



# LEVERAGING FEDERAL RENEWABLE ENERGY TAX CREDITS

State and local governments have a limited window of opportunity to leverage recently-extended federal tax credits to accelerate the deployment of clean, renewable energy. Federal tax credits have played an important role in the rapid growth of the U.S. renewable energy industry. Over the past decade, wind electricity generation increased 7-fold to 191 terawatt-hours (TWh) in 2015 and photovoltaic (PV) electricity generation rose from near-zero to 36 TWh in 2015 (Figures 1 and 2), delivering an array of benefits: **economic growth, energy security, job creation, energy price stability, and health and environmental co-benefits.**

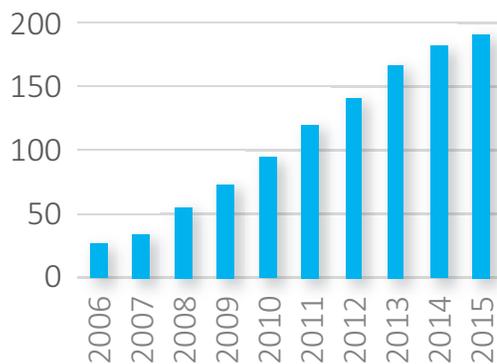
The [Consolidated Appropriations Act](#), passed into law in December 2015, extends federal tax credits for a number of renewable energy technologies.<sup>1</sup> This Department of Energy resource guide focuses on the tax credits for wind and solar energy, which received five-year extensions with built-in phase-downs that will continue to be important in energy-related decisions and actions by state and local governments.

## GROWTH IN U.S. WIND AND SOLAR ELECTRICITY GENERATION



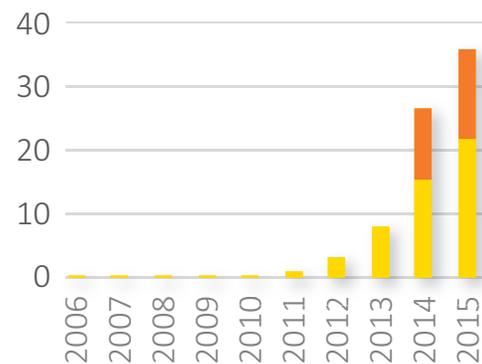
### WIND

TWh



### SOLAR

TWh



**FIGURES 1 AND 2.** Growth in U.S. electricity generation in terawatt-hours (TWh) from wind (left) and from solar PV (right).<sup>2</sup> Solar PV includes two components: utility-scale PV (yellow) and distributed PV (orange; estimates only for 2014 and 2015).

The extensions provide a window of opportunity to accelerate renewable energy deployment by creating market stability that will draw additional private sector investment. The Production Tax Credit (PTC) for wind technologies was extended from December 2014 to December 2019. The Investment Tax Credit (ITC) for solar technologies was extended from December 2016 to December 2021, with a sustained, reduced tax credit for commercial and utility systems thereafter. Both the wind and solar tax credits reward early action, offering the largest credits in the initial period of the extensions and subsequently phasing down (Figures 3 and 4).

Federal tax credits help drive deployment of clean energy technologies. The 2015 PTC and ITC extensions are projected to result in approximately 50 GW of additional renewable capacity by the early 2020s<sup>3</sup> – equivalent to about half of the total installed wind and solar capacity as of 2015.<sup>4</sup> Realizing this potential or exceeding it will require supportive actions from a broad set of stakeholders.

<sup>1</sup> A series of legislative actions have amended and extended federal wind and solar energy tax credits since the establishment of the wind PTC in the Energy Policy Act of 1992 and the solar tax credit in the Energy Tax Act of 1978.

<sup>2</sup> EIA (2016) Electric Power Monthly. [http://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_1\\_1\\_a](http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_1_1_a).

<sup>3</sup> NREL (2016) Impacts of Federal Tax Credit Extensions on Renewable Deployment and Power Sector Emissions. <http://www.nrel.gov/docs/fy16osti/65571.pdf>.

<sup>4</sup> EIA (2016) Electric Power Annual. [https://www.eia.gov/electricity/annual/html/epa\\_04\\_03.html](https://www.eia.gov/electricity/annual/html/epa_04_03.html).

