

Integrating Solar PV Into Energy Services Performance Contracts: Options for Local Governments Nationwide

Prepared by the



For



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Introduction to Energy Services Performance Contracting at the State and Local Level

State and Local “Lead by Example” Policies

In recent years, many state and local governments have shown an interest in reducing energy costs and enhancing the environmental sustainability of government operations. These policies and programs associated with these efforts are often referred to as “lead by example” approaches, as they are intended to demonstrate the state or local government’s commitment to environmental protection, energy independence and/or disciplined fiscal management.

As of this writing, the federal government and 38 states have instituted standards for state government public buildings that require (or set a goal for) energy usage reductions and/or increases in the usage of renewable energy resources. In addition to these states, the Database of State Incentives for Renewables and Efficiency (DSIRE) has also identified 36 medium and large cities in 15 states that also have goals or requirements for energy efficiency or renewable energy usage in municipal buildings.ⁱ In order to meet these goals, many state and local governments have utilized a financing method called an energy services performance contract (ESPC).

How Performance Contracts Work: The Value Proposition for Local Government Customers

In a typical performance contracting arrangement, a customer (usually a government agency) will engage with an energy services company (ESCO) to install a series of energy conservation measures (ECMs) (e.g. efficient lighting, HVAC or other building envelope improvements) for little to no upfront cost. At that point, the ESCO establishes the facility’s baseline energy usage and conducts an “investment-grade audit” to ensure that the ECMs will deliver a certain level of energy savings. The ESCO then makes a performance guarantee that ensures that the government agency receives a guaranteed minimum financial savings, ideally achieved through the operation of the ECMs. In exchange, the ESCO receives a share of the total savings delivered by efficient operation of the ECMs.

Figures 1 and 2 illustrate a customer’s likely energy cost pathway with and without a performance contract in place. The main purpose of the performance guarantee is to ensure that the customer receives an overall financial savings, regardless of whether or not all of the energy conservation measures operate correctly.

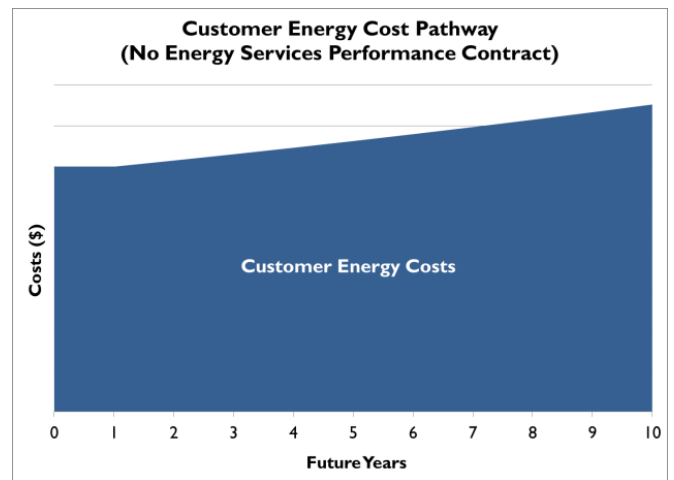


Figure 1: Likely Customer Energy Cost Pathway Without a Performance Contract in Place

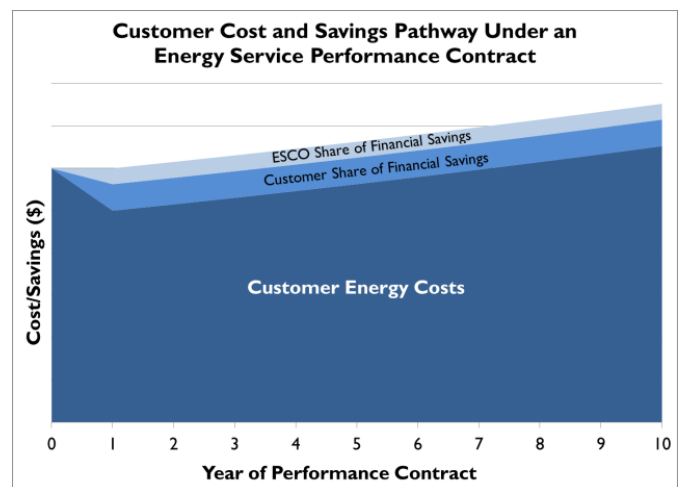


Figure 2: Potential Customer Energy Cost, Customer Share of Energy Savings, and ESCO Share of Cost Savings in a Performance Contract

Benefits of Performance Contracting for Local Governments

Limited to No Upfront Capital Required: When a government customer enters into a performance contract with a “shared savings” structure, the ESCO covers most, if not all, of the upfront costs for the installation of the ECMs selected for the project. This allows the customer to realize utility bill savings without a significant outlay of initial capital.

