Solar Valuation Subject Guide

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Valuing residential and commercial properties with photovoltaic (PV) installations is a growing challenge facing the assessment industry. As more homes and businesses turn to solar power, the need grows for ways to develop reliable and credible opinions of value of the installations and the power they generate. While relatively young, the solar market is an increasingly important part of the American economy. In 2016, the value of the U.S. solar market was $23 billion. The market has grown by an average of 68% every year over the last decade. Currently installed solar capacity in the U.S. is 44.7 gigawatts, with 15 gigawatts installed in 2016 alone. The top corporate users of solar energy are Target (147.5 megawatts) and Walmart (145 megawatts). The top states for solar capacity are California (18,963 megawatts) and North Carolina (3,287 megawatts).

This subject guide includes both residential and commercial solar photovoltaic installations as well as large scale solar installations (farms). Very little literature exists for solar farm valuation, so this is a gap in our knowledge base that needs further research. To suggest a resource for this guide, contact the library staff at library@iaao.org.

(Statistics from the Solar Energy Industries Association Cheat Sheet, update 6/8/2017.)

Articles and Books in the LibraryLink Catalog

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An analysis of solar home paired sales across six states. 2016. Adomatis, Sandra K. *Appraisal Journal*, v. 84 n. 1: 27-42.

Brownfields to brightfields: Can old landfills become viable sites for renewable energy? 2010. Johnson, Daniel E. *Right of Way*, v. 57 n. 5: 23-25.

Property tax assessment incentives for green building: A review. 2016. Shazmin, S.A.A., Ibrahim, Sipan, and Maimunah, Sapri. *Renewable and Sustainable Energy Reviews*, v. 60: 536-548.

Renewables, tax credits and ad valorem taxes: Are policies aligned? 2014. DeLacy, P. Barton. *Real Estate Issues*, v. 39 m. 1: 50-58.

Residential green valuation tools. 2014. Adomatis, Sandra K**.** Chicago, IL: The Appraisal Institute.

Solar PV systems in home valuations: A policy perspective. 2012. Lyons, Parker et. al. Boulder, Colorado: Renewable and Sustainable Energy Institute, University of Colorado at Boulder.

Valuation of solar photovoltaic sstems using a discounted cash flow approach. 2013. Johnwon, Jamie L., Sandra K. Adomatis, and Geoffrey T. Klise. *Appraisal Journal*, v. 81 n. 4: 316-331.

Valuing solar energy: Part 1. 2016. Roy-Patenaude, Nathalie. *Canadian Property Valuation*, v. 60 n. 1: 28-30.

Valuing solar energy: Part 2. 2016. Roy-Patenaude, Nathalie. *Canadian Property Valuation*, v. 60 n. 2: 18-21.

Online Reports & Articles

An analysis of the effects of residential photovoltaic energy systems on home sales prices in California. April 2011. Hoen, Ben et. al. Berkeley, California: Berkeley National Laboratory.

Best practices for siting solar photovoltaics on municipal solid waste landfills. February 2013. National Renewable Energy Laboratory. Washington D.C.: U.S. Environmental Protection Agency.

Clean energy: Implications from an ad valorem tax perspective. 2016. Sullivan, William T. *Insights: Business Valuation, Forensic Analysis, and Financial Opinion Insights:* 64-68.

Economics of solar electric systems for consumers: Payback and other financial tests. July 2009. Black, Andy. California: OnGrid.

Here comes the sun: The value of residential solar. November 2016. Hunt, Harold D. *Tierra Grande*.

Passive solar design: Increase energy efficiency and comfort in homes by incorporating passive solar design features. 2000. Washington, D.C.: Environmental Protection Agency, Office of Building Technology, State and Community Programs, Energy Efficiency and Renewable Energy.

Photovoltaic desert: Tax revenue outcomes of solar development in Fresno County. 2012. Harland, Eli Waylon. Sacramento, California: California State University.

Property taxes and solar PV systems: Policies, practices, and issues. July 2013. Barnes, Justin et. al. Oakland, California: ICLEI Local Governments for Sustainability USA.

Selling into the sun: Price premium analysis of a multi-state dataset of solar homes. 2015. Hoen, Ben. Berkeley, California: Lawrence Berkeley National Laboratory.

Solar and wind: Power energy device exemption and appraisal guidelines. 2016. Hegar, Glenn. Texas Comptroller of Public Accounts.

Standard requirements for a certificate of completion for residential energy upgrades (2101-S-2013). September 2013. Malta, New York: Building Performance Institute.

Technical assistance: Solar power analysis and design specifications. 2009. Washington D.C.: U.S. Environmental Protection Agency and SPA International. Study of the City of Huston's proposed solar power farm on a former landfill.

Tracking the sun VI: A historical summary of the installed price of photovoltaics in the United States from 1998 to 2012. July 2013. Barbose, Galen, et. al. Berkeley, California: Lawrence Berkeley National Laboratory.

U.S. Solar Market Trends: 2013. July 2014. Sherwood, Larry. Latham, New York: Interstate Renewable Energy Council (IREC).

Valuation of solar generation assets. August 2013. Washington D.C.: Solar Energy Industries Association.

Websites

Environmental Protection Agency (EPA). Describes the major types of solar thermal technologies.

Database of State Incentives for Renewables & Efficiency (DSIRE). Searchable database of solar policies and incentives by state.

Green Building Resources. The Appraisal Institute offers two worksheets for solar energy valuation, commercial and residential, which help the appraiser analyze green features.

Incentives for Specific Property Improvements. Lincoln Institute of Land Policy's Significant Features of the Property Tax includes state-by-state property tax incentives on installation of equipment and machinery conserve energy.

National American Board of Certified Energy Practitioners (NABCEP). Offers various resource guides on PV installation.

National Renewable Energy Laboratory (NREL). Provides maps that show the solar energy potential where you live.

Open PV Project. A collaborative effort between government, industry, and the public that continues to compile a database of available public data for photovoltaic (PV) installation data for the United States.

Planning and Zoning for Solar Energy. Includes examples of jurisdictions across the country that have regulated both small-scale and large-scale solar installations as well s mitigating the effects of glare on surrounding properties.

PV Value. This spreadsheet tool was developed by Sandia National Laboratories and Energy Sense Finance to help determine the value of a new or existing photovoltaic (PV) system installed on residential and commercial properties. It is designed to be used by real estate appraisers and real property assessors. Free registration required to use the calculator at https://www.pvvalue.com/

PV Watts. The PV Watts calculator estimates the energy production and cost of energy of grid-connected photovoltaic (PV) energy systems throughout the world. It allows homeowners, small building owners, installers and manufacturers to easily develop estimates of the performance of potential PV installations.

Solar Energy Industries Association (SEIA). The leading organization for solar market research, producing an annual trends report, a national database of solar installations, and a list of utility-scale installations.