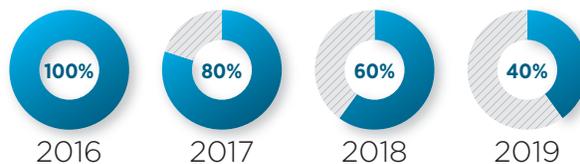
## TAX CREDIT DESIGN



### WIND

For wind technologies, the PTC is a tax credit of 2.3 cents per kilowatt-hour of electricity sold during the first 10 years of

operation for facilities that commenced construction in 2016.<sup>5</sup> The PTC begins a credit step-down for wind facilities commencing construction after 2016, declining to 80%, 60%, and 40% of the full value for facilities commencing construction in 2017, 2018, and 2019, respectively. Taxpayers that sell wind electricity to an unrelated party during the taxable year claim the credit under Section 45 of the Internal Revenue Code (IRC). As of 2016, the PTC has no scheduled credit after 2019. For more information on the PTC, visit <http://programs.dsireusa.org/system/program/detail/734>.



**2.3 cents**  
per  
kilowatt-hour

**FIGURE 3.** The annual value of the federal wind production tax credit (PTC) expressed as a percentage of the full wind PTC credit of 2.3 cents per kilowatt-hour (in year 2016 dollars).<sup>6</sup> The schedule reflects commenced-construction dates.



### SOLAR

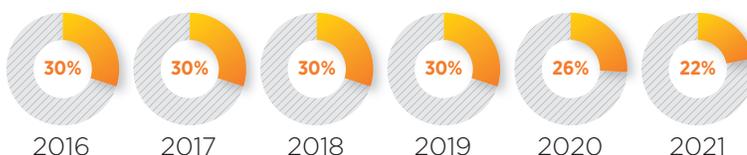
For solar technologies, the ITC provides a 30% investment tax credit for qualified commercial, utility, and residential solar projects through 2019.

The credit declines in subsequent years: 26% in 2020; and 22% in 2021. Beyond 2021, a 10% credit is scheduled for commercial and utility systems. As of 2016, residential systems do not have a scheduled credit after 2021. The solar ITC covers photovoltaics and solar thermal technologies. Businesses that develop or finance commercial and utility solar projects claim a credit on their corporate taxes (under Section 48 of the IRC), while homeowners that purchase their own residential solar systems claim the credit on their personal income taxes (under Section 25D of the IRC). Large wind energy systems are eligible to claim the ITC in lieu of the PTC; the ITC for large wind is 30% in 2016, 24% in 2017, 18% in 2018, and 12% in 2019. For more information on the ITC, visit <http://programs.dsireusa.org/system/program/detail/658>.

#### Commercial and Utility Systems (Businesses) | SECTION 48



#### Residential Systems (Homeowners) | SECTION 25D



**Percentage**  
of project  
value

**FIGURE 4.** The annual value of the federal solar investment tax credit (ITC) expressed as a percentage of the project's value.<sup>7</sup> The Section 48 and Section 25D schedules reflect commenced-construction dates and placed-in-service dates, respectively.

<sup>5</sup> 2.3 cents per kilowatt-hour in year 2016 dollars. The exact amount in a given year will depend on the inflation-adjustment factor used by the Internal Revenue Service.

<sup>6</sup> DSIRE (2016) Renewable Electricity Production Tax Credit (PTC). <http://programs.dsireusa.org/system/program/detail/734>.

<sup>7</sup> NREL (2016) Impacts of Federal Tax Credit Extensions on Renewable Deployment and Power Sector Emissions. <http://www.nrel.gov/docs/fy16osti/65571.pdf>.

## How State and Local Governments Can Leverage Federal Tax Credits

State and local governments can help their residents and businesses become aware of and claim federal tax credits by directing them to resources such as the following:

### Production Tax Credit

Database of State Incentives for Renewables & Efficiency (DSIRE)

**LEARN MORE**

<http://programs.dsireusa.org/system/program/detail/734>

### Investment Tax Credit

(DSIRE)

**LEARN MORE**

<http://programs.dsireusa.org/system/program/detail/658>

State and local government policies and programs can also leverage federal renewable energy tax credits through a range of complementary measures that help overcome obstacles to clean energy deployment. State and local government actions to engage, inform, and collaborate with stakeholders serve as the foundation for these measures, which can include the following:

#### IMPROVE THE CLARITY, EFFICIENCY, AND TIMELINESS OF PERMITTING PROCEDURES

to cut business process costs (soft costs), which account for more than half of the total cost for many residential PV systems,<sup>8</sup> and save the local government time and money. For example, the City of Philadelphia has streamlined permitting and lowered fees for qualified solar energy systems and offers a guidebook to assist residents and builders with the permitting process.<sup>9</sup> With lower soft costs, renewables are more economical and can be deployed at faster rates.

**ADOPT FINANCING POLICIES** that enable more renewable energy projects to move forward. Many innovative financing options exist. Examples include: property assessed clean energy (PACE) programs that enable property owners to make energy improvements funded by state and local governments that are repaid over time as an addition to the owner's property tax bills;<sup>10</sup> and green banks that provide low-cost financing support for clean energy projects by leveraging public funds to attract private investment.

**ENABLE POWER PURCHASE AGREEMENTS** that allow developers to install and own a renewable energy system on a consumer's property under an agreement whereby the consumer will purchase the power generated by the system over some period of time. These agreements can support distributed renewable electricity generation, enable low and moderate income residents to access renewable energy, and allow electricity producers and consumers to better utilize tax credits, including cities and other public entities that are tax-exempt. More than two dozen states have enacted legislation to authorize and regulate power purchase agreements.<sup>11, 12</sup>

**PROVIDE TAX INCENTIVES AND REBATES** that supplement federal tax credits and provide additional support for clean energy market growth. For example, Arizona offers a suite of state renewable energy tax credits, including a tax credit of 25% of the system cost for residential solar and wind energy systems.<sup>13</sup>

**CREATE DISTRIBUTED GENERATION INCENTIVES** that encourage more sources of renewable energy production from homes and businesses. Many states have net energy metering, which credits rooftop solar owners for excess electricity delivered to the grid. Minnesota established a value-of-solar tariff in which solar owners sell all of the energy they produce to the utility.<sup>14</sup>

**ESTABLISH OR INCREASE EXISTING RENEWABLE PORTFOLIO STANDARDS** that drive deployment by requiring a certain level of energy production from renewable sources. Iowa was the first state to adopt a renewable portfolio standard in 1983 and now is a national leader in wind power, producing one-third of its electricity from wind.<sup>15</sup>

<sup>8</sup> LBNL (2013) The Impact of City-level Permitting Processes on Residential Photovoltaic Installation Prices and Development Times: An Empirical Analysis of Solar Systems in California Cities. <https://emp.lbl.gov/sites/all/files/lbnl-6140e.pdf>.

<sup>9</sup> DOE (2016) City of Philadelphia – Streamlined Solar Permitting and Fee Reduction. <http://energy.gov/savings/city-philadelphia-streamlined-solar-permitting-and-fee-reduction>.

<sup>10</sup> DOE (2016) Property-Assessed Clean Energy Programs. <http://energy.gov/eere/slsc/property-assessed-clean-energy-programs>.

<sup>11</sup> DSIRE (2016) Third-Party Solar Power Purchase Agreement Policies.

<http://www.dsireusa.org/resources/detailed-summary-maps/>.

<sup>12</sup> NCSL (2015) State Policies for Power Purchase Agreements. <http://www.ncsl.org/research/energy/state-policies-for-purchase-agreements.aspx>.

<sup>13</sup> <http://programs.dsireusa.org/system/program?state=AZ>.

<sup>14</sup> NREL, SEPA (2015) Value of Solar: Program Design and Implementation Considerations. <http://www.nrel.gov/docs/fy15osti/62361.pdf>.

<sup>15</sup> EIA (2016) Iowa State Profile and Energy Estimates. <http://www.eia.gov/state/?sid=IA>.

## Resources Supported by the U.S. Department of Energy

A range of federal technical and financial resources are available to support the adoption of clean, renewable energy. To explore more renewable energy resources supported by the U.S. Department of Energy, visit the following sites:



### WIND

**DOE WIND RESOURCES:** An entry-point for a range of DOE resources and information related to wind power, including initiatives, funding opportunities, reports, and news. <http://energy.gov/science-innovation/energy-sources/renewable-energy/wind>

**DOE WIND PROGRAM:** The Wind Program accelerates the deployment of wind power technologies through improved performance, lower costs, and reduced market barriers. <http://www.energy.gov/eere/wind/wind-program>

**DOE WINDEXCHANGE:** A hub of stakeholder engagement and outreach activities that helps communities weigh the benefits and costs of wind energy, understand the deployment process, and make wind development decisions supported by the best-available science and other fact-based information. <http://www.energy.gov/eere/wind/windexchange>

**WIND ENERGY REGIONAL RESOURCE CENTERS:** These centers provide unbiased wind energy information to communities and decision makers to help them evaluate wind energy potential and learn about wind power benefits and impacts in their regions. <http://apps2.eere.energy.gov/wind/windexchange/regional.asp>

**WIND VISION: A NEW ERA FOR WIND POWER IN THE UNITED STATES:** The DOE Wind Program, in close cooperation with the wind industry, developed the Wind Vision report, which looks at the future of wind power through 2050 and the economic benefits that come with a robust wind industry. <http://energy.gov/eere/wind/maps/wind-vision>



### SOLAR

**DOE SOLAR RESOURCES:** An entry-point for a range of DOE resources and information related to solar power, including initiatives, funding opportunities, reports, and news. <http://energy.gov/science-innovation/energy-sources/renewable-energy/solar>

**DOE SUNSHOT INITIATIVE:** The SunShot Initiative is a national effort to support solar energy adoption by making solar energy affordable for all Americans through research and development efforts in collaboration with public and private partners. <http://www.energy.gov/eere/sunshot/sunshot-initiative>

**SOLSMART:** A national designation program to recognize communities that have taken key steps to address local barriers to solar energy and otherwise foster the growth of mature local solar markets. <http://www.thesolarfoundation.org/policy-research/solmart/>

**SOLAR OUTREACH PARTNERSHIP:** A partnership to help accelerate solar energy adoption on the local level by providing timely and actionable information to local governments. <http://solaroutreach.org/>

**INTERNATIONAL CITY/COUNTY MANAGEMENT ASSOCIATION:** An association to increase the use and integration of solar energy technologies in communities across the country through the SunShot Solar Outreach Partnership. [http://icma.org/en/icma/knowledge\\_network/topics/topic/292](http://icma.org/en/icma/knowledge_network/topics/topic/292)

**DOE SOLAR POWERING YOUR COMMUNITY: A GUIDE FOR LOCAL GOVERNMENTS:** A guide to assist local government officials and stakeholders in designing and implementing strategic local solar plans. <http://energy.gov/eere/solar/downloads/solar-powering-your-community-guide-local-governments-book-energy-efficiency>



## CLEAN ENERGY PLANNING

**DOE DEVELOP A CLEAN ENERGY PLAN:** A compilation of resources and information related to clean energy planning. [http://energy.gov/eere/slsc/develop-clean-energy-plan?Assistance\\_Area=Develop%20a%20Clean%20Energy%20Plan](http://energy.gov/eere/slsc/develop-clean-energy-plan?Assistance_Area=Develop%20a%20Clean%20Energy%20Plan)



## FINANCING

**DOE PAY FOR CLEAN ENERGY:** A portal for innovative clean energy financing solutions. [http://energy.gov/eere/slsc/pay-clean-energy?Assistance\\_Area=Pay%20for%20Clean%20Energy](http://energy.gov/eere/slsc/pay-clean-energy?Assistance_Area=Pay%20for%20Clean%20Energy)

### SOLAR OUTREACH PARTNERSHIP FINANCING

**RESOURCES:** Resources to help communities explore financing mechanisms and other important financial considerations related to solar implementation. <http://solaroutreach.org/resource-section/financing/>

### DOE FEDERAL FINANCING PROGRAMS FOR CLEAN ENERGY 2016:

A resource guide to U.S. government programs that support the development of clean energy projects in the United States and abroad. [http://energy.gov/sites/prod/files/2016/05/f32/Federal\\_Financing\\_Programs\\_for\\_Clean\\_Energy.pdf](http://energy.gov/sites/prod/files/2016/05/f32/Federal_Financing_Programs_for_Clean_Energy.pdf)



## MODELING TOOLS

**ENERGY MODELING 101:** An overview resource covering the basics of power sector capacity expansion modeling as well as other modeling and analytical tools. <http://energy.gov/eere/slsc/downloads/energy-policy-and-systems-analysis-presentation-energy-modeling-101>

**SYSTEM ADVISOR MODEL:** A performance and financial model designed to facilitate decision making for people involved in the renewable energy industry. <https://sam.nrel.gov/>

**REGIONAL ENERGY DEPLOYMENT SYSTEM:** A long-term capacity-expansion model for the deployment of electric power generation technologies and transmission infrastructure throughout the contiguous United States. <http://www.nrel.gov/analysis/needs/value.html>

## Conclusion

There are a range of actions that state and local governments can take to effectively leverage recently-extended federal tax credits for renewable energy technologies. A broad array of federal resources—on deployment policies and programs, financing mechanisms, and modeling tools—are available to support these actions and help realize the potential of renewable energy for our economy, environment, and health.

### Contact us:

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