Guaranteed Long-Term Financial Savings: When customers enter into a performance contract with a performance guarantee, the customer can expect a predetermined amount of financial savings. This allows municipalities to have greater clarity and control related to their future energy savings, if not their future energy costs.

Energy Portfolio Diversification/Utility Rate Hedge Value: In addition, local governments entering into performance contracts can utilize solar PV, which has no fuel costs, to hedge against the rising cost of electricity from their local utility provider. In tandem with solar PV’s hedge value, local governments can diversify their energy resources, which may, in certain cases, allow them to provide power during an emergency situation when the grid is not delivering reliable power.

Job Retention and Enhancement of Government Services: Since the beginning of the economic downturn, local governments have borne the brunt of reduced tax revenues, which have forced many communities to enact deep budget cuts. As a result, since January 2009, local governments have shed approximately 503,000 jobs.ⁱⁱ While the energy and financial savings to local governments from cutting energy costs with a performance contract may not necessarily allow many of these jobs to be retained, it could help stem further job losses at the local level and enhance the delivery of local government services.

Avoidance of Deferred Maintenance: Many local governments suffer from a problem known as deferred maintenance, where jurisdictions cannot afford facilities maintenance and repairs and put them off to future budget years.ⁱⁱⁱ As part of the contract, an ESCO will perform all necessary maintenance of the investments made, taking this financial burden off of the municipality.

Enhancement of Community Sustainability Efforts: Finally, many local governments have made pledges to integrate sustainable business practices into all aspects of local government. Utilizing solar PV to provide some of its electricity allows local governments to enhance the sustainability of their operations, as well as serve as an example to their community and to other communities.

Incorporating Solar PV Into an Energy Services Performance Contract

Improving Economics of Solar PV for Local Governments

Over the past 10 years, solar PV has become a more attractive option for small to medium commercial electric utility customers interested in reducing their monthly bills. This favorable shift in the economics of solar PV has taken place for two key reasons:

Increasing Utility/Energy Costs: Since 2003, the cost of electricity for the average U.S. commercial customer has risen by 26%.^{iv} This is the result of a significant building and investment cycle undertaken by U.S. utilities, as well as increasing (yet fluctuating) costs of coal, natural gas and other purchased power.

Falling Costs of Solar PV Installations: Concurrently, the cost of rooftop solar PV has fallen dramatically. Over the same 2003-2012 time period, the cost of solar PV installations sized for small and medium-commercial customers (10-100 kW) has declined 44%. These costs represent the cost of the installation without any federal, state, local, or utility incentives.^v

As a result, the rate at which investments in solar PV “payback” in the form of reduced utility costs has dropped. While these payback rates vary across the country with electricity rates, incentives, tax and renewable energy credits, net metering policies, and solar resources, many recent estimates show that customers across the country are able to purchase systems over 10 kW and under 100 kW with payback periods under ten years.^{vi}

The Rise of Third-Party Financing

As the cost of solar PV has declined over the past ten years, the value of incentives offered by many states and utilities has declined significantly. In fact, the average value of incentives offered by states and local utilities per watt of solar PV installed has declined 77% since 2003. As a percentage of the total installed cost, this means that average state and local incentives have declined from 51% of the total installed cost to just 21% in 2012.^{vii}

Despite these declining state and local incentive levels the solar PV industry has continued to deliver enhanced value to its customers via alternative financing structures. Many solar PV installers offer favorable financing terms, such as third-party ownership options such as a lease or power purchase agreement that reduce or eliminate the upfront cost of purchasing a rooftop solar PV system.

This innovation has allowed customers that do not have significant capital on hand to enjoy the benefits and bill savings associated with solar PV. In fact, as Figure 3 shows, systems that are financed via third-party financing and ownership have captured a significant share of the commercial-scale PV markets in California and Arizona, two of the largest markets for solar PV in the nation.^{viii}

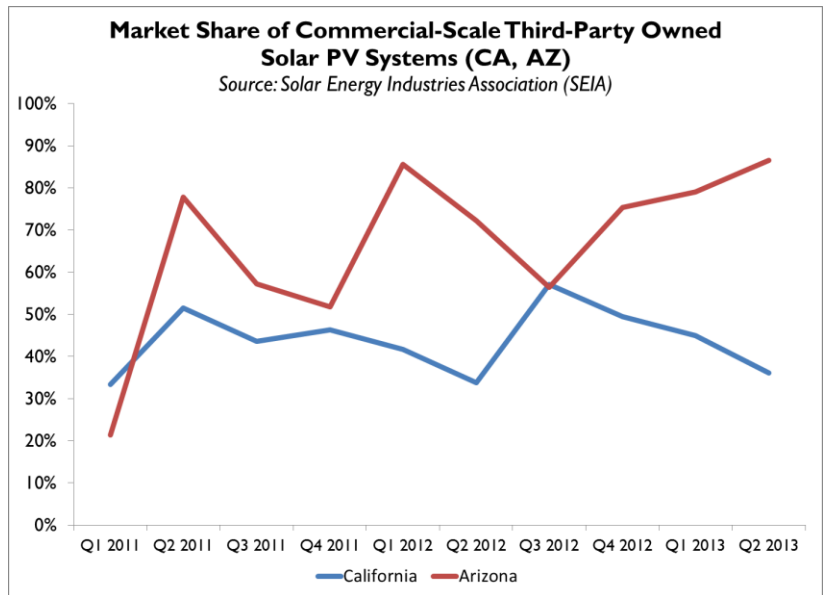


Figure 3: Market Share of Third-Party Owned Commercial PV Systems

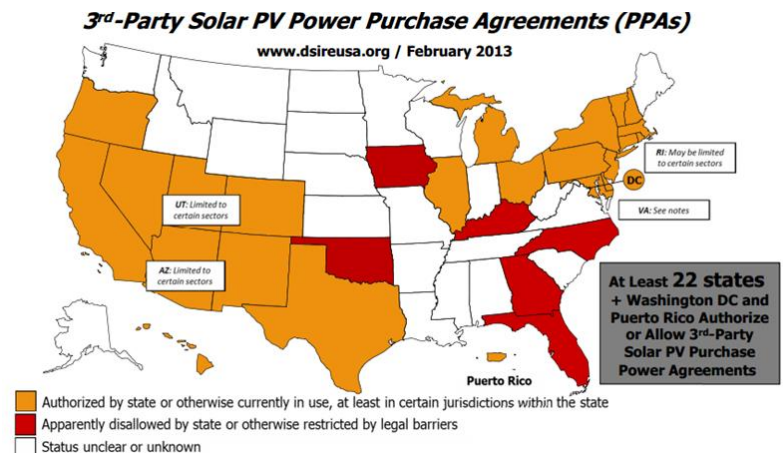


Figure 4: States Allowing/Disallowing Third Party PPAs for Solar PV (Source: Database of State Incentives for Renewables and Efficiency (DSIRE))

Case Study: City of Cincinnati, OH



Duke Energy Convention Center Solar PV Array (Photo Credit: Ohio Department of Development)

Project Description

The City of Cincinnati, OH has entered into a two-phase performance contract with Ameresco, a major energy services company, to install a wide variety of energy conservation measures (ECMs). As part of the contract, Ameresco installed a 100.1 kW system on the roof of Cincinnati's Duke Energy Convention Center.

Third-Party PPA Permitted?

Yes. Ohio permits third-party PPAs for solar PV.

Commercial Electricity Price (Source: EIA):

12.8 cents/kWh (Duke Energy Ohio)

Total Investment

\$6.7M

Total Shared Savings

Phase 1: \$153,731/yr.

Phase 2: \$324,819/yr.

Source: Ameresco. "Case Study: Cincinnati, OH". Available: <http://www.ameresco.com/case-study/city-cincinnati>

Financing Solar PV Via Performance Contracting

Instead of making an upfront purchase with the use of revenue or bonds, performance contracting allows for alternative methods for financing solar PV. This allows municipal governments to install solar PV with little or no up-front cost allowing for savings from day one.

Third-Party PPAs

Customers interested in investing in solar PV through a performance contract can enter into a power purchase agreement (PPA) with their energy services company for on-site solar PV generation. Under a PPA structure, a solar PV installer will own the PV system on a customer's roof and sell them the electricity produced from the system for no upfront cost. This is the most common way to finance a solar PV project through an energy services performance contract.

As of this writing, third-party PPAs are explicitly authorized in 22 states, Washington, DC, and Puerto Rico. However, as of this writing, PPAs are explicitly disallowed in several states, and their status is somewhat less than clear in the rest.^{ix}

Typically, a power purchase agreement will have the following terms and structure:

- A minimum energy performance guarantee;
- An annual price (in cents/kWh) for electricity from the system, as well as an annual percentage "escalator" (price increase); and
- Terms related to the ownership (and receipt of revenue from) renewable energy certificates (RECs) generated by the operation of the PV system, as well as terms related to the customer's purchase of the system after a set number of years.^x

Third-Party Equipment Leasing

If third-party PPAs are not permitted in a given state, an ESCO could potentially offer its customer the option to enter into a leasing arrangement, in which the solar PV installer leases the solar panels to a customer for a predetermined lease payment over a specific lease term. While the states that do not permit third-party PPAs restrict third parties from selling electricity within another utility's designated retail service territory, these restrictions do not necessarily extend to leasing arrangements in which the third-party leases the solar PV system to a customer for a lease payment that is not tied to the customer's energy usage.^{xi} As a result, leasing agreements are often executed in states that explicitly disallow third-party solar PPAs.

Cash Purchase

Another financing option is for the city to simply purchase the PV system with cash. In this case, the local government has full ownership over the solar array, while the ESCO still provides a performance guarantee and maintenance services. The ESCO also helps in the process of purchasing and installing the system. The downside of this option is that the city is unable to take advantage of tax credits. However, the city is able to avoid interest and lease payments this way.

Other Financing Mechanisms

If a local government chooses not to use third-party financing to procure solar PV as part of a performance contract, it can avail itself of other options. One such option is a Qualified Energy Conservation Bond (QECCB). A QECCB is a bond that has its interest rate subsidized by the U.S. Treasury in order to make it more attractive to municipal bond investors. However, the downside of this arrangement (especially if no third party is able to own or lease the system to the customer) is that the local government will have more difficulty accessing the tax benefits associated with installing a solar PV system, given that it will not have a private-

Case Study: City of Knoxville, TN



Knoxville Convention Center Solar PV Array (Photo Credit: International Brotherhood of Electrical Workers Local 790)

Project Description

In 2009, as part of a performance contract the City signed with Ameresco, a major energy services company, the City built a 30-kW PV array on the roof of its convention center. In 2011, it added an additional 90 kW (outside of the ESPC), bringing the array's total capacity to 120 kW.

Third-Party PPA Permitted?

No. The Tennessee Valley Authority does not allow third-party PPAs for solar PV in the retail service territories for whom it generates electricity.

Commercial Electricity Price (Source: EIA):

9.8 cents/kWh (Knoxville Utilities Board/Tennessee Valley Authority)

Total Performance Contract Investment
\$13.8M

Total Shared Savings
\$1.1M/year

Source: Ameresco. "Case Study: Knoxville, TN". Available: http://www.ameresco.com/sites/default/files/cs_knoxville_0.pdf

sector partner to take the federal (and, often, state) corporate tax benefits available.

For more information about incentives or grants available in your state related to the purchase and/or financing of solar PV, please visit the Database of State Incentives for Renewables and Efficiency (DSIRE) at dsireusa.org.

Advantages of Financing Solar PV Through a Performance Contract

There are several advantages to using third-party financing (particularly via PPAs) to integrate solar PV into a performance contract for a government agency.

First, government agencies are able to benefit from not only the energy savings associated with the operation of the system, but also from the pass-through of federal, state, and local tax incentives that they, as entities without a tax liability, are unable to claim without partnering with an ESCO. Specifically, ESCOs may have a tax liability, which allows them to take advantage of federal, state, and local corporate tax benefits, or secure tax equity financing from investors that have an even more significant tax liability.

Second, the government agency can, as a utility customer, enter into net metering agreements with their local utility to sell their electricity back at retail (or near-retail) rates, thereby supplementing their utility bill savings.

Third, signing a PPA allows the government agency to benefit from energy and utility bill savings from solar PV without having to invest any upfront capital or claim the solar PV system on their balance sheet. Finally, the ESCO assumes responsibility for the operation and maintenance of the system, much like it would for all other ECMs the customer chooses to install.^{xii}

While many of the same advantages of third party PPAs for customers also apply to third party leasing arrangements, one drawback of this approach is that customers must pay the same rate each month for the solar PV installation. This means that the customer may pay more for the lease payment than they receive in energy savings during winter months in which the solar PV installation produces less energy. However, leases could be structured to have a term long enough to structure a payment that produces energy savings, subject to any limitations on the length of contracting terms permitted by state and local laws.

Local Governments' Experiences with Incorporating Solar into a Performance Contract

Knoxville, TN

In 2007, the mayor of Knoxville, Bill Haslam (now governor of Tennessee), recognized that the city wasn't paying enough attention to its energy use and made it a goal for the City of Knoxville to reduce its energy expenditures.^{xiii} This led to the city's interest in an ESPC to save energy and costs. In 2008, Knoxville was awarded a Solar America Cities grant and became interested in establishing itself as a leader in solar energy and setting an example for other cities to follow.^{xiv} These two goals of saving energy expenses and becoming a solar leader led to the city of Knoxville's decision to incorporate a solar array into its ESPC.

Ameresco, Knoxville's ESCO, was aware of the city's status as a Solar America Cities awardee, and presented the choice of including a solar array in the contract.^{xv} The city selected this option and had a 30-kW system installed on its convention center's roof. While the system is relatively small, it is highly visible, helping to increase energy awareness in the city. As third-party PPAs are not permitted in TVA's service territory, Knoxville had to use a different financing mechanism. The city used municipal bonds to purchase the PV array,

and was thus unable to take advantage of tax credits.^{xvi} However, unlike traditional ownership, under the performance contract, Ameresco is responsible for maintenance of the system.

A performance guarantee was made for the contract as a whole, rather than for each individual energy measure implemented. However, a projected output for the PV array was given to the city, and the actual output has been very close to this projection.^{xvii} Furthermore, Ameresco's initial report indicates that the energy measures altogether have saved more than projected, and energy use in city buildings has declined by 16%.^{xviii}

City of Knoxville sustainability director Erin Gill and sustainability project manager Jake Tisinger noted that integrating solar into an ESPC is an excellent way for a city to begin its work on solar. While the process of establishing an ESPC can be lengthy, particularly for longer contracts, bundling a solar array with other high-return efficiency measures can make for an easily justifiable investment and lead to further interest in solar. Since completing its PV system as part of the ESPC, the city of Knoxville has had a second third-party owned array installed.¹

Cincinnati, OH

When the city of Cincinnati began the process of entering into its ESPCs, Cincinnati sustainability coordinator Steve Johns said that “the city was looking to do the right thing by the environment, but also make sure that the economics worked.” Their investment was made during the recession and also helped to stimulate the local economy.²

Cincinnati entered into performance contracts in 2009 and 2010 (phases 1 and 2), and the city is currently working on a third phase. As part of the first phase, Cincinnati installed a 100.1 kW solar PV system on the roof of the Duke Energy Convention Center. Overall, the city of Cincinnati has saved more money than expected through its performance contracts and is very pleased with its PV system.

Three Suggested Approaches for Local Governments to Consider

Understand the key incentives, rules and policies available in your state. While the federal government has a consistent set of incentives offered in all 50 states, there are a wide variety of state and local incentives (as well as laws, rules and regulations related to performance contracting) that have a profound and varied impact upon the solar PV value proposition for local governments. Before using a performance contract to invest in PV, it is important to ensure that it is feasible under state law, and makes economic sense for your local government.

Pursue larger-scale orders to reduce costs and maximize savings and investment return. As many of the case studies in this fact sheet show, many local governments choosing commercial-scale rooftop solar PV systems choose larger scale systems at or above 100 kW. Investing in a larger system, while more costly as an individual line-item, provides more rapid payback and more significant savings and financial returns for local governments over the life of a performance contract.

Consider utilizing a variety of financial metrics to understand solar PV's role in a performance contract's overall value. The advent of third-party financing and/or ownership challenges many

¹ Conversation with Erin Gill and Jake Tisinger. City of Knoxville Sustainability Department. 19 February 2014.

² Conversation with Steve Johns. City of Cincinnati Office of Environment and Sustainability. 18 February 2014.

conventional ways of thinking about investing in solar PV and other ECMs. As an analysis by the National Renewable Energy Laboratory (NREL) notes, the ability to finance a solar PV system has no effect on the “simple payback” calculation central to determining what ECMs are able to be part of an energy services performance contract.^{xix} As NREL notes, when using a “time to net positive cash flow” payback method (which assumes a system is paying back at the first moment it provides savings greater than costs), the same PV system that might have a longer “simple payback” actually provides savings much more quickly than “simple payback” analysis would suggest.^{xx}

Local governments have a wide array of options for using solar PV to reduce their utility bills and enhancing the sustainability and effectiveness of their operations. For more information on how local governments can go solar, please visit solaroutreach.org.

SOURCES:

- ⁱ Database of State Incentives for Renewables and Efficiency (DSIRE). “Rules, Regulations and Policies for Energy Efficiency: Energy Standards for Public Buildings”. Accessible at: <http://dsireusa.org/summarytables/rrpee.cfm>. Accessed on: 11 November 2013.
- ⁱⁱ Seasonally-Adjusted Employment, Hours and Earnings data for Local Government, Table B-1 of the Current Employment Survey, Bureau of Labor Statistics (BLS), U.S. Department of Labor. Accessible at: <http://www.bls.gov/webapps/legacy/cesbtab1.htm>. Accessed 30 September 2013.
- ⁱⁱⁱ U.S. Department of Energy. “Energy Savings Performance Contracting (ESPC): Opportunities and Advantages”. Accessible at: http://www1.eere.energy.gov/wip/solutioncenter/pdfs/T2_ICF_FS3_OpportunAdvant_FINAL_052311.pdf. Accessed 14 February 2014.
- ^{iv} U.S. Energy Information Administration (EIA). EIA Form 861. Accessible at: <http://www.eia.gov/electricity/data/eia861/>. Accessed 11 November 2013.
- ^v Analysis of data file from Barbose, et al. *Tracking the Sun VI: An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2012*. Lawrence Berkeley National Laboratory (LBNL). Accessible at: <http://emp.lbl.gov/publications/tracking-sun-vi-historical-summary-installed-price-photovoltaics-united-states-1998-2012>. Accessed 11 November 2013.
- ^{vi} National Renewable Energy Laboratory (NREL). *Federal Energy Management Program (FEMP) Screening Map*. Available at: http://maps.nrel.gov/femp_atlas. Accessed 14 April 2014.
- ^{vii} Ibid.
- ^{viii} Data from GTM Research/Solar Energy Industries Association (SEIA), provided to the author by Philip Haddix of the Solar Foundation.
- ^{ix} Database of State Incentives for Renewables and Efficiency (DSIRE). “Third-Party Solar PV Power Purchase Agreements (PPAs)”. Accessible at: http://dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf. Accessed 13 November 2013.
- ^x Clinton Climate Initiative. *Energy Performance Contracting Financing Options. From the EPC Toolkit for Higher Education, April 2009*. Accessible at: http://www2.presidentsclimatecommitment.org/documents/ccitoolkit/Energy_Performance_Contracting_Financing_Options.pdf. Accessed 11 November 2013.
- ^{xi} Municipalities interested in a third-party leasing arrangement should ensure that third-party leasing is permitted in their state. This review can and should be undertaken by a licensed attorney.
- ^{xii} Ibid.
- ^{xiii} Correspondence with Erin Gill and Jake Tisinger. City of Knoxville Sustainability Department. 19 February 2014.
- ^{xiv} Ibