Personal	(1)	Personal property for which the annual taxes would be less than the cost of collecting those taxes is exempt. NTC determines level of cost.
Cemeteries and Graveyards - Public	361.130		Real	(1)	Exempt cemeteries and graveyards must be open to the public and no charge is made for burial.
Cemeteries and Graveyards – Private	361.132		Real	(2)	Real property of a nonprofit corporation governed by the provisions of NRS Chapter 82 formed for the purposes of procuring and holding lands to be used exclusively for a cemetery are exempt, so long as the lots or plats remain dedicated to the purpose of a cemetery.
Charitable Foundation: See <i>University</i>	361.098		Both	(2)	All property owned by the charitable foundation established by the Board of Regents of University of Nevada is exempt unless it is used for a purpose other than carrying out the legitimate functions of the foundation.
Charitable Organizations	361.135		Both	(2)	See Lodges
Charitable Corporations	361.140		Both	(2)	Property actually occupied and used by corporation meeting certain qualifying criteria is exempt.
Charter School Leased Property	361.096		Both	(2)	All property leased or rented to a charter school is deemed to be used for an educational purpose and is exempt. Only the portion of the property that is used for the lease or rental to a charter school is exempt.

Churches & Chapels	361.125		Both	(2)	Buildings and personal property used for religious worship other than marriage chapels, is exempt. The property must be owned by a recognized religious society or corporation. If the property is used for other than church purposes and a rent is received, the property is not exempt.
Church Land, see <i>also</i> "Land Used for Worship"	361.125		Real	(2)	Parcels of land used exclusively for worship, including without limitation, both developed and undeveloped portions of a parcel.
Counties, Town, Municipal Corp	361.060		Both	(1)	Property of counties, domestic municipal corporations, irrigation drainage, reclamation district, or town, except for certain community pastures, is exempt. <i>See also Nevada Rural Housing Authority, Irrigation Districts</i>
Conservation District	361.060		Real	(1)	Real property acquired on or after 7-1-2003 by a conservation district is exempt.
Defenders of Wildlife	361.135		Both	(2)	<i>See Lodges for explanation.</i>
Disabled Veterans	361.091		Both	(3)	Up to \$20,000 assessed value of property, adjusted by CPI, may be exempt, based on a sliding scale of disability of the veteran-owner. Only the property of residents or their surviving spouses meeting certain qualifying criteria is eligible for exemption.
Drainage Ditches, Canals & Irrigation Systems	361.070		Real	(1)	Drainage ditches and canals along with the lands included in the right-of-way of the ditch or canal are exempt. Each part of a permanently installed irrigation system, including pipes, concrete linings of ditches and headgates, are exempt.
Elderly & Handicapped Housing	361.086		Real and personal used for housing	(2)	All real property and mobile or modular housing and related facilities for elderly or handicapped persons are exempt if certain qualifying criteria are met.
Eagles Club	361.135		Both	(2)	<i>See Lodges for explanation</i>
Elks Club	361.135		Both	(2)	<i>See Lodges for explanation.</i>

Energy Systems (fka Heating & Cooling Systems)	701A.200 (fka 361.079)	361.052- 361.058	Both	(1)	The value of a qualified system is not included in the assessed value of the building of which it is a part. Qualified systems in commercial or industrial buildings receiving certain other abatements or exemptions are ineligible for this exemption. System must conform to standards established by the Department.
Fine Art for Public Display	361.068; 361.186	361.030 – 361.044	Personal	(3)	The exemption is limited to certain kinds of works of art purchased for \$25,000 or more and meets certain public display requirements. When a taxpayer collects an admission fee, the amount of exemption is reduced by the net revenue received by taxpayer. <i>See NRS and NAC requirements.</i>
Girl Scouts of America	361.11		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also Nevada Museum of Art.</i>
Habitat for Humanity	361.115		Both	(2)	All property is exempt unless it is used for a purpose other than carrying out the legitimate functions of the organization. <i>See also Nevada Children's Foundation, Nevada Heritage Association.</i>
Hospital	361.083		Real	(2)	Property on which stands a hospital or other charitable asylum for the care or relief of orphans or sick, infirm or indigent persons owned by a qualifying non-profit corporation, is exempt. If the property is used for a different purpose, the property is taxable. <i>See also orphan children.</i>
Household Goods and Furniture	361.069	361.085	Personal	(1)	Household goods, furniture except certain appliances and furniture of time-share projects, are exempt. Examples are in both statute and regulation.
Irrigation, Drainage, Reclamation District	361.060		Both	(1)	See Counties, Towns for explanation.
Knights of Pythias	361.135		Both	(2)	<i>See Lodges for explanation.</i>
Knights of Columbus	361.135		Both	(2)	<i>See Lodges for explanation.</i>

Lahontan Audubon Society	361.135		Both	(2)	<i>See Lodges for explanation.</i>
Land Used for Worship	361.125		Real	(2)	<i>See Church Land for explanation.</i>
Livestock	361.068		Personal	(1)	Livestock is exempt. Livestock is defined at NAC 361A.055. See also Article 10 (6).
Lodges & Other Charitable Organizations	361.135		Both	(2)	Funds, furniture, paraphernalia and regalia owned by certain charitable organizations as well as real estate and fixtures are exempt. If the real estate is leased, the exemption does not apply to the portion so leased or rented.
Low Income Housing Projects	361.082	361.089	Both	(3)	That portion of real property and tangible personal property used for housing and related facilities for persons with low incomes is exempt if the property meets certain criteria.
Masons	361.135		Both	(2)	<i>See Lodges for explanation.</i>
Mortgages	Article 10		Personal	(1)	Articles of personal property deemed to represent an interest in real or personal property already assessed and taxed is exempt.
Motor Vehicles	361.067		Personal	(1)	Vehicles defined in NRS 371.020 are exempt, except mobile homes. NRS 371.020 refers to NRS 482 and 706. Under NRS 482.210, special mobile equipment is not licensed and is therefore taxable for property tax.
Nathan Adelson Hospice	361.088		Both	(2)	All property is exempt, unless it is used for any purpose other than carrying out the legitimate functions of hospice care.
National Audubon Society	361.135		Both	(2)	<i>See Lodges for explanation.</i>
Nature Conservancy	361.111		Real	(2)	<i>See explanation under American Land Conservancy.</i>
Nevada Children's Foundation	361.115		Both	(2)	<i>See Habitat for Humanity for explanation.</i>
Nevada Heritage Association	361.115		Both	(2)	<i>See Habitat for Humanity for explanation.</i>
Nevada Land Conservancy	361.111		Real	(2)	<i>See explanation under American Land Conservancy.</i>

Nevada Museum of Art	361.11		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also YMCA, YWCA, American National Red Cross, Salvation Army Corp, GSA, Camp Fire Girls, BSA, Sierra Arts Foundation.</i>
Nevada Rural Housing Authority	361.060		Real	(1)	<i>See explanation under Counties, Cities</i>
Noncommercial Theaters	361.145		Both	(2)	Buildings, furniture & equipment of noncommercial theaters owned and operated by nonprofit educational corporations organized for the exclusive purpose of conducting theater practice classes and the production of plays on a nonprofessional basis are exempt.
Nonprofit Private Schools	361.105		Both	(2)	All property is exempt from taxation.
Odd Fellows	361.135		Both	(2)	<i>See Lodges for explanation.</i>
Orphan Children or Sick, Infirm or Indigent Persons	361.083		Real	(2)	Land and buildings use for the care or relief of orphans or of sick, infirm or indigent persons owned by a nonprofit corporation organized or existing pursuant to NRS 82, is exempt. <i>See also Hospitals.</i>
Patented Mining Claims	362.010-362.095		Real	(5)	Upon receipt of an affidavit from the county recorder pursuant to NRS 362.050, the assessor shall exclude from the roll the assessment against the patented mine or mining claim named in the affidavit.
Pershing County Kids, Horses, Rodeo Inc.	361.107		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization.
Personal Property Held for Sale by Merchant	361.068		Personal	(1)	Personal property held for sale by a merchant is exempt.
Personal Property Held for Sale by Manufacturer	361.068		Personal	(1)	Personal property held for sale by a manufacturer is exempt.

Personal Property in Transit	361.160-361.185	361.062	Personal	(4)	Claims must be submitted to county assessor in which the warehouse is located and a certification from the warehouse as to the status of the property must be attached.
Pipe & Irrigation Equipment	361.068		Personal	(1)	Pipe and other agricultural equipment used to convey water for the irrigation of legal crops is exempt.
Pollution Control Devices	361.077	361.046-361.050	Both	(3)	Property used as a facility, device, or method for the control of air or water pollution is exempt. Taxpayer must supply an annual affidavit to assessor on a form approved by Department. Certain property is not exempt per NAC 361.046.
Possessory Interest – Vending Stands	361.159		Personal	(3)	The possessory interest in otherwise exempt property is taxable, except for vending stands operated by blind persons under the auspices of the Bureau of Services to the Blind – DETR.
Possessory Interest – Public Airport	361.159		Personal	(2)	The possessory interest in otherwise exempt property is taxable, except for personal property owned and used in a public airport.
Possessory Interest – Public Airport, Park, Market, Fairground	361.157(2)(a)		Real	(2)	The possessory interest in otherwise exempt property is taxable, except for real property located upon a public airport, park, market, or fairground. Certain leased property on a public airport made available for purposes other than the purposes of a public airport is taxable.
Possessory Interest – Federal Property	361.157(2)(b)		Real	(1)	A possessory interest in federal property for which PILT payments are made is exempt.
Possessory Interest – State-supported Educational Institution	361.157(2)c		Real	(1)	A possessory interest in the property of any state-supported educational institution is exempt, except any part located within a TIA created pursuant to NRS 278C.155.

Possessory Interest – Taylor Grazing Act, USFS, BuRec	361.157(2)(d)		Real	(1)	A possessory interest in property used by persons, associations or corporations according to the Taylor Grazing Act, United States Forest Service or the Bureau of Reclamation is exempt.
Possessory Interest – Indian Tribe	361.157(2)(e)		Real	(1)	A possessory interest in property of any Indian held in trust by the U.S. is exempt.
Possessory Interest – Vending Stands of the Blind	361.157(2)(f)		Real	(1)	A possessory interest in vending stand locations operated by blind persons under the auspices of the Bureau of Services to the Blind and Visually Impaired – DETR, is exempt.
Possessory Interest – Geothermal Leases	361.157(2)(g)		Real	(1)	A possessory interest in geothermal leases for resources which have not been put into commercial production, is exempt.
Possessory Interest – Public Officer or Employee	361.157(2)(h)		Real	(1)	A possessory interest in property that is leased, loaned or made available to a public officer or employee in the course of public employment, is exempt.
Possessory Interest – Parsonage	361.157(2)(i)		Real	(1)	A possessory interest in a parsonage owned by a recognized religious society or corporation when used exclusively as a parsonage, is exempt.
Possessory Interest – Charitable or Religious Residence	361.157(2)(j)		Real	(1)	A possessory interest in a residence used by a person carrying out the activities of a charitable or religious organization is exempt
Possessory Interest – Shelter for Elderly or Indigent	361.157(2)(k)		Real	(1)	A possessory interest in property which is used to provide shelter at a reduced rate to the elderly or indigent is exempt.
Possessory Interest – Rental of Meeting Rooms	361.157(2)(l)		Real	(1)	A possessory interest in property used as meeting rooms or similar facilities for periods of less than 30 consecutive days is exempt.
Possessory Interest – Daycare	361.157(2)(m)		Real	(1)	A possessory interest in property used as a daycare by a nonprofit organization is exempt.

Promissory Notes	Article 10		Personal	(1)	Articles of personal property deemed to represent an interest in real or personal property already assessed and taxed is exempt.
Privately Owned Airports Used by Public	361.061(2)		Real	(2)	Privately owned airport property used for a public purpose, except areas from which income is derived, is exempt.
Privately Owned Parks Used by Public	361.0605	361.080	Real	(2)	The initial claim for exemption must be accompanied by a copy of the agreement with a local government that the property may be used by the public without charge. A sign must also be posted at each entrance to park. The exemption does not include areas from which income is derived.
Public Function Trusts	361.062		Both	(2)	Property of a trust created for the benefit of any public function pursuant to law is exempt, however, PILT monies may be paid to the beneficiary if so, provided in any agreement contained in creating the trust.
Radioactive Fallout Shelters	361.078		Real	(3)	Residential property is exempt up to \$1,000 in assessed value if it meets certain qualifying conditions.
Raw Materials & Components Consumed in the Process of Manufacture	361.068		Personal	(1)	Raw materials are exempt when they are held by a manufacturer for manufacture into products. Supplies consumed in the process of manufacture are also exempt.
Salvation Army Corps	361.11		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also Nevada Museum of Art.</i>
School Districts	361.065		Both	(1) school dist	All property owned by any legally created school district or charter school and devoted to public school purposes is exempt.
				(2) charter school	

Sierra Arts Foundation	361.11		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also Nevada Museum of Art.</i>
State Lands	361.055		Both	(1)	All property owned by the state, except land assigned to the Department of Wildlife, is exempt. PILT payments are made by the Department of Wildlife.
Stocks	Article 10		Personal	(1)	Articles of personal property deemed to represent an interest in real or personal property already assessed and taxed is exempt.
Surviving Spouse	361.080		Both	(3)	Property of surviving spouses up to an assessed value of \$1,000, as modified by CPI, is exempt. The original affidavit of claim must be accompanied by a death certificate showing the claimant was married to the deceased at the time of their death. Renewal affidavits must be completed each year.
Surviving Spouses of Disabled Veterans	361.091		Both	(3)	See Disabled Veterans.
Transient Personal Property	361.068		Personal	(1)	Personal property owned by a non-resident and located in Nevada for purposes of a display, exhibition, convention, carnival, fair or circus is exempt. <i>See also Carnival, fair circus.</i>
United States	361.050		Both	(1)	All property owned by the United States is exempt.
University Fraternities & Sororities	361.100		Real	(2)	Real property owned by fraternities and sororities whose members are students at UNR or UNLV and use the property as their home, is exempt.
University System: Charitable Foundation	361.098		Both	(2)	All property owned by a charitable foundation established by the Board of Regents of the University of Nevada is exempt, unless it is used for a purpose other than the legitimate functions of the foundation.

University System Leased Property	361.099	361.070	Both	(2)	Property leased to the Nevada System of Higher Education is exempt if the total consideration from the lease is less than 10 percent of the fair market value of the property. Certain documentation must be provided. <i>See NAC 361.070.</i>
Unpatented Mines & mining Claims	361.075		Real	(1)	Unpatented mines and mining claims are exempt, except for possessory interests in lands held by U.S. or state of Nevada.
Vehicles	361.067		Personal	(1)	<i>See Motor Vehicles</i>
Veterans	361.09		Both	(3)	Up to \$2,000 assessed value, adjusted by CPI, of property may be exempt. Only the property of residents meeting certain qualifying criteria is eligible for exemption.
Veteran Organizations	361.095		Both	(2)	Up to \$10,000 assessed value, adjusted by CPI, of Funds, furniture, paraphernalia and regalia owned by certain charitable organizations as well as real estate and fixtures, is exempt. If the real estate is leased, the exemption does not apply to the portion so leased or rented.
Volunteer Fire Departments	361.150		Both	(2)	All property is exempt, unless it is used for any purpose other than carrying out the legitimate functions of a volunteer fire department.
Water Users' Nonprofit Associations	361.073		Both	(2)	All property is exempt, unless it is used for any purpose other than carrying out the legitimate functions of a water users' nonprofit cooperative corporation.
Young Men's Christian Association	361.110		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also Nevada Museum of Art.</i>
Young Women's Christian Association	361.110		Both	(2)	All real and personal property is exempt, unless it is used for a purpose other than the legitimate functions of the organization. <i>See also Nevada Museum of Art.</i>

APPENDIX E

2025-26 PERSONAL PROPERTY MANUAL: VALUATION GUIDELINES

Determining Whether Fixtures are Real or Personal Property

NRS 361.333 requires that each major class of property be examined to determine whether there is equality of assessment. One of the principal classes of property is personal property, pursuant to NRS 361.227(4). Uniformity and equality of assessment thus depend on proper classification. Although NRS 361.035 defines real estate and NRS 361.030 defines personal property, in practice it is sometimes difficult to tell whether an item is personal property or a fixture that is part of the real estate. As the Attorney General stated in Opinion #41 (1963), “the classification depends on the facts of each particular case.” The assessor is encouraged to consult the Division of Local Government Services and/or the District Attorney in difficult cases.

A fixture may be defined as an item that was originally personal property which has been installed or attached to land or an improvement in a permanent manner. There is an abundant amount of case law which discusses three tests often used in deciding whether an item is a fixture. The tests are:

1. Physical Annexation;
2. Constructive Annexation, also called Adaptation; and
3. Intent

Under the first test, annexation, an item is a fixture if it is attached to, imbedded in or permanently resting upon land or an improvement, or is attached by other means that are normally used for permanent installation, and cannot be removed without substantially damaging the item or the land or improvement with which it is being used. For example, an item which is attached to real property for stability and has quick disconnect attachments such as simple wiring and conduit connections may not meet the test for a permanent fixture.

Under the second test, constructive annexation, an item is a fixture if the use or purpose of an item that is not otherwise physically annexed to land or an improvement is so adapted that it is:

- A. A necessary, integral or working part of the land or improvement;
- B. Designed or committed for use with the land or improvement; or
- C. So essential to the land or improvement that the land or improvement cannot perform its desired function without the nonattached item.

Using the constructive annexation test, if the purpose of the item is to augment the use of the improvement no matter how it is attached, such as an elevator, the item must be considered a fixture. Another example would be heating, ventilation, and air conditioning equipment (HVAC). Equipment used to heat, ventilate, or cool a structure is considered to be real property.

Permanently attached personal property may be temporarily removed for repair or renovation onsite and still be considered permanently attached. Permanently attached fixtures do not include movable tangible personal property that is attached for convenience, stability, or an obviously temporary purpose.

Underlying both the physical or constructive annexation tests is a determination of intent. An assessor must consider whether the item is intended to be a permanent part of the land or improvement, taking into account

physical or constructive annexation, and other objective manifestations of permanence. NAC 361.1127 provides examples of objective manifestations of permanence.

A trade fixture may be distinguished from a fixture. It is an item of personal property that is non-permanently attached to real property for the purpose of conducting a business or trade; and has a unique identity and function separate from the real property to which it is attached. NAC 361.11745 provides a definition of trade fixture.

Pursuant to NRS 361.244, a mobile or manufactured home becomes real property when the Assessor has listed it on the tax roll as real property. The classification of mobile and manufactured homes as real property may be made when the requirements enumerated in NRS 361.244(1) and (2) are met. This includes the issuance of a Real Property Notice by the Manufactured Housing Division of the Department of Business and Industry. Factory-built housing becomes real property once it is permanently affixed to the land. These housing units conform to the Uniform Building Code and are not titled. As such they are not personal property nor are they considered “conversions”. These “UBC” homes do not exhibit the HUD placards found on manufactured housing. Instead, they may have a placard referencing NRS 461.080 and their serial numbers may begin with the characters “UBC”.

In general, personal property is defined by exception pursuant to NRS 361.030. Property that does not meet the criteria of real property is personal property. To assist in making the determination on real and personal property, which occurs on a case-by-case basis, the six-factor Whiteco test, in which the following questions were developed in helping determine if property was/is considered tangible personal property or real property. The six questions are:

1. Is the property capable of being moved, and has it in fact been moved?
2. Is the property designed or constructed to remain permanently in place?
3. Are there circumstances which tend to show the expected or intended length of affixation — that is, are there circumstances which show that the property may or will have to be moved?
4. How substantial a job is removal of the property and how time consuming is it? Is it “readily removable”?
5. How much damage will the property sustain upon its removal?
6. What is the manner of affixation of the property to the land? Can it be removed without causing damage?

The Assessor should recognize that certain fixtures such as bars, stages, walk-in coolers, or bank drive-ups, may already be included in the real property component of the Assessor’s Taxable Value. The Assessor should review the differing building occupancies of the Marshall-Swift cost manuals to ensure that a component of real or personal property is not double-assessed. The improper classification of any component of taxable property as real or personal does not render the valuation void or invalid.

For further research and explanation, please consult:

Attorney General Opinion 2012-10 (10-31-2012) (as it applies to fixtures, not to trade fixtures)

Attorney General Opinion #41 (1963)

Attorney General Opinion No. 2000-04

Marvin Arnold, Respondent, v. Goldfield Third Chance Mining Co, 32 Nev. 447; 109 P. 718 (1910)

National Advertising Co. v. State Department of Transportation, 116 Nev. Adv. Op. No. 10, (Feb. 2, 2000)

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APPENDIX F

2025- 26 PERSONAL PROPERTY MANUAL: VALUATION GUIDELINES

UTILITY SCALE PHOTOVOLTAIC SOLAR FARM 30 YEAR LIFE 200% DECLINING BALANCE

NAC 361.1375 requires that each category of property must be assigned to a schedule of expected life which is based on commonly available sources of information, including, without limitation, the life expectancy guidelines published in Marshal and Swift Valuation Service and any other sources published in the Personal Property Manual.

NAC 361.1375(4) allows that Depreciation must be calculated over the expected life of the personal property by using the declining balance method, except that tables which provide a method other than the declining balance method for calculating depreciation may be used if the tables have been approved by the Commission.

Utility Scale Solar Farms have provided for a unique study in depreciation. There has been rapid de-appreciation of the cost to construct and build solar farms. With this the normal cost indexes which generally account for an appreciating market to bring prior years costs current have proven insufficient in determining a current acquisition cost to be depreciated. The below proposed table is made in accordance with subsection 4 of NAC 361.1375. A market study was conducted to produce a depreciation table to better reflect and ensure that taxable value of such structures do not exceed full cash value according to NRS 361.227.

This table would only be applicable to Utility Scale Solar Farms that are classified as personal property. That classification is made on a case by case basis with the assistance of the guidance provided in Appendix E. Cost Indexes are currently only provided back to 2007 as that is availability of data but will be updated in future years.

UTILITY SCALE PHOTOVOLTAIC SOLAR FARM 30 YEAR LIFE 200% DECLINING BALANCE

YEAR ACQUIRED	AGE	PROPOSED COST INDEX	PERCENT DEPRECIATION	PERCENT GOOD	PROPOSED CONVERSION FACTOR
2025	0	1.00	0.0	100.0	1.0000
2024	1	0.93	7.0	93.0	0.8649
2023	2	0.87	13.0	87.0	0.7569
2022	3	0.81	19.0	81.0	0.6561
2021	4	0.76	24.0	76.0	0.5776
2020	5	0.70	29.0	71.0	0.4970
2019	6	0.64	34.0	66.0	0.4224
2018	7	0.57	38.0	62.0	0.3534
2017	8	0.51	42.0	58.0	0.2958
2016	9	0.45	46.0	54.0	0.2430
2015	10	0.40	50.0	50.0	0.2000
2014	11	0.35	53.0	47.0	0.1645
2013	12	0.30	56.0	44.0	0.1320
2012	13	0.25	59.0	41.0	0.1025
2011	14	0.21	62.0	38.0	0.0798
2010	15	0.17	64.0	36.0	0.0612
2009	16	0.13	67.0	33.0	0.0429
2008	17	0.10	69.0	31.0	0.0310
2007	18	0.06	71.0	29.0	0.0174
2006	19		73.0	27.0	
2005	20		75.0	25.0	
2004	21		77.0	23.0	
2003	22		79.0	21.0	
2002	23		81.0	19.0	
2001	24		83.0	17.0	
2000	25		85.0	15.0	
1999	26		87.0	13.0	
1998	27		89.0	11.0	
1997	28		91.0	9.0	
1996	29		93.0	7.0	
1995	30		95.0	5.0	
Residual			95.0	5.0	

Used 2022-2023 data from Berkley Labs.

30 years of solar data unavailable.

Currently, solar data only goes back to 2007.

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25/26 # 224631

Description	Year Acq	Acquisition Cost	Cost Index per pp Manual	RCN	% Good per PP Manual	Taxable Value (RCNLD)	Assessment Rate	Assessed Value	Tax Rate	Gross Taxes
Solar system	2021	438,245,207	0.76	333,066,357	76	253,130,432	0.35000000	88,595,651	2.6097	2,312,080.71
BESS	2021	81,834,086	0.76	62,193,905	76	47,267,368	0.35000000	16,543,579	2.6097	431,737.78
BESS Software	2021	11,159,193	0.76	8,480,987	76	6,445,550	0.35000000	2,255,942	2.6097	58,873.33

Account Totals	531,238,486	403,741,249	306,843,350	107,395,172	2,802,691.81
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Less RETA	55%
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Net Taxes Due	1,261,211.32
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Additional NRS & NAC

NRS 361.227 Determination of taxable value.

1. Any person determining the taxable value of real property shall appraise:
 - (a) The full cash value of:
 - (1) Vacant land by considering the uses to which it may lawfully be put, any legal or physical restrictions upon those uses, the character of the terrain, and the uses of other land in the vicinity.
 - (2) Improved land consistently with the use to which the improvements are being put.
 - (b) Any improvements made on the land by subtracting from the cost of replacement of the improvements all applicable depreciation and obsolescence. Depreciation of an improvement made on real property must be calculated at 1.5 percent of the cost of replacement for each year of adjusted actual age of the improvement, up to a maximum of 50 years.
 2. The unit of appraisal must be a single parcel unless:
 - (a) The location of the improvements causes two or more parcels to function as a single parcel;
 - (b) The parcel is one of a group of contiguous parcels which qualifies for valuation as a subdivision pursuant to the regulations of the Nevada Tax Commission; or
 - (c) In the professional judgment of the person determining the taxable value, the parcel is one of a group of parcels which should be valued as a collective unit.
 3. The taxable value of a leasehold interest, possessory interest, beneficial interest or beneficial use for the purpose of [NRS 361.157](#) or [361.159](#) must be determined in the same manner as the taxable value of the property would otherwise be determined if the lessee or user of the property was the owner of the property and it was not exempt from taxation, except that the taxable value so determined must be reduced by a percentage of the taxable value that is equal to the:
 - (a) Percentage of the property that is not actually leased by the lessee or used by the user during the fiscal year; and
 - (b) Percentage of time that the property is not actually leased by the lessee or used by the user during the fiscal year, which must be determined in accordance with [NRS 361.2275](#).
 4. The taxable value of other taxable personal property, except a mobile or manufactured home, must be determined by subtracting from the cost of replacement of the property all applicable depreciation and obsolescence. Depreciation of a billboard must be calculated at 1.5 percent of the cost of replacement for each year after the year of acquisition of the billboard, up to a maximum of 50 years.
 5. The computed taxable value of any property must not exceed its full cash value. Each person determining the taxable value of property shall reduce it if necessary to comply with this requirement. A person determining whether taxable value exceeds that full cash value or whether obsolescence is a factor in valuation may consider:
 - (a) Comparative sales, based on prices actually paid in market transactions.
 - (b) A summation of the estimated full cash value of the land and contributory value of the improvements.
 - (c) Capitalization of the fair economic income expectancy or fair economic rent, or an analysis of the discounted cash flow.
- È A county assessor is required to make the reduction prescribed in this subsection if the owner calls to his or her attention the facts warranting it, if the county assessor discovers those facts during physical reappraisal of the property or if the county assessor is otherwise aware of those facts.
6. The Nevada Tax Commission shall, by regulation, establish:
 - (a) Standards for determining the cost of replacement of improvements of various kinds.
 - (b) Standards for determining the cost of replacement of personal property of various kinds. The standards must include a separate index of factors for application to the acquisition cost of a billboard to determine its replacement cost.
 - (c) Schedules of depreciation for personal property based on its estimated life.
 - (d) Criteria for the valuation of two or more parcels as a subdivision.
 7. In determining, for the purpose of computing taxable value, the cost of replacement of:
 - (a) Any personal property, the cost of all improvements of the personal property, including any additions to or renovations of the personal property, but excluding routine maintenance and repairs, must be added to the cost of acquisition of the personal property.
 - (b) An improvement made on land, a county assessor may use any final representations of the improvement prepared by the architect or builder of the improvement, including, without limitation, any final building plans,

drawings, sketches and surveys, and any specifications included in such representations, as a basis for establishing any relevant measurements of size or quantity.

8. The county assessor shall, upon the request of the owner, furnish within 15 days to the owner a copy of the most recent appraisal of the property, including, without limitation, copies of any sales data, materials presented on appeal to the county board of equalization or State Board of Equalization and other materials used to determine or defend the taxable value of the property.

9. The provisions of this section do not apply to property which is assessed pursuant to [NRS 361.320](#).

(Added to NRS by [1965, 1445](#); A [1969, 1451](#); [1975, 65, 1656](#); [1977, 1318](#); [1979, 79](#); [1981, 788, 789](#); [1983, 1047, 1884, 1885](#); [1987, 2075](#); [1989, 668, 1818](#); [1993, 2312](#); [1997, 1111](#); [1999, 1029](#); [2001, 842](#); [2003, 2758](#); [2009, 1216](#); [2013, 3116](#))

NRS 361.345 Power of county board of equalization to change valuation of property; review of changes in valuation and estimation of certain property by county assessor; notice of addition to assessed valuation.

1. Except as otherwise provided in subsection 2, the county board of equalization may:

(a) Determine the valuation of any real or personal property placed on:

(1) The secured tax roll which was assessed by the county assessor; or

(2) The unsecured tax roll which was assessed by the county assessor on or after May 1 and on or before December 15; and

(b) Change and correct any valuation found to be incorrect either by adding thereto or by deducting therefrom such sum as is necessary to make it conform to the taxable value of the property assessed, whether that valuation was fixed by the owner or the county assessor. The county board of equalization may not reduce the assessment of the county assessor unless it is established by a preponderance of the evidence that the valuation established by the county assessor exceeds the full cash value of the property or is inequitable. A change so made is effective only for the fiscal year for which the assessment was made. The county assessor shall each year review all such changes made for the previous fiscal year and maintain or remove each change as circumstances warrant.

2. If a person complaining of the assessment of his or her property:

(a) Has refused or, without good cause, has neglected to give the county assessor the person's list under oath, as required by [NRS 361.265](#); or

(b) Has, without good cause, refused entry to the assessor for the purpose of conducting the physical examination required by [NRS 361.260](#),

the county assessor shall make a reasonable estimate of the property and assess it accordingly. No reduction may be made by the county board of equalization from the assessment of the county assessor made pursuant to this subsection.

3. If the county board of equalization finds it necessary to add to the assessed valuation of any property on the assessment roll, it shall direct the clerk to give notice to the person so interested by registered or certified letter, or by personal service, naming the day when it will act on the matter and allowing a reasonable time for the interested person to appear.

[Part 18:344:1953; A [1954, 29](#)](NRS A [1969, 95](#); [1981, 796](#); [1985, 1435](#); [1991, 2097](#); [1997, 1576](#); [2003, 2764](#); [2005, 2657](#); [2009, 1219](#))

NRS 361.360 Appeals to State Board of Equalization.

1. Any taxpayer aggrieved at the action of the county board of equalization in equalizing, or failing to equalize, the value of his or her property, or property of others, or a county assessor, may file an appeal with the State Board of Equalization on or before March 10 and present to the State Board of Equalization the matters complained of at one of its sessions. If March 10 falls on a Saturday, Sunday or legal holiday, the appeal may be filed on the next business day.

2. All such appeals must be presented upon the same facts and evidence as were submitted to the county board of equalization in the first instance, unless there is discovered new evidence pertaining to the matter which could not, by due diligence, have been discovered before the final adjournment of the county board of equalization. The new evidence must be submitted in writing to the State Board of Equalization and served upon the county assessor not less than 7 days before the hearing.

3. Any taxpayer whose real or personal property placed on the unsecured tax roll was assessed after December 15 but before or on the following April 30 may likewise protest to the State Board of Equalization. Every such appeal must be filed on or before May 15. If May 15 falls on a Saturday, Sunday or legal holiday, the appeal may be filed on the next business day. A meeting must be held before May 31 to hear those protests that in the opinion of the State Board of Equalization may have a substantial effect on tax revenues. One or more meetings may be held at any time and place in the State before November 1 to hear all other protests.

4. The State Board of Equalization may not reduce the assessment of the county assessor if:

(a) The appeal involves an assessment on property which the taxpayer has refused or, without good cause, has neglected to include in the list required of the taxpayer pursuant to [NRS 361.265](#) or if the taxpayer has refused or, without good cause, has neglected to provide the list to the county assessor; or

(b) The taxpayer has, without good cause, refused entry to the assessor for the purpose of conducting the physical examination authorized by [NRS 361.260](#).

5. Any change made in an assessment appealed to the State Board of Equalization is effective only for the fiscal year for which the assessment was made. The county assessor shall review each such change and maintain or remove the change as circumstances warrant for the next fiscal year.

6. If the State Board of Equalization determines that the record of a case on appeal from the county board of equalization is inadequate because of an act or omission of the county assessor, the district attorney or the county board of equalization, the State Board of Equalization may remand the case to the county board of equalization with directions to develop an adequate record within 30 days after the remand. The directions must indicate specifically the inadequacies to be remedied. If the State Board of Equalization determines that the record returned from the county board of equalization after remand is still inadequate, the State Board of Equalization may hold a hearing anew on the appellant's complaint or it may, if necessary, contract with an appropriate person to hear the matter, develop an adequate record in the case and submit recommendations to the State Board. The cost of the contract and all costs, including attorney's fees, to the State or the appellant necessary to remedy the inadequate record on appeal are a charge against the county.

[Part 20:344:1953]—(NRS A [1971, 507](#); [1975, 1665](#); [1981, 798](#); [1983, 685](#), [1902](#); [1985, 894](#), [1436](#); [1993, 95](#); [1997, 1577](#); [2003, 2766](#); [2007, 1884](#); [2011, 1876](#))

NRS 361.767 Assessment of personal property that was not assessed or was underassessed.

1. If the county assessor determines that certain personal property was not assessed, the assessor may assess the property based upon its taxable value in the year in which it was not assessed.

2. If the county assessor determines that certain personal property was underassessed because it was incorrectly reported by the owner, the assessor may assess the property based upon its taxable value in the year in which it was underassessed. He or she may then send an additional tax bill for an amount which represents the difference between the reported value and the taxable value for each year.

3. The assessments provided for in subsections 1 and 2 may be made at any time within 3 years after the end of the fiscal year in which the taxes would have been due. The tax bill must specify the fiscal year for which the tax is due and the applicable rate and whether it is for property which was not assessed or for property which was underassessed.

4. If property is not assessed or is underassessed because the owner submitted an incorrect written statement or failed to submit a written statement required pursuant to subsection 1 of [NRS 361.265](#), there must be added to the taxes due a penalty in the amount of 20 percent of the tax for each year the property was not assessed or was underassessed. The county assessor may waive this penalty if he or she finds extenuating circumstances sufficient to justify the waiver.

(Added to NRS by [1987, 530](#); A [1999, 2774](#))

NRS 701A.370 Duration, amount and other terms of partial abatement; notice of abatement; distribution of certificate of eligibility by Director. [Effective through June 30, 2049.]

1. If the Director approves an application for a partial abatement pursuant to [NRS 701A.300](#) to [701A.390](#), inclusive, of:

(a) Property taxes imposed pursuant to [chapter 361](#) of NRS, the partial abatement must:

(1) Be for a duration of the 20 fiscal years immediately following the date of approval of the application;

(2) Be equal to 55 percent of the taxes on real and personal property payable by the facility each year; and
 (3) Not apply during any period in which the facility is receiving another abatement or exemption from property taxes imposed pursuant to [chapter 361](#) of NRS, other than any partial abatement provided pursuant to [NRS 361.4722](#).

(b) Local sales and use taxes:

(1) The partial abatement must:

(I) Be for the 3 years beginning on the date of approval of the application;
 (II) Be equal to that portion of the combined rate of all the local sales and use taxes payable by the facility each year which exceeds 0.6 percent; and
 (III) Not apply during any period in which the facility is receiving another abatement or exemption from local sales and use taxes.

(2) The Department of Taxation shall issue to the facility a document certifying the abatement which can be presented to retailers at the time of sale. The document must clearly state that the purchaser is only required to pay sales and use taxes imposed in this State at the rate of 2.6 percent.

2. Upon approving an application for a partial abatement pursuant to [NRS 701A.300](#) to [701A.390](#), inclusive, the Director shall immediately forward a certificate of eligibility for the abatement to:

- (a) The Department of Taxation;
- (b) The board of county commissioners;
- (c) The county assessor;
- (d) The county treasurer; and
- (e) The Office of Economic Development.

(Added to NRS by [2009, 2004, 2010](#); A [2009, 2010](#); [2011, 2073, 2896, 3481](#); [2013, 3427](#); [2015, 2955](#))

NAC 361.1117 “Cost of replacement” defined. ([NRS 360.090, 360.250](#)) “Cost of replacement” means the total cost of construction required to replace an improvement with a substitute of like or equal utility using current standards of materials and design, including the cost of any pertinent labor, materials, supervision, contractors’ profit and overhead, architects’ plans and specifications, sales taxes and insurance.

(Added to NAC by Tax Comm’n by R039-10, 8-13-2010, eff. 7-1-2012)

NAC 361.11745 “Trade fixture” defined. ([NRS 360.090, 360.250](#)) “Trade fixture” means an item of personal property that:

1. Is installed or attached nonpermanently to real property by an owner or tenant for the purpose of conducting a business or trade and not for the enhancement of the real property to which it is installed or attached; and
2. Has a unique identity and function which is related to the business or trade for which it is installed or attached and which is distinct from the real property to which it is installed or attached.

(Added to NAC by Tax Comm’n by R068-12, eff. 9-14-2012)

NAC 361.1351 “Acquisition cost” and “original cost” defined. ([NRS 360.090, 360.250, 361.227](#))

“Acquisition cost” or “original cost” means the actual cost of property to its present owner, including, without limitation, the costs of transportation and the costs of installation.

(Added to NAC by Tax Comm’n by R034-03, eff. 12-4-2003)

NAC 361.1371 Procedure for determination of taxable value. ([NRS 360.090, 360.250, 361.227](#))

1. The taxable value of personal property must be determined by adjusting the acquisition cost of the property by a cost-index factor and reducing the adjusted acquisition cost by an estimate of applicable depreciation. The taxable value so determined shall be deemed to be the indicator of value of replacement cost new less depreciation.

2. In determining taxable value, a county assessor shall use the schedules in the *Personal Property Manual* that show the cost-index factors, the rates of depreciation and the percent good by year. The assessor shall use the schedules by:

- (a) Selecting the appropriate expected useful life of the personal property; and
- (b) Selecting the appropriate cost-index factor, based on the year of acquisition of the property, and applying it to the acquisition cost of the property.

Ê The result shall be deemed to be the replacement cost new of the property.

3. The assessor shall select the method of applying depreciation to the personal property by either:
 - (a) Multiplying the adjusted acquisition cost of the property by the rate of depreciation and subtracting the result from the adjusted acquisition cost; or
 - (b) Multiplying the adjusted acquisition cost of the property by the percent-good factor.
- Ê The result from either approach shall be deemed to be the taxable value of the property.
(Added to NAC by Tax Comm'n by R034-03, eff. 12-4-2003)

Cost Approach

The cost approach may be used to develop an opinion of market value (or some other type of value that an appraisal assignment may require such as use value or fair value) of proposed construction, special-purpose or specialty properties, and other properties that are not frequently exchanged in the market. Buyers of these properties often measure the price they will pay for an existing building against the cost to build less depreciation or against the cost to purchase an existing structure and make any necessary modifications. If sale and rental data for comparable properties is not available, current market indications of the depreciated cost of an existing building [or property] would be the best reflections of market thinking and, thus, of market value.

The Appraisal of Real Estate, Fifteenth Edition, pg. 530, Appraisal Institute, 2020

Whiteco Industries, Inc. v. Commissioner, 65 T.C. 664 (1975)

Dec. 31, 1975 · United States Tax Court · Docket Nos. 3918-73, 3919-73, 7188-74

65 T.C. 664

Whiteco Industries, Inc., et al., 1 Petitioners v. Commissioner of Internal Revenue, Respondent

*John S. Pennell, Don S. Harnack, and George W. Benson, for the petitioners.
Harmon B. Dow, for the respondent.*

1

Cases of the following petitioners are consolidated herewith: Whiteco Industries, Inc., and Subsidiaries, docket Nos. 3919-73 and 7188-74.

*670 OPINION

We must decide whether the petitioner's outdoor advertising signs may qualify for the investment credit of section 38.

Property can qualify for the investment credit only if it constitutes "section 38 property." Such term is defined in section 48(a)(1), which provides in relevant part:

(a) Section 38 Property.—

(1) In GENERAL. — * * * the term "section 38 property" means—

(A) tangible personal property, or

(B) other tangible property (not including a building and its structural components) but only if such property—

(i) is used as an integral part of manufacturing, production, or extraction or of furnishing transportation, communications, electrical energy, gas, water, or sewage disposal services, * * *

The petitioner argues that the outdoor advertising signs qualify for the investment credit either as "tangible personal property" within the meaning of section 48(a)(1)(A) or as "other tangible property" within the meaning of section 48(a)(1)(B). We hold that the signs constitute "tangible personal property." In light of our holding, we do not address the petitioner's alternative contention.

Although this Court has not ruled on the type of property in issue herein, the Court of Claims recently held, in two companion cases, *Alabama Displays, Inc. v. United States*, [507 F. 2d 844](#) (1974), and *National Advertising Co. v. United States*, [507 F. 2d 850](#) (1974), that outdoor advertising signs, indistinguishable from the ones before us, constitute tangible personal property. We believe the result reached by the Court of Claims is sound, and for the reasons set forth hereinafter, we reach the same result.

The statute contains no definition of the term "tangible personal property," but committee reports relating to the enactment of the investment credit do contain many

statements which are helpful in understanding the types of property intended to be included within the term. The Income Tax Regulations also contain many relevant guidelines. The technical explanations at ^{*671}attached to the House and Senate committee reports provide that the term “tangible personal property” for purposes of section 48:

includes any tangible property except land, and improvements thereto, such as buildings or other inherently permanent structures thereon (including items which are structural components of such buildings or structures). * * * [H. Rept. No. 1447, 87th Cong., 2d Sess. (1962), 1962-3 C.B. 405, 515-516; S. Rept. No. 1881, 87th Cong., 2d Sess. (1962), 1962-3 C.B. 707, 858.]

Thus, all tangible property constitutes tangible personal property unless it is excluded because it is land or an improvement thereto. A building is given as an example of an improvement, but the common characteristic which is attributed to improvements is that they are “inherently permanent structures.” Section 1.48-1(c), Income Tax Regs., adopts the same definition of tangible personal property as that given in the technical explanations to the committee reports, and the regulations characterize improvements as “inherently permanent structures.”³ Accordingly, as both parties recognize, resolution of the issue before us turns on whether the petitioner’s outdoor advertising signs are “inherently permanent structures.”

The term “inherently permanent structure” does not describe a clearly recognizable or defined class of property. The committee report also states: “Tangible personal property is not intended to be defined narrowly here, nor to necessarily follow the rules of State law.” H. Rept. No. 1447, *supra*, 1962-3 C.B. at 415. Thus, although under State law, fixation to the land is a basis for distinguishing personal property from other property, such basis is not to be relied upon for purposes of deciding what property may qualify for the investment credit. Such a rule is illustrated by the following statement in the committee report:

Assets accessory to the operation of a business, such as machinery, printing presses, transportation or office equipment, refrigerators, individual air-conditioning units, grocery counters, testing equipment, display racks and shelves, etc., generally constitute tangible personal property for purposes of section 48, *even though such assets may be termed fixtures under local law.* *** [S. Rept. No. 1881, *supra*, 1962-3 C.B. at 858; emphasis supplied.]

See also H. Rept. No. 1447, *supra*, 1962-3 C.B. at 516.

^{*672}In line with such legislative history and regulations, the decided cases have held that affixation to land does not per se exclude the property from the category of tangible personal property. See *Kenneth D. LaCroix*, 61 T.C. 471, 488 (1974); *Estate of Shirley Morgan*, 52 T.C. 478, 483 (1969), *affd. per curiam* 448 F. 2d 1397 (9th Cir. 1971). In deciding whether property is to be classified as tangible personal property for purposes of the investment credit, the courts have developed several questions to be considered:

(1) Is the property capable of being moved, and has it in fact been moved? *Alabama Displays, Inc. v. United States*, 507 F. 2d. at 849; *Joseph Henry Moore*, [58 T.C. 1045](#), 1052 (1972), *affd. per curiam* [489 F. 2d 285](#) (5th Cir. 1973). The evidence clearly shows that the petitioner's signs are capable of being moved and have in fact been moved.

(2) Is the property designed or constructed to remain permanently in place? *Joseph B. Weirick*, [62 T.C. 446](#), 451 (1974); *C. C. Everhart*, [61 T.C. 328](#), 330 (1973); *Beverly R. Roberts*, [60 T.C. 861](#), 866 (1973). The evidence in this case indicates that the petitioner's signs are not designed or constructed to last permanently. They are designed or constructed to last for the term of a contract between the petitioner and one of its advertisers. On the average, the term of a contract will last only 5 years. At the end of such period, the sign structure requires substantial renovation. A new sign face must be attached, some stringers must be replaced, and poles are either replaced or straightened and recemented.

(3) Are there circumstances which tend to show the expected or intended length of affixation, i.e., are there circumstances which show that the property may or will have to be moved? *Alabama Displays, Inc. v. United States*, *supra*; *Kenneth D. LaCroix*, [61 T.C. at 487](#). The petitioner does not intend, nor could it realistically expect, the signs to remain permanently in place. The petitioner realizes that in numerous situations it may have to move its signs at the expiration of a contract with an advertiser, or prior thereto. The signs may have to be moved because the owner of the leased land does not renew the lease or exercises his option to develop his land, or because there is a change in the location of the road or the occurrence of some other condition which makes the position of the sign no longer desirable. The Court of Claims placed great emphasis upon such ⁶⁷³facts to demonstrate the inherently temporary nature of the affixation of the signs therein. *Alabama Displays, Inc. v. United States*, 507 F. 2d at 845; *National Advertising Co. v. United States*, 507 F. 2d at 851-852. Such court also used such facts to distinguish the signs therein from the pilings which were used to secure a floating dock and which we found were not tangible personal property. *Estate of Shirley Morgan*, *supra*.

(4) How substantial a job is removal of the property and how time-consuming is it? Is it "readily removable"? *Estate of Shirley Morgan*, [52 T.C. at 483](#). The disassembly and removal of a sign is a relatively quick and easy process. Although specific figures were not supplied for the time necessary to remove the sign face and the stringers, it appears that the process may be accomplished quickly, using merely a hammer and a sledge hammer or an ax. Removal of the poles for a 40-foot sign takes only an hour or an hour and a half.

(5) How much damage will the property sustain upon its removal? *King Radio Corp. v. United States*, [486 F. 2d 1091](#), 1096 (10th Cir. 1973). Much of the sign assembly is not damaged when it is moved. The only necessary wastage is that portion of the poles surrounded by concrete, but the remaining portions of the poles are used for other signs. If the sign is moved upon the expiration of a contract with an advertiser, the sign face is also replaced.

(6) What is the manner of affixation of the property to the land? *Joseph B. Weirick, supra*; *C. C. Everhart, supra*; *Beverly R. Roberts, supra*. The poles on which the petitioner's signs are mounted are placed in the ground and surrounded by concrete; yet, such poles can easily be removed from the ground, and as a matter of practice, they are so removed.

In our judgment, the application of these criteria to the facts of this case leads to the conclusion that the outdoor advertising signs of the petitioner were not inherently permanent. They were not expected to last indefinitely; inevitably, they would have to be moved in a relatively short time; and they could be removed easily. Such signs are manifestly less permanent in nature than other properties which the courts have found to be tangible personal property for purposes of the investment credit: *King Radio Corp. v. United States, supra*; *Minot Federal Savings & Loan Assn. v. United States*, [435 F.2d 1368](#) (8th Cir. 1970) (movable partition system fastened to the floor and ceiling by ^{*674}screws or masonry nails); *Marineland of the Pacific, Inc.*, [T.C. Memo. 1975-288](#) (338-foot sky tower); *Joseph B. Weirick*, [62 T.C. 446](#) (1974) (holddown towers for a ski lift and its cable support as well as wooden passenger ramps); *Joseph Henry Moore*, [58 T.C. 1045](#) (1972) (mobile homes placed on concrete blocks); *Estate of Shirley Morgan*, [52 T.C. 478](#) (1969) (a floating dock held down by pilings). Moreover, the Income Tax Regulations specifically provide that "neon and other signs, which * * * [are] contained in or attached to a building" are tangible personal property for purposes of the credit allowed by section 38. Sec. 1.48-l(c), Income Tax Regs. Certainly, such signs may be constructed, designed, and affixed in a much more permanent fashion than the signs of the petitioner.

In deciding what property qualifies for the investment credit as tangible personal property, some very subtle distinctions have been suggested. It is difficult to reconcile the position maintained by the Commissioner in this case with his own rulings. He has allowed property, far more inherently permanent than the petitioner's signs, to qualify: Rev. Rul. 74-602, 1974-[2 C.B. 12](#) (gasoline storage tanks of approximately 8,000-gallon capacity (located usually below ground but some above ground and not generally moved during useful life) and associated piping in a retail gasoline station); Rev. Rul. 71-104, 1971-[1 C.B. 5](#) (burner and 14-story preheater structure for cement kiln facility); Rev. Rul. 70-236, 1970-[1 C.B. 8](#) (liquified petroleum gas equipment); Rev. Rul. 70-160, 1970-[1 C.B. 7](#) (boiler facility to produce steam used in the manufacture of furniture); Rev. Rul. 70-103, 1970-[1 C.B. 6](#) (a diesel generator, fuel tanks, exhaust equipment, a chlorinator, vault doors with combination locks, dehumidifiers, pumps, space heaters, safety doors, and louvers); Rev. Rul. 69-602, 1969-[2 C.B. 6](#) (propane gas storage tanks and water heaters installed on customers' premises); Rev. Rul. 69-557, 1969-[2 C.B. 3](#) (dry kiln structures to remove moisture from wood); Rev. Rul. 67-349, 1967-[2 C.B. 48](#) (wall-to-wall carpeting installed in guest rooms, office space, bar areas, and dining rooms of a motel); and Rev. Rul. 65-79, 1965-[1 C.B. 26](#) (bank vault doors, night depository facilities, walk-up and drive-up teller's windows). As a court, we must be guided by rational principles in making our decisions, and if those items of property are to be treated as tangible personal property, we see no rational basis for disqualifying the petitioner's outdoor advertising signs.

^{*675}The Commissioner argues that the petitioner's signs cannot qualify as tangible personal property, in any event, because the House committee report specifically excludes such outdoor advertising signs. The passage on which he relies is:

In order to qualify for the credit, property (other than tangible personal property and research or storage facilities used in the specified activities) must be used as an integral part of one or more of the specified activities. Thus, for example, section 38 property would ordinarily not include such assets as pavements, parking areas, *advertising displays*, outdoor lighting facilities, or swimming pools which, although used as a part of the overall business operation, are not used directly in the specified activities. * * * [H. Rept. No. 1447, *supra*, 1962-3 C.B. at 517; emphasis supplied.]

This same argument was rejected by the Court of Claims in *Alabama Displays, Inc. v. United States*, [507 F. 2d 844](#) (1974). We also believe the argument is misplaced and therefore reject it.

There- are a number of reasons for rejecting the Commissioner's argument. In the first place, it is not clear as to what is meant by the term "advertising displays." There is some indication that the term may have been used to refer to show windows. A spokesman for the American Retail Federation appeared before the Senate Finance Committee and urged the committee to allow the investment credit with respect to a retailer's show windows, and it may have been those show windows to which the committee meant to refer. Hearings Before the Senate Committee on Finance on H.R. 10650, 87th Cong., 2d Sess., part 3, 1019 (1962). In. addition, it is not clear that the committee had .in mind such property as the petitioner's signs. The committee may have intended to indicate merely that the advertising displays of a person engaged in manufacturing or production were not an integral part of his business, and the committee may not have intended to make any reference to a person who was in the advertising business. The Court of Claims adopted this view of the language in the legislative history. *Alabama Displays, Inc. v. United States*, *supra*. Moreover, the committee merely indicated that advertising displays are not ordinarily to qualify for the investment credit, but the committee may have had in mind advertising displays that were much more substantial and more permanent than the petitioner's signs..For these reasons, we are not persuaded that the committee intended to indicate that outdoor advertising signs of the type ^{*676}erected by the petitioner could not qualify for the investment credit.

Decisions will be entered under Rule 155.

3

Sec. 1.48-1(c), Income Tax Regs., in relevant part, provides:

(c) *Definition of tangible personal property.* * * * For purposes of this section, the term "tangible personal property" means any tangible property except land and improvements thereto, such as buildings or *other inherently permanent structures* (including items which are structural components of such buildings or structures). * * * [Emphasis supplied.]

WHETHER ASSET IS STRUCTURAL OR PERSONAL PROPERTY IS FACTUAL TEST

ILM 199921045

APR. 1, 1999

Citations: ILM 199921045

UIL: 9999.9800

Release Date: 5/28/1999

Date: April 1, 1999

CC:DOM:FS:P&SI

SPR-122705-98

MEMORANDUM FOR JOSEPH M. ABELE

CC:NER:PEN:PHI

ASSISTANT DISTRICT COUNSEL

FROM:

HARVE M. LEWIS

CHIEF, PASSTHROUGHS & SPECIAL INDUSTRIES

(FIELD SERVICE DIVISION)

SUBJECT:

Depreciation/HCA-SPR-122705-98

[1] You have asked for our response as to the position that examiners should take in light of the Tax Court's decision in *Health Corp. of America, Inc. v. Commissioner*, 109 T.C. 21 (1997) ("HCA"). In the following discussion we review the factors relevant to a determination of whether an item is a structural component of a building or tangible personal property, as well as what facts and circumstances may be of special concern to examiners. The determination is still a highly factual one, with no bright line tests.

[2] In HCA petitioners argued that several disputed items associated with facilities built in the 1980's constituted Internal Revenue Code section 1245 property and therefore were appropriately depreciated using a 5-year recovery period (pursuant to petitioner's business asset guideline class under ACRS and MACRS). The Commissioner countered that allowing these items to be depreciated over a different recovery period than the buildings to which they related resulted in component depreciation, which is no longer allowed under ACRS and MACRS. Further, the Commissioner argued that investment tax credit ("ITC") cases involving years prior to 1981, when the cost recovery system was adopted and component depreciation was disallowed, are of limited application in determining what constitutes a structural component. Finally, the Commissioner took the position that these items were structural components and thus section 1250 property and should be depreciated over the same recovery period as the building to which they relate.

[3] The Tax Court rejected the Commissioner's primary argument stating that in prohibiting component depreciation, Congress did not intend to redefine section 1250 property to include property which prior to the enactment of ACRS had been section 1245 property for the purposes of the ITC. The court looked at the statutory and regulatory language of ACRS and MACRS, as well as its legislative history and determined that to the extent disputed property would qualify as tangible personal property for ITC purposes under pre-1981 law, it will also qualify as tangible personal property for ACRS and MACRS.

[4] The court then turned to the Commissioner's contention that the disputed items were structural components under an ITC analysis. The court examined each category of disputed items to determine whether the assets should be characterized as section 1250 property, a structural component of the facility, or section 1245 property, tangible personal property under Treas. Reg. section 1.48- 1(c). In making this determination the court employed the factors set forth in *Whiteco Indus., Inc. v. Commissioner*, 65 T.C. 664, 672-673 (1975) to ascertain whether the items were inherently permanent and thus not tangible personal property within the meaning of Treas. Reg. section 1.48-1(c). These factors include: 1) Is the property capable of being moved, and has it in fact been moved?; 2) Is the property designed or constructed to remain permanently in place?; 3) Are there circumstances which tend to show the expected or intended length of affixation, i.e., are there circumstances which show that the property may or will have to be moved?; 4) How substantial a job is removal of the property and how time-consuming is it? Is it "readily removable?"; 5) How much damage will the property sustain upon its removal?; and 6) What is the manner of affixation of the property to the

land? HCA, 109 T.C. at 57 (citing *Whiteco*, 65 T.C. at 672. The presence of one factor is not the sole determinant of what is tangible personal property. *Id.*

[5] HCA went on to define structural components by way of example as set forth in section 1.48-1(e)(2):

The term "structural components" includes such parts of a building as walls, partitions, floors, and ceilings, as well as any permanent coverings therefor such as paneling or tiling; windows and doors; all components (whether in, on, or adjacent to the building) of a central air conditioning or heating system, including motors, compressors, pipes and ducts; plumbing and plumbing fixtures; such as sinks and bathtubs; electric wiring and lighting fixtures; chimneys; stairs; escalators, and elevators, including all components thereof; sprinkler systems; fire escapes; and other components relating to the operation or maintenance of a building. . . . the term "structural components" does not include machinery the sole justification for the installation of which is the fact that such machinery is required to meet temperature or humidity requirements which are essential for the operation of other machinery or the processing of materials or foodstuffs.

[6] The court summarized the regulation saying, "an item constitutes a structural component of a building if the item relates to the operation and maintenance of the building. . . ." HCA, 109 T.C. at 58. Be aware, however, that the list may be misleading. The HCA court followed *Scott Paper Co. v. Commissioner*, 74 T.C. 137, 182- 3 (1980) in determining that even though wiring is an example under Treas. Reg. section 1.48-1(e)(2), it is not a structural component unless it relates to the operation or maintenance of a building. HCA, 109 T.C. at 66. The focus, the court found, should be on ultimate use. *Id.* at 68. In addition, the Service has stated that it will not challenge the *Scott Paper* approach. *Illinois Cereal Mills, Inc. v. Commissioner*, T.C. Memo. 1983-469, action on decision, 1991-019 (Oct. 22, 1991).

[7] Again, the determination of whether an asset is a structural component or tangible personal property is a facts and circumstances assessment. As noted above, pre-1981 case law and factors set forth therein are still relevant to the assessment. In view of the factual nature of the inquiry, no bright line test exists.

[8] As a practical matter, it should be noted that the use of cost segregation studies must be specifically applied by the taxpayer. The HCA court sustained the Service's position that certain "allocated" equipment must be depreciated over the same period as the buildings to which they relate because the record did not provide any "logical and objective measure" of the portion of the equipment that would constitute section 1245 property. HCA, 109 T.C. at 92. An accurate cost segregation study may not be based on non- contemporaneous records, reconstructed data, or taxpayer's estimates or assumptions that have no supporting records. See *Boddie-Noell Enterprises, Inc. v. United States*, 36 Fed. Cl. 722, 746 (1996), *aff'd* without op. 132 F.2d 54 (Fed. Cir. 1997). Thus, cost segregation studies should be closely scrutinized by the field.

[9] Treas. Reg. section 1.167(e)-1(a) provides that any change in the method of computing the depreciation allowances with respect to a particular account is a change in method of accounting. Further, the legislative history underlying the statutory language of section 446(e) and former section 167(e) clearly indicates that a change in depreciation method is a change in method of accounting. The legislative history of section 446(e) provides that a change in method of accounting includes "a change in the treatment of a material item such as . . . a change in the method of depreciating any property." S. Rep. No. 1622, 83d Cong., 2d Sess. (1954). The legislative history of former section 167(e) provides that "[a]ll changes in depreciation method are changes in accounting method under section 446(e) and, therefore, will require the consent of the Secretary or his delegate." S. Rep. No. 1622, 83d Cong., 2d Sess. (1954). Also, in *Standard Oil Co. v. Commissioner*, 77 T.C. 349 (1981), which concerned a taxpayer that reclassified certain assets from section 1250 property to section 1245 property and then sought to use different depreciation methods, the Tax Court stated that it "is unquestioned that a change in the method of computing depreciation is a change in the method of accounting." 77 T.C. at 410. Thus, a change in depreciation method is a change in method of accounting.

[10] With respect to a change in recovery period or convention, Treas. Reg. section 1.446-1(e)(2)(ii)(a) indicates that such a change is a change in method of accounting. This section provides that a change in method of accounting includes a change in the treatment of any material item, and that a material item is any item that involves the proper time for the inclusion of the item in income or the taking of the item as a deduction. The recovery period determines the period of time over which the basis of depreciable property is recovered. The convention determines the portion of the taxable year for which depreciation is allowable and determines how much of the applicable recovery period remains as of the beginning of the taxable year following the placed-in-service year. A change in recovery period or convention affects when, not whether, the cost of depreciable property will be recovered. Consequently, a change in recovery period or convention affects the timing of deductions and is a change in method of accounting.

[11] Treas. Reg. section 1.446-1(e)(2)(i) provides that a taxpayer who changes the method of accounting employed in keeping his books shall, before computing his income using a new method for tax purposes, secure the consent of the Commissioner, whether or not such method is proper or is permitted under the Internal Revenue Code or the regulations thereunder.

Sincerely,

Harve M. Lewis

Chief

Passthroughs & Special Industries

Branch (Field Service)

U.S. Utility-Scale Solar 2025 Data Update

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U.S. Utility-Scale Solar - 2025 Data Update



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Photo credit:
SOLV Energy, Brian Doll.
Mammoth North Solar, completed in 2024.

U.S. Utility-Scale Solar - 2025 Data Update

About This Publication:

This publication presents an annual snapshot of trends in utility-scale solar generators, defined as ground-mounted projects larger than 5MW_{AC}. It summarizes public empirical data, especially from the U.S. Energy Information Administration (EIA) and the U.S. Federal Energy Regulatory Commission (FERC). For the CapEx analysis we leverage additional (non-public) data provided to LBNL through Non-Disclosure Agreements to fill in gaps from the public data. A separate data collection on distributed solar and storage data is available [here](#).

The 2025 edition of the publication summarizes data for generators coming online through the end of 2024 with a focus on the most recent full calendar year. We neither directly comment on nor recommend any specific policies but simply summarize and explain data trends.

This year's update is divided into two parts: The **summary section** spotlights key 2024 data changes upfront, while the **extensive appendix** provides additional analyses and longer-term trends.

Funding:

U.S. Department of Energy's Solar Energy Technologies Office

Products in addition to this slide deck:

The 2025 Data Update consists of this file, interactive visualizations, and an Excel data file containing the data behind each graph (and more). All products are available at: utilityscalesolar.lbl.gov

New in this year's update:

- Executive Summary with 2024 Data Highlights
- Project size distributions
- Expanded capex sample from EIA enabling more refined cost analyses for PV standalone and PV+battery projects
- Increased details on technological design choices for PV+battery projects
- Levelized cost of energy estimates for PV+battery projects
- Levelized solar market value estimates by commercial operation date and net-value analyses
- Comparison of actual year 1 performance to idealized year 1 performance

U.S. Utility-Scale Solar - 2025 Data Update



Deployment Trends (Appendix: Technology Trends)

Capital Costs (CapEx) (Appendix: Operation & Maintenance Costs)

Performance (Capacity Factors)

Levelized Cost of Energy (LCOE) and Power Purchase Agreements (PPA)

Wholesale Market Value and Net Value

PV+Battery Hybrid Plants

Capacity in Interconnection Queues

Appendix: Concentrating Solar Thermal Power (CSP) Plants

Executive Summary

Utility-scale PV continued to lead solar deployment in 2024 (80% of new solar and 54% of all new capacity). Texas added the most new capacity in 2024 and now leads the nation with the greatest cumulative solar capacity as well. 99% of new projects feature single-axis tracking.

The capacity-weighted installed cost of solar projects that came online in 2024 increased slightly to \$1.61/W_{AC} (\$1.22/W_{DC}), up 1% from 2023 but down 73% from 2010. Strong economies of scale explain a quintupling of the average project size over the past eight years.

Average capacity factors range from 17% in the least-sunny regions to 31% in the sunniest. Single-axis tracking adds more than five percentage points to capacity factors in the regions with the strongest solar resource. Year 1 performance indices indicate recent project vintages performing worse than older vintages, compared with a modeled output.

The generation-weighted LCOE from utility-scale PV has increased by 25% since 2022 to \$60/MWh (without tax credits) or \$41/MWh (with tax credits) in 2024. Levelized PPA prices have also trended upward the last few years. Since 2021 prices have typically landed between \$20-30/MWh in CAISO and the non-ISO West and between \$40-\$80/MWh elsewhere, with the highest prices in the Northeast.

The market value of solar fell in 2024 to \$32/MWh on a national-average basis, as energy prices fell. Rising PPA prices and generation costs are now higher in some regions than solar's energy and capacity market value for the newest solar projects.

Interest in hybridization (pairing PV with batteries) continued to grow in 2024 (33 new projects). All in battery CapEx increased to \$458/kWh in 2024. Added costs for a PV system grow with greater storage capacity ratio (0.57) and duration (3.3h) and were \$1/W_{AC-PV} in 2024 - equivalent to an LCOE adder of \$25/MWh (after tax credits).

Across all 7 ISOs and 49 additional utilities, there were 956GW of solar in interconnection queues at the end of 2024 (-12% vs. 2023). 47% of this proposed solar capacity is paired with battery storage, with the highest concentration of these PV+battery hybrid plants in CAISO (93%) and the non-ISO West (83%).

Data and Methods

(additional details are found in each section in the Appendix)

Solar Deployment: Primary data sources are EIA 860, FERC 556, and primary research.

Capital Expenditure (CapEx): Primary data sources are EIA 860 Schedule 5B (not public and acquired via NDA), FERC Form 1, and primary research. New CapEx estimates for projects with 2024 COD are still preliminary both in scope and accuracy of individual data points and may not be representative of final numbers that will be published later by EIA. We present data in $\$/W_{AC}$ terms (detailed $\$/W_{DC}$ costs in the online data file). CapEx is adjusted from nominal to real \$ using BEA's implicit GDP price deflator.

Performance: Primary data source is EIA 923, reflecting net generation (excluding energy used by the plant itself and curtailment). Outliers and low-quality data are dropped from the analysis. Since we require one full year of generation data, our performance sample includes projects built through 2023, with generation data through 2024. Net Capacity Factors (NCF) represent the ratio of its actual annual generation delivered to the grid to the maximum possible annual output if it operated continuously every hour of the year.

LCOE: LCOE estimates are derived with formulas following NREL's Annual Technology Baseline, describing the average costs to generate a MWh over the lifetime of a project. CapEx and NCF use project-specific data, while OpEx, design life, degradation, and WACC rely on industry averages and vary by commercial operation year.

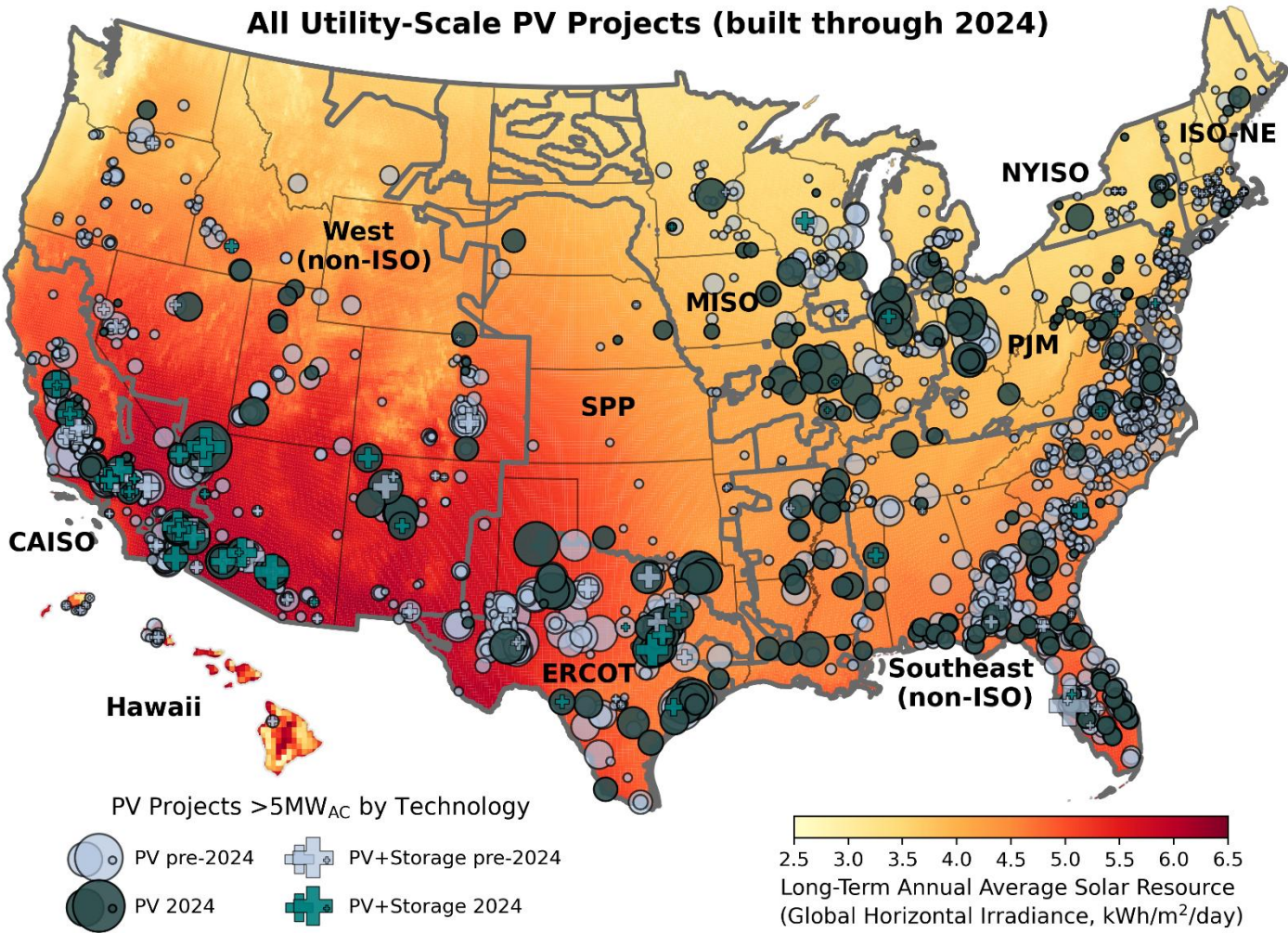
PPA: Primary data sources are FERC Electric Quarterly Reports, FERC Form 1, and state regulatory filings. Annual PPA data is converted to real \$ and levelized using WACC.

Value: We model hourly solar profiles using NREL's System Advisory Model and debias generation with ISO and EIA 923 data. Energy value is derived from LMPs or FERC System Lambdas, capacity value from BA-specific capacity accreditation rules and capacity prices (from central markets or bilateral transactions). The value represents the marginal "replacement costs" of what an offtaker would pay in short-term wholesale markets. It does not include any additional revenues or costs (Ancillary Services, Renewable Energy Credits, infrastructure impacts...).

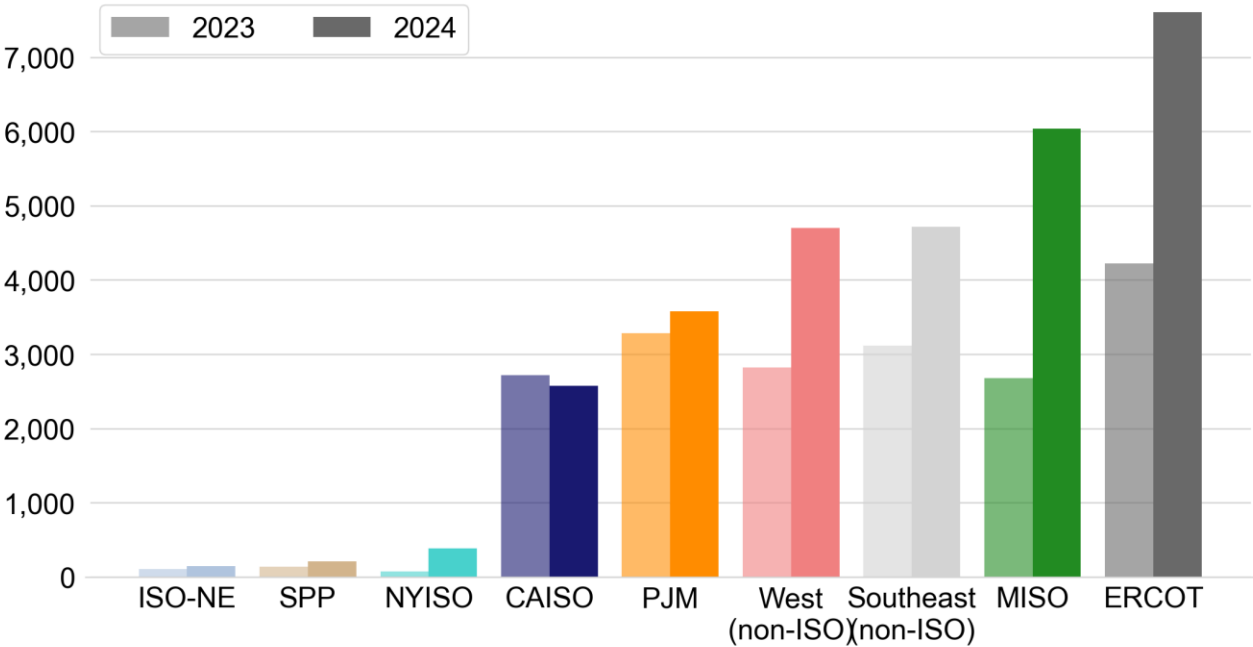
Interconnection Queues: Primary data comes from interconnection queues from 7 ISOs/RTOs and 49 non-ISO BAs, collected via interconnection.fyi. We focus on projects connecting to the bulk-power system (not distribution-connected / behind-the-meter).

Utility-scale solar deployment grew by 56% from 19 to 30 GW_{AC} in 2024 in the United States

Sample: 1,759 projects totaling 111 GW_{AC}



Capacity Additions by Region: 2023 vs 2024 (MW_{AC})

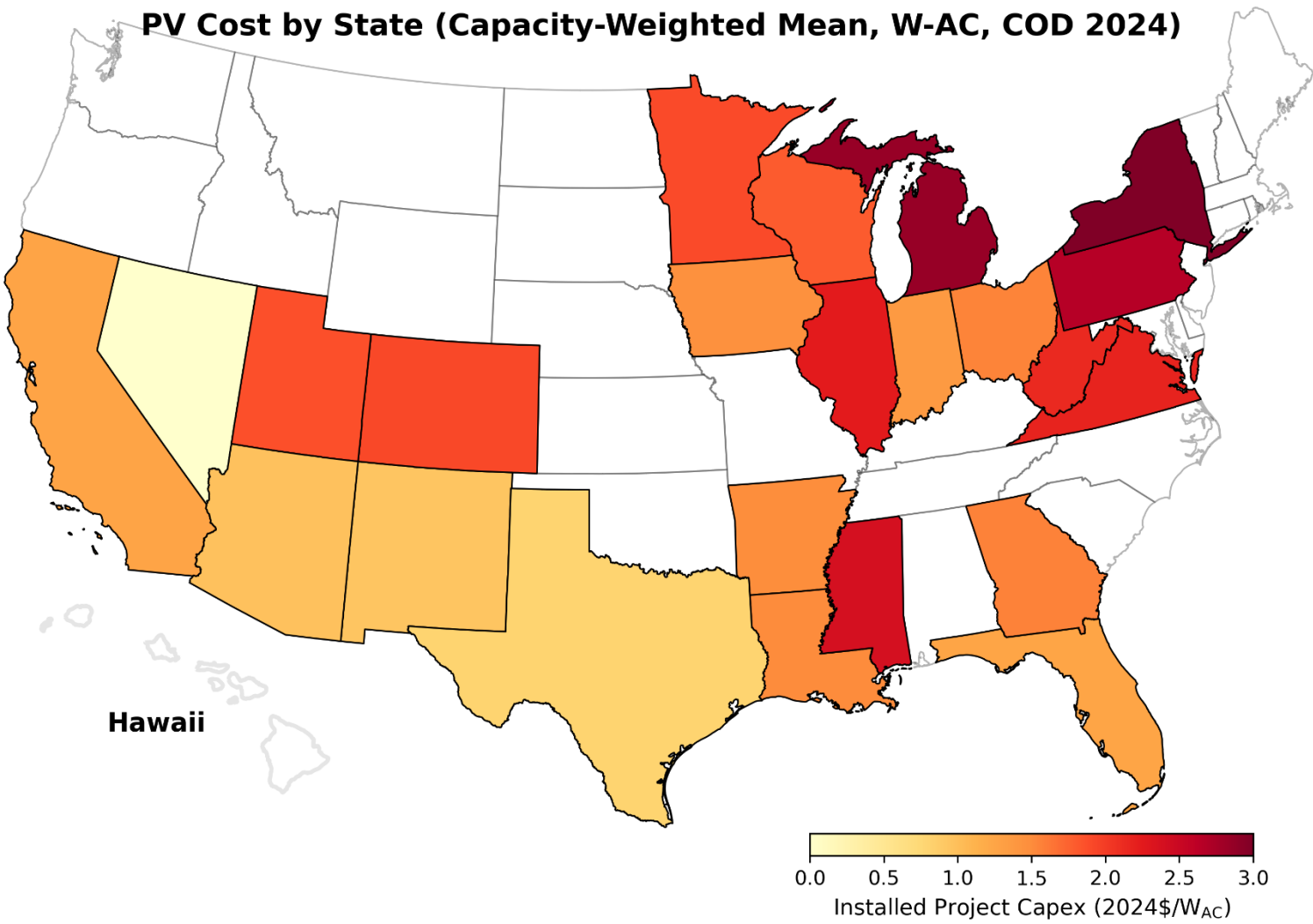


We define utility-scale solar as ground-mounted projects with a nameplate capacity >5 MW_{AC}. Annual capacity additions increased in 2024 to 30 GW_{AC} (or 35 GW_{DC}) and accounted for 54% of all new grid-connected capacity.

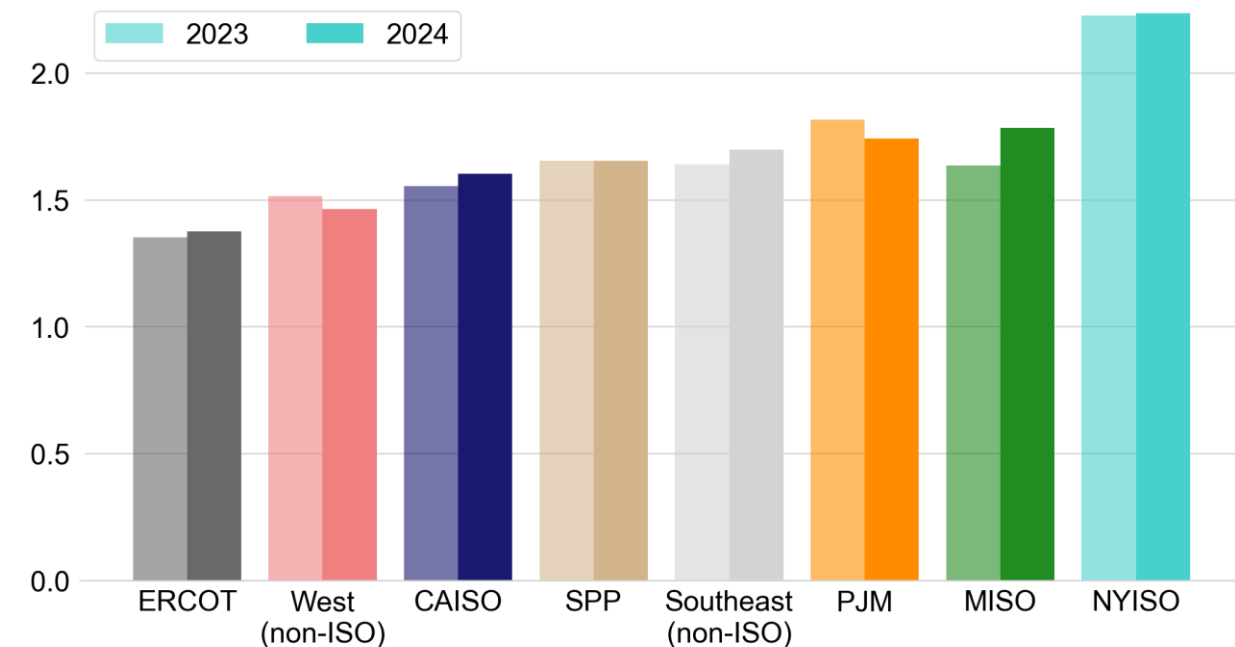
The new capacity is not uniformly spread across the U.S. – growth is concentrated in ERCOT (7.6 GW_{AC}), MISO (6 GW_{AC}), and the non-ISO West and Southeast (both 4.7 GW_{AC}).

Installed costs of PV were \$1.6/W_{AC} (\$1.2/W_{DC}) in 2024, similar to the year before

Sample: 425 projects totaling 44.2 GW_{AC}



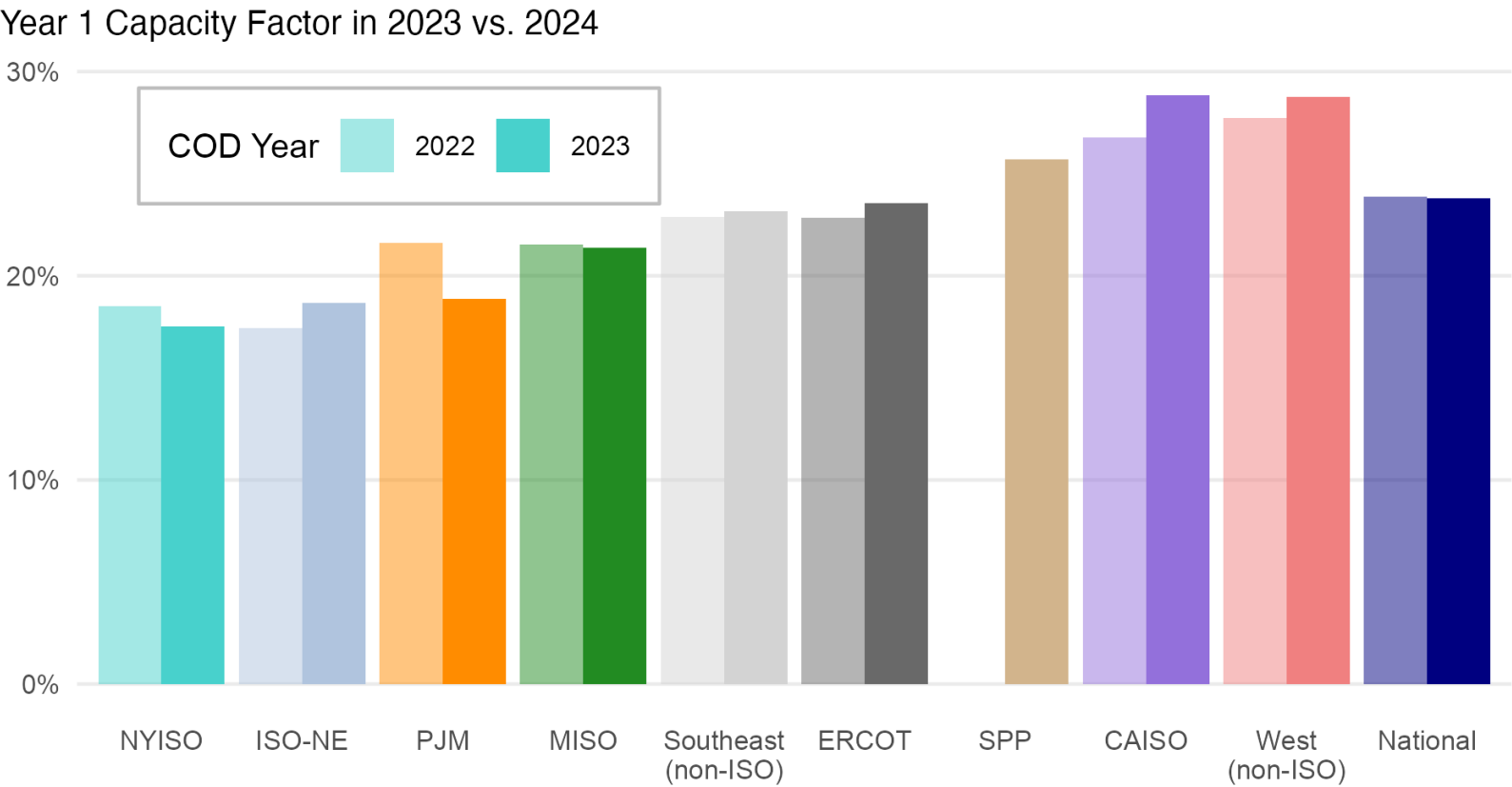
Installed Capex of 2023 vs. 2024 Projects (2024\$/W_{AC})



Capacity-weighted PV costs increased from \$1.59/W_{AC} in 2023 to \$1.61/W_{AC} in 2024. Our CapEx sample is robust, with 2024 data covering 92% of new projects. Costs vary by region, driven by differing project sizes (economies of scale), land availability, prevailing labor rates, and transmission network upgrade costs.

First-year performance of newly built projects was stable in 2024, with variation by region

Sample: 342 plants totaling 29 GW_{AC}



Solar plant performance is influenced by technical design (e.g., the share using single-axis tracking), interannual variation in the solar resource, and extreme weather (e.g., storm damage or wildfire smoke).

Performance remained relatively stable between 2023 (COD 2022 plants) and 2024 (COD 2023 plants), with regional variation. In 2024, the non-ISO West’s capacity factor was 11 percentage points higher than that of NYISO.

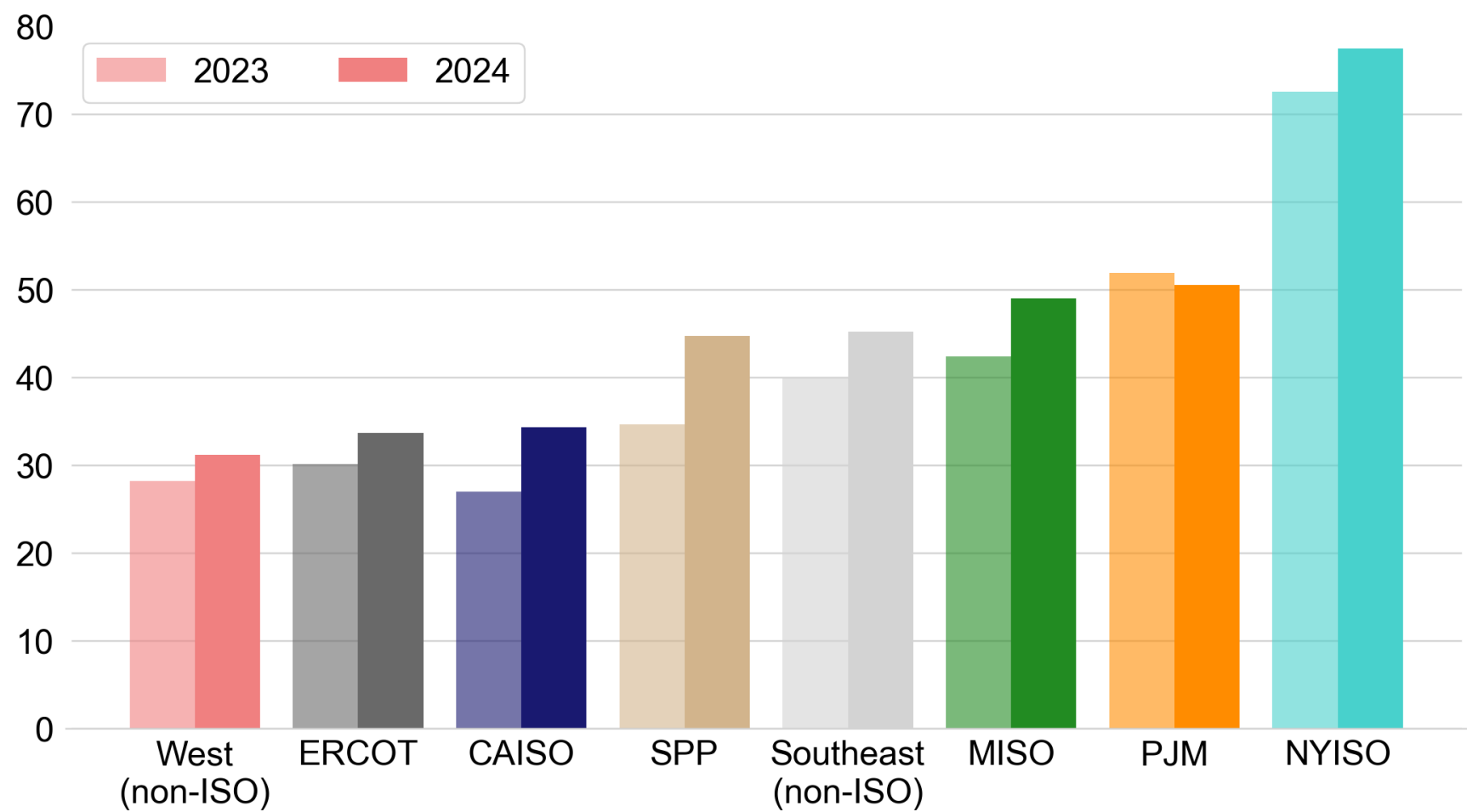


Note: Only region/year combinations with at least four plants are included. Bars show capacity-weighted averages.

National average solar generation costs rose by 13% to \$60/MWh (without tax credits) or \$41/MWh (with tax credits) in 2024

Sample: 425 projects totaling 44.2 GW_{AC}

LCOE of 2023 vs 2024 Projects with Tax Credits (2024 \$/MWh)



Higher financing costs, increasing CapEx and slightly lower estimated performance increased the national average levelized cost of energy (LCOE) of standalone PV from \$53 in 2023 to \$60/MWh in 2024 (without tax credits). Accounting for available tax credits (ITC, PTC, energy community bonus), LCOE rose from \$36 to \$41/MWh.

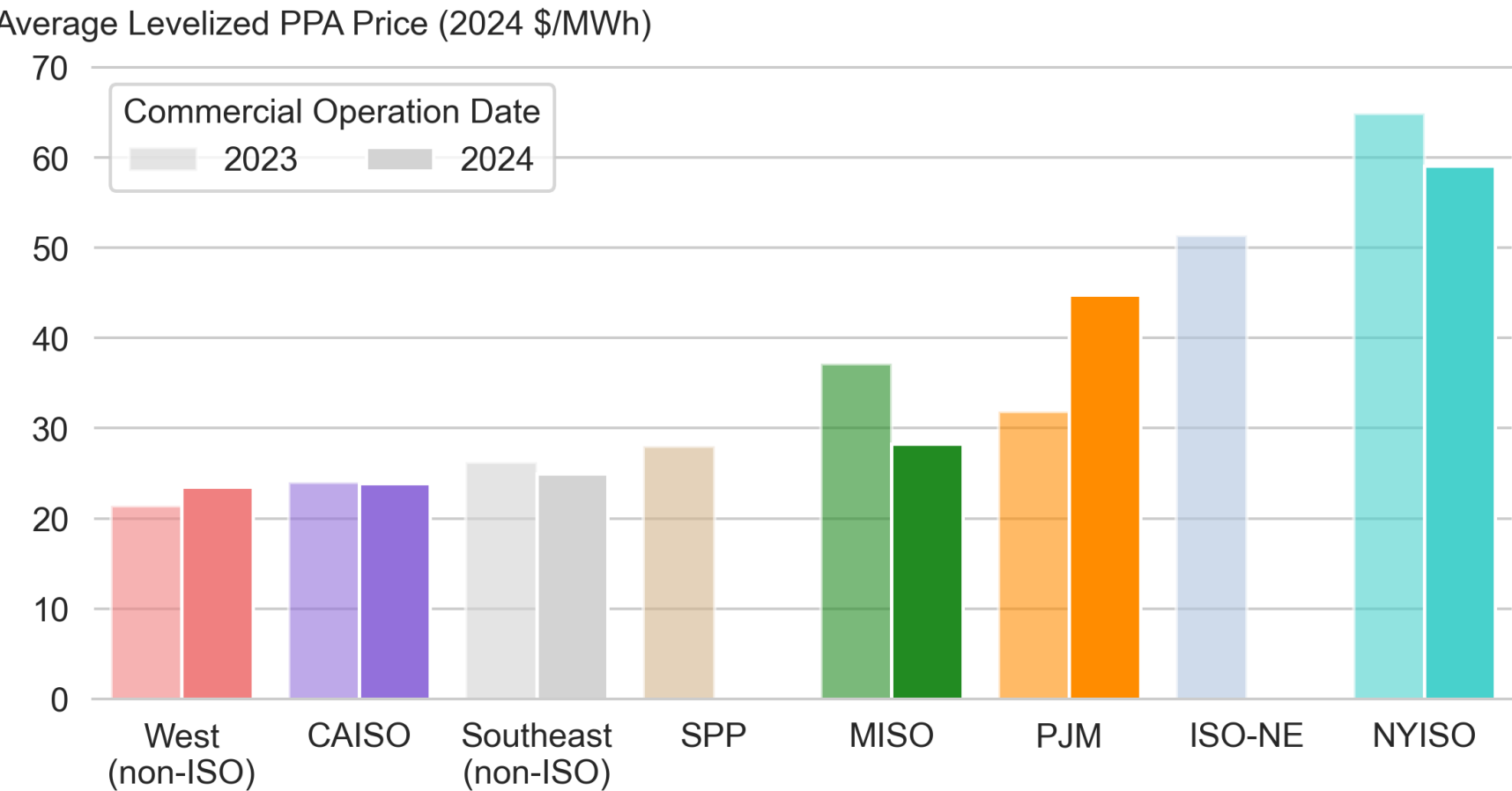
Average LCOE ranged from \$31 in the non-ISO West to \$77/MWh in NYISO (with tax credits), driven by regional differences in CapEx and performance.



Note: Only preliminary data is available for new solar projects coming online in 2024. Findings may shift as more final EIA Capex and project-specific performance data become available.

PPA prices of \$22-40/MWh were typical for utility-scale PV projects that came online in 2024, with wide differences between regions

Sample: 2023 – 72 PPAs, 2024 – 41 PPAs



Power purchase agreement (PPA) prices reflect the bundled price of electricity and RECs as sold by the project owner.

Not all projects sign a PPA and not all PPA terms are publicly available. PPAs for projects in our sample that commenced operations in 2024 had an average levelized price of \$29/MWh. This is a 14% increase from 2023, driven by the sample shifting towards higher-priced regions. NYISO saw the highest average price in 2024 (\$59/MWh) while the non-ISO West had the lowest (\$24/MWh).

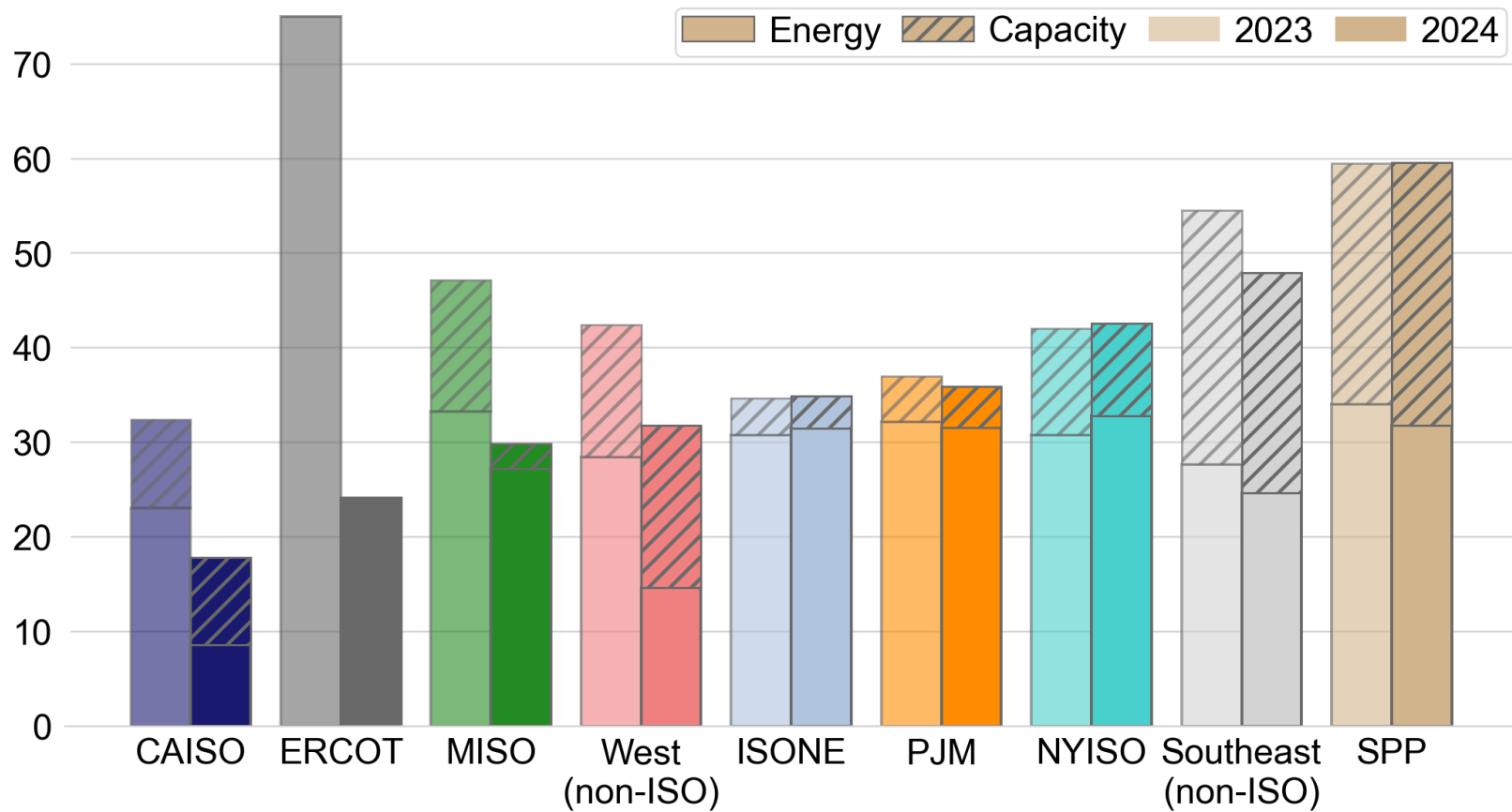


Note: \$22-40/MWh range reflects 25th-75th percentiles of levelized PPA prices. Year-Region combinations with fewer than 2 PPAs are excluded from the graph. The PPAs shown here are typically executed 2-4 years before the commercial operation date.

PV's wholesale energy + capacity value declined by 35% to \$32/MWh in 2024 and was less than generation costs for recent projects

Sample: 5,474 projects totaling 88.4 GW_{AC}

Energy and Capacity Value of 2023 vs 2024 Projects (2024 \$/MWh)



Driven by declining natural gas prices, fewer summer heat waves, and increasing solar penetration, PV's average market value decreased from \$48/MWh in 2023 to \$32/MWh in 2024. CAISO with 30% solar penetration had the lowest standalone solar value at \$18/MWh, while high capacity values supported greater total values in SPP (\$60/MWh) and many southeastern BAs.

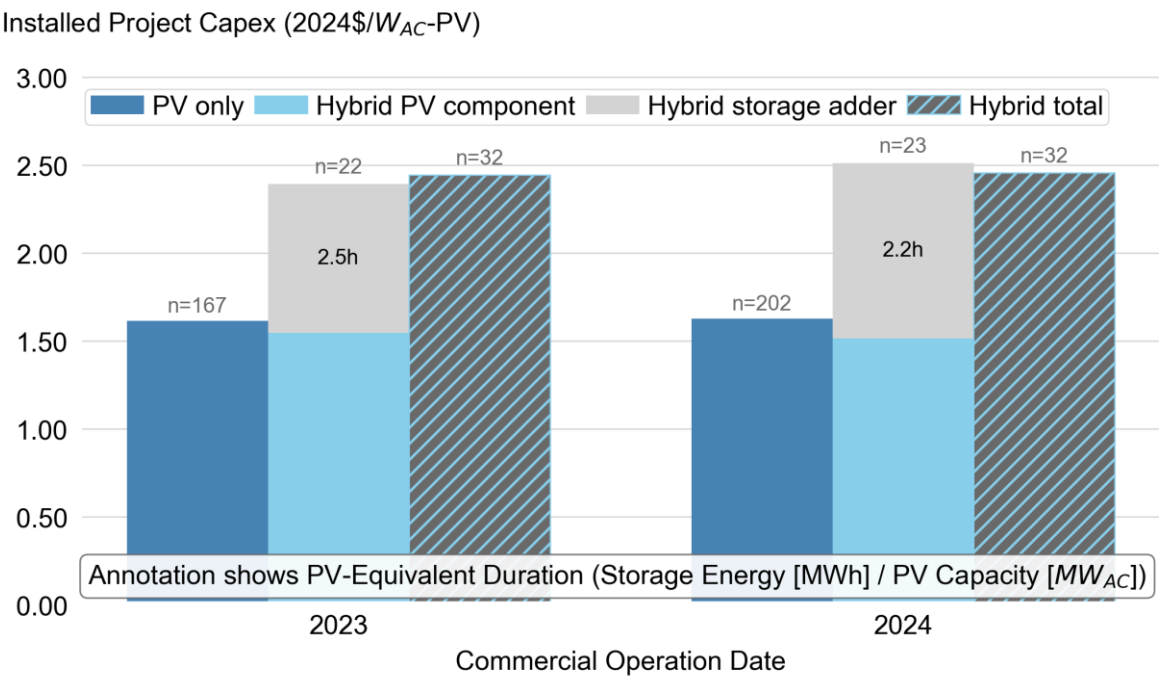
National average net value (levelized energy+capacity value minus LCOE) for solar standalone turned from \$5/MWh for 2022 COD to -\$7/MWh for 2023 COD projects (after accounting for tax credits). Net value ranges from -\$34/MWh in NYISO to \$17/MWh in SPP. 9 out of 30 BAs have positive net values in 2024, the rest negative net values.



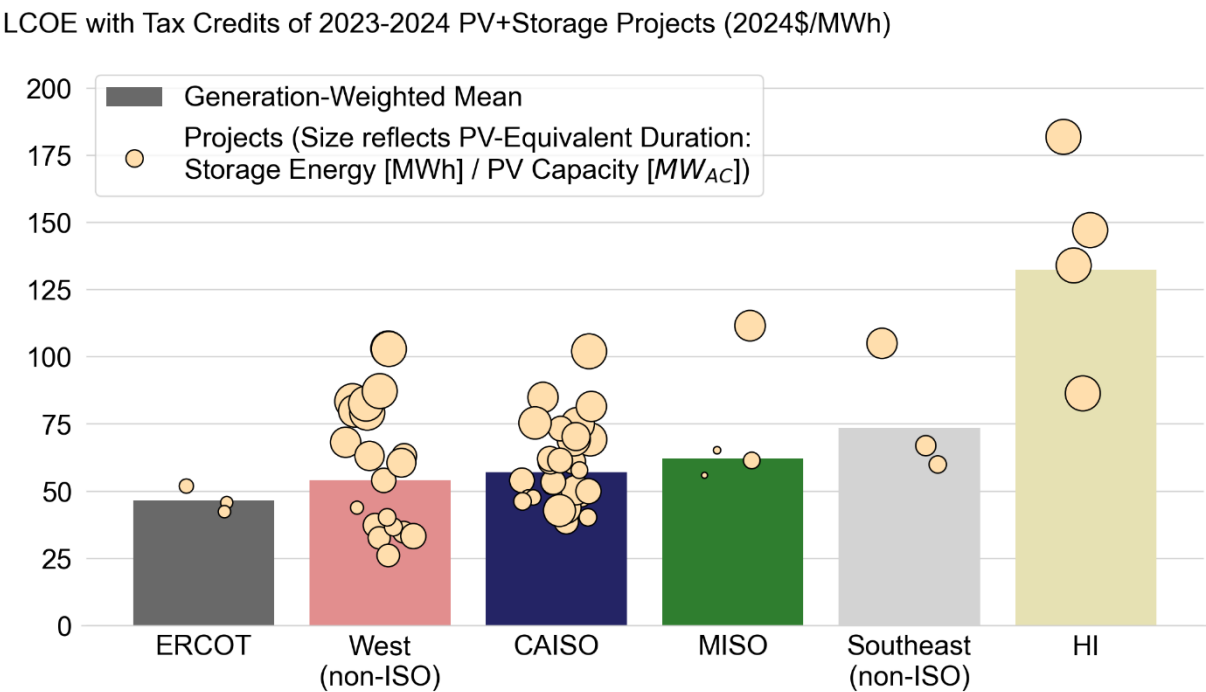
Note: The data shows generation-weighted average annual market value of all large-scale (1 MW+) solar projects in select balancing authorities. Non-ISO BA results are shown in the accompanying data file.

Costs of PV+battery projects remained stable at \$2.5/W_{AC-PV} in 2024, LCOE rose by 13% to \$87/MWh (before) or \$59/MWh after tax credits)

Sample: 64 greenfield plants totaling 9.4 GW_{AC} of PV and 5.4 GW / 19.7 GWh of batteries



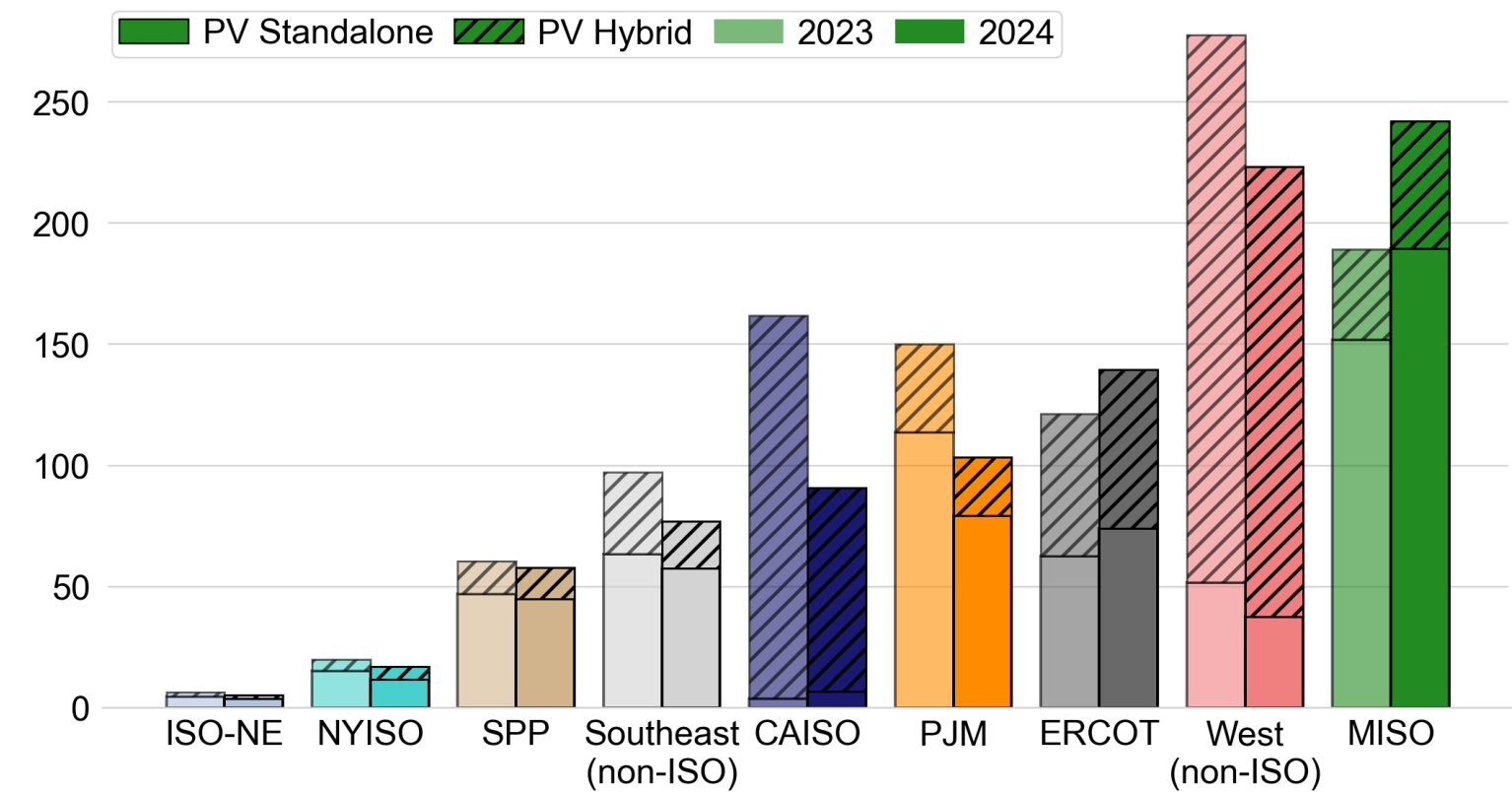
Capital costs for newly built PV–battery hybrids remained roughly flat in 2024. Among projects with component-level cost data, the battery contributed \$1.0/W_{AC-PV} to total system cost. For hybrids without a component breakdown, we report only total system cost (hatched), which was \$2.46/W_{AC-PV} in 2024.



Batteries added \$36/MWh (before) or \$25/MWh (after tax credits) to the LCOE of a PV project in 2024. The battery cost adder grows with the storage capacity ratio (battery capacity relative to PV capacity) and storage duration (larger bubbles in the graph above).

Active PV capacity in interconnection queues declined by 12% to 956 GW in 2024

Active PV Capacity in Interconnection Queues 2023 vs 2024 (GW)



7 out of 9 regions had contracting interconnection queues as a potential early result from FERC 2023 reforms. 161 GW of solar capacity entered the queues in 2024 (the remainder entered in earlier years), with MISO and the non-ISO West having over 200 GW of active solar requests. CAISO and PJM did not accept new interconnection applications in 2024, contributing to a decline in their pipeline.

Nationwide, 452 GW of queued solar includes a battery (47%). Hybridization is more common in regions with larger solar deployment like CAISO (93%) and the non-ISO West (83%).

If historical patterns persist, only ~9% of solar capacity requesting interconnection will ultimately get built and become operational.



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Explore this briefing, an extensive workbook with all underlying data, and interactive visualizations: utilityscalesolar.lbl.gov

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Read about our other work on utility-scale generators and storage [here](#)

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See the following appendix for additional analyses

This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under Solar Energy Technologies Office (SETO) Agreement Number 38444 and Contract No. DE-AC02-05CH11231. The authors are solely responsible for any omissions or errors contained herein.

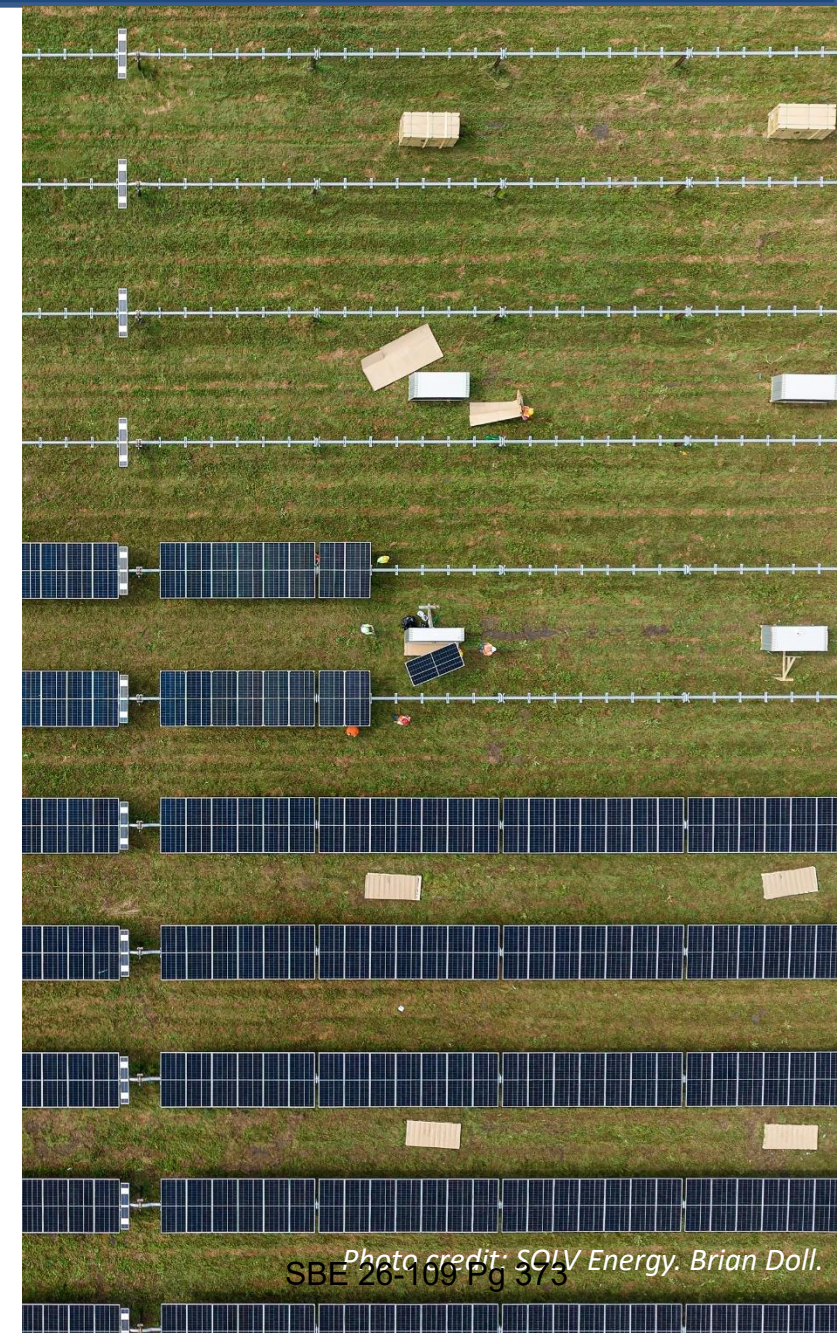


Photo credit: SOLV Energy, Brian Doll.
SBE 26-109 Pg 373



Appendix to U.S. Utility-Scale Solar - 2025 Data Update



Deployment and Technology Trends

Capital Costs (CapEx) and Operation & Maintenance (O&M) Costs

Performance (Capacity Factors)

Levelized Cost of Energy (LCOE) and Power Purchase Agreements (PPA)

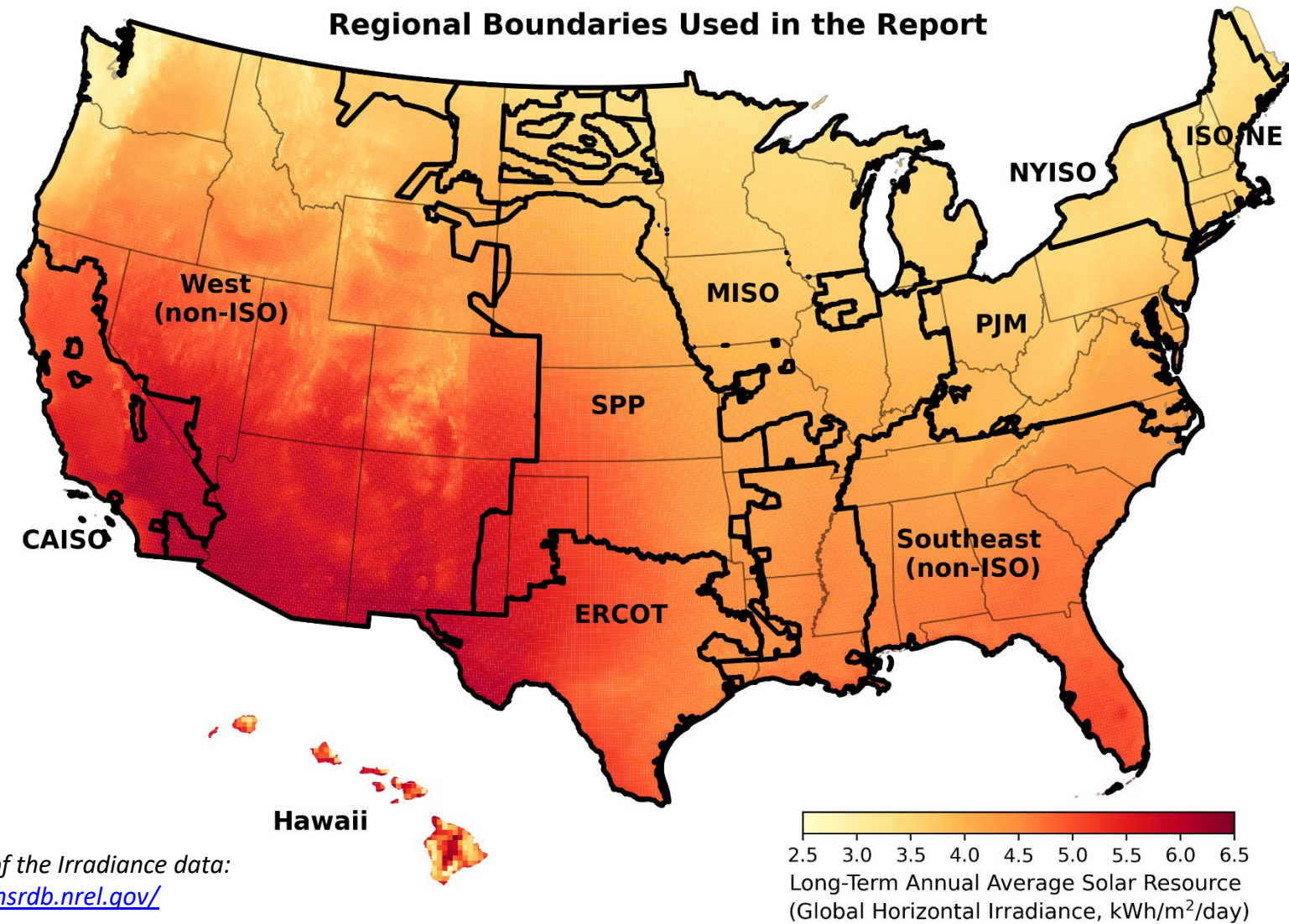
Wholesale Market Value and Net Value

PV+Battery Hybrid Plants

Concentrating Solar Thermal Power (CSP) Plants

Capacity in Interconnection Queues

Regional boundaries applied in this analysis include the seven independent system operators (ISO) and two non-ISO regions



Source of the Irradiance data:
<https://nsrdb.nrel.gov/>



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Deployment and Technology Trends

Deployment and Technology Trends: data and methodology

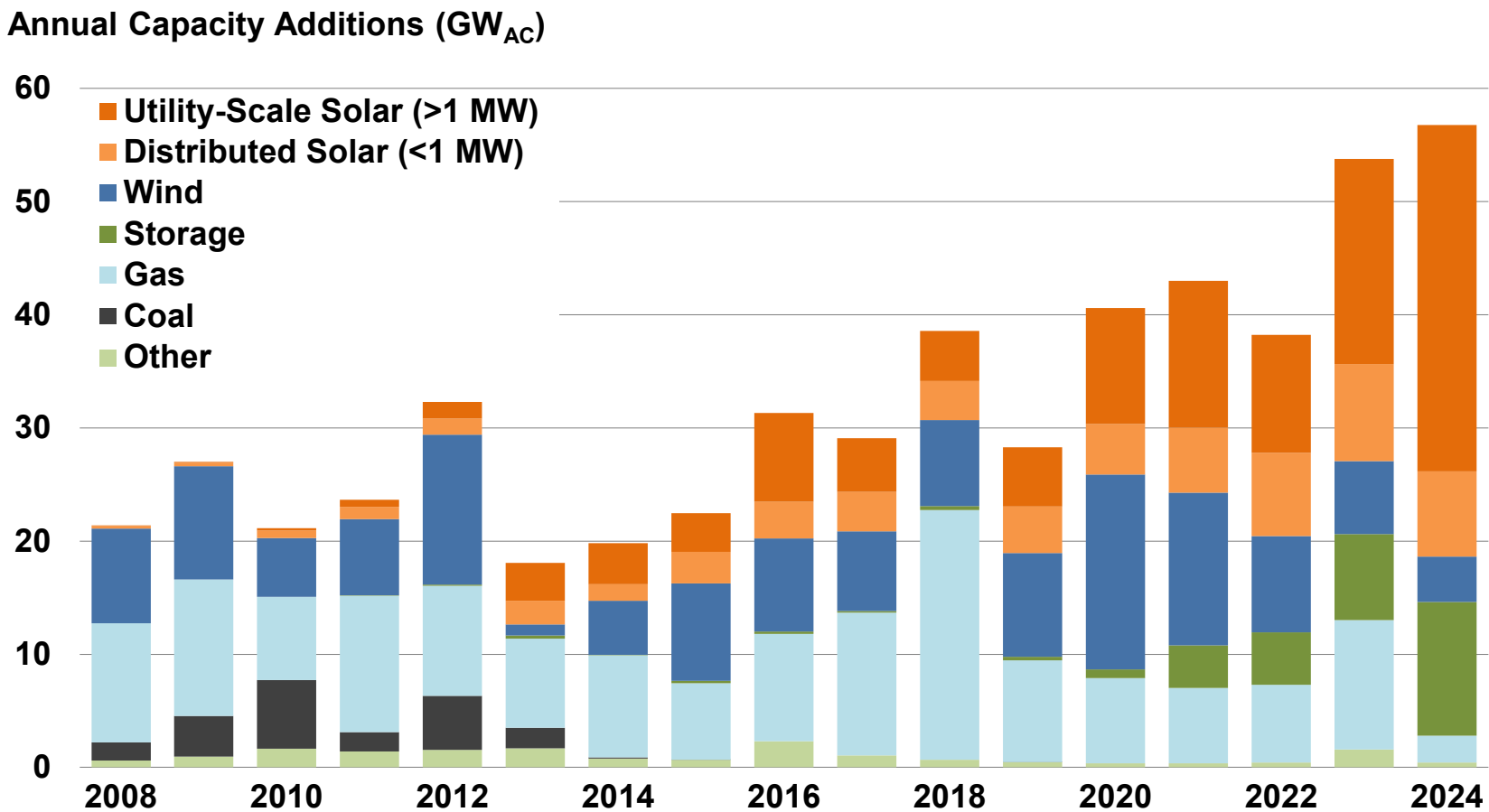
Deployment Trends Data: National and state-level deployment data are sourced from the Energy Information Administration (EIA) and LBNL datasets.

Technology Trends Data: Project-level metadata are sourced from a combination of Form EIA-860, FERC Form 556, state regulatory filings, interviews and websites of project developers and owners, and news and trade press articles. We independently verify much of the metadata—such as project location, fixed-tilt vs. tracking, azimuth—via satellite imagery.

Data Sample: Our data analysis focuses on a subset of the EIA 860 solar sample (all projects larger than 5 MW_{AC}):

- **2023:** 223 new projects totaling 19.3 GW_{AC} or 24.7 GW_{DC}
- **2024:** 248 new projects totaling 30 GW_{AC}. 221 projects with known DC capacity sum to 35.3 GW_{DC}

More than 50% of new U.S. electric nameplate generating capacity came from utility-scale solar in 2024



Utility-scale (54%) and distributed (13%) solar accounted for a combined 67% of all capacity added to U.S. grids in 2024. Over the first 7 months of 2025, utility-scale solar capacity additions are on par with the same period in 2024 (both 13.1 GW_{AC}).

Nameplate generating *capacity* is the maximum power output a generator is capable of. It is different from the amount of *energy* produced over time and the *capacity credit* – a measure of a generator’s contribution to a system’s resource adequacy – which are discussed later ([capacity factors](#), [capacity value](#)).

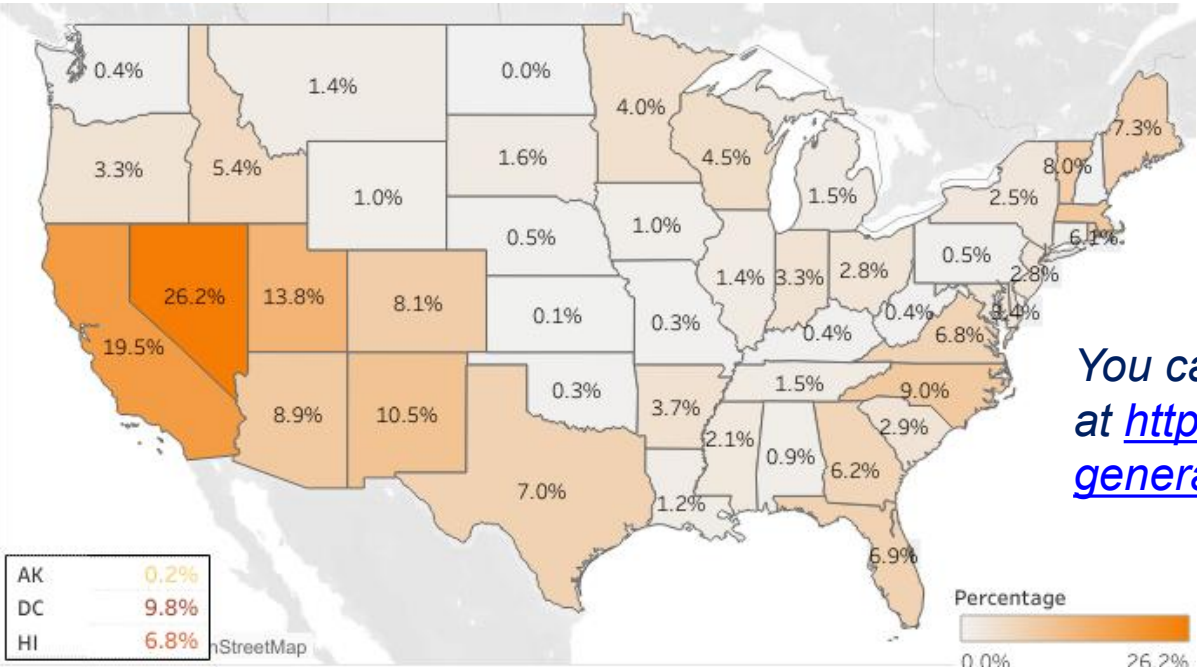
Utility-scale solar was responsible for 5% of U.S. electricity generation in 2024, and >25% of generation in Nevada

State	Preliminary 2024			
	Solar generation as a % of in-state generation		Solar generation as a % of in-state load	
	All Solar	Utility-Scale Solar Only	All Solar	Utility-Scale Solar Only
District of Columbia	64.8	9.8	2.9	0.4
California	32.4	19.5	28.8	17.3
Nevada	30.5	26.2	34.0	29.2
Massachusetts	25.6	9.1	11.8	4.2
Hawaii	21.5	6.8	22.1	7.0
Vermont	16.8	8.0	8.2	3.9
Utah	16.6	13.8	16.7	13.9
Maine	14.2	7.3	17.1	8.8
Arizona	13.3	8.9	17.0	11.3
Rhode Island	13.1	6.1	16.4	7.7
New Mexico	12.5	10.5	16.4	13.9
Colorado	11.5	8.1	11.9	8.4
North Carolina	9.7	9.0	9.6	8.9
Florida	8.6	6.9	9.0	7.2
New Jersey	8.0	2.8	6.8	2.3
Virginia	7.8	6.8	5.9	5.1
Texas	7.8	7.0	8.9	7.9
Delaware	7.5	3.4	3.2	1.4
Maryland	7.0	3.0	4.3	1.8
Idaho	6.9	5.4	4.9	3.8
Georgia	6.6	6.2	6.3	5.9
TOTAL U.S.	6.9	5.0	7.5	5.4

Solar’s generation market share varies considerably depending on whether it is calculated as a percentage of total generation or load (e.g., D.C., Vermont).

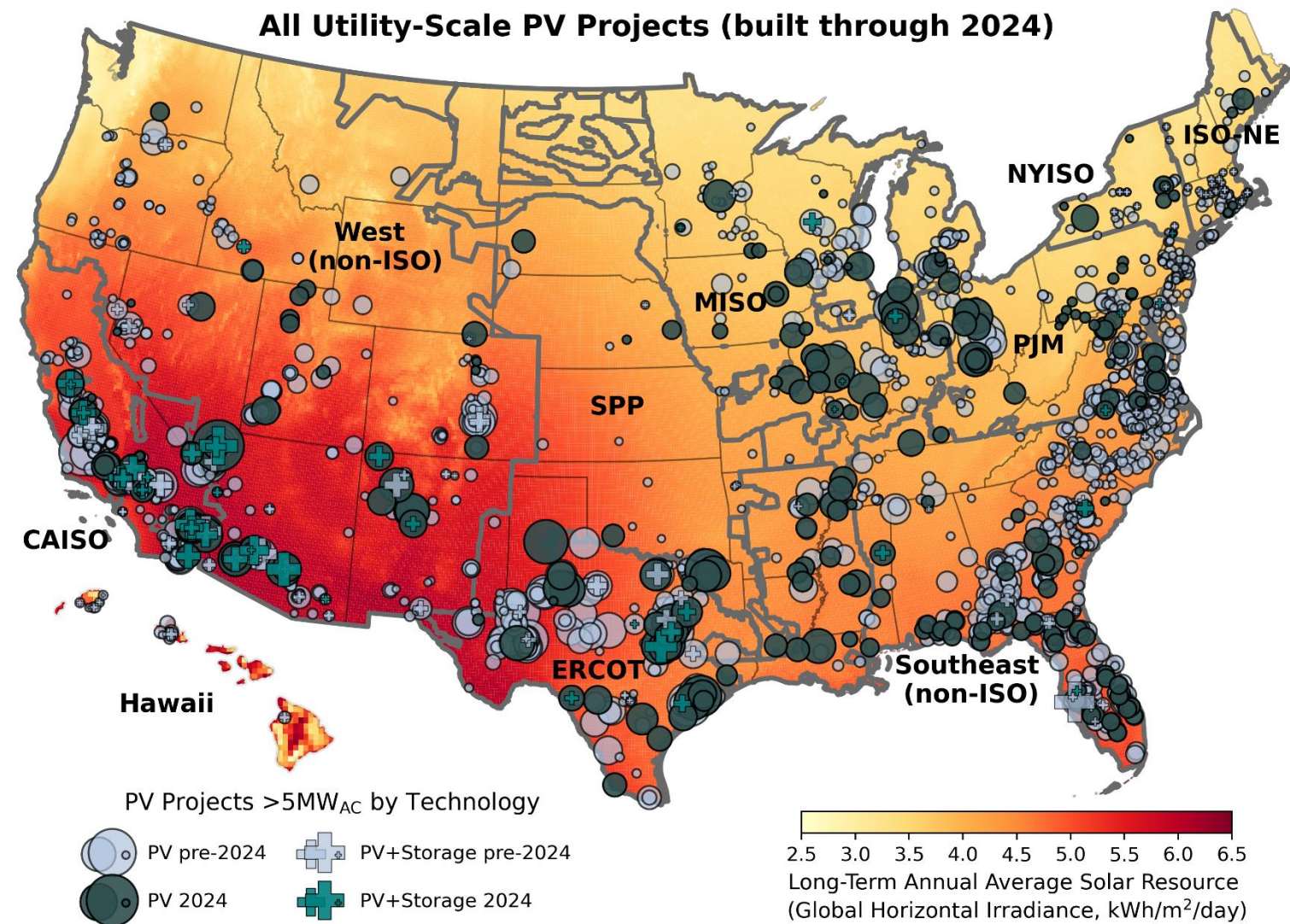
As a percentage of in-state generation, California and Nevada’s utility-scale solar market share exceeded 19% in 2024, while North Carolina, Massachusetts, D.C., New Mexico, and Utah all surpassed 9%.

The utility-scale’s contribution to total solar varies by state: a minority in the Northeast and Hawaii, a majority elsewhere in the U.S.



You can explore this data over time at <https://emp.lbl.gov/capacity-and-generation-state>

Utility-scale solar has been built throughout the United States, but remains concentrated in some regions



Utility-scale PV is found throughout the nation, except for North Dakota and New Hampshire, which do not have any utility-scale solar projects in our sample.

West Virginia had their first large solar projects (up to 80 MW) in 2024. 14 states more than doubled their solar capacity in 2024, led by Missouri, Nebraska, Oklahoma, Kentucky.

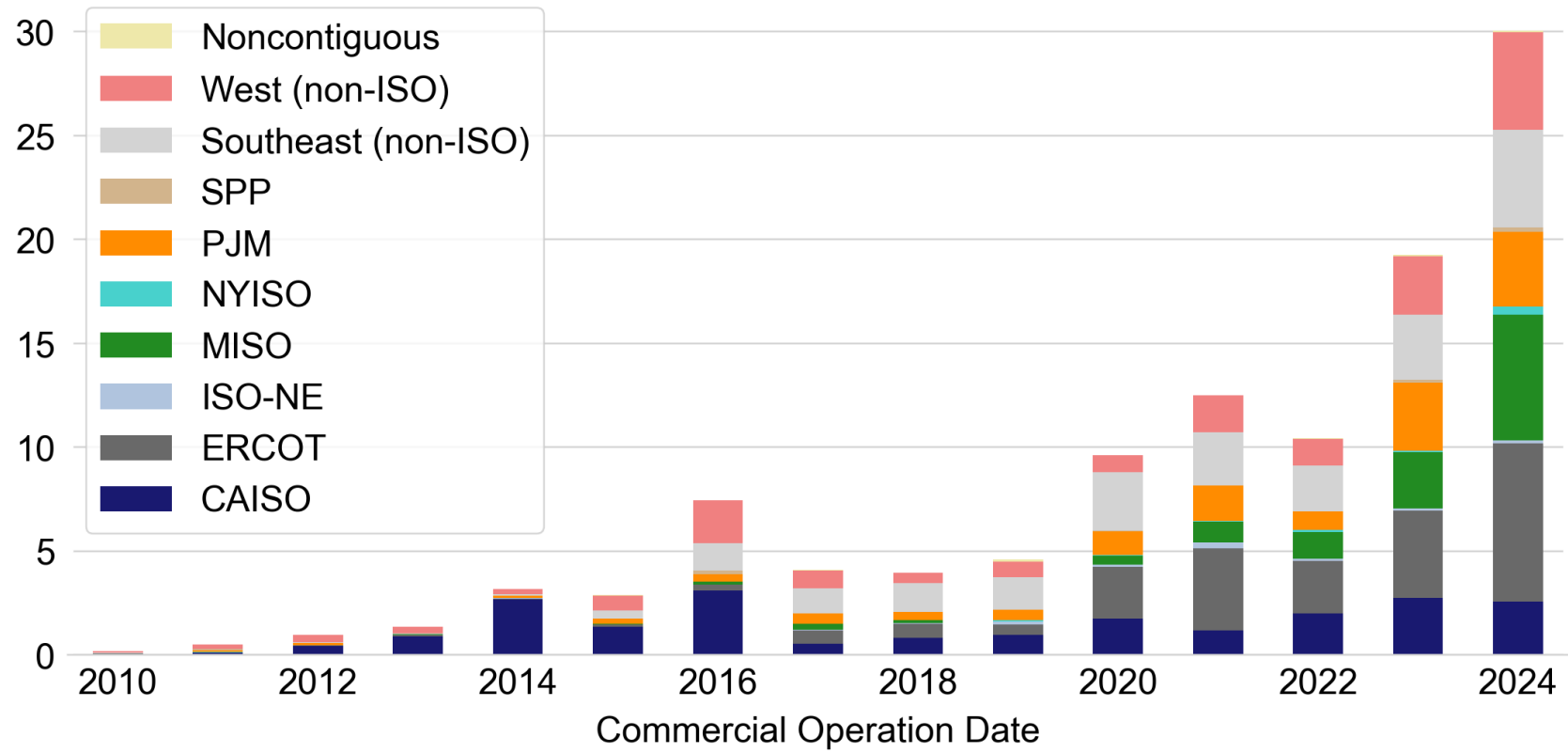
In 2024, PV+storage (+) hybrid projects continued to grow. Batteries were added to already existing (14) and new (35) PV projects. Solar-rich non-ISO West added the most PV-coupled battery capacity (1,905 MW), followed by CAISO (1,465 MW).

ERCOT and MISO added the most utility-scale solar capacity in 2024.

ERCOT and the Southeast have the most total deployment.

PV project sample: 1,759 projects totaling 111 GW_{AC}

Annual Capacity Additions (GW_{AC})



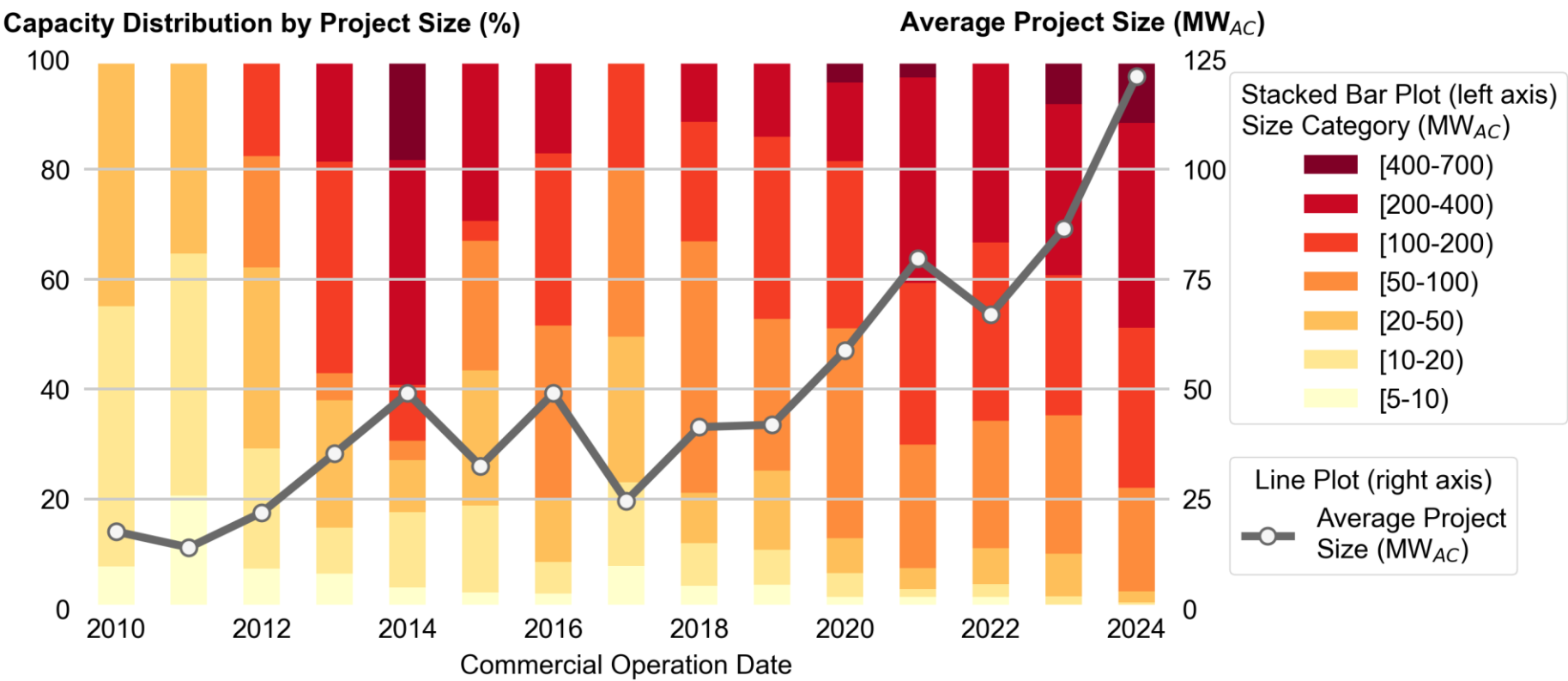
Utility-scale solar deployment in 2024 represents multiple GW of additions in ERCOT (7.6 GW_{AC}), MISO (6.0 GW_{AC}), the non-ISO Southeast and West (both 4.7 GW_{AC}), PJM (3.6 GW_{AC}), and CAISO (2.6 GW_{AC}).

Taking a state perspective, **Texas** added the most with 7.7 GW_{AC} followed by **Florida** (3.2 GW_{AC}), **California** (2.5 GW_{AC}), **Illinois** (1.6 GW_{AC}) and **Ohio** (1.5 GW_{AC}). 9 states added more than 1 GW_{AC} of new capacity.

In cumulative deployment, ERCOT (23 GW_{AC}), the non-ISO Southeast (21 GW_{AC}), and CAISO (also 21 GW_{AC}) have the most. The non-ISO West (17 GW_{AC}) is following closely.

New solar projects are now 120MW_{AC} on average, 40% larger than in 2023 and much larger than in the 2010s

PV project sample: 1,759 projects totaling 111 GW_{AC}



Average project size has grown 7x since 2010 to 120MW_{AC}. 2024 saw 52 projects >200MW_{AC} come online.

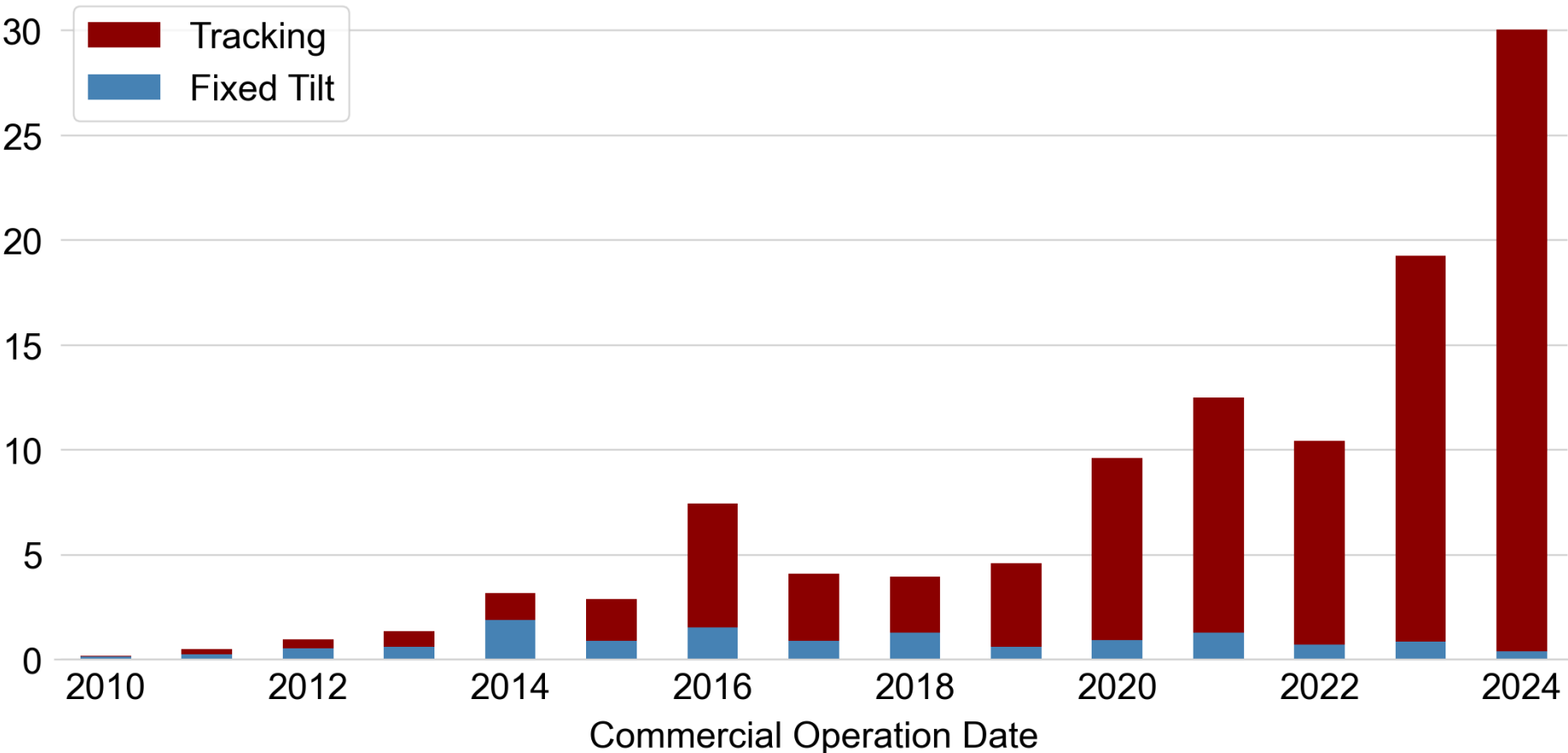
The Gemini Solar project (690MW_{AC}) built in 2024 in NV is the largest to date.

Multiple projects larger than 1GW_{AC} are in the pipeline. Greater project size coincides with slow-moving interconnection queues and economies of scale (discussed [later](#)).

99% of new project capacity chose single-axis tracking over fixed-tilt racking

PV project sample: 1,757 projects totaling 111 GW_{AC}

Annual Capacity Additions (GW_{AC})



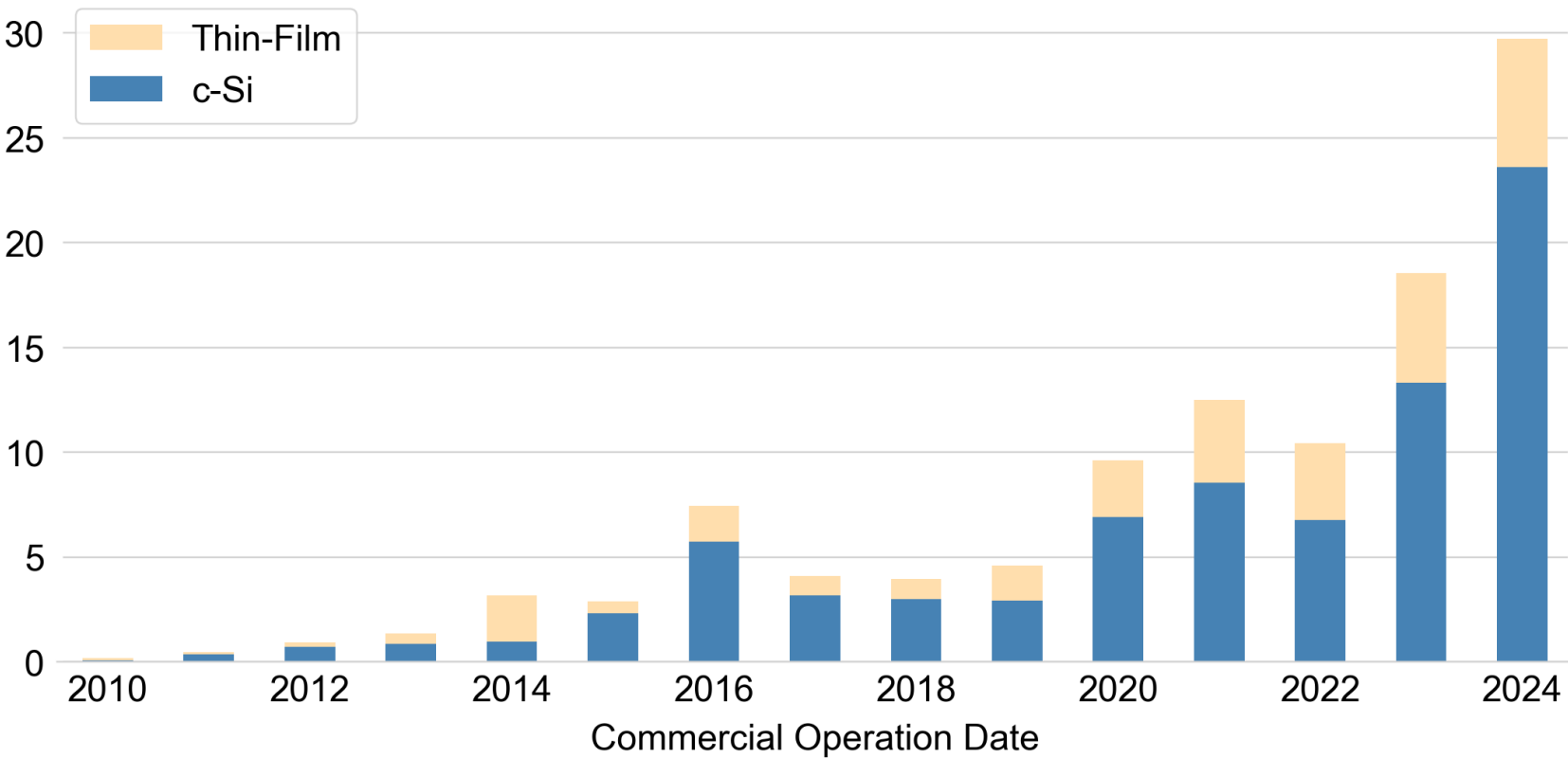
The upfront cost premium for **trackers** faded over time, resulting in favorable overall economics (discussed [later](#)).

Fixed-tilt installations are now only chosen in a few edge cases (challenging terrain or high wind loading).

Use of c-Si modules grew in 2024 to 79% of added capacity

PV project sample: 1,747 projects totaling 110 GW_{AC}

Annual Capacity Additions (GW_{AC})



Note: The 2024 sample includes 2 projects (0.3GW_{AC}) without conclusive module type data which are excluded from the graph above

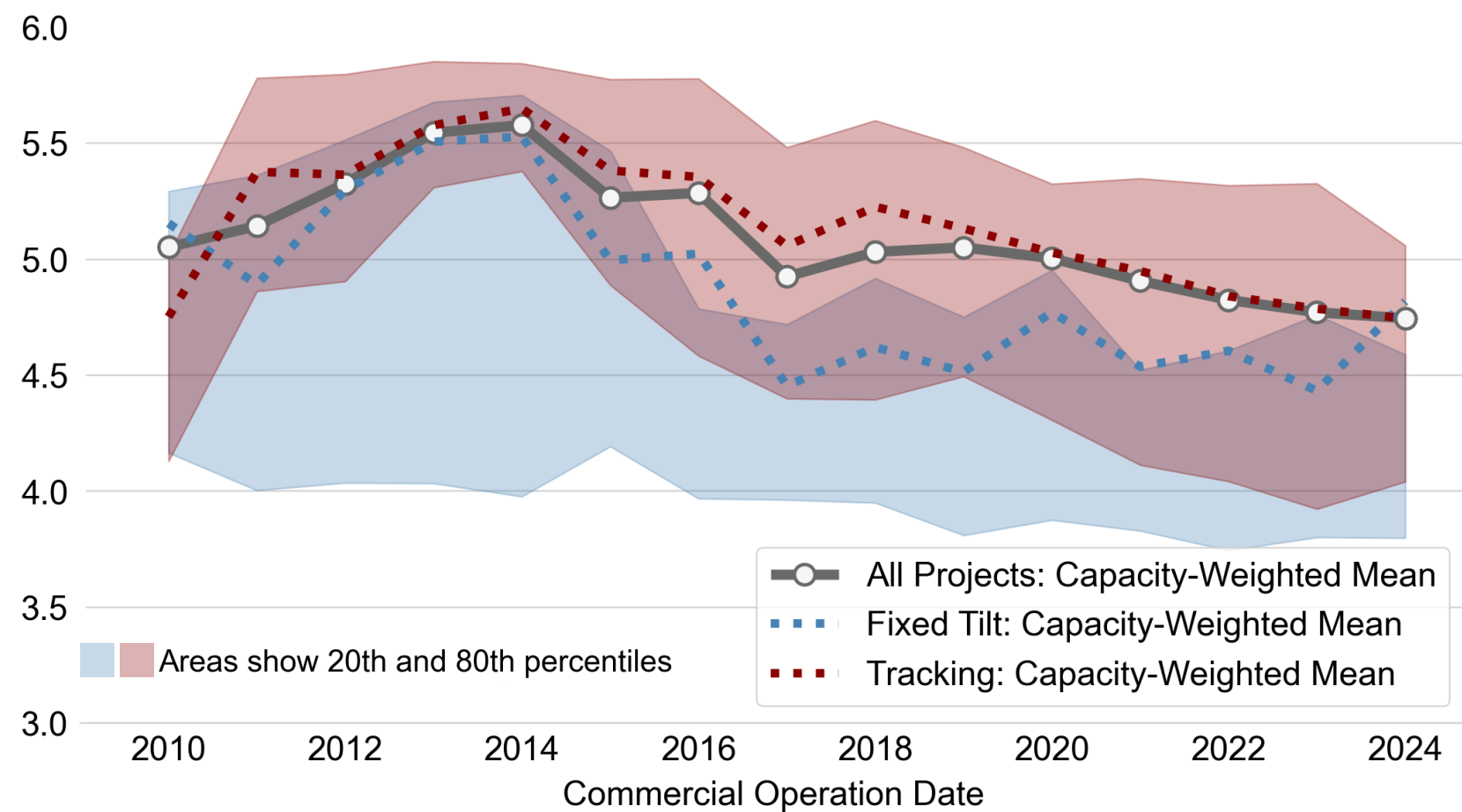
c-Si modules have been the dominant module technology at large-scale solar projects in the US since 2015. After a temporary decline in 2022, c-Si modules expanded their market share in 2024 to 79% of newly installed capacity.

Thin-film modules grew in popularity between 2016 and 2022. In 2024 they reached a new annual deployment record of 6 GW_{AC}, even though their market share declined.

Solar projects were built in very solar-rich areas in the early 2010s. Since then, utility-scale solar projects have expanded to regions with lower resource quality.

PV project sample: 1,758 projects totaling 111 GW_{AC}

Long-Term Average Annual GHI at Newly-Built Sites (daily kWh/m²)



Sites built in 2014 had the highest average long-term global horizontal irradiance (**GHI**). Since then, the market has expanded to less-sunny states and the long-term GHI at sites built in 2024 was down to 4.75 kWh/m²/day.

Fixed-tilt PV is now primarily built at lower-insolation sites, while **tracking** PV is increasingly deployed in those same areas (note the decline in its 20th percentile).

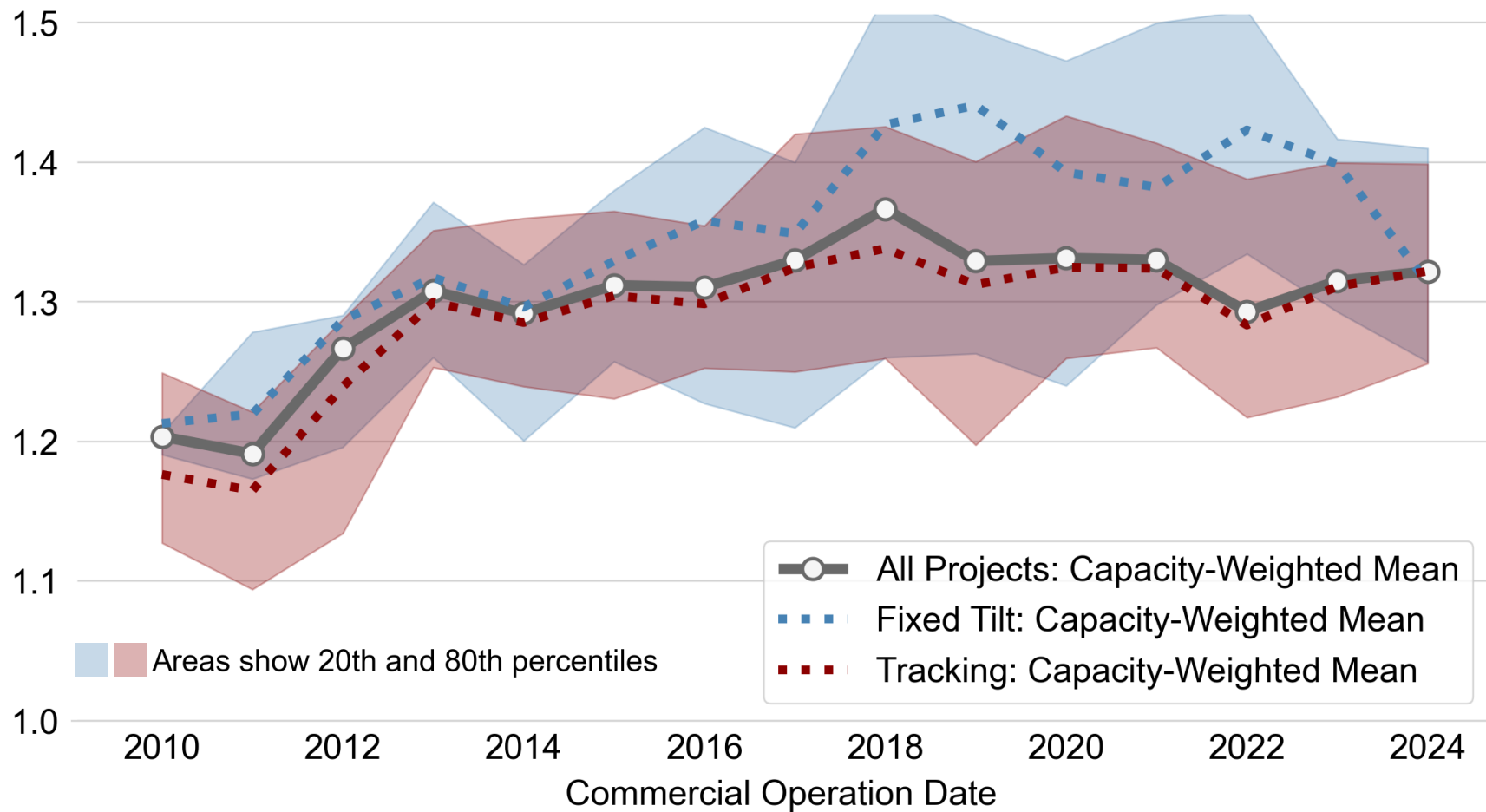
Exceptions are fixed-tilt installations in windy regions (Florida), on brownfields and landfill sites, and on particularly challenging terrain. Only 2 out of 13 of these new 2024 projects have a south-western orientation to maximize evening production.

All else equal, the buildout of lower-GHI sites dampens solar energy production per installed capacity (shown in sample-wide capacity factors [later](#)).

The average inverter loading ratio (ILR) has held steady since 2017

PV project sample: 1,726 projects totaling 107 GW_{AC}

Inverter Loading Ratio (DC:AC Capacity)



As module prices have fallen (faster than inverter prices), developers have oversized the DC array capacity relative to the AC inverter capacity to enhance revenue and reduce output variability.

In 2024, the capacity-weighted average *inverter loading ratio* (**ILR**: MW_{DC} to MW_{AC} ratio) did not differ meaningfully between fixed-tilt installations and tracking projects.

All else equal, a higher ILR should boost capacity factors denominated in AC terms (discussed [later](#)).



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Capital Costs (CapEx) and Operation & Maintenance (O&M) Costs

Capital and Operation & Maintenance Costs: data and methodology

CapEx Data:

- Project-level capital expenditure (CapEx) estimates are sourced from a combination of Form EIA-860, Section 1603 grant data from the U.S. Treasury, FERC Form 1, data from applicable state rebate and incentive programs, state regulatory filings, company financial filings, interviews with developers and owners, and trade press articles.
- CapEx estimates for projects built from 2013-2024 have been cross-checked against confidential EIA-860 data obtained under a non-disclosure agreement. Estimates for projects with 2024 COD are still preliminary both in scope and accuracy of individual data points and may not be representative of final numbers that will be published later by EIA. LBNL did not include all preliminary data points after a data review and will provide revised estimates in a later update.

CapEx Methods:

- We present data in $\$/W_{AC}$ terms to facilitate cost comparison between generators of multiple fuel types. The accompanying data file on utilityscalesolar.lbl.gov also provides detailed data in $\$/W_{DC}$ terms. CapEx is adjusted from nominal to real \$ using BEA's implicit GDP price deflator ([Table 1.1.9](#)).
- We define cost scope in close alignment with [EIA's 860](#) Schedule 5B (p29) to include:
 - construction costs (civil and structural costs, equipment and installation, electrical and instrumentation, indirect costs (incl. overhead and profits) and owner costs (incl. tie-in and potential transmission network upgrades)). For a detailed analysis of interconnection costs of utility-scale solar see https://emp.lbl.gov/interconnection_costs.
 - construction finance costs.
- We first show costs for PV standalone projects (or PV component costs of hybrid projects). Storage costs are discussed later in the hybrid section.

O&M Data:

- Plant-level operation and maintenance costs, capacity, net generation, and construction year are sourced from FERC Form 1 Annual Reports, which are filed by major electric utilities.

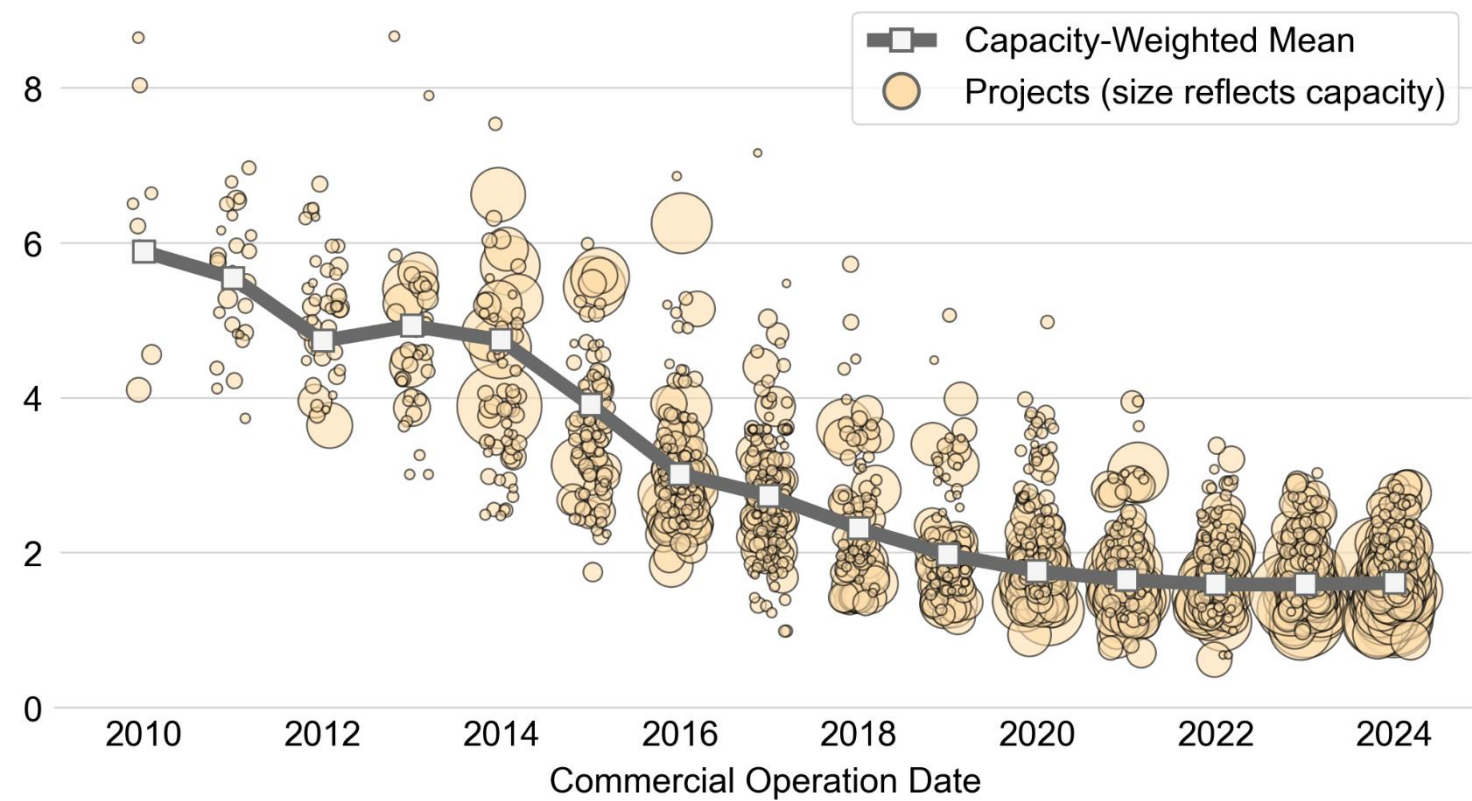
O&M Methods:

- We exclude O&M cost observations from the year a plant was constructed to avoid data based on a partial year of operations.
- We also exclude projects ≤ 5 MW in size, consistent with our definition of utility-scale.
- We present data for combined operations and maintenance costs in $\$/kW_{AC}$ (capacity denomination) and $\$/MWh$ (generation denomination) terms.

Installed costs of PV were \$1.6/W_{AC} (\$1.2/W_{DC}) in 2024

PV project sample: 1,629 projects totaling 104 GW_{AC}

Installed Project Capex (2024\$/W_{AC})



Note: Estimates for projects with 2024 COD are still preliminary both in scope and accuracy of individual data points and may not be representative of final numbers that will be published later by EIA.

Costs for installed utility-scale PV fell by 73% between 2010 and 2022 but have been flat or slightly increased since then in real dollar terms.

Capacity-weighted means (reflecting the average costs of solar capacity) increased from \$1.59/W_{AC} in 2023 to \$1.61/W_{AC} in 2024.

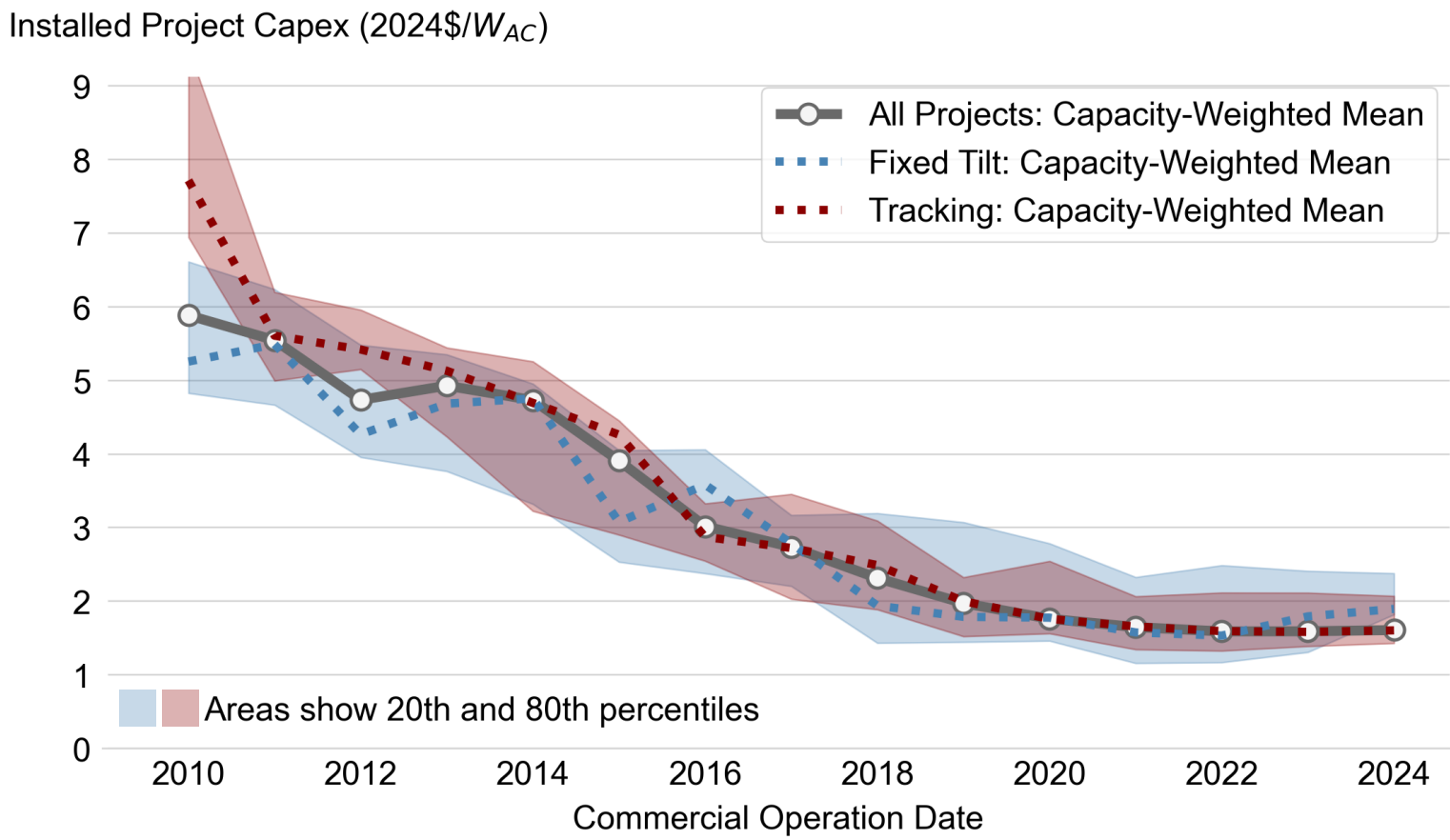
Medians (reflecting typical project costs, not shown in graph) increased from \$1.64/W_{AC} in 2023 to \$1.70/W_{AC} in 2024.

Our sample is robust, covering 93% of installed capacity through 2024. 2024 data covers 92% of new projects (227) or 88% of new capacity (26.4 GW_{AC}).

Data presented here refers only to PV costs (additional battery costs of hybrid projects are discussed later).

2024 tracking projects cost less than fixed-tilt projects

PV project sample: 1,629 projects totaling 104 GW_{AC}



Note: Estimates for projects with 2024 COD are still preliminary both in scope and accuracy of individual data points and may not be representative of final numbers that will be published later by EIA.

We focus here on cost differences between projects using tracking and fixed-tilt mounting. The graph shows capacity-weighted average costs by mounting type across our sample but does not control for other factors that influence total project costs (equipment, labor, land, grid interconnection, project size...).

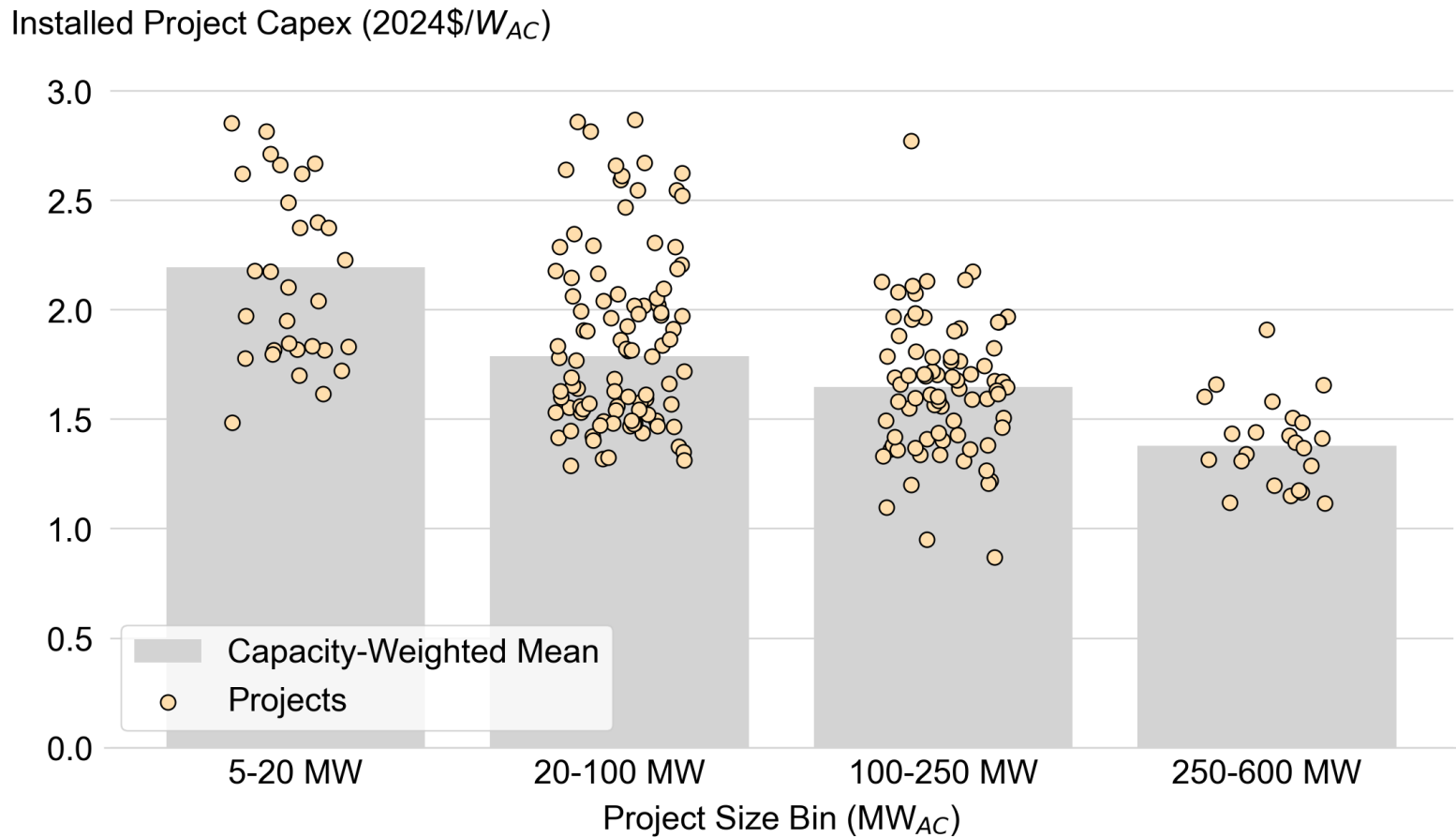
Trackers can sustain some higher upfront costs because they deliver more energy per installed capacity. Historically, tracking projects have often been more expensive, but the cost premium has fluctuated and at times even reversed (like in 2016 and now in 2024).

Beginning in 2020, tracker installations grew rapidly. By 2024, 99% of all new capacity used trackers, and fixed-tilt has only been used at particularly challenging sites (see [earlier slide](#)).

Tracking projects (\$1.61/W_{AC} or \$1.22/W_{DC}) had lower overall costs than fixed-tilt projects (\$1.90/W_{AC} or \$1.35/W_{DC}) in 2024.

Larger solar projects (>250 MW) cost 37% less than smaller (5-20 MW) projects per MW of installed capacity in 2024

PV project sample in 2024: 227 projects totaling 26 GW_{AC}



Note: Estimates for projects with 2024 COD are still preliminary both in scope and accuracy of individual data points and may not be representative of final numbers that will be published later by EIA.

Differences in project size are one major driver in explaining cost variation—we focus only on 2024 for this slide. The apparent economies of scale are likely one reason why average project sizes have grown by a factor of five since 2017.

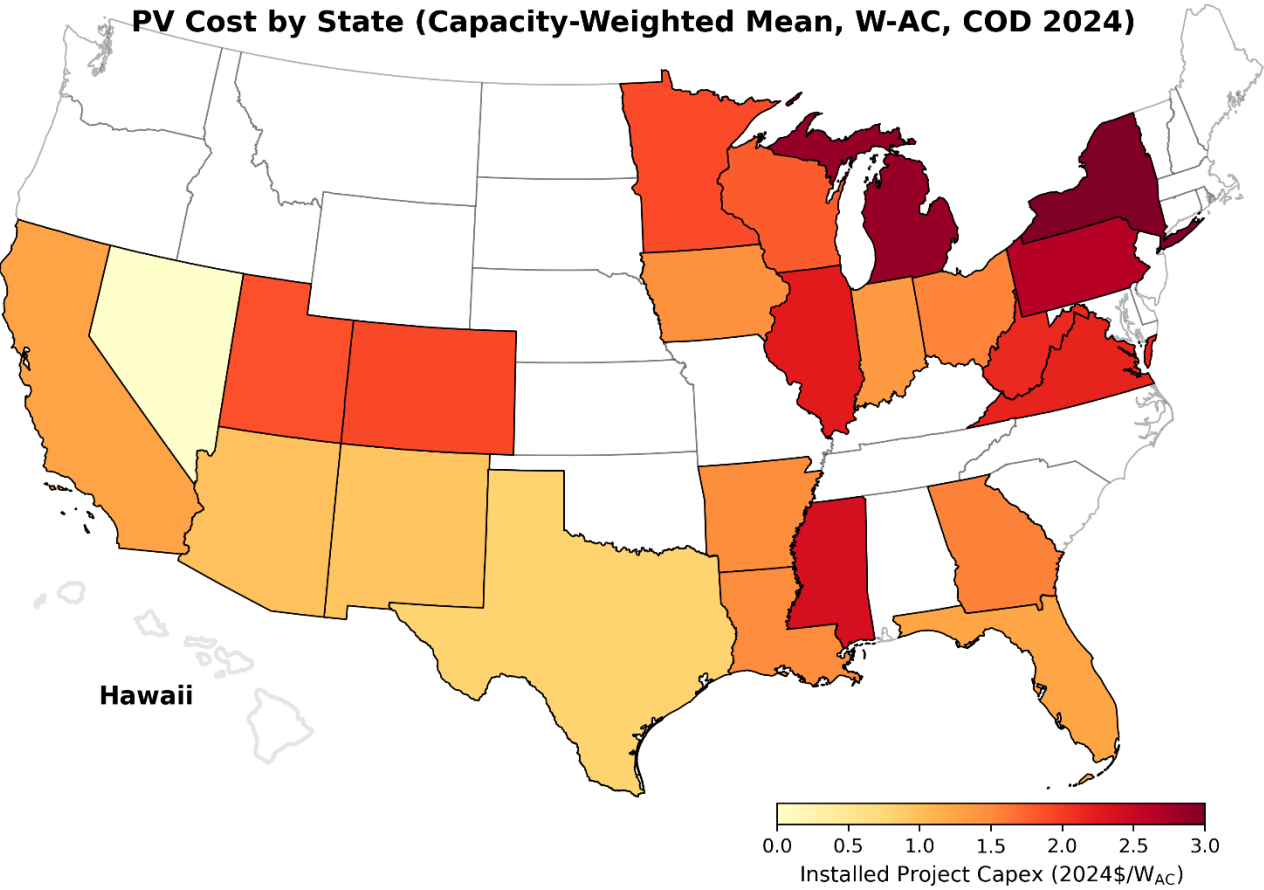
Projects larger than 250 MW_{AC} at \$1.38/W_{AC} cost substantially less than projects smaller than 20MW_{AC} at \$2.19/W_{AC}.

In \$/W_{DC} terms, prices seem to decline especially among projects larger than 100MW_{DC}:

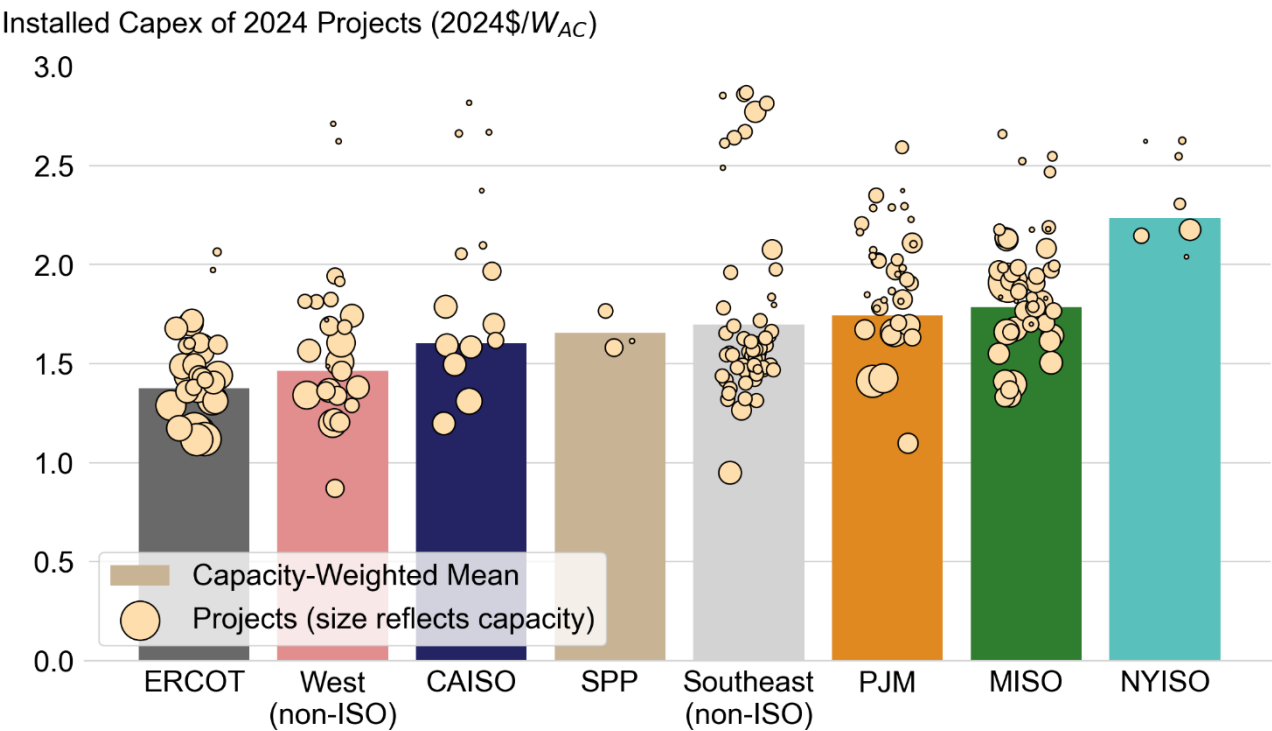
- \$1.62/W_{DC} for 5-20 MW
- \$1.53/W_{DC} for 20-100 MW
- \$1.28/W_{DC} for 100-250 MW
- \$1.10/W_{DC} for 250-800 MW

2024 solar projects in ERCOT and the Southwest were usually cheaper than in the North and East

PV project sample in 2024: 227 projects totaling 26 GW_{AC}



Note: Estimates for projects with 2024 COD are still preliminary both in scope and accuracy of individual data points and may not be representative of final numbers that will be published later by EIA.



Utility-scale solar project costs also vary by region, driven in part by differing project sizes coupled with the previously discussed economies of scale, but also due to land availability, prevailing labor rates and transmission network upgrade costs. Projects in ERCOT (\$1.38/W_{AC} or \$1.06/W_{DC}) and the non-ISO West have lower costs than the northeastern U.S.

PV projects now spend much less on operation and maintenance (O&M) during their first few years than projects built in the 2010s

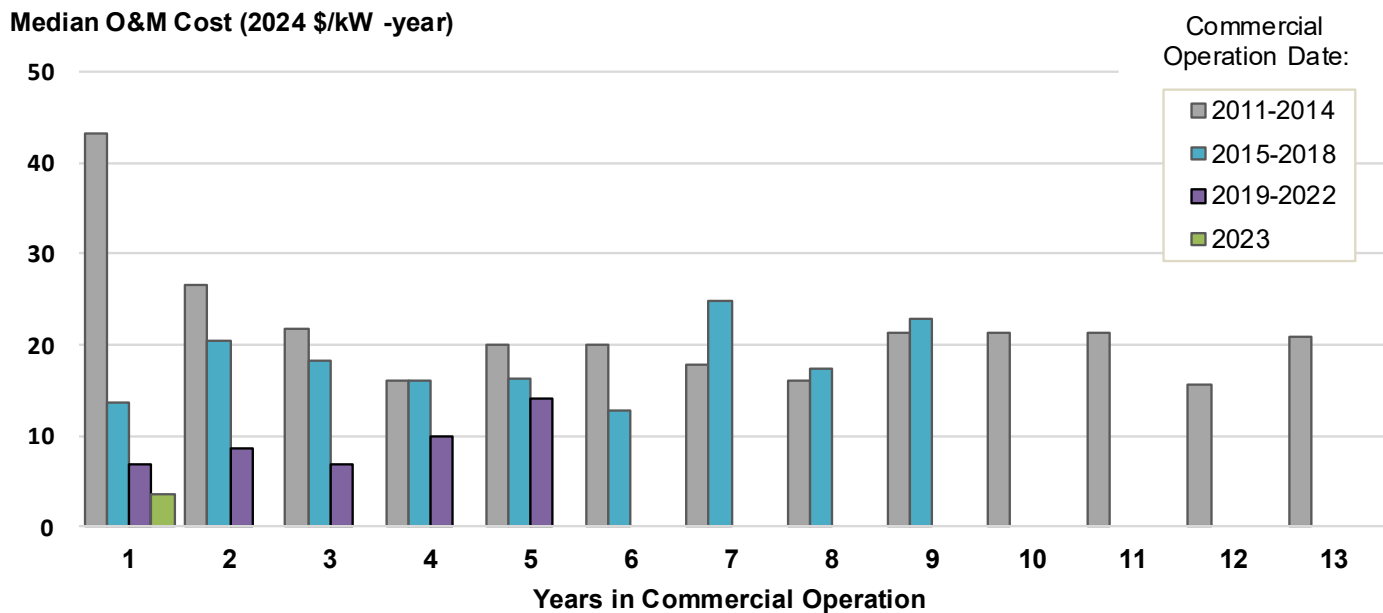
PV project sample in 2024: 187 projects totaling 10.0 GW_{AC}

Regulated utilities report annual solar O&M costs for plants that they own, representing a mix of technologies and at least one full operational year.

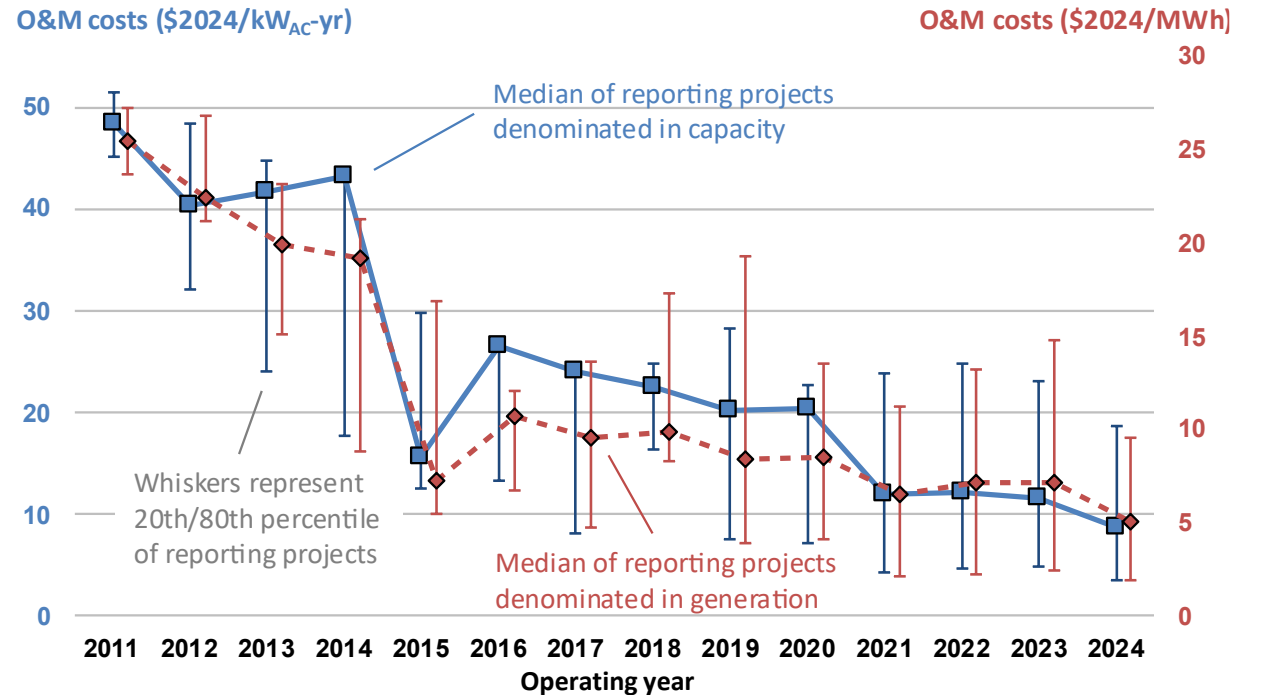
These O&M costs are only one part of total operating expenses.

Cost Scope (per guidelines for FERC Form 1):

- Includes supervision and engineering, maintenance, rents, and training
- Excludes payments for property taxes, insurance, land royalties, performance bonds, various administrative and other fees, and overhead



Projects built since 2019 report much lower O&M costs in their first three years of operation compared to older ones, potentially due to a narrower scope of service agreements. Starting in year 5 of a project’s life there does not appear to be a sustained upward or downward trend in O&M costs.



Median O&M costs for the cumulative sample have declined from about \$40/kW_{AC}-year or \$22/MWh in 2012 to about **\$11/kW_{AC}-year or \$5/MWh in 2024.**



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Performance (Capacity Factors)

PV performance analysis: data and methodology

Net generation data are sourced largely from EIA Form 923. These data reflect net generation and thus exclude energy used by the plant itself. They also exclude energy that was curtailed (for economic or system stability reasons). Outliers and low-quality data are dropped from the analysis. We exclude observations from the first calendar year of the plant’s operation. Since we require one full year of generation data, our performance sample includes projects built through 2023, with generation data through 2024.

Net Capacity Factors (AC) measure a plant’s performance, representing the ratio of its actual annual generation delivered to the grid to the maximum possible annual output if it operated continuously every hour of the year.

$$\text{Annual Net Capacity Factor} = \frac{\text{Annual Net Generation (MWh)}}{\text{Capacity (MW}_{AC}) * \text{number of hours in year}}$$

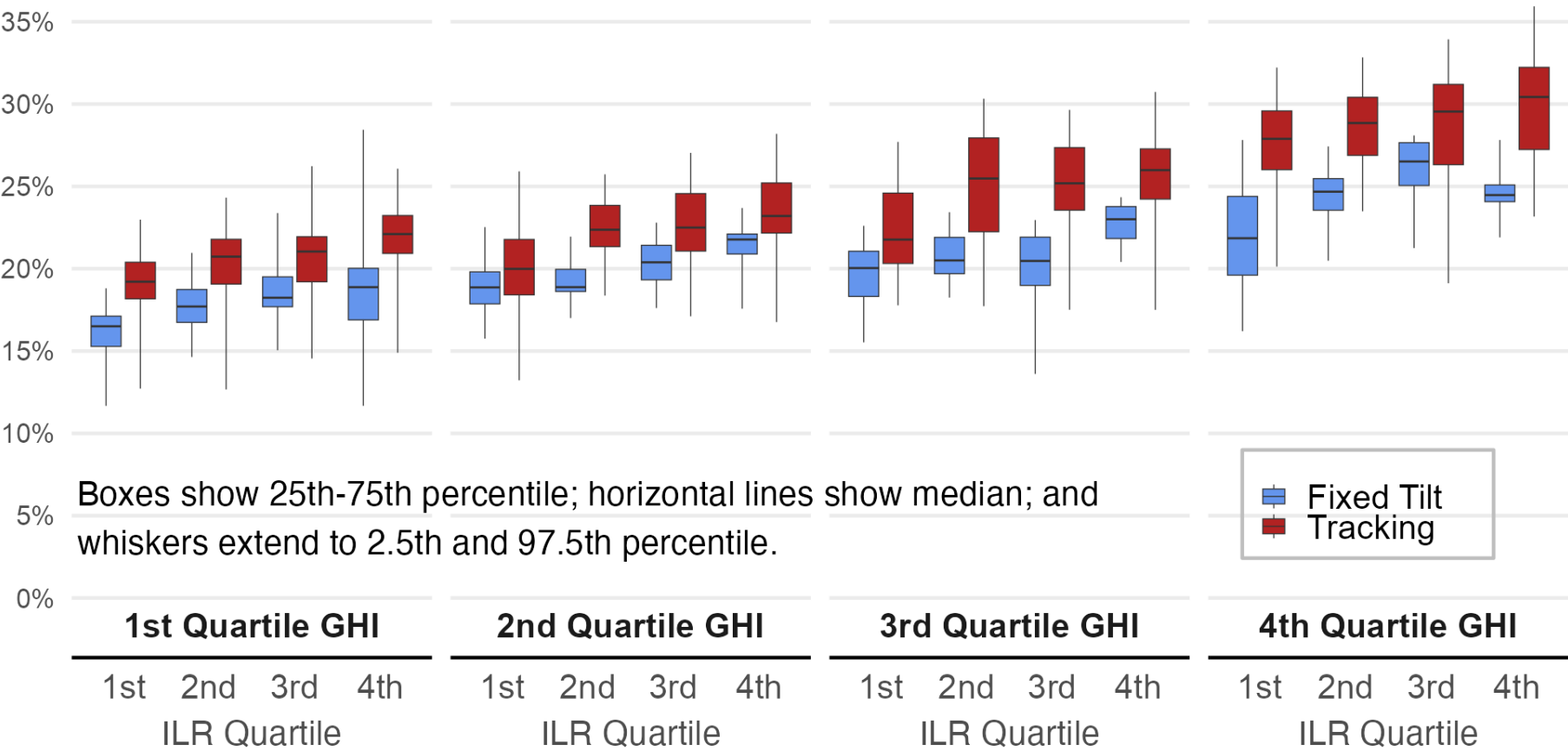
We use MW_{AC} capacity terms in our capacity factor calculations to facilitate comparisons with other bulk system generator types.

Annual generation can vary based on weather and climate variability, system degradation, system uptime, or curtailment. We thus present primarily **cumulative net capacity factors**, which represent the average capacity factor over the lifetime of a project up until the most recent reported period (i.e., no future modeled generation data).

PV performance varies widely among projects, driven by resource availability and project design choices

PV project sample: 1,461 projects totaling 79.3 GW_{AC}

Cumulative AC Capacity Factor



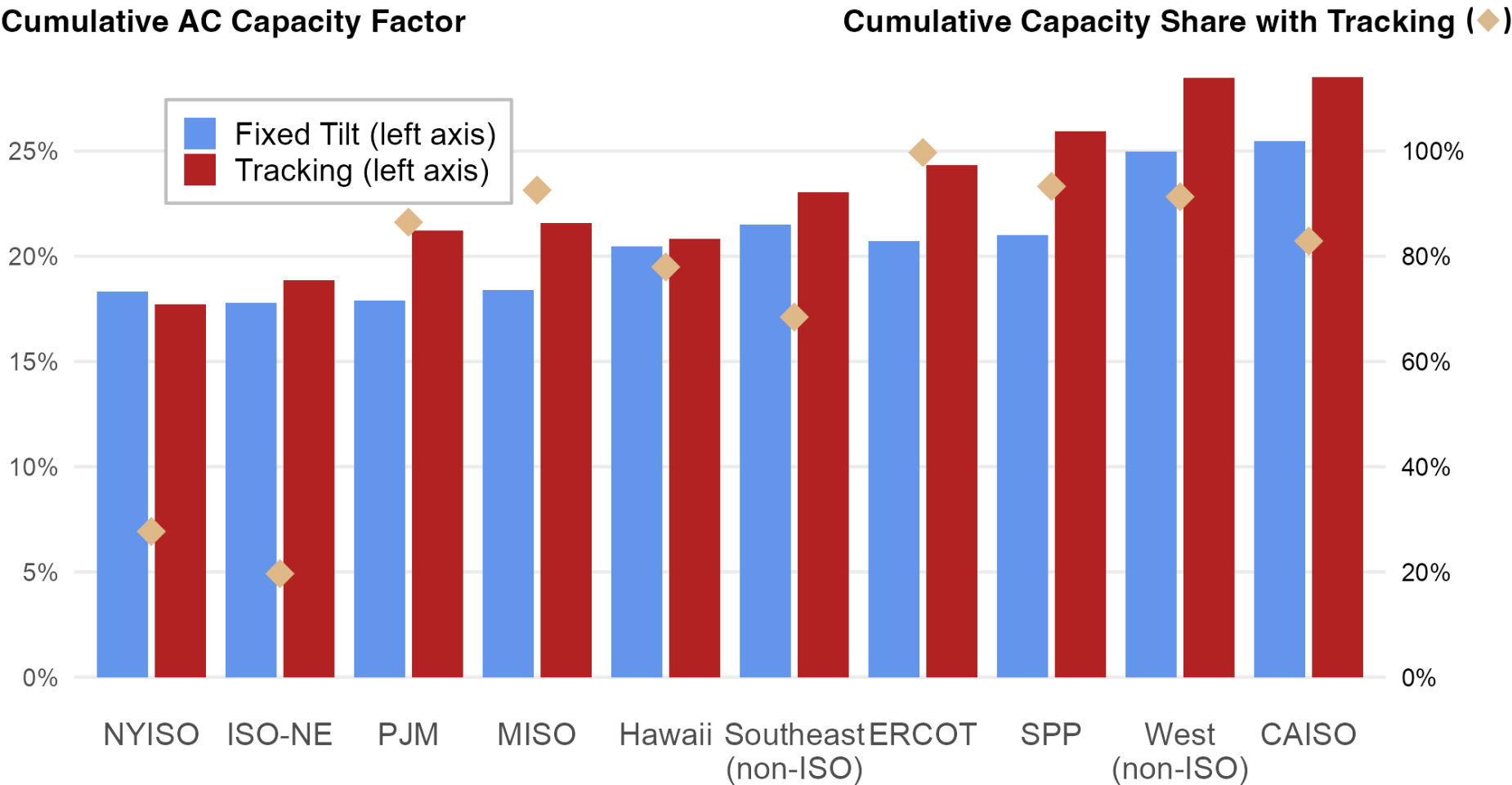
The cumulative net capacity factor is typically around 25% but ranges from 7% to 37% among all projects in our sample.

Project-level variation in PV capacity factor is driven by:

- ❑ **Solar Resource (GHI):** Strongest solar resource quartile (right-most panel) has 9 percentage point higher median capacity factor than lowest resource quartile (left-most panel)
- ❑ **Tracking:** **Tracking** adds 5 percentage points to median capacity factors on average vs. **fixed tilt**, with improvement from tracking more pronounced in higher solar resource areas
- ❑ **Inverter Loading Ratio (ILR):** Highest ILR (DC/AC ratio) quartiles (right-most within each panel) have on average 1 percentage point higher capacity factors than lowest ILR quartiles

Tracking boosts capacity factors by 5 percentage points in high-insolation regions

PV project sample: 1,465 projects totaling 79.9 GW_{AC}



Capacity factors are highest in California and the non-ISO West, and lowest in the Northeast (ISO-NE and NYISO).

Tracking yields more benefits compared with fixed-tilt installations in regions with strong solar resources, leading to a greater proportion of tracking projects in those regions.

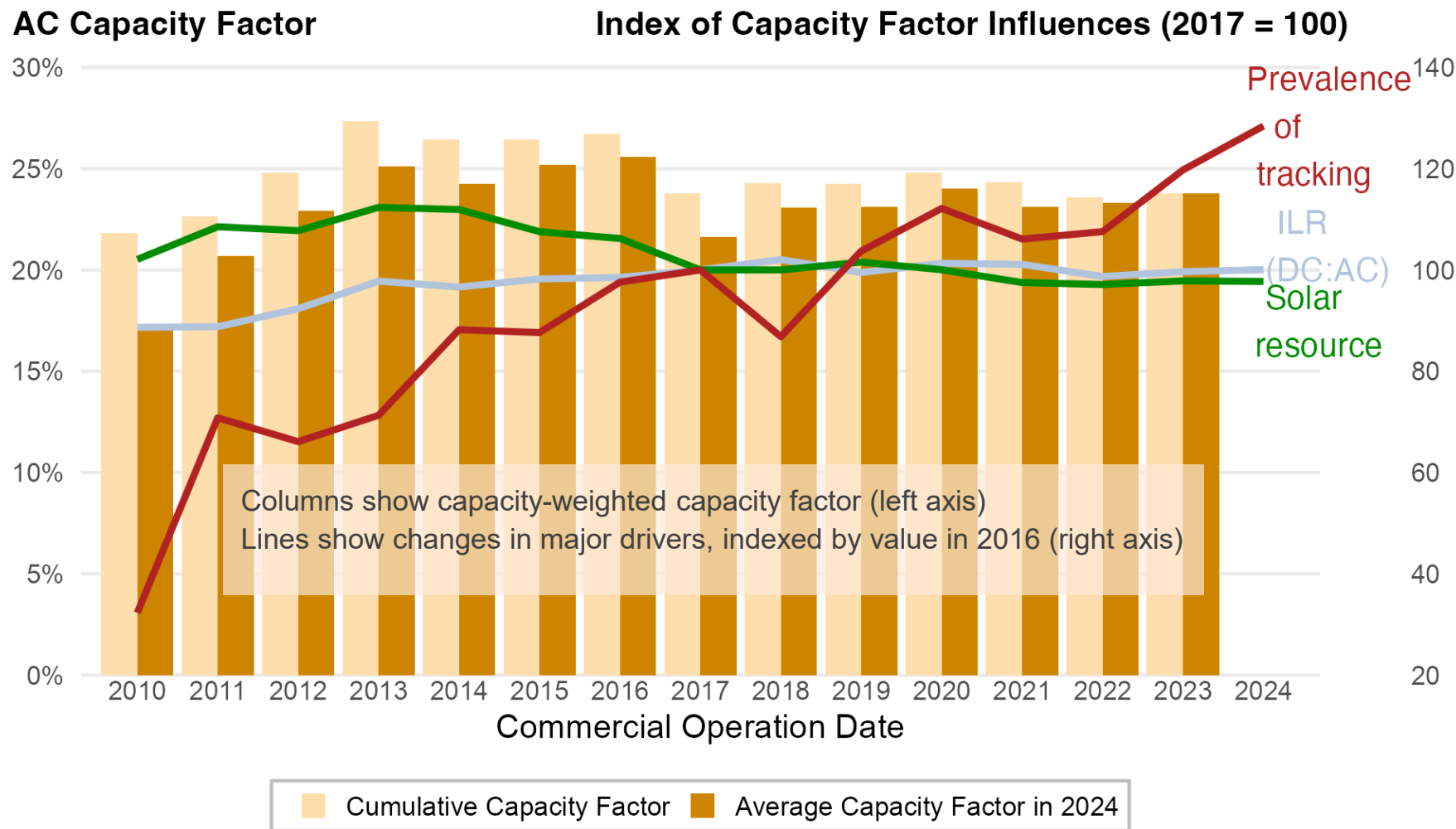
Notes: Capacity factors represent weighted means by capacity (MW_{AC}) across all years of data. The one utility-scale solar project in Alaska is excluded from this plot.



You can explore this data interactively at <https://emp.lbl.gov/pv-capacity-factors>

Since 2013, competing drivers have caused average capacity factors by project vintage to stabilize

PV project sample: 1,462 projects totaling 79.7 GW_{AC}



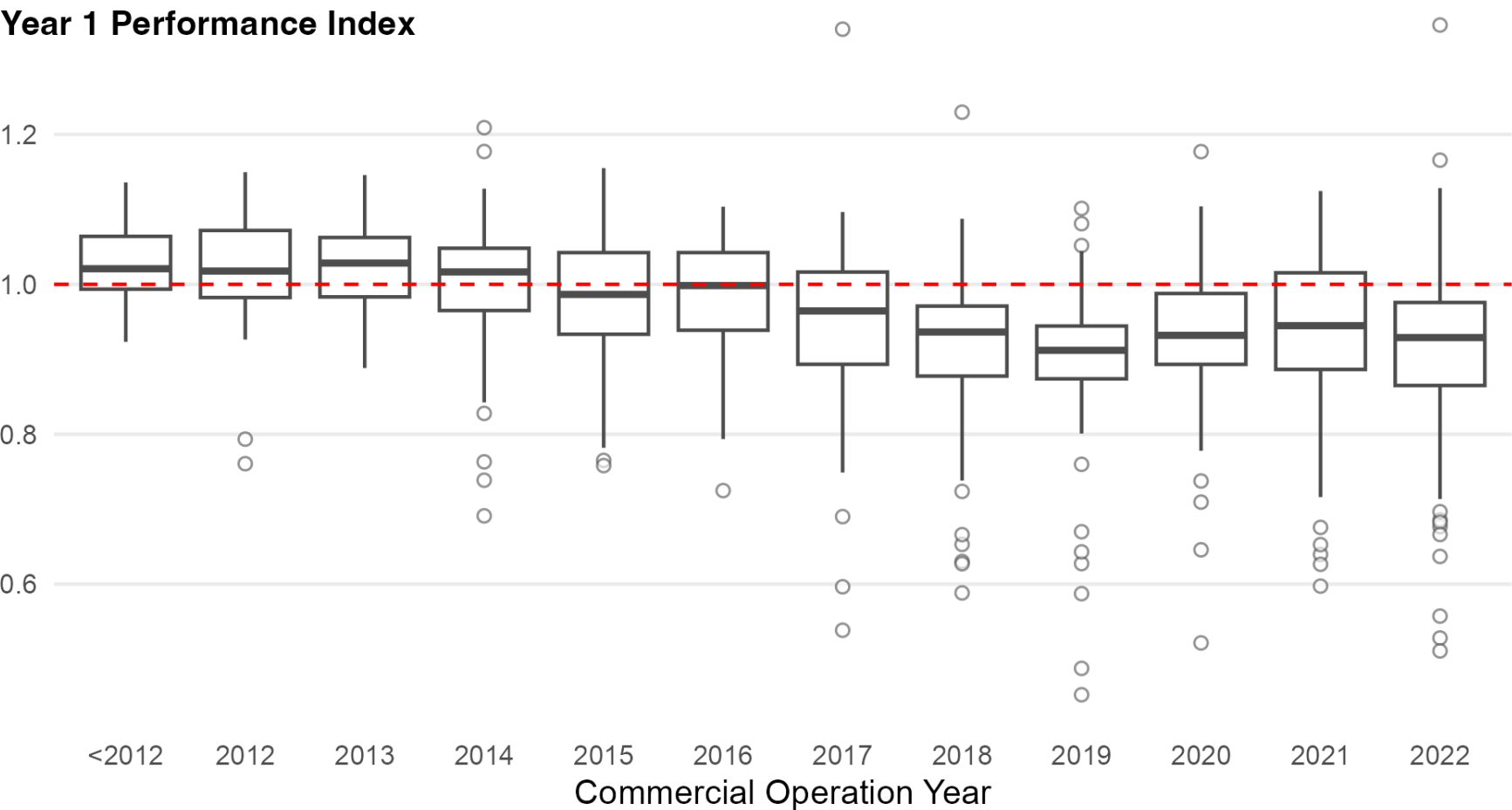
Cumulative capacity-weighted capacity factors increased from 2010 to 2013 due to greater DC-oversizing, adoption of single-axis tracking, and better solar resource sites.

Since 2013, capacity factors have declined and stagnated due to mixed factors: while tracking has become widespread (53% to 95%) and ILR has seen minor growth, new projects have expanded into less sunny regions (average capacity-weighted site GHI decreased from 5.55 to 4.76 kWh/m²/day between 2013 and 2023).

First-year performance index—actual vs. modeled capacity factor—declines in more recent project vintages

PV project sample: 1,149 projects totaling 60 GW_{AC}

Year 1 Performance Index



The Performance Index (PI) compares real-world operations of a PV project to simulated generation using location and year-specific weather data. An index smaller than 1 indicates underperformance. We focus on the first operational year after COD to sidestep early teething issues and long-term degradation effects. For projects in CA and TX, we adjust for curtailment effects.

More recent vintages have lower year one PIs than older ones, with 2022 plants having a median PI of 93%. This decline in newer vintages may be driven by factors that have become more common over time, including weather impacts (wildfire smoke, hailstorms, hurricanes, etc.) and/or higher DC:AC ratios (sub-hourly clipping is not captured well by hourly modeling).

Notes: We use site-level weather data from NREL’s [National Solar Radiation Database](#) (NSRDB) and plant-specific characteristics to model plant output using NREL’s [System Advisor Model](#) (SAM). SAM and NSRDB are models and may have biases.

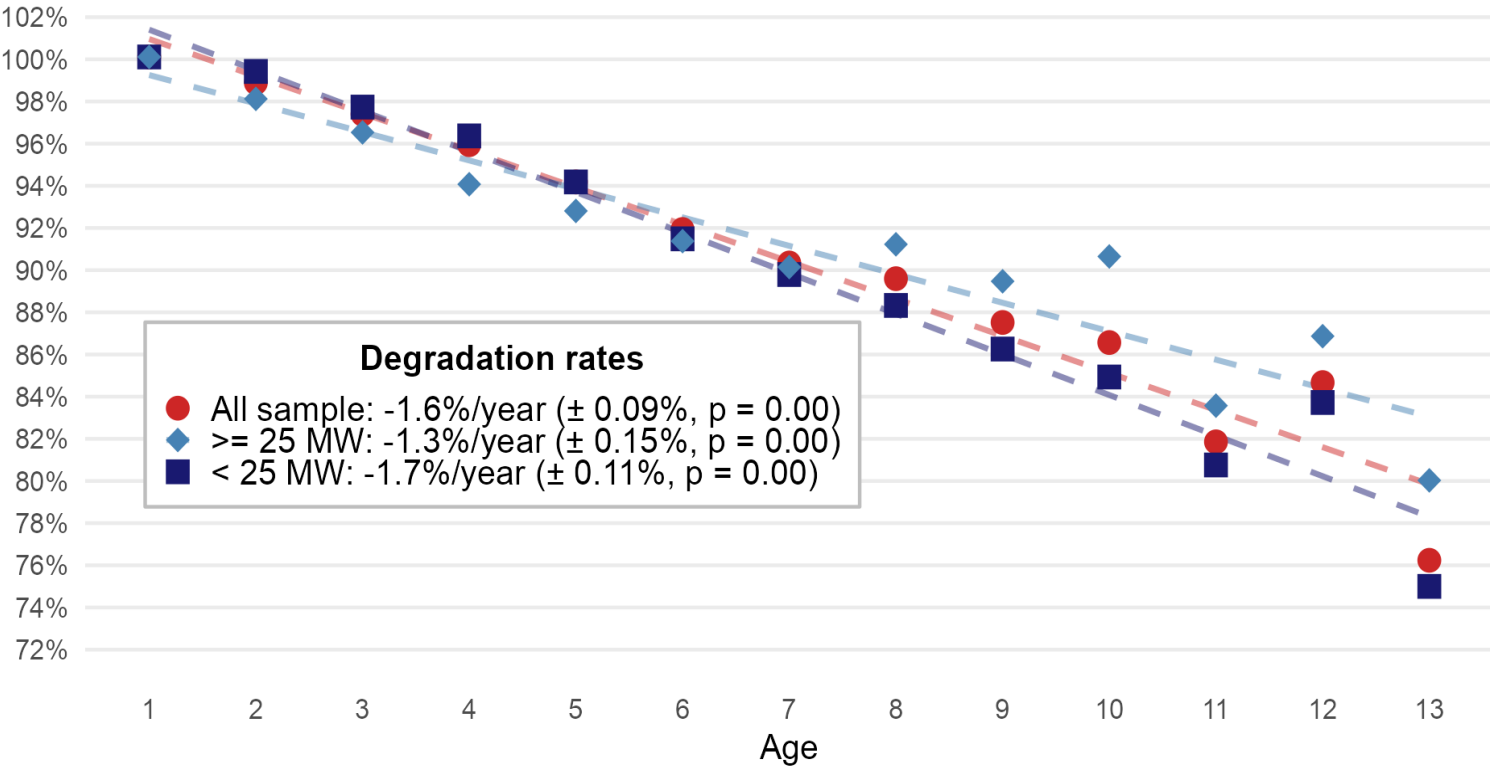


Sample includes plants built through 2022 due to availability of NSRDB data (through 2023).

Project output declines with age at an average annual degradation rate of 1.6%, but larger projects degrade more slowly

PV project sample: 1,045 projects totaling 51 GW_{AC}

Indexed Capacity Factor (Age 1 = 100%)



Note: Sample includes plants built through 2021 with performance data through 2023 (model requires two years of performance and weather data, and public weather data from NSRDB is only available through 2023 at time of analysis).

Our degradation analysis measures total project-level performance, including possible impacts from module degradation, inverter or breaker failure, stuck trackers, or soiling. We find an annual degradation rate of 1.6%, with variation by project size: larger projects (≥ 25 MW_{AC}) average 1.3%, while smaller projects (< 25 MW_{AC}) average 1.7%. While we attempt to correct for curtailment in CA and TX, limited high-quality project-level curtailment data and increasing curtailment in other regions may contribute to the apparent decline in performance.

Fixed effects regression model defined by:

$$CF_{f,t}^{actual} = CF_{f,t}^{ideal} + S_f + A_T + \epsilon_{f,t}$$

where:

$CF_{f,t}^{actual}$ = Actual capacity factor of project f at time t (raw empirical data, but grossed up for curtailment in CAISO and ERCOT)
 $CF_{f,t}^{ideal}$ = "Ideal" capacity factor of project f at time t, estimated based on physical project characteristics and solar resource at the site
 S_f = Site-level fixed effects of project f to control for differences in capacity factor across projects
 A_T = Age fixed effects at time t to control for differences in capacity factor within projects
 $\epsilon_{f,t}$ = Residual of project f at time t



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Levelized Cost of Energy (LCOE) and Power Purchase Agreement (PPA) Prices

LCOE analysis: data sets and methodology

Methods:

- For our project-level LCOE estimates of solar projects we follow the formula published in NREL's [Annual Technology Baseline](#), describing the average costs to generate a MWh over the lifetime of a project.
- We use LCOE as proxy for direct generation costs in later parts of this publication. It is important to note that additional "system" or "integration" costs (transmission needs beyond what is captured via interconnection costs, resource adequacy /capacity needs, LMP congestion components or ancillary service costs) are not accounted for here.

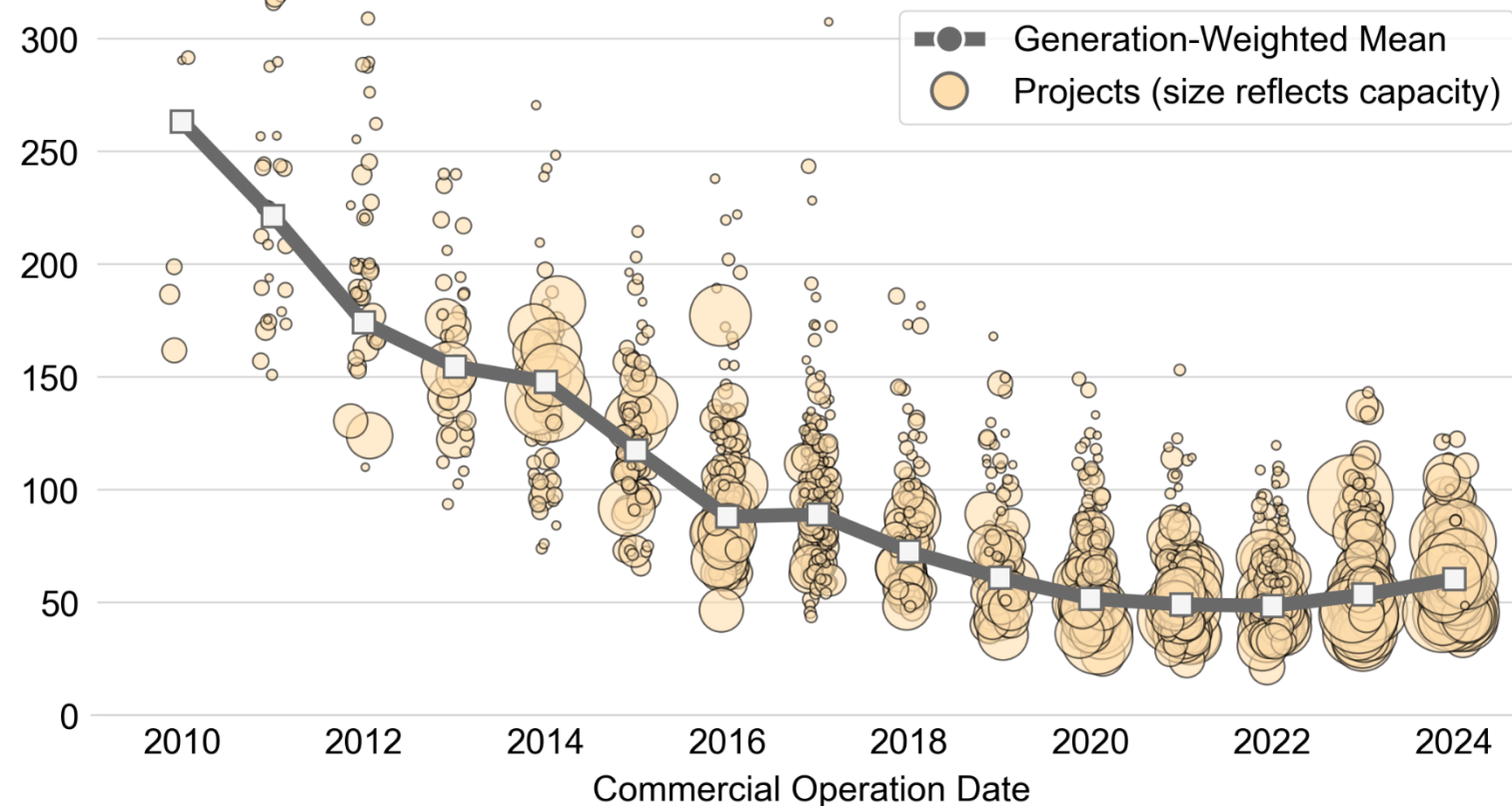
Data and Assumptions:

- LCOE will be presented first without and then later with inclusion of federal tax credits (assuming labor requirements for ITC and PTC are met, including Energy Community adders where applicable, but assuming no Domestic Content adders).
- Project-level variation:
 - **CapEx:** LCOE is only calculated for projects with empirical cost estimates, only costs of solar components are used for PV-battery projects.
 - **Net Capacity Factor:** We use empirical annual NCF estimates based on EIA 923 data when available. For missing and future years we assume annual degradation rates ranging between 1.74% (projects <25MW) and 1.28% (projects ≥25MW). For projects without any reported generation (e.g., most recent COD cohort) we use the regional average NCF of recent projects. NCF is levelized over the project design life. For hybrid projects we decrease the solar NCF to account for round-trip efficiency losses, assuming a battery cycling of once a day.
- Cohort-level variation:
 - **OpEx** is levelized and declines from \$50/kW_{DC}-yr in 2007 to \$25/kW_{DC}-yr in 2024 (in 2024\$, based on prior LBNL and NREL Benchmarks). For hybrid projects we assume a battery replacement after 15 years with replacement costs derived from NREL ATB (80% of moderate cost scenario, scaled to capacity and duration).
 - **Project design life** increases from 21.5 years in 2007 to 35 years in 2021 and thereafter (prior LBNL research).
 - **Weighted average cost of capital (WACC):**
 - based on a constant 70%/30% debt/equity ratio and time-varying market rates.
 - Combined income tax rate of 38.25% pre-2018 and 24.95% post-2017.
 - 5-yr MACRS; forward-looking annual inflation expectations range from -0.2% (early Covid pandemic) to 4.2%.
 - Real WACC for 2024 COD projects is 3.26%.

Average LCOE (without the ITC/PTC) has increased 25% since 2022

Sample: 1,628 projects totaling 104 GW_{AC}

Installed Project LCOE without Tax Credits (2024\$/MWh)



Note: LCOE estimates depicted here do not include tax credit benefits.

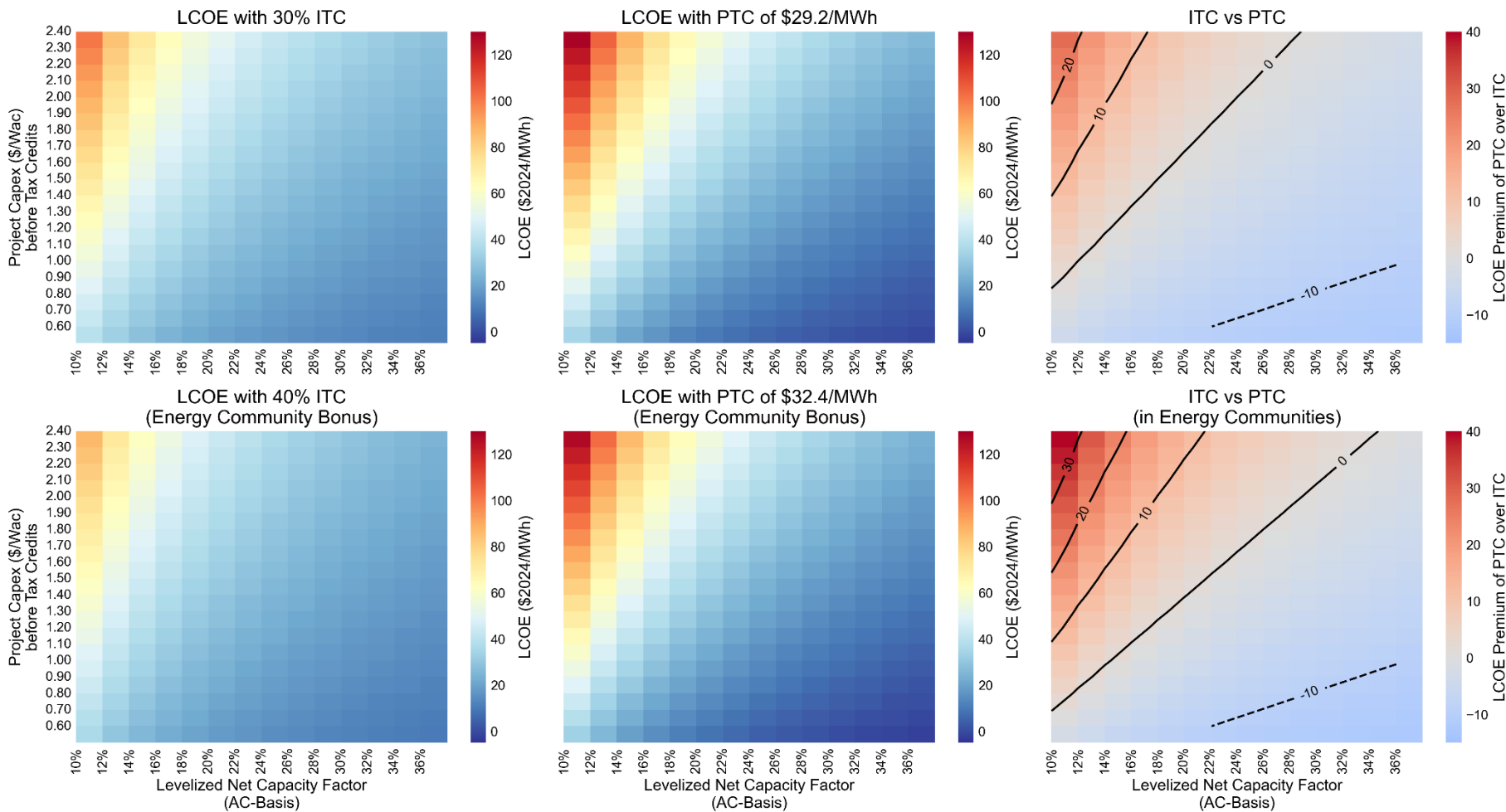
Only preliminary data is available for new solar projects coming online in 2024.

Findings may shift as more final EIA Capex and project-specific performance data become available.

Utility-scale PV's average LCOE fell by 82% between 2010 and 2022 to \$48/MWh, driven by lower capital costs and operating expenses, as well as increased project design life.

Counteracting these longer-term trends are falling national average capacity factors since 2016, higher financing costs since 2020, and most recently, increasing CapEx. As a result, average LCOE (not including any tax credits) increased by 25% since 2022 to \$60/MWh in 2024.

The Production Tax Credit lowers post-credit LCOE more than the Investment Tax Credit for 55% of projects since 2023



Available federal tax credits lower the effective LCOE shown on the previous slides. The graphs show post-incentive LCOE variation by project CapEx and performance, both for the Investment Tax Credit (ITC, left) and the Production Tax Credit (PTC, center). The PTC is paid for the first 10 years (\$29.2/MWh and rising with inflation) – levelized over a 35-year project lifetime it reduces LCOE by ~\$15.8/MWh.

The right column compares the benefit of each tax credit, with red squares showing where the ITC results in a lower LCOE (higher-cost, lower-performing projects) and the blue squares showing where the PTC results in a lower LCOE (lower-cost, higher-performing projects). The bottom row repeats the analyses but includes the bonus adder available for projects sited in Energy Communities.

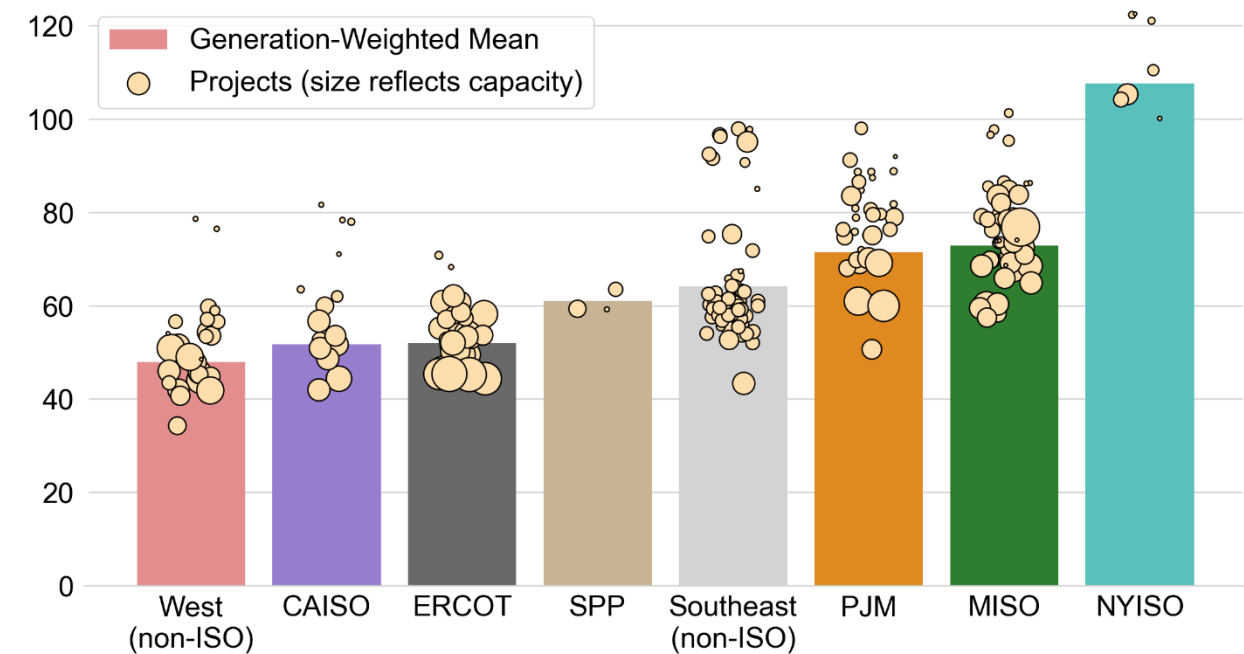
For the 2023 and 2024 COD cohort, preliminary data indicates that about half of all projects (233 out of 424) would benefit more from the Base PTC than the ITC.

LCOE varies between regions due to differences in solar resource quality, project costs, and system size

Sample: 225 projects totaling 26.4 GW_{AC}

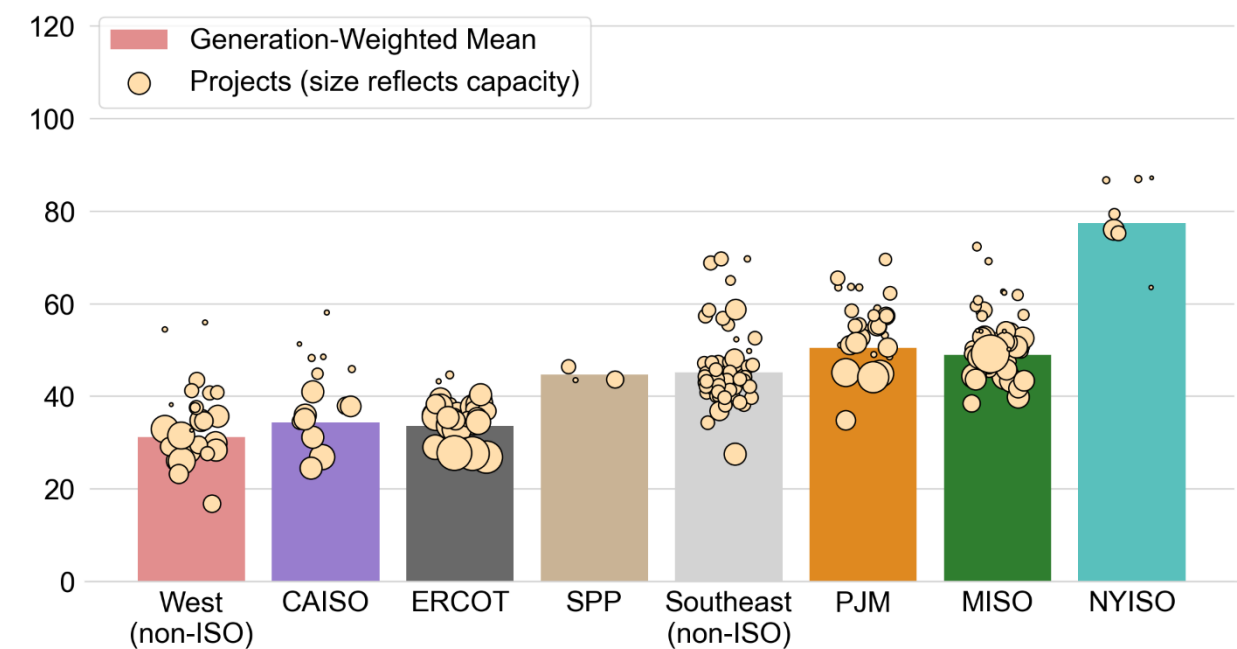
See interactive visualization at <https://emp.lbl.gov/capex-lcoe-and-ppa-prices-region>

LCOE of 2024 Projects without Tax Credits (2024\$/MWh)



Higher insolation regions will always have lower LCOEs compared to less sunny parts of the country. Among projects coming online in 2024, large projects in the non-ISO West (\$48/MWh), and CAISO and ERCOT (\$52/MWh for both) had the lowest cost, while smaller projects in NYISO had the highest cost (\$108/MWh).

LCOE of 2024 Projects with Tax Credits (2024\$/MWh)



Accounting for either the ITC or PTC (whichever results in lower costs), post-incentive LCOE of 2024 projects are \$31/MWh in the non-ISO West, \$34/MWh in CAISO and ERCOT, \$45-50/MWh in SPP, Southeast, MISO and PJM, and \$77/MWh in NYISO.

Power Purchase Agreement (PPA) price analysis: data sets and methodology

PPA prices are from utility-scale solar plants built since 2007 or planned for future installation, and include:

- 546 PV-only contracts totaling 41.6 GW_{AC}.
- 5 concentrating solar thermal power (CSP) contracts totaling 1.2 GW_{AC} (presented in a later section).

PPA prices reflect the bundled price of electricity and RECs as sold by the project owner under the PPA

- Dataset excludes merchant plants, projects that sell renewable energy certificates (RECs) separately, and most direct retail sales.
- PPAs are priced to recover both capital and other ongoing operational costs while accounting for the receipt of state and federal incentives (e.g., the ITC or PTC) and, as a result, do not simply reflect solar generation costs. Ultimately, PPA prices reflect marketplace conditions, including the supply of ready-to-build plants, cost of capital, and demand for energy, capacity, and RECs.

Data collection

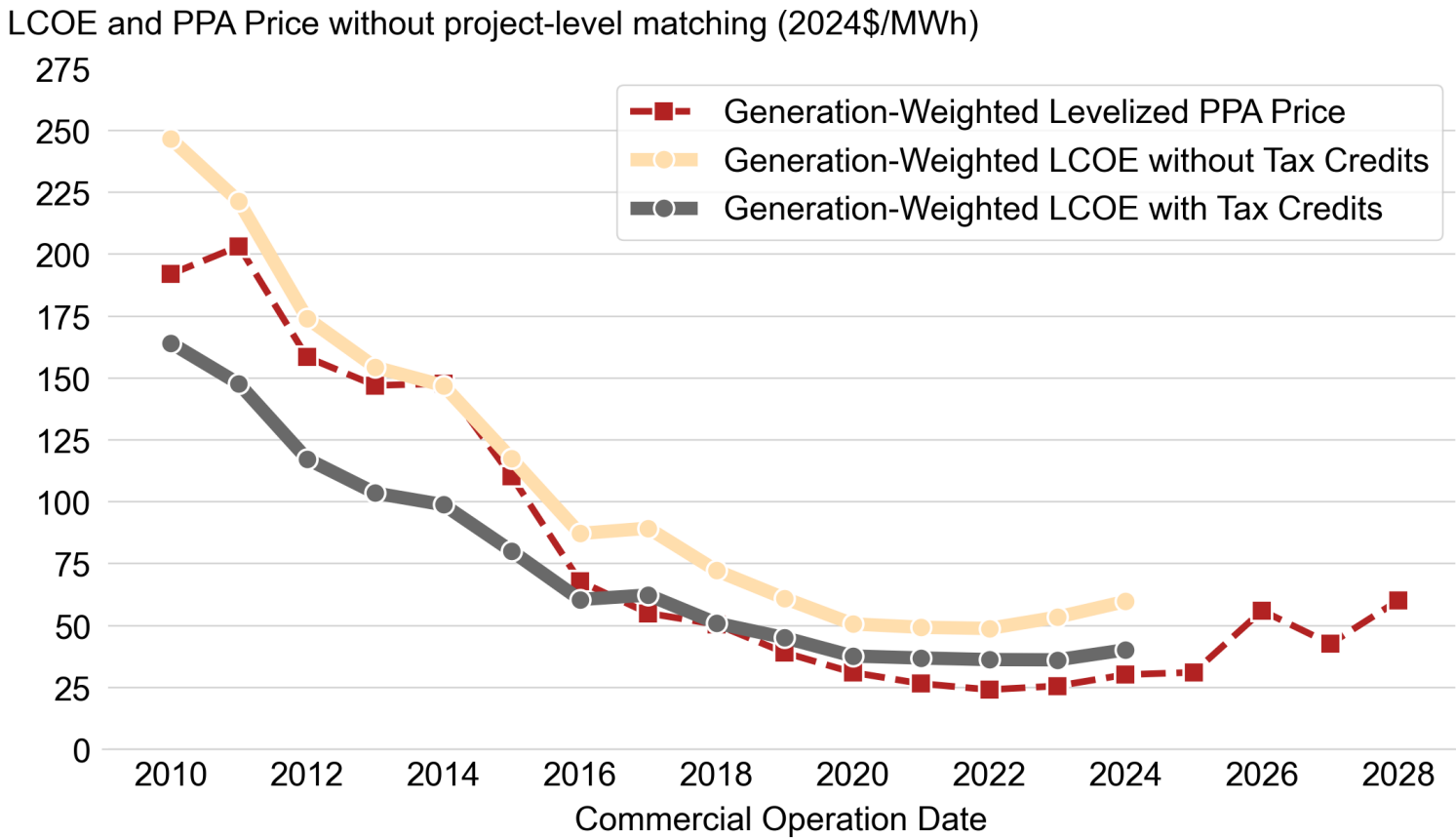
- We gather PPA price data from a combination of FERC Electric Quarterly Reports, FERC Form 1, Form EIA-923, state regulatory filings and award data, company financial filings, and trade press articles. We prioritize data quality over quantity in this process. That is, we only include a PPA within our sample if we have high confidence in all of the key variables such as execution date, starting date, starting price, escalation rate (if any), time-of-day factor (if any), and term.
- To augment our PPA price sample, and to gain visibility into corporate PPA pricing (which is not well-represented within our sample), we also compile LevelTen Energy¹ and Trio² data on PPA offers (25th percentile). These often reflect shorter contract durations and target voluntary and corporate offtakers, though fewer contract specifics are known relative to the PPA data we collect directly.

Levelization methodology

- We deflate the nominal dollar price series to 2024 dollars using a GDP deflator (actual deflators historically, along with projected future deflators), and then levelize the resulting price series using the real weighted average cost of capital (described in the LCOE methods) corresponding to the PPA execution date.
 - For PPA prices we collect, prices are levelized over the full term of each contract, after accounting for any escalation rates and/or time-of-delivery factors.
 - For LevelTen Energy and Trio, we assume the reported prices are for 12-year, flat-priced (in nominal dollars) PPAs that commence in the following calendar year.

Since 2016, levelized PPA prices have tracked LCOE after accounting for tax credits

Sample: 1,631 projects totaling 108 GW_{AC}



This graph contrasts solar LCOE with and without tax credits - choosing either PTC or ITC for each project that results in lowest cost (including the Energy Community but excluding the Domestic Content adder).

Generation-weighted average LCOE increased since 2022 both before the application of tax credits (\$60/MWh in 2024 vs. \$49 in 2022) and after (\$41/MWh vs. \$36/MWh).

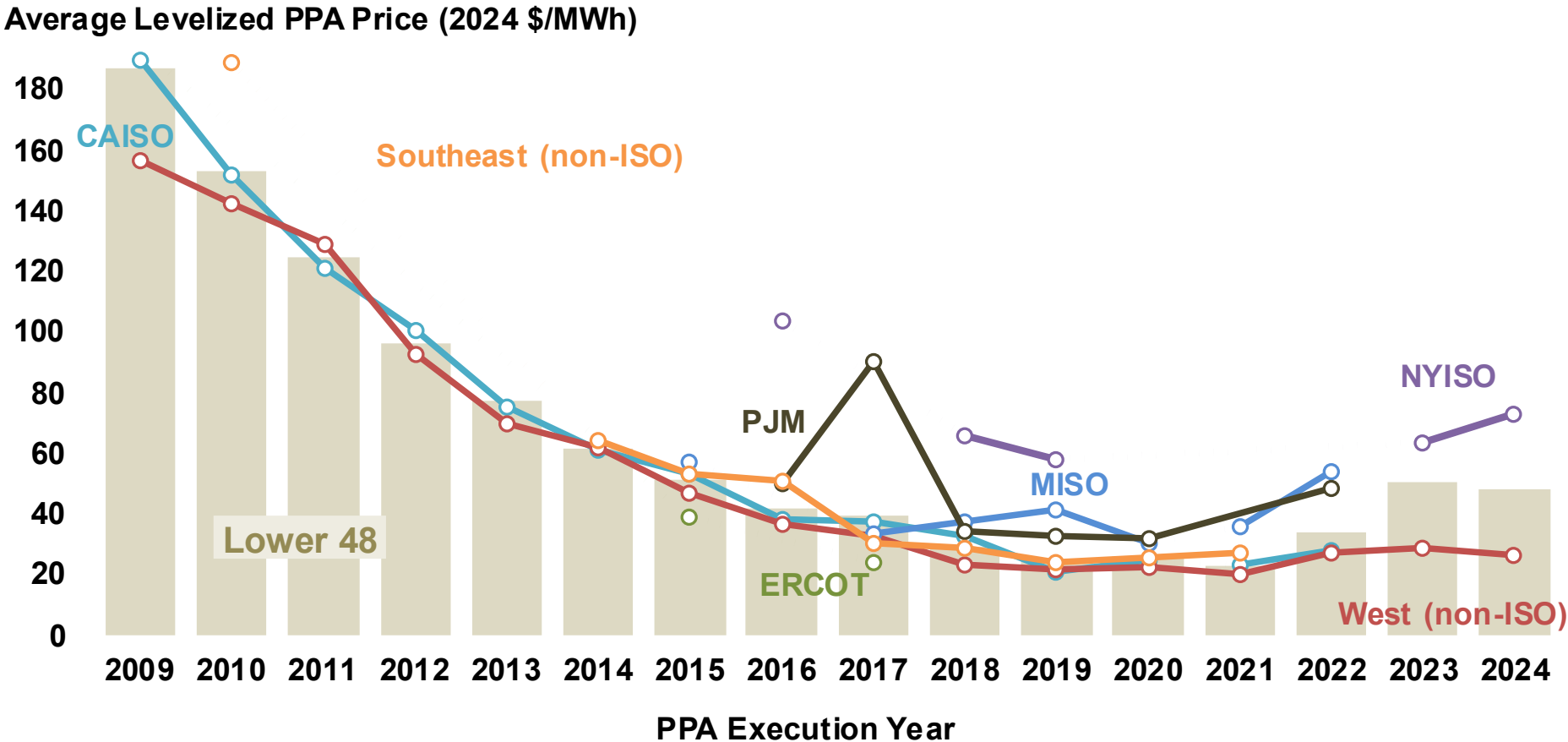
Since 2016, levelized PPA prices charted by plant COD have closely tracked or hovered slightly below the LCOE with tax credits. This suggests a pass-through of these tax credits and a competitive PPA market.

The depicted PPA sample is smaller than the shown LCOE sample. When performing a project-level match the gap between PPA and LCOE decreases further (see accompanying workbook).



Note: Only preliminary data is available for new solar projects coming online in 2024. Findings may shift as more final EIA Capex and project-specific performance data become available.

Average PPA prices in the Lower 48 fell by ~87% (or ~19%/year) from 2009-2019 and have been flat or rising in the 2020s



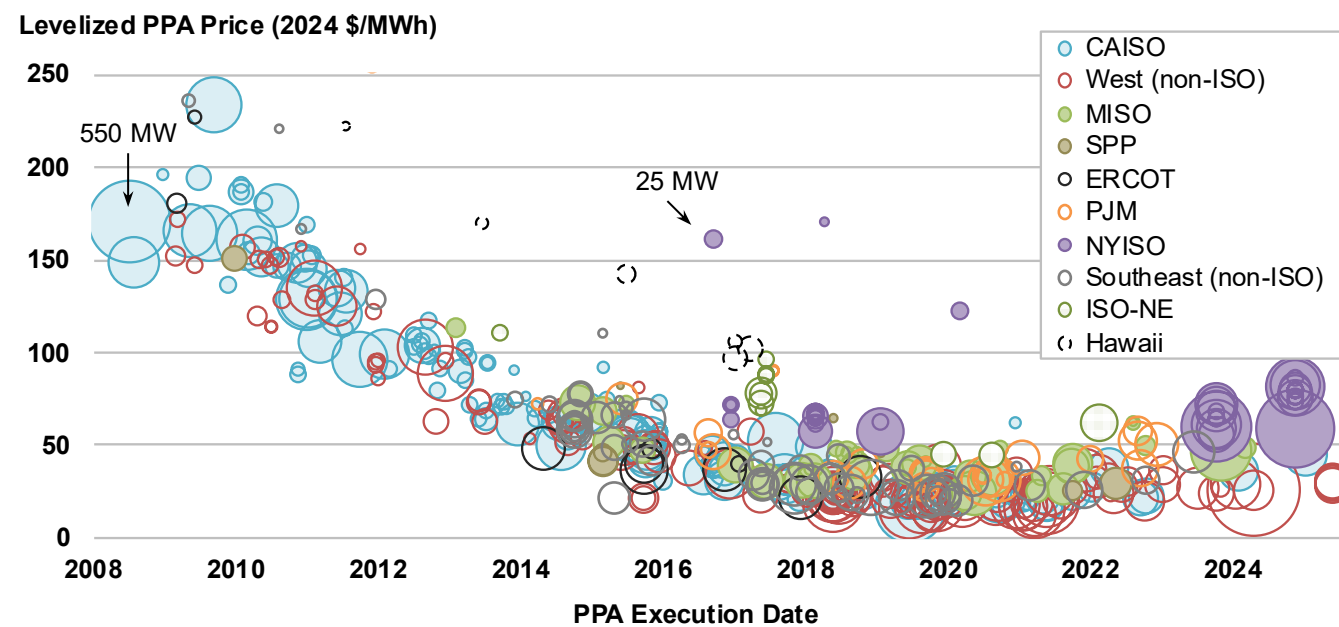
This graph focuses on national and regional average PPA prices, rather than project-level prices (shown in the next slide). In 2023 and 2024 the Lower 48 average is heavily weighted toward NYISO – specifically NYSERDA REC strike prices – due to the sample composition.

Year-Region combinations with fewer than 2 PPAs are excluded from the graph (dashed line segments indicate that the line is skipping over such years).

The graph reflects PV-only pricing, not PV+battery.

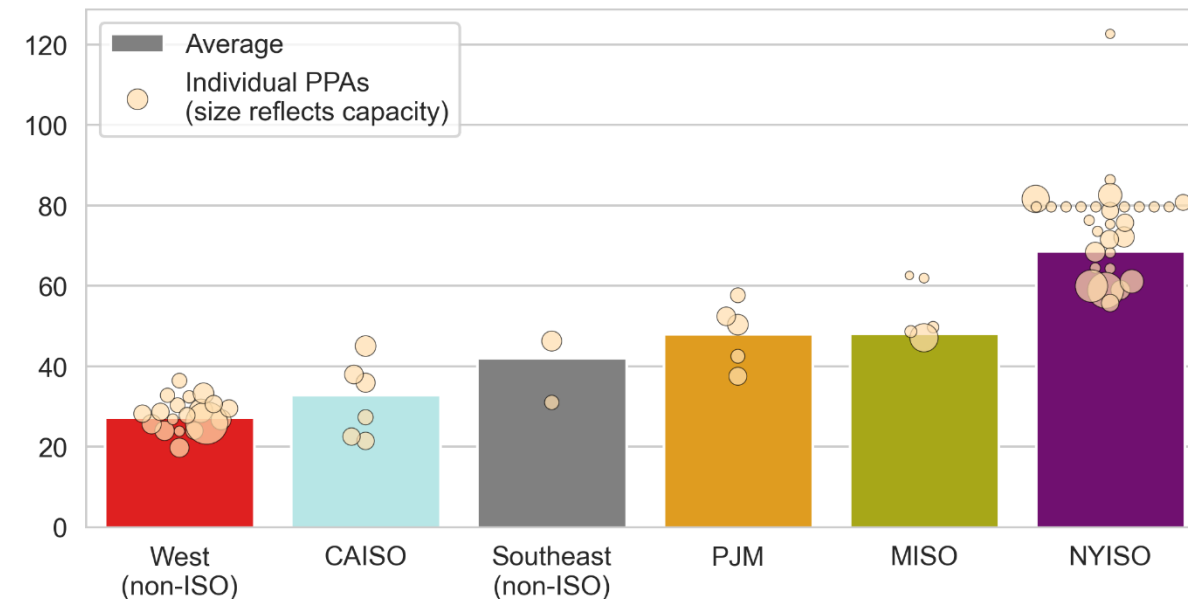
Individual PPA prices vary, even within the same region

Full sample: 546 PPAs, 41.6 GW_{AC}



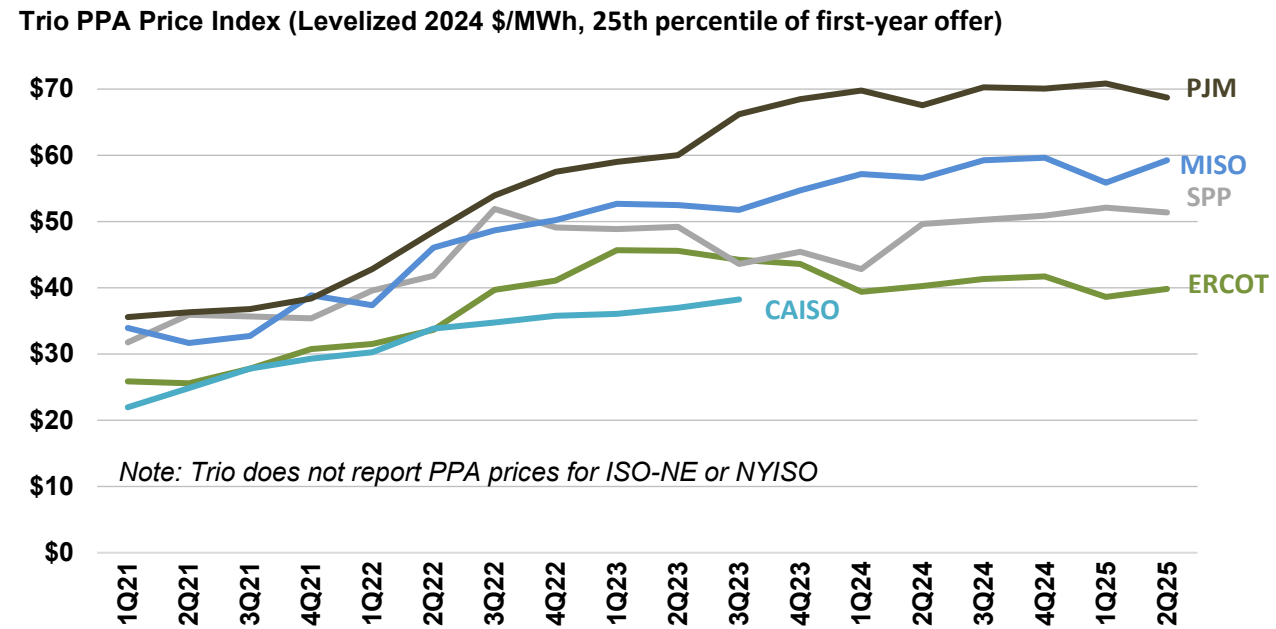
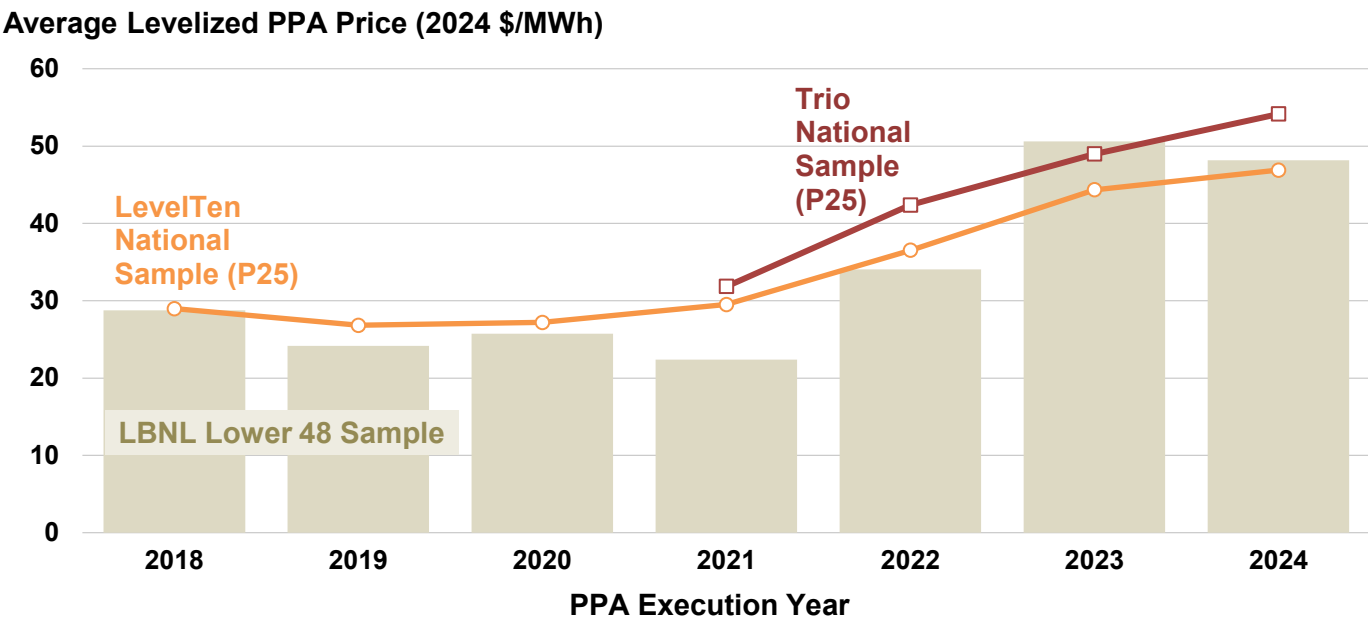
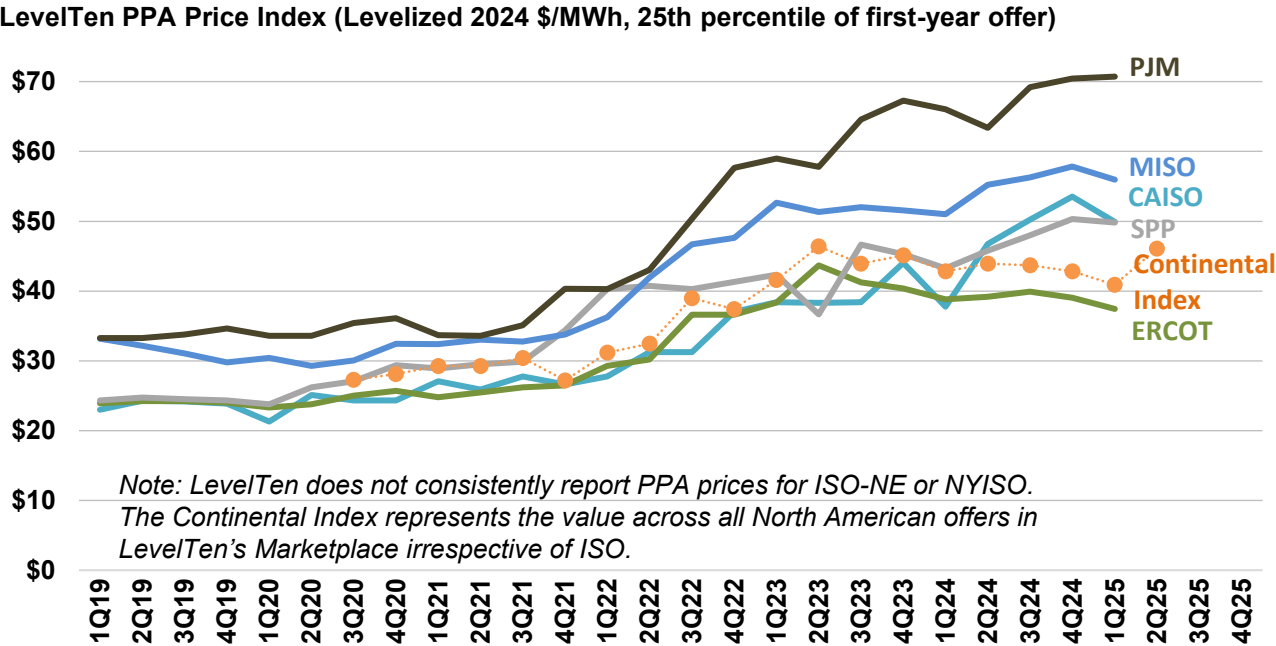
2022-present sample: 69 PPAs, 7.2 GW_{AC}

Levelized PPA Price (2024 \$/MWh) for PPAs Executed 2022+



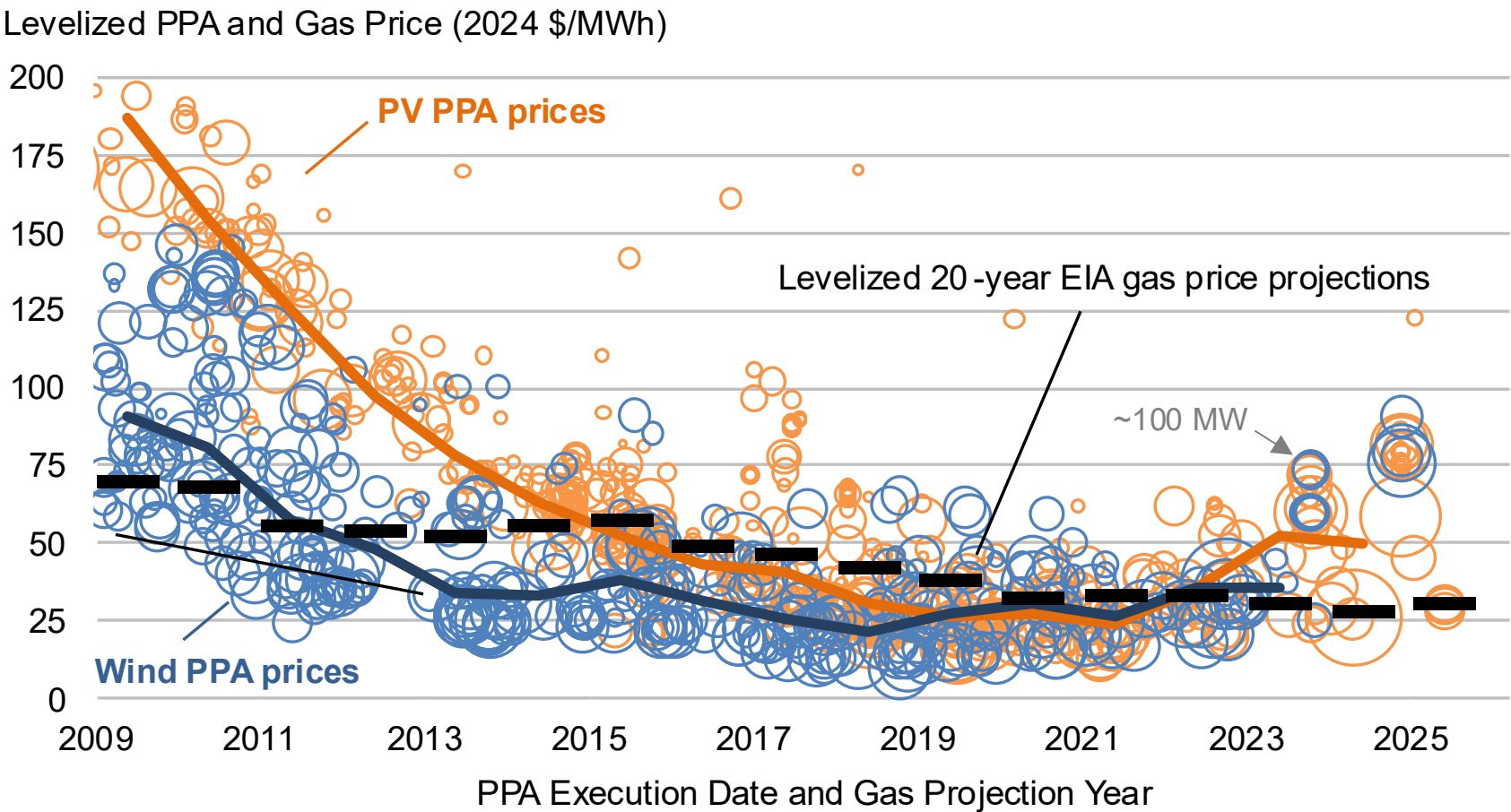
- Power Purchase Agreement (PPA) prices are levelized over the full term of each contract, after accounting for any escalation rates and/or time-of-delivery factors, and are shown in real 2024 dollars
- Characteristics of projects in the full sample:
 - Contract term is between 20 and 25 years (inclusive) for 77% of PPAs
 - >90% of the sample is currently operational
 - PPAs are typically executed 1.5-3 years before a project's commercial operation date

LevelTen Energy and Trio's utility-scale PV PPA price indices match the increasing trend seen in the LBNL sample since 2021



To augment our PPA price sample, and to gain visibility into corporate PPA pricing (which is not well-represented within our sample), we present LevelTen Energy and Trio's PPA price indices.

Solar PPA prices can be compared with wind PPA prices and gas price projections



The graph shows levelized solar PPA prices, levelized wind PPA prices, and levelized gas price projections from the EIA's Annual Energy Outlook.

PPAs are priced to recover both capital and other ongoing operational costs.

Gas prices capture the cost of burning fuel in an existing combined-cycle natural gas unit (NGCC), but not the capital cost of a new plant.



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Wholesale Market Value and Net Value

Wholesale market value analysis: data sets and methodology (I of II)

We estimate the wholesale market value for each utility-scale PV project larger than 1 MW (as reported on Form EIA-860). Each project-level estimate may be prone to some biases - greater emphasis should thus be placed on the aggregate generation-weighted averages which we calculate for all seven ISOs and 23 additional balancing authorities.

We draw from project-level modeled hourly solar generation (using NREL's System Advisor Model and site- and year-specific insolation data from NREL's National Solar Radiation Database and NOAA's High Resolution Rapid Refresh Model) and de-bias the generation by leveraging ISO-reported aggregate solar generation and plant-level reported generation by Form EIA-923. Hourly curtailment data is either derived from plant-level reports (ERCOT: High Sustained Limit - MW) or allocated from ISO-level reports (CAISO and SPP).

Energy value is the product of hourly solar generation by plant or county and concurrent wholesale energy prices

- Plant-level debiased hourly solar generation
- Real-time energy price from
 - nearest LMP node (ISOs, CAISO's + SPP's EIM/EIS BAs)
 - FERC Lambda for some BAs without ISO connection

$$Energy\ Value = \frac{\sum Postcurtailment\ Generation_h * Wholesale\ RT\ Energy\ Price_h}{\sum Precurtailment\ Generation_h}$$

Capacity value is the product of a plant's or county's capacity credit and capacity prices

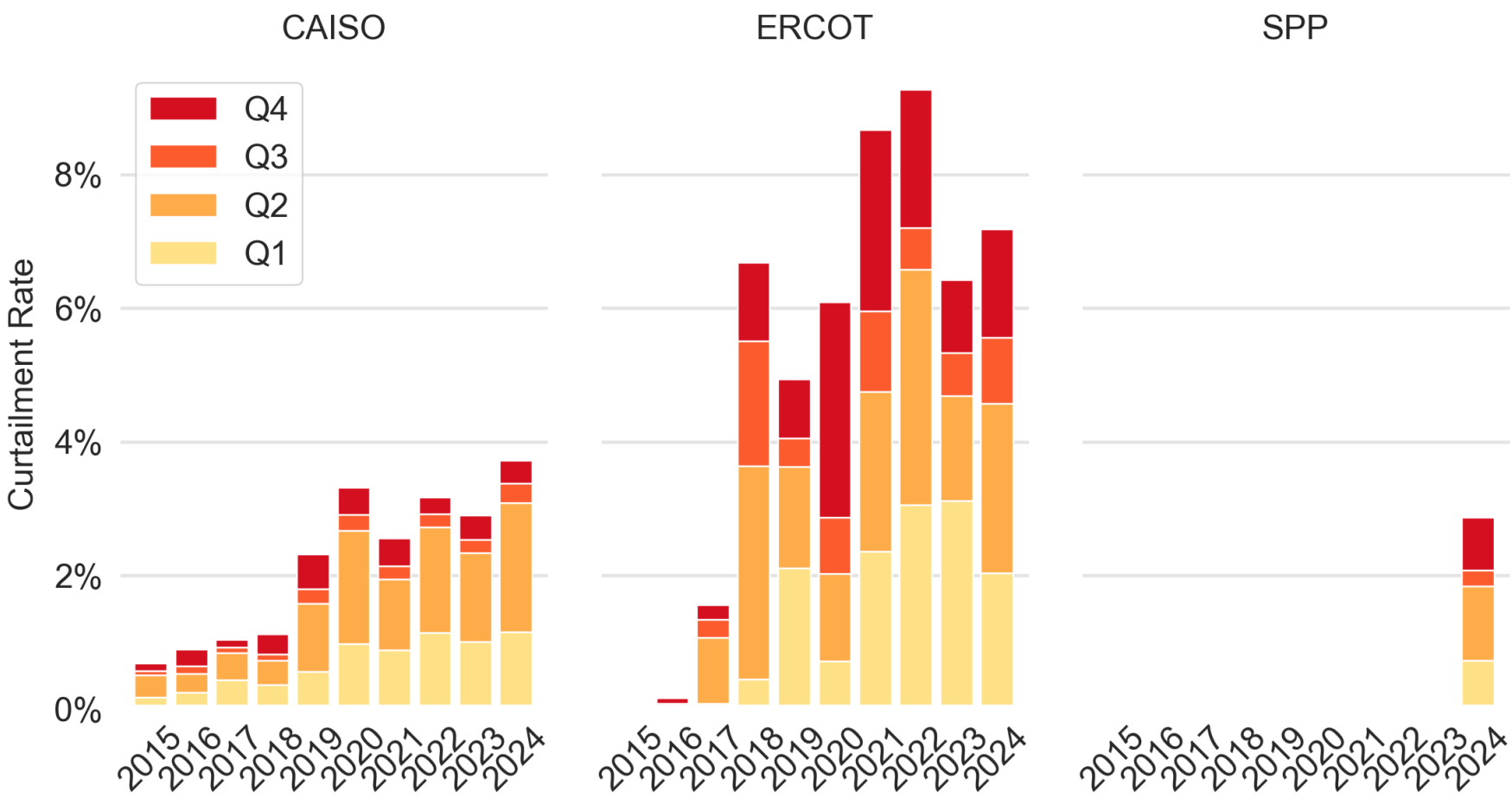
- Capacity credit based on plant-level profile; varies by month, season, or year
- Capacity prices from respective ISO region; prices vary by month, season, or year
- Estimate bilateral capacity prices for regions without organized capacity markets
- Focus on annual value of solar for projects with a full calendar year of operation
- Calculate capacity value for all solar, even if some solar does not participate in capacity markets

$$Capacity\ Value = \frac{\sum Capacity\ Credit_T * Nameplate * Capacity\ Price_T}{\sum Precurtailment\ Generation_T}$$

Wholesale market value analysis: data sets and methodology (II of II)

- **Total wholesale market value** is simply the sum of solar's energy and capacity value
 - It represents the “replacement costs” of what an offtaker would have to pay in the short-term wholesale market had they not procured solar generation. Revenues for a solar project owner are set by their PPA terms and may differ from our estimate.
 - It does not include any potential additional revenue streams or costs (ancillary service (AS) revenues or costs, renewable energy credits, infrastructure deferral or imposition that are not already internalized in wholesale energy and capacity markets).
 - It is based on the real-time LMP market and thus reflects the marginal solar value. It does not fully consider sub-hourly variability and forecast errors.
 - It excludes broader sectoral impacts such as the merit-order effect on power prices or reduced natural gas demand and associated price declines.
- **Generation costs** are approximated by LCOE (with and without tax credits), but do not include:
 - Full integration costs (AS) or transmission needs (beyond LMP congestion components and interconnection network upgrade costs).
 - The full cost to the Treasury of federal investment and production tax credits.
 - Other social costs and benefits beyond the grid system.
- The **Value Factor** is defined as the ratio of solar's average market value to the BA-average market value of a 'flat block' of power (i.e., a 24x7 block).
 - It indicates whether solar's total value is above or below the average wholesale value, with generators delivering electricity primarily during high-value hours achieving a value factor above 100%.
 - It controls for fluctuations in energy and capacity prices across years (and across ISOs) and focuses instead on the impact of solar's generation profile and location on value, allowing for derivate penetration and congestion analyses.

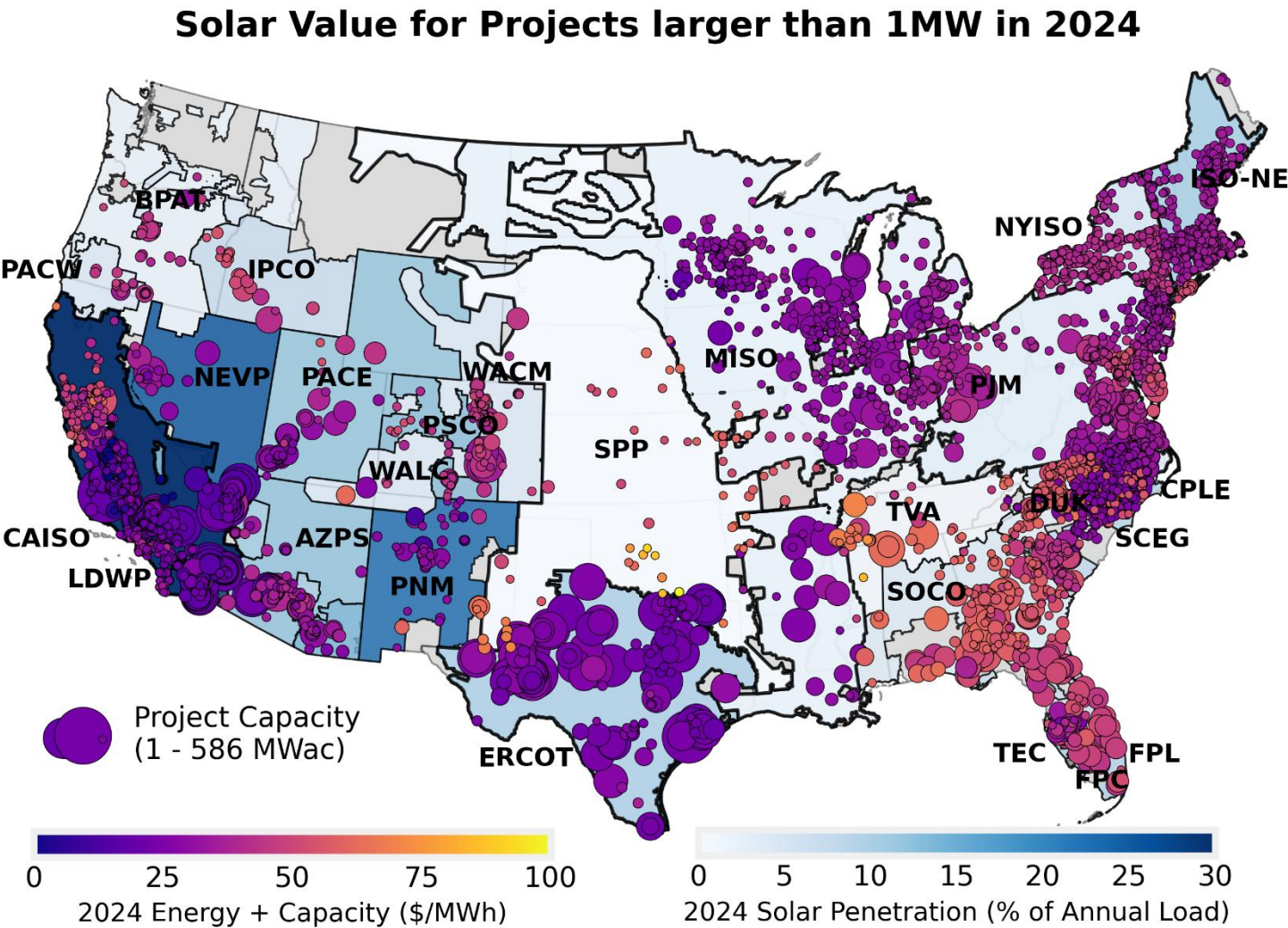
Solar curtailment varied by region in 2024. Most ISOs and regions do not yet report curtailment.



The *rate of solar curtailment* was much higher in ERCOT (7.1%) than in CAISO (3.7%) and SPP (2.8%) in 2024, even though solar’s penetration rate is far lower in ERCOT (10%) than CAISO (30%).

Most of ERCOT’s curtailment occurs in the western part of Texas, driven by transmission/pipeline congestion and excess local electricity production.

Solar's energy and capacity value varied by location



We estimate solar wholesale market value for 5,571 projects in 30 balancing authorities (subset shown on the left map).

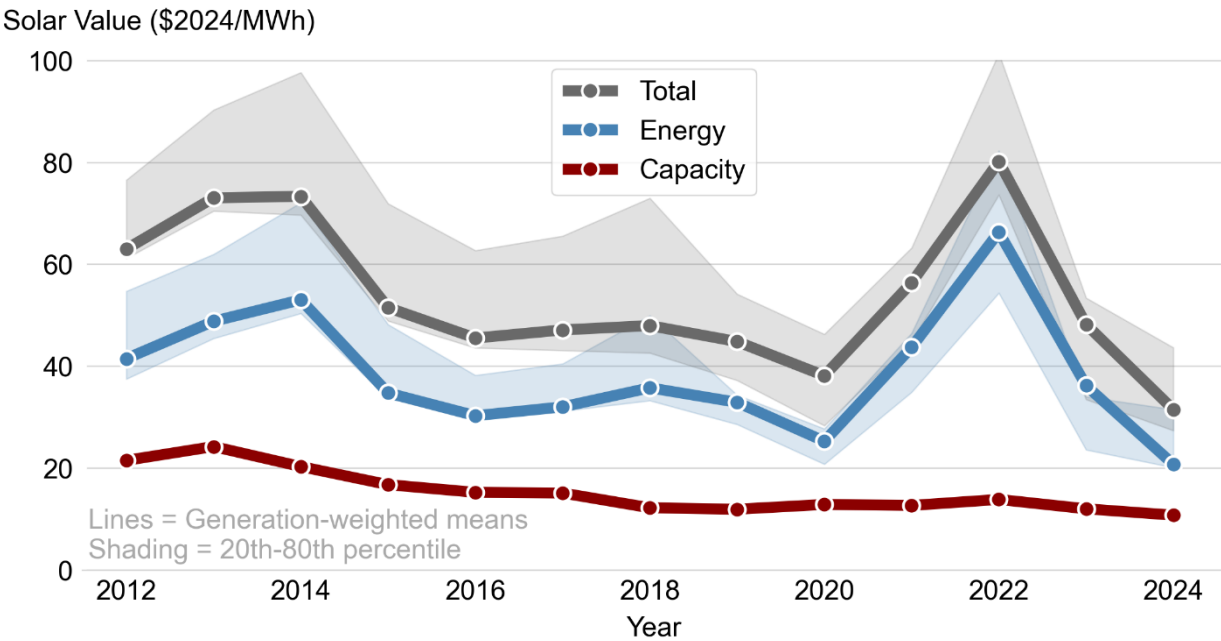
Value varies both between and within regions, driven by generator supply curves, transmission congestion, solar resource quality or differing use of technology like trackers.

For example, in CAISO the northern zone has typically higher average values than the southern zone. Similarly, in SPP and NYISO solar in the southern part of the footprint was much more valuable than solar in the northern part.

Other markets like ISO-NE show very little variation in annual average value between projects (20th vs. 80th percentile had a difference of less than \$2/MWh).

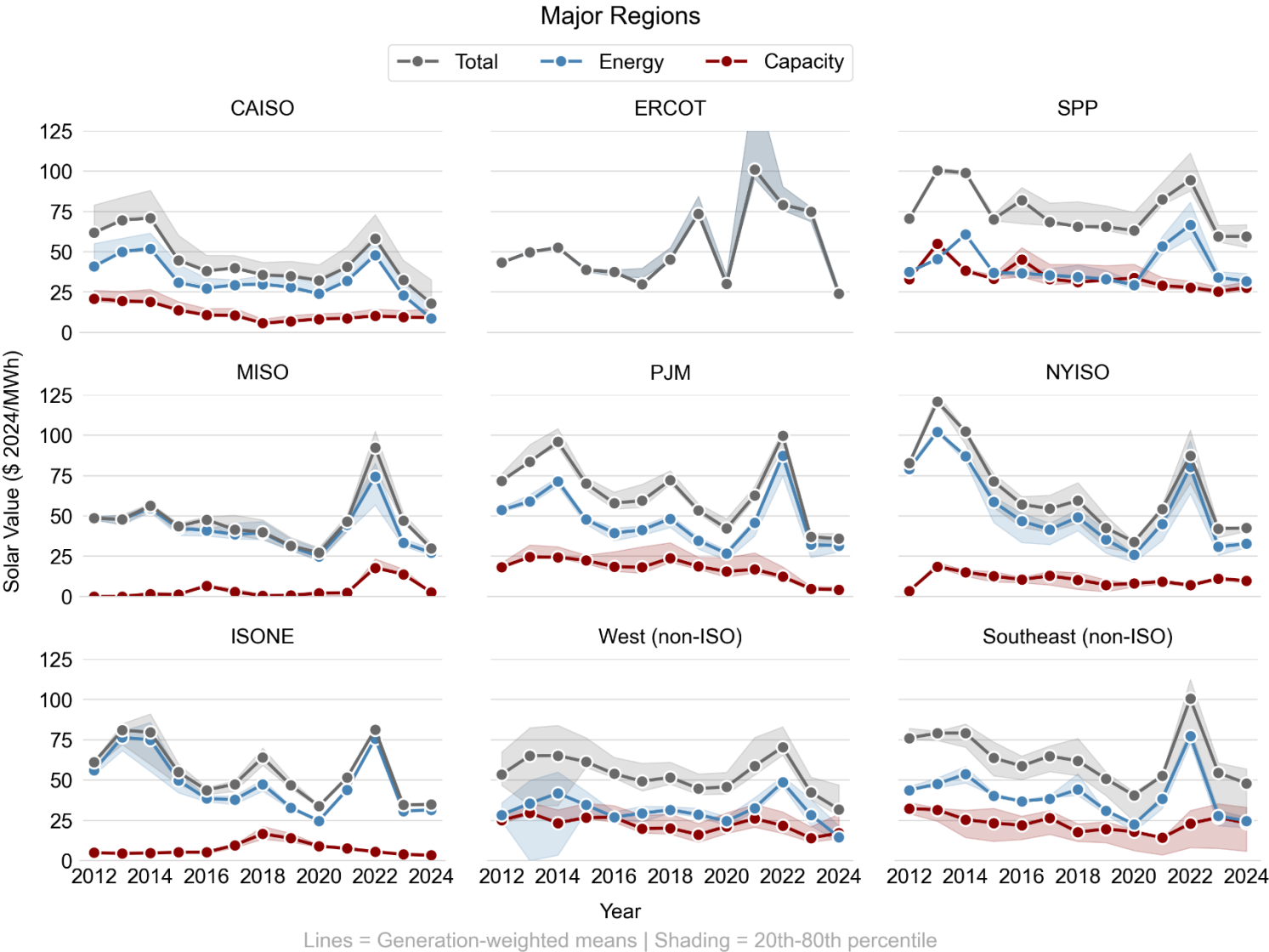
Note: Marker size shows project capacity while marker color shows market value.

Solar's energy plus capacity value declined to a record-low national average of \$32/MWh in 2024



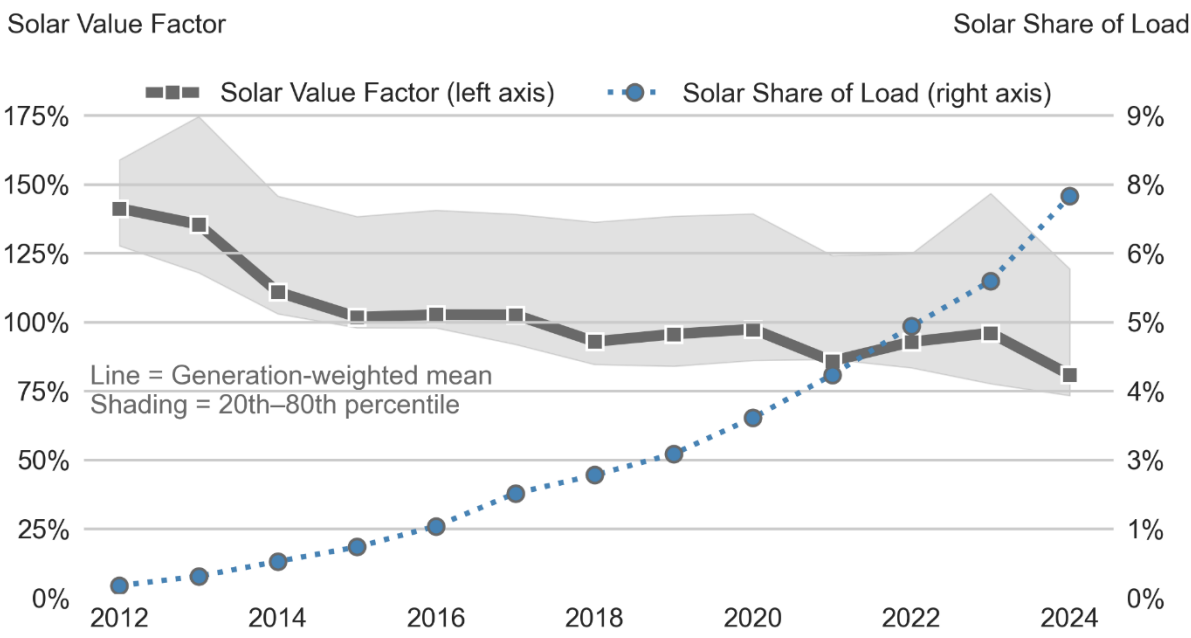
Driven by declining natural gas prices, fewer summer heat waves, and increasing solar penetration, PV's average market value decreased from \$48/MWh in 2023 to \$32/MWh in 2024.

CAISO had the lowest standalone solar value at \$18/MWh, while a high capacity value supported a higher total value in SPP (\$60/MWh) & many southeastern BAs.

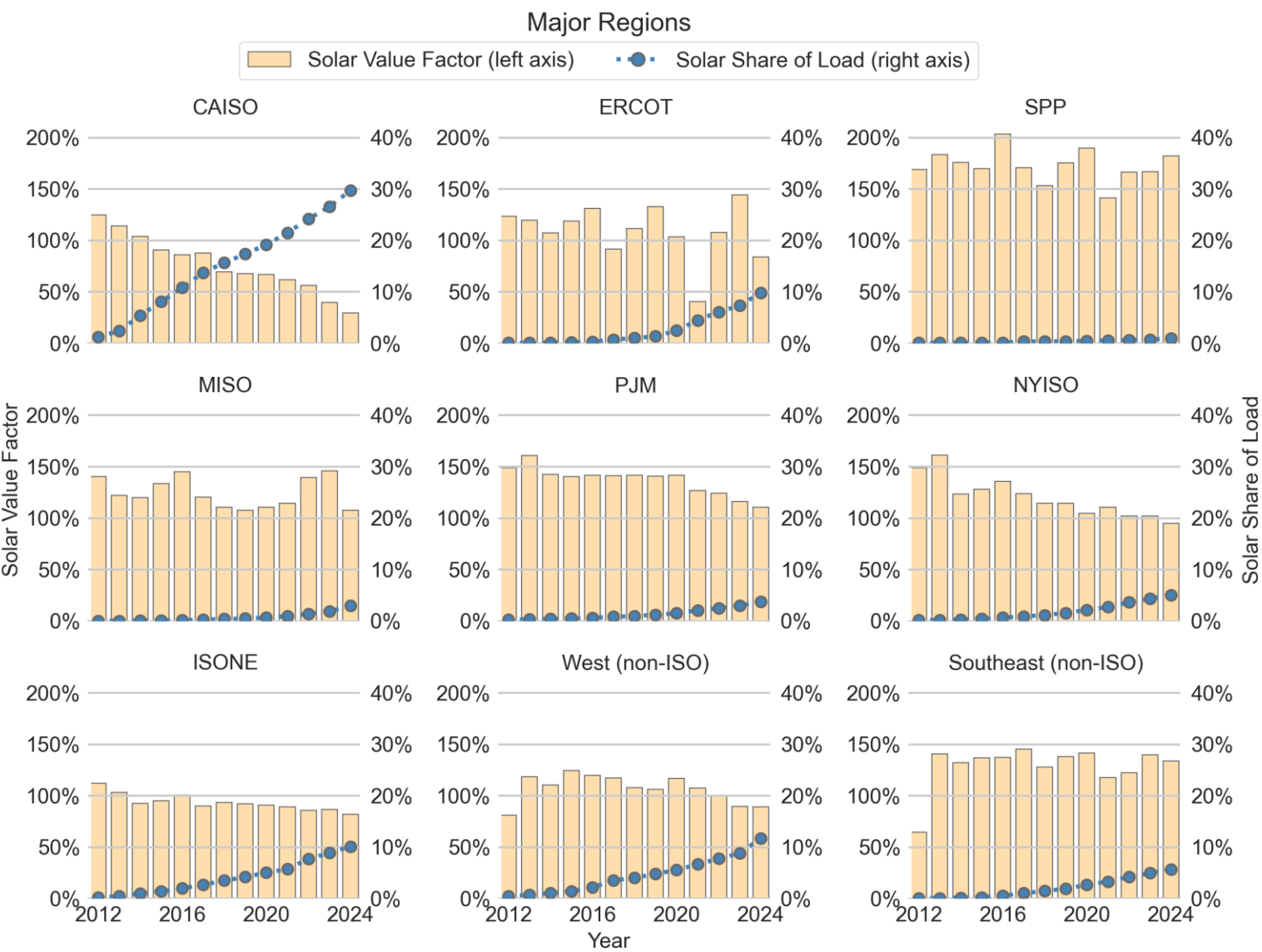


Note: The data shows generation-weighted average annual market value of all large-scale (1 MW+) solar projects in select balancing authorities. Non-ISO BA results are shown in the accompanying data file.

Solar's value factor declines as solar serves a higher share of a region's load; as a national average, it fell to 80% in 2024



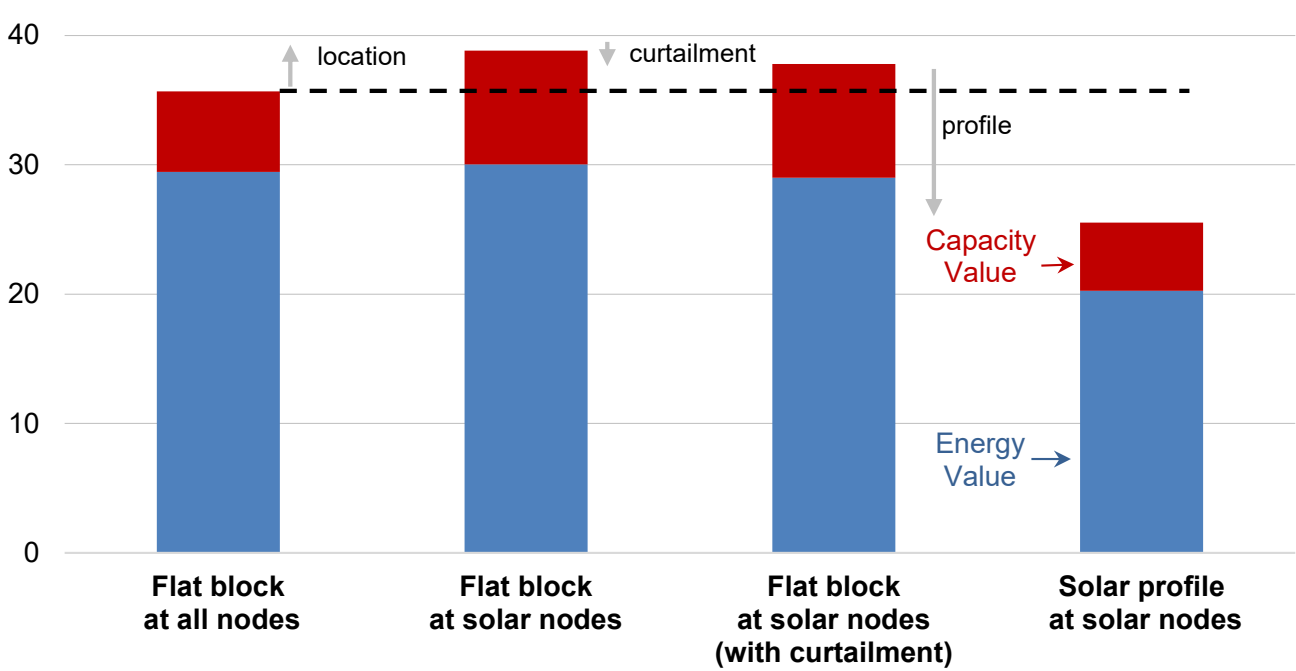
Solar's value factor has fallen over time as solar serves a greater share of load, reaching 80% in 2024 as the national average. It is lowest at 30% in CAISO (at 30% penetration) and Nevada Power (49%). The value factor is highest at 181% in SPP (at 1% penetration) and is still above 100% in MISO, PJM, Northern California BA, WAPA Desert Southwest and Rocky Mountains, Public Service Colorado, and most southeastern BAs.



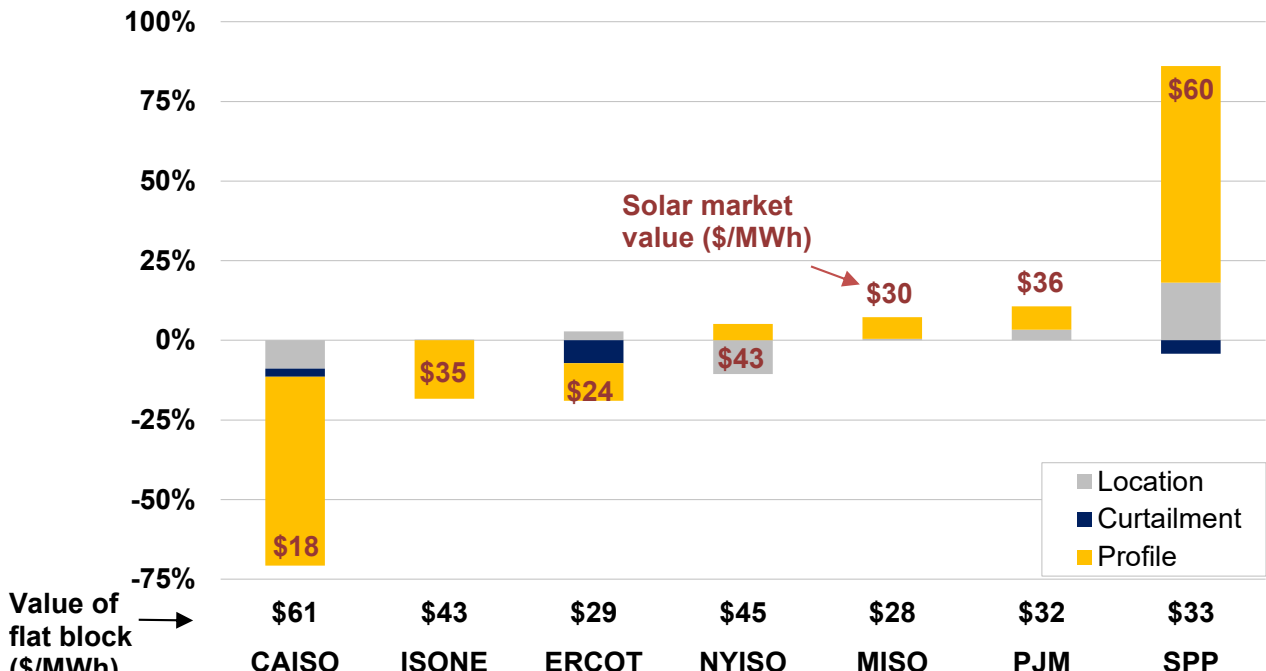
Note: Solar market share in those years only reflects contribution of distributed PV. Non-ISO BA results are shown in the accompanying data workbook.

Solar’s generation profile was the largest source of value differences between solar and a flat block in 2024

Wholesale Market Value in 2024 (2024 \$/MWh)



Solar Value Relative to Flat Block Value in 2024 (% difference)



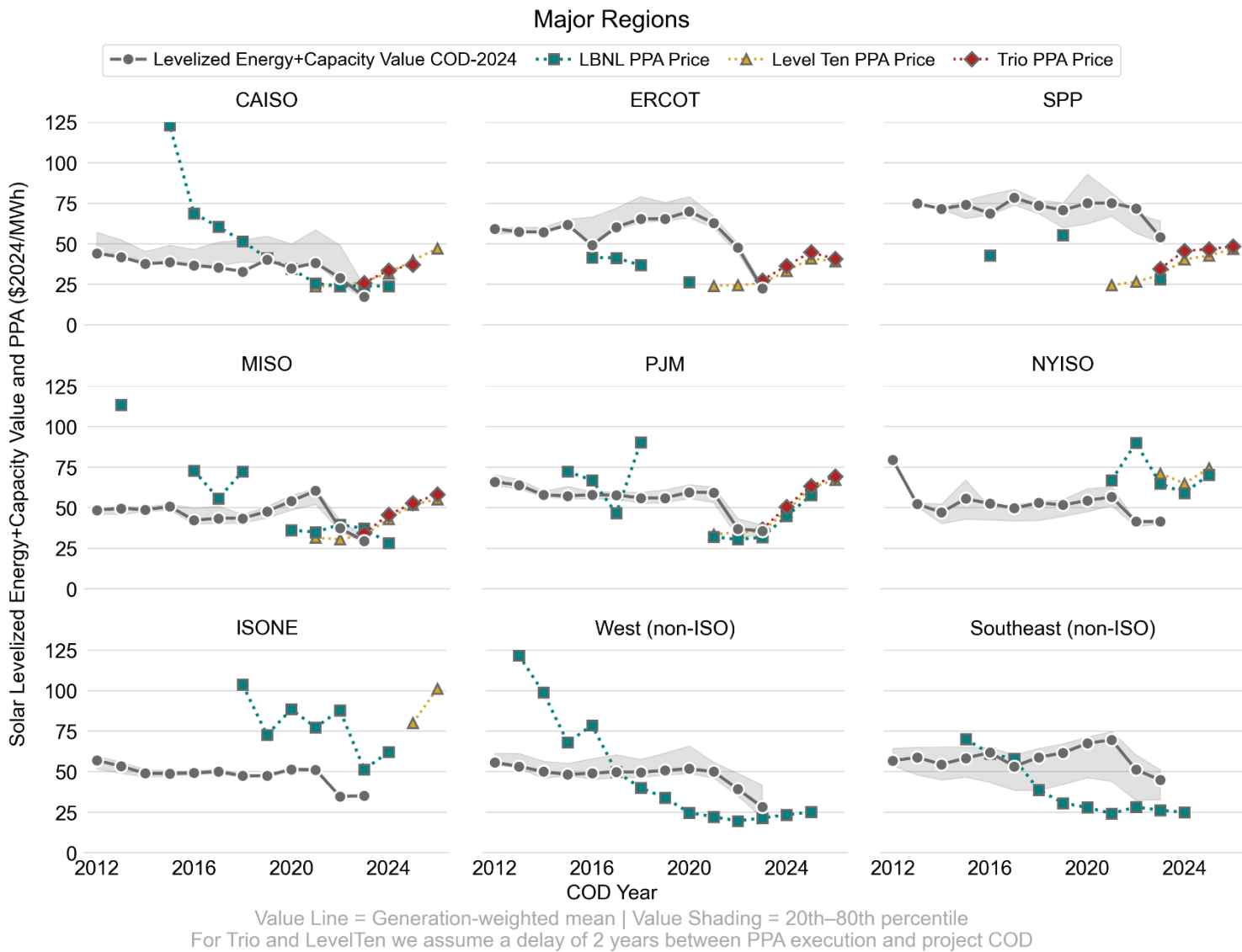
Across the seven ISOs, solar projects were usually sited at locations with average energy values. The large amount of solar deployed in areas with lower relative value (particularly CAISO and driven by profile impacts) yields a value factor of 72% across all solar projects in the ISOs.

Solar’s generation profile has the largest impact and either hurts (in CAISO, ISO-NE, ERCOT) or helps (in SPP, PJM, MISO, and NYISO) solar’s value relative to a flat block. Curtailment is primarily an issue for solar in ERCOT.



Note: Numbers and figures shown here only reflect market value in the year 2024 in the seven ISOs and do not include data from other years or non-ISO regions.

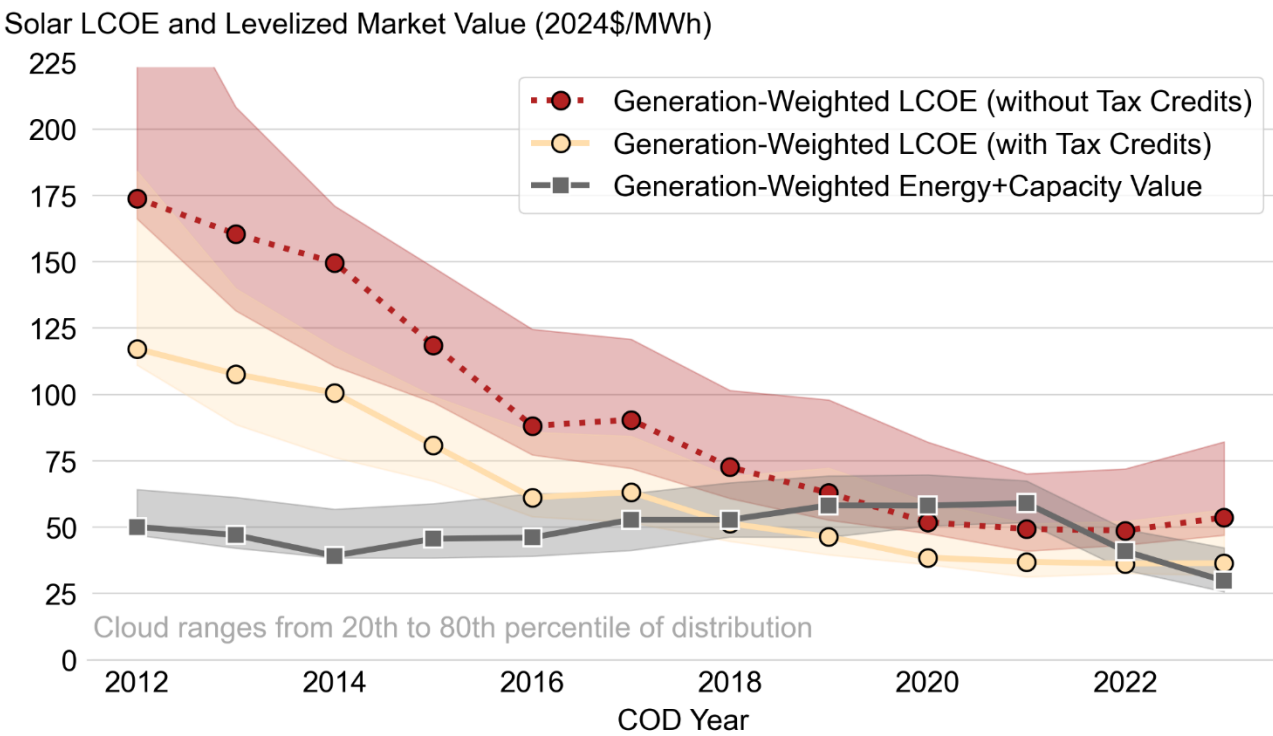
Market Value vs. PPAs: Rising prices for new PPAs exceed falling wholesale market value in some regions in 2024



PPAs provide the power purchaser a hedge for price fluctuations over 10 to 20 years. A true benefit accounting should span the length of the PPA contract. However, we do not project future revenue (which will change with solar penetration, load growth and natural gas prices) and simply levelize wholesale market revenue between COD and 2024 as a proxy. PPA prices are also presented in levelized terms. They are influenced by solar’s generation costs, solar’s wholesale market “replacement costs”, and supply and demand dynamics.

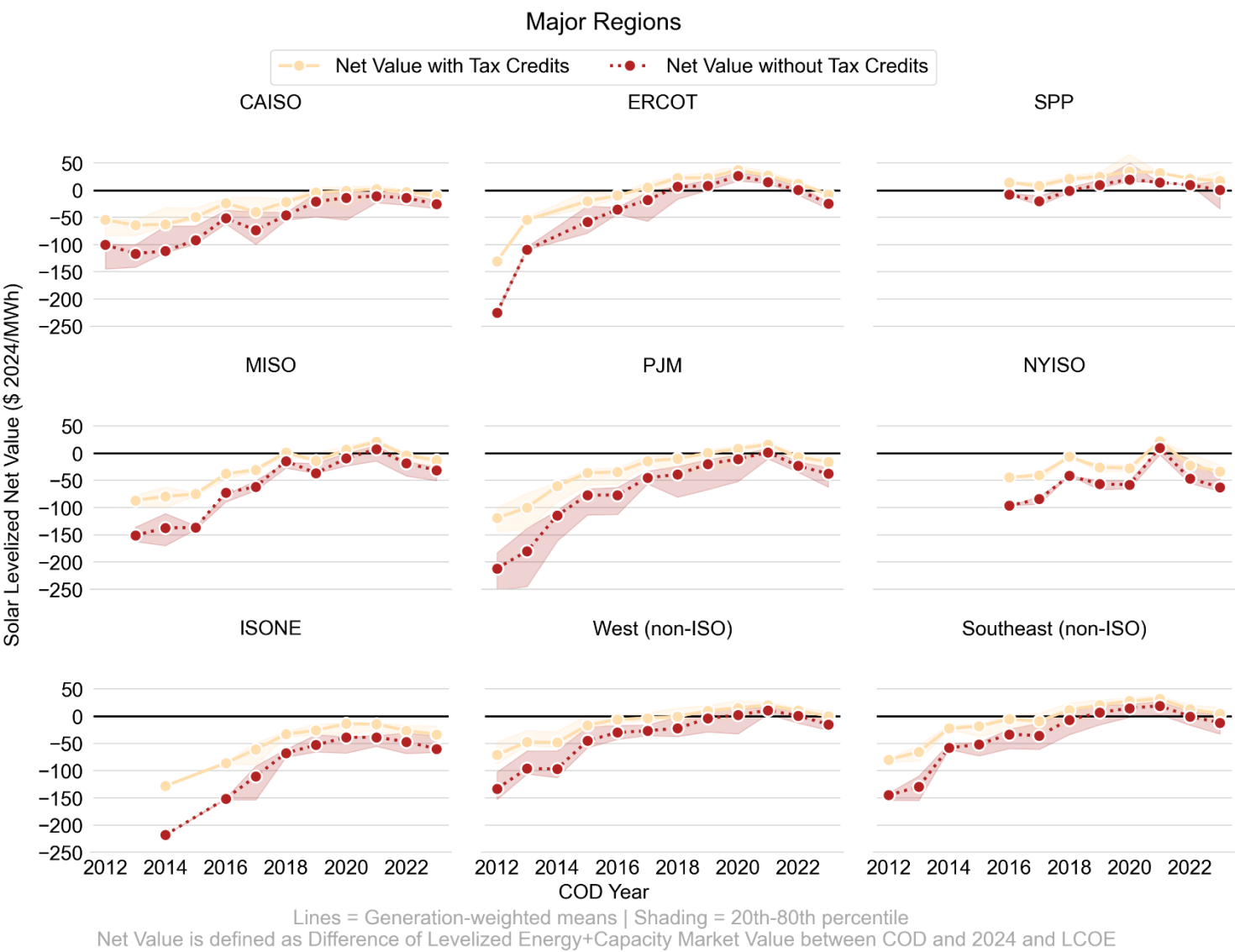
Falling PPA prices had largely kept pace with falling market value until PPAs started rising in 2021. Elevated energy prices in 2022 offset rising PPA prices, but in several regions (CAISO, ERCOT, MISO, PJM, NYISO, and ISO-NE) PPA prices are now higher than the wholesale market value. In contrast, solar offered greater value than what is paid for it via PPAs in SPP and many non-ISO BAs in 2024.

Historically, solar's generation costs (after tax credits) exceeded market value, after 2018 the balance turned net-positive (except COD 2023 so far).



National average net value (energy+capacity value minus LCOE) for 2023 COD solar standalone projects is slightly negative (-\$7/MWh) even after accounting for tax credits.

Net value varies by region from -\$34/MWh in NYISO to \$17/MWh in SPP. 9 out of 30 BAs have positive net values in 2024, the rest negative net values.





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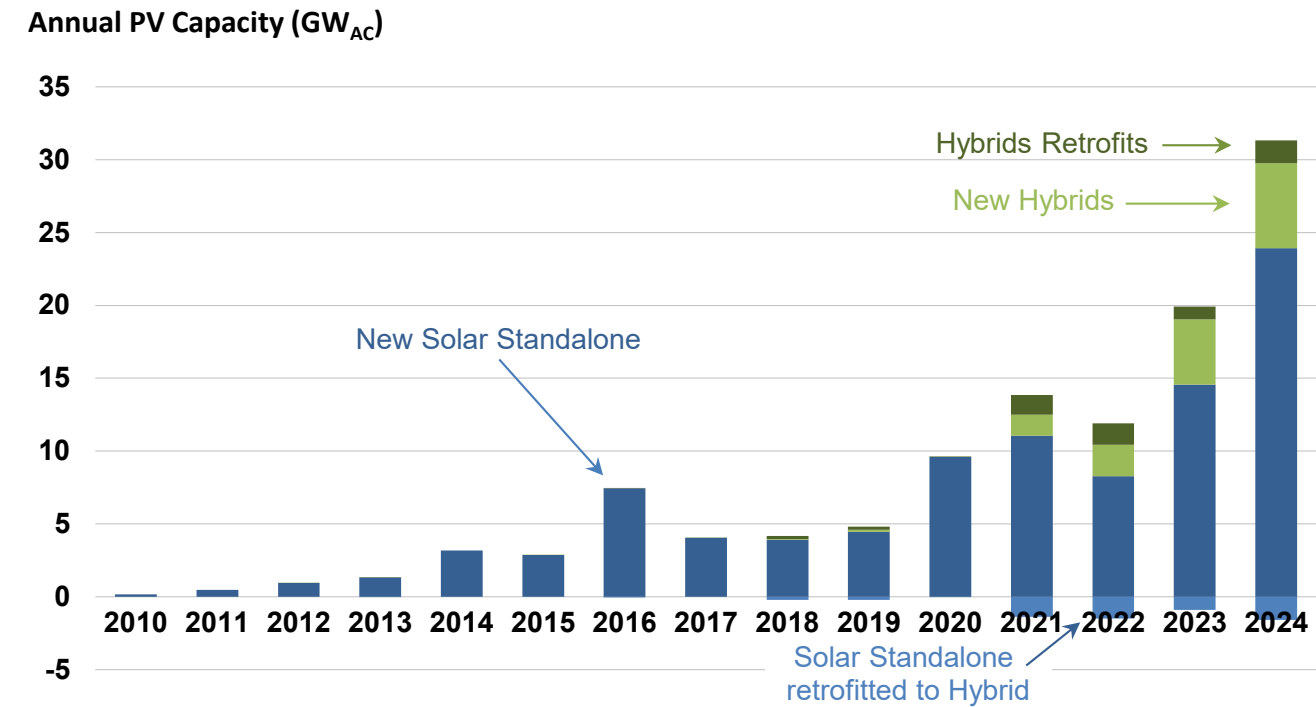
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PV+Battery Hybrid Plants

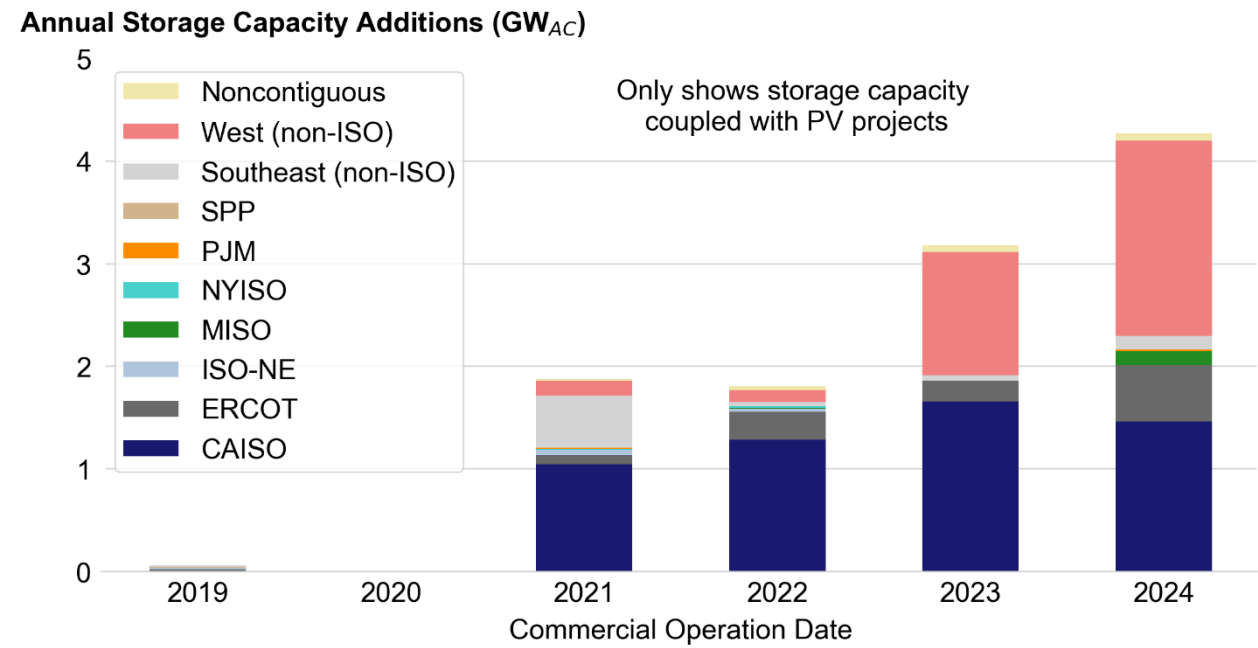
(for more of Berkeley Lab's analysis of hybrid power plants,
see <https://emp.lbl.gov/hybrid>)

PV+battery hybrid plants added 7.4 GW_{AC-PV} and 4.3 GW_{Storage} greenfield and retrofit capacity in 2024

Sample: 201 projects totaling 19.9 GW_{AC} of PV, 11.4 GW_{AC} of battery capacity, and 36.3 GWh of battery energy

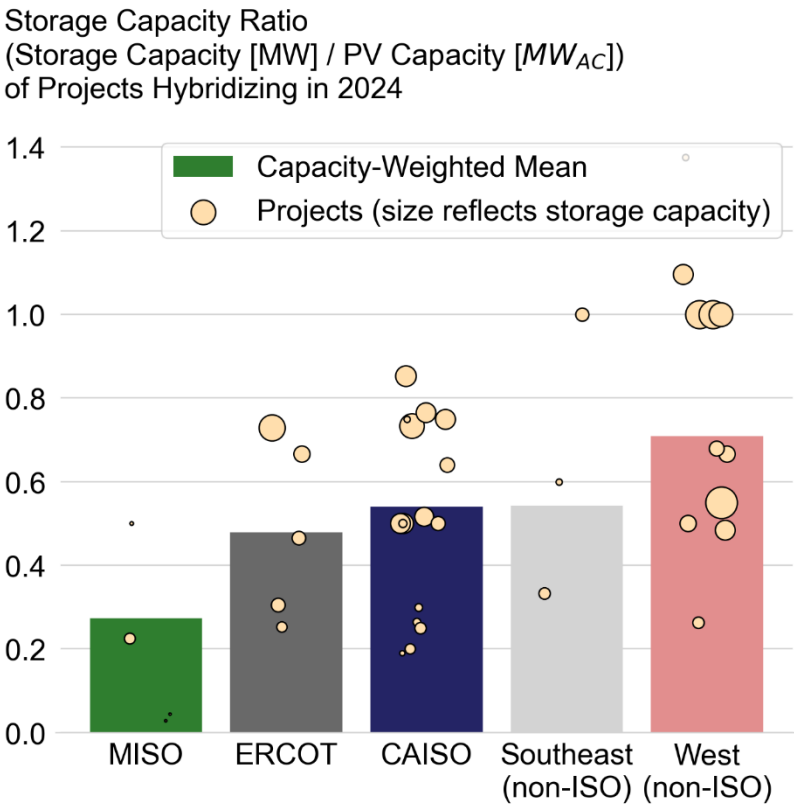


The large-scale PV+battery hybrid market started in earnest in 2021 with 39 hybrid installations. 2024 added the most capacity both for newly built hybrids (33 plants, 5.8 GW_{AC-PV}) and for storage retrofits to existing stand-alone solar projects (14 plants, 1.6 GW_{AC-PV}).

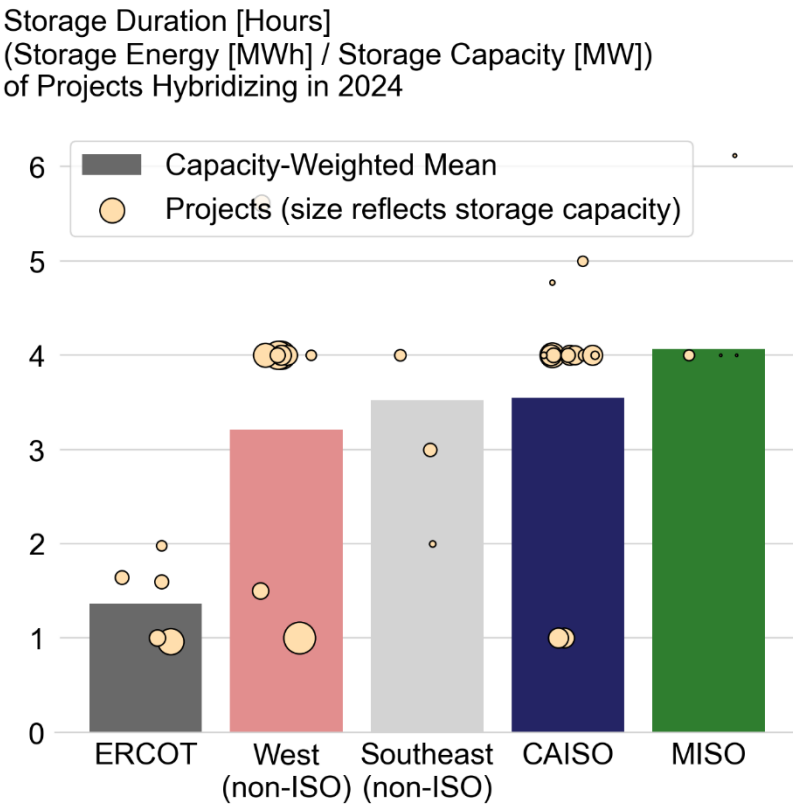


Most of the new hybrid storage was built in the solar-rich non-ISO West (13 plants, 1.9 GW_{storage}) followed by CAISO (16 plants, 1.5 GW_{storage}). ERCOT grew rapidly (6 plants, 0.5 GW_{storage}) and MISO had its first larger deployment (5 plants, 0.1 GW_{storage}).

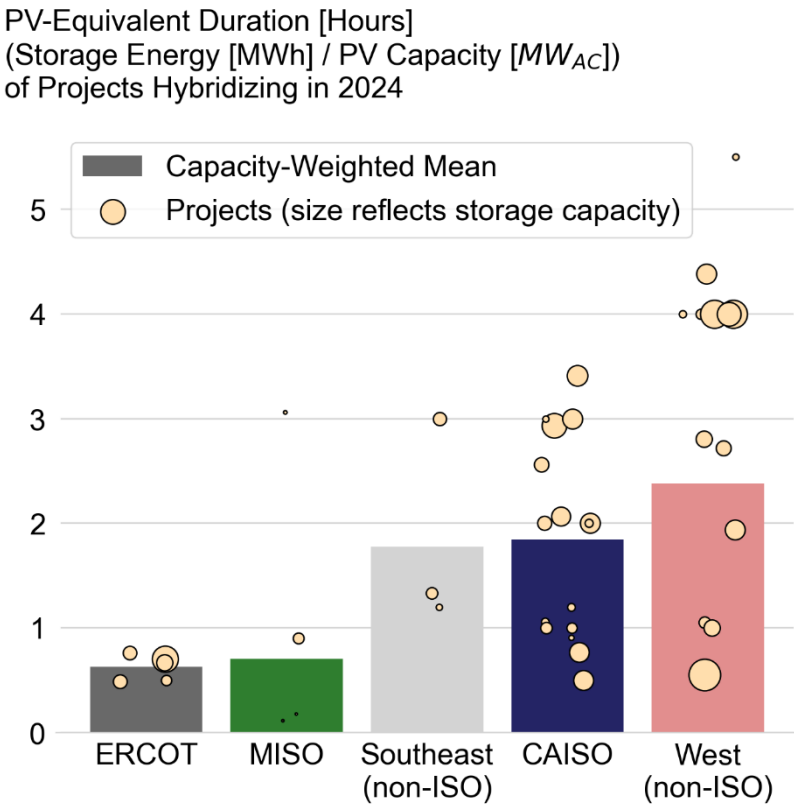
The average storage:PV capacity ratio grew to 0.57 with 3.3 hours of duration in 2024



Storage capacity ratio (SCR) describes the battery capacity relative to solar capacity (MW_{AC}). In 2024 it is greatest in the non-ISO West and lowest in MISO.

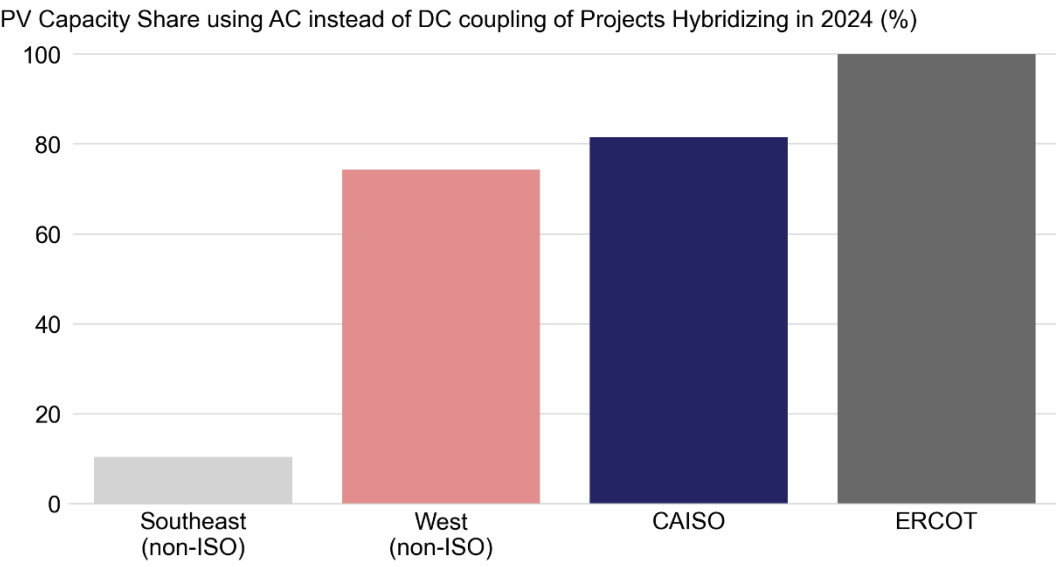
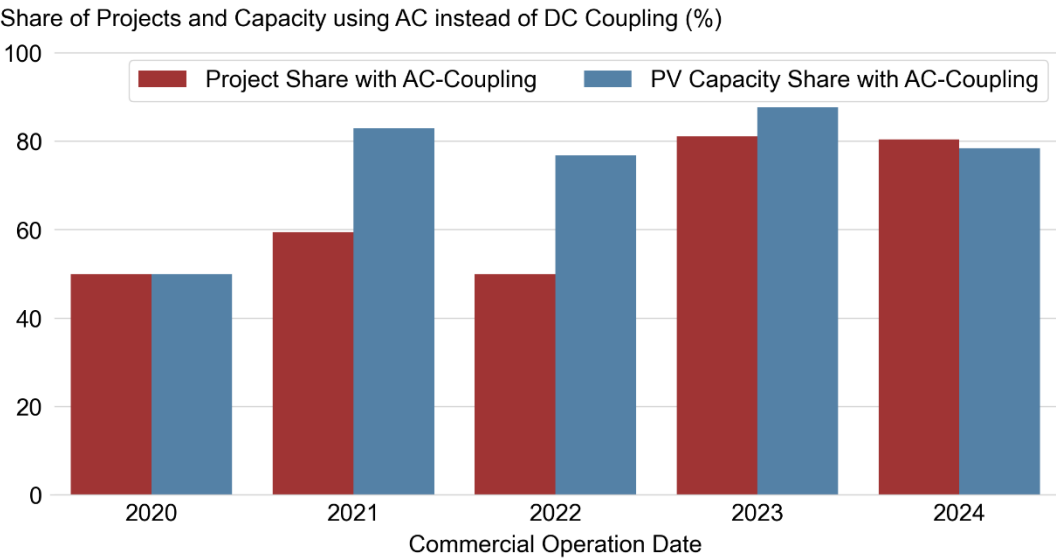


Storage duration at full rated battery capacity is shortest in ERCOT and often above 3h in the rest of the country.



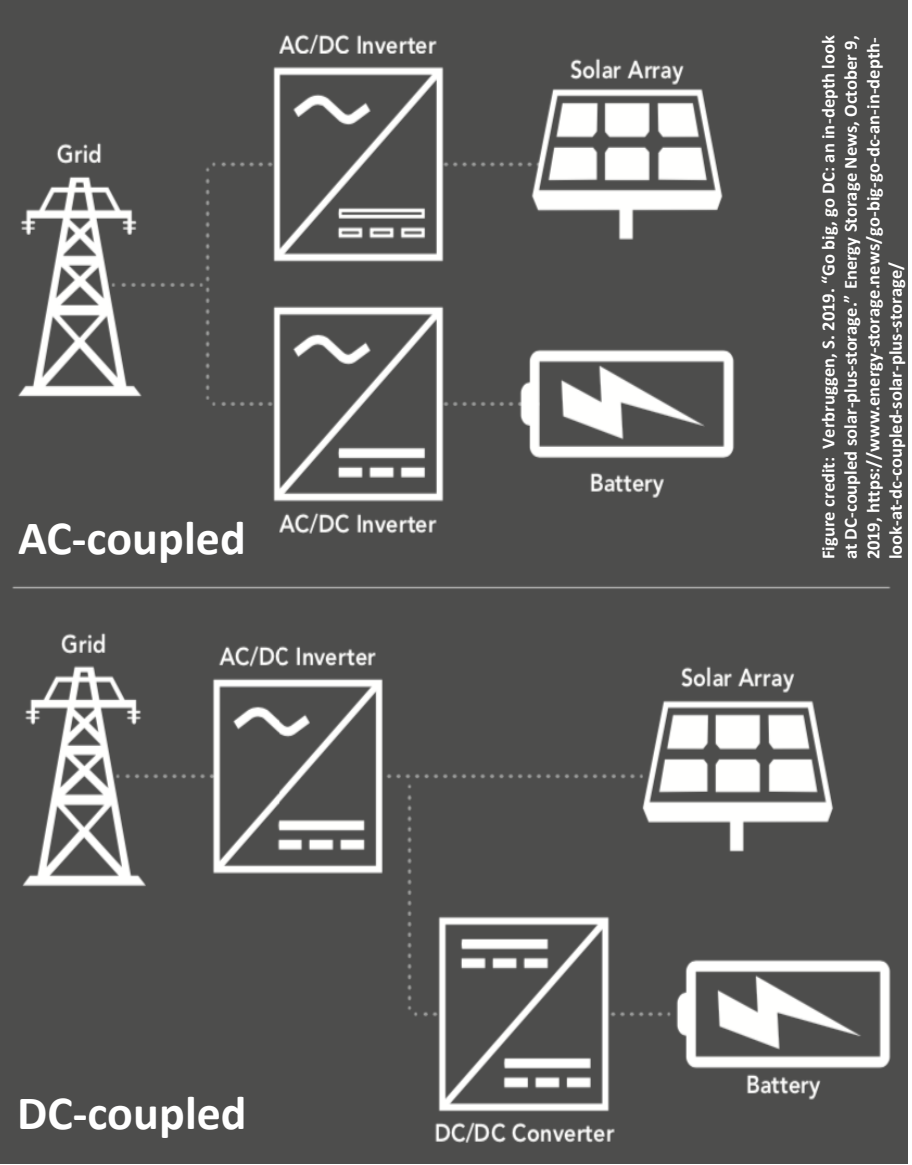
PV-equivalent duration combines SCR and storage duration and describes theoretical battery duration at PV capacity. We will use this term as proxy for battery size.

80% of new PV+battery projects used AC-coupling in 2024



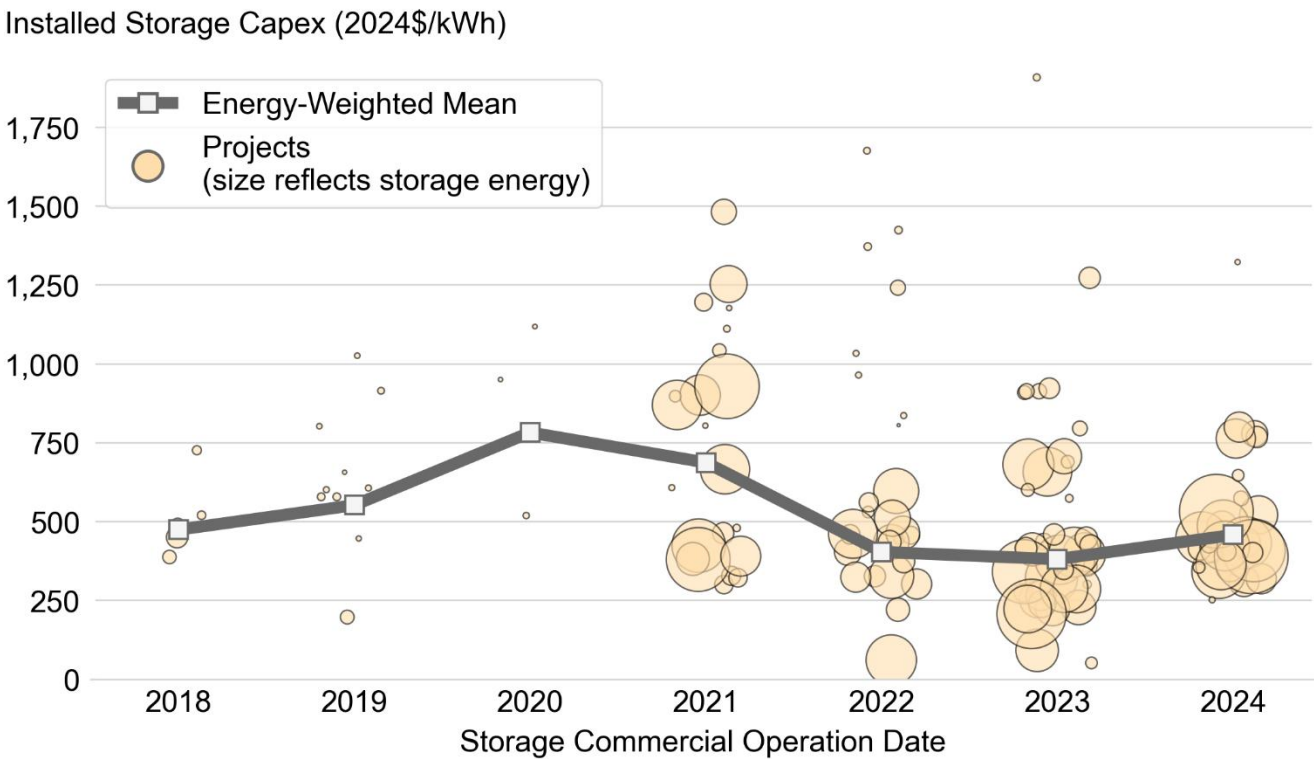
- PV and batteries can be **AC-coupled**
- requiring separate dedicated inverters
 - often featuring a centralized battery yard
 - common among retrofits
- or **DC-coupled**
- only using one inverter setup but a separate DC/DC converter
 - often having higher ILR as battery can capture clipped energy

Despite theoretical cost savings of DC-coupling, most of the recent projects use AC-coupling (except in Florida).

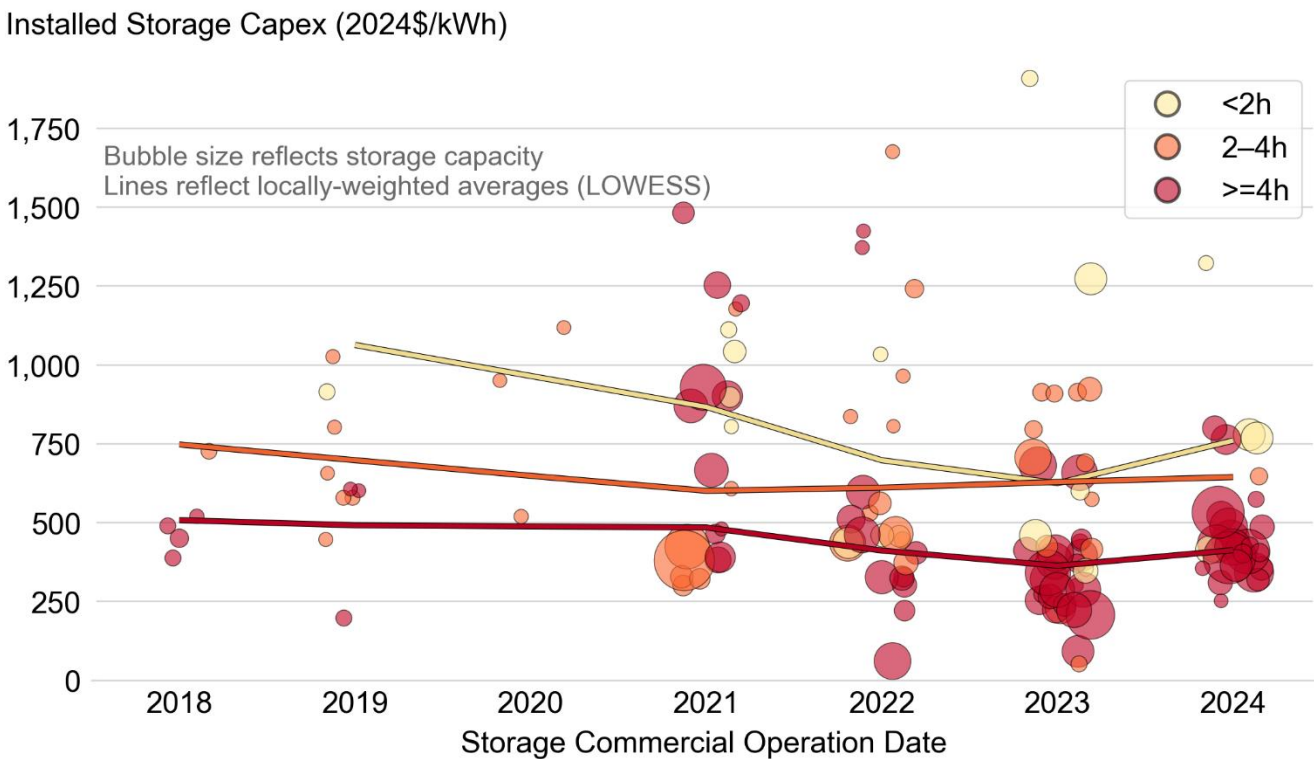


Costs of co-located batteries increased to \$458/kWh in 2024

Sample: 138 projects totaling 8.5 GW and 29.5 GWh of batteries



Capacity-weighted average costs increased from \$381/kWh in 2023 to \$458/kWh in 2024. Costs are lowest in MISO (\$351/kWh) and greatest in the non-ISO Southeast (\$473/kWh).

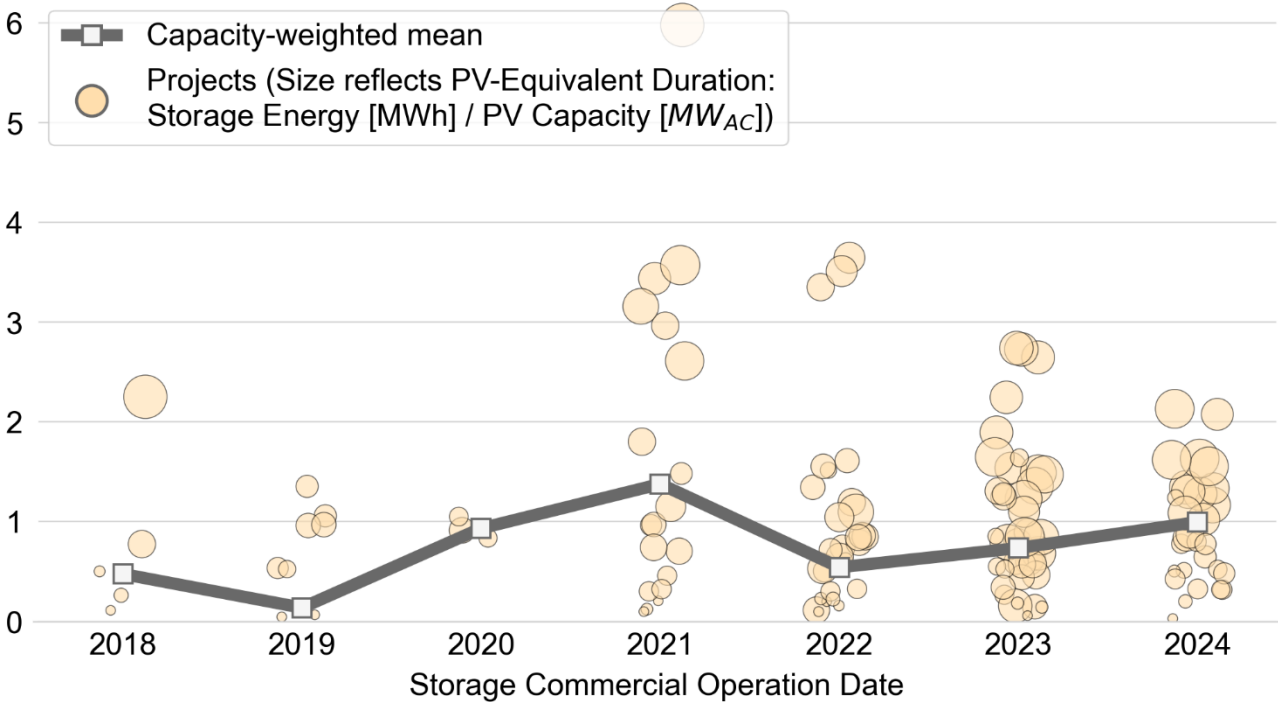


Longer duration storage is cheaper on a per kWh basis than shorter duration storage, indicating economies of scale.

The storage CapEx adder to PV projects depends on battery sizing

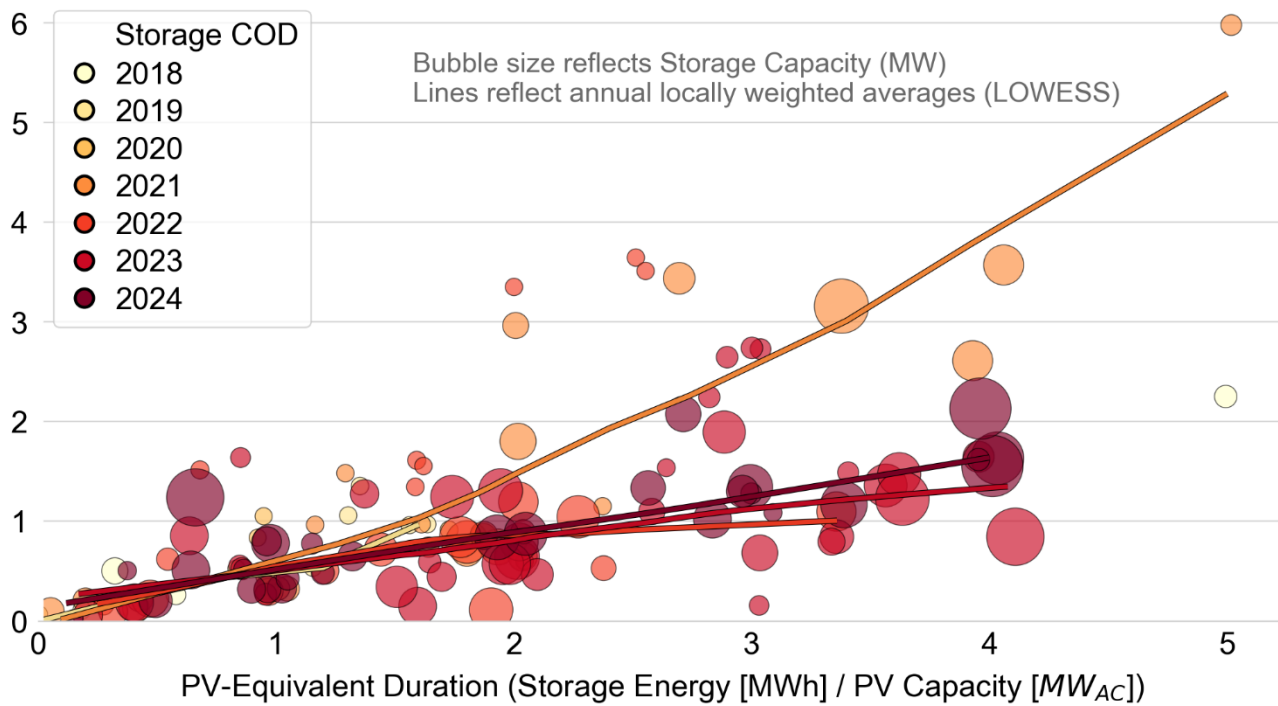
Sample: 131 projects totaling 8 GW and 27.4 GWh of batteries

Storage Capex Adder (2024\$/W_{AC}-PV)



Storage sizes have increased by nearly 50% since 2022, explaining in part the growth of the storage cost adder to \$1.00/W_{AC}-PV in 2024.

Storage Capex Adder (2024\$/W_{AC}-PV)

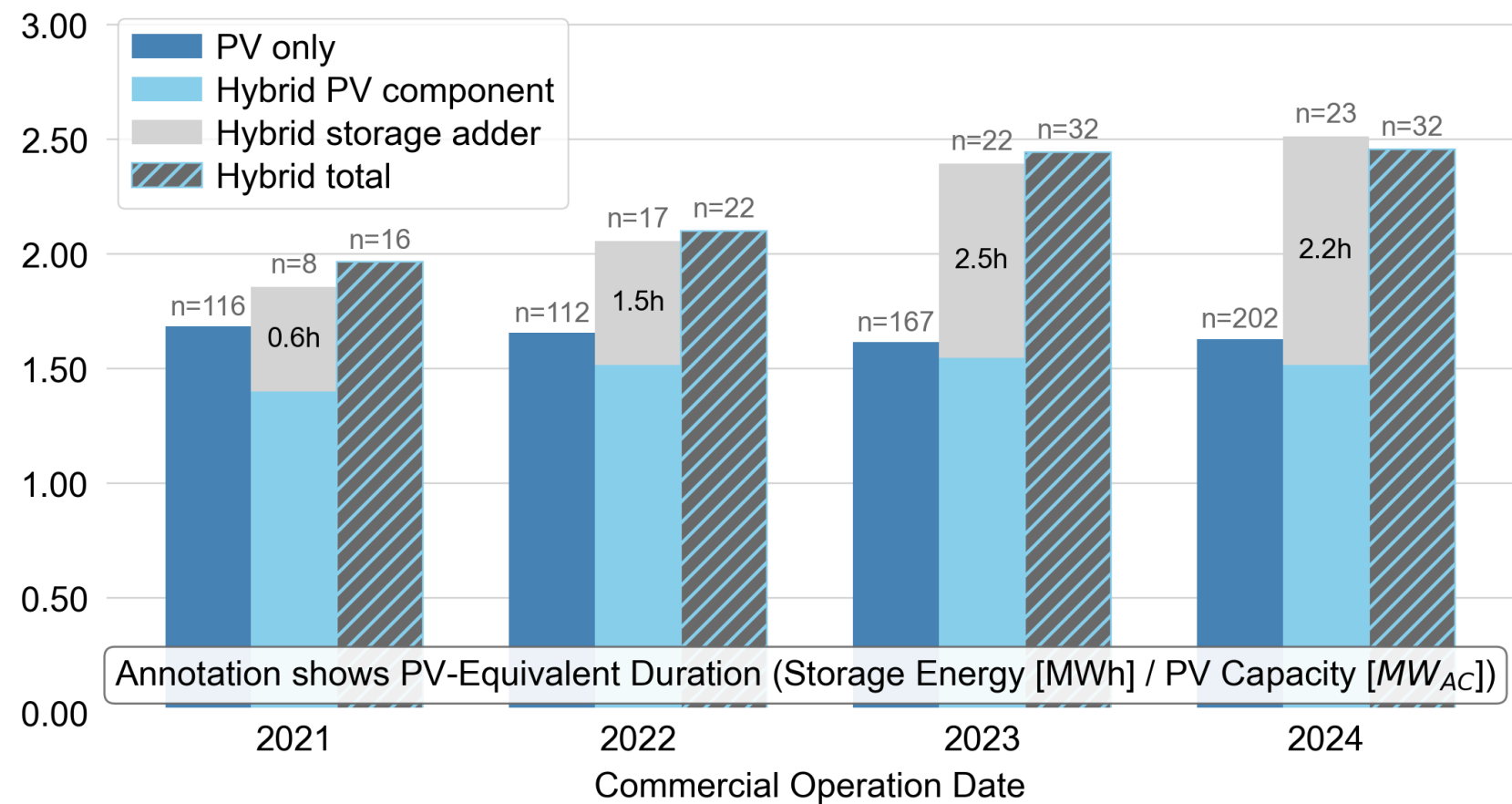


Accounting for storage size variations, storage capex adders in 2024 (**dark red line**) are slightly greater than over the past three years.

Costs of PV+battery projects remained stable at \$2.46/W_{AC-PV} in 2024

Sample: 102 greenfield plants totaling 12.4 GW_{AC} of PV and 6.6 GW / 23.1 GWh of batteries

Installed Project Capex (2024\$/W_{AC}-PV)



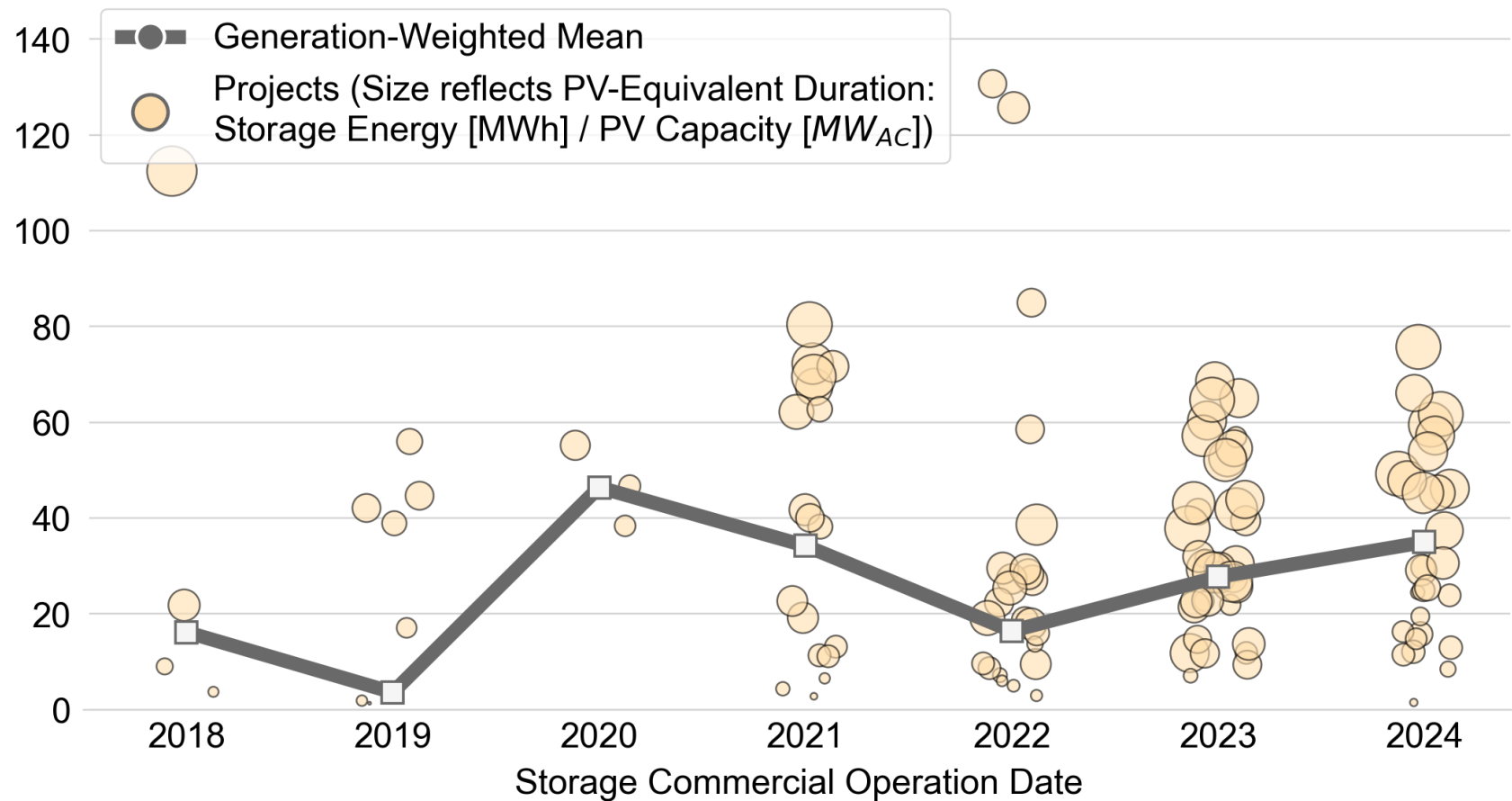
Focusing only on greenfield hybrid developments (excluding retrofits), average cost of PV components of a co-located project are slightly lower than for a PV-standalone project (driven by project size, geographics or shared infrastructure with storage components like inverters for DC-coupled installations).

For some hybrid projects we lack component-level costs and can only report total system costs (hatched) – they were thus excluded from previous slides. These sample differences explain slightly diverging trends (cost increase in center bars vs. stability in right-most bars for the years 2023 vs. 2024).

The battery LCOE adder to PV projects scales with battery sizing, like the capex adder before

Sample: 122 projects totaling 7.5 GW and 26.9 GWh of batteries (including storage retrofits)

Storage LCOE Adder without Tax Credits (2024\$/MWh_{PVS})

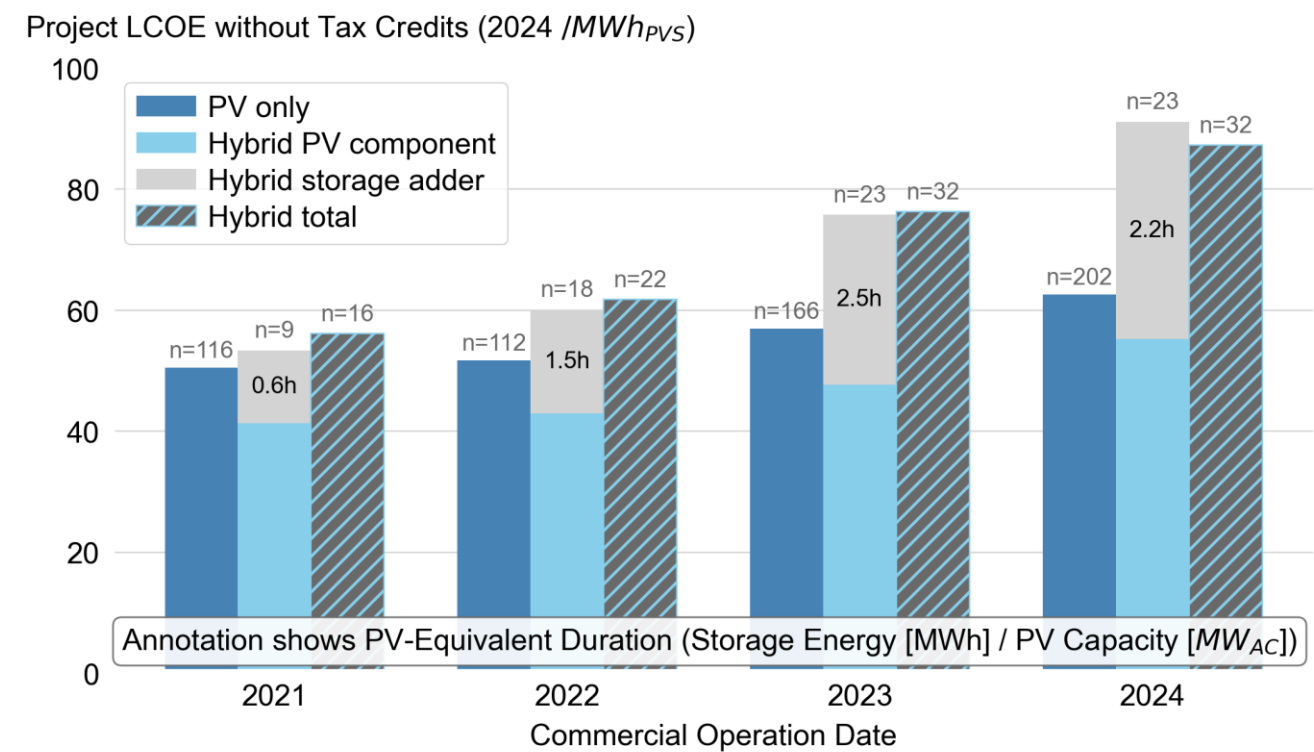


Battery LCOE adders (for both newly built co-located projects and retrofits to existing PV projects) have grown since 2022, driven by larger battery sizes and increased financing costs.

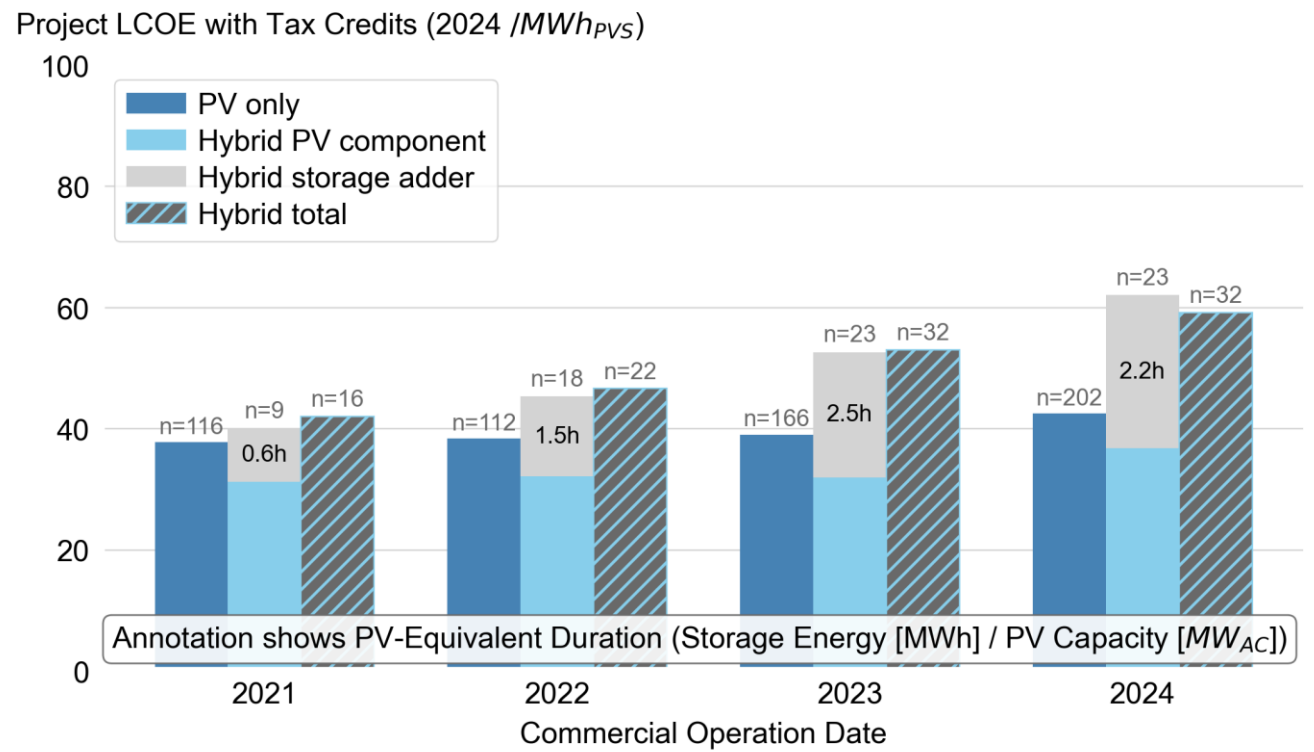
In 2024 the adder was \$35/MWh_{PVS} before tax credits (shown in graph) and \$25/MWh_{PVS} after tax credits.

PV+battery projects had a LCOE of \$87/MWh without and \$59/MWh with tax credits

Sample: 102 greenfield plants totaling 12.4 GW_{AC} of PV and 6.6 GW / 23.2 GWh of batteries (excluding retrofits)



This sample excludes projects with storage retrofits (unlike previous slide). PV component LCOE of a co-located project is lower than PV only as hybrids are usually in sunnier regions.

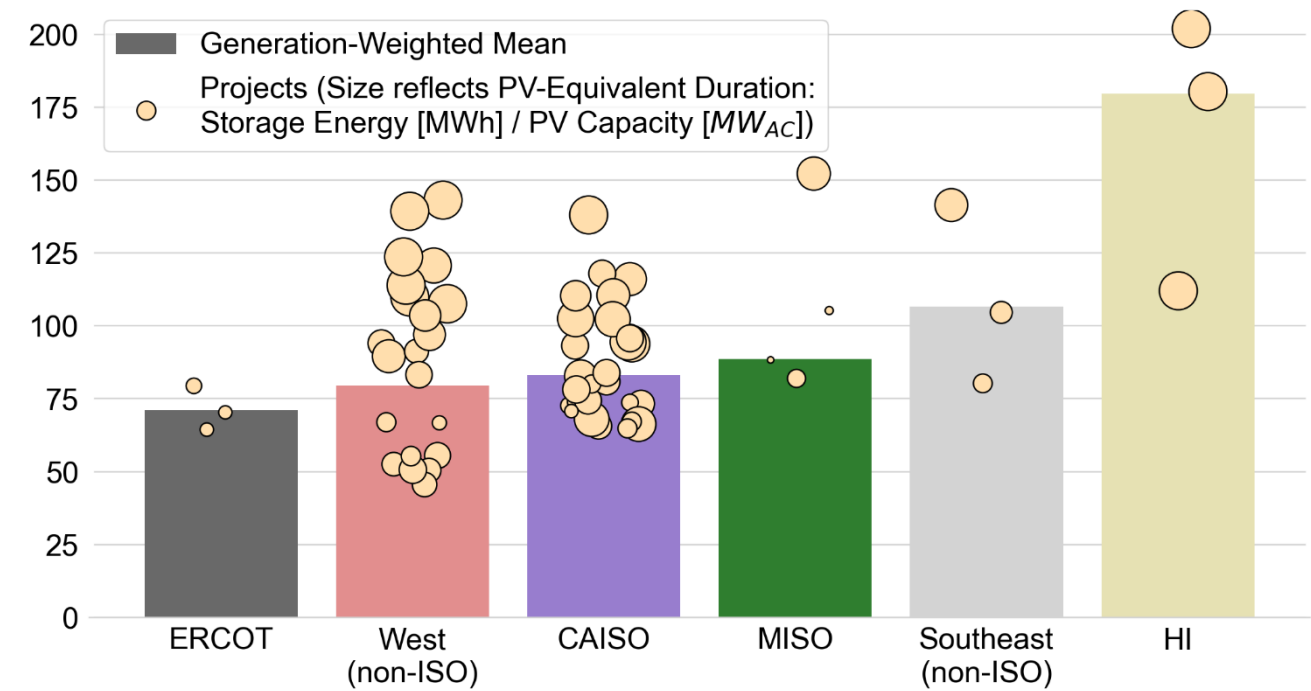


The battery LCOE adder has grown to \$36/MWh before tax credits (left graph) and \$25/MWh after tax credits (right graph) in 2024.

Recent PV+battery LCOE was lowest in Texas and greatest in Hawaii

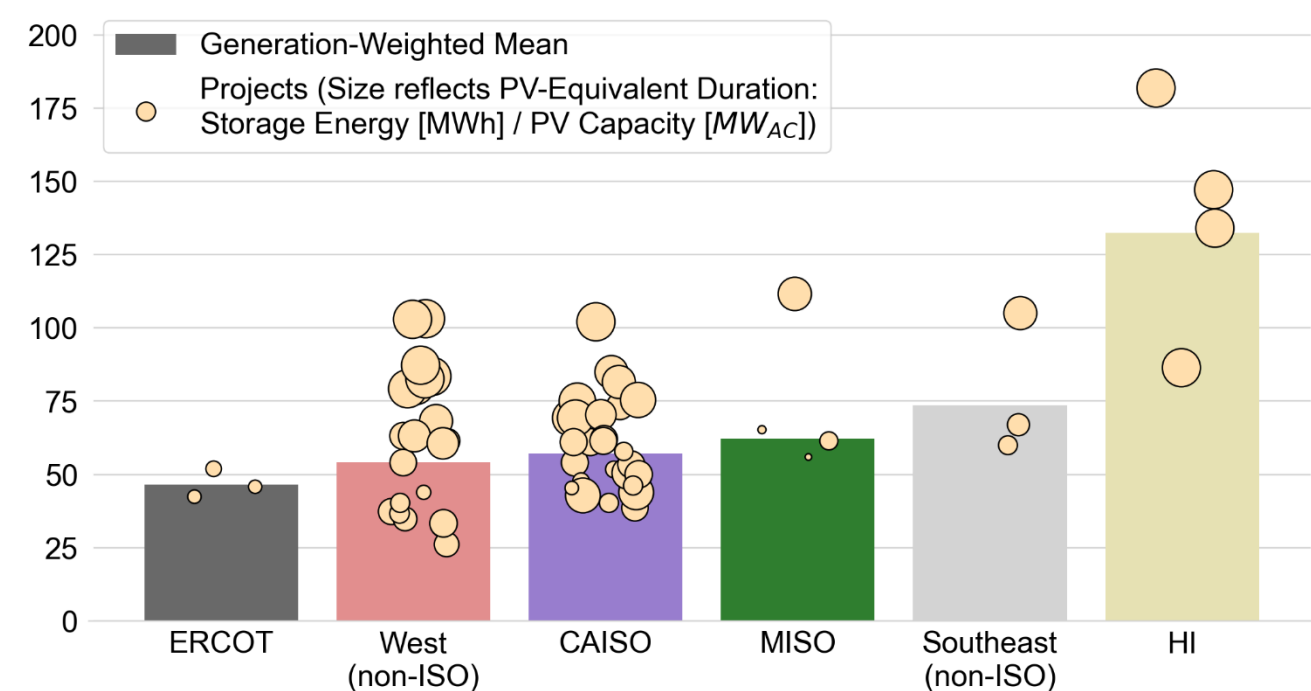
Sample: 63 greenfield plants totaling 9.4 GW_{AC} of PV and 5.5 GW / 19.7 GWh of batteries (excluding retrofits)

LCOE without Tax Credits of 2023-2024 PV+Storage Projects (2024\$/MWh)



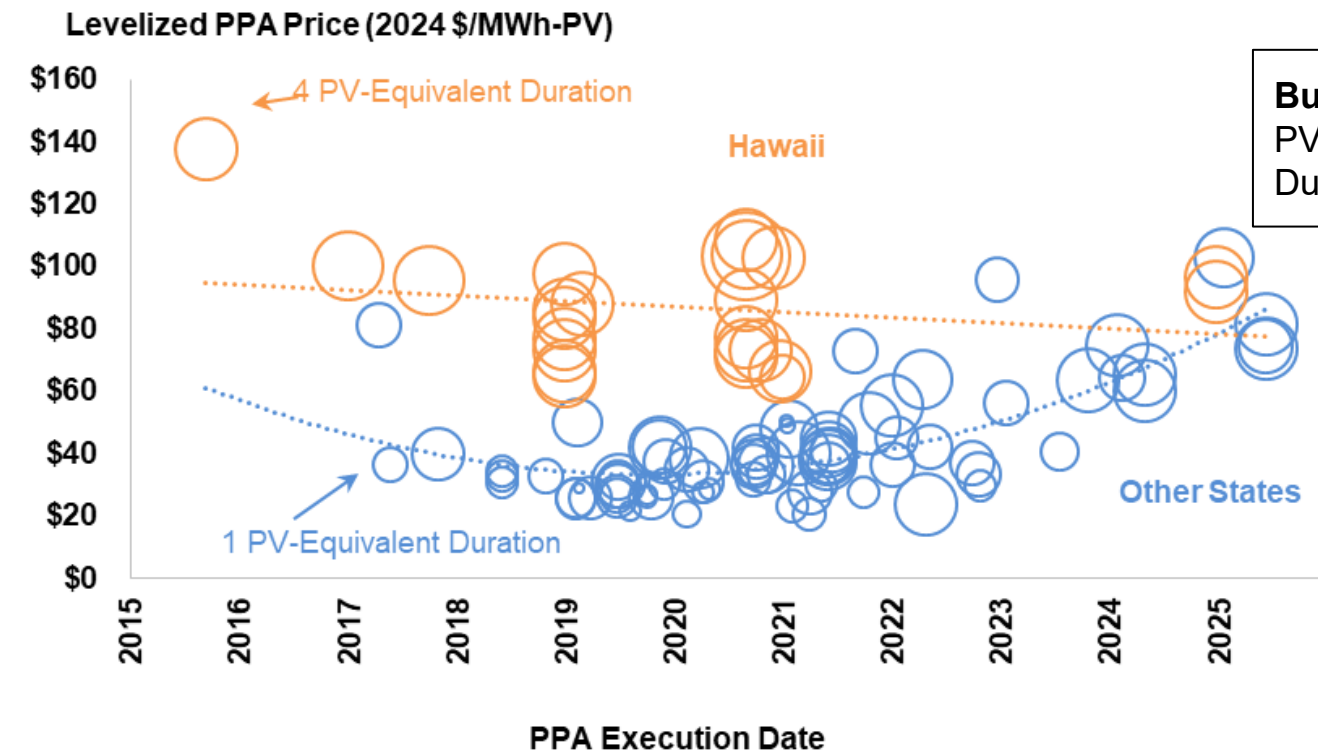
Average PV+battery LCOE in ERCOT was \$71/MWh compared to \$180/MWh in Hawaii in 2023/2024 (HI storage is sized to 100% PV capacity with 4h duration).

LCOE with Tax Credits of 2023-2024 PV+Storage Projects (2024\$/MWh)



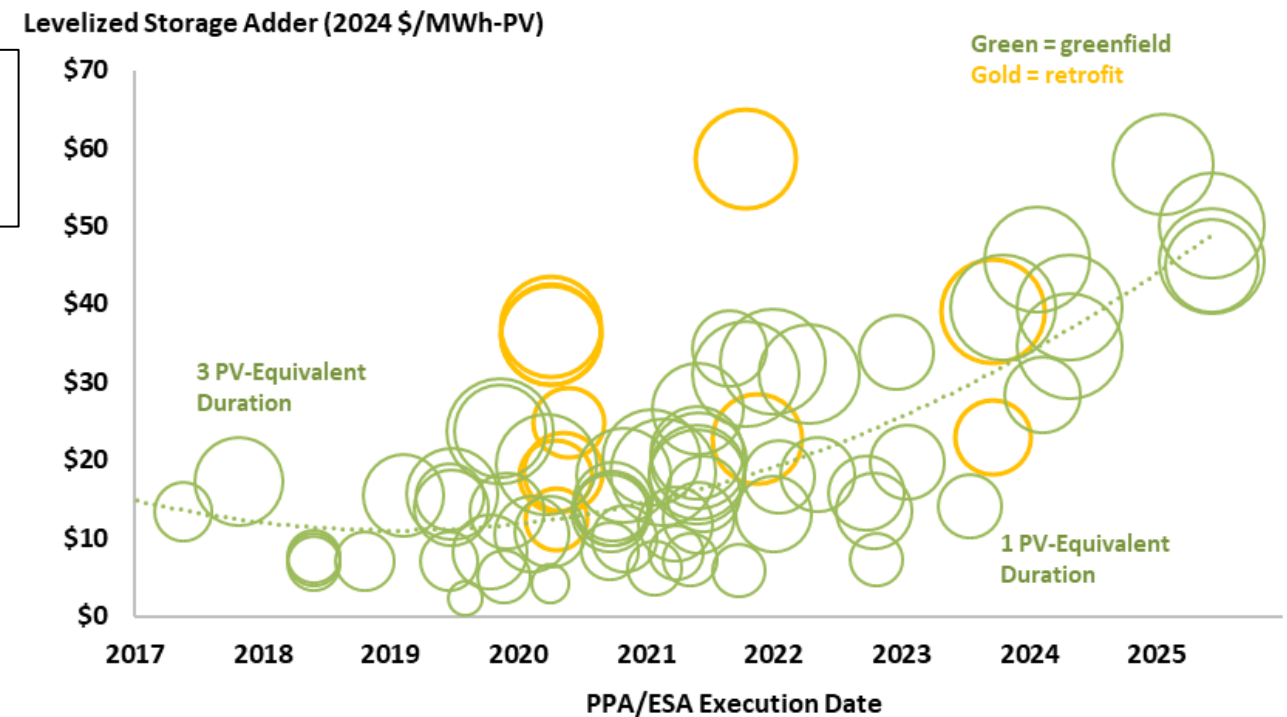
After accounting for available tax credits (excluding potential domestic content bonuses), average LCOE fell to a range \$47/MWh to \$132/MWh.

PPA prices for PV+battery have increased significantly from 2019/2020 lows; Hawaii prices converging overtime



Left graph is sub-sample of 103 plants (retrofits not included)

- Hawaii (orange): 24 plants, 0.9 GW_{AC} PV, 0.9 GW_{AC} battery
- Other States (blue): 78 plants, 11.3 GW_{AC} PV, 6.5 GW_{AC} battery
- Storage duration ranges from 2-8 hours



Right graph is sub-sample of 74 plants (6.6 GW_{AC}) that provide enough information to calculate a levelized storage adder

- CA: 38 plants; NV 14 plants; NM 16 plants; AZ 5 plants; OR 1 plant



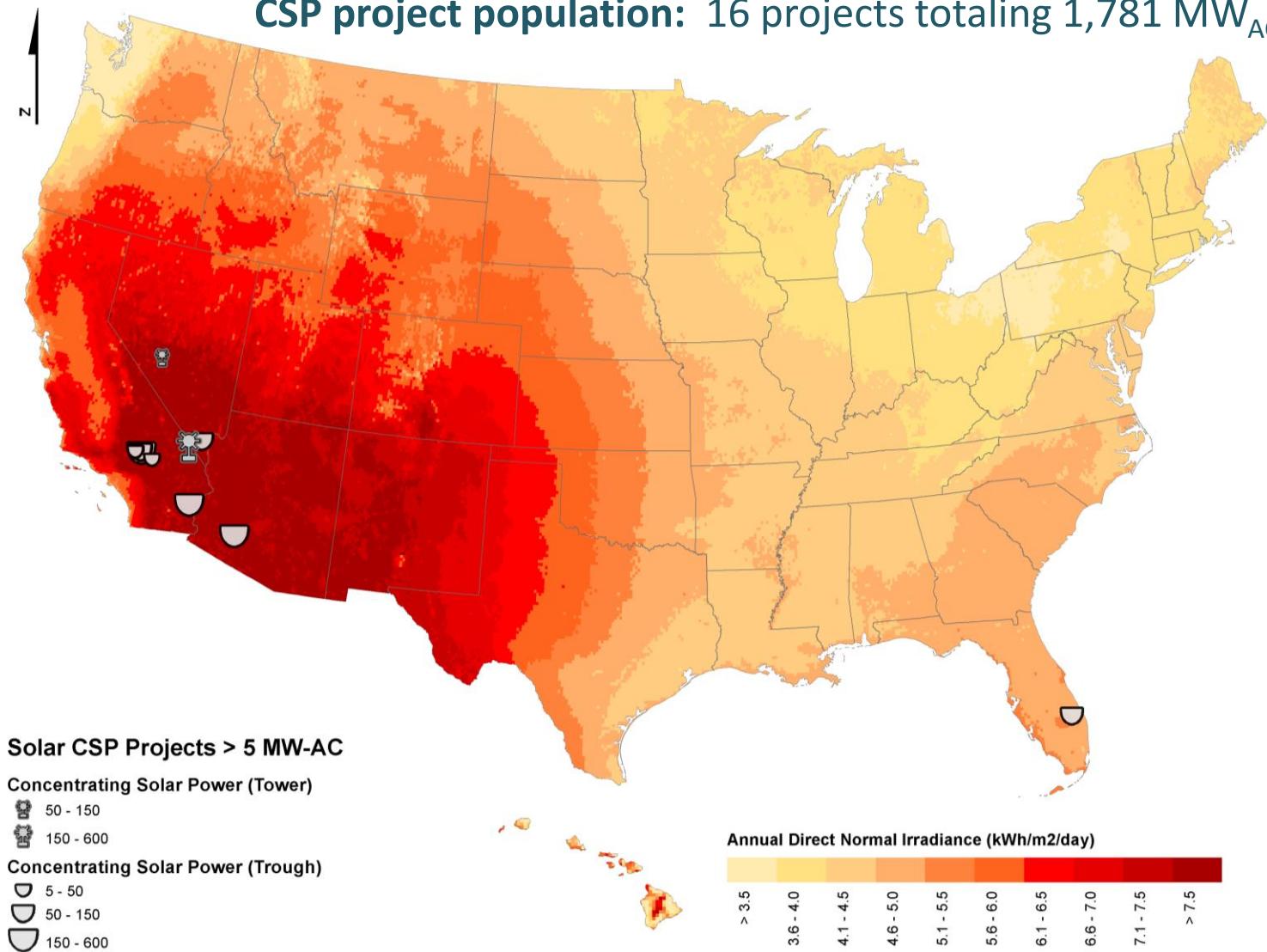
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Concentrating Solar Thermal Power (CSP) Plants

Sample description of CSP projects

CSP project population: 16 projects totaling 1,781 MW_{AC}



After nearly 400 MW_{AC} built in the late-1980s and early-1990s, no new CSP was built in the U.S. until 2007 (68 MW_{AC}), 2010 (75 MW_{AC}), and 2013-2015 (1,237 MW_{AC}).

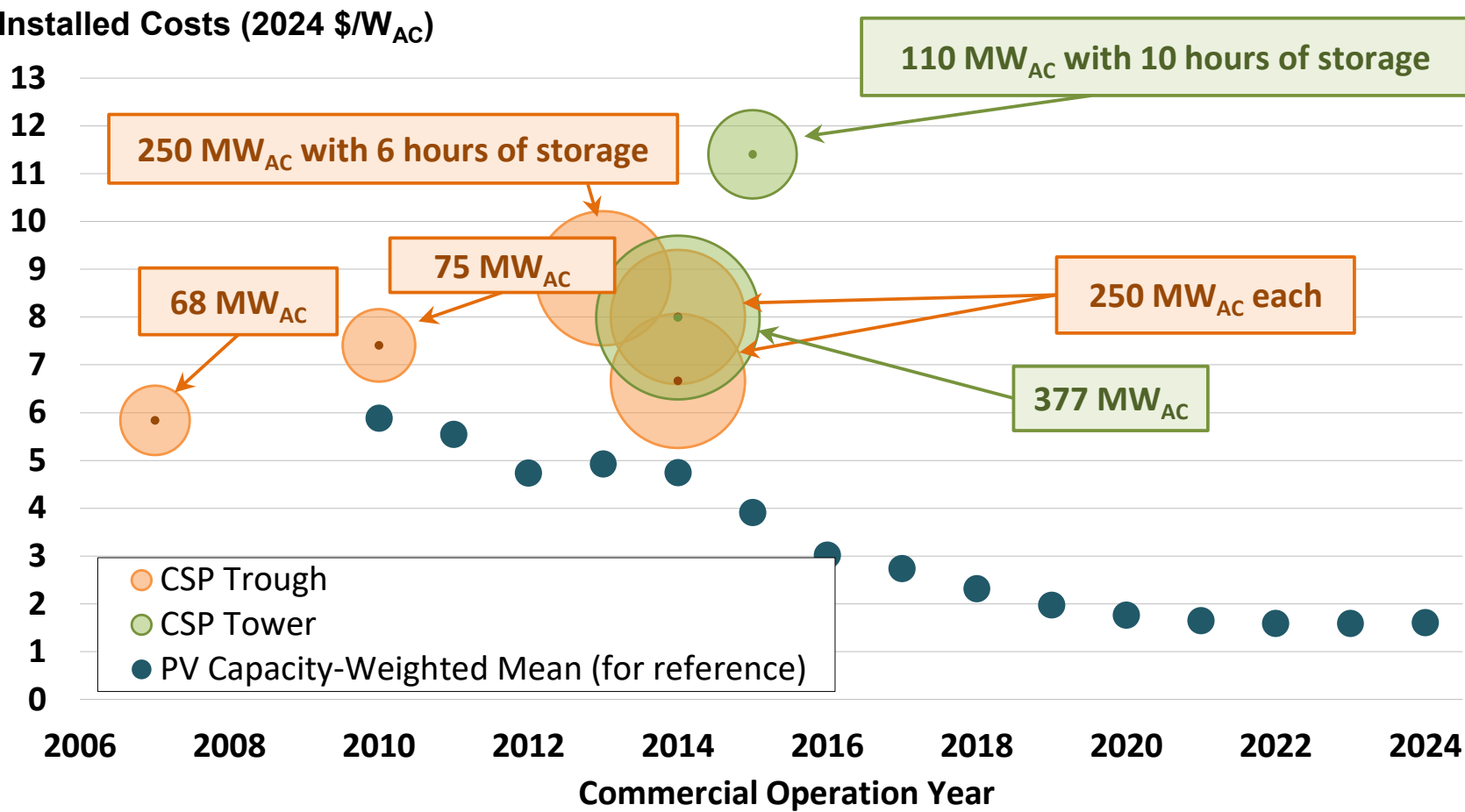
Prior to the large 2013-15 build-out, all utility-scale CSP projects in the U.S. used parabolic trough collectors.

The five 2013-2015 projects include:

- 3 parabolic troughs (one with 6 hours of storage) totaling 750 MW_{AC} (net) and
- 2 “power tower” projects (one with 10 hours of storage) totaling 487 MW_{AC} (net).

With no recent CSP installations in the U.S., empirical installed cost data are dated

CSP cost sample: 7 projects totaling 1,381 MW_{AC}



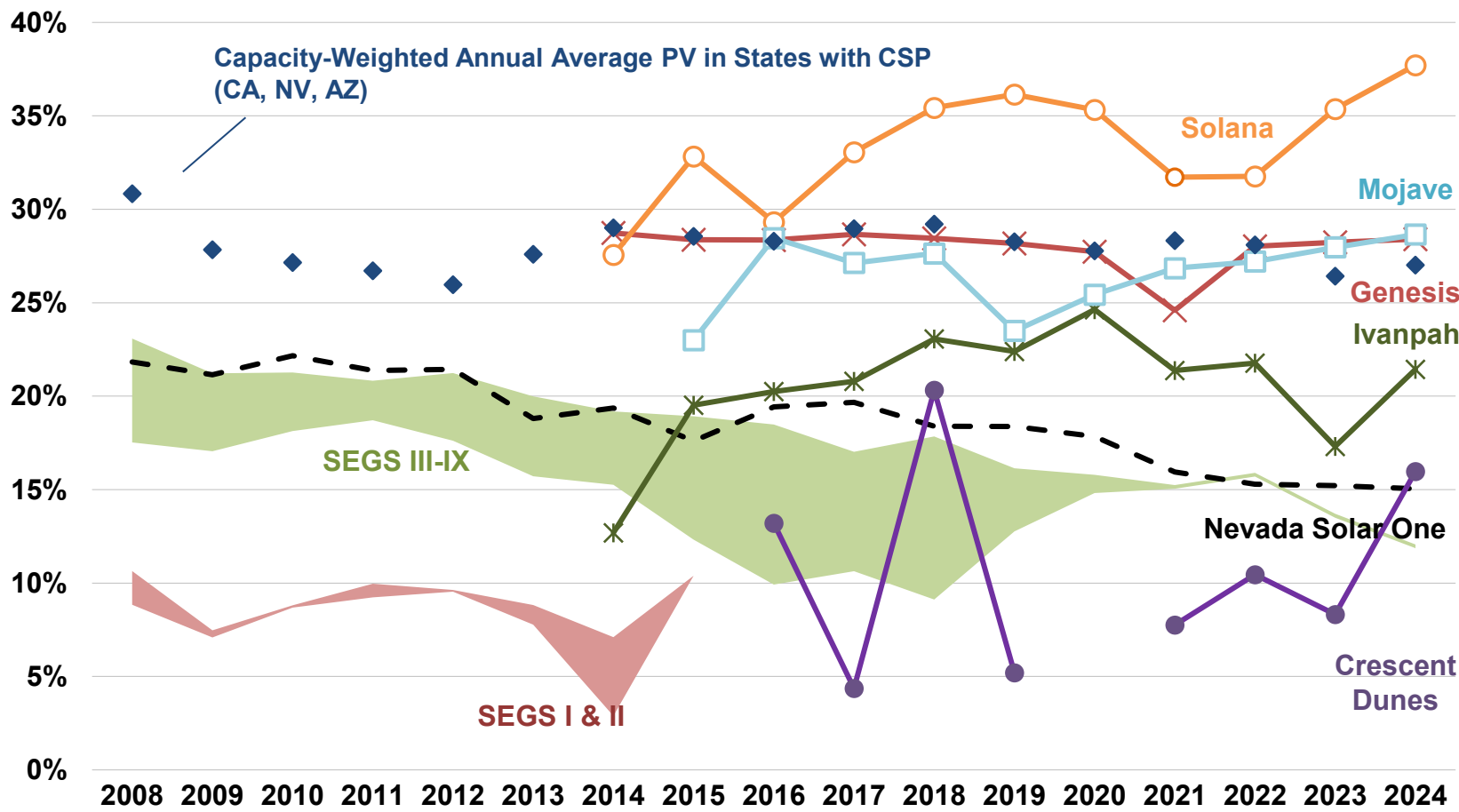
Small sample of 7 projects using different technologies makes it hard to identify trends. Newer projects (5 built in 2013-15) did not show cost declines, though some included storage or used new technology (power tower).

PV costs have continuously declined and are now far below the historical CSP costs. While international CSP projects appear more competitive with PV, no new large-scale CSP projects are currently under active development in the U.S.

CSP projects show modest performance improvements in 2024 despite continued underperformance relative to expectations

CSP capacity factor sample: 7 projects totaling 1,394 MW_{AC}

Annual Capacity Factor (solar portion only)



Power Towers: Ivanpah’s (370 MW) capacity factor increased in 2024--21.4%, up from 17.3% in 2023. The facility is expected to begin decommissioning in 2026, following the termination of its contract with PG&E. Crescent Dunes (110 MW with 10 hours of storage) performed at 16.0% capacity factor in 2024, up from 8.3% in 2023, but still well below expectations.

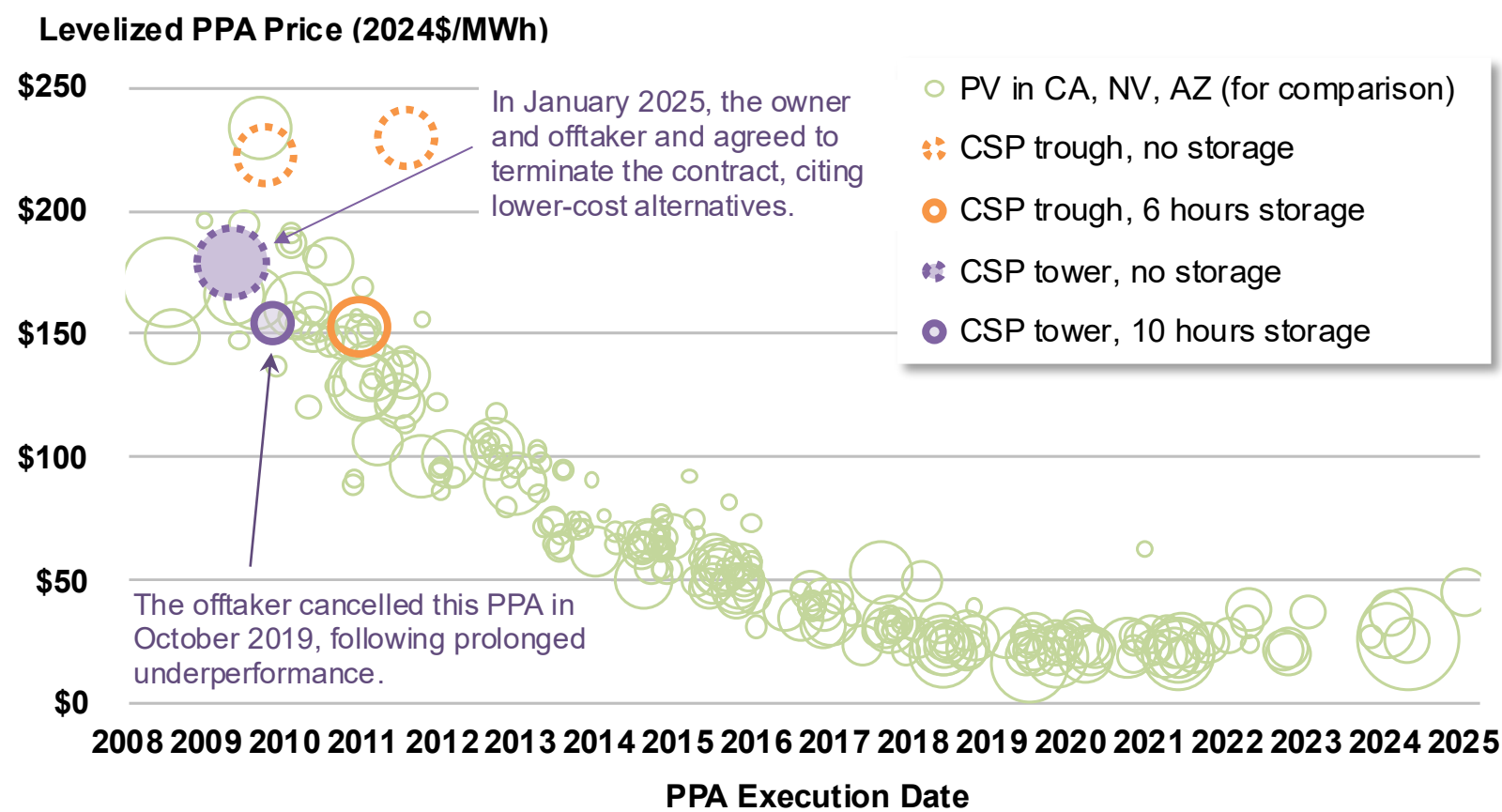
Trough with storage: Solana (250 MW trough project with 6 hours of storage) performed at 37.7% capacity factor in 2024, inching closer to expectations of >40%.

Troughs without storage: Mojave and Genesis (both 250 MW net) were at 28-29% capacity factor in 2024. Both have performed better than the old SEGS projects (now decommissioned and repowered with PV) and the 2007 Nevada Solar One project.

Only Solana, Genesis, and Mojave have matched or exceeded the average capacity factor among utility-scale PV projects across CA, NV, and AZ.

Though CSP was once competitive, PV PPA prices have declined dramatically. Without new CSP PPA data, current comparisons are difficult.

CSP PPA price sample: 5 projects totaling 1,237 MW_{AC}



When PPAs for the most recent batch of CSP projects (with CODs of 2013-15) were signed back in 2009-2011, they had similar prices as PV PPAs.

CSP has not been able to keep pace with PV’s price decline. Partly as a result, no new PPAs for CSP projects have been signed in the U.S. since 2011 and some of the PPAs have been cancelled.



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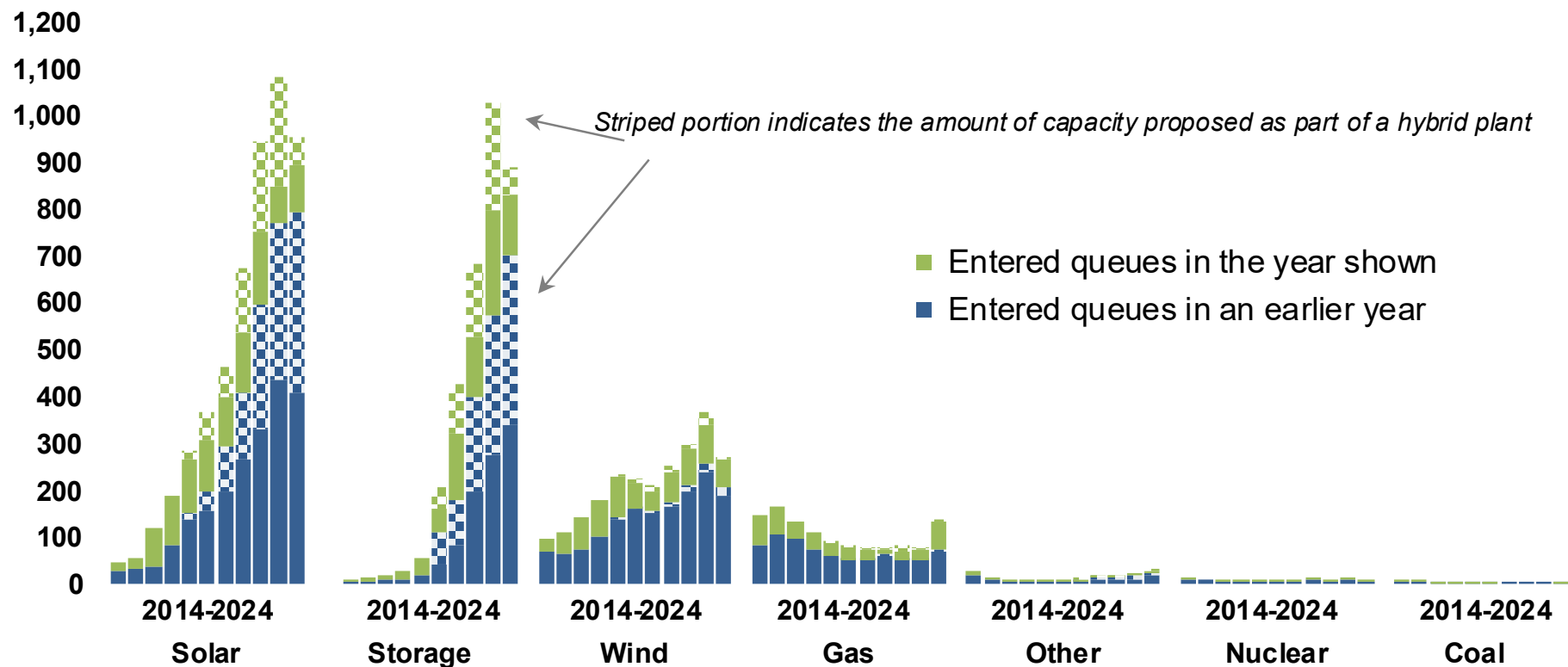
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Capacity in Interconnection Queues

Nearly 1 TW of solar is active in the interconnection queues, a decline from the previous year

Sample: Active bulk-power interconnection requests from 56 interconnection queues.

Capacity in Queues at Year-End (GW)



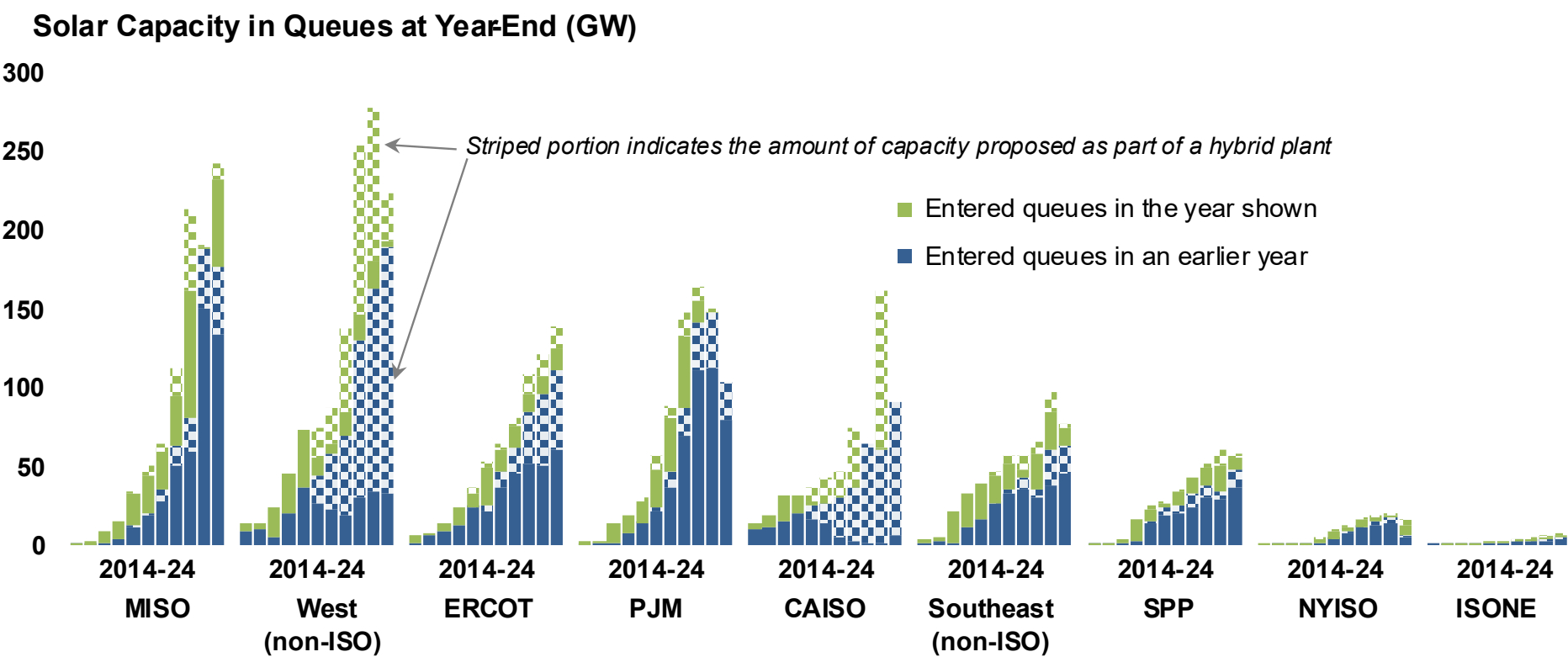
956 GW of solar was in the queues at the end 2024, down 12% from 2023 as a potential early result from FERC 2023 reforms. 161 GW entered the queues in 2024 while the remainder entered in earlier years and remained active.

452 GW of solar in the queues (47%) includes a battery.

Solar (both in standalone and hybrid form) is the largest resource within these queues, followed closely by storage, with wind and gas as 3rd and 4th. All other resources are negligible in comparison.

MISO has the most queued solar capacity in the nation

Sample: Data from 56 interconnection queues across the U.S.



7 out of 9 regions saw contractions in the total amount of queued solar in 2024. MISO and the non-ISO West had more than 200GW in 2024.

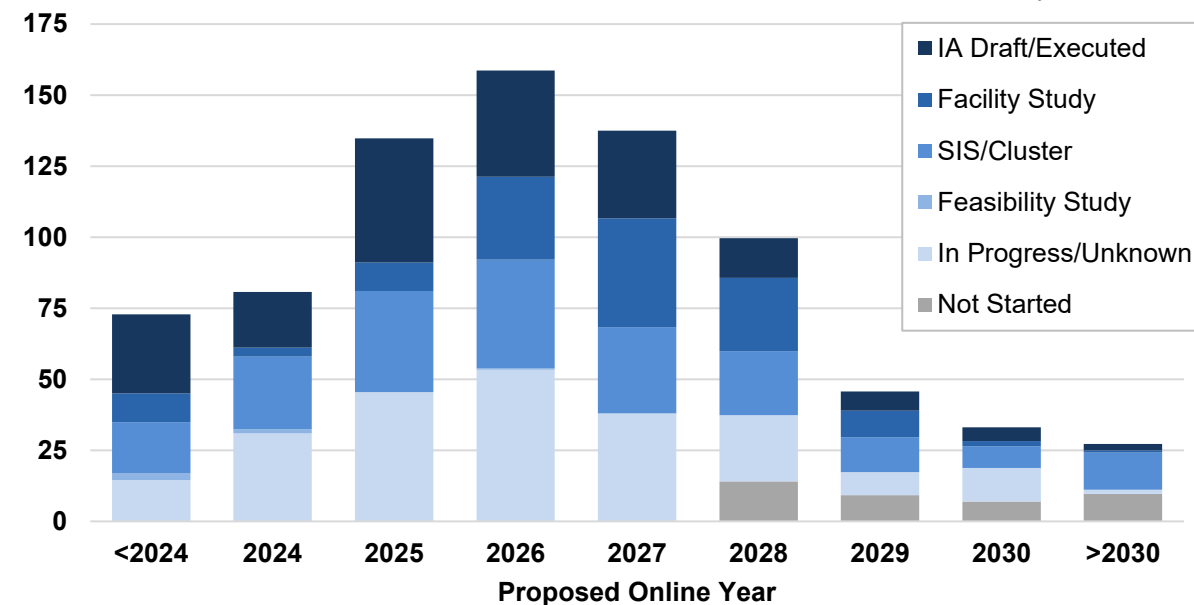
❑ CAISO and PJM did not accept new interconnection requests in 2024, so all solar in those queues entered in an earlier year

93% of the solar capacity in CAISO’s queue at the end of 2024 was paired with a battery; in the non-ISO West, that number was also high, at 83%

❑ Both regions are seeing solar value factors decline due to solar’s relatively high market share (as [discussed previously](#))

Most active solar proposes to be online by 2028, but the historical completion rate for solar projects requesting interconnection is low

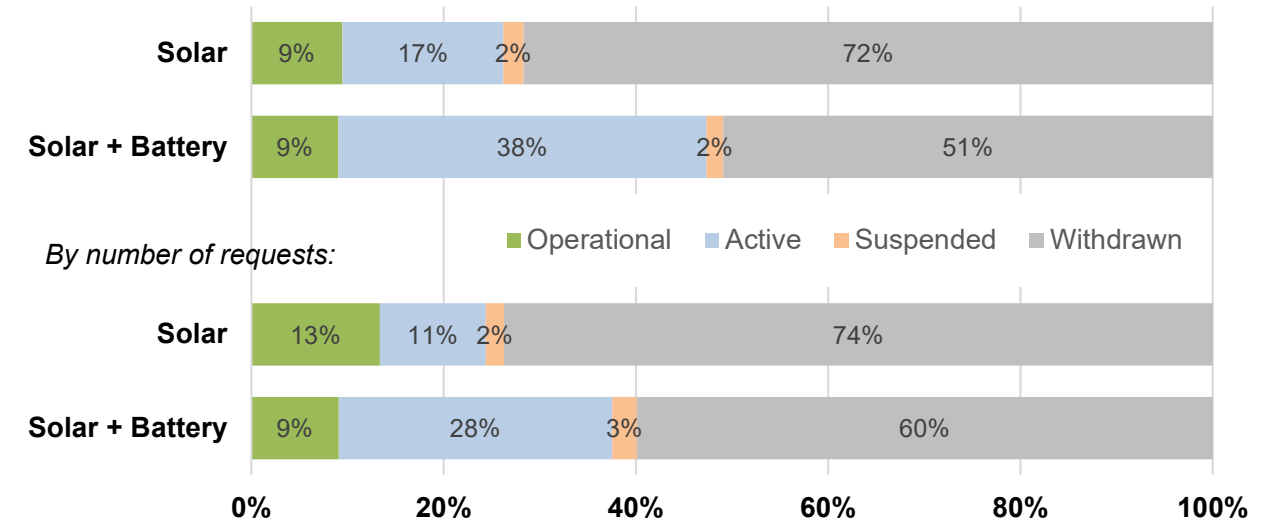
Solar Capacity in Queues at 2024 Year-End (GW)



- Few solar projects have requested interconnection with a proposed online date of 2029 or later
- Proposed online dates are included in the developer's original interconnection request and may differ from actual online date
 - ❑ 154 GW of active solar requests were already past their proposed online date at the end of 2024
- 187 GW of solar capacity have an interconnection agreement (either draft or executed) – these projects are the most likely to be completed

Current Status for Requests Submitted 2000-2019

By capacity of requests:



- If historical patterns persist, only ~9% of solar capacity requesting interconnection will ultimately get built and become operational
- Developers withdraw interconnection requests for many reasons:
 - ❑ Some reasons are based in the interconnection process, such as [high cost to interconnect](#) and study delays
 - ❑ Some reasons arise outside of the interconnection process, such as failure to secure financing or an offtaker, permitting issues, or insufficient resources to complete all proposed projects



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For more information

Explore this briefing, an extensive workbook with all underlying data, and interactive visualizations: utilityscalesolar.lbl.gov

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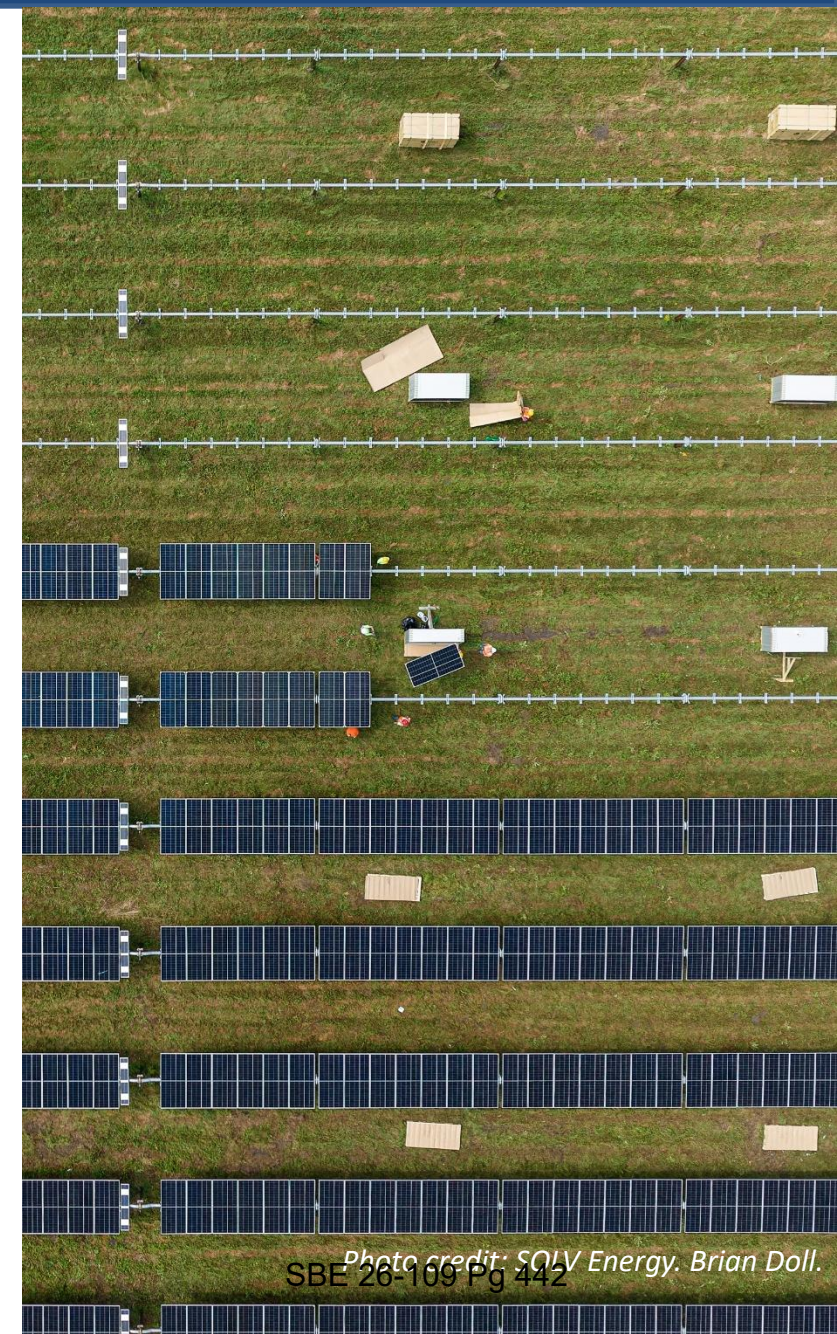


Photo credit: SOLV Energy, Brian Doll.
SBE 26-109 Pg 442



ITC Legislation

Legislation	Enacted Date	Availability Period & Details - Credit First Established
Energy Tax Act of 1978	11/9/1978	10/1/1978 – 12/31/1982 10% for solar and wind (refundable)
Crude Oil Windfall Profit Tax Act of 1980	4/2/1980	1/1/1980 – 12/31/1985 – 15% for solar and wind (non-refundable) – Additional technologies now eligible
Tax Reform Act of 1986	10/22/1986	1/1/1987 – 12/31/1987 12% 1/1/1988 – 12/31/1988 10%
Technical and Miscellaneous Revenue Act of 1988	11/10/1988	1/1/1989 – 12/31/1989 10%
Omnibus Budget Reconciliation Act of 1989	12/19/1989	1/1/1990 – 9/30/1990 10%
Omnibus Budget Reconciliation Act of 1990	11/5/1990	10/1/1990 – 12/31/1991 10%
Tax Extension Act of 1991	12/11/1991	1/1/1992 – 6/30/1992 10%
Energy Policy Act of 1992	10/24/1992	10% credit made permanent
Energy Policy Act of 2005	8/8/2005	1/1/2006 – 12/31/2007 30% – Residential systems made eligible
Tax Relief and Health Care Act of 2006	12/20/2006	1/1/2007 – 12/31/2008 30% 1/1/2009 – 12/31/2016 30%
Emergency Economic Stabilization Act of 2008	10/3/2008	– Credit allowed to offset Alt. Minimum Tax – Small Wind (100 kW or less) made eligible, capped at \$4,000
American Recovery and Reinvestment Act of 2009	2/17/2009	– Ability to claim ITC in lieu of PTC (must be placed in service in 2009 – 2012, later extended)

		– Ability to claim grant in lieu of ITC (must commence construction in 2009 or 2010, later extended to 2011)
Tax Increase Prevention Act of 2014	12/19/2014	– ITC in lieu of PTC extended retroactively through 12/31/2014 1/1/2017 – 12/31/2021 – Credit expiration changed to commenced construction date from placed in service date
Consolidated Appropriations Act of 2016	12/18/2015	– ITC in lieu of PTC extended retroactively through 12/31/2019 for wind – Phaseout for solar introduced: – 26% ITC in 2020 – 22% ITC in 2021 – 10% ITC in 2022 and thereafter – ITC expiration date for non-solar technologies extended and phaseout introduced:
Bipartisan Budget Act of 2018	2/9/2018	– 26% ITC in 2020 – 22% ITC in 2021 — Phaseout amended
Consolidated Appropriations Act of 2021	12/27/2020	– 26% ITC in 2020 – 2022 – 22% ITC in 2023 – New tax credit for offshore wind 1/1/2022 – 12/31/2024
Inflation Reduction Act	8/16/2022	– Transitioning to technology-neutral credit through 2034 or later – Labor provisions – Bonus Credits



NEVADA DEPARTMENT OF TAXATION
Division of Local Government Services

CAPITALIZATION RATE STUDY CALENDAR
YEAR 2023
FOR THE 2025-2026 SECURED AND
2024-2025 UNSECURED TAX YEAR

NEVADA DEPARTMENT OF TAXATION

Capitalization Rate Study per Nevada State Administrative Code Methodology

Calendar Year 2023

**For the 2025-2026 Secured &
2024-2025 Unsecured Tax Year**

The Nevada Tax Commission is required to adopt formulas providing the method or methods pursued in fixing and establishing the taxable value of all property assessed by it pursuant to [NRS 361.320 \(4\)](#) . [NAC 361.425](#) describes the formulas adopted by the Commission for the development of the income indicator of value. Under NAC 361.425, the Department is permitted to develop an equity rate for each industry group based on one or more of the following models:

- (1) Discounted cash flow method;
- (2) Capital asset-pricing; or
- (3) Risk premium analysis.

The Department selected the discounted cash flow model as the preferred income indicator.

The Department also considers four capitalization criteria in its capitalization rate study:

- (1) The estimate of the equity cost of capital must comport with common sense.
- (2) The company's equity risk premium should be reasonably stable over short periods of time.
- (3) The estimate of the cost of equity should apply for the long term.
- (4) The estimation procedure must be sufficiently straightforward so that it can be easily understood, applied, and even adjusted by educated practitioners.

Additionally, the Department's capitalization rate model uses comparables, and:

- (1) It provides development of "pure plays".
- (2) It uses comparables to reduce measurement error, however, there is a trade-off between the reduced measurement error that averaging makes possible and the potent bias that it introduces. "There is no unambiguous way to identify comparability."
- (3) Because of the impact of diversification, averaging reduces the short-term variation in the estimated cost of equity. From the standpoint of regulatory agencies, which must set policies based on estimates of the cost of capital, this increased stability is a major benefit." (Cornell, p. 9).

The capitalization rate model utilized for development of the 2025-2026 tax year income indicators of value for centrally assessed companies is a forward looking discounted cash flow model. The Department's developed rates use data from select firms and groups within an industry and not from all industries. This is so because the rate developed must be reflective of the "typical" company within an industry or group. See [NAC 361.425](#). Capitalization rates are developed for specific industry segments using data specific to each of those segments.

Value Line, Moody's/Mergent Financial Information Services, Standard & Poor's along with independent studies, studies submitted by industry groups, studies from other states, and studies received from individual companies provide sources for documentation, development and analysis of information contained in this study. The DCF model used by the Department is the generally accepted DCF presentation with the company structure and growth components derived from Value Line data sheets for companies found in Value Line's industry segments. Historical income is used as a predictor of future revenue streams. The Department also considers in its analysis, studies and data submitted by industry groups or individual companies. No comparisons are drawn from companies not related to the industry being appraised.

The income indicator of value is based on the theory that value is equal to the present worth of anticipated future net benefits. From an investment standpoint, the critical element affecting value is the earning power of the asset. The income approach is used to estimate market value because it converts the right to receive future earnings and benefits into an estimate of present value. "Present value is the sum that a prudent purchaser-investor would pay for the right to receive the forecast net income stream over the specified period." W. Kinnard, Jr., *Income Property Valuation* (1971), p. 62, quoted in *Folsum v. County of Spokane*, 725 P.2d 987 (Wash.1986), p. 990. Because the income stream produced by the property is an indication of earning power, reliable measurement of the income stream becomes crucial.

The rates used to convert income are based on the costs of the major sources of capital. The overall cost of capital is estimated by using band-of-investment methodology, as required under Commission rules at [NAC 361.425 \(1\)](#). The band-of-investment method derives the "weighted average cost" of three components of capital: debt, preferred equity, and common equity. "Weighted average cost" is derived by multiplying the average capital structure components (common equity, preferred equity, and debt) of the "typical" company by the cost of capital for each category.

The "capital structure" is derived by developing a representative, or "typical company", within the industry group. The typical company's capital structure is the median average of a selected sample of companies. Selection of companies for the sample is based on comparability of revenues, bond ratings, nature of operations and regulatory environment. (See, [NAC 361.425 \(3-4\)](#)).

The discounted cash flow (DCF) model measures the rate of return requirements of industrial stock (equity) as demonstrated by investors in the market. The basic theory of DCF is that the price paid for a share of stock reflects the investors' discounted present value of expected future returns from holding a stock (dividends and price appreciation).

The basic DCF formula is:

$$K_e = D_1/P_0 + G$$

Where:

K_e = Cost of Capital

D_1 = Projected Dividend

P_0 = Current Stock Price

G = Growth

The division of the D_1 variable by the P_0 variable results in an estimate of dividend yield. Dividend yield is obtained from the Value Line projected dividend yield for the 2023 year. The growth factor in the model was derived by subtracting the published dividend yield from the Value Line projected annual total return for the same period. The Value Line projected annual total return includes both the dividend yield and the overall price appreciation, if any. Overall price appreciation is assumed to represent investor expectations regarding earnings per share and book value per share growth.

The calculation is made for each of the companies contained in the sample. In most cases, the Department selected the median dividend yield plus the median growth rate to determine the overall common equity rate in order to minimize any skewing of the data which might occur with the presence of any non-typical company statistics.

Income Stream

The Department estimates the income stream for yield capitalization by deducting allowable expenses from operating revenues. The result is adjusted to reflect normalized and annualized revenues and expenses, and to reflect disallowed rental expenses, allowed federal income tax and book depreciation if necessary. See [NAC 361.423](#) & [NAC 361.454](#). The operating income to be capitalized into taxable value will be normalized and annualized based on the most recent year's adjusted net operating income. When the most recent year's net operating income is typically not a reasonable representation of the net operating income of the industry under review, such as where the net operating income of the industry tends to be cyclical, a 3 or 5-year average of adjusted net operating incomes will be normalized and annualized and are used as a prediction of future revenue streams. The cash flows (adjusted net operating income) from existing assets are assumed to continue in perpetuity.

Market Capital Structure

Electrics, Gas Pipelines, Telecommunications

Pursuant to [NAC 361.425 \(4\) and \(5\)](#), the Department has derived the capital structure of the typical company from the use of market information for the selected sample of firms. The capital structure is developed using information from Value Line for each firm. The median structure is then calculated and applied to each component cost of capital to determine the weighted-average cost of capital.

The sample of firms was selected on the basis of comparability of Value Line Ratings, S&P Ratings, Moody's/Mergent Ratings, size of capitalization, debt rate, and NAICS code number. In the case of electric companies, western regional companies were selected over central or eastern regional companies. In addition, most nuclear-powered generation companies were rejected from the sample, with the exception of Southern California Edison, a Nevada taxpayer. The pipeline company sample includes a wide range of types, from coal-slurry to natural gas. The telecommunications sample includes inter-exchange and local exchange service as many firms now provide both types of service.

Railroads

The sample of firms selected for inclusion in the study was comprised of Class I carriers controlled by selected major railroad holding companies. Criteria for selection for all industries included a debt rating of at least BBB- (Standard and Poor's) and Baa (Moody's); a listing on a major stock exchange; and listed by Value Line.

Airlines

The sample of firms for each airline sub-group was determined on a wide range of comparability factors that included elements for financial, operating and physical characteristics. For example, the major segmentation of the industry was based on payload, distinguishing pure freight carriers from mixed passenger-freight carriers.

Components of the Cost of Capital

Debt Capital:

Electrics, Gas Pipelines, Telecommunications

The 2023 cost of debt was developed using information from Moody's/Mergent Financial Information Services: Bond Records. At Corporate Bond Yield Averages Record, December, 2023, the 2023 yields for Baa utility bonds ranged from 5.50% to 6.63%. The average of this range is 5.86%. Only long-term debt obligations are included since only long-term liabilities are included in a capital structure. Baa utility bonds are considered to be medium grade obligations, neither high quality nor highly speculative. Baa bonds are typically representative of many utilities, and the resulting cost of debt is conservative.

Railroads

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Airlines

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Flotation Costs of Debt

The Department adjusts the cost of debt as necessary to reflect additional bond issue costs, called flotation costs. Flotation costs include underwriter's fees and legal expenses and are estimated to be approximately 0.60% of the debt issue. The formula used by the Department is: $(\text{Cost of debt}) * (1/(1-.0060))$. The multiplier for debt is obtained by dividing 1 by 1 minus the flotation cost. The multiplier is then applied to the cost of debt to obtain the adjusted cost of debt. (See, Parcell, The Cost of Capital – A Practitioners Guide (1997), p. 11-2). In addition this formulation was used by the California State Board of Equalization and the Southwest Gas Corporation.

There are several ways in which flotation costs can be recognized with regards to assessed valuations/appraisals. The first method, and the way previously recognized by the Department, has been to adjust upward the return on equity to reflect the flotation costs incurred to issue the securities. This method treats flotation costs like most other operating costs and allows for their recovery or in the assessed valuation process allows these expenses as any other legitimate expenses to offset the cash flows under the income approach. In other words flotation expenses are accounted for in the income stream. Expensing issuance costs in the year incurred has the advantage of simplicity. The alternative recovery can be accomplished via straight line amortization over a short period of time

Preferred Equity Capital:

Preferred equity contains characteristics of both debt and equity. Preferred issues are like common stocks in that they have no maturity dates and represent ownership in the company but they are like debt in that they usually have fixed dividend payments similar to interest payments. However, Moody's/Mergent Financial Information Services ceased providing preferred stock yield averages in July 2011. Given the rarity of the use of preferred stock equity by the subject industries and the absence of available market rate information, it is only utilized in the analysis of large electric companies.

Large Utility Companies

Two of the three companies in the sample group of this sector utilize preferred stock. Due to the absence of market information, the rate utilized for analysis is derived from the weighted average Value Line yields for the subject utility companies. A rate of 5.4583% is utilized for the cost of preferred equity for this sector.

Flotation Costs of Preferred Equity

The Department adjusts the cost of preferred equity as necessary to reflect additional preferred equity issue costs, called flotation costs. Flotation costs include underwriter's fees and legal expenses and in most cases are estimated to be approximately 1.25% of the preferred equity issue. The formula used by the Department is: $(\text{Cost of equity}) * (1/(1-.0270))$. The multiplier for preferred equity is obtained by dividing 1 by 1 minus the flotation cost. The multiplier is then applied to the cost of preferred equity to obtain the adjusted cost. (See, Parcell, The Cost of Capital – A Practitioners Guide (1997), p. 11-2). (See Keown, Martin, Petty and Scott, Foundations of Finance(2006), p. 334). See Brigham-Gapenski, Financial Management -Theory and Practice (Seventh Edition), p. 340).

Common Equity Capital:

Airlines, Electrics, Gas Pipelines, Railroads, Telecommunications

Pursuant to [NAC 361.425](#), the Department developed a common equity rate based on the discounted cash-flow method model. The calculation is made for each of the companies contained in the sample. In most cases, the Department selected the median dividend yield plus the median growth rate to determine the overall common equity rate in order to minimize any skewing of the data which might occur with the presence of any non-typical company statistics. Refer to the method described fully in the introduction and in the yield capitalization technique described above.

Flotation Costs of Equity

The Department adjusts the cost of common equity as necessary to reflect additional equity issue costs, called flotation costs. Flotation costs include underwriter's fees and legal expenses and in most cases are estimated to be approximately 3.0% of the common equity issue. The Department references current used flotation cost adjustments from the recent "Willamette Management Associates Gross Spread Study" referenced in the Union Pacific Railroad Cost of Capital Study for 2023 Assessment Year. Based on recent industry input and request the Department will no longer tax-effect the flotation costs. The formula used by the Department is:

$$K = \frac{D}{P(1-f)} + g$$

The multiplier for common equity is obtained by dividing the dividend yield by 1 minus the flotation cost plus the growth rate. The multiplier is then applied to the cost of common equity to obtain the adjusted cost. (See, Parcell, The Cost of Capital – A Practitioners Guide (1997), p. 11-17). (See Copeland-Weston, Managerial Finance (Ninth Edition), p. 616. (See, Brigham-Houston, Fundamentals of Financial Management (2004), p. 368-369). See Brigham-Gapenski, Financial Management – Theory and Practice (Seventh Edition), p. 358-359).

Pursuant to [NAC 361.425 \(8C\)](#), the Department may, with Director approval, utilize Direct Cap Rates. The cost of equity is earnings divided by price from Value Line and Standard and Poor's Stock Guide. The cost of debt is long-term interest divided by market value long-term debt, also from Value Line. As a check of reasonableness to the Yield Cap Rate method the Department conducted a Direct Cap Rate study. Attached to this narrative are the results of the Yield Cap Rate study.

May 25, 2023

SOURCES OF INFORMATION AND DATA

The following sources of information were referenced to develop data for the capitalization rate study:

Moody's/Mergent Public Utility Stock and Bond Averages

Moody's/Mergent Industrial Stock and Bond Averages

Value Line Investment Survey, various editions

Other sources referenced for analysis and comparison:

Colorado State Board, Colorado Capitalization Rates for Tax Year 2023

https://drive.google.com/file/d/1hBqy99Y_Junw20d6ix1I9zlo1fP7VMIV/view?usp=drive_link accessed on 04/15/24

New York University Annual Industry Capitalization Rate Study 2023, http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/wacc.htm accessed on 03/13/24

Idaho Power Company's 2023 Assessment Year
Cost of Capital Study

Keown, Martin, Petty and Scott, Foundations of Finance (2006), p. 334

Brigham-Gapenski, Financial Management-Theory and Practice (Seventh Edition), p. 340, 358-359

Copeland-Weston, Managerial Finance (Ninth Edition), p. 616

Brigham-Gapenski, Fundamentals of Financial Management (2004), p. 368-369

Parcell, The Cost of Capital – A Practitioners Guide (1997), p. 11-17

[Nevada Revised Statute, NRS 361](#)

[Nevada Administrative Code, NAC 361](#)

NEVADA DEPARTMENT OF TAXATION - DOAS 2025-2026 CAPITALIZATION RATE COMPARISON - DCF

	INDUSTRY	FIRMS	MODEL	STRUCTURE	EQUITY	EQUITY +	PREF.	PREF. +	DEBT	DEBT +	2025-2026	REF.	REF.	REF.
				C.E. / P.E. / D	COST	FLOTATION	COST	FLOTATION	COST	FLOTATION	WACC - DCF	2024-2025	2023-2024	2022-2023
1	AIRLINE ALL PASSENGER	10	DCF	37.9%/0.0%/62.1%	17.8000%	18.3340%	0.0000%	0.0000%	5.8608%	5.8962%	10.6135%	10.9153%	10.8121%	10.7503%
2	AIRLINE ALL FREIGHT	2	DCF	80.9%/0.0%/19.1%	9.4057%	9.4407%	0.0000%	0.0000%	5.8608%	5.8962%	8.7653%	8.9550%	8.7390%	8.7130%
3	ELECTRIC - LARGE	4	DCF	62.0%/2.5%/35.5%	9.1647%	9.2427%	5.3901%	5.4583%	5.8608%	5.8962%	7.9601%	7.8166%	7.6094%	7.6868%
4	ELECTRIC - SMALL	6	DCF	51.6%/0.0%/48.4%	8.0279%	12.2638%	0.0000%	0.0000%	5.8608%	5.8962%	9.1849%	8.8412%	7.8472%	7.7630%
5	GAS/PIPE DISTRIBUTION	6	DCF	54.8%/0.6%/44.6%	13.6431%	14.0524%	0.0000%	0.0000%	5.8608%	5.8962%	10.3294%	10.8680%	9.0249%	9.0414%
6	GAS/PIPE DIVERSIFIED	7	DCF	62.8%/0.0%/37.2%	14.7150%	15.1711%	0.0000%	0.0000%	5.8608%	5.8962%	11.7213%	12.0481%	11.3967%	11.3177%
7	RAILROAD	4	DCF	79.4%/0.0%/20.6%	10.1721%	13.3735%	0.0000%	0.0000%	5.8608%	5.8962%	11.8338%	11.4736%	11.9037%	11.7404%
8	TELECOM (ALL)	5	DCF	54.3%/0.0%/45.7%	14.1711%	14.8946%	0.0000%	0.0000%	5.8608%	5.8962%	10.7840%	10.9454%	11.0630%	10.4507%
9	ALTERNATIVE ENERGY CO.	8	DCF	55.0%/0.0%/45.0%	14.8000%	15.6451%	0.0000%	0.0000%	5.8608%	5.8962%	11.2581%	11.0712%	10.4288%	10.4177%

NEVADA DEPARTMENT OF TAXATION DOAS 2025-2026 CAPITALIZATION RATE COMPARISON

OTHER 2025-2026 STUDIES

	REFERENCE ONLY		STRUCTURE	EQUITY	EQUITY +	PREF.	PREF. +	DEBT	DEBT +	2025-2026	REF.	REF.	REF.
	INDUSTRY	SOURCE		COST	FLOTATION	COST	FLOTATION	COST	FLOTATION	WACC	2024-2025	2023-2024	2022-2023
1	AIRLINE *	NEW YORK U.	38.15% / 0.0%/61.85%	9.7100%	NO DATA	NO DATA	NO DATA	5.0900%	NO DATA	6.0600%	6.9800%	4.8300%	4.6100%
2	ELECTRIC/GENERAL *	NEW YORK U.	51.83% / 0.0%/48.17%	6.8700%	NO DATA	NO DATA	NO DATA	4.5000%	NO DATA	5.1900%	6.1700%	3.7000%	2.9000%
3	GAS/PIPELINE DIV (Productic	NEW YORK U.	81.12% / 0.0%/18.88%	8.1600%	NO DATA	NO DATA	NO DATA	5.0900%	NO DATA	7.3400%	10.1900%	6.0400%	4.7000%
4	OIL/GAS DISTRIBUTION *	NEW YORK U.	58.75%/0.0%/41.25%	7.5200%	NO DATA	NO DATA	NO DATA	5.0900%	NO DATA	5.9900%	7.4200%	5.1800%	4.0200%
5	RAILROAD *	NEW YORK U.	74.86%/0.0%/25.14%	9.6700%	NO DATA	NO DATA	NO DATA	5.3500%	NO DATA	8.2500%	8.7900%	4.1500%	4.2700%
6	TELECOM (Services) *	NEW YORK U.	44.46%/0.0%/55.54%	7.4900%	NO DATA	NO DATA	NO DATA	5.3500%	NO DATA	5.5600%	6.5700%	3.7000%	3.2000%
7	AIRLINE PASSENGER *	CO. ST. BD.	50.0%/0.0%/50.0%	14.8300%	NO DATA	NO DATA	NO DATA	7.2500%	NO DATA	11.0400%	11.4100%	11.3500%	11.5900%
8	AIRLINE CARGO *	CO. ST. BD.	80.0%/0.0%/20.0%	10.1000%	NO DATA	NO DATA	NO DATA	5.6200%	NO DATA	9.2000%	9.0100%	8.7600%	8.6600%
9	ELECTRIC *	CO. ST. BD.	58.0%/0.0%/42.0%	10.1000%	NO DATA	NO DATA	NO DATA	5.8700%	NO DATA	8.3300%	8.1000%	7.7500%	7.2800%
10	GAS/PIPELINE DISTRI *	CO. ST. BD.	60.0%/0.0%/40.0%	9.8300%	NO DATA	NO DATA	NO DATA	5.9400%	NO DATA	8.2700%	8.2400%	7.6200%	7.6500%
11	GAS/PIPELINE TRANSM *	CO. ST. BD.	62.0%/0.0%/38.0%	14.3500%	NO DATA	NO DATA	NO DATA	5.8500%	NO DATA	11.1200%	10.8300%	10.2000%	10.9600%
12	RAILROAD *	CO. ST. BD.	85.0%/0.0%/15.0%	11.8500%	NO DATA	NO DATA	NO DATA	5.7500%	NO DATA	10.9400%	10.9300%	11.1000%	10.7400%
13	TELECOM CLECS/LD TELCC	CO. ST. BD.	30.0%/0.0%/70.0%	10.5000%	NO DATA	NO DATA	NO DATA	8.0000%	NO DATA	8.7500%	8.8400%	8.8800%	9.0300%
14	TELECOM LD *	CO. ST. BD.	45.0%/0.0%/55.0%	11.0000%	NO DATA	NO DATA	NO DATA	8.0000%	NO DATA	9.3500%	9.2800%	9.2400%	9.0100%
15	RAILROAD *	UNION PACIFIC	78.0%/0%/22.0%	14.0000%	14.4300%	NO DATA	NO DATA	5.8600%	5.9000%	12.5600%	12.2900%	12.8300%	12.0300%
16	ELECTRIC	IDAHO POWER	56%/0.0%/44%	9.6000%	9.8800%	NO DATA	NO DATA	6.1900%	6.2900%	8.3000%	8.6500%	7.8400%	7.8600%

NOTE: NEW YORK UNIVERSITY COST OF DEBT SHOWN ABOVE IS AFTER-TAX

Jesse Crews

From: Jesse Crews
Sent: Tuesday, February 17, 2026 8:51 AM
To: 'Chris Clark'
Cc: 'James Bergstrom'; Amy Mills; David Denman
Subject: RE: BOE Case # 00032 - Acct 224631 TOWNSITE SOLAR

Hello Chris,

Please provide status of your third-party valuation.

Regards,

Jesse Crews

Property Appraiser, Assessor's Office



togetherforbetter

500 S. Grand Central Pkwy, 2nd Floor | Las Vegas, NV 89155

Email: Jesse.Crews@ClarkCountyNV.gov

Direct: 702.455.4983 | Office: 702.455.4997

ClarkCountyNV.gov



service integrity respect accountability excellence leadership

From: Jesse Crews
Sent: Monday, February 9, 2026 9:26 AM
To: 'Chris Clark' <cclark@arevonenergy.com>
Cc: James Bergstrom <jbergstrom@arevonenergy.com>; Amy Mills <aha@ClarkCountyNV.gov>; David Denman <jde@ClarkCountyNV.gov>
Subject: RE: BOE Case # 00032 - Acct 224631 TOWNSITE SOLAR

Hello Chris,

Hope your weekend was enjoyable. Just wanted to follow up and request ETA of your third-party valuation.

Regards,

Jesse Crews*Property Appraiser, Assessor's Office***togetherforbetter**

500 S. Grand Central Pkwy, 2nd Floor | Las Vegas, NV 89155

Email: Jesse.Crews@ClarkCountyNV.gov

Direct: 702.455.4983 | Office: 702.455.4997

ClarkCountyNV.gov**service integrity respect accountability excellence leadership****From:** Chris Clark <cclark@arevonenergy.com>**Sent:** Monday, February 2, 2026 11:19 AM**To:** Jesse Crews <Jesse.Crews@ClarkCountyNV.gov>**Cc:** James Bergstrom <jbergstrom@arevonenergy.com>**Subject:** BOE Case # 00032 - Acct 224631 TOWNSITE SOLAR

Good Morning,

Happy February. Yes, we have three scenarios that come up with our valuation for Townsite as follows:

1. The State Board of Equalization's value of \$375,000,000, which was determined at the SBOE's hearing in 2025. We used that value as of the 2022 tax year.
2. We used the SBOE's value and backed into the 2021 value (Year 1) that equals \$433,576,135.97
3. Lastly, we used the income approach to value and determined our NPV of ~\$260,000,000.

Our appeal uses option 3. Attached you will find all three scenarios for your review along with our 2025 financials. We are still waiting for our third-party valuation which should come in the next couple of weeks.

Thank you,

Christopher Clark

Manager, State and Local Tax

Office (480) 653-8450

Mobile (602) 772-1090



Notice: This message and any attachments are intended exclusively for the individual or entity to which they are addressed. This communication may contain information that is proprietary, privileged or confidential or otherwise legally exempt from disclosure. If you are not the named addressee, you are not authorized to read, print, retain, copy or disseminate this message or any part of it. If you have received this message in error, please notify the sender immediately by e-mail and delete all copies of the message.

Townsite Solar, LLC
Investment Analysis of Townsite Solar Generation Facility [1]
Business Enterprise Value - Income Approach
As of January 1, 2026

In Thousands (\$000)s

	Analysis Year								
	0	1	2	3	4	5	6	7	8
	12/31/25	12/31/26	12/31/27	12/31/28	12/31/29	12/31/30	12/31/31	12/31/32	12/31/33
Revenue									
Solar PPA Revenue	41,002	41,822	42,658	43,512	44,382	45,270	46,175	47,098	48,040
Solar PPA Revenue Growth %		2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Solar PPA Revenue - RA	4,000	4,080	4,162	4,245	4,330	4,416	4,505	4,595	4,687
Solar PPA RA Revenue Growth %		2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Solar Merchant Generation Revenue	7,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Solar Merchant Generation Revenue Growth %									
Solar Contracted REC Revenue	20,900	20,900	20,900						
Solar Merchant REC Revenue				5,575	5,575	5,575	5,575	5,575	5,575
Storage Merchant Revenue		4,590	7,560	7,560	7,560	7,560	7,560	7,560	7,560
Storage Merchant Revenue Growth %				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Storage Merchant Revenue - RA	41	889	250	200	160	128	102	82	66
Storage Merchant RA Revenue Growth %				-20%	-20%	-20%	-20%	-20%	-20%
Total Revenue	72,943	83,281	86,530	66,516	67,432	68,374	69,342	70,335	71,353
Total Revenue Growth %		14.2%	3.9%	-23.1%	1.4%	1.4%	1.4%	1.4%	1.4%
Cost of Goods Sold (Purchases of Power & RA for Resale)	22,366	27,483	28,555	21,950	22,252	22,563	22,883	23,211	23,546
Percent of Total Revenue	33%	33%	33%	33%	33%	33%	33%	33%	33%
Total Net Revenue	50,577	55,798	57,975	44,566	45,179	45,810	46,459	47,124	47,806
Expenses									
O&M (In Scope)	800	816	832	849	866	883	901	919	937
O&M (Out of Scope)	120	122	125	127	130	132	135	138	141
BESS O&M (LTSA)	1,475	400	408	416	424	433	442	450	459
Spare Parts	54	175	179	182	186	189	193	197	201
Operating Credit Support/ Letter of Credit (LC) Fees	865	700	714	728	743	758	773	788	804
[2] Property Tax (Represented by Loading the Cap Rate by the Effective Tax Rate of 0.50%)	0	0	0	0	0	0	0	0	0
Land Lease	1,572	1,584	1,596	1,608	1,620	1,632	1,644	1,656	1,669
Insurance Expense (Projects)	575	587	598	610	622	635	648	660	674
Audit & Tax Expense (Projects)	125	128	130	133	135	138	141	144	146
General & Admin	750	765	780	796	812	828	845	862	879
Other Operating Expenses	324	330	337	344	351	358	365	372	380
Expenses Growth %		2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Total Operating Expenses	6,660	5,607	5,699	5,793	5,889	5,986	6,086	6,187	6,290
[3] Overall Expense Ratio	13.2%	10.0%	9.8%	13.0%	13.0%	13.1%	13.1%	13.1%	13.2%
EBITDA (NOI)	43,917	50,192	52,276	38,773	39,290	39,824	40,373	40,938	41,516
EBITDA Margin	86.8%	90.0%	90.2%	87.0%	87.0%	86.9%	86.9%	86.9%	86.8%
After-Tax Calculations									
[4] Depreciation & Amortization Expenses	51,196	31,856	31,543	17,025	2,652	2,639	2,630	2,626	2,630
Depreciation & Amortization Expenses %	101.2%	57.1%	54.4%	38.2%	5.9%	5.8%	5.7%	5.6%	5.5%
EBIT	(7,279)	18,336	20,733	21,748	36,638	37,185	37,743	38,312	38,886
EBIT %	-14.4%	32.9%	35.8%	48.8%	81.1%	81.2%	81.2%	81.3%	81.3%
Income Taxes	(1,529)	3,850	4,354	4,567	7,694	7,809	7,926	8,045	8,166
[5] Income Tax Rate %	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%
Net Operating Profit After Tax	(5,750)	14,485	16,379	17,181	28,944	29,376	29,817	30,266	30,720
Plus: Depreciation & Amortization Expenses	51,196	31,856	31,543	17,025	2,652	2,639	2,630	2,626	2,630
Plus: Depreciation & Amortization Expenses %	101.2%	57.1%	54.4%	38.2%	5.9%	5.8%	5.7%	5.6%	5.5%
Free Cash Flow	45,446	46,341	47,922	34,206	31,596	32,015	32,447	32,892	33,350
Present Value Factor @ 7.80% Discount Rate	1.00000	0.92764	0.86052	0.79826	0.74050	0.68692	0.63722	0.59111	0.54834
Discounted Cash Flow	45,446	42,988	41,238	27,305	23,397	21,992	20,676	19,443	18,287
Sum of Discounted Cash Flows		361,773							
[6] Investment Tax Credit Recapture Liability		36,021							
Tax Amortization Benefit		14,356							
Business Enterprise Value		412,150							

Key Assumptions	
Selected Tax Rate	21.0%
Unleveraged Disc. Rate (Before RE Taxes, After Inc. Tax)	7.30%
Effective Tax Rate (After Inc. Tax Property Tax Rate)	0.50%
Discount Rate (After RE Taxes, After Inc. Taxes)	7.80%

Notes:

- [1] Information directly sourced from the 2022, 2023, 2024 and 2025 Inc. & Exp Statements and NVP calculations provided by Appellant.
[2] Taxes were not included in Op Ex. To accommodate the analysis, the ETR was added to the Cap Rate.
[3] All of the expenses were escalated for changes in CPIU. Based on the last 50 years.
[4] Depreciation expenses and amortization expenses projections were estimated by KPMG (within a prior report).
[5] Based on the blended federal and Nevada state corporate income tax rate (estimated by KPMG within a prior report).
[6] Investment Tax Credit (ITC) recapture liability refers to the repayment of tax benefits that a taxpayer previously claimed through the ITC if the qualifying property is disposed of or otherwise ceases to meet the eligibility criteria for the credit.

9	10	11	12	13	14	15	16	17	18	19	20	21
12/31/34	12/31/35	12/31/36	12/31/37	12/31/38	12/31/39	12/31/40	12/31/41	12/31/42	12/31/43	12/31/44	12/31/45	12/31/46
49,001	49,981	50,981	52,000	53,040	54,101	55,183	18,495	1,820				
2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	-66.5%	-90.2%				
4,780	4,876	4,973	5,073	5,174	5,278	5,383	1,804	178				
2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	-66.5%	-90.2%				
11,000	11,000	11,000	11,000	11,000	11,000	11,000	21,500	22,145	22,809	23,494	24,198	24,924
								3.0%	3.0%	3.0%	3.0%	3.0%
5,575	5,575	5,575	5,575	5,575	5,575	5,575	6,380	6,380	6,380	6,380	6,380	6,380
7,560	7,560	7,560	7,560	7,560	7,560	7,560	7,560					
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%					
52	42	34	27									
-20%	-20%	-20%	-20%									
72,394	73,459	74,548	75,660	76,775	77,939	79,127	49,360	24,142	22,809	23,494	24,198	24,924
1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	-37.6%	-51.1%	-5.5%	3.0%	3.0%	3.0%
23,890	24,242	24,601	24,968	25,336	25,720	26,112	9,872	1,207				
33%	33%	33%	33%	33%	33%	33%	20.0%	5.0%				
48,504	49,218	49,947	50,692	51,439	52,219	53,015	39,488	22,935	22,809	23,494	24,198	24,924
956	975	995	1015	1035	1056	1077	1098	1120	1143	1165	1189	1213
143	146	149	152	155	158	162	165	168	171	175	178	182
469	478	488	497	507	517	528	538	549	560	571	583	594
205	209	213	218	222	226	231	236	240	245	250	255	260
820	837	853	870	888	906	924						
0	0	0	0	0	0	0	0	0	0	0	0	0
1,681	1,694	1,707	1,719	1,732	1,745	1,758	1,772	1,785	1,798	1,812	1,825	1,839
687	701	715	729	744	759	774	789	805	821	838	854	872
149	152	155	159	162	165	168	172	175	179	182	186	189
896	914	933	951	970	990	1,009	1,030	1,050	1,071	1,093	1,114	1,137
387	395	403	411	419	428	436	445	454	463	472	481	491
2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
6,395	6,502	6,611	6,721	6,834	6,949	7,067	7,186	6,347	6,451	6,558	6,666	6,777
13.2%	13.2%	13.2%	13.3%	13.3%	13.3%	13.3%	18.2%	27.7%	28.3%	27.9%	27.5%	27.2%
42,109	42,716	43,337	43,971	44,605	45,270	45,948	32,302	16,589	16,358	16,936	17,532	18,148
86.8%	86.8%	86.8%	86.7%	86.7%	86.7%	86.7%	81.8%	72.3%	71.7%	72.1%	72.5%	72.8%
2,626	2,630	2,626	2,630	1,465	305	305	305	305	152	0	0	0
5.4%	5.3%	5.3%	5.2%	2.8%	0.6%	0.6%	0.8%	1.3%	0.7%	0.0%	0.0%	0.0%
39,483	40,086	40,711	41,341	43,140	44,965	45,643	31,997	16,284	16,206	16,936	17,532	18,148
81.4%	81.4%	81.5%	81.6%	83.9%	86.1%	86.1%	81.0%	71.0%	71.1%	72.1%	72.5%	72.8%
8,291	8,418	8,549	8,682	9,059	9,443	9,585	6,719	3,420	3,403	3,557	3,682	3,811
21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%
31,192	31,668	32,161	32,659	34,080	35,522	36,058	25,277	12,864	12,803	13,379	13,850	14,337
2,626	2,630	2,626	2,630	1,465	305	305	305	305	152	0	0	0
5.4%	5.3%	5.3%	5.2%	2.8%	0.6%	0.6%	0.8%	1.3%	0.7%	0.0%	0.0%	0.0%
33,818	34,298	34,787	35,289	35,545	35,827	36,363	25,582	13,169	12,955	13,379	13,850	14,337
0.50866	0.47186	0.43772	0.40605	0.37667	0.34941	0.32413	0.30068	0.27892	0.25874	0.24002	0.22265	0.20654
17,202	16,184	15,227	14,329	13,389	12,518	11,786	7,692	3,673	3,352	3,211	3,084	2,961

22	23	24	25	26	27	28	29	30
12/31/47	12/31/48	12/31/49	12/31/50	12/31/51	12/31/52	12/31/53	12/31/54	12/31/55
25,672	26,442	27,236	28,053	28,894	29,761	30,654	31,573	32,521
3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
6,380	6,380	6,380	6,380	6,380	6,380	6,380	6,380	6,380
25,672	26,442	27,236	28,053	28,894	29,761	30,654	31,573	32,521
3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
25,672	26,442	27,236	28,053	28,894	29,761	30,654	31,573	32,521
1237	1262	1287	1312	1339	1366	1393	1421	1449
186	189	193	197	201	205	209	213	217
606	618	631	643	656	669	683	696	710
265	271	276	281	287	293	299	305	311
0	0	0	0	0	0	0	0	0
1,853	1,867	1,881	1,895	1,909	1,923	1,938	1,952	1,967
889	907	925	943	962	981	1,001	1,021	1,042
193	197	201	205	209	213	218	222	226
1,159	1,183	1,206	1,230	1,255	1,280	1,306	1,332	1,359
501	511	521	532	542	553	564	575	587
2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
6,889	7,004	7,121	7,240	7,361	7,484	7,610	7,738	7,868
26.8%	26.5%	26.1%	25.8%	25.5%	25.1%	24.8%	24.5%	24.2%
18,783	19,438	20,115	20,813	21,534	22,277	23,044	23,836	24,653
73.2%	73.5%	73.9%	74.2%	74.5%	74.9%	75.2%	75.5%	75.8%
0	0	0	0	0	0	0	0	0
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
18,783	19,438	20,115	20,813	21,534	22,277	23,044	23,836	24,653
73.2%	73.5%	73.9%	74.2%	74.5%	74.9%	75.2%	75.5%	75.8%
3,944	4,082	4,224	4,371	4,522	4,678	4,839	5,006	5,177
21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%
14,838	15,356	15,891	16,442	17,012	17,599	18,205	18,830	19,476
0	0	0	0	0	0	0	0	0
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
14,838	15,356	15,891	16,442	17,012	17,599	18,205	18,830	19,476
0.19160	0.17773	0.16487	0.15294	0.14188	0.13161	0.12209	0.11325	0.10506
2,843	2,729	2,620	2,515	2,414	2,316	2,223	2,133	2,046

Townsite Solar, LLC
Investment Analysis of Townsite Solar Generation Facility
First Year Estimations Comparing Sources

	2025	NPV DCF	KPMG DCF	Assessor DCF
	Inc. & Exp Stmt.	Entries for 2025	Entries for 2025	Entries for 2025
Revenue				
Solar PPA Revenue	41,002	41,320	34,022	41,002
<i>Solar PPA Revenue Growth %</i>				
Solar PPA Revenue - RA	4,132	<i>Missing</i>	<i>Missing</i>	4,000
<i>Solar PPA RA Revenue Growth %</i>				
Solar Merchant Generation Revenue	7,004	8,326	0	7,000
<i>Solar Merchant Generation Revenue Growth %</i>				
Solar Contracted REC Revenue	20,938	23,942	3,582	20,900
Solar Merchant REC Revenue			0	0
Storage Merchant Revenue	<i>Future Rev</i>	<i>Future Rev</i>	4320	<i>Future Rev</i>
<i>Storage Merchant Revenue Growth %</i>				
Storage Merchant Revenue - RA	<i>Unknown</i>	41	<i>Missing</i>	41
<i>Storage Merchant RA Revenue Growth %</i>				
Total Revenue	73,076	73,629	41,924	72,943
<i>Total Revenue Growth %</i>				
Cost of Goods Sold (Purchases of Power & RA for Resale)	22,366	21,684		22,366
<i>Percent of Total Revenue</i>				
Total Net Revenue	50,710	51,945	41,924	50,577
Expenses				
O&M (In Scope)	817	1,294	801	800
O&M (Out of Scope)	119	237	271	120
BESS O&M (LTSA)	1,478	1,495	1,530	1,475
Spare Parts	54	51	271	54
Operating Credit Support/ Letter of Credit (LC) Fees	865	935	580	865
[2] Property Tax (Represented by Loading the Cap Rate by the Effective Tax Rate of 0.9%)	1,368	1,147	1,150	0
Land Lease	1,908	1,981	1,581	1,572
Insurance Expense (Projects)	574	503	584	575
Audit & Tax Expense (Projects)	0	529	1,980	125
General & Admin	723	<i>Unknown</i>	1,356	750
Other Operating Expenses	324	329		324
<i>Expenses Growth %</i>				
Total Operating Expenses	8,230	8,501	10,104	6,660
[3] Overall Expense Ratio				
EBITDA (NOI)	42,480	43,444	31,820	43,917

Discount Rate Conversions - Before & After-Tax

Starting at the top of the calculations on the adjacent spreadsheet, assuming that the after-income-tax discount rate was calculated properly, that starting point is fine. That is where we start the discount rate calculations for DCF analyses on solar farms, by developing the after-income-tax WACC.

After developing the after-income-tax WACC, then calculate the after-income-tax effective property tax rate (by multiplying the effective property tax rate by 1 minus the income tax rate). Make sure the effective property tax rate of 0.68% is a before-income-tax property tax rate.

In any case, after calculating the after-income-tax effective property tax rate, that rate is simply added to the after-income-tax WACC, resulting in an after-income-tax before-property-tax WACC.

In discounted cash flow analyses for power generating assets, including solar farms, it is typical to develop projections of after-income-tax cash flows, and then apply the after-income-tax before-property-tax WACC described above to those cash flows to determine the present value.

If you have before-income-tax cash flow projections, then you will need a before-income-tax before-property-tax discount rate, and that's where things get a bit tricky. The problem is that mathematically it does not actually work to directly convert an after-income-tax discount rate to a before-income-tax discount rate by multiplying the after-income-tax discount rate by 1 minus the income tax rate. As it turns out, that mathematical conversion only works for cap rates, not discount rates.

What that means is that the after-income-tax discount rate first needs to be converted to an after-income-tax cap rate. Use the Gordon Growth Model for this conversion, subtracting an estimate of the stabilized annual rate of change in income and value over the holding period from the discount rate to determine the equivalent after-income-tax cap rate.

That after-income-tax cap rate can then be converted to a before-income-tax cap rate by dividing the after-income-tax rate by 1 minus the income tax rate.

Finally, again using the Gordon Growth Model, the before-income-tax cap rate is converted back to a discount rate (now a before-income-tax discount rate) by adding back the stabilized annual rate of change in income and value.

Assuming that the effective property tax rate presented below is a "before income tax" property tax rate, and plugging in estimated annual growth rate in income and value, the calculations would look basically like the adjacent spreadsheet calculations.

One of the more challenging parts of this analysis is determining the correct stabilized annual growth rates to convert from discount rates to cap rates and vice versa. So investigate thoroughly.

WACC Discount Rate - After Property Taxes, After Income Taxes		6.80%
Effective Before Income Tax Property Tax Rate		0.68%
Times: 1 - Effective Income Tax Rate	21.00%	79.00%
Equals: Effective After Income Tax Property Tax Rate		0.54%
Plus: After Property Tax, After Income Tax Discount Rate		6.80%
Property Equals: Discount Rate - Before Property Taxes, After Income Taxes		7.34%
Minus: Annual growth rate in income and value	-1.44%	-1.44%
Equals Cap Rate - Before Property Taxes, After Income Taxes		8.78%
Divided by: 1 - Effective Income Tax Rate		79.00%
Equals Cap Rate - Before Property Taxes, Before Income Taxes		11.11%
Plus: Annual growth rate in income and value		-1.44%
Equals: Discount Rate - Before Property Taxes, Before Income Taxes		9.67%

Thomas Walusek

From: Chris Olmsted <colmsted@federalappraisal.com>
Sent: Wednesday, March 12, 2025 7:44 AM
To: Thomas Walusek
Cc: Katherine Tantinan
Subject: RE: Weighting rates: theory, practice and proof

Hi Thomas,

Good morning, and nice to meet you.

I always wonder if anybody ever actually reads those articles, so I'm glad to hear you might have found it to be of some help!

You have an interesting discount rate calculation there, and I'm happy to give you my two cents. We do these types of analyses all the time, so let me share with you how we handle these calculations.

Starting at the top, assuming that the after-income-tax discount rate was calculated properly as you indicate, that starting point is fine. That is where we also start our discount rate calculations for DCF analyses on solar farms, by developing the after-income-tax WACC. As an aside, we also almost always do discounted cash flow analyses with no reversionary values for these types of assets.

However, for the next steps our discount rate calculations diverge from those you sent. After developing the after-income-tax WACC, we then calculate the after-income-tax effective property tax rate (by multiplying the effective property tax rate by 1 minus the income tax rate). I'm not sure if the effective property tax rate shown below of 1.13% is a before-income-tax property tax rate or an after-income-tax property tax rate?

In any case, after calculating the after-income-tax effective property tax rate, that rate is simply added to the after-income-tax WACC, resulting in an after-income-tax before-property-tax WACC.

When we do discounted cash flow analyses for power generating assets, including solar farms, we typically develop projections of after-income-tax cash flows, and then we apply the after-income-tax before-property-tax WACC described above to those cash flows to determine the present value.

If you have before-income-tax cash flow projections, then you will need a before-income-tax before-property-tax discount rate, and that's where things get a bit tricky. The problem is that mathematically it does not actually work to directly convert an after-income-tax discount rate to a before-income-tax discount rate by multiplying the after-income-tax discount rate by 1 minus the income tax rate. As it turns out, that mathematical conversion only works for cap rates, not discount rates.

What that means is that the after-income-tax discount rate first needs to be converted to an after-income-tax cap rate. We use the Gordon Growth Model for this conversion, subtracting an estimate of the stabilized annual rate of change in income and value over the holding period from the discount rate to determine the equivalent after-income-tax cap rate.

That after-income-tax cap rate can then be converted to a before-income-tax cap rate by dividing the after-income-tax rate by 1 minus the income tax rate.

Finally, again using the Gordon Growth Model, the before-income-tax cap rate is converted back to a discount rate (now a before-income-tax discount rate) by adding back the stabilized annual rate of change in income and value.

Assuming that the effective property tax rate presented below is a “before income tax” property tax rate, and plugging in a hypothetical stabilized annual growth rate in income and value of 2 percent, the calculations would look basically like this:

WACC Discount Rate - After RE Taxes, After Income Taxes	6.8000%
Effective Before Income Tax Property Tax Rate	1.130%
Times: 1 - Effective Income Tax Rate	<u>79.00%</u>
Equals: Effective After Income Tax Property Tax Rate	0.8927%
Plus: After Property Tax, After Income Tax Discount Rate	<u>6.8000%</u>
Equals: Discount Rate - Before RE Taxes, After Income Taxes	7.69270%
Minus: Annual growth rate in income and value	<u>2.00%</u>
Equals Cap Rate - Before Property Taxes, After Income Taxes	5.6927%
Divided by: 1 - Effective Income Tax Rate	<u>79.00%</u>
Equals Cap Rate - Before Property Taxes, Before Income Taxes	7.2059%
Plus: Annual growth rate in income and value	<u>2.00%</u>
Equals: Discount Rate - Before Property Taxes, Before Income Taxes	9.2059%

I hope this helps!

In our experience, one of the more challenging parts of this analysis is determining the correct stabilized annual growth rates to convert from discount rates to cap rates and vice versa.

Let me know if you have any questions or want to talk over any of this stuff. I'd be happy to get on a call with you to discuss if that helps.

Thanks,

Chris

Chris Olmsted, MAI, AI-GRS

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Weighting Rates: Theory, Practice, and Proof

BY CHRIS OLMSTED

Abstract

In appraising the value of a revenue-generating asset, it is often good appraisal practice to use the income approach when the data are available. However, there are different techniques of income capitalization that can be considered, including but not limited to the use of a gross income multiplier (GIM), a direct capitalization analysis, or a discounted cash flow (DCF) analysis. There are a number of regular users and uses of appraisals that require a property or other asset to be analyzed with one or more income techniques assuming the perspective of a certain level of income. Common examples are of appraisals of real property (usually requiring after-property-tax but before-income-tax analyses), appraisal of real property for ad valorem property tax assessment or appeal purposes (usually requiring before-property-tax net operating income [NOI] appraisals), and power plant and other special-purpose industrial property appraisals and many business appraisals (often requiring after-income-tax appraisals). This paper discusses the importance of ensuring the income multiplier, capitalization rate, or discount rate being used matches the cash flow or NOI it is being applied to. It provides the mathematical framework to allow appraisers to properly transition from one type of analysis to another — cash flow or NOI before or after real estate taxes and/or before or after income taxes.

Weighting Rates — The Value Is the Value

A number of different approaches to value are available to appraisers. The reasons for choosing any given approach to value for a specific asset are numerous and varied, for example, the type of asset being appraised, the intended use and intended user of the value conclusions, the quantity and quality of the different types of data used in the various

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approaches, the experience and expertise of the person doing the valuation, and the laws or regulations in the jurisdiction where the asset is being valued.

For example, an experienced appraiser who specializes in apartment buildings in any given market might have developed a well-supported GIM for that property type in that market, and so the appraiser would need to know only the forecasted stabilized gross income of the property in question.

On the other hand, laws, regulations, and historical precedent in a given property tax jurisdiction might require that appraisers of office buildings for property tax appeal purposes utilize a before-property-tax and before-income-tax direct capitalization approach. An appraisal of the same office building for financing purposes would likely use an after-property-tax and before-income-tax DCF approach. Further, appraising a power plant or a business for disposition or acquisition would most likely require an after-property-tax and after-income-tax DCF approach.

Although there are a number of different techniques and variations of income approaches that can be completed on any given income-producing asset, the value of the asset itself does not depend on the methodology used. For example, the value of the asset is the same, regardless of whether an appraiser uses a before-property-tax direct capitalization approach or an after-income-tax DCF analysis.

The value of an income-producing asset as of the specified valuation date is an intrinsic quality of that asset that does not change, regardless of the valuation tool being used to measure it.

In a broader sense, this is true not only of the various types of income approach techniques but also of the various types of sales comparison and cost approaches that appraisers use on a daily basis.

Each of these approaches to value provides an indication of the true, intrinsic market value of the asset being appraised, with some approaches typically resulting in a more credible or reliable estimate of value than others depending on the type of asset being appraised, the purpose and use of the appraisal, the definition of value being used in the appraisal, and the quantity and quality of data available. The appraiser must then reconcile the various indications of value from the approaches applied to make a final estimate conclusion about the value of the asset in question.

Income Approach to Value

In general, there are three main income approach techniques used to determine the value of an income-producing asset: the GIM, the direct capitalization analysis, and DCF analysis, also known as yield capitalization. Each technique requires different inputs, assumptions, and calculations. However, based on the assumption that the data are sufficient and that the approaches are executed properly, all three techniques should mathematically result in either the same value or a narrow range of estimated values.

The GIM method simply consists of multiplying a single year's projected stabilized gross income by a multiplier in order to estimate the value of the asset. The gross income is the income attributable to the asset before any expenses are deducted.

The GIM technique may be applied to either potential gross income or effective gross income, as long as the proper multiplier is utilized, either a potential GIM or an effective GIM. Although still commonly employed by investors and brokers for certain types of properties (such as one- to four-unit residential investment properties), today the GIM technique is not typically used by appraisers except as a check of reasonableness of the value conclusions indicated using other income valuation techniques.

Direct capitalization analysis makes use of a single year's stabilized NOI (generally defined as effective gross income less operating expenses) and a capitalization rate. Initially, the process appears rather simple; the appraiser need only estimate the NOI the

12-month period following the valuation date along with a capitalization rate. However, difficulties may arise when attempting to forecast stabilized (representative of the long term) annual income and expense estimates, because income and expenses can vary, sometimes dramatically, in future years. Furthermore, appraisers must recognize that a capitalization rate is applied to only one characteristic of the property (i.e., NOI from a single stabilized year) and that the overall capitalization rate is valid and reliable only if it accounts for all characteristics of the property, including all associated risks of the investment, projected changes in income and expenses, and property and income appreciation or depreciation.

It is a common misunderstanding that a direct capitalization analysis consists only of the next year's NOI. Instead, the annual NOI used in a direct capitalization analysis must represent a stabilized annual income projected not only into the next year but also throughout the entire projected life of the property. As with the GIM, a direct capitalization analysis is valid only when the proper capitalization rate is applied to the specific type of NOI. For example, only an after-capital reserves/expenses capitalization rate will do for an NOI computed after after-capital reserves/expenses.

In other words, both an after-capital reserves/expenses capitalization rate and a before-capital reserves/expenses capitalization rate will indicate the same value when properly applied to their respective NOI.

In contrast to direct capitalization analysis, a DCF analysis requires the practitioner to set forth explicit forecasts of income, expenses, and changes in income and expenditure levels over a projected holding period. In preparing the DCF analysis, the practitioner must draw specific conclusions about changes in income, expenses, cash flows, and property values over the holding period. The reversionary value of the property at the end of the holding period must also be estimated. The discount rate (or yield rate) is then applied to convert the anticipated economic benefits (the future cash flows) into a present value. Again, this approach is valid only if the discount rate matches the type of cash flow it is applied to.

Weighting Capitalization Rates for Real Estate Taxes

Depending on the purpose and use of the appraisal, the income approach analyses may require either inclusion or exclusion of various expenses, such as property taxes and/or income taxes.

For example, in appraising an income-producing commercial property for ad valorem tax purposes, it is common practice to project the annual NOI or cash flows before deducting property taxes. Nonetheless, value for income-producing properties assumes property taxes are an allowable expense.

Taxes and assessor's market value estimates are linked by definition; taxes are based on the value of the property being appraised, but that value has not yet been estimated since the appraisal is not yet complete. Problematically that appraisal cannot be completed until, in some way, the taxes are accounted for.

In order to appropriately account for property taxes in an income approach, the capitalization rate or discount rate can be weighted or loaded (these terms are used interchangeably) with the effective tax rate. Weighting capitalization rates for property taxes is sometimes referred to as an assessor's method. For property taxes, this weighting consists of simply adding the effective tax rate to the before-tax capitalization rate (also known as discount or recapture rates).

Based on the assumption that the value of a property based on its net income after property taxes (calculated in a direct capitalization technique by dividing the income after property taxes by the after-property-tax capitalization rate) is equal to the value of the property based on its net income before property taxes (income before property taxes

divided by the loaded before-property-tax capitalization rate), the assessor's formula can be proven algebraically as follows:

Prove that

$$R_B = R_A + ETR$$

given that

$$\frac{I_A}{R_A} = \frac{I_B}{R_B}$$

$$I_A = I_B - V_B \times ETR$$

$$V_B = \frac{I_B}{R_B}$$

Handwritten notes: $I_B = I_A - V_A \times ETR$ and $V_A = \frac{I_A}{R_A}$

where

- I_A = income after property taxes
- I_B = income before property taxes
- R_A = capitalization rate after property taxes
- R_B = capitalization rate before property taxes
- ETR = effective tax rate.

The proof is as follows:

$$\frac{I_A}{R_A} = \frac{I_B}{R_B}$$

$$I_A \times R_B = I_B \times R_A$$

$$R_B(I_B - V_B \times ETR) = I_B \times R_A$$

$$R_B = \frac{I_B \times R_A}{I_B - V_B \times ETR}$$

$$R_B = \frac{I_B \times R_A}{I_B - ETR \left(\frac{I_B}{R_B} \right)}$$

$$R_B = \frac{I_B \times R_A}{I_B - \left(\frac{I_B \times ETR}{R_B} \right)}$$

$$R_B = \frac{I_B \times R_A \times R_B}{I_B \times R_B - I_B \times ETR}$$

$$R_B = \frac{R_A R_B}{R_B - ETR}$$

$$R_B(R_B - ETR) = R_A \times R_B$$

$$R_B - ETR = R_A$$

$$R_B = R_A + ETR$$

This proof shows that the capitalization rate before property taxes is equal to the capitalization rate after property taxes plus the effective tax rate. In other words, in the direct capitalization technique, if the expense line item for property taxes is removed from the projected stabilized annual NOI and then that NOI is divided by the total of the after-property-tax capitalization rate plus the effective property tax rate, the indication of value will be the same as if the property taxes were kept in the calculation of the NOI and that NOI was divided by the after-property-tax capitalization rate unweighted for property taxes, assuming that the taxes being deducted from NOI are equal to the same percentage of value indicated by the effective property tax rate.

Weighting Capitalization Rates for Income Taxes

As with real property taxes, there are other intended users and uses of appraisals that require that the income approach be calculated either before or after income taxes are deducted, or even sometimes both before- and after-income-tax analyses are completed. Again, the value is the value—regardless of whether the cash flow from the property is before or after income taxes, the value of the property does not change. However, unlike for property taxes, the capitalization rate cannot be weighted for income taxes by simply adding the income tax rate. Instead, the process for weighting for income taxes is to multiply the capitalization rate before income taxes by one minus the effective income tax rate.

The effective income tax rate is not the nominal or statutory tax rate. Instead, the effective income tax rate equals the actual or projected income taxes paid divided by the taxable income, and reflects the tax abatements, exemptions, deferments, and other tax adjustments that the asset being appraised may be expected to enjoy.

Based on the assumption that the value after income taxes (calculated in a direct capitalization analysis by dividing the income after income taxes by the after-income-tax capitalization rate) is equal to the value before income taxes (income before income taxes divided by the before-income-tax capitalization rate), the tax weighting formula to convert after-income-tax capitalization rates and before-income-tax capitalization rates can be proven algebraically as follows:

Prove that

$$R_A = R_B \times (1 - R_{IT})$$

given that

$$\frac{I_A}{R_A} = \frac{I_B}{R_B}$$

$$I_A = I_B - I_B \times R_{IT}$$

where

- I_A = income after income taxes
- I_B = income before income taxes
- R_A = capitalization rate after income taxes
- R_B = capitalization rate before income taxes
- R_{IT} = effective income tax rate.

The proof is as follows:

$$\frac{I_A}{R_A} = \frac{I_B}{R_B}$$

$$I_B \times R_A = I_A \times R_B$$

$$I_B \times R_A = R_B (I_B - I_B \times R_{IT})$$

$$I_B \times R_A = I_B \times R_B (1 - R_{IT})$$

$$R_A = R_B \times (1 - R_{IT})$$

This proof shows that the capitalization rate after income taxes is equal to the capitalization rate before income taxes times one minus the effective income tax rate. In other words, in a direct capitalization analysis, if the expense line item for income taxes is included in the projected cash flows when the NOI is calculated and then that NOI is divided by the total of the before-income-tax capitalization rate times one minus the effective income tax rate, the resulting indication of value will be the same as if the income taxes had been left out of the calculation of the NOI and that NOI was divided by the before-income-tax capitalization rate unweighted for income taxes.

Direct Capitalization — An Example

Table 1 shows an example of a multilevel direct capitalization analysis using some basic inputs. The analysis assumes a potential gross income (PGI) of \$100,000, a vacancy and collection loss of 10 percent of PGI, an operating expense ratio (excluding both real estate and income taxes) of 50 percent of effective gross income (EGI), a 2.0 percent effective real estate tax rate, an 8.0 percent after-property-tax and before-income-tax capitalization rate, and a 35.0 percent effective income tax rate.

A typical direct capitalization analysis of a commercial property starts with the PGI (\$100,000); the vacancy and collection loss is then subtracted to obtain the EGI (\$90,000), and then the operating expenses including real estate taxes are subtracted to obtain the NOI (\$36,000). This NOI is then divided by the after-property-tax and before-income-tax capitalization rate (8.0 percent) to obtain the estimate of market value (\$36,000 ÷ 0.08 = \$450,000). However, as table 1 shows, the analyst can move up or down on the level of income to be analyzed (i.e., before real estate taxes, after income taxes, or even before vacancy and collection loss), and can use the formulas described previously to either weight or unweight the capitalization rate as needed to develop the correct capitalization rate corresponding to that level of income, and the indication of value will be exactly the same at each level.

For example, if the purpose of the appraisal was for use in an appeal of the property taxes, the analyst would want to look at the value of the income stream before deducting real estate taxes. As shown in table 1, if the after-real-estate-tax capitalization rate is 8.0 percent and the 2.0 percent (of value) real estate tax rate is added to it, the capitalization rate will be 10.0 percent. This capitalization rate will then be applied to the before-real-estate-tax cash flow of \$45,000, indicating a market value of \$450,000.

At the same time, if the analyst wanted to look at the value of the property after income taxes, he or she would again start with the after-expenses capitalization rate of 8.0 percent, and then multiply that rate by one minus the effective income tax rate of 35.0 percent, resulting in an after-income-tax capitalization rate of 5.2 percent. When this capitalization rate is applied to the after-income-tax cash flow of \$23,400, the value indicated is the same, \$450,000.

$$R_B \times (1 - R_{IT}) = R_A$$

$$8 \times (1 - 0.35) = 5.2$$

Table 1. Direct capitalization using various income levels and corresponding capitalization rates

Income	Annual	Expense-to-Value Ratio (percent)	Cap Rate from Exp/Val Ratio	Expense-to-Income Ratio (percent)	Cap Rate from Exp/Inc Ratio	Indicated Value
Potential gross income	\$100,000		22.22 percent		22.22 percent	\$450,000
Vacancy and collection loss	\$10,000	2.22 percent		10.00 percent		
Effective gross income	\$90,000		20.00 percent		20.00 percent	\$450,000
Operating and capital expenses before real estate taxes	\$45,000	10.00 percent		50.00 percent		
Net operating income before real estate taxes	\$45,000		10.00 percent		10.00 percent	\$450,000
Real estate taxes	\$9,000	2.00 percent		20 percent		
Net operating income after real estate taxes/EBITDA	\$36,000		8.00 percent		8.00 percent	\$450,000
Income taxes	\$12,600	2.80 percent		35.00 percent		
After-tax cash flow/free cash flow	\$23,400		5.20 percent		5.20 percent	\$450,000

Why Are Weighting Rates for Property Taxes and Income Taxes Different?

As shown above, the capitalization rate for property taxes can be weighted by simply adding the effective (property) tax rate to the after-property-tax capitalization rate to obtain the appropriate before-property-tax capitalization rate. Also, the capitalization rate for income taxes can be unweighted by multiplying the before-income-tax capitalization rate by one minus the effective income tax rate to obtain the appropriate after-income-tax capitalization rate.

These two different formulas may lead some to ask, “What’s the difference? They are both taxes. Why can’t we treat them the same way, by either adding or multiplying the tax rates?”

The answer is that they could actually be treated the same way, but they are not because of the way these different taxes are provided in the market data to the appraiser and are calculated. When the taxes (or more generally, any expense item) the analyst is trying to weight the capitalization rate for is presented to the appraiser as a percentage of the value of the property, as with property taxes, that percentage is simply added to or subtracted from the capitalization rate to weight or unweight it for that expense.

On the other hand, if the expense item to be weighted is presented as a percentage of the income, as with income taxes, the capitalization rate must be multiplied or divided by one minus the rate of the expense. As such, if the annual income taxes as a percentage

of the value of the property are known, in fact that percentage could be added to the capitalization rate to determine the before-income-tax capitalization rate. Likewise, if the property taxes are presented as a percentage of annual income, the before-property-tax capitalization rate could be calculated by dividing the after-property-tax capitalization rate by one minus the “property tax as a percentage of income” rate. The value indication would be the same.

What this means is that the capitalization rate can be weighted or unweighted for any expense, not only taxes, as long as either the percentage of value or the percentage of annual income that that expense represents is known.

Incidentally, this also explains why a GIM analysis results in the same indication of value as a direct CAP analysis. Since both operating expenses and vacancy and collection loss can be expressed in terms of a percentage of income, it is possible to mathematically *unweight* the direct capitalization rate for those expenses by multiplying the capitalization rate by one minus the “expense as a percentage of income” rate. Once that “gross income” capitalization rate has been obtained, the inverse of it is used to obtain GIM, and when that is applied to the gross income, the value indication is the same as when the capitalization rate is applied to the NOI after all operating expenses and vacancy and collection loss, as shown in the example above.

The Gordon Growth Model

All the formulas and calculations described above were applied only to capitalization rates for use in a direct capitalization analysis. Similar formulas can be applied to discount (or yield) rates. To understand the discount rate weighting formulas, it is important to first understand how capitalization rates and discount rates are related to one another. Recall that capitalization rates are rates that are applied to a single year’s stabilized future cash flow to estimate the value of an asset, and that this analysis assumes that the stabilized annual cash flow is assumed to be the same annual cash flow into perpetuity, unless special procedures and adjustments are made to specifically account for a finite life.

On the other hand, discount rates are rates that are applied to multiple years of future cash flows over a specific holding period and that may or may not include a reversionary value. The reversionary value represents the value of the asset remaining after the end of the projected holding period. If an asset has an indefinite life span, like most residential and commercial properties, then the DCF will include a reversionary value at the end of the holding period, even if only the value of the land. However, if an asset has a finite life (e.g., most types of personal property including fixtures, furniture, equipment, and machinery have finite lives) and the entire economic life of the asset is included in the projected holding period, then that DCF analysis will likely not include a reversionary value because the value of the asset is assumed to be zero at the end of the holding period.

As such, both direct capitalization and DCF analyses that include reversions typically assume that the asset continues to generate income in perpetuity. This assumption demonstrates the relationship between capitalization rates and discount rates, and that relationship can be expressed by using the Gordon growth model. The Gordon growth model is named after Myron J. Gordon of the University of Toronto, who originally published it along with Eli Shapiro (Gordon and Shapiro 1956). The model was developed for use in business valuation, but is also widely used in the valuation of other income-producing assets, including commercial real estate.

The Gordon growth model basically states that the discount rate applicable to a series of future cash flows is equal to the capitalization rate applicable to the first year’s stabilized cash flow plus the stable rate of growth of the income and value over the projected holding period. As an example, and continuing with the inputs from the previous direct capitalization example, if the going-in capitalization rate is 8.0 percent after real estate

taxes are taken out as an expense but before income taxes are deducted, income growth is stable at a rate of 3.0 percent, and the holding period is 10 years, the indicated after-real-estate-tax and before-income-tax discount rate will be 11.0 percent. If a DCF analysis (with a reversion) is performed holding all the other assumptions the same (a \$100,000 potential gross income, 10 percent vacancy and collection loss rate, 50 percent operating expense rate, and 2.0 percent real estate tax rate) and using that 11.0 percent discount rate and 3.0 percent annual income growth rate, the same indication of value (\$450,000) will be obtained as when all those direct capitalization analyses were used. That analysis is shown in table 2.

Cool

Three other issues or caveats need to be discussed here, each of which was discussed in greater detail in Skolnik's 1993 article in *The Appraisal Journal*. The first issue is the length of the projected holding period, and the other two are the projections of reversionary risk adjustments to the reversionary capitalization rate and the reversionary expenses in the calculations of the reversionary value at the end of the holding period. All three are areas in which the common practice by appraisers and valuation professionals is counter to the theoretically and mathematically correct application of a DCF analysis.

First, the DCF example in table 2 used a 10-year holding period. This is a common holding period utilized by real estate appraisers, as it often captures a full turnover of existing leases at any particular property, assuming that the existing leases all expire within the 10-year period after the valuation date. Although this is not an incorrect practice, the 10-year holding period is not required in a DCF analysis, either theoretically or mathematically. In fact, the DCF analysis results in the same value conclusion as the direct capitalization analysis as long as the holding period is long enough that the cash flows are stabilized from that point forward. That is, if the projected cash flows stabilize in the third year of the holding period, the same indication of value will be obtained, regardless of whether a 10-year cash flow with a reversion in the eleventh year (as is common) or a two-year cash flow with the reversion in the third year is performed. In both cases, the reversion assumes that the stabilized cash flow continues into perpetuity, so it does not matter which year it is accounted for in the analysis. This is shown in table 3, in which the same inputs are used as in the DCF analysis presented in table 2, except that the holding period is five years instead of 10 years.

The second issue is the inclusion of an additional risk adjustment to the reversionary capitalization rate when the value of the reversion is being calculated. Many appraisers consider a reversionary value to be the projected cash flow from a hypothetical sale of the asset at the end of the holding period. Based on the assumption that this hypothetical sale is taking place in the future (often 11 years in the future at the end of a 10-year projected holding period), many appraisers further conclude that there is some extra financial risk in estimating a sale price of the asset that far in the future, above the risk already reflected in the discount rate. As such, many appraisers commonly add an additional risk adjustment to the reversionary capitalization rate used to determine the reversionary value. This practice is counter to the theory and mathematics underlying a DCF analysis because the discount rate being applied to the annual cash flows already theoretically accounts for all of the future risk in the projected cash flows, including the risks in the reversionary period and value. This risk is exactly why the present value factors of near-term future cash flows are higher while those for more distant future cash flows are lower. Since all future risk, including the risk during the reversionary period, is already fully accounted for in the discount rate, it is theoretically and mathematically incorrect to make an additional risk adjustment to the reversionary capitalization rate. Instead, and in virtually every case, the reversionary (or going out) capitalization rate should be exactly the same as the regular (or going in) capitalization rate.

Table 2. Discounted cash flow analysis for a 10-year holding period

	Year of Cash Flow										Reversion
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Annual growth rate		3 percent	3 percent	3 percent	3 percent	3 percent	3 percent	3 percent	3 percent	3 percent	3 percent
Potential gross income	\$100,000	\$103,000	\$106,090	\$109,273	\$112,551	\$115,927	\$119,405	\$122,987	\$126,677	\$130,477	\$134,392
		3.00 percent	3.00 percent	3.00 percent	3.00 percent	3.00 percent	3.00 percent	3.00 percent	3.00 percent	3.00 percent	3.00 percent
Vacancy and credit loss rate	10 percent	10 percent	10 percent	10 percent	10 percent	10 percent	10 percent	10 percent	10 percent	10 percent	10 percent
Vacancy and credit loss	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$11,593	\$11,941	\$12,299	\$12,668	\$13,048	\$13,439
Effective gross income	\$90,000	\$92,700	\$95,481	\$98,345	\$101,296	\$104,335	\$107,465	\$110,689	\$114,009	\$117,430	\$120,952
Total operating expenses	\$45,000	\$46,350	\$47,741	\$49,173	\$50,648	\$52,167	\$53,732	\$55,344	\$57,005	\$58,715	\$60,476
Operating expense rate	50 percent	50 percent	50 percent	50 percent	50 percent	50 percent	50 percent	50 percent	50 percent	50 percent	50 percent
Net income before real estate taxes	\$45,000	\$46,350	\$47,741	\$49,173	\$50,648	\$52,167	\$53,732	\$55,344	\$57,005	\$58,715	\$60,476
Total real estate taxes	\$9,000	\$9,270	\$9,548	\$9,835	\$10,130	\$10,433	\$10,746	\$11,069	\$11,401	\$11,743	\$12,095
Real estate tax rate	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent
Net income after real estate taxes	\$36,000	\$37,080	\$38,192	\$39,338	\$40,518	\$41,734	\$42,986	\$44,275	\$45,604	\$46,972	\$48,381
Reversionary capitalization rate											8.00 percent
Reversionary value											\$604,762
Reversionary expense rate											0.0 percent
Reversionary expense											0
Net from reversion											\$604,762
Total pre-debt cash flow and reversion	\$36,000	\$37,080	\$38,192	\$39,338	\$40,518	\$41,734	\$42,986	\$44,275	\$45,604	\$46,972	\$651,734
Annual growth rate		3.0000 percent	3.0000 percent	3.0000 percent	3.0000 percent	3.0000 percent	3.0000 percent	3.0000 percent	3.0000 percent	1329 percent	
Discount rate	11.00 percent										
Discount factor	0.900901	0.811622	0.731191	0.658731	0.593451	0.534641	0.481658	0.433926	0.390925	0.352184	
Discounted cash flow	\$32,432	\$30,095	\$27,926	\$25,913	\$24,046	\$22,313	\$20,704	\$19,212	\$17,828	\$229,530	
Present value — sum of discounted cash flows including reversion = \$450,000											

Table 3. Discounted cash flow analysis for a five-year holding period

	Year of Cash Flow					
	1	2	3	4	5	Reversion
	2010	2011	2012	2013	2014	
Annual growth rate		3 percent	3 percent	3 percent	3 percent	3 percent
Potential gross income	\$100,000	\$103,000	\$106,090	\$109,273	\$112,551	\$115,927
Vacancy and credit loss rate	10 percent	10 percent	10 percent	10 percent	10 percent	10 percent
Vacancy and credit loss	\$10,000	\$10,300	\$10,609	\$10,927	\$11,255	\$11,593
Effective gross income	\$90,000	\$92,700	\$95,481	\$98,345	\$101,296	\$104,335
Total operating expenses	\$45,000	\$46,350	\$47,741	\$49,173	\$50,648	\$52,167
Operating expense rate	50 percent	50 percent	50 percent	50 percent	50 percent	50 percent
Net income before real estate taxes	\$45,000	\$46,350	\$47,741	\$49,173	\$50,648	\$52,167
Total real estate taxes	\$9,000	\$9,270	\$9,548	\$9,835	\$10,130	\$10,433
Real estate tax rate	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent	2.00 percent
Net income after real estate taxes	\$36,000	\$37,080	\$38,192	\$39,338	\$40,518	\$41,734
Reversionary capitalization rate						8.00 percent
Reversionary value						\$521,673
Reversionary expense rate						0.0 percent
Reversionary expense						0
Net from reversion						\$521,673
Total pre-debt cash flow and reversion	\$36,000	\$37,080	\$38,192	\$39,338	\$562,192	
Annual growth rate		3.0000 percent	3.0000 percent	3.0000 percent	1329.1250 percent	
Discount rate	11.00 percent					
Discount factor	0.900901	0.811622	0.731191	0.658731	0.593451	
Discounted cash flow	\$32,432	\$30,095	\$27,926	\$25,913	\$333,633	
Present value – sum of discounted cash flows including reversion = \$450,000						

The third issue is the deduction of reversionary expenses from the reversionary value at the end of the holding period. This practice again stems from the fact that appraisers typically consider a reversionary value as being the projected net cash flow from a hypothetical sale of the asset at the end of the holding period. As a net cash flow, appraisers often assume that any transactional expenses such as advertising and brokerage costs should be deducted from the reversionary value. However, this practice is again counter to both the theory and mathematics underlying the DCF analysis.

Instead of being considered as a net cash flow from a hypothetical sale, the reversionary value should be considered to be simply that: the value of the remaining stabilized cash flow attributable to the asset after the end of the holding period. The key distinction here is that the reversionary value is a value, not a sale price. No assumption of a hypothetical sale is necessary. Instead, the reversionary value is simply the value of the asset as of that valuation year as determined by a direct capitalization analysis.

As further proof, consider a typical direct capitalization analysis as is often used to value various types of assets, including many types of commercial real estate. When appraisers conclude on the value of a property based on a direct capitalization analysis, they do not then subtract any transaction costs from their conclusion to determine the net proceeds to the owner of the property. That deduction is not part of the definition of market value, and it should not be part of the calculation of the reversionary value.

While the first issue (regarding the length of the holding period) might not have any impact on the final conclusions of value, the other two issues, when incorrectly applied, result in artificially lower conclusions of value. By increasing the reversionary capitalization rate and then taking out hypothetical transactional expenses, the estimated future value of the reversion is decreased, and therefore the final present value of the asset is also decreased.

Weighting Discount Rates for Property Taxes

The process and formula for weighting discount rates for expenses that are expressed as a percentage of value, as with property taxes, are identical to those for weighting capitalization rates. Recall that the formula for weighting capitalization rates for property taxes is simply to add the effective property tax rate to the after-property-tax capitalization rate. Recall also that the Gordon growth model simply requires that the stable income growth rate be added to the capitalization rate. Because all these calculations are simply additive, the order in which the additions are made does not matter. If the after-property-tax capitalization rate for an asset is 8.0 percent, the property tax rate is 2.0 percent annually, and the stable income growth rate is 3.0 percent annually, then these figures can be added or subtracted in any order to obtain the level of income (before or after property taxes) and the type of analysis (direct capitalization or DCF) needed. Continuing the example, the analyses of direct capitalization and discount rates both before and after real estate taxes (but all still before deducting income taxes), including reversionary capitalization rates, are shown in table 4. A line for a reversionary risk adjustment has been included in the analysis, but as described above, that risk adjustment should be zero.

Weighting Discount Rates for Income Taxes

The process and formula for weighting discount rates for expenses that are expressed as a percentage of income, as with income taxes, are not the same as those for weighting capitalization rates. It is mathematically incorrect to simply multiply a discount rate by one minus the effective income tax rate to try to derive an after-income-tax discount rate. That calculation is specific only to capitalization rates, and there is not an equivalent simple and direct formula that can be applied to discount rates. However, this does not mean that discount rates cannot be weighted or unweighted for income taxes.

Recall that the formula for weighting capitalization rates for income taxes (one minus

Table 4. Analysis of direct capitalization and discount rates before and after real estate taxes including reversionary capitalization rates

Analysis after Real Estate Taxes and before Income Taxes	
Going-in capitalization rate after real estate taxes and before income taxes	8.00 percent
Plus average annual growth rate through the holding period	3.00 percent
Indicated discount rate after real estate taxes and before income taxes	11.00 percent
Going-in capitalization rate after real estate taxes and before income taxes	8.00 percent
Plus reversionary risk adjustment	0.00 percent
Reversionary capitalization rate after real estate taxes and before income taxes	8.00 percent
Analysis before Real Estate Taxes and before Income Taxes	
Going-in capitalization rate after real estate taxes and before income taxes	8.00 percent
Plus real estate tax rate	2.00 percent
Going-in capitalization rate before real estate taxes and before income taxes	10.00 percent
Plus average annual growth rate through the holding period	3.00 percent
Discount rate before real estate taxes and before income taxes	13.00 percent
Going-in capitalization rate before real estate taxes and before income taxes	10.00 percent
Plus reversionary risk adjustment	0.00 percent
Reversionary capitalization rate before real estate taxes and before income taxes	10.00 percent

Table 5. Analysis of direct capitalization and discount rates before and after income taxes including reversionary capitalization rates.

Analysis after Real Estate Taxes and after Income Taxes	
Income tax rate	35.00 percent
100 percent minus income tax rate	65.00 percent
Multiply by going-in capitalization rate after real estate taxes and before income taxes	8.00 percent
Going-in capitalization rate after real estate taxes and after income taxes	5.20 percent
Plus average annual growth rate through the holding period	3.00 percent
Discount rate after real estate taxes and after income taxes	8.20 percent
Going-in capitalization rate after real estate taxes and after income taxes	5.20 percent
Plus reversionary risk adjustment	0.00 percent
Reversionary capitalization rate after real estate taxes and after income taxes	5.20 percent
Analysis before Real Estate Taxes and after Income Taxes	
Income tax rate	35.00 percent
100 percent minus income tax rate	65.00 percent
Multiply by real estate tax rate	2.00 percent
Effective property tax rate after income taxes	1.30 percent
Plus discount rate after real estate taxes and after income taxes	8.20 percent
Discount rate before real estate taxes and after income taxes	9.50 percent
Less average annual growth rate through the holding period	3.00 percent
Overall capitalization rate before real estate taxes and after income taxes	6.50 percent
Plus reversionary risk adjustment	0.00 percent
Reversionary capitalization rate before real estate taxes and after income taxes	6.50 percent

the effective income tax rate) is known and also that the formula for converting capitalization rates to discount rates and vice versa (the Gordon growth Model) is known. By using these two formulas in combination, discount rates for income taxes can be weighted. The calculations start with the before-income-tax discount rate, which then must be converted to a before-income-tax capitalization rate using the Gordon growth model, then converted again to an after-income-tax capitalization rate by multiplying it by one minus the effective income tax rate, and then finally converted back into an after-income-tax discount rate using the Gordon growth model. By using these formulas in the proper order and applying them to the correct rates, capitalization rates and discount rates that can appropriately be applied to any level of income can be calculated. Further, continuing the example above, the calculations to determine the after-income-tax capitalization and discount rates are shown in table 5. Again, line items for reversionary risk adjustments are included for display purposes only, to reinforce that these adjustments should be zero.

Testing the Example — Various Direct Capitalization and DCF Conclusions

In order to provide analytical evidence of the principles presented here, a number of direct capitalization and DCF analyses were tested to determine the market value conclusions using cash flows both before and after real estate and income taxes, utilizing the same example inputs and assumptions used in the direct capitalization and DCF analyses presented in tables 2 and 3. Representative scenarios are those presented in table 6, which include DCFs that either assume a 10-year holding period with a reversion or a very long (200 years and 100 years) holding period with no reversion. In each case, the type of analysis and level of income were matched to the correct corresponding capitalization or discount rate as concluded above. The various inputs and assumptions used in all the analyses along with the conclusions from each analysis are presented in table 6.

In every direct capitalization analysis and DCF analysis with a reversion (each of which assumes the projected cash flows continue in perpetuity), the indicated conclusion of value of the example asset is exactly the same (\$450,000). In addition, the “200-year cash flow with no reversion DCF” results in the same value conclusion as the various direct capitalization and DCF with reversion analyses, while the 100-year cash flow analysis results in a slightly lower (by about one-hundredth of 1 percent) value conclusion, well within normal rounding policies in typical appraisal practice.

Conclusions

There are a number of regular users and uses of appraisals that require a property or other asset to be analyzed using one or more income techniques assuming the perspective of a certain level of income. Common examples are typical appraisals of real property (usually requiring after-property-tax but before-income-tax analysis), appraisal of real property for ad valorem property tax assessment or appeal purposes (usually requiring before-property-tax appraisals), and power plant and some other special-purpose industrial property appraisals and many business appraisals (often requiring after-income-tax appraisals). In each case, it is of critical importance to ensure that the income multiplier, capitalization rate, or discount rate being used correctly corresponds to the cash flow it is being applied to, and that the correct mathematical formulas and processes are used to properly transition from one type of analysis to another as needed. It is also important that the appropriate theories and practices are applied regarding projected holding periods (no reversion until a stabilized year of income is achieved) and reversionary capitalization rate risk adjustments and transactional expenses (neither should be included in the calculation of the reversionary value).

The examples presented in this paper in some ways represent *best-case scenarios* in

Table 6. Summary of conclusions

Model Inputs	Input	Description
Potential gross income	\$100,000	
Vacancy and collection loss rate	10.00 percent	of potential gross income
Operating and capital expense rate	50.00 percent	of effective gross income
Effective real estate tax rate	2.00 percent	of value
Going-in capitalization rate after real estate taxes and before income taxes	8.00 percent	capitalization rate
Effective income tax rate	35.00 percent	of taxable income
Annual income growth rate	3.00 percent	stable annual growth rate
Reversionary capitalization rate risk adjustment	0.00 percent	should always be zero
Reversionary expense rate	0.00 percent	should always be zero

Type of Analysis	Capitalization or Discount Rate	Value	Difference from Direct Capitalization (percent)
Before real estate taxes and before income taxes, direct capitalization	10.00 percent	\$450,000	0.00 percent
After real estate taxes and before income taxes, direct capitalization	8.00 percent	\$450,000	0.00 percent
After real estate taxes and after income taxes, direct capitalization	5.20 percent	\$450,000	0.00 percent
After real estate taxes and before income taxes, 10-year discounted cash flow	11.00 percent	\$450,000	0.00 percent
After real estate taxes and before income taxes, 5-year discounted cash flow	11.00 percent	\$450,000	0.00 percent
After real estate taxes and after income taxes, 10-year discounted cash flow	8.20 percent	\$450,000	0.00 percent
Before real estate taxes and before income taxes, 10-year discounted cash flow	13.00 percent	\$450,000	0.00 percent
Before real estate taxes and after income taxes, 10-year discounted cash flow	9.50 percent	\$450,000	0.00 percent
Before real estate taxes and before income taxes, 200-year discounted cash flow, no reversion	13.00 percent	\$450,000	0.00 percent
Before real estate taxes and before income taxes, 100-year discounted cash flow, no reversion	13.00 percent	\$449,957	0.01 percent

terms of the consistency and stability of the future projections of cash flows. There are a number of other appraisal theories, formulas, and techniques that will need to be applied when the real-world data and financial projections are less consistent and less stable than those used in the examples. These issues are beyond the scope of this paper.

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NRS 361.227 - Determination of taxable value (5): The computed taxable value of any property must not exceed its full cash value.

NRS 361.025 “Full cash value” defined: “Full cash value” means **the most probable price** which property would bring **in a competitive and open market** under **all conditions requisite to a fair sale.**”

Revenue Ruling 59-60 defines fair market value as: “The **price at which property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or sell, and both having reasonable knowledge of relevant facts.**”

Market Value: What Does It Really Mean?

by Michael V. Sanders, MAI, SRA

Abstract

Appraisers are routinely confronted with multiple definitions of the terms *market value* and *fair market value*, depending on the purpose of the assignment. Many value definitions in common use are needlessly subjective and in clear conflict with other definitions. Particular problems revolve around the value standard (highest versus most probable) and varied conditions imposed on the hypothetical market, which in many cases do not comport with the realities of the marketplace. This article seeks to explore how we got here, and what we might do to bring some clarity and consistency to the term *market value*.

Introduction

Definition of *value* is integral to real estate valuation and is one of several assignment elements identified in the Uniform Standards of Professional Appraisal Practice (USPAP).¹ While there are many types of value (assessed value, business value, disposition value, insurable value, investment value, liquidation value, public interest value, use value, etc.), market value is the subject of most appraisal assignments.

Whether the term is “market value” or “fair market value” is of little practical consequence, as noted in an eminent domain decision by the U.S. Supreme Court where the Court observed “the term ‘fair’ hardly adds anything to the phrase ‘market value.’”² *The Dictionary of Real Estate Appraisal*, sixth edition, indicates fair market value to be “equivalent” to market value in non-technical usage, and “similar in concept” with respect to technical usage in condemnation, litigation, and tax situations.³ But, definitions of *market value* and *fair market value* vary widely in two major respects:

- Value standard (most probable versus highest price, or in some cases no specification at all)
- Conditions imposed on the hypothetical market under which a sale is presumed to occur

The purpose of this article is to explore some of these definitional differences, the problems they cause, and their practical impact on appraisal practice.

Market Value Concept

Value is generally recognized to be extrinsic rather than intrinsic to the real estate, reflecting the relationship of property to the marketplace. The concept of market value used in modern valuation theory originated with neoclassical economics in the late nineteenth century. This school of economic thought was the first to propose a unified theory of value encompassing both the cost/supply side and the price/demand side. A seminal work was *Principles of Economics* by Alfred Marshall,⁴ introducing what are now

1. See the Scope of Work Rule in Appraisal Standards Board, *Uniform Standards of Professional Appraisal Practice*, 2018–2019 ed. (Washington, DC: The Appraisal Foundation, 2018).
2. *United States v. Miller*, 317 U.S. 369 (1943).
3. Appraisal Institute, *The Dictionary of Real Estate Appraisal*, 6th ed. (Chicago: Appraisal Institute, 2015), s.v. “fair market value.”
4. Alfred Marshall, *Principles of Economics* (London: Macmillan, 1890).

well-known concepts such as the supply/demand curve, equilibrium price and the perfect market. As used in neoclassical economics, a perfectly competitive market is comprised of rational participants, all acting for economic self-interest; characteristics of the perfect market include the following:

- Many buyers and sellers (no one can unduly influence the market)
- Homogenous product
- Perfect information (about product and pricing)
- No barriers to entry/no transaction costs
- Prices that tend towards equilibrium (at least in the long term)

Most markets in the real world do not meet these criteria. Real estate markets are particularly imperfect and inefficient, although some (conforming homes, for example) are more competitive than others (special-purpose or unique properties). As a result, appraisers deal with uncertainty and ranges of value, instead of the equilibrium market price envisioned by the neoclassical model. Along with the variability of the market itself, appraisers also have to contend with subjectivity introduced by commonly used value definitions and conflicts among various definitions that are used for different purposes.

History of Market Value Definitions

One of the first articulated definitions of *market value* is found in an early 1900s eminent domain case decided by the California Supreme Court, *Sacramento Southern Railroad v. Heilbron*, less than twenty years after the first edition of Marshall's economics text was published in 1890. In the *Heilbron* case, the court described market value as

The highest price estimated in terms of money which the land would bring if exposed for sale in the open market, with reasonable time allowed in which to find

a purchaser, buying with knowledge of all of the uses and purposes to which it was adapted and for which it was capable.⁵

The notable things about this definition are the value standard (highest price) and the conditions imposed on the market (money, open market, reasonable time, knowledge). This definition subsequently mutated and replicated many times over the years.

The *Heilbron* definition was incorporated virtually unchanged in the 1950 and 1962 editions of the *Appraisal Terminology and Handbook* published by the American Institute of Real Estate Appraisers (AIREA). However, the *Handbook* included alternative definitions as well:

- The price at which a willing-seller would sell and a willing-buyer would buy, neither being under abnormal pressure.
- The price expectable if a reasonable time is allowed to find a purchaser and if both seller and prospective buyer are fully informed.⁶

The definition of *market value* changed significantly in the 1975 edition of *Real Estate Appraisal Terminology* (published jointly by AIREA and the Society of Real Estate Appraisers). The highest price standard was unchanged, but the conditions imposed on the market became more numerous and specific, resembling those currently included in standard value definitions for mortgage lending.⁷ Also of interest in this text is its succinct definition of *most probable sales price*, a term that was used in appraisal literature addressing this topic during the 1960s and 1970s. *Most probable sales price* is defined as "That price at which a property would most probably sell if exposed to the market for a reasonable time, under market conditions prevailing as of the date of the appraisal."⁸

The 1981 version of the same text contained almost the same definition of *market value*, except that the value standard changed from the "high-

5. *Sacramento Southern Railroad v. Heilbron*, 156 Cal. 408 (1909).

6. American Institute of Real Estate Appraisers, *Appraisal Terminology and Handbook*, 4th ed. (Chicago: American Institute of Real Estate Appraisers, 1962), 121.

7. Byrl N. Boyce, comp. and ed., *Real Estate Appraisal Terminology* (Chicago: American Institute of Real Estate Appraisers and Society of Real Estate Appraisers, 1975), 137.

8. Boyce, *Real Estate Appraisal Terminology*, 145. Note the value standard ("most probably") and the only condition imposed on the market (exposure for "a reasonable time"), which otherwise assumes prevailing conditions.

est price ... a property will bring” to “most probable price ... a property should bring.”⁹ The ninth edition of *The Appraisal of Real Estate*, published six years later, contains relevant and significant commentary about this difference, noting that the concept of market value as the “highest price,” as opposed to market value as a modal or central tendency, is controversial. Of particular interest is the observation that “highest price” was originally rooted in the idea that market value should be the highest price represented by the central tendency, rather than the highest price within an entire data range, and that “a definition that includes the word *highest* is perhaps subject to misinterpretation.”¹⁰

The debate over most probable versus highest price is perhaps best illustrated by a series of changes to eminent domain law in Nevada. Prior to 1993, value for eminent domain was defined as the “highest price,” similar to current law in California and some other states (California also uses the highest price standard for damage to real property and marital dissolution).

The fair market value of the property is the highest price on the date of valuation that would be agreed to by a seller who is willing to sell, but who is under no particular or urgent necessity for so doing, and who is not obligated to sell, and a buyer who is ready, willing, and able to buy, but who is under no particular necessity for so doing, each dealing with the other with full knowledge of all the uses and purposes for which the property is reasonably adaptable and available.¹¹

In 1993, however, the Nevada legislature changed the definition of value to the “most probable price,” adopted from the prevailing definition of market value for federally related lending transactions:

Value means the most probable price which a property would bring in a competitive and open market under the conditions of a fair sale, without the price being affected by undue stimulus, whereby the sale is consummated on a specified date and the title of the property is passed from the seller to the buyer under the following conditions:

- a) the buyer and seller are acting prudently and knowledgeably;
- b) the buyer and seller are typically motivated;
- c) the buyer and seller are well informed or well advised and acting in what they consider are their own best interests;
- d) a reasonable time is allowed to expose the property for sale on the open market;
- e) payment is made with United States dollars in cash or pursuant to another financial arrangement comparable thereto; and
- f) the sale price represents the normal consideration for the property and is unaffected by special or creative financing or sales concessions granted by any person associated with the sale.¹²

During a 1996 trial involving a taking by Clark County, Nevada, (County) the trial court nonetheless awarded the “highest price,” accepting the landowner’s argument that the 1993 change in the state’s value definition was unconstitutional. The County appealed, and the Nevada Supreme Court reversed, ruling that the definitional change to “most probable price” was indeed constitutional. In its opinion, the court indicated that the two terms were not synonymous, noting the legislature’s characterization of the “highest price” standard as speculative, and its “misuse and abuse” in the instant case. In a separate concurrence, one justice deviated from his colleagues, reasoning that the terms “highest

9. Byrl N. Boyce, comp. and ed., *Real Estate Appraisal Terminology*, revised ed. (American Institute of Real Estate Appraisers and Society of Real Estate Appraisers, 1981), 160–161.

10. American Institute of Real Estate Appraisers, *The Appraisal of Real Estate*, 9th ed. (Chicago: American Institute of Real Estate Appraisers, 1987), 18.

11. Excerpted from *County of Clark v. Buckwalter*, 115 Nev. 58 (1999).

12. Nev. Rev. Stat. § 37.009 (1993), adopted from 12 C.F.R. § 34.42(g).

price” and “most probable price” were actually synonymous—“a distinction without a difference.”¹³ To complete the saga, the Nevada legislature changed the definition back to “highest price” in 2007,¹⁴ a likely reaction to the *Kelo v. New London* decision by the US Supreme Court in 2005.¹⁵

There are a number of definitions of *market value* and *fair market value* in common use today, all with unique aspects that can differ with respect to the applicable value standard and hypothetical conditions imposed on the market. Appraisers may encounter these definitions in assignments related to

- Mortgage lending
- Eminent domain (state)
- Damage to real property
- Marital dissolution
- Property taxation
- Estate tax
- Casualty losses
- Federal land acquisitions
- Financial reporting
- Global valuation

The table in Exhibit 1 summarizes some of these definitions, illustrating their substantial variation, and the potential for value opinions to be influenced by which definition an appraiser uses.¹⁶

Literature Review

The topic of market value has been addressed sporadically in appraisal literature over the years, typically during times of valuation difficulties—depressed values in the 1970s, creative financing during the 1980s, market decline following the Savings and Loan Crisis in the early 1990s, and most recently, the market collapse in the wake of the subprime mortgage crisis.

Richard U. Ratcliff was one of the pioneering thought leaders on the topic of market value in the 1960s and 1970s, advocating for “most probable price” years before it was finally adopted in some published definitions.¹⁷ Henry A. Babcock in his 1968 text also argued for “most probable buy-sell price” as central to the concept of market value.¹⁸ Ratcliff additionally proposed the idea of expressing value in probabilistic terms (a probability distribution or equivalent), something supported by many subsequent authors, most recently by Max Kummerow¹⁹ and Gale L. Pooley.²⁰ Finally, Ratcliff was critical of attaching hypothetical or idealized perfect market conditions to standard value definitions, instead believing that market value should reflect real, if imperfect, markets without artificial constraints.

Following Ratcliff’s criticism of assuming perfect market conditions, Richard D. Marshall

13. *County of Clark v. Buckwalter*, 115 Nev. 58 (1999).

14. Nev. Rev. Stat. § 37 .009.

15. *Kelo v. City of New London*, 545 U.S. 469 (2005). This seminal 5-4 U.S. Supreme Court decision allowed the transfer of land using eminent domain from one private property owner to another for purposes of economic development, effectively characterizing a “public benefit” as a permissible public use under the Takings Clause of the Fifth Amendment. A significant political and judicial backlash followed, with most states enacting some type of eminent domain reform in the decade following the *Kelo* decision.

16. The table includes many that are in common use, though it should be understood that the table is not intended to include every definition, nor would it be feasible to do so. The very fact that there are a multiplicity of different value definitions strikes at the heart of the problem addressed in this article.

17. Richard U. Ratcliff, “A Neoteric View of the Appraisal Function,” *The Appraisal Journal* (April 1965): 167–175; Richard U. Ratcliff, “Market Value Can’t be Estimated,” *The Real Estate Appraiser* (January-February, 1970): 16–19; Richard U. Ratcliff, “Appraisal: Is It Measurement or Prediction?” *The Real Estate Appraiser* (November-December, 1972): 4–6.

18. Henry A. Babcock, *Appraisal Principles and Procedures* (Homewood, IL: Ricard D. Irwin, Inc., 1968), 117.

19. Max Kummerow, “Logical Steps in Property Valuation,” *The Appraisal Journal* (January 1997): 25–31; Max Kummerow, “Thinking Statistically about Valuations,” *The Appraisal Journal* (July 2000): 318–325; Max Kummerow, “A Statistical Definition of Value,” *The Appraisal Journal* (October 2002): 407–416.

20. Gale L. Pooley, “Adding Value to Valuation with Confidence,” *The Appraisal Journal* (Summer 2015): 218–225.

Exhibit 1 Summary of Definitions of Value

Source	Value Definition
Federal Mortgage Lending (Comptroller of the Currency) 12 C.F.R. § 34.42(g)	<i>Market value</i> means the most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby: (1) buyer and seller are typically motivated; (2) both parties are well informed or well advised, and acting in what they consider their own best interests; (3) a reasonable time is allowed for exposure in the open market; (4) payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and (5) the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.
Same definition for FDIC, NCUA, FNMA Selling Guide	
California Code of Civil Procedure, Eminent Domain C.C.P. § 1263.320(a)	The fair market value of the property taken is the highest price on the date of valuation that would be agreed to by a seller, being willing to sell but under no particular or urgent necessity for so doing, not obliged to sell, and a buyer, being ready, willing, and able to buy but under no particular necessity for so doing, each dealing with the other with full knowledge of all the uses and purposes for which the property is reasonably adaptable and available.
California Real Property Damage Civil Jury Instructions § 3903F	“Fair market value” is the highest price for the property that a willing buyer would have paid to a willing seller, assuming: (1) that there is no pressure on either one to buy or sell; and (2) that the buyer and seller know all the uses and purposes which the property is reasonably capable of being used.
California Marital Dissolution <i>In re Marriage of Cream</i> 13 Cal.App.4th 81 (1993)	The fair market value of a marketable asset in marital dissolution cases is the highest price on the date of valuation that would be agreed to by a seller, being willing to sell but under no obligation or urgent necessity to do so, and a buyer, being ready, willing and able to buy but under no particular necessity for so doing.
IAAO Glossary for Property Appraisal and Assessment, 2nd ed. (2013)	Market value is the major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. A current economic definition agreed upon by agencies that regulate federal financial institutions in the United States is: [see above]
California Property Taxation R.T.C. § 110(a)	“Full cash value” or “fair market value” means the amount of cash or its equivalent that property would bring if exposed for sale in the open market under conditions in which neither buyer nor seller could take advantage of the exigencies of the other, and both the buyer and the seller have knowledge of all of the uses and purposes to which the property is adapted and for which it is capable of being used, and of the enforceable restrictions upon those uses and purposes.
Federal Estate Tax 26 C.F.R. § 20.2031-1(b)	The fair market value is the price at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or to sell and both having reasonable knowledge of relevant facts.

CONTINUED >

Exhibit 1 Summary of Definitions of Value (*continued*)

Source	Value Definition
Federal Casualty Loss 26 C.F.R. § 1.165-7 Instructions for Form 4684	Fair market value (FMV) is the price at which the property would be sold between a willing buyer and willing seller, each having knowledge of the relevant facts. The difference between the FMV immediately before the casualty or theft and the FMV immediately after represents the decrease in FMV because of the casualty or theft.
Uniform Appraisal Standards for Federal Land Acquisitions (2016) § 1.2.4	Market value is the amount in cash, or on terms reasonably equivalent to cash, for which in all probability the property would have sold on the effective date of value, after a reasonable exposure time on the open competitive market, from a willing and reasonably knowledgeable seller to a willing and reasonably knowledgeable buyer, with neither acting under any compulsion to buy or sell, giving due consideration to all available economic uses of the property.
Legal (general) <i>Black's Law Dictionary</i> 2nd pocket edition (2016)	The price that a seller is willing to accept and a buyer is willing to pay on the open market and in an arm's length transaction; the point at which supply and demand intersect. (fair market value)
Financial Reporting FASB 157 ¶ 5-14 [excerpts]	Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The measurement should consider attributes specific to the asset or liability. A fair value measurement assumes that the asset or liability is exchanged in an orderly transaction between market participants to sell the asset or transfer the liability at the measurement date. A fair value measurement assumes that the transaction to sell the asset or transfer the liability occurs in the principal market for the asset or liability or, in the absence of a principal market, the most advantageous market for the asset or liability. Market participants are buyers and sellers in the principal (or most advantageous) market for the asset or liability that are: (a) Independent of the reporting entity; that is, they are not related parties (b) Knowledgeable, having a reasonable understanding about the asset or liability and the transaction based on all available information (c) Able to transact for the asset or liability (d) Willing to transact for the asset or liability; that is, they are motivated but not forced or otherwise compelled to do so. A fair value measurement assumes the highest and best use of the asset by market participants.
Global Valuation International Valuation Standards (2017) ¶ 30.1	Market Value is the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion.

notes that “what actually takes place in a transaction does not meet the criteria of the definitions that have been developed to guide the determination of market value,” while further stating that “participants in real estate transactions cannot avail themselves of the kind of efficient market ... that serves investors in the stock market.”²¹ Kerry D. Vandell suggests that market value definitions based on formal economic theory “are of limited usefulness because they assume a perfectly competitive market and complete certainty about present and future conditions ... [while] the real estate market is neither perfectly competitive nor certain.”²² Vandell argues that “market value and HBU should be associated with what actually is expected to happen to the subject property under current market conditions.”²³ Peter N. Thomson is another who indicates “an appraiser faces an apparent dichotomy between assumptions that underpin market value and the current market realities,”²⁴ arguing for use of alternative value definitions such as liquidation price to deal with speculative or troubled markets.

In advocating for a statistically oriented definition of market value, Peter F. Colwell observed that “different definitions yield different estimates of market value.”²⁵ Harold D. Albritton, noting differing opinions regarding the meaning of *highest price*, suggested that it should not be interpreted literally, but rather as “the most probable price at the highest and best use.”²⁶ In an earlier article, Robert N. Frissell commented on the then-prevailing definition of market value using “highest price,” indicating that the appraiser must therefore “look for the highest price that the market will justify, ... not the price at which the transaction would ‘probably’ occur,” and further suggesting that “the average sale must be adjusted

upward” to conform to the highest price definition.²⁷ Richard Marchitelli and Peter F. Korpacz proposed a single concise definition that could be applied to all real estate activity, using the term “likely” instead of “most probable,” and with few explicit assumptions about the market:

The price in cash and/or other identified terms for which the specified real property interest is likely to sell as of the effective date of appraisal in the real estate marketplace under all conditions requisite to a fair sale.²⁸

A number of articles in the mid-1980s discuss price as it relates to value. Writing about the debate between “most probable selling price” (a term likely first used by Ratcliff to distinguish a value unencumbered by idealized or unreal market conditions) and traditional market value, Kenneth M. Lusht proposes that these are really equal, where traditional value definitions assume market efficiency explicitly (via conditions attached to a hypothetical market), and most probable selling price does so implicitly based on the use of historical data. He argues that appraisers must use a working assumption of market efficiency to produce a credible value estimate. Lusht also distinguishes between a “prediction” (relative certainty quantified by a probability distribution) and a more judgmental “estimate,” a topic also addressed by Ratcliff in some of his writings.²⁹

Jared Shlaes suggests that “*highest price* and *typical price* are clearly at odds with one another,” with “highest price” reflecting an atypical purchaser, and perhaps an atypical seller willing to wait for the best available offer,³⁰ noting that “the fool in the market teaches us nothing about value, only about foolishness.”³¹ Joseph Williams posits that fair market value rarely represents an

21. Richard D. Marshall, “Market Value: What Does It Mean in Real Estate Today?” *The Real Estate Appraiser* (January-February 1978): 32.

22. Kerry D. Vandell, “Toward Analytically Precise Definitions of Market Value and Highest and Best Use,” *The Appraisal Journal* (April 1982): 256.

23. Vandell, “Toward Analytically Precise Definitions,” 261.

24. Peter N. Thomson, “Market Value: Does One Size Really Fit All?” *The Appraisal Journal* (October 1993): 566.

25. Peter F. Colwell, “A Statistically Oriented Definition of Market Value,” *The Appraisal Journal* (January 1979): 58.

26. Harold D. Albritton, “Market Value: Highest Price or Most Probable Price?” *The Appraisal Journal* (July 1979): 453; Harold D. Albritton, “A Critique of the Prevailing Definition of Market Value,” *The Appraisal Journal* (April 1980): 201.

27. Robert N. Frissell, “The Professional Appraisal and Market Value,” *The Appraisal Journal* (October 1966): 582.

28. Richard Marchitelli and Peter F. Korpacz, “Market Value: The Elusive Standard,” *The Appraisal Journal* (July 1992): 318.

29. Kenneth M. Lusht, “Most Probable Selling Price,” *The Appraisal Journal* (July 1983): 346–354.

30. Jared Shlaes, “The Market in Market Value,” *The Appraisal Journal* (October 1984): 501.

31. Shlaes, “The Market in Market Value,” 513.

optimal price, but rather a compromise price arrived at by buyers and sellers through negotiation, noting also that fair market value definitions presume ideal conditions and efficient markets that rarely exist.³²

Terry V. Grissom addressed the quest for more consistent and descriptive definitions of market value by using symbolic logic, first identifying two schools of appraisal thought, characterized as the traditional and the contemporary. The traditional perspective uses “fair market value” and is rooted in formal neoclassical economics at the intersection of supply and demand, incorporating the assumptions of a perfectly competitive market. He reasons that insights gained from this approach more than offset the loss in concrete reality based on representative conditions. The contemporary argument, on the other hand, emphasizes “most probable selling price,” rejecting the premise that actual real estate markets comply with the perfect competition model. In an attempt to reconcile the two schools of thought, Grissom describes a third perspective, identified as neotraditional. In his view, this is not so much a school of thought as a gray area where semantic differences between the concepts of market value and most probable selling price are debated, with some arguing for quantitative equivalence between the two, while others try to modify definitions to fit a strictly empirical perception of the real estate market.³³

In 1992, the Appraisal Institute Special Task Force on Value Definitions published a report addressing problems associated with distressed market conditions and limited sales activity, suggesting that transactions differing substantially from assumed conditions in a value definition fail as evidence of market value, which may imply a price that cannot occur until some future time.³⁴ This is reminiscent of fictional intrinsic values assumed during the Great Depression in the 1930s, and clearly contrary to the position taken by Ratcliff and others, that “market value” should reflect the market as it is, however imperfect it might be.

In response to these difficulties, Shlaes offered what he called the concept of subjunctive value defined as “That value which the relevant parties, hope, wish, fear, or suspect might be equal to market value, but which all recognize is not necessarily so.”³⁵ In the same article, Shlaes (tongue in cheek) suggests another definition to be used in the absence of a market, called “nu value,” certainly an antithesis to the equilibrium price of the perfect market. He describes this as “value as determined by a committee of experts sitting at a round table with all pertinent facts at hand in a locked room from which they will not be released until they have reached agreement.”³⁶

An Appraisal Institute white paper in 1999 lamented “a proliferation of Market Value definitions, dilution of the Market Value concept, and great confusion in the marketplace.”³⁷ A suggestion that USPAP clarify market value for appraisers and users of appraisal services resulted in a quasi (but not citable) definition of market value added to USPAP in 2001, which does little more than note that market value “presumes the transfer of a property, as of a certain date, under specific conditions,” cautioning appraisers to identify the exact definition applicable in each appraisal assignment.

Market Price

While value is commonly perceived to be an opinion of worth, price is what is actually paid. Prices are used as a proxy for value in the sales comparison approach, though it is recognized that price and value are not the same, and that prices are not infrequently different from estimated or perceived value. Because the term “market price” has been used and discussed occasionally in appraisal literature, often in different contexts, an examination of this term is warranted in connection with the larger discussion of market value.

Writing in the mid-1930s, George Schmutz and Loring McCormick argue against *market price*

32. Joseph Williams, “An Examination of Fair Market Value Concepts for Oil and Gas Properties,” *The Appraisal Journal* (July 1991): 402–414.

33. Terry V. Grissom, “Value Debates: The Argument Forms and Market Structure,” *The Appraisal Journal* (January 1986): 124–135.

34. Appraisal Institute, *Special Task Force on Value Definitions* (Chicago: Appraisal Institute, June 1992).

35. Jared Shlaes, “Value: More Than Ever, in Your Eye,” *The Appraisal Journal* (January 1993): 76.

36. Shlaes, “Value,” 77.

37. Appraisal Institute, *Market Value Initiative White Paper* (Chicago: Appraisal Institute, revised December 7, 1999), 5.

measured in dollars, in favor of *market value* measured in commodity units, based on the present worth of future benefits. They observe that prices can change dramatically because of changes in the value of money, while the value of underlying commodities (including real estate) experience little change.³⁸ This position is not necessarily surprising given the volatility of prices following the sharp market decline in 1929–1932, and the notion that real estate had intrinsic value not properly reflected in prevailing prices during the Great Depression. M. J. Slonim subsequently suggested that courts do not distinguish between *market price* and *market value*; i.e., that market value is established by the prices buyers actually pay.³⁹ This might tend to support the notion that courts are inclined to favor sales comparison over alternative approaches to value.

Fred E. Case distinguishes among the terms *normal value*, *market value*, and *market price*, with *normal value* relating primarily to proposed prices during the bidding process, while the latter two are reflective of actual completed transactions. Ultimately, however, market price is what is actually paid, consistent with most subsequent definitions containing the word “price.” Importantly, Case points out that common market assumptions (voluntary participation, fully informed, etc.) often do not exist in the real world, noting further that some circumstances (no market, forced or speculative markets) can result in erroneous market indicators.⁴⁰

In more-recently published articles, Kevin Clarke uses *market price* as a solution to providing prospective (future) values, although his proposed definition of market price is quite similar in concept to prevailing definitions of market value.⁴¹ The premise of an article by Stephen F. Fanning, et al. is that there are really two real estate markets—the transaction (buy/sell) mar-

ket, and the fundamental market (measured by economic potential). In a stable market, there may be little difference between the two, but during boom or bust conditions, market prices may deviate significantly from fundamentals. Thus, actual prices over time might fluctuate substantially, while underlying economic value exhibits more moderate and sustainable movement; this harkens back to the position of Schmutz during the 1930s, suggesting that value might be somewhat independent of prices actually paid in some circumstances. Fanning acknowledges the appraiser’s dilemma between these two schools of thought, indicating that reconciliation of valuation approaches becomes more important in unstable markets.⁴²

The term *market price* has been specifically defined occasionally by the Appraisal Institute and its predecessor organizations, with a pre-1945 version of *Appraisal Terminology* including a footnote to the definition of market value stating that “at any given moment in time, market value connotes what a property is actually worth, and market price what it may be sold for.”⁴³ The term was not defined in the 1950 and 1962 editions of *Appraisal Terminology and Handbook*, but later appeared in the 1975 and 1981 editions of *Real Estate Appraisal Terminology* as “the amount actually paid, or to be paid, for a property in a particular transaction,” with the clarification that it “differs from market value in that it is an accomplished or historic fact, whereas market value is and remains an estimate until proved [and] involves no assumption of prudent conduct by the parties, or absence of undue stimulus or of any other conditions basic to the market value concept.”⁴⁴

Standards and guidelines for broker price opinions include the term *fair market price* defined as follows:

38. George L. Schmutz and Loring O. McCormick, “The Factors Affecting Market Price,” *The Journal of the American Institute of Real Estate Appraisers* (April 1934): 181–188.

39. M. J. Slonim, “Market Value or Market Price,” *The Appraisal Journal* (October 1945): 390–391.

40. Fred E. Case, “Value, Market Value, and Market Price,” *The Appraisal Journal* (April 1953): 217–223.

41. Kevin Clarke, “Market Price: A Practical Solution,” *The Appraisal Journal* (July 1993): 437–438.

42. Stephen F. Fanning, John A. Blazejack, and George R. Mann, “Price versus Fundamentals—From Bubbles to Distressed Markets,” *The Appraisal Journal* (Spring 2011): 143–154.

43. Slonim, “Market Value or Market Price,” 390; nearly identical verbiage was included following the definition of *market value* in the 1962 edition of AIREA’s *Appraisal Terminology and Handbook*, although the term *market price* was not specifically defined.

44. Boyce, *Real Estate Appraisal Terminology*, 136; Boyce, *Real Estate Appraisal Terminology*, revised ed., 160.

The most probable price, as of the date of inspection or other specifically defined date, in terms equivalent to cash, unaffected by special or creative financing or sales concessions, for which the property should sell after reasonable exposure in a competitive market under all conditions requisite to a fair sale with buyer and seller each acting prudently and for self-interest and assuming neither is under undue duress. Also known as Market Price.⁴⁵

Market price has also been defined in the IAAO Glossary for Property Appraisal and Assessment as “the price a particular buyer and seller agree to in a particular transaction; the amount actually paid.”⁴⁶

Market price has not been defined in *The Dictionary of Real Estate Appraisal*, including only a definition of price, initially defined as “the amount a particular purchaser agrees to pay and a particular seller agrees to accept under the circumstances surrounding their transaction.”⁴⁷ Price is currently defined in *The Dictionary of Real Estate Appraisal*, sixth edition, as “the amount paid in exchange for a good or commodity.” It notes that price is a fact when a transaction is consummated, while value is an estimate, further stating that “the price paid for a property may or may not have any relation to the value that might be ascribed to that property by others.”⁴⁸

In general, market price and price are more or less synonymous, although lack of a consistent definition for market price has allowed authors some flexibility in their interpretation of the term. Real estate brokers and sales agents preparing broker price opinions (BPO) use market price somewhat synonymously with our understanding of market value, although this is clearly an exception.

The distinction between price and value is perhaps best summarized by Warren Buffet, who sagely observed that “price is what you pay, value is what you get.”

Value Standard

The market value definition for mortgage lending is the most widely used, and conspicuously defines value as the “most probable price,” closely resembling the definition of market value in the 1981 edition of *Real Estate Appraisal Terminology*. The market value definition in the Uniform Appraisal Standards for Federal Land Acquisitions is somewhat similar, defining market value as “the amount in cash ... for which in all probability the property would have sold.”⁴⁹ Many other standard definitions instead use the highest price standard, including California definitions for eminent domain,⁵⁰ damage to real property⁵¹ and marital dissolution.⁵² Still other definitions do not specify any particular standard, simply an amount or price at which a property would be sold, including federal definitions for estate taxation⁵³ and casualty losses.⁵⁴

The definition of fair market value from *Black's Law Dictionary* similarly provides no definitive standard, while also paying homage to the neoclassical model by referencing the intersection of supply and demand: “The price that a seller is willing to accept and a buyer is willing to pay on the open market and in an arm's length transaction; the point at which supply and demand intersect.”⁵⁵

After decades of debate, the practical difference between highest price and most probable price, if any, remains unclear. “Most probable price”—

45. National Association of Broker Price Opinion Professionals, *Broker Price Opinion Standards & Guidelines*, version 5.0, 16.

46. International Association of Assessing Officers, *Glossary for Property Appraisal and Assessment*, second ed. (Kansas City: International Association of Assessing Officers, 2013), 100.

47. American Institute of Real Estate Appraisers, *The Dictionary of Real Estate Appraisal*, ed. (Chicago: American Institute of Real Estate Appraisers of the National Association of Realtors, 1984), 237.

48. Appraisal Institute, *The Dictionary of Real Estate Appraisal*, 6th ed. (Chicago: Appraisal Institute, 2015), s.v. “price.”

49. Interagency Land Acquisition Conference, *Uniform Appraisal Standards for Federal Land Acquisitions* (Appraisal Foundation, 2016), 10; <http://bit.ly/UASFLA>.

50. Cal. Civ. Proc. Code § 1263.320.

51. Judicial Council of California Civil Jury Instructions (2018) § 3903(f).

52. *In re Marriage of Cream*, 13 Cal. App. 4th 81; 16 Cal. Rptr. 2d 575 (1993).

53. 26 C.F.R. § 20.2031-1(b).

54. IRS Instructions for Form 4684; see also 26 C.F.R. § 1.165-7.

55. Bryan A. Garner, ed., *Black's Law Dictionary*, 5th pocket ed. (St. Paul, MN: Thomson Reuters, 2016), s.v. “fair market value.”

whether defined statistically as the mean, median, or mode, or an expected value or range of values—is a fairly objective standard, at least in comparison to highest price, which conceivably might encompass any number above the mid-point of a possible value distribution. It has even been argued that a literal interpretation of highest price ignores the impact of uncertainty in the market.

Thinking of value as a transaction zone where the low end of the seller's expectation meets the high end of what a buyer is willing to pay is helpful, but still leaves room for considerable variation depending on the characteristics and efficiency of the market, negotiating position of the parties and/or random price variation. Nor does it necessarily account for high (or low) sales that seemingly defy the market, or situations where market imperfection results in a wide value range. Only in the perfectly competitive market does a true equilibrium price exist, where most probable and highest price are the same number.

The graphic in Exhibit 2 helps to visualize the potential difference between most probable and highest price (a normal distribution is used as an exemplar, although value distributions can exhibit different characteristics).

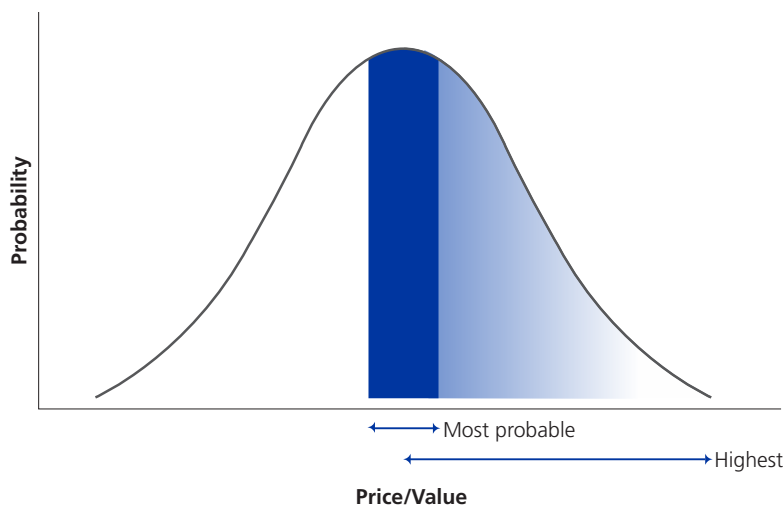
Whether expressed as a specific number or a range, most probable price represents the portion of a value distribution that is most likely to occur, based on analysis of market data. Highest price, on the other hand, is much more subjective, as

evidenced by its varied interpretations in appraisal literature and court decisions over the years:

- Synonymous with most probable price
- Most probable price at highest and best use
- Highest price represented by the central tendency
- Highest price that the market will justify (average sale adjusted upward)
- Reflective of an atypical purchaser
- Highest price as speculative, subject to misuse and abuse

It is clear that a literal interpretation of highest price could result in a value limited only by the extreme upper limit of a data range (and perhaps the creativity of the appraiser). But values in this rarefied area are probably not likely and certainly not “fair.” In fact, one might argue in more general terms that *highest price* is not fair and equitable. The rationale for highest price is perhaps understandable in eminent domain, where a property owner is involuntarily forced to cede property to a condemning agency, but an award of compensation higher than prevailing values (most probable price) is certainly not fair to the taxpayers. And in other types of civil litigation or family law, basing market value on the highest price could easily favor one party over another, resulting in something less than a fair and equitable outcome. And what about definitions that have no value standard? There might be an implication that an expected or likely (most probable) value would be appropriate, but without some qualification, an appraiser is free to interpret the definition as he or she sees fit.

Exhibit 2 Normal Distribution: Market Value



Assumptions about the Market

Whether we call it market value or fair market value, virtually all definitions include assumptions about the hypothetical market where a transaction is to take place, with conditions that may or may not comport with actual transactions in the marketplace. A number of authors, including Case, Ratcliff, Marshall, Vandell, and Thomson, have noted the disconnect between hypothetical or idealized perfect market conditions and the real world. Douglas Lovell suggests that “sales which violate the basic terms and conditions of the type of value being estimated are excluded from consideration because they intro-

duce bias into the analytic process,”⁵⁶ an idea that was reinforced by the Appraisal Institute Special Task Force on Value Definitions in 1992.

While some definitions are more restrictive than others, USPAP identifies three categories of conditions included in market value definitions:

1. the relationship, knowledge and motivation of the parties (i.e., seller and buyer);
2. the terms of sale (e.g., cash, cash equivalent or other terms); and
3. the conditions of sale (e.g., exposure in a competitive market for a reasonable time prior to sale).

Consider the motivation of the parties. Under most value definitions, distress sales are generally not reflective of market value. In a 2012 article, William G. Steinke addressed this issue, noting the inherent conflict between distressed markets and conditions attributed to standard value definitions. Even if real estate owned and short-sale transactions in distressed markets reflect typical motivation, Steinke opines that they still reflect undue stimulus, and are therefore not reflective of market value.⁵⁷ But if distressed sales comprise all or most market activity, isn't it more realistic to accept the market as it is, rather than impose unrealistic conditions associated with a non-existent semi-perfect market? Ratcliff and others argue strongly that idealized conditions sometimes bear little resemblance to the real world, and appraisers generally ignore the literal implication of value definitions in actual practice.

What about legitimate sales that are not consistent with conditions and limitations in many value definitions? Some definitions, for example, assume reasonable exposure on the open market; would this disqualify an off-market but otherwise legitimate arm's-length transaction? If typical buyers are not particularly knowledgeable or well-informed, are these sales somehow not indicative of market value? Do appraisers have an obligation to forecast normal market prices during a

boom or bust? If prevailing terms are not cash or equivalent, is it appropriate to discount to cash equivalence and call the result market value?

In essence, should market value be positive (objective; what is) or normative (subjective; what should be)? Every normative condition imposed on a market value definition has the potential to make the definition less representative of the actual market, and in extreme cases, might result in a situation where market value simply cannot occur at the effective date.⁵⁸

Conclusion

“A proliferation of Market Value definitions ... and great uncertainty in the marketplace” is as much of a problem today as when it was identified by the Appraisal Institute's *Market Value Initiative White Paper* in 1999, debated in appraisal literature for decades prior and since.

The two primary differences among various definitions of market value and fair market value are the value standard (most probable versus highest price versus no standard) and conditions imposed on the hypothetical market. The use of “highest price” in many legal definitions is especially problematic, given its inherent subjectivity and potential for “misuse and abuse.” Confining opinions of market value to an expected or likely range would eliminate much uncertainty, and would arguably be more “fair” than a literal interpretation of *highest price*.

Assumptions about the market generally impose certain normative conditions that might disqualify legitimate sales, or in extreme circumstances might make it virtually impossible to estimate market value at the effective date. Ratcliff's suggestion that literal implications of value definitions are often ignored in actual practice probably has some truth, but differences between an idealized semi-perfect market and the real world shouldn't require appraisers to make this choice, even subconsciously.

56. Douglas D. Lovell, “Does Your Client Really Need a Market Value Estimate?” *The Real Estate Appraiser* (May 1991): 6.

57. William G. Steinke, “Price, Value, and Comparable Distinctions in Distressed Markets,” *The Appraisal Journal* (Spring 2012): 140[1/n]-148.

58. As an example, consider a market where all transactions are distressed sales, a not uncommon occurrence during the years following the subprime mortgage crisis. Under conditions imposed by the standard lending definition of *market value* (e.g., lack of undue stimulus, typical motivation, reasonable exposure time), these transactions fail as evidence of market value, suggesting that some level of market stabilization would be necessary to provide sufficient transaction data matching the operative definition of market value.

Market value and fair market value definitions are embedded in a plethora of codes, regulations, and court decisions across the country. Thus, a real solution to the problem of multiple market value definitions used for varied purposes across different jurisdictions is elusive. The simplicity of a single market value definition based on expected or likely price, without artificial constraints, that could be used for all purposes, is definitely appealing. When it comes to something as basic and important as defining “market value,” it is unfortunate that the role of the appraisal profession has been usurped by the courts, regulators, and others.

While it is unrealistic to presume that myriad definitions in current use could actually be changed to conform to a single standard, the valuation profession should seek to clarify how the

terms *market value* and *fair market value* can be consistently applied, particularly with respect to the value standard (highest versus most probable). This would also be an opportunity to carefully review what conditions (if any) should be imposed on the market; i.e., should we really seek to impose conditions of the semi-perfect market on what all would agree to be imperfect and inefficient real estate markets?

Quoting Richard Ratcliff yet again, “appraisal is largely the predicting of human behavior under given market conditions.”⁵⁹ In an ideal world, appraisers would apply market value definitions using a relatively consistent and objective standard, and reflect conditions in the market as they exist, rather than how others might wish them to be.

About the Author

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Additional Resources

Suggested by the Y. T. and Louise Lee Lum Library

Appraisal Institute

- **Guide Notes to the Standards of Professional Appraisal Practice**

<https://www.appraisalinstitute.org/professional-practice/ethics-and-standards/guide-notes-to-the-standards-of-professional-practice-of-the-appraisal-institute/>

- **Lum Library External Resources [Login Required]**

Information Files—Value

Appraisal Standards Board—Uniform Standards of Professional Appraisal Practice

<http://www.uspap.org/files/assets/basic-html/page-1.html#>

Financial Accounting Standards Board—Fair Value Measurements

https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1218220130001&acceptedDisclaimer=true

59. Richard U. Ratcliff, “Appraisal Is Market Analysis,” *The Appraisal Journal* (October 1975): 486.

Valuing Closely Held Businesses — Apricity Law

 apricitylegal.com/insights/revenue-ruling-59-60-business-valuation

Troy Ortiz

December 13, 2025

Revenue Ruling 59-60 and the Valuation of Closely Held Businesses

Valuation issues arise frequently for owners of closely held businesses, particularly when equity is issued, transferred, or taxed. Unlike publicly traded companies, private corporations lack an observable market price for their stock. To address this gap, the Internal Revenue Service relies on [Revenue Ruling 59-60](#), which remains the foundational authority for determining the fair market value of private company stock for federal tax purposes.

Business owners, professionals, and families engaging in equity planning should understand how this guidance applies and why it continues to govern private business valuations more than six decades after its issuance.

Overview of Revenue Ruling 59-60

Revenue Ruling 59-60 was issued by the IRS in 1959 to provide guidance on valuing stock of closely held corporations for estate and gift tax purposes. Over time, its principles have been broadly adopted in other tax and legal contexts, including:

- Restricted stock grants and 83(b) elections
- Gifting and intra-family transfers
- Buy-sell agreements and redemptions
- Divorce and shareholder disputes
- Succession and estate planning

Courts, valuation professionals, and the IRS consistently rely on Rev. Rul. 59-60 as the starting point for determining fair market value where no public market exists.

Definition of Fair Market Value

Revenue Ruling 59-60 defines fair market value as:

The price at which property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or sell, and both having reasonable knowledge of relevant facts.

This definition emphasizes that fair market value is an objective, hypothetical standard. It is distinct from book value, investor pricing, or an owner's subjective expectations.

The Required Valuation Factors

Rev. Rul. 59-60 does not prescribe a formula. Instead, it requires consideration of all relevant facts and circumstances, including the following non-exclusive factors:

1. Nature and History of the Business

This includes the company's formation, ownership structure, operational history, and stage of development.

2. General Economic Outlook and Industry Conditions

Valuation must reflect prevailing economic conditions and trends within the company's specific industry.

3. Book Value and Financial Condition

While book value may provide a baseline, it is rarely determinative, particularly for service-based businesses.

4. Earnings Capacity

Earnings history and future earning potential are often the most significant considerations for operating companies. For professional practices, normalization of owner compensation is critical.

5. Dividend-Paying Capacity

The ability of the business to generate distributable cash is relevant, regardless of whether dividends are actually paid.

6. Goodwill and Intangible Assets

This may include brand value, client relationships, and workforce. In professional practices, a key issue is whether goodwill is personal or enterprise-related.

7. Prior Sales of Stock

Recent arm's-length transactions involving the company's stock may provide meaningful valuation evidence if they are comparable and bona fide.

8. Market Prices of Comparable Companies

When available, market data from comparable public companies or private transactions may inform valuation, subject to appropriate adjustments.

No single factor is controlling, and valuation requires the exercise of informed judgment.

Absence of Mechanical Rules

A central principle of Rev. Rul. 59-60 is the rejection of rigid valuation formulas or rules of thumb. The IRS expressly recognized that closely held businesses vary widely and that valuation must be grounded in a comprehensive analysis of the specific facts.

As a result, valuations based solely on revenue multiples or simplistic benchmarks are often insufficient for tax-sensitive purposes.

Discounts Applicable to Closely Held Stock

Revenue Ruling 59-60 also acknowledges that ownership interests in private companies may warrant valuation discounts not applicable to publicly traded stock. Common adjustments include:

- Discounts for lack of marketability
- Minority interest discounts, where applicable

These discounts can materially affect fair market value and are frequently examined by the IRS in audits and disputes.

Practical Implications for Business Owners

Owners should be mindful that Rev. Rul. 59-60 applies implicitly whenever private company equity is valued for tax or legal purposes. This includes situations such as issuing restricted stock, filing an 83(b) election, transferring interests to family members, or planning ownership transitions.

Failure to adhere to these principles can result in adverse tax consequences, including recharacterized income, penalties, and interest.

Revenue Ruling 59-60 remains the cornerstone of private business valuation in the United States. Any transaction involving closely held stock should be evaluated through its lens. Proper valuation is not merely a technical exercise, it is a critical component of sound legal and tax planning.

For guidance on valuations, equity issuances, or ownership planning, [contact](#) us to schedule a consultation.

NATIONAL NET LEASE MARKET

Fourth Quarter 2025

	CURRENT	LAST QUARTER	1 YEAR AGO	3 YEARS AGO	5 YEARS AGO
DISCOUNT RATE (IRR)^a					
Range	6.00% – 10.00%	6.00% – 11.00%	6.00% – 11.00%	5.00% – 10.00%	5.50% – 10.00%
Average	7.67%	7.63%	8.00%	7.35%	7.20%
Change (Basis Points)		+ 4	– 33	+ 32	+ 47
OVERALL CAP RATE (OAR)^a					
Range	6.25% – 9.00%	6.00% – 9.00%	6.25% – 9.00%	5.00% – 7.50%	4.00% – 8.00%
Average	7.38%	7.16%	7.71%	6.23%	6.22%
Change (Basis Points)		+ 22	– 33	+ 115	+ 116
RESIDUAL CAP RATE					
Range	6.50% – 9.00%	6.00% – 9.00%	6.50% – 9.00%	5.00% – 7.50%	5.50% – 8.50%
Average	7.54%	7.28%	7.62%	6.28%	7.03%
Change (Basis Points)		+ 26	– 8	+ 126	+ 51
MARKET RENT CHANGE^b					
Range	(5.00%) – 3.00%	(5.00%) – 6.50%	(5.00%) – 3.00%	(5.00%) – 2.00%	(10.00%) – 2.00%
Average	0.67%	2.00%	1.00%	0.00%	(0.85%)
Change (Basis Points)		– 133	– 33	+ 67	+ 152
EXPENSE CHANGE^b					
Range	0.00% – 3.00%	0.00% – 3.00%	0.00% – 3.00%	0.00% – 3.00%	0.00% – 3.00%
Average	2.00%	1.88%	2.00%	1.60%	1.10%
Change (Basis Points)		+ 12	0	+ 40	+ 90
MARKETING TIME^c					
Range	3 – 18	1 – 18	3 – 18	2 – 18	1 – 18
Average	8.2	6.6	7.6	6.3	5.8
Change (▼, ▲, =)		▲	▲	▲	▲
FORECAST VALUE CHANGE^d					
Range	(5.0%) – 0.0%	(5.0%) – 20.0%	(15.0%) – 0.0%	(5.0%) – 5.0%	(15.0%) – 0.0%
Average	(2.2%)	2.1%	(4.4%)	(1.1%)	(3.1%)
Change (▼, ▲, =)		▼	▲	▼	▲

a. Rate on unleveraged, all-cash transactions; assumes stabilized occupancy

b. Year-one rate of change c. Months d. Over next 12 months

Source: PwC Investor Survey; survey conducted by PwC during October 2025

NATIONAL REGIONAL MALL MARKET⁽¹⁾

Fourth Quarter 2025

	CURRENT	LAST QUARTER	1 YEAR AGO	3 YEARS AGO	5 YEARS AGO
DISCOUNT RATE (IRR)^a					
Range	(2)	6.00% – 12.00%	6.00% – 13.50%	6.00% – 13.00%	5.75% – 15.00%
Average		8.08%	8.50%	7.88%	7.75%
OVERALL CAP RATE (OAR)^a					
Range	(2)	4.75% – 10.00%	5.00% – 12.00%	5.00% – 12.50%	4.50% – 15.00%
Average		7.13%	7.17%	7.33%	6.93%
RESIDUAL CAP RATE					
Range	(2)	5.00% – 12.00%	5.00% – 12.50%	5.00% – 12.50%	4.50% – 15.00%
Average		7.75%	7.71%	7.40%	7.60%
MARKET RENT CHANGE^b					
Range	(2)	(10.00%) – 7.00%	(15.00%) – 7.00%	0.00% – 3.00%	(10.00%) – 0.00%
Average		1.63%	0.50%	0.60%	(1.80%)
EXPENSE CHANGE^b					
Range	(2)	2.00% – 5.00%	2.00% – 10.00%	2.00% – 10.00%	(5.00%) – 4.00%
Average		3.50%	4.25%	3.67%	1.80%
MARKETING TIME^c					
Range	(2)	3 – 24	3 – 18	3 – 18	3 – 18
Average		10.1	9.0	11.8	10.5
FORECAST VALUE CHANGE^d					
Range	(2)	0.0% – 20.0%	(8.0%) – 20.0%	(2.0%) – 10.0%	(25.0%) – 5.0%
Average		5.4%	3.0%	2.3%	(4.3%)

a. Rate on unleveraged, all-cash transactions; assumes stabilized occupancy

b. Year-one rate of change c. Months d. Over next 12 months

(1) Relates to Class A⁺, A, and B⁺ malls

(2) Insufficient responses prevent us from reporting data for the noted time period.

Source: PwC Investor Survey; survey conducted by PwC during October 2025

Difference Between Real and Nominal WACC in NREL's Financial Assumptions

In NREL's ATB financial cases, **WACC (Weighted Average Cost of Capital)** is presented in two forms: **real WACC** and **nominal WACC**. The key difference lies in how they account for inflation.

Nominal WACC

- Reflects the **actual market interest rates** and return expectations, which already include the effects of inflation.
- It is expressed in **current (nominal) dollars** and is the rate investors would demand for a given risk level, adjusted for expected inflation.
- In NREL's "Market + Policies" case, nominal WACC is used when modeling project finance with real-world interest rates and inflation expectations. ATB | NREL +1

Real WACC

- Adjusts the nominal rate to remove the effect of inflation, expressing the cost of capital in **constant (real) dollars**.
- It represents the **inflation-adjusted return** investors require, so it is not influenced by changes in the general price level.
- Real WACC is useful for comparing projects across different inflation environments or for long-term planning where inflation is a known factor. Department of Taxation and Finance

Why NREL Uses Both

- **Nominal WACC** is more relevant for short-term financial modeling and project financing because it matches the actual cash flows and interest rates in the market.
- **Real WACC** is more appropriate for long-term, inflation-adjusted analysis, such as comparing technologies over decades or assessing the impact of inflation on capital costs.
- In the ATB, the choice between nominal and real WACC can affect the calculated **levelized cost of energy (LCOE)**, especially when inflation rates differ between cases (e.g., long-term vs. recent inflation assumptions). ATB | NREL

Practical Example

If the nominal WACC is 7% and the expected inflation rate is 2%, the real WACC would be approximately 4.9% (using the Fisher equation: $1 + r_{\text{real}} \approx \frac{1 + r_{\text{nominal}}}{1 + i}$). This adjustment ensures that the discount rate reflects the true cost of capital in constant dollars.

In summary:

- **Nominal WACC** = market rate + inflation effect.
- **Real WACC** = nominal rate minus inflation effect.
- NREL presents both to allow flexibility in modeling, depending on whether you want to reflect current market conditions (nominal) or long-term, inflation-adjusted costs (real). ATB | NREL +2

Thomas Walusek

From: Joachim Seel <jseel@lbl.gov>
Sent: Monday, February 23, 2026 10:46 AM
To: Thomas Walusek; Dev Millstein
Cc: Julie Mulvaney Kemp
Subject: Re: Help!

Hi Tom,

Julie, our PPA expert, is out on maternity leave. I don't have all-encompassing statistics and will only be able to give you some more anecdotal evidence with no claim for completeness. Overall, renegotiations or terminations of PPAs are rare given the scale of the utility-scale solar market, but they can happen. I'll try to parse out some themes:

- 1) Early PV years: In the late 2000s/early 2010s we saw some attempts (sometimes successful, sometimes rejected by CPUC) to renegotiate PPAs for Topaz and Mojave Solar after early developers were too optimistic in their cost estimates
- 2) Concentrated Solar tech failures: In contrast to PV, CSP was more prone to underperformance and cost overruns. Crescent Dunes and Ivanpah are two examples of offtakers walking away.
- 3) Developer Bankruptcy: SunEdison, a major solar developer, had several projects falter when it declared bankruptcy in 2016. There are some examples in Hawaii where a new developer (NRG) picked up the assets and actually offered a lower PPA to HECO
- 4) Transmission and interconnection delays: This issue is becoming more frequent, where transmission network upgrades are not completed on time / projects don't advance through the interconnection queues within the originally estimated time. Sometimes this just needs to be an extension of the commercial operation date, sometimes it results in cost increases to accommodate higher transmission network upgrade costs. Examples are Yellow Pine III, Boulder Solar III and Purple Sage
- 5) Tariffs and supply-chain shocks: With covid and many component import tariffs (both during Biden and now Trump administration) there have been cost overruns that sometimes resulted in renegotiated PPAs and sometimes in project cancelations. Some PPAs include price collars, but if the price ceiling is too tight developers may not be able to stay under it, leading to project cancellation. Examples are Aramis, Resurgence, Coyote Creek, sapphire solar+storage or a whole portfolio of solar projects in TVA.

One result of these experiences is that new PPAs are rising relative to the \$30/MWh figures often seen in the early 2020s. But ultimately I am not privy to many of these behind the scenes negotiations. Maybe ACP or SEIA can give you more information here.

Hope this helps and all the best,
 Jo

On Sun, Feb 22, 2026 at 6:54 PM Thomas Walusek <Thomas.Walusek@clarkcountynv.gov> wrote:
 Hey guys. Happy Monday!

Cost Approach

The cost approach may be used to develop an opinion of market value (or some other type of value that an appraisal assignment may require such as use value or fair value) of proposed construction, special-purpose or specialty properties, and other properties that are not frequently exchanged in the market. Buyers of these properties often measure the price they will pay for an existing building against the cost to build less depreciation or against the cost to purchase an existing structure and make any necessary modifications. If sale and rental data for comparable properties is not available, current market indications of the depreciated cost of an existing building [or property] would be the best reflections of market thinking and, thus, of market value.

The Appraisal of Real Estate, Fifteenth Edition, pg. 530, Appraisal Institute, 2020

Townsite Solar, LLC

Balance Sheet

As of December 31, 2021

Financial Row	Amount
ASSETS	
Current Assets	
Bank	
10000 - Cash and cash equivalents_Non-Restricted	
10500 - CEI VII	
10532 - CEIVII_Townsite Solar_SVB_Oper_1437	\$273,970.66
Total - 10500 - CEI VII	\$273,970.66
Total - 10000 - Cash and cash equivalents_Non-Restricted	\$273,970.66
Total Bank	\$273,970.66
Accounts Receivable	
12000 - Accounts Receivable	
12005 - PPA Receivables	\$7,248,547.44
12011 - Accounts Receivable - General	\$22,093,942.98
Total - 12000 - Accounts Receivable	\$29,342,490.42
Total Accounts Receivable	\$29,342,490.42
Other Current Asset	
13000 - Other Current Assets	
13300 - Prepaid Expenses	
13320 - Prepaid Site Lease	\$3,929,150.85
Total - 13300 - Prepaid Expenses	\$3,929,150.85
Total - 13000 - Other Current Assets	\$3,929,150.85
Total Other Current Asset	\$3,929,150.85
Total Current Assets	\$33,545,611.93
Fixed Assets	
15000 - Fixed Assets	
15200 - Solar Energy Systems	
15205 - Solar Energy Systems - General	\$370,178,599.43
Total - 15200 - Solar Energy Systems	\$370,178,599.43
15305 - Battery Energy Systems	\$161,010,865.74
17060 - Fixed Assets - Accumulated Depreciation	
17060 - Fixed Assets - Accumulated Depreciation	(\$277,527.57)
17061 - Fixed Assets - Accumulated Depreciation - Battery	(\$178,953.87)
Total - 17060 - Fixed Assets - Accumulated Depreciation	(\$456,481.44)
Total - 15000 - Fixed Assets	\$530,732,983.73
Total Fixed Assets	\$530,732,983.73
Other Assets	
17100 - Asset Retirement Obligation Asset	
17105 - Asset Retirement Obligation Asset - General	\$4,483,612.88
17106 - Asset Retirement Obligation Asset - Battery	\$47,619.77
Total - 17100 - Asset Retirement Obligation Asset	\$4,531,232.65
Total Other Assets	\$4,531,232.65
Total ASSETS	\$568,809,828.31
Liabilities & Equity	
Current Liabilities	
Accounts Payable	
20000 - Accounts Payable	\$4,527,367.94
Total Accounts Payable	\$4,527,367.94
Other Current Liability	
21000 - Other Current Liabilities	
21005 - Other Current Liabilities - General	\$14,962,310.93
21500 - Intercompany Payable	
21693 - Townsite Solar Parent HoldCo, LLC	(\$8,247,829.63)
Total - 21500 - Intercompany Payable	(\$8,247,829.63)
Total - 21000 - Other Current Liabilities	\$6,714,481.30
Total Other Current Liability	\$6,714,481.30

Total Current Liabilities	\$11,241,849.24
Long Term Liabilities	
28000 - Other Long Term Liabilities	
28010 - Asset Retirement Obligation Liability	\$4,513,036.59
28011 - Asset Retirement Obligation Liability - Battery	\$47,932.27
28015 - Deferred Lease - Long Term	(\$566,719.85)
Total - 28000 - Other Long Term Liabilities	\$3,994,249.01
Total Long Term Liabilities	\$3,994,249.01
Equity	
32000 - Member's Equity	
32005 - Member's Contributions	\$537,009,371.98
32020 - Income (Loss) Allocation	\$16,564,358.08
Total - 32000 - Member's Equity	\$553,573,730.06
Retained Earnings	(\$7,676,204.98)
Net Income	\$7,676,204.98
Total Equity	\$553,573,730.06
Total Liabilities & Equity	\$568,809,828.31

Townsite Solar, LLC

Income Statement

January 1, 2021 - December 31, 2021

Financial Row	Amount
Ordinary Income/Expense	
Income	
40000 - Revenue	
40005 - PPA Revenue	\$25,708,210.96
40010 - Merchant Revenue	\$559,700.48
Total - 40000 - Revenue	\$26,267,911.44
Total - Income	\$26,267,911.44
Cost Of Sales	
50000 - Cost Of Operations	
50005 - Maintenance Agreement - Operations & Maintenance	\$64,033.72
50030 - Taxes	\$968.41
50075 - Operational Costs - Other	\$50,706.02
50200 - Ground Lease	
50201 - Lease Expense - General	\$1,796,206.92
50210 - Basic Term	\$170,849.15
Total - 50200 - Ground Lease	\$1,967,056.07
Total - 50000 - Cost Of Operations	\$2,082,764.22
51000 - Cost of Goods Sold	
51003 - Purchases of Electricity for Resale	\$15,986,616.08
Total - 51000 - Cost of Goods Sold	\$15,986,616.08
Total - Cost Of Sales	\$18,069,380.30
Gross Profit	\$8,198,531.14
Expense	
60000 - General And Administrative Expenses	
60015 - Consulting	\$5,112.50
60020 - Legal	\$2,137.50
60035 - Bank Service Charges & Fees	\$994.51
60050 - Business License And Permits	\$2,684.00
Total - 60000 - General And Administrative Expenses	\$10,928.51
70000 - Depreciation, Amortization And Accretion Expense	
70005 - Depreciation Expense	\$456,481.44
70015 - Accretion Expense	\$29,736.21
Total - 70000 - Depreciation, Amortization And Accretion Expense	\$486,217.65
Total - Expense	\$497,146.16
Net Ordinary Income	\$7,701,384.98
Other Income and Expenses	
Other Expense	
90000 - Other Expense	
92000 - Income Tax Expense (Benefit)	
92010 - Income Tax Expense - State	\$25,180.00
Total - 92000 - Income Tax Expense (Benefit)	\$25,180.00
Total - 90000 - Other Expense	\$25,180.00
Total - Other Expense	\$25,180.00
Net Other Income	(\$25,180.00)
Net Income	\$7,676,204.98

Townsite Solar, LLC

Balance Sheet

As of December 31, 2022

Financial Row	Amount
ASSETS	
Current Assets	
Bank	
10000 - Cash and cash equivalents_Non-Restricted	
10500 - CEI VII	
10532 - CEIVII_Townsite Solar_SVB_Oper_1437	\$6,395,669.16
Total - 10500 - CEI VII	\$6,395,669.16
Total - 10000 - Cash and cash equivalents_Non-Restricted	\$6,395,669.16
Total Bank	\$6,395,669.16
Accounts Receivable	
12000 - Accounts Receivable	
12005 - PPA Receivables	\$7,051,833.46
12010 - RECs Receivables	\$958,438.75
12011 - Accounts Receivable - General	\$1,556,650.24
Total - 12000 - Accounts Receivable	\$9,566,922.45
Total Accounts Receivable	\$9,566,922.45
Other Current Asset	
13000 - Other Current Assets	
13300 - Prepaid Expenses	
13305 - Prepaid Expenses - General	\$3,420,387.42
13310 - Prepaid Insurance	\$124,697.02
13315 - Prepaid Taxes	\$5,021.13
Total - 13300 - Prepaid Expenses	\$3,550,105.57
Total - 13000 - Other Current Assets	\$3,550,105.57
Total Other Current Asset	\$3,550,105.57
Total Current Assets	\$19,512,697.18
Fixed Assets	
15000 - Fixed Assets	
15200 - Solar Energy Systems	
15205 - Solar Energy Systems - General	\$368,519,137.45
Total - 15200 - Solar Energy Systems	\$368,519,137.45
15305 - Battery Energy Systems	\$161,010,865.74
17060 - Fixed Assets - Accumulated Depreciation	
17060 - Fixed Assets - Accumulated Depreciation	(\$10,899,418.70)
17061 - Fixed Assets - Accumulated Depreciation - Battery	(\$8,222,930.45)
Total - 17060 - Fixed Assets - Accumulated Depreciation	(\$19,122,349.15)
Total - 15000 - Fixed Assets	\$510,407,654.04
Total Fixed Assets	\$510,407,654.04
Other Assets	
17100 - Asset Retirement Obligation Asset	
17105 - Asset Retirement Obligation Asset - General	\$3,476,783.49
17106 - Asset Retirement Obligation Asset - Battery	\$47,619.77
Total - 17100 - Asset Retirement Obligation Asset	\$3,524,403.26
18300 - Other Non-Current Assets	
18316 - Operating Lease ROU Asset	\$51,824,433.26
Total - 18300 - Other Non-Current Assets	\$51,824,433.26
Total Other Assets	\$55,348,836.52
Total ASSETS	\$585,269,187.74
Liabilities & Equity	
Current Liabilities	
Accounts Payable	
20000 - Accounts Payable	\$3,574,514.53
Total Accounts Payable	\$3,574,514.53
Other Current Liability	
20100 - Accrued Expense	\$6,096,089.24

21000 - Other Current Liabilities	
21305 - Operating Lease Liability - Current	\$602,124.80
Total - 21000 - Other Current Liabilities	\$602,124.80
Total Other Current Liability	\$6,698,214.04
Total Current Liabilities	\$10,272,728.57
Long Term Liabilities	
28000 - Other Long Term Liabilities	
28010 - Asset Retirement Obligation Liability	\$3,782,658.13
28011 - Asset Retirement Obligation Liability - Battery	\$51,369.83
28016 - Operating Lease Liability - Non-Current	\$47,088,024.76
Total - 28000 - Other Long Term Liabilities	\$50,922,052.72
Total Long Term Liabilities	\$50,922,052.72
Equity	
32000 - Member's Equity	
32005 - Member's Contributions	\$541,218,658.69
32010 - Member's Return of Capital	(\$11,808,584.89)
32015 - Member's Distributions	(\$18,756,375.40)
32020 - Income (Loss) Allocation	\$13,420,708.05
Total - 32000 - Member's Equity	\$524,074,406.45
Retained Earnings	\$3,143,650.03
Net Income	(\$3,143,650.03)
Total Equity	\$524,074,406.45
Total Liabilities & Equity	\$585,269,187.74

Townsite Solar, LLC
Income Statement
January 1, 2022 - December 31, 2022

Financial Row	Amount
Ordinary Income/Expense	
Income	
40000 - Revenue	
40005 - PPA Revenue	\$39,279,402.98
40006 - PPA Revenue - RA	\$2,149,678.66
40010 - Merchant Revenue	\$30,110,258.06
40020 - REC Revenue	\$3,320,240.75
40022 - Ancillary Service Revenue	\$19,495.62
Total - 40000 - Revenue	\$74,879,076.07
Total - Income	\$74,879,076.07
Cost Of Sales	
50000 - Cost Of Operations	
50005 - Maintenance Agreement - Operations & Maintenance	\$769,696.45
50006 - Maintenance Agreement - Bess	\$1,818,613.60
50010 - Maintenance Agreement - Additional O&M	\$132,600.12
50015 - Maintenance Agreement - BOP	\$31,576.70
50017 - Project Letter of Credit Fees	\$367,151.81
50019 - Shared Facilities	\$420,750.50
50020 - Utilities	\$212.49
50022 - Regulatory Compliance	\$58,274.17
50023 - Utilities - Telecommunications	\$15,785.99
50030 - Taxes	\$2,001,488.91
50035 - Insurance	\$531,317.83
50045 - Asset Management Fee	\$652,122.37
50065 - Power Factors	\$18,532.87
50070 - REC Fees	\$11,227.53
50075 - Operational Costs - Other	\$49,777.54
50085 - Energy Management Agreement	\$395,155.42
50200 - Ground Lease	
50201 - Lease Expense - General	\$1,907,795.86
Total - 50200 - Ground Lease	\$1,907,795.86
Total - 50000 - Cost Of Operations	\$9,182,080.16
51000 - Cost of Goods Sold	
51003 - Purchases of Electricity for Resale	\$47,565,218.80
51004 - Purchase of RA for Resale	\$1,563,763.86
Total - 51000 - Cost of Goods Sold	\$49,128,982.66
Total - Cost Of Sales	\$58,311,062.82
Gross Profit	\$16,568,013.25
Expense	
60000 - General And Administrative Expenses	
60010 - Audit	\$107,475.00
60015 - Consulting	\$64,690.36
60020 - Legal	\$415,707.67
60025 - Tax Compliance	\$6,375.00
60030 - Tax Consulting	\$66,424.00
60035 - Bank Service Charges & Fees	\$1,522.04
60040 - Charitable Contributions	\$5,000.00
60050 - Business License And Permits	\$1,995.01
60081 - Security Monitoring	\$9,834.75
Total - 60000 - General And Administrative Expenses	\$679,023.83
70000 - Depreciation, Amortization And Accretion Expense	
70005 - Depreciation Expense	\$18,665,867.71
70015 - Accretion Expense	\$279,888.49
Total - 70000 - Depreciation, Amortization And Accretion Expense	\$18,945,756.20
Total - Expense	\$19,624,780.03

Net Ordinary Income	(\$3,056,766.78)
Other Income and Expenses	
Other Income	
80000 - Other Income	
80030 - Liquidated damages	(\$69,629.15)
Total - 80000 - Other Income	(\$69,629.15)
Total - Other Income	(\$69,629.15)
Other Expense	
90000 - Other Expense	
91000 - Interest Expense	\$1,211.62
92000 - Income Tax Expense (Benefit)	
92010 - Income Tax Expense - State	\$12,590.00
92025 - Tax Penalties	\$3,452.48
Total - 92000 - Income Tax Expense (Benefit)	\$16,042.48
Total - 90000 - Other Expense	\$17,254.10
Total - Other Expense	\$17,254.10
Net Other Income	(\$86,883.25)
Net Income	(\$3,143,650.03)

Townsite Solar, LLC

Balance Sheet

As of December 31, 2023

Financial Row	Amount
ASSETS	
Current Assets	
Bank	
10000 - Cash and cash equivalents_Non-Restricted	
10500 - CEI VII	
11855 - CEIVII_Townsite Solar_BofA_Oper_8020	\$5,010,958.29
Total - 10500 - CEI VII	\$5,010,958.29
Total - 10000 - Cash and cash equivalents_Non-Restricted	\$5,010,958.29
Total Bank	\$5,010,958.29
Accounts Receivable	
12000 - Accounts Receivable	
12005 - PPA Receivables	\$6,480,491.14
12010 - RECs Receivables	\$408,960.00
Total - 12000 - Accounts Receivable	\$6,889,451.14
Total Accounts Receivable	\$6,889,451.14
Other Current Asset	
13000 - Other Current Assets	
13300 - Prepaid Expenses	
13305 - Prepaid Expenses - General	\$3,283,780.58
13310 - Prepaid Insurance	\$99,846.12
13315 - Prepaid Taxes	\$2,440.26
Total - 13300 - Prepaid Expenses	\$3,386,066.96
Total - 13000 - Other Current Assets	\$3,386,066.96
Total Other Current Asset	\$3,386,066.96
Total Current Assets	\$15,286,476.39
Fixed Assets	
15000 - Fixed Assets	
15200 - Solar Energy Systems	
15205 - Solar Energy Systems - General	\$368,519,137.45
Total - 15200 - Solar Energy Systems	\$368,519,137.45
15305 - Battery Energy Systems	\$161,010,865.74
17060 - Fixed Assets - Accumulated Depreciation	
17060 - Fixed Assets - Accumulated Depreciation	(\$21,318,099.35)
17061 - Fixed Assets - Accumulated Depreciation - Battery	(\$16,262,097.52)
Total - 17060 - Fixed Assets - Accumulated Depreciation	(\$37,580,196.87)
Total - 15000 - Fixed Assets	\$491,949,806.32
16000 - Inventory	
16001 - Modules	\$223,089.58
Total - 16000 - Inventory	\$223,089.58
Total Fixed Assets	\$492,172,895.90
Other Assets	
17100 - Asset Retirement Obligation Asset	
17105 - Asset Retirement Obligation Asset - General	\$3,476,783.49
17106 - Asset Retirement Obligation Asset - Battery	\$47,619.77
17110 - Asset Retirement Obligation Asset - Accumulated Amortizati	(\$201,804.79)
17113 - Asset Retirement Obligation Asset - Accum. Amort. - Batter	(\$4,809.47)
Total - 17100 - Asset Retirement Obligation Asset	\$3,317,789.00
18300 - Other Non-Current Assets	
18316 - Operating Lease ROU Asset	\$50,872,318.08
Total - 18300 - Other Non-Current Assets	\$50,872,318.08
Total Other Assets	\$54,190,107.08
Total ASSETS	\$561,649,479.37
Liabilities & Equity	
Current Liabilities	
Accounts Payable	
20000 - Accounts Payable	\$2,192,658.07
Total Accounts Payable	\$2,192,658.07
Other Current Liability	

20100 - Accrued Expense	\$7,658,955.91
21000 - Other Current Liabilities	
21305 - Operating Lease Liability - Current	\$626,111.46
21500 - Intercompany Payable	
21626 - Townsite Solar CEI, LLC	(\$242,355.31)
Total - 21500 - Intercompany Payable	(\$242,355.31)
Total - 21000 - Other Current Liabilities	\$383,756.15
Total Other Current Liability	\$8,042,712.06
Total Current Liabilities	\$10,235,370.13
Long Term Liabilities	
28000 - Other Long Term Liabilities	
28010 - Asset Retirement Obligation Liability	\$4,080,542.41
28011 - Asset Retirement Obligation Liability - Battery	\$55,415.15
28016 - Operating Lease Liability - Non-Current	\$46,461,913.27
Total - 28000 - Other Long Term Liabilities	\$50,597,870.83
Total Long Term Liabilities	\$50,597,870.83
Equity	
32000 - Member's Equity	
32005 - Member's Contributions	\$541,218,658.69
32010 - Member's Return of Capital	(\$11,808,584.89)
32015 - Member's Distributions	(\$36,655,771.55)
32020 - Income (Loss) Allocation	\$8,061,936.16
Total - 32000 - Member's Equity	\$500,816,238.41
Retained Earnings	\$5,358,771.89
Net Income	(\$5,358,771.89)
Total Equity	\$500,816,238.41
Total Liabilities & Equity	\$561,649,479.37

Townsite Solar, LLC

Income Statement

January 1, 2023 - December 31, 2023

Financial Row	Amount
Ordinary Income/Expense	
Income	
40000 - Revenue	
40005 - PPA Revenue	\$40,148,261.43
40006 - PPA Revenue - RA	\$3,666,710.00
40010 - Merchant Revenue	\$2,643,001.51
40020 - REC Revenue	\$5,330,736.25
40180 - Revenue - Liquidated damages	\$80,081.80
Total - 40000 - Revenue	\$51,868,790.99
Total - Income	\$51,868,790.99
Cost Of Sales	
50000 - Cost Of Operations	
50005 - Maintenance Agreement - Operations & Maintenance	\$788,871.16
50006 - Maintenance Agreement - Bess	\$1,333,664.10
50010 - Maintenance Agreement - Additional O&M	\$63,925.56
50015 - Maintenance Agreement - BOP	\$14,409.65
50017 - Project Letter of Credit Fees	\$824,588.46
50019 - Shared Facilities	\$386,313.54
50020 - Utilities	\$287.82
50021 - Road/Ground Maintenance	\$22,000.00
50022 - Regulatory Compliance	\$73,615.00
50023 - Utilities - Telecommunications	\$70,945.52
50030 - Taxes	\$1,995,267.72
50035 - Insurance	\$643,186.26
50045 - Asset Management Fee	\$402,634.80
50050 - Spare Parts	\$168,353.36
50065 - Power Factors	\$59,348.72
50070 - REC Fees	\$11,858.35
50075 - Operational Costs - Other	\$118,174.98
50085 - Energy Management Agreement	\$459,750.39
50200 - Ground Lease	
50201 - Lease Expense - General	\$1,907,795.77
Total - 50200 - Ground Lease	\$1,907,795.77
Total - 50000 - Cost Of Operations	\$9,344,991.16
51000 - Cost of Goods Sold	
51003 - Purchases of Electricity for Resale	\$28,610,730.09
Total - 51000 - Cost of Goods Sold	\$28,610,730.09
Total - Cost Of Sales	\$37,955,721.25
Gross Profit	\$13,913,069.74
Expense	
60000 - General And Administrative Expenses	
60015 - Consulting	\$18,750.00
60020 - Legal	\$261,455.71
60050 - Business License And Permits	\$1,396.00
60081 - Security Monitoring	\$9,243.75
Total - 60000 - General And Administrative Expenses	\$290,845.46
70000 - Depreciation, Amortization And Accretion Expense	
70005 - Depreciation Expense	\$18,664,461.98
70015 - Accretion Expense	\$301,929.60
Total - 70000 - Depreciation, Amortization And Accretion Expense	\$18,966,391.58
Total - Expense	\$19,257,237.04

Net Ordinary Income	(\$5,344,167.30)
Other Income and Expenses	
Other Income	
80000 - Other Income	
80001 - Other Income - General	\$10,002.72
80005 - Interest Income	\$32,240.94
Total - 80000 - Other Income	\$42,243.66
Total - Other Income	\$42,243.66
Other Expense	
90000 - Other Expense	
90040 - Liquidated damages	\$45,087.32
92000 - Income Tax Expense (Benefit)	
92010 - Income Tax Expense - State	\$11,760.93
Total - 92000 - Income Tax Expense (Benefit)	\$11,760.93
Total - 90000 - Other Expense	\$56,848.25
Total - Other Expense	\$56,848.25
Net Other Income	(\$14,604.59)
Net Income	(\$5,358,771.89)

Townsite Solar, LLC
Balance Sheet
As of December 31, 2024

Financial Row	Amount
ASSETS	
Current Assets	
Bank	
10000 - Cash and cash equivalents_Non-Restricted	
10500 - CEI VII	
11855 - CEIVII_Townsite Solar_BofA_Oper_8020	\$3,025,219.04
Total - 10500 - CEI VII	\$3,025,219.04
Total - 10000 - Cash and cash equivalents_Non-Restricted	\$3,025,219.04
Total Bank	\$3,025,219.04
Accounts Receivable	
12000 - Accounts Receivable	
12005 - PPA Receivables	\$6,273,153.94
12010 - RECs Receivables	\$3,028,253.00
Total - 12000 - Accounts Receivable	\$9,301,406.94
Total Accounts Receivable	\$9,301,406.94
Other Current Asset	
13000 - Other Current Assets	
13300 - Prepaid Expenses	
13305 - Prepaid Expenses - General	\$2,876,207.27
13310 - Prepaid Insurance	\$113,597.99
13315 - Prepaid Taxes	\$31,586.46
Total - 13300 - Prepaid Expenses	\$3,021,391.72
Total - 13000 - Other Current Assets	\$3,021,391.72
Total Other Current Asset	\$3,021,391.72
Total Current Assets	\$15,348,017.70
Fixed Assets	
15000 - Fixed Assets	
15200 - Solar Energy Systems	
15205 - Solar Energy Systems - General	\$368,519,137.45
15215 - Project Amortizable Costs	\$95,935.47
Total - 15200 - Solar Energy Systems	\$368,615,072.92
15300 - Fixed Assets - General	\$185,000.00
15305 - Battery Energy Systems	\$161,010,865.74
17060 - Fixed Assets - Accumulated Depreciation	
17060 - Fixed Assets - Accumulated Depreciation	(\$31,842,117.72)
17061 - Fixed Assets - Accumulated Depreciation - Battery	(\$24,303,695.80)
Total - 17060 - Fixed Assets - Accumulated Depreciation	(\$56,145,813.52)
Total - 15000 - Fixed Assets	\$473,665,125.14
16000 - Inventory	
16001 - Modules	\$67,074.06
16002 - Inverters	\$225,916.66
Total - 16000 - Inventory	\$292,990.72
Total Fixed Assets	\$473,958,115.86
Other Assets	
17100 - Asset Retirement Obligation Asset	
17105 - Asset Retirement Obligation Asset - General	\$3,476,783.49
17106 - Asset Retirement Obligation Asset - Battery	\$47,619.77
17110 - Asset Retirement Obligation Asset - Accumulated Amortization	(\$301,046.59)
17113 - Asset Retirement Obligation Asset – Accum. Amort. – Battery	(\$7,187.75)
Total - 17100 - Asset Retirement Obligation Asset	\$3,216,168.92
17900 - Deposits	
17905 - Refundable Deposits	\$41,895.76
Total - 17900 - Deposits	\$41,895.76
18300 - Other Non-Current Assets	

18316 - Operating Lease ROU Asset	\$49,907,899.85
Total - 18300 - Other Non-Current Assets	\$49,907,899.85
Total Other Assets	\$53,165,964.53
Total ASSETS	\$542,472,098.09
Liabilities & Equity	
Current Liabilities	
Accounts Payable	
20000 - Accounts Payable	\$388,833.61
Total Accounts Payable	\$388,833.61
Other Current Liability	
20100 - Accrued Expense	\$1,359,870.68
21000 - Other Current Liabilities	
21001 - Clearing Account	\$2,882,067.25
21305 - Operating Lease Liability - Current	\$650,673.00
21500 - Intercompany Payable	
21626 - Townsite Solar CEI, LLC	\$59.61
Total - 21500 - Intercompany Payable	\$59.61
Total - 21000 - Other Current Liabilities	\$3,532,799.86
Total Other Current Liability	\$4,892,670.54
Total Current Liabilities	\$5,281,504.15
Long Term Liabilities	
28000 - Other Long Term Liabilities	
28010 - Asset Retirement Obligation Liability	\$4,401,885.13
28011 - Asset Retirement Obligation Liability - Battery	\$59,779.07
28016 - Operating Lease Liability - Non-Current	\$45,811,240.26
Total - 28000 - Other Long Term Liabilities	\$50,272,904.46
Total Long Term Liabilities	\$50,272,904.46
Equity	
32000 - Member's Equity	
32005 - Member's Contributions	\$541,218,658.69
32010 - Member's Return of Capital	(\$11,808,584.89)
32015 - Member's Distributions	(\$65,588,926.24)
32020 - Income (Loss) Allocation	\$23,096,541.92
Total - 32000 - Member's Equity	\$486,917,689.48
Retained Earnings	(\$15,034,605.76)
Net Income	\$15,034,605.76
Total Equity	\$486,917,689.48
Total Liabilities & Equity	\$542,472,098.09

Townsite Solar, LLC
Income Statement
January 1, 2024 - December 31, 2024

Financial Row	Amount
Ordinary Income/Expense	
Income	
40000 - Revenue	
40005 - PPA Revenue	\$40,922,362.70
40006 - PPA Revenue - RA	\$19,827,461.75
40010 - Merchant Revenue	\$1,933,130.36
40020 - REC Revenue	\$16,030,319.20
40167 - Insurance Proceeds Operations	\$154,115.00
40180 - Revenue - Liquidated damages	\$3,580,987.14
Total - 40000 - Revenue	\$82,448,376.15
Total - Income	\$82,448,376.15
Cost Of Sales	
50000 - Cost Of Operations	
50005 - Maintenance Agreement - Operations & Maintenance	\$796,904.79
50006 - Maintenance Agreement - Bess	\$1,474,227.30
50007 - Variable LTSA fees – BESS	\$436,103.79
50010 - Maintenance Agreement - Additional O&M	\$135,514.61
50017 - Project Letter of Credit Fees	\$822,467.84
50019 - Shared Facilities	\$345,702.80
50020 - Utilities	\$54,727.32
50021 - Road/Ground Maintenance	\$357,871.48
50022 - Regulatory Compliance	\$35,460.00
50023 - Utilities - Telecommunications	\$29,637.43
50030 - Taxes	\$2,285,260.46
50035 - Insurance	\$671,645.63
50045 - Asset Management Fee	\$521,556.15
50050 - Spare Parts	\$294,338.23
50065 - Power Factors	\$59,348.72
50070 - REC Fees	\$401,009.21
50075 - Operational Costs - Other	\$77,534.63
50085 - Energy Management Agreement	\$477,349.96
50200 - Ground Lease	
50201 - Lease Expense - General	\$1,907,795.71
Total - 50200 - Ground Lease	\$1,907,795.71
Total - 50000 - Cost Of Operations	\$11,184,456.06
51000 - Cost of Goods Sold	
51000 - Cost of Goods Sold	\$216,992.09
51003 - Purchases of Electricity for Resale	\$17,189,583.15
51004 - Purchase of RA for Resale	\$17,955,028.82
Total - 51000 - Cost of Goods Sold	\$35,361,604.06
Total - Cost Of Sales	\$46,546,060.12
Gross Profit	\$35,902,316.03
Expense	
60000 - General And Administrative Expenses	
60015 - Consulting	\$111,904.73
60020 - Legal	\$1,743,185.42
60040 - Charitable Contributions	\$5,000.00
60050 - Business License And Permits	\$1,186.75
60081 - Security Monitoring	\$900.00
Total - 60000 - General And Administrative Expenses	\$1,862,176.90
70000 - Depreciation, Amortization And Accretion Expense	
70005 - Depreciation Expense	\$18,667,236.73
70015 - Accretion Expense	\$325,706.64
Total - 70000 - Depreciation, Amortization And Accretion Expense	\$18,992,943.37

Total - Expense	\$20,855,120.27
Net Ordinary Income	\$15,047,195.76
Other Income and Expenses	
Other Expense	
90000 - Other Expense	
92000 - Income Tax Expense (Benefit)	
92010 - Income Tax Expense - State	\$12,590.00
Total - 92000 - Income Tax Expense (Benefit)	\$12,590.00
Total - 90000 - Other Expense	\$12,590.00
Total - Other Expense	\$12,590.00
Net Other Income	(\$12,590.00)
Net Income	\$15,034,605.76

Townsite Solar, LLC

Balance Sheet

As of December 31, 2025

Financial Row	Amount
ASSETS	
Current Assets	
Bank	
10000 - Cash and cash equivalents_Non-Restricted	
10500 - CEI VII	
11855 - CEIVII_Townsite Solar_BofA_Oper_8020	\$5,020,258.03
Total - 10500 - CEI VII	\$5,020,258.03
Total - 10000 - Cash and cash equivalents_Non-Restricted	\$5,020,258.03
Total Bank	\$5,020,258.03
Accounts Receivable	
12000 - Accounts Receivable	
12005 - PPA Receivables	\$3,470,832.80
12010 - RECs Receivables	\$3,308,925.00
12011 - Accounts Receivable - General	\$4,697,548.41
Total - 12000 - Accounts Receivable	\$11,477,306.21
Total Accounts Receivable	\$11,477,306.21
Other Current Asset	
13000 - Other Current Assets	
13300 - Prepaid Expenses	
13305 - Prepaid Expenses - General	\$3,073,098.78
13310 - Prepaid Insurance	\$92,111.88
13315 - Prepaid Taxes	\$664,718.88
Total - 13300 - Prepaid Expenses	\$3,829,929.54
Total - 13000 - Other Current Assets	\$3,829,929.54
Total Other Current Asset	\$3,829,929.54
Total Current Assets	\$20,327,493.78
Fixed Assets	
15000 - Fixed Assets	
15200 - Solar Energy Systems	
15205 - Solar Energy Systems - General	\$368,433,350.02
15215 - Project Amortizable Costs	\$95,935.47
Total - 15200 - Solar Energy Systems	\$368,529,285.49
15300 - Fixed Assets - General	\$185,000.00
15305 - Battery Energy Systems	\$161,010,865.74
15400 - Fixed Assets - Equipment	\$115,100.34
17060 - Fixed Assets - Accumulated Depreciation	
17060 - Fixed Assets - Accumulated Depreciation	(\$42,383,538.72)
17061 - Fixed Assets - Accumulated Depreciation - Battery	(\$32,345,294.08)
Total - 17060 - Fixed Assets - Accumulated Depreciation	(\$74,728,832.80)
Total - 15000 - Fixed Assets	\$455,111,418.77
16000 - Inventory	
16001 - Modules	\$67,074.06
16002 - Inverters	\$225,916.66
16003 - Transformers	\$155,087.88
16004 - Other	\$23,554.76
Total - 16000 - Inventory	\$471,633.36
Total Fixed Assets	\$455,583,052.13
Other Assets	
17100 - Asset Retirement Obligation Asset	
17105 - Asset Retirement Obligation Asset - General	\$3,476,783.49
17106 - Asset Retirement Obligation Asset - Battery	\$47,619.77
17110 - Asset Retirement Obligation Asset - Accumulated Amortization	(\$400,288.39)
17113 - Asset Retirement Obligation Asset - Accum. Amort. - Battery	(\$9,566.03)
Total - 17100 - Asset Retirement Obligation Asset	\$3,114,548.84
18300 - Other Non-Current Assets	
18316 - Operating Lease ROU Asset	\$48,930,691.15
Total - 18300 - Other Non-Current Assets	\$48,930,691.15

Total Other Assets	\$52,045,239.99
Total ASSETS	\$527,955,785.90
Liabilities & Equity	
Current Liabilities	
Accounts Payable	
20000 - Accounts Payable	\$2,032,898.22
Total Accounts Payable	\$2,032,898.22
Other Current Liability	
20100 - Accrued Expense	\$996,529.38
21000 - Other Current Liabilities	
21001 - Clearing Account	\$2,456,915.00
21305 - Operating Lease Liability - Current	\$675,821.76
Total - 21000 - Other Current Liabilities	\$3,132,736.76
Total Other Current Liability	\$4,129,266.14
Total Current Liabilities	\$6,162,164.36
Long Term Liabilities	
28000 - Other Long Term Liabilities	
28010 - Asset Retirement Obligation Liability	\$4,748,533.57
28011 - Asset Retirement Obligation Liability - Battery	\$64,486.67
28016 - Operating Lease Liability - Non-Current	\$45,135,418.52
Total - 28000 - Other Long Term Liabilities	\$49,948,438.76
Total Long Term Liabilities	\$49,948,438.76
Equity	
32000 - Member's Equity	
32005 - Member's Contributions	\$541,218,658.69
32010 - Member's Return of Capital	(\$11,808,584.89)
32015 - Member's Distributions	(\$110,281,526.70)
32020 - Income (Loss) Allocation	\$52,716,635.68
Total - 32000 - Member's Equity	\$471,845,182.78
Retained Earnings	(\$29,620,093.76)
Net Income	\$29,620,093.76
Total Equity	\$471,845,182.78
Total Liabilities & Equity	\$527,955,785.90

Townsite Solar, LLC
Income Statement
January 1, 2025 - December 31, 2025

Financial Row	Amount
Ordinary Income/Expense	
Income	
40000 - Revenue	
40005 - PPA Revenue	\$41,001,550.68
40006 - PPA Revenue - RA	\$4,131,720.00
40010 - Merchant Revenue	\$7,003,840.99
40020 - REC Revenue	\$20,938,024.50
40022 - Ancillary Service Revenue	\$2,045.04
40180 - Revenue - Liquidated damages	\$9,688,173.41
Total - 40000 - Revenue	\$82,765,354.62
Total - Income	\$82,765,354.62
Cost Of Sales	
50000 - Cost Of Operations	
50005 - Maintenance Agreement - Operations & Maintenance	\$816,754.55
50006 - Maintenance Agreement - Bess	\$1,477,580.87
50007 - Variable LTSA fees – BESS	(\$44,636.33)
50010 - Maintenance Agreement - Additional O&M	\$119,086.98
50017 - Project Letter of Credit Fees	\$865,294.42
50019 - Shared Facilities	\$234,732.68
50020 - Utilities	\$27,774.62
50021 - Road/Ground Maintenance	\$1,068,000.00
50022 - Regulatory Compliance	\$113,521.85
50023 - Utilities - Telecommunications	\$32,502.42
50030 - Taxes	\$1,368,523.43
50035 - Insurance	\$574,157.45
50045 - Asset Management Fee	\$587,266.06
50050 - Spare Parts	\$54,050.89
50055 - Vegetation Management	\$157,758.60
50065 - Power Factors	\$53,535.54
50070 - REC Fees	\$380,313.27
50075 - Operational Costs - Other	\$377,867.48
50085 - Energy Management Agreement	\$691,334.79
50200 - Ground Lease	
50201 - Lease Expense - General	\$1,907,795.81
Total - 50200 - Ground Lease	\$1,907,795.81
Total - 50000 - Cost Of Operations	\$10,863,215.38
51000 - Cost of Goods Sold	
51000 - Cost of Goods Sold	\$1,112,273.77
51003 - Purchases of Electricity for Resale	\$17,182,335.79
51004 - Purchase of RA for Resale	\$4,072,202.89
Total - 51000 - Cost of Goods Sold	\$22,366,812.45
Total - Cost Of Sales	\$33,230,027.83
Gross Profit	\$49,535,326.79
Expense	
60000 - General And Administrative Expenses	
60015 - Consulting	\$9,000.00
60020 - Legal	\$709,420.90
60050 - Business License And Permits	\$1,186.75
60083 - Software - Other	\$2,868.05
61015 - Invoice Late Fees	\$910.02
Total - 60000 - General And Administrative Expenses	\$723,385.72
70000 - Depreciation, Amortization And Accretion Expense	
70005 - Depreciation Expense	\$18,684,639.36
70015 - Accretion Expense	\$351,356.04
Total - 70000 - Depreciation, Amortization And Accretion Expense	\$19,035,995.40
Total - Expense	\$19,759,381.12
Net Ordinary Income	\$29,775,945.67

Other Income and Expenses**Other Expense****90000 - Other Expense****92000 - Income Tax Expense (Benefit)**

92010 - Income Tax Expense - State

\$12,590.00

92025 - Tax Penalties

\$143,261.91

Total - 92000 - Income Tax Expense (Benefit)**\$155,851.91****Total - 90000 - Other Expense****\$155,851.91****Total - Other Expense****\$155,851.91****Net Other Income****(\$155,851.91)****Net Income****\$29,620,093.76**

Townsite Solar, LLC
Income Statements
January 1, 2022 - December 31, 2025 (In Thousands 000s)

Financial Row	2022	2023	2024	2025
Ordinary Income/Expense				
Income				
40000 - Revenue				
40005 - PPA Revenue	\$39,279.4	\$40,148.3	\$40,922.4	\$41,001.6
40006 - PPA Revenue - RA	\$2,149.7	\$3,666.7	\$19,827.5	\$4,131.7
40010 - Merchant Revenue	\$30,110.3	\$2,643.0	\$1,933.1	\$7,003.8
40020 - REC Revenue	\$3,320.2	\$5,330.7	\$16,030.3	\$20,938.0
40022 - Ancillary Service Revenue	\$19.5			\$2.0
40167 - Insurance Proceeds Operations			\$154.1	
40180 - Revenue - Liquidated damages		\$80.1	\$3,581.0	\$9,688.2
Total - 40000 - Revenue	\$74,879.1	\$51,868.8	\$82,448.4	\$82,765.4
Total - Income	\$74,879.1	\$51,868.8	\$82,448.4	\$82,765.4
Cost Of Sales				
50000 - Cost Of Operations				
50005 - Maintenance Agreement - Operations & Maintenance (In Scope)	\$769.7	\$788.9	\$796.9	\$816.8
50006 - Maintenance Agreement - Bess (LTSA)	\$1,818.6	\$1,333.7	\$1,474.2	\$1,477.6
50007 - Variable LTSA fees – BESS			\$436.1	(\$44.6)
50010 - Maintenance Agreement - Additional O&M (Out of Scope)	\$132.6	\$63.9	\$135.5	\$119.1
50015 - Maintenance Agreement - BOP	\$31.6	\$14.4		
50017 - Project Letter of Credit Fees	\$367.2	\$824.6	\$822.5	\$865.3
50019 - Shared Facilities	\$420.8	\$386.3	\$345.7	\$234.7
50020 - Utilities	\$0.2	\$0.3	\$54.7	\$27.8
50021 - Road/Ground Maintenance		\$22.0	\$357.9	\$1,068.0
50022 - Regulatory Compliance	\$58.3	\$73.6	\$35.5	\$113.5
50023 - Utilities - Telecommunications	\$15.8	\$70.9	\$29.6	\$32.5
50030 - Taxes	\$2,001.5	\$1,995.3	\$2,285.3	\$1,368.5
50035 - Insurance	\$531.3	\$643.2	\$671.6	\$574.2
50045 - Asset Management Fee	\$652.1	\$402.6	\$521.6	\$587.3
50050 - Spare Parts		\$168.4	\$294.3	\$54.1
50055 - Vegetation Management				\$157.8
50065 - Power Factors	\$18.5	\$59.3	\$59.3	\$53.5
50070 - REC Fees	\$11.2	\$11.9	\$401.0	\$380.3
50075 - Operational Costs - Other	\$49.8	\$118.2	\$77.5	\$377.9
50085 - Energy Management Agreement	\$395.2	\$459.8	\$477.3	\$691.3
50200 - Ground Lease				
50201 - Lease Expense - General	\$1,907.8	\$1,907.8	\$1,907.8	\$1,907.8
Total - 50200 - Ground Lease	\$1,907.8	\$1,907.8	\$1,907.8	\$1,907.8
Total - 50000 - Cost Of Operations	\$9,182.1	\$9,345.0	\$11,184.5	\$10,863.2
51000 - Cost of Goods Sold				
51000 - Cost of Goods Sold			\$217.0	\$1,112.3
51003 - Purchases of Electricity for Resale	\$47,565.2	\$28,610.7	\$17,189.6	\$17,182.3
51004 - Purchase of RA for Resale	\$1,563.8		\$17,955.0	\$4,072.2
Total - 51000 - Cost of Goods Sold	\$49,129.0	\$28,610.7	\$35,361.6	\$22,366.8
Total - Cost Of Sales	\$58,311.1	\$37,955.7	\$46,546.1	\$33,230.0
Gross Profit	\$16,568.0	\$13,913.1	\$35,902.3	\$49,535.3
Expense				
60000 - General And Administrative Expenses				
60010 - Audit	\$107.5			
60015 - Consulting	\$64.7	\$18.8	\$111.9	\$9.0
60020 - Legal	\$415.7	\$261.5	\$1,743.2	\$709.4
60025 - Tax Compliance	\$6.4			
60030 - Tax Consulting	\$66.4			
60035 - Bank Service Charges & Fees	\$1.5			
60040 - Charitable Contributions	\$5.0		\$5.0	
60050 - Business License And Permits	\$2.0	\$1.4	\$1.2	\$1.2
60081 - Security Monitoring	\$9.8	\$9.2	\$0.9	
60083 - Software - Other				\$2.9
61015 - Invoice Late Fees				\$0.9
Total - 60000 - General And Administrative Expenses	\$679.0	\$290.8	\$1,862.2	\$723.4
70000 - Depreciation, Amortization And Accretion Expense				
70005 - Depreciation Expense	\$18,665.9	\$18,664.5	\$18,667.2	\$18,684.6
70015 - Accretion Expense	\$279.9	\$301.9	\$325.7	\$351.4
Total - 70000 - Depreciation, Amortization And Accretion Expense	\$18,945.8	\$18,966.4	\$18,992.9	\$19,036.0
Total - Expense	\$19,624.8	\$19,257.2	\$20,855.1	\$19,759.4
Net Ordinary Income	-\$3,056.8	-\$5,344.2	\$15,047.2	\$29,775.9

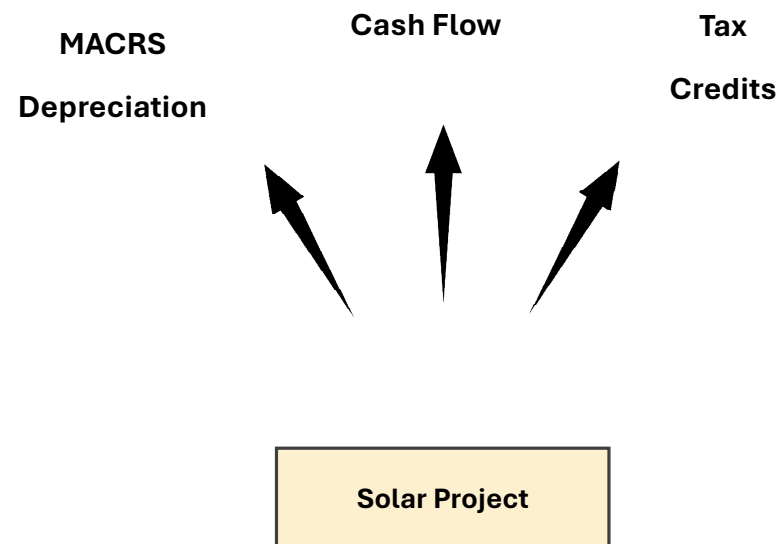
Other Income and Expenses

Other Income				
80000 - Other Income				
80001 - Other Income - General		\$10.0		
80005 - Interest Income		\$32.2		
80030 - Liquidated damages	-\$69.6			
Total - 80000 - Other Income	-\$69.6	\$42.2		
Total - Other Income	-\$69.6	\$42.2		
Other Expense				
90000 - Other Expense				
90040 - Liquidated damages		\$45.1		
91000 - Interest Expense	\$1.2			
92000 - Income Tax Expense (Benefit)				
92010 - Income Tax Expense - State	\$12.6	\$11.8	\$12.6	\$12.6
92025 - Tax Penalties	\$3.5			\$143.3
Total - 92000 - Income Tax Expense (Benefit)	\$16.0	\$11.8	\$12.6	\$155.9
Total - 90000 - Other Expense	\$17.3	\$56.8	\$12.6	\$155.9
Total - Other Expense	\$17.3	\$56.8	\$12.6	\$155.9
Net Other Income	-\$86.9	-\$14.6	-\$12.6	(\$155.9)
Net Income	-\$3,143.7	-\$5,358.8	\$15,034.6	\$29,620.1

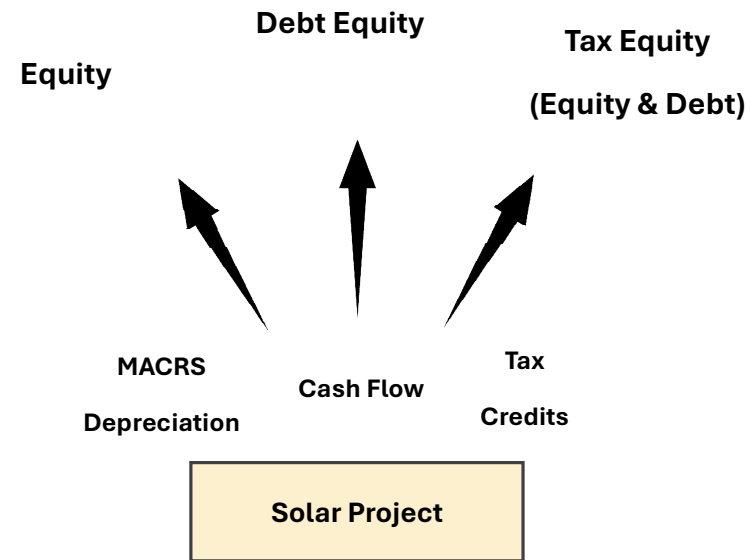
Sources of Value: Pre-Tax and After-Tax



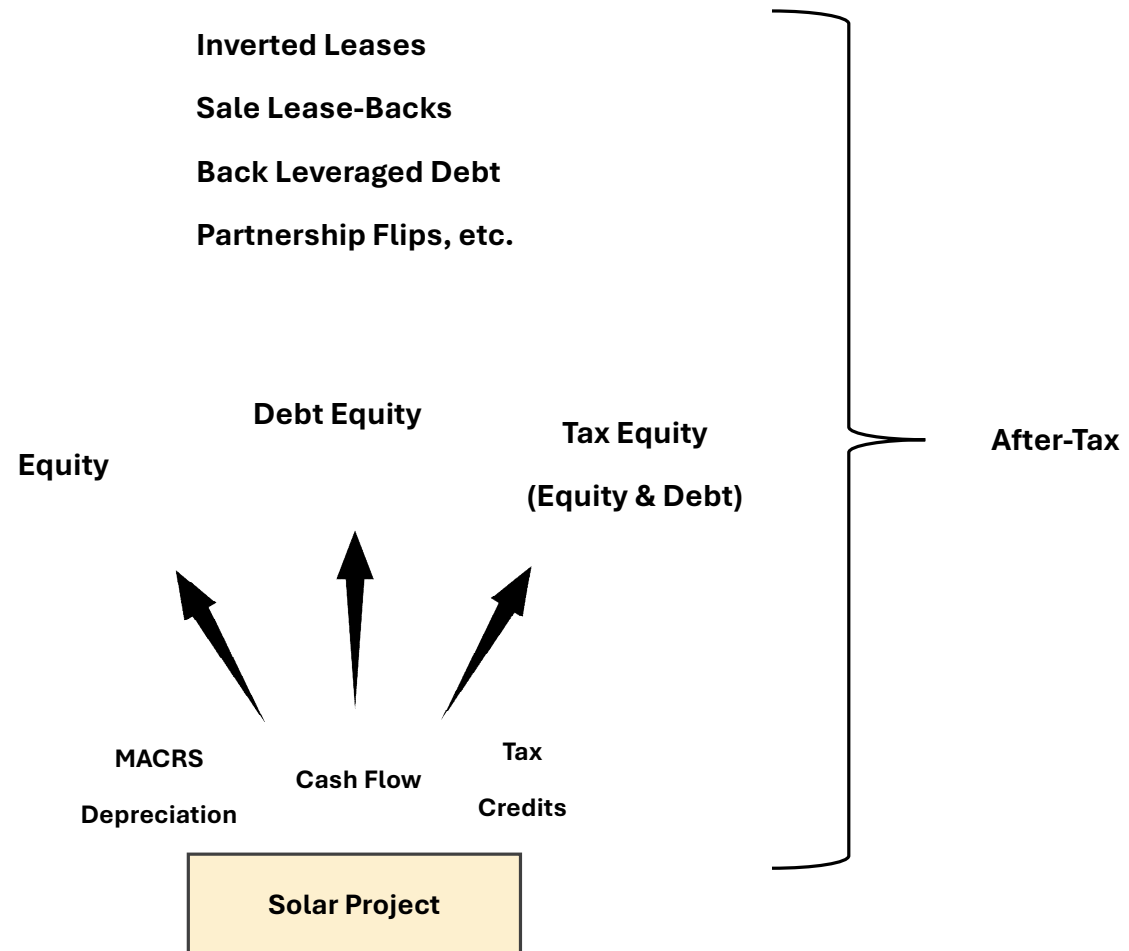
Sources of Value: Pre-Tax and After-Tax



Sources of Value: Pre-Tax and After-Tax



Sources of Value: Pre-Tax and After-Tax



Townsite Solar, LLC
Income Statements - Normalized
January 1, 2022 - December 31, 2025 (In Thousands 000s)

Financial Row	2022 Normalized	2023 Normalized	2024 Normalized	2025 Normalized
Ordinary Income/Expense				
Income				
40000 - Revenue				
40005 - PPA Revenue	\$39,279.4	\$40,148.3	\$40,922.4	\$41,001.6
40006 - PPA Revenue - RA	\$2,149.7	\$3,666.7	\$19,827.5	\$4,131.7
40010 - Merchant Revenue	\$30,110.3	\$2,643.0	\$1,933.1	\$7,003.8
40020 - REC Revenue	\$3,320.2	\$5,330.7	\$16,030.3	\$20,938.0
40022 - Ancillary Service Revenue	\$19.5			\$2.0
40167 - Insurance Proceeds Operations				
40180 - Revenue - Liquidated damages		\$0.0	\$0.0	\$0.0
Total - 40000 - Revenue	\$74,879.1	\$51,788.7	\$78,867.4	\$73,077.2
Total - Income	\$74,879.1	\$51,788.7	\$78,867.4	\$73,077.2
Cost Of Sales				
50000 - Cost Of Operations				
50005 - Maintenance Agreement - Operations & Maintenance (In Scope)	\$769.7	\$788.9	\$796.9	\$816.8
50006 - Maintenance Agreement - Bess (LTSA)	\$1,818.6	\$1,333.7	\$1,474.2	\$1,477.6
50007 - Variable LTSA fees – BESS			\$436.1	-\$44.6
50010 - Maintenance Agreement - Additional O&M (Out of Scope)	\$132.6	\$63.9	\$135.5	\$119.1
50015 - Maintenance Agreement - BOP	\$31.6	\$14.4		
50017 - Project Letter of Credit Fees	\$367.2	\$824.6	\$822.5	\$865.3
50019 - Shared Facilities	\$0.0	\$0.0	\$0.0	\$0.0
50020 - Utilities	\$0.2	\$0.3	\$54.7	\$27.8
50021 - Road/Ground Maintenance		\$22.0	\$357.9	\$1,068.0
50022 - Regulatory Compliance	\$58.3	\$73.6	\$35.5	\$113.5
50023 - Utilities - Telecommunications	\$15.8	\$70.9	\$29.6	\$32.5
50030 - Taxes	\$0.0	\$0.0	\$0.0	\$0.0
50035 - Insurance	\$531.3	\$643.2	\$671.6	\$574.2
50045 - Asset Management Fee	\$652.1	\$402.6	\$521.6	\$587.3
50050 - Spare Parts		\$168.4	\$294.3	\$54.1
50055 - Vegetation Management				\$157.8
50065 - Power Factors	\$18.5	\$59.3	\$59.3	\$53.5
50070 - REC Fees	\$11.2	\$11.9	\$401.0	\$380.3
50075 - Operational Costs - Other	\$49.8	\$118.2	\$77.5	\$377.9
50085 - Energy Management Agreement	\$395.2	\$459.8	\$477.3	\$691.3
50200 - Ground Lease				
50201 - Lease Expense - General	\$1,907.8	\$1,907.8	\$1,907.8	\$1,907.8
Total - 50200 - Ground Lease	\$1,907.8	\$1,907.8	\$1,907.8	\$1,907.8
Total - 50000 - Cost Of Operations	\$7,180.6	\$7,349.7	\$8,899.2	\$9,260.0
51000 - Cost of Goods Sold				
51000 - Cost of Goods Sold			\$217.0	\$1,112.3
51003 - Purchases of Electricity for Resale	\$47,565.2	\$28,610.7	\$17,189.6	\$17,182.3
51004 - Purchase of RA for Resale	\$1,563.8		\$17,955.0	\$4,072.2
Total - 51000 - Cost of Goods Sold	\$49,129.0	\$28,610.7	\$35,361.6	\$22,366.8
Total - Cost Of Sales	\$56,309.6	\$35,960.5	\$44,260.8	\$31,626.8
Gross Profit	\$18,569.5	\$15,828.3	\$34,606.6	\$41,450.4
Expense				
60000 - General And Administrative Expenses				
60010 - Audit	\$107.5			
60015 - Consulting	\$64.7	\$18.8	\$111.9	\$9.0
60020 - Legal	\$415.7	\$261.5	\$1,743.2	\$709.4
60025 - Tax Compliance	\$6.4			
60030 - Tax Consulting	\$66.4			
60035 - Bank Service Charges & Fees	\$1.5			
60040 - Charitable Contributions	\$5.0		\$5.0	
60050 - Business License And Permits	\$2.0	\$1.4	\$1.2	\$1.2
60081 - Security Monitoring	\$9.8	\$9.2	\$0.9	
60083 - Software - Other				\$2.9
61015 - Invoice Late Fees				\$0.9
Total - 60000 - General And Administrative Expenses	\$679.0	\$290.8	\$1,862.2	\$723.4
EBITDA	\$17,890.5	\$15,537.4	\$32,744.4	\$40,727.0
70000 - Depreciation, Amortization And Accretion Expense				
70005 - Depreciation Expense	\$18,665.9	\$18,664.5	\$18,667.2	\$18,684.6
70015 - Accretion Expense	\$279.9	\$301.9	\$325.7	\$351.4
Total - 70000 - Depreciation, Amortization And Accretion Expense	\$18,945.8	\$18,966.4	\$18,992.9	\$19,036.0
Total - Expense	\$19,624.8	\$19,257.2	\$20,855.1	\$19,759.4

Net Ordinary Income	- \$1,055.3	- \$3,429.0	\$13,751.5	\$21,691.0
EBITDA				
Other Income and Expenses				
Other Income				
80000 - Other Income				
80001 - Other Income - General		\$10.0		
80005 - Interest Income		\$32.2		
80030 - Liquidated damages	-\$69.6			
Total - 80000 - Other Income	-\$69.6	\$42.2		
Total - Other Income	-\$69.6	\$42.2		
Other Expense				
90000 - Other Expense				
90040 - Liquidated damages		\$45.1		
91000 - Interest Expense	\$1.2			
92000 - Income Tax Expense (Benefit)				
92010 - Income Tax Expense - State	\$12.6	\$11.8	\$12.6	\$12.6
92025 - Tax Penalties	\$3.5			\$143.3
Total - 92000 - Income Tax Expense (Benefit)	\$16.0	\$11.8	\$12.6	\$155.9
Total - 90000 - Other Expense	\$17.3	\$56.8	\$12.6	\$155.9
Total - Other Expense	\$17.3	\$56.8	\$12.6	\$155.9
Net Other Income	-\$86.9	-\$14.6	-\$12.6	-\$155.9
Net Income	-\$3,143.7	-\$5,358.8	\$15,034.6	\$29,620.1



Resource Adequacy Primer

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Acronyms

BA	Balancing Authority
CAISO	California Independent System Operator
CCA	Community Choice Aggregator
CEC	California Energy Commission
CMUA	California Municipal Utilities Association
COD	Commercial Operations Date
CPUC	California Public Utilities Commission
DER	Distributed Energy Resource
EDAM	Extended Day-Ahead Market
EFC	Effective Flexible Capacity
ELCC	Effective Load Carrying Capacity
IOU	Investor-Owned Utility
IR	Interconnection Request
KW	Kilowatt
LRA	Local Regulatory Authority
LSE	Load-Serving Entity
MW	Megawatt
NQC	Net Qualifying Capacity
POU	Publicly Owned Utility
PRM	Planning Reserve Margin
QC	Qualifying Capacity
RA	Resource Adequacy
RPS	Renewable Portfolio Standard
SMUD	Sacramento Municipal Utility District
SOD	Slice of Day Framework
WEIM	Western Energy Imbalance Market

Executive Summary

California's electricity system is undergoing a transformative shift as it balances the urgent need for decarbonization with the fundamental requirement of grid reliability. Resource Adequacy (RA), the framework that ensures enough capacity is available to meet electricity demand, especially during peak periods, is both a critical planning tool for utilities and a key revenue stream for new electricity generation projects. This primer aims to educate stakeholders—including load-serving entities, state policymakers, and project developers—on the evolving RA landscape, broader energy market conditions, and the implications for solar canal projects.

The Role of Resource Adequacy in Grid Reliability and Project Finance

RA functions as the grid's "insurance policy," ensuring that sufficient generation resources are available to meet electricity demand. Each month, load-serving entities (LSEs) must meet regulatory requirements by securing bilateral contracts with independent power producers and building generation capacity, like solar+battery projects. Contracted and self-generated capacity must be equivalent to LSEs' forecasted peak demand, plus a planning reserve margin. RA contracts can provide important financial support for renewable energy projects, including solar canals.

Emerging Challenges in RA Procurement

California LSEs face multiple headwinds in the procurement of resource adequacy:

- Increasing electrification of buildings and transportation, combined with demand from data centers, drives up load and RA requirements.
- The retirement of fossil fuel plants reduces available RA capacity.
- The intermittency of clean energy resources can lead to reliability gaps.
- Interconnection delays can prevent new projects from coming online quickly.

These trends are fueling a highly competitive and expensive RA market, with prices rising sharply, especially during the summer months.

Regulatory Reforms and the Shift to "Slice of Day"

To adapt to evolving grid dynamics, the California Public Utilities Commission (CPUC) started implementing the Slice of Day (SOD) methodology in 2025. SOD requires LSEs to meet hourly capacity needs on the grid's highest demand day of each month.¹ As a result, solar-only resources, which cannot provide energy during nighttime, are valued less for

¹ "2025 Resource Adequacy and Slice of Day Guide" (California Public Utilities Commission, September 25, 2024), <https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/resource-adequacy-homepage/resource-adequacy-compliance-materials/guides-and-resources/2025-ra-slice-of-day-filing-guide.pdf>.

RA compared to dispatchable resources like solar-plus-storage that can discharge during evening peak demand periods. This regulation is reshaping RA market dynamics and favors dispatchable generation technologies.

Impacts on Publicly Owned Utilities (POUs)

RA planning for POU is less centralized and varies by jurisdiction. While POU within the CAISO balancing authority must follow certain reporting obligations to ensure a functional grid, their local regulatory authorities (e.g. city council) determine specific RA requirements. Recent legislation, such as **AB 209 and AB 1373**, has pushed POU toward more standardized RA obligations and introduced penalties for non-compliance. This requires smaller load-serving entities (municipal utilities, irrigation districts) to navigate tight RA markets and rising costs while balancing affordability and clean energy goals.

Resource Adequacy Price Trends

RA prices have more than doubled over the past decade, with even sharper increases for Community Choice Aggregators (CCAs) and POU. In 2022, the CPUC reported that average system RA prices reached \$7,680/MW-month.² However, the CPUC noted 82 instances of LSEs paying over \$100/KW-month, or \$100,000/MW-month for RA between 2023 and 2024.³ This sharp escalation reflects a constrained capacity market and limited availability of dispatchable resources, particularly during peak periods.

Opportunities and Innovation: Solar Canals and Storage

As LSEs seek clean, dispatchable resources to satisfy reliability standards, solar canal projects present a promising solution. These projects, paired with storage, can provide system-wide and local resource adequacy capacity. A five-megawatt utility-scale solar-only system could have an average annual RA value of ~\$70,000.⁴ However, their success hinges on navigating **complex RA eligibility rules, interconnection timelines, and market volatility.**

Bottom Line

California's RA framework is undergoing rapid change to keep pace with its clean energy goals and growing electricity needs. While these shifts create uncertainty, they also present strategic opportunities for innovative projects like solar canals. Understanding

² Sasha Cole et al., "2022 Resource Adequacy Report" (California Public Utilities Commission, May 2024), https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/resource-adequacy-homepage/2022-ra-report_05022024.pdf.

³ Haley Weinstein, "Creating a Pathway for Front-of-Meter Distributed Resource Adequacy to Fix California's Stunted Capacity Market," Clean Coalition, March 29, 2025, <https://clean-coalition.org/news/creating-a-pathway-for-front-of-meter-distributed-resource-adequacy-to-fix-californias-stunted-capacity-market/creat>

⁴ Sasha Cole et al., "2022 Resource Adequacy Report."

and adapting to the evolving RA landscape will be essential for developers, utilities, and policymakers alike.

DRAFT

1. Introduction: What is Resource Adequacy?

Resource Adequacy (RA) is a reliability planning framework that refers to the electricity system's ability to reliably meet energy demand, particularly during times of peak load. The California Independent System Operator (CAISO) describes RA as an "insurance policy" for the grid, ensuring that sufficient capacity is available to meet forecasted energy demand.⁵ RA also supports the financial stability of energy projects, including solar canals.

Under California's RA framework, load-serving entities (LSEs) must contract, or self-supply, enough generation capacity to serve their projected load plus an extra "reserve" margin (since actual electricity demand may be higher than forecasted). Generators providing RA make bilateral contracts with LSEs to have a certain amount of energy available (capacity) at specified times and to "bid" (make an offer to sell electricity at a certain price) into the electricity market at those times. The price that a generator is paid to provide RA capacity, or be available to deliver electricity, is referred to as RA value or capacity value. RA is a key revenue stream for project financing beyond the sale of energy, enabling project developers and owners to cover capital and operating costs. Each LSE in California must procure RA capacity to meet regulatory requirements or reliability standards issued by the grid operator (CAISO in most cases), and they can face penalties if they don't procure enough. LSEs require a balanced portfolio of resources to maintain a reliable grid.

However, it has become increasingly challenging for LSEs to meet their RA requirements at affordable prices. Several evolving conditions have made RA procurement in California increasingly constrained and expensive.

- 1) **The demand for clean energy resources is high.** Each load-serving entity faces increasing Renewable Portfolio Standards (RPS) due to SB 100, which requires load-serving entities to meet 100% renewable energy sales by 2045. This means that, today, LSEs are mainly seeking to add clean energy resources to their portfolio.
- 2) **Renewables alone are not enough.** Rooftop solar and other forms of distributed clean energy have propelled solar production in California to reach record-high levels. However, without sufficient energy storage like lithium-ion batteries, intermittent clean energy resources like solar contribute little to grid reliability during peak periods. In fact, solar is being curtailed (shut off from entering the grid) during daytime hours when production is higher than the grid can use or store.⁶ When solar is combined with storage, the systems can meet power demand during evening peak hours after the solar production decreases, with the batteries storing clean energy fully discharged in the evening (typically 6-9pm). Consequently, LSEs

⁵ CAISO, "Resource Adequacy," Computer-based training, March 28, 2024, <https://www.caiso.com/content/cbt/resource-adequacy/story.html>.

⁶ "Managing the Evolving Grid | California ISO," accessed April 11, 2025, <https://www.caiso.com/about/our-business/managing-the-evolving-grid>.

are seeking clean and dispatchable (easily turned on and off) resources, like combined solar and storage projects, to ensure grid reliability during peak hours. This will be increasingly important as fossil generation is gradually phased out in the 2030s and 2040s. Today, the grid still relies on gas-fired generation to meet demand at night, early morning, and during some peak demand hours.

- 3) **Load growth increases RA requirements.** Continued electrification of transportation and buildings, plus the proliferation of power-hungry data centers, are contributing to electricity demand growth in California. As electricity needs rise, RA requirements increase accordingly. As a result, LSEs are faced with procuring more energy in the short term to meet their RA requirements. This has increased competition for RA contracts, driving up prices, particularly during the summer when demand is highest.
- 4) **Plant retirements are reducing available RA capacity.** As California moves to a cleaner grid and operating costs rise, gas plants are being retired in the state, and imported coal-fired power is being phased out. Retiring these polluting facilities benefits the health of local communities and reduces greenhouse gas emissions. However, these fossil resources provide “baseload” capacity, contributing to grid reliability at all hours, which LSEs must replace with RA in the form of zero-emission renewables and storage.
- 5) **Interconnection delays slow new RA capacity from coming online.** As of December 2023, CAISO had 995 energy projects in the interconnection queue, totaling 523.3 GW of capacity. The average project takes 5 years to complete from the interconnection request (IR) to the commercial operations date (COD). An estimated 70% of projects withdraw during the interconnection process.^{7 8}

This paper examines these evolving conditions and the implications for solar canal developers and other stakeholders.

Box 1. Considerations for Solar Canal Projects

Load-serving entities typically look at utility-scale projects for RA capacity because current CAISO market rules make it challenging for distributed energy resources (DERs) to be eligible.⁹ Due to solar canal projects’ unique characteristics as linear generation resources, they have the flexibility to interconnect and provide electricity to different load-serving entities and balancing

⁷ Joseph Rand et al., “Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2023,” n.d.

⁸ CAISO reforms, approved by FERC in September 2024, seek to reduce these timelines by prioritizing projects based on commercial interest, project viability, and system need. “FERC Approves CAISO Interconnection Reform Plan | Utility Dive,” accessed April 14, 2025, <https://www.utilitydive.com/news/ferc-california-caiso-interconnection-reform-plan/728633/>.

⁹ Justin Gundlach and Romany Webb, “Distributed Energy Resource Participation in Wholesale Markets: Lessons from the California ISO” 39 (2018), <https://climate.law.columbia.edu/sites/default/files/content/docs/others/Gundlach-and-Webb-2018-05-DE-R-in-Wholesale-Markets.pdf>.

authorities. This can be an advantage for solar canal projects compared to location-fixed generation projects.

While many energy projects use RA eligibility to secure project financing contracts, projects can still proceed without RA eligibility. For instance, developers can monetize tax credits and energy generation through behind-the-meter energy contracts or energy-only agreements to finance projects. Still, RA can be an important portion of project financing.

2. Evolving Resource Adequacy Regulations for Investor-Owned Utilities and Community Choice Aggregators

Resource Adequacy (RA) requirements in California were established in the aftermath of the state's energy crisis in the early 2000s.¹⁰ The crisis underscored the need for a reliable and predictable supply of electricity and resulted in California ending the deregulation of energy markets. Under the new reliability framework, utilities were required to procure necessary generation resources to meet demand. Over time, these requirements have evolved to account for the growing adoption of variable renewable resources, as well as emerging challenges such as the risk of rolling blackouts from climate-driven extreme weather events and load growth from electrification and data centers.

In response to these challenges, particularly the rolling blackouts experienced in 2021, the California Public Utilities Commission (CPUC) launched a multiyear reform process to address the evolving needs of the state's energy system. This process culminated in the development of the **Slice of Day** (SOD) framework, which represents a significant shift in how resource adequacy is planned and accounted for in California. Finalized in 2023, SOD is being implemented and enforced for the first time in 2025 after being piloted in 2024. The goal of the framework is to ensure that LSEs under the CPUC's jurisdiction (e.g. investor-owned utilities, community choice aggregators) procure enough capacity to meet energy demand for every hour on the system's worst day each month (i.e. day with the highest forecast peak load) plus a planning reserve margin (PRM) of 17%.¹¹

Under this new framework, solar-only (and other intermittent) resources are expected to have little RA value due to the CPUC shifting from using "effective load-carrying capacity" to an "exceedance" methodology to calculate a resource's qualifying capacity. **Qualifying capacity** is the amount of a resource's capacity that is eligible to count towards meeting RA requirements every month.¹² Box 2 describes these two methodologies in more detail.

¹⁰ "Fixing California's Resource Adequacy Woes | Utility Dive," accessed October 23, 2024, <https://www.utilitydive.com/news/california-resource-adequacy-puc-caiso-Kahrl/631720/>.

¹¹ "2025 Resource Adequacy and Slice of Day Guide."

¹² "2025 Resource Adequacy and Slice of Day Guide."

Compared to solar-only resources, dispatchable resources like solar+storage are valued higher due to their contribution to grid reliability at net peak hours. For example, in the SOD framework, the contribution of energy storage resources to the RA market is no longer capped. Further, LSEs can count multiple battery cycles toward their RA requirements.¹³ However, under the new framework, charging must be considered when determining a storage asset's RA value. Thus, LSEs using storage resources must have sufficient hourly capacity to meet batteries' charging needs and efficiency losses. These factors favor market conditions for solar and storage resources.¹⁴

Looking ahead, the CAISO's forthcoming **Extended Day-Ahead Market (EDAM)** will also impact the evolving RA landscape. Scheduled for implementation in 2026, EDAM will build on the success of CAISO's Western Energy Imbalance Market (WEIM) by improving reliability, reducing costs, and increasing the environmental benefits of the interconnected grid.¹⁵ The EDAM is expected to stabilize RA prices as more suppliers enter the market.

Box 2: Qualifying Capacity Methodologies

Local regulatory authorities (LRAs), such as the CPUC, determine rules for calculating qualifying capacity (QC), or how different energy technologies (and non-energy technologies like demand response) are eligible to provide resource adequacy capacity. LRAs must submit QC values for different resources to the CAISO, which adjusts the QC to determine a monthly Net Qualifying Capacity (NQC) value for each resource after testing its deliverability, or ability to deliver output to the system load at peak demand. The NQC value is crucial because resources must either be fully or partially deliverable to count towards RA requirements.¹⁶ The assigned NQC ultimately determines how the resource is counted toward an LSE's RA requirements.

Effective load-carrying capacity (ELCC) is a common resource-counting methodology representing a resource's ability to generate energy when the grid is likely to face electricity shortfalls. For example, a 10 MW wind plant with an ELCC of 20% should contribute 2 MW towards grid reliability. However, ELCC is dependent on the amount of

¹³ "SLICE IT UP: CALIFORNIA's Slice-of-Day RA Approach and Impact on Energy Storage," accessed December 20, 2024, <https://www.tyba.ai//blog/slice-it-up-caisos-slice-of-day-ra-approach-and-impact-on-energy-storage>.

¹⁴ "2025 Resource Adequacy and Slice of Day Guide."

¹⁵ "Extended Day-Ahead Market Fact Sheet" (California ISO, November 2024), <https://www.caiso.com/documents/extended-day-ahead-market-edam-fact-sheet.pdf>.

¹⁶ Resource Adequacy Modeling and Program Design Working Group, "CAISO RA Processes and CPUC's Slice of Day" (California ISO, January 2024), <https://stakeholdercenter.caiso.com/InitiativeDocuments/White-Paper-ResourceAdequacyProcesses-CPU C-Slice-of-Day-Jan09-2024.pdf>.

a resource on the grid (i.e. marginal value), so in high-renewable portfolios, increasing amounts of variable generation resources may contribute little to grid reliability.¹⁷

The CPUC—the main LRA with jurisdiction over IOUs and CCAs—has used both ELCC and exceedance methodologies over the years. The SOD framework returns to using exceedance, which is a statistical approach for calculating the expected generation from a resource for a certain percentage of time. For example, a 75% exceedance profile represents how much solar output can be expected on each hour of the day on 75% of days in a month.¹⁸ The CPUC uses historical CAISO meter settlement data, which measures actual resource production, as a basis for calculating exceedance for solar and wind technologies.¹⁹ Under the exceedance methodology, solar’s contribution is 0 during evening hours. LSEs had to replace this capacity in their RA showings when SOD was implemented (e.g. 1,460 MW in the September 2023 supply stack during net peak hours had to be replaced, as calculated by CalCCA.)²⁰ Ultimately, the shift to SOD lowers the value of solar-only resources, especially as these resources are increasingly being curtailed in the afternoon hours.

Types of Resource Adequacy

All load-serving entities in the CAISO balancing authority must meet their assigned System, Local, and Flexible RA requirements. Each of these categories plays a critical role in ensuring that the grid has the necessary resources to meet demand under varying conditions.

Table 1: Comparison of Resource Adequacy Types

Type	What is it?	Who sets the rules?	How are requirements determined?	When is it measured ?	How is it measured?
System	Resources that will be available to meet	California Energy	CEC's Coincident Peak Forecast	Monthly and	Net Qualifying

¹⁷ “ELCC Explained: The Critical Renewable Energy Concept You’ve Never Heard Of,” The Equation, October 12, 2020, <https://blog.ucsusa.org/mark-specht/elcc-explained-the-critical-renewable-energy-concept-youve-never-heard-of/>.

¹⁸ NP Energy, “Renewables and Exceedance – A Primer,” https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/resource-adequacy-homepage/ra_t3b2_workshop-1_presentation-np.pdf.

¹⁹ “California’s Resource Adequacy Reforms Are Here,” accessed November 27, 2024, <https://www.orrick.com/en/Insights/2024/07/Californias-Resource-Adequacy-Reforms-Are-Here>.

²⁰ “California’s Constrained Resource Adequacy Market: Ratepayers Left Standing in a Game of Musical Chairs” (CalCCA, January 16, 2024), https://cal-cca.org/wp-content/uploads/2024/02/CalCCA-Stack-Analysis-2023-2026-updated-01_16_24.pdf.

	CAISO demand when needed to meet system needs.	Commission (CEC) and Local Regulatory Authorities (LRAs)	(1-in-2 forecast), which represents the peak demand forecast with a 50% probability of being exceeded, and a specified Planning Reserve Margin (PRM).	annually	Capacity (NQC)
Local	Resources located in local reliability areas with insufficient transmission to meet demand in the event of certain outages.	CAISO	CAISO study using the 1-in-10 CEC forecast, which represents a severe weather scenario.	Annually	Net Qualifying Capacity (NQC)
Flexible	Resources that can rapidly ramp up or down to accommodate variations in load and intermittent energy generation.	CAISO	Based on the 1-in-2 CEC hourly forecast, which considers the largest three-hour ramp for each month to ensure system reliability.	Monthly	Effective Flexible Capacity (EFC)

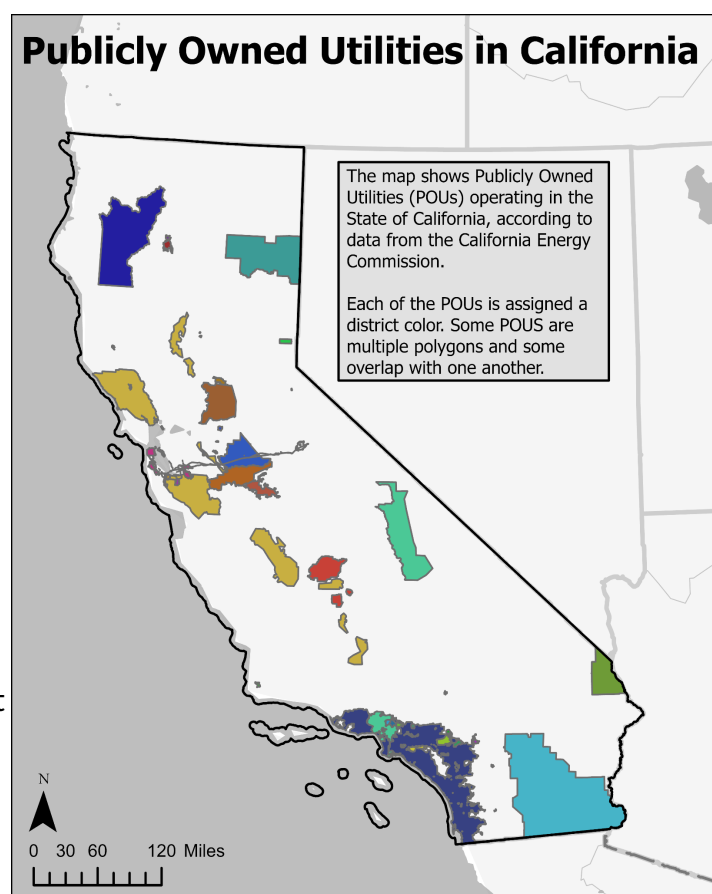
3. Resource Adequacy Requirements for Publicly Owned Utilities

Compared to investor-owned utilities, resource adequacy requirements for publicly-owned utilities are much more decentralized. POU are regulated by their local regulatory authority (LRA), which can range from the local city council to a board, so their resource adequacy obligations and planning frameworks vary. In contrast, the CPUC serves as the LRA for Investor-Owned Utilities (IOUs) and CCAs. The LRA is responsible for developing resource-counting methodologies and setting the required Planning Resource Margins (PRMs) for their jurisdictions.

Figure 1. Map of Publicly Owned Utilities in California

While POU's in CAISO's balancing authority are required to follow CAISO's reporting obligations, they can either design their own resource adequacy programs or default to the CAISO framework (see Appendix). POU's outside the CAISO balancing authority (BA), such as the Los Angeles Department of Water and Power and Sacramento Municipal Utilities District, must follow their BA's reliability standards.

When making procurement decisions to meet resource adequacy requirements, POU's are under pressure to balance affordability for their customers with the need to meet the state's renewable portfolio standard under SB 100. SB 100 requires renewable energy and zero-carbon resources to supply 100% of electric retail sales by 2045,



Created by Max Dunsker using CEC data

and LSEs must transition their energy portfolios to be progressively cleaner until then.²¹ Procuring dispatchable clean resources is the newest hurdle for POU's.²²

Additional legislative developments aim to strengthen energy reliability for publicly owned utilities. **AB 209** from the 2021-2022 legislative cycle directed the California Energy Commission (CEC), with support from the CPUC, to release recommendations for POU's within the CAISO balancing authority to develop minimum PRMs. The final recommendations, released in the CEC's 2024 California Energy Resource and Reliability Outlook, outline a modeling approach for POU's to estimate a minimum planning reserve margin. The recommendations note that utilities reliant on a small number of generators may see higher PRMs and, therefore, need to phase in the implementation of a higher PRM over time to control rate increases in the face of a highly constrained short-term RA

²¹ California Energy Commission, "SB 100 Joint Agency Report" (California Energy Commission, current-date), 100, <https://www.energy.ca.gov/sb100>.

²² "SMUD Unveils First Large Utility-Scale Battery Storage," accessed February 5, 2025, <https://www.smud.org/Corporate/About-us/News-and-Media/2022/2022/SMUD-unveils-first-large-utility-scale-battery-storage>.

market.²³ Yet, during public comment periods, California Municipal Utilities Association (CMUA) noted that smaller publicly owned utilities face little variability in their load and may be forced to procure additional resources that are neither cost-effective nor environmentally sustainable to meet these planning reserve margins.²⁴

AB 1373 from the 2023-2024 legislative cycle authorizes the Department of Water Resources to procure long-lead time resources on behalf of all load-serving entities in the CPUC Integrated Resource Planning purview.²⁵ Relevant to resource adequacy, the law required the CEC, also in consultation with CPUC, to send the Legislature a report assessing POU's performance in meeting minimum PRMs and system RA requirements. The report was published in April 2024, finding that at least 15 POUs had not procured enough RA between July and September 2023, compared to their reported peak demand plus PRMs.²⁶ The law also authorizes the CEC to adopt regulations establishing a new fee structure, or capacity payment, for POUs that do not meet their PRMs during a month where the Department of Water Resources' Electricity Supply Strategic Reliability Reserve Program (ESSRRP) dispatches resources to meet a reliability need. It also requires the CEC to assess capacity payments to POUs annually and to deposit payments into the DWR ESSRRP fund to recover the costs of this backstop procurement. The draft regulations were released in May 2024 and were expected to be finalized in the first quarter of 2025.^{27 28}

Overall, these laws may change California POUs' RA procurement needs. Understanding individual POU's RA requirements further requires research on individual California POUs' resource adequacy planning frameworks.

²³ Reliability Analysis Branch Energy Assessments Division, "California Energy Resource and Reliability Outlook, 2024" (California Energy Commission, August 14, 2024), <https://efiling.energy.ca.gov/GetDocument.aspx?tn=258494>.

²⁴ Jen-Ann Lee, "California Municipal Utilities Association Comments - on AB 209 POU PRM Workshop" (California Energy Commission, n.d.), <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-ESR-01>.

²⁵ California Public Utilities Commission, "Decision Determining Need For Centralized Procurement Of Long Lead-Time Resources," August 29, 2024, <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M539/K202/539202613.PDF>.

²⁶ Yee Yang, Chie Hong, and Kristen Widdifield, "Assembly Bill 1373 Report Assessment of Publicly Owned Utilities' Resource Adequacy" (California Energy Commission, April 2024).

²⁷ "AB 1373 Draft Regulations for Capacity Payments," May 29, 2024, <https://efiling.energy.ca.gov/GetDocument.aspx?tn=256584>.

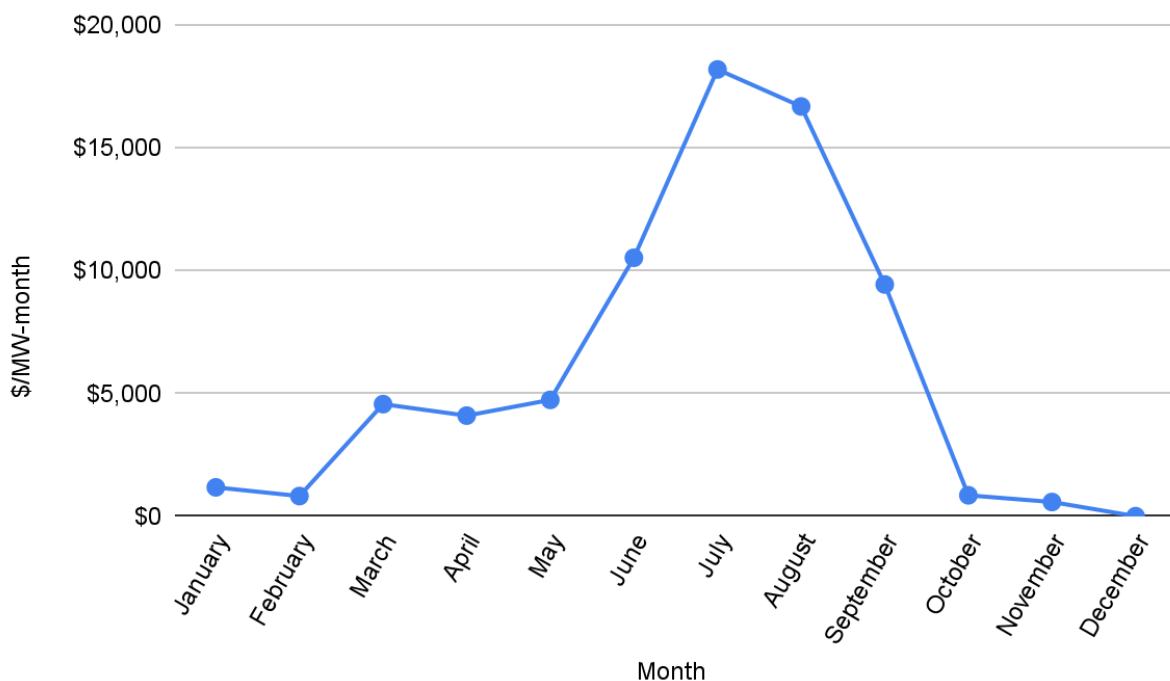
²⁸ As of May 14, 2025, the most recent document in CEC Docket 24-OIR-01 titled, Rulemaking on AB 1373 POU Capacity Payment to Implementation, was submitted in June 2024.

4. Resource Adequacy Prices

Over the past few years, the cost of procuring RA has risen steadily, particularly in 2021 and 2022, when the CPUC's latest RA price analysis is available. These price increases are largely due to the limited availability of resources and competition among LSEs to procure sufficient RA to meet the requirements of their local regulatory authority (e.g. CPUC). In 2022, the weighted average price was \$7,680/MW-month for system resource adequacy contracts, reflecting a more than doubling of RA prices over 10 years.

To put this in context, a 5 MW utility-scale solar-only project (without storage) would have an average annual RA value of ~\$70,000²⁹ compared to an estimated capital expenditure of \$8 million in 2022.³⁰ Since solar projects only produce electricity for part of the day and solar output varies each month, their net qualifying capacity is adjusted accordingly. As Figure 2 shows, the weighted resource adequacy value (in dollars per MW-month) for a 5 MW utility-scale solar project in 2022 varied significantly every month, spiking in July and August, when electricity demand is highest. See Appendix 3 for full calculations.

Figure 2. 2022 Monthly Weighted Average System RA Price for 5 MW Utility-Scale Solar Project (\$/MW-month)



Source: CPUC 2022 Resource Adequacy Report

²⁹ Sasha Cole et al., "2022 Resource Adequacy Report."

³⁰ Joachim Seel et al., "Utility-Scale Solar," 2024, <https://emp.lbl.gov/sites/default/files/2024-10/Utility%20Scale%20Solar%202024%20Edition%20Slides.pdf>.

RA prices also vary by LSE, with Community Choice Aggregators (CCAs) often facing higher costs compared to Investor-Owned Utilities (IOUs). CalCCA, which advocates on behalf of California's CCAs, notes that IOUs tend to have long-standing contracts with generators and thus pay lower rates for RA, on average, compared to CCAs. CalCCA also notes that the lack of clarity about upcoming RA obligations makes it challenging to make long-term RA contracts. Their analysis found that as of 2023, average monthly RA prices had risen to above \$13,000 per MW-month, with the highest observed prices of over \$60,000 per MW-month.³¹

POUs face the same constrained capacity markets as CCAs. As described by the California Municipal Utilities Association (CMUA), POUs "reported a quintupling of average RA prices between 2019 and 2024, up from about \$5,000 per MW-month to \$25,000 per MW-month. Because demand is higher, summer months are the most expensive. In 2024, POUs are seeing prices of below \$3,000 per MW-month in January and February, but prices likely will approach \$100,000 per MW-month in September, when California utilities typically experience their peak load."³² These dynamics reveal an increasingly competitive capacity market in California, placing upward pressure on prices while an evolving regulatory landscape pushes the value of variable resources down.

³¹ "California's Constrained Resource Adequacy Market: Ratepayers Left Standing in a Game of Musical Chairs."

³² "Issue Brief: Electric Reliability, Resource Adequacy, and California's Electric Grid" (California Municipal Utilities Association, February 2024), https://www.cmua.org//Files/2024_Capitol_Day/CMUA_IB_Electric_Reliability_2024.pdf.

5. Conclusion: Ongoing Challenges and Critiques of the RA System

The rising cost of RA, particularly the competition for dispatchable resources, has raised concerns among CCAs, POUs, and other smaller LSEs. Critics argue that the current system favors IOUs with established long-term contracts, leaving newer entities like CCAs to pay significantly higher prices for RA resources. This situation exacerbates affordability challenges for these electricity providers and, by extension, their customers.

Additionally, the limited supply of RA—especially resources capable of providing flexible or dispatchable capacity—continues to be a point of contention. As California's grid transitions toward greater reliance on renewable resources, particularly solar and wind, the need for clean dispatchable resources to manage variability becomes even more pressing. This shift further complicates RA procurement for LSEs, particularly as they strive to meet both the state's renewable energy targets and the growing electricity demand. The challenges of procuring RA are compounded by the ongoing competition for renewables, with LSEs under increasing pressure to meet procurement mandates while navigating a constrained capacity market.

Looking ahead, ongoing reform to resource adequacy frameworks at the CPUC and CAISO, a legislative proposal for Western Regionalization (SB 540), anticipated load growth, and the implementation of new interconnection processes may change RA dynamics. Further, advocates continue pushing for a simpler pathway for distributed energy resources (DERs) to contribute to grid reliability. Configuring solar canal systems as distributed energy resources may be a preferred approach if regulations make it easier for DERs to provide RA value.

In this context, solar canal projects may present an innovative solution to help LSEs meet RA requirements. These projects, when coupled with energy storage such as batteries, could provide reliable, dispatchable electricity to meet demand during periods of grid strain while contributing to California's renewable energy goals. Some load-serving entities may offer an easier pathway for solar canals than others, depending on their RA requirements, their interconnection process, and the solar canal project design. Overall, navigating the regulatory landscape and securing RA contracts for solar canal projects will likely remain a complex endeavor in the near term.

Appendix 1: Key Regulators and Oversight

The landscape for RA involves several key entities at the state, regional, and federal levels:

- **FERC:** The Federal Energy Regulatory Commission has authority over wholesale power markets and transmission-scale resources, including CAISO's operational requirements.
- **NERC:** The North American Electric Reliability Corporation establishes national reliability standards for generating resources and high-voltage transmission systems.
- **WECC:** The Western Electricity Coordinating Council (WECC) ensures that ISO/RTOs in the Western Interconnection comply with NERC's standards. WECC also manages the tracking of renewable energy credits (RECs) for the Western Interconnection.
- **CAISO:** As the independent system operator for California, CAISO manages grid reliability, operates the day-ahead and real-time markets, and oversees the RA requirements for utilities and energy providers in its jurisdiction. While CAISO is not a state agency, its board is appointed by the Governor and confirmed by the State Senate, and it works closely with the California Public Utilities Commission and California Energy Commission.
- **CPUC:** The California Public Utilities Commission regulates utilities under its jurisdiction (mainly investor-owned utilities and community choice aggregators), ensuring compliance with reliability standards and supporting the state's renewable energy goals.
- **CEC:** The California Energy Commission forecasts energy demand and oversees publicly owned utilities' compliance with some regulatory requirements.
- **CARB:** The California Air Resources Board monitors and enforces air quality regulations and issues penalties for non-compliance with the state's Renewable Portfolio Standard (RPS).

Appendix 2: Elements of Resource Adequacy Programs

As per CAISO's Business Practice Manual, the seven basic elements of a resource adequacy program include³³:

- A procedure to forecast demand and peak demand.
- A specified reserve margin (a certain capacity above demand to account for reliability and planning issues).
- Deliverability to ensure contracted capacity is not constrained by transmission limitations when serving load.
- Criteria for determining resource eligibility and counting resource capacity.
- LSE must develop a plan for showing they are meeting resource adequacy requirements.
- Rules under which resources are made available to ISO operators to balance supply and demand.
- Compliance program to ensure LSE is following the RA program and not relying on other market participants.

³³ RajaShekar Thappetaobula, "Business Practice Manual for Reliability Requirements Version 75" (CAISO, November 12, 2024), <https://bpmcm.aiso.com/Pages/BPMDetails.aspx?BPM=Distributed%20Generation%20for%20Deliverability>.

Appendix 3: Methods for Calculating Resource Adequacy Revenue and Capital Expenditures for Example Project

To calculate the **monthly weighted average RA revenues** (\$/MW-month) for a utility-scale solar project in 2022, multiply the CPUC's 2022 Weighted Average Price for System RA (\$/kw-month)³⁴ by the CPUC's 2022 Solar Effective Load Carrying Capacity (ELCC)³⁵. Then, convert the price from \$/kw-month to \$/MW-month by multiplying by $\frac{1000 \text{ kw}}{1 \text{ MW}}$. See Table 2 for the monthly calculations.

Table 2. 2022 Monthly RA Value for Utility-Scale Solar Project

Month Number	2022 Weighted Average Price for System RA (\$/kw-month)	CY 2022 Solar Effective Load Carrying Capacity (ELCC)	Conversion from \$/kw-month to \$/MW-month	2022 Monthly Weighted Average Price (\$/MW-month)
1	5.87	4%	$\frac{\$}{\text{kw-month}} \times \frac{1000 \text{ kw}}{1 \text{ MW}}$	234.80
2	5.46	3%		163.80
3	5.07	18%		912.60
4	5.46	15%		819.00
5	5.92	16%		947.20
6	6.79	31%		2104.90
7	9.33	39%		3638.70
8	12.36	27%		3337.20
9	13.48	14%		1887.20
10	8.5	2%		170.00

³⁴ Sasha Cole et al., "2022 Resource Adequacy Report."

³⁵ "2022 Net Qualifying Capacity and Effective Flexible Capacity Values for Resource Adequacy Resources," accessed April 14, 2025, <https://www.caiso.com/documents/2022netqualifyingcapacity-effectiveflexiblecapacityvalues-resourceadequacyresources.html>.

11	5.77	2%		115.40
12	6.02	0%		0.00

To estimate **capital expenditures** in 2023 dollars for a utility-scale solar project built in 2022, convert the capacity-weighted mean project cost (2023 \$/watt) for AC solar projects built in CAISO to \$/megawatt by multiplying by $\frac{1,000,000 \text{ W}}{1 \text{ MW}}$. Finally, multiply by 5 megawatts.³⁶

³⁶ Seel et al., "Utility-Scale Solar."

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DRAFT



CLARK COUNTY BOARD OF EQUALIZATION

Case # 32

Miscellaneous Information

TAXABLE VALUE/FULL CASH VALUE - GOVERNING LAW

NRS 361.227 Determination of taxable value.

1. Any person determining the taxable value of real property shall appraise:
 - (a) The full cash value of:
 - (1) Vacant land by considering the uses to which it may lawfully be put, any legal or physical restrictions upon those uses, the character of the terrain, and the uses of other land in the vicinity.
 - (2) Improved land consistently with the use to which the improvements are being put.
 - (b) Any improvements made on the land by subtracting from the cost of replacement of the improvements all applicable depreciation and obsolescence. Depreciation of an improvement made on real property must be calculated at 1.5 percent of the cost of replacement for each year of adjusted actual age of the improvement, up to a maximum of 50 years.
2. The unit of appraisal must be a single parcel unless:
 - (a) The location of the improvements causes two or more parcels to function as a single parcel;
 - (b) The parcel is one of a group of contiguous parcels which qualifies for valuation as a subdivision pursuant to the regulations of the Nevada Tax Commission; or
 - (c) In the professional judgment of the person determining the taxable value, the parcel is one of a group of parcels which should be valued as a collective unit.
3. ...
4. ...
5. The computed taxable value of any property must not exceed its full cash value. Each person determining the taxable value of property shall reduce it if necessary to comply with this requirement. A person determining whether taxable value exceeds that full cash value or whether obsolescence is a factor in valuation may consider:
 - (a) Comparative sales, based on prices actually paid in market transactions.
 - (b) A summation of the estimated full cash value of the land and contributory value of the improvements.
 - (c) Capitalization of the fair economic income expectancy or fair economic rent, or an analysis of the discounted cash flow.

NAC 361.1177 (c) adopts by reference *Property Appraisal and Assessment Administration* as published by the International Association of Assessing Officers (IAAO).

Definition of Economic Rent from the *Glossary for Property Appraisal and Assessment* by IAAO:

Rent, Economic – (1) In appraisal, the annual rent that is justified for the property on the basis of a careful study of comparable properties in the area; market rent.

NRS 361.345 Power of county board of equalization to change valuation of property; review of changes in valuation and estimation of certain property by county assessor; notice of addition to assessed valuation.

1. Except as otherwise provided in subsection 2, the county board of equalization may:
 - (a) Determine the valuation of any real or personal property placed on:
 - (1) The secured tax roll which was assessed by the county assessor; or
 - (2) The unsecured tax roll which was assessed by the county assessor on or after May 1 and on or before December 15; and
 - (b) Change and correct any valuation found to be incorrect either by adding thereto or by deducting therefrom such sum as is necessary to make it conform to the taxable value of the property assessed, whether that valuation was fixed by the owner or the county assessor. The county board of equalization may not reduce the assessment of the county assessor unless it is established by a preponderance of the evidence that the valuation established by the county assessor exceeds the full cash value of the property or is inequitable. A change so made is effective only for the fiscal year for which the assessment was made. The county assessor shall each year review all such changes made for the previous fiscal year and maintain or remove each change as circumstances warrant.

PETITION 32: TOWNSITE SOLAR/AREVON, LLC

Parcel Number(s): 224631
Petitioner Duly Sworn: James Bergstrom and Rocco Debruno
Document(s) Submitted: *See Attached*

DISCUSSION:

TERRY FARR

Let's get started with Case 32, Townsite Solar.

JESSE CREWS

Good morning. Jesse Crews with the Clark County Assessor's Office. Case 32 begins—

TERRY FARR

Can you pause one moment please before we have to let the Appellant state their name and address? Gentleman, name and address for the record please.

JAMES BERGSTROM

Yes, James Bergstrom. The address of the property is 13316 U.S. Highway 95 Boulder City.

TERRY FARR

Your address, sir.

JAMES BERGSTROM

Oh, my address. Sorry. 8800 South Ganey Center Drive, Scottsdale, Arizona, 85258.

TERRY FARR

Thank you. Sir?

ROCCO DEBRUNO

Rocco DeBruno. Address is 32 Shamrock Road, Lumberton, New Jersey.

TERRY FARR

Very well. Mr. Crews?

JESSE CREWS

Jesse Crews with the Clark County Assessor's Office. Case 32 begins in the addendum book page 1790. This case is a personal property for Townsite Solar, account number 224631. Townsite Solar is a 193 megawatt AC photovoltaic (PV) utility scale solar facility with battery storage. It is located at over 1200 acres west and south of the Border City Airport. The Assessor's Office recommends holding the taxable value of \$306,843,350 for the 2025/2026 fiscal year. It should be noted that last year this account was heard before the State BOE (Board of Equalization) and currently in District Court.

TERRY FARR

Gentlemen?

JAMES BERGSTROM

Yes. We're here today to talk about the value of this property. We've provided a discounted cash flow, which shows a much lower value and in addition to that we've provided a appraisal done by a third party,

KPMG. I have with me today Rocco, who is an appraiser. I was going to ask him a few questions about his appraisal, if you don't mind. Could you please introduce yourself to the Board?

ROCCO DEBRUNO

Yeah, my name is Rocco DeBruno. I'm a tax managing director at KPMG LLP. I practice in the economic evaluation services group and focus on primarily tax valuations.

JAMES BERGSTROM

Yes. And how much experience do you have in appraising?

ROCCO DEBRUNO

I've been an appraiser for 18 years. I have a certified general real estate appraiser licensed in South Carolina. I maintain my license regularly and perform primarily valuations of energy property. And, for the last 10 years, I've appraised solar facilities, battery storage, facilities, wind, and other energy property.

JAMES BERGSTROM

And, can you tell us your conclusion of value as far as the PPE (Property, Plant, and Equipment) is concerned in this project?

ROCCO DEBRUNO

Sure. We appraised the property, plant, and equipment at Townsite at \$221.5 million to \$237.5 million.

JAMES BERGSTROM

And can you explain why your final conclusion used the income approach for your valuation?

ROCCO DEBRUNO

Sure. We considered multiple approaches, income and cost approach. A market approach was excluded since there are generally not comparable properties to specific solar and battery storage properties. The income approach was our primary approach as we are able to estimate the energy production of the facility, the price that electricity would be sold, and calculate what the value the economic value would be over its remaining useful life. This is a useful approach as it allows us to bifurcate the value of the tangible taxable property from any intangible assets. We did conclude on certain intangible asset value. We also concluded or performed a cost approach, which ultimately reconciled to our income approach and ultimately concluded on the range of \$221.5 million to \$237.5 million.

JAMES BERGSTROM

So, we have an independent third-party who came to about \$220 million, and then when we did our income approach, we came to a conclusion of \$260 million. Both of those are substantially lower than what the state concluded and we believe somewhere in that range is a more accurate conclusion. Thank you.

TERRY FARR

Mr. Crews?

JESSE CREWS

Jesse Crews, Clark County Assessor's Office. Case 32 begins at the addenda book page 2006. The valuation of personal property for Townsite Solar was calculated as directed according to the NRS (Nevada Revised Statutes), NAC (Nevada Administrative Code), and the personal property manual using the taxpayers reported acquisition year and costs. As directed by the personal property manual, the newly adapted utility scale photovoltaic solar farm 30-year life table was applied. This state approved

table uses market data to derive cost index factors for the PV solar that takes into account the obsolescence that is inherent in this specific industry. This results in a replacement cost new that is less than the historical acquisition cost. Appendix F of the PP (Personal Property) manual explains the state's process for determining the new taxable value, that begins on page 2094. A market study was conducted to produce a depreciation table to better reflect and ensure the taxable value of such structures do not exceed full cash value according to NRS 361.227.

A declaration was filed with a total reported acquisition cost for the equipment and fixtures of \$531,238,486 and that can be viewed on page 1,882. On addendum page 2,106, you'll see that after applying the cost index and percent good per the personal property manual, we arrived at a total taxable value or replacement cost new less depreciation of \$306,843,350 for the 2025-2026 fiscal year. NRS 361.227, Section 5 allows for three methods to determine if taxable value exceeds full cash value, sales comparison, cost approach, or income approach. According to the IAAO (International Association of Assessing Officers) and Appraisal Institute, the best valuation method for special purpose properties is the cost method. Sales and income are not. The cost approach is what was used in determining the taxable value. The sales approach is not used, as there are no sales within this industry. Now, Tom Walusek will explain how the Assessor arrived and analyzed the income approach.

TOM WALUSEK

Good morning. Tom Walusek for the Clark County Assessor's Office. While we're discussing this, let's move to page 2,095. It's the utility scale photovoltaic solar farm 30-year life table that the PP manual recommends for this property. The state has indexed costs for RCN (Replacement Cost New) appropriately, reflecting all of the market obsolescence and functional obsolescence that has been experienced. This was based on a market study of the total installed costs as reported by 1,200 solar facilities. As shown in column three, it's yellow, the estimates for replacement costs new have been indexed downward to recognize the rapid decrease in total cost, installed costs for these facilities. The table then accommodates depreciation for wear and tear using a double declining balance as in the fifth and sixth column. With double declining balance, depreciation reaches 50% in as little as 10 years. Between the market supported rate of economic and functional obsolescence and the depreciation via double declining balance, a fully depreciated taxable value of the equipment can be calculated. This is how the taxable value of \$306,843,350 was developed for the subject.

We don't rely on the sales comparison approach either. There apparently has been no open market arms length traded or re-traded properties that we or anyone that we have contacted can point to. The upshot of this is that there is no direct market evidence that would typically support discount rates, capitalization rates, and other economic metrics. My testimony today will focus on why the income approach cannot be relied upon. We will be using the appellant's supplied investment analysis as an example. On page 1,855 through 1,857 is the business enterprise value calculation. Principally, I want to draw your attention to the treatment of two expenses, lines five and eight, more or less in the middle of the page. The property tax expense on line five was estimated without the effects of the Renewable Energy Tax Abatement, RETA for short, which overstates the expense burden to the property by an additional undiscounted \$7 million over the projection period.

The report's expense line eight for audit and tax expense started at \$2 million a year and was escalated to \$3.9 million in the final year and represented a roughly \$88 million total undiscounted cost to the project. However, a conversation with James Bergstrom, senior tax manager, with the taxpayer who is here today, indicated that the expense which we brought to his attention is an error and overstated, that nearly \$2 million should be closer to \$125,000 annually or roughly \$5.2 million total undiscounted cost for the project. This alone provides an additional \$83 million unwarranted on discounted expense to the analysis.

Our conclusion, the business enterprise value, as presented, seriously underreports the net income of the project. The indicated value conclusion is materially understated.

Let's move to page 1,860 through 1,862. This is the appellant's investment analysis for the property, plant, and equipment. This replicates the prior enterprise analysis but without the PPAs or Power Purchase Agreements that essentially underwrote the project to begin with. Revenue was estimated from merchant sales. However, the reports stated that the merchant pricing assumption was founded on Nevada pricing, as presented in internal page 1 and 2 of the report or pages 1,803 and 1,804, if you care to go there, California pricing is at least twice Nevada pricing. \$90 per megawatt hour versus \$40 per megawatt hour. It is still considerably higher even today, not including California merchant pricing for the portion of the subject that receives contracted California pricing as the effect of significantly reducing the total revenue calculated in this DCF (Discounted Cash Flow), and materially understates the PPE result. And this is before the issue of what we see as excessive discounting.

Let's go to page 1,864 so we can address this. On the left of the page in the center there is a buildup estimate for the cost of equity, a component of the weighted average cost of capital or WACC. Within the table, there's an equity risk premium of 475 basis points. This was based on the notion that an investor of this class of institutional investor class coupon property backed by 20 and up to 30 year leases would either invest in this property or throw his money into the widely varying returns of the stock market, providing none of the after-tax benefits. We don't think this makes complete sense and exaggerates the discount rate. At the bottom of that table, the cost of equity table is a company-specific premium of an additional 300 basis points that was added. Overall, the appellant has estimated a 775 basis point risk premium. This is greater than the total expected returns for most institutional grade investments, not just the risk premium. This risk premium in our judgment is not appropriate.

So, what is the risk of receiving the revenue stream for a property such as the subject? According to Berkeley Labs, negotiations or terminations of PPAs are rare given the scale of the utility-scale solar market and were mostly before 2016, excuse me. Since then, there have only been a few cases involving concentrated solar tech, like Crescent Dunes and Ivan Paul. Overall, the market, considering its size, has been very secure. This does not reflect extreme risk, quite just the opposite. The selected discount rate that we used in our DCF is based on NREL's, or the National Renewable Energy Laboratory's, survey of 174 solar development projects in this country and internationally. The reported WACC is 7.3%. All things equal, this alone makes about a 20% change in value from the KPMG report's business enterprise value indication. Roughly, \$60 million swing. Utilizing the same WACC for the property plant and equipment significantly alters the calculation results as well.

Lastly, the report utilized the DCF to attempt to report any perceived intangible value for the PPAs themselves. This is on page 1,870 through 1,872. This analytical method is not settled science. Other practitioners report that in their analyses and valuation of solar facilities, which includes other power plants, that the contract is considered to be representative of net lease credit tenant contracts, and that the contract was at market at its inception and considering its quality, term, durability, market fluctuations (inaudible) to intangible value. So, there is some question if the analysis is even required. That alone provides \$112 million swing indicated value.

Even if utilized, as already indicated, the merchant pricing assumption was founded on Nevada pricing, in this case, not including California merchant pricing for the portion of the subject that receives this has the effect of significantly increasing the calculated differential and results in materially overstating the off-taker differential and resulting conclusion. Basically, over 15 years and with 1600 solar facilities, there's been no open market arm's length transactions. There simply is not an open and competitive market for

buyers and sellers. This is a critical distinction because as presented on page 2,246 the definition of full cash value requires a competitive and open market.

And the rest, NRS 361.2275 says the computed taxable value of any property must not exceed its full cash value, which by definition must be reflected in a competitive open market. Currently, the fair market value definition does not provide commensurate value. It's based on rule 59 to 60 of the IRS (Internal Revenue Service) code and was created basically so that in thinly traded, closely held corporations for stock and things like that, you could have two guys sitting at a table, and as long as they weren't under duress and they came to some agreement that that was fair market value. The definition of full cash value says the most probable sales price. You cannot have a distribution curve of one. You need an open competitive market. So we see these two values as mutually exclusive. To take one of these investment analysis numbers, something you might base an offer letter on, and suggest that it tells us about the full cash value of the equipment could be very misleading.

In point of fact, to suggest these investment analyses reflect full cash value is contrary to known fact. Although we did develop a DCF that results in a value indication of \$412 million, we do not rely on the income approach and neither should you. Let's wrap it up. The sales comparison approach is not valid as there are no sales. Although very well presented, there are too many points of variability to rely on the report's income approach conclusions. It does not result in an estimate of full cash value, nor is it considered proof that full cash value was exceeded as NRS 361.2275 requires. The County recommends this Board of Equalization support the County's estimate of taxable value of \$306,843,350 as it is based on vast and unsaleable market evidence until such time when market sales can clearly support another conclusion. Thank you. We are happy to answer any questions.

TERRY FARR

Any rebuttal?

JAMES BERGSTROM

Yes, sir. The first, using the utility scale use of life that they've developed, I think it's a great method. I think they've come up with a lot of good ideas here, but that is, by using so many properties, they are watering it down and they're forgetting all the specifics that is to an individual project. So, inherently, it's going to get you somewhere closer to reality, but it's going to miss the fact that this is its own project and it's going to miss that. They said that they used a discounted rate of somewhere around 7% and that ours are really high. For centrally assessed properties, State of Nevada actually publishes discounted rates and for renewable energy they came to 11%. So, them saying 7% is close to reality just seems way outside of what other people, even the State of Nevada concludes as an accurate number. Did you have anything regarding what he said about your report?

ROCCO DEBRUNO

I would note that the discount rate range that the Assessor provided reflects new build solar projects, which are typically contracted assets, and therefore have lower risk than a merchant facility. When we applied our discounted cash flow approach, we utilized a merchant cash flow to understand what you would get for the price of electricity sold today at current market rates. There's inherently more risk selling into a merchant market than having a contracted asset, and our discount rate reflects that.

JAMES BERGSTROM

And then the last thing I'd like to say is, with his analysis when they did the cost of PP&E and the income approach, they came to similar numbers, reasonably close to the same number. So, we both can agree that comparable sales don't exist. But, using both of the other methods, we came to reasonably close to the same conclusions.

TERRY FARR

Members of the Board?

TIO DIFEDERICO

I just have, excuse me, a question. Tom, you had mentioned they're using in their discounted cash flow for the merchant sales only Nevada costs?

TOM WALUSEK

Correct.

TIO DIFEDERICO

And so is a portion of this being sold to California?

TOM WALUSEK

Yes.

TIO DIFEDERICO

So why didn't you include that in your discounted cash flow?

ROCCO DEBRUNO

We considered what you would sell electricity for on a merchant basis locally, which is how a project typically would sell electricity on a merchant basis. If you were to sell energy generated in Nevada, California, there would be significant transmission costs to deliver that power to California. That is typically not economically viable on a merchant basis. If you have a contract with California, it can be possible. But if you are trying to understand if you were to sell electricity at merchant rates, looking to Nevada is the right way to do it.

TIO DIFEDERICO

Okay. Just a question then. A minute ago you said you need to be project specific.

ROCCO DEBRUNO

Correct.

TIO DIFEDERICO

And yet, your project's selling to California. And now, you're telling me, but you can't value it selling— It's too risky to sell to California. I mean, I think that to me, in my mind, you're contradicting yourself there, because you're actually doing that at this project. So, to say, "Well, we didn't do that in our discount." In my opinion, if you're selling that, then you should have included it, and you can't come up here and say, "Well, it's too risky." Well, you're doing it, so how are you doing it if it's so risky? It just doesn't click to me.

ROCCO DEBRUNO

When we perform our income approach, we look to the merchant forecast, which you could sell electricity for in a spot market. We do that because we want to isolate the value to the taxable property, just the equipment. When you sell electricity to California under a contract, it's a different risk profile than selling it in a merchant market. So, the intent is to value the taxable equipment, therefore it requires us to look at that merchant profile.

TIO DIFEDERICO

It doesn't make sense to me though, because you're not doing that. So, that just seems weird to me.

JAMES BERGSTROM

In this specific case, there's a specific contract which pays the cost of wheeling, or the cost of moving the electricity. And so, if we were going to do the cost of California, then we'd have to add the cost of wheeling, which would basically net the difference of the cost, the difference in value.

TIO DIFEDERICO

Well, I think you should have done that then.

JAMES BERGSTROM

Okay.

TIO DIFEDERICO

Then it would've shown us that, "Yeah, we took it into consideration. But it costs more, so we addressed that." That's where I'm not trusting your numbers there.

JAMES BERGSTROM

I understand- okay.

GLENN ANDERSON

Can you tell me when this project was built or when it was installed?

JAMES BERGSTROM

It was built over three years, starting in 2021.

GLENN ANDERSON

2021?

TERRY FARR

Starting in 2021 or completed in 2021? And the reason I'm asking is, is there was a comment made about being brand new centers, as far as the discount rates being used and we're talking about a three or four-year-old system.

JAMES BERGSTROM

Sorry, I've mixed up my two projects. This one was finished in 2020.

TERRY FARR

Finished in 2020. Okay, so it's six-years-old.

JAMES BERGSTROM

Yes.

TAMI CAMPA

Why are you at—You're higher than the appraiser. You're 260 and they're 221.

JAMES BERGSTROM

I mean, I ran out my discounted cash flows to what it was, and that was the conclusion I got to. We weren't necessarily trying to get to the same conclusion. That's just where I ended up.

TERRY FARR

Did you have any comments on what the Assessor found as faults in your DCFs?

JAMES BERGSTROM

I think, there was the one expense that was overstated and that was a mistake. I think his conclusion of how much that was worth is a little high. I would also say that I didn't adjust for the reducing of property taxes, so I think, if I were to increase my discounted cash flow rate by the amount of property taxes, I think that would actually probably about net to very little.

TAMI CAMPA

Mr. Walusek, can you explain that?

TOM WALUSEK

Yeah, there's a couple of things here. And let's be clear. We actually like their work, and in fact on our own, at DCF, if you'd like to go to it on 2,221, you'll find it in form and function reasonably very similar. I guess, in this sense, maybe imitation is a sincere form of flattery. We appreciated the work. Our point here was not to discredit the effort that was put into this volume. Our interest here was just merely to show that with a \$7 million swing in just property tax cost, \$80 million swing in audit and expense, which is an error. That's a big error, it changes in cap rates. We're not saying that 7.3 is the end-all of end-all discount rates. It is backed up by 174 different facilities, but it's an average by definition, right? There were ones that were lower and the ones that were higher. I don't know of any buyer or seller that will use average returns to determine what the value of their property is. We're just making the case that we can't rely on it. We don't find it substantial enough to provide the level of proof that's required by NRS that would present or persuade somebody to ignore the vast and undeniable data that the cost approach itself is built on.

And let's focus on that for just a second. The cost approach deals only with the equipment. We're not interested in the business value and the intangible or not intangible value that may or may not even be there based upon which analyst you're going to be speaking about. We just want to determine what the equipment would be depreciated to considering it's taken into consideration market evidence of all the functional and economic obsolescence and then it put on an accelerated physical depreciation schedule. We think that's perfectly reasonable. At some point in time, I don't have a question that we're going to be presenting with evidence that we'll have to take into consideration. We just don't believe we have any here today. Thank you.

LISA LOGSDON

Chairman Farr, there is a legal opinion also in this case in page 2,007 through 2,011, and part of what the District Attorney's Office (DA) has analyzed is the discounted cash flow, the most reliable method under the statute? And the only case I could really find that was similar to this is the County of Clark versus Sun City Summerlin. I don't know if you guys are familiar with the common element cases about 15 years ago. And so in that case, the State Board of Equalization found a nominal value because there was no comparable sales for clubhouses, pools, resorts, different things like that.

But the Nevada Supreme Court overturned those decisions finding that when there's no usable evidence of a price that the property would fetch in an open market that the Board should consider other workable methods. And in this case, even they found the common elements, even though they have no resale value, they still have significant taxable value. And so in that case, the Nevada Supreme Court ended up ultimately upholding the County's valuation of \$20 million on those improvements because that was replacement cost minus depreciation. And that's similar here in using the personal property manual as the best evidence of full cash value. The State of Nevada has went out and conducted a market study the best that they could through the personal property manual and we believe that is the most reliable evidence in the record.

JESSE CREWS

Jesse Crews, Clark County Assessor's Office, I'd refer again to the chart on page 2,106, which shows the appellants reported acquisition cost and our valuation using the state mandated tables.

MARY ANN WEIDNER

Chairman Farr.

JESSE CREWS

2,106.

MARY ANN WEIDNER

Yes. I'd just like to make a comment just about the manual and these tables that are in the personal property manual, these did not exist five years ago. This table did not exist. The reason it is even here, in fact when we were depreciating solar farms, they were actually on an index that was indexing them up and because of that it was causing them to be overvalued. And we agree with that, particularly the older, older facilities because the newer facilities, they made me to build them for a lower cost. And so our office actually participated in a manual workshop and Mr. Walusek had done extensive studies on what has been going on historically on that and we provided that information and then the state themselves did their own I guess studies. And so this is why, and I think this is the second year, if you can correct me. I believe it's the second year that we've had this table in our manual. Is that correct?

DAVID DENMAN

David Denman with the Clark County Assessor's Office. This is the first year, 2025-2026 is the first year. Prior to that we were applying obsolescence based on that study, it took about two to three years to get it into the PP (Personal Property) manual.

MARY ANN WEIDNER

So, I just want you to understand the history behind this table and why it's there that it did not exist and it is the only table I believe in the personal property manual that actually indexes down over time instead of up. And so that what they're testifying to. So, I just want you to understand what's going on in the manual and how this table was derived.

DAVID DENMAN

David Denman with the Clark County Assessor's Office, this is the only table in the PP manual that is specific to a very specific part of an industry. The only facilities used to determine this were photovoltaic solar facilities. No other renewable energy facility was used to determine the cost index factors in that table in Appendix F.

TIO DIFEDERICO

The table on 2,206, it has a taxable value of \$306 million and change is the difference between that and the \$360 million, the land value or because you're at \$360 million?

DAVID DENMAN

Actually, our taxable value that we're recommending is the \$306,843,350.

TIO DIFEDERICO

Okay. I thought it was the \$360 million.

DAVID DENMAN

No, because the land value in this particular facility is a possessory interest, so it wouldn't be on this particular account that's being appealed today.

TIO DIFEDERICO

Based on the information provided by the Assessor and the appellant and the mistakes I believe that are in the DCF, the overstatement and they're not using the California sales. I think the Assessor's case.

JAMES BERGSTROM

Can I say one more thing?

MOTION

TIO DIFEDERICO

No, I'm talking, I'm going to make a motion that we accept the Assessor's value of \$306,843,350.

TERRY FARR

Motions been made. Please cast your votes.

VOTE

VOTING AYE: Terence J. Farr, Glenn Anderson, Tami L. Campa, Tio S. DiFederico,
Heidi Meidenbauer

VOTING NAY: None

ABSENT: None

ABSTAIN: None

TERRY FARR

And that motion passes. You do have the right to appeal. Forms are outside the door, sir. I'm assuming you're here for Eagle Shadow Mountain and Gemini as well.

JAMES BERGSTROM

Just Eagle Shadow Mountain.

FINAL ACTION:

Accepted the Assessor's recommendation (for no change in the total taxable value of \$306,843,350)

ASSESSOR BRIEF



STATE BOARD OF EQUALIZATION

Case # 26-109 Assessor Pre-Hearing Brief

SBOE Case Number: 26-109

Taxpayer Name: Townsite Solar Arevon, LLC

Parcel Number / Account Number: 224631

Assessment Year: 2025-2026

Note

It should be noted that the County filed a petition for judicial review challenging the State Board's decision in the prior year cases. The Taxpayer in that case is represented by the law firm of McDonald Carano and at a hearing on September 22, 2026, the District Court granted the County petition and remanded the matter to the State Board for more robust findings of fact and conclusions of law to support its decision.

Introduction

The subject property is a 193-megawatt AC photovoltaic (PV) utility scale solar facility with battery storage. It is located on over 1,200 acres west and south of the Boulder City Airport. The total taxable value set by the Assessor's office and upheld by the County Board of Equalization is \$306,843,350 for the 2025/2026 fiscal year.

The issue of this case is straightforward: which valuation method is most appropriate for this property type.

- The cost approach is the best method of valuing the subject's equipment.
- The income approach (discounted cash flow) cannot be relied upon due to excessive variability in the basic inputs to the analysis and the lack of reliable market data that would normally support this type of analysis. It is not appropriate for this property type for this specific purpose.
- Ultimately, a valuation estimate cannot be trusted if the combined value of all errors and non-standard method differences, is greater than the project's total value which is currently the case.

The County Board of Equalization (CBOE) supported the Assessor's estimate of taxable value based on the many substantial errors in the Appellant's discounted cash flow, such as the overstatement of expenses and understatement of income. Based on the weaknesses in the Appellant supplied discounted cash flow, the CBOE upheld the Assessor's valuation, and we recommend that the State Board of Equalization (SBOE) do the same.

It should be noted that the SBOE's decision from last year to reduce the taxable value is pending judicial review in the Eighth Judicial District Court.

Clark County Valuation

The valuation of Townsite Solar's personal property was calculated in accordance with Nevada Revised Statutes (NRS), Nevada Administrative Code (NAC), and the Personal Property Manual. The starting point was the taxpayer's reported acquisition year and costs. The County relied upon the Cost Approach, being the approach which is required by statute to set taxable value, and which the International Association of Assessing Officers (IAAO), and the Appraisal Institute both indicate is the best valuation method for special purpose properties.

A prior unpublished opinion by the Nevada Supreme Court supports the Cost Approach as the appropriate valuation method in this context. In *County of Clark v. Sun City Summerlin*, 130 Nev. 1164 (2014), the Nevada Supreme Court held that when no reliable sales exist, the SBOE should consider other workable methods – specifically including replacement cost minus depreciation. The Court in that case found that under NAC 361.631 evidence of market value can be the full cash value of the land plus the depreciated placement cost of any improvements. The same principle applies here.

Within the Personal Property Manual, a table specific to the valuation of photovoltaic facilities was used that provides an estimate of taxable value that includes all forms of accrued depreciation. Based on the reported experience of over 1,200 solar facilities as reported in the Berkeley Labs annual report, this table reflects all the functional, economic and physical depreciation present in the property based on overwhelming market data. Utilizing the table specific for utility scale photovoltaic solar farms, the \$531,238,486 declared by the Appellant was indexed to reflect economic and functional obsolescence, and then a percent good was applied to reflect physical depreciation. This process converted the Appellant's declaration of value into \$306,843,350 in taxable value. The taxable value of the assessed equipment reflects all forms of accrued depreciation.

Taxpayer Issues

The taxpayer argues that the facility is overvalued. They submitted two primary valuation analyses:

1. An in-house discounted cash flow (DCF) model which concluded a value indication of \$258.2 million, and;
2. An independent third-party (KPMG) investment analysis of the property, which concluded a range of \$221.5 million to \$237.5 million.

The taxpayer states that the Income Approach provides the most meaningful estimate of value because it allows the separation of tangible taxable assets from intangible assets. They assert that their merchant-market risk warrants a higher discount rate and that the

County's 7 percent rate is unrealistically low compared to the 11 percent rate published by the State of Nevada for renewable energy projects. They believe the Cost Approach used by the County "waters down" project-specific characteristics and fails to capture actual performance, merchant pricing risk, and individualized project economics.

County's Rebuttal

The Cost Approach was given primary emphasis based on statute requirements and the vast volume of market data that supports it. The Sales Comparison Approach was omitted as there are no known arm's length transactions. The Assessor did not rely on the Income Approach due to the widely various methods and inputs that it uses, producing widely varying conclusions, which is to be expected due to the lack of verifiable market evidence supporting discount rates and other key inputs typically provided by market sales.

The County contends that the Income Approach is unreliable for this analysis and uses the Appellant's DCF to demonstrate this.

The following errors within the expense section of KPMG's analysis greatly and unwarrantedly reduce the net income for Townsite operations and make the analysis unreliable as discussed in the following.

Tax estimates were overstated by not including the benefit of the Renewable Energy Tax Abatement (RETA). The 55% tax abatement granted by RETA reduces the overall tax burden of the property. This was not reflected in the cash flow analysis and resulted in an approximate \$7.0 million overstatement of expenses to the property, before discounting.

The Appellant admitted to an error in "audit and tax" expense that overstated expenses by roughly \$83.0 million in an undiscounted overcharge. What should have been around \$125,000 in annual expense was reported as roughly a \$2.0 million to \$3.9 million annual expense which ranged over the 30 plus years of the investment analysis.

In the KPMG DCF analysis for the property's, plant and equipment (PP&E), the analysis does not mirror the property's actual revenue sources, of \$89.7/MWh for California vs roughly \$39.0/MWh for local Nevada power purchasers, and ignores California sales on the open market, relying solely on local Nevada power sales of \$30.7/MWh, artificially and significantly reducing the project's revenue. Not mirroring this analysis faithfully, essentially renders a *hypothetical value* of what the project could have been if it had not been developed and operated as it is. Between this and the errors in expense that are repeated, this analysis results in a greatly understated estimated value that cannot be relied upon.

The weighted average cost of capital (WACC) rates used are highly inflated. In one case, a 775-basis point (7.75%) risk premium, unsupported by market evidence, was applied to the

property. This exceeds the total expected returns for institutional grade property (Class A office, regional malls, etc.), not just their risk premiums. The WACC was estimated at 10.2% for the primary analysis, 12.25% for the PP&E analysis and 8.5% for the intangibles analysis. The Assessor's utilized a WACC of 7.3% and was based on the WACC as reported by the National Renewable Energy Laboratory (NREL) for 174 solar projects. All things being equal, the difference in WACC rates alone has the potential of making a roughly \$60 million change in value in the KPMG Business Enterprise Analysis.

The analysis utilized an additional DCF to estimate a purported intangible value for the subject's power purchase agreements (PPAs). The use of DCF analysis (or other income methods) is not universally done for determining intangible value. Other practitioners report that in their valuation of solar facilities, the contract is considered to be representative of net lease credit-tenant contracts, and that the contract was at market at its inception. Considering the contract's quality, term, and durability, market fluctuations do not translate into intangible value. The inclusion of this analysis component is not uniformly done in the industry and its inclusion results in a \$112.0 million potential understatement of value.

The KPMG report utilizes an incompatible definition of value for the purposes of NRS 361.227. It uses Fair Market Value as a condition of report and is based on Section 59 to 60 of the Internal Revenue Service (IRS) code, created so that in thinly traded, closely held corporations, for stock and similar assets, a buyer and seller sitting at a table, as long as they weren't under duress, could come to some agreement and that represented Fair Market Value.

The definition of Full Cash Value (FCV) in Nevada requires the "most probable sales price in an open and competitive market". The State's definition of FCV demands an open and competitive market which doesn't exist for this property market segment. The Assessor's office sees these two definitions of value as non-interchangeable. One reflects the possible or hypothetical agreement between any two parties, and the other reflects what multiple pairs of parties actually agreed to. Is it logical to talk about the "most probable sales price" of the one possible "sale" that you are making up for both parties? The reason the definition of FCV is so powerful is that eliminates this very example of self-serving analysis engaged in by the analyst who in their analysis is representing both sides of the table.

All of the prior arguments illustrate why the County emphasizes that it does not rely on the Income Approach (even its own) due to excessive variability and the lack of reliable market data that would normally be able to support it.

The County rebuts the Appellant's contention that the State's roughly 11% WACC is appropriate as it is based on only 8 "renewable energy" entities and includes potentially geothermal, wind and biomass properties which have widely different operating profiles. The 174 reported WACC rates relied on by the County come solely from solar photovoltaic facilities.

The County rebuts the Appellant's contention that the Income Approach provides the most meaningful estimate of value because it allows the separation of tangible taxable assets from intangible assets. If the County was valuing the business enterprise value of a typical company, this might be true, but the County has estimated the taxable value of the equipment itself.

The County rebuts the Appellant's contention that the Cost Approach used by the County, based on over 1,200 solar farms, "waters down" project-specific characteristics and fails to capture actual performance, merchant pricing risk, and individualized project economics. Again, the County was not attempting to value the business enterprise value of the project, only the taxable value of the equipment which reflects all its accrued depreciation. The cost analysis of the equipment cannot "water down" the enterprise valuation. If this was a true concern, the Appellant's third-party analysis would have been based on the actual performance of the property as reported in the provided Income/Expense statements, which were used by the Appellant themselves in their DCF and in the County's DCF, but not in the KPMG analysis.

Conclusion

The County valued the property in accordance with NRS, NAC, and the Personal Property Manual. The CBOE affirmed the taxable value of \$306,843,350 for the 2025–2026 fiscal year when it passed the motion as stated in the transcript, "Based on the information provided by the Assessor and the appellant and the mistakes I believe that are in the DCF, the overstatement and that they are not using California [spot] sales, I think the Assessor's case...I make the motion that we accept the Assessor's value of \$306,843,350". This passed unanimously.

This property has been reviewed by this Board on two prior occasions resulting in two different opinions. On 10/21/2024, the State Board of Equalization upheld the Assessor's taxable value based on the primary arguments that the cost approach is the most reliable method of valuation and that the income approach based on a DCF was not reliable and did not provide the preponderance of evidence necessary to set aside the Assessor's development of taxable value. On 09/29/2025 the State Board reduced the Assessor's taxable value based on the owner's opinion of value and the County's failure to submit a discounted cash flow.

Each time this property has appeared before the County Board of Equalization it has upheld the Assessor's taxable value based on the primary arguments that the cost approach is the most reliable method of valuation and that the income approach based on a DCF was not reliable and did not provide the preponderance of evidence necessary to set aside the Assessor's development of taxable value.

The County respectfully requests that the SBOE uphold the County Board's ruling, as the Cost Approach remains the most reliable and supported method available for valuing the equipment of specialized utility-scale solar facilities.

SBE NOTICE OF HEARING



STATE OF NEVADA
DEPARTMENT OF TAXATION

MAIN OFFICE
3850 Arrowhead Drive
Carson City, Nevada 89706

JOE LOMBARDO
Governor

GEORGE KELESIS
Chair, Nevada Tax Commission

SHELLIE HUGHES
Executive Director

September 24, 2026

**STATE BOARD OF EQUALIZATION
NOTICE OF HEARING**

CERTIFIED MAIL– 9489 0090 0027 6528 6949 63

PETITIONER:

Townsite Solar Arevon, LLC
Eric Huswick
8800 N Gailey Center Dr, STE 100
Scottsdale AZ 85258

CERTIFIED MAIL – 9489 0090 0027 6528 6949 49

RESPONDENT:

Briana Johnson
Clark County Assessor
500 S Grand Central Pkwy, 2nd Floor
Las Vegas NV 89155

DATE/ TIME: Wednesday, October 14, 2026 at 9:00 a.m.

PLACE: Nevada Department of Taxation
700 E Warm Springs Rd., Room 150
Las Vegas, Nevada 89119

ZOOM

<https://us02web.zoom.us/j/84349113453>

Webinar ID: 843 4911 3453

Phone Number: 1-669-900-9128

Please note this is an amended Notice of Hearing. This version corrects the month information incorrectly specified on the certificate of service.

Hearings begin on the first day. It is each taxpayer's or his representative's responsibility to be present when the case is called.

LEGAL AUTHORITY AND JURISDICTION OF THE STATE BOARD OF EQUALIZATION: NRS 361.360 & NRS 361.400

BRIEF STATEMENT OF MATTER: Appeal from the action of the Clark County Board of Equalization

Case No: 26-109

Account number: 224631

The State Board of Equalization (State Board) will hear the Petitioner's appeal at the time and place stated above. Please be aware that the time is approximate and although you may be assured the appeal will not be heard prior to the stated time, be prepared for possible delays as several appeals are scheduled at the same time. If the taxpayer or his representative is not present when his hearing is called, the State Board will invoke the requirements of NRS 361.385 and NAC 361.708(4). The State Board may (a) proceed with the hearing; (b) dismiss the proceeding with or without prejudice; or (c) recess the hearing for a period to be set by the State Board to enable the party to attend.

Please be aware the State Board will limit its consideration to the issues and contentions set forth in the petition. Other issues may be heard if the requirements of NAC 361.745 are met.

Information regarding the rules of practice and procedure before the State Board is provided on the attached information sheet.

A meeting agenda will be posted on the Department's website (<https://tax.nv.gov>) three (3) days prior to the scheduled meeting. If you would like an agenda emailed or mailed to you, please contact Denise Mosely at (775) 684-2160 or stateboard@tax.state.nv.us. If a party wishes to obtain a transcript of any hearing conducted before the State Board, the party must pay for the transcript or obtain a copy from the reporter provided by the State Board at the party's expense pursuant to NAC 361.731.

In compliance with the Americans with Disabilities Act, individuals needing special accommodations during this hearing should notify the Department at least 3 days before the hearing. In order to comply with the security procedures of the Department, you will be required to show identification and sign a visitor's log prior to entering the hearing room.

If you need an accommodation in order to communicate during the hearing, the Department will provide one at no cost to you. Arrangements for an interpreter should be made as soon as possible, but no later than 14 days before the scheduled meeting. Please contact Denise Mosely at (775) 684-2160 at least 14 days in advance to request an interpreter in your preferred language. You may also submit your request through stateboard@tax.state.nv.us.

Si necesita una ayuda para comunicarse durante la audiencia, el Departamento se lo proporcionará sin costo alguno. Los trámites para conseguir un intérprete deben hacerse lo antes posible, pero a más tardar 14 días antes de la cita programada. Por favor, póngase en contacto con Denise Mosely al (775) 684-2160 con al menos 14 días de anticipación para solicitar un intérprete en su idioma de preferencia. También puede solicitarlo a través de stateboard@tax.state.nv.us.

If you have any questions, please call (775) 684-2160.

Shellie Hughes
Secretary to the State Board of Equalization

By: 
Denise Mosely
Program Officer II, Boards and Commissions
Department of Taxation

**STATE BOARD OF EQUALIZATION
NOTICE OF HEARING
CERTIFICATE OF SERVICE
26-109**

I hereby certify that on this day I served the foregoing document upon all parties of record in this proceeding by placing a true and correct copy thereof in the United States Mail, postage prepaid, and properly addressed to the following:

CERTIFIED MAIL– 9489 0090 0027 6528 6949 63

PETITIONER:

Townsite Solar Arevon, LLC

Eric Huswick

8800 N Gainey Center Dr, STE 100

Scottsdale AZ 85258

Electronic mail: indirect-tax@arevonenergy.com

CERTIFIED MAIL – 9489 0090 0027 6528 6949 49

RESPONDENT:

Briana Johnson

Clark County Assessor

500 S Grand Central Pkwy, 2nd Floor

Las Vegas NV 89155

Electronic mail: bap@ClarkCountyNV.gov; meo@ClarkCountyNV.gov; lisa.logsdon@clarkcountydav.gov
Millicent.Washington@ClarkCountyNV.gov; Courtney.Moerschell@ClarkCountyNV.gov

Dated at this 24 day of the month of ~~June~~ September of the year 2026.



Denise Mosely, Program Officer II
Department of Taxation
State Board of Equalization



STATE OF NEVADA
DEPARTMENT OF TAXATION

MAIN OFFICE
3850 Arrowhead Drive
Carson City, Nevada 89706

JOE LOMBARDO
Governor

GEORGE KELESIS
Chair, Nevada Tax Commission

SHELLIE HUGHES
Executive Director

September 24, 2026

**STATE BOARD OF EQUALIZATION
NOTICE OF HEARING**

CERTIFIED MAIL– 9489 0090 0027 6528 6949 63

PETITIONER:

Townsite Solar Arevon, LLC
Eric Huswick
8800 N Gailey Center Dr, STE 100
Scottsdale AZ 85258

CERTIFIED MAIL – 9489 0090 0027 6528 6949 49

RESPONDENT:

Briana Johnson
Clark County Assessor
500 S Grand Central Pkwy, 2nd Floor
Las Vegas NV 89155

DATE/ TIME: Wednesday, October 14, 2026 at 9:00 a.m.

PLACE: Nevada Department of Taxation
700 E Warm Springs Rd., Room 150
Las Vegas, Nevada 89119

ZOOM

<https://us02web.zoom.us/j/84349113453>

Webinar ID: 843 4911 3453

Phone Number: 1-669-900-9128

Hearings begin on the first day. It is each taxpayer's or his representative's responsibility to be present when the case is called.

LEGAL AUTHORITY AND JURISDICTION OF THE STATE BOARD OF EQUALIZATION: NRS 361.360 & NRS 361.400

BRIEF STATEMENT OF MATTER: Appeal from the action of the Clark County Board of Equalization

Case No: 26-109

Account number: 224631

The State Board of Equalization (State Board) will hear the Petitioner's appeal at the time and place stated above. Please be aware that the time is approximate and although you may be assured the appeal will not be heard prior to the stated time, be prepared for possible delays as several appeals are scheduled at the same time. If the taxpayer or his representative is not present when his hearing is called, the State Board will invoke the requirements of NRS 361.385 and NAC 361.708(4). The State Board may (a) proceed with the hearing; (b) dismiss the proceeding with or without prejudice; or (c) recess the hearing for a period to be set by the State Board to enable the party to attend.

Please be aware the State Board will limit its consideration to the issues and contentions set forth in the petition. Other issues may be heard if the requirements of NAC 361.745 are met.

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If you have any questions, please call (775) 684-2160.

Shellie Hughes
Secretary to the State Board of Equalization

By: 
Denise Mosely
Program Officer II, Boards and Commissions
Department of Taxation

**STATE BOARD OF EQUALIZATION
NOTICE OF HEARING
CERTIFICATE OF SERVICE
26-109**

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RESPONDENT:

Briana Johnson

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Electronic mail: bap@ClarkCountyNV.gov; meo@ClarkCountyNV.gov; lisa.logsdon@clarkcountydav.gov
Millicent.Washington@ClarkCountyNV.gov; Courtney.Moerschell@ClarkCountyNV.gov

Dated at this 24 day of the month of June of the year 2026.



Denise Mosely, Program Officer II
Department of Taxation
State Board of Equalization



October 01, 2026

Dear State Board:

The following is in response to your request for proof of delivery on your item with the tracking number:
9489 0090 0027 6528 6949 49.

Item Details

Status:	Delivered, Individual Picked Up at Post Office
Status Date / Time:	September 29, 2026, 07:03 am
Location:	LAS VEGAS, NV 89106
Postal Product:	First-Class Mail®
Extra Services:	Certified Mail™
	Return Receipt Electronic

Shipment Details

Weight: 10lb, 14.9oz

Recipient Signature

Signature of Recipient:	Signature	
	Printed Name	JIM ACAFICES
Address of Recipient:	Delivery Address	CLARK COUNTY/GOV N FELIX

Note: Scanned image may reflect a different destination address due to Intended Recipient's delivery instructions on file.

Thank you for selecting the United States Postal Service® for your mailing needs. If you require additional assistance, please contact your local Post Office™ or a Postal representative at 1-800-222-1811.

Sincerely,

United States Postal Service®
475 L'Enfant Plaza SW
Washington, D.C. 20260-0004



October 02, 2026

Dear State Board:

The following is in response to your request for proof of delivery on your item with the tracking number:
9489 0090 0027 6528 6949 63.

Item Details

Status:	Delivered, Front Desk/Reception/Mail Room
Status Date / Time:	September 29, 2026, 10:37 am
Location:	SCOTTSDALE, AZ 85258
Postal Product:	First-Class Mail®
Extra Services:	Certified Mail™ Return Receipt Electronic

Shipment Details

Weight:	2lb, 15.6oz
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Recipient Signature

Signature of Recipient:	
Address of Recipient:	8800 N GAINES CENTER DR STE 100, SCOTTSDALE, AZ 85258

Note: Scanned image may reflect a different destination address due to Intended Recipient's delivery instructions on file.

Thank you for selecting the United States Postal Service® for your mailing needs. If you require additional assistance, please contact your local Post Office™ or a Postal representative at 1-800-222-1811.

Sincerely,
United States Postal Service®
475 L'Enfant Plaza SW
Washington, D.C. 20260-0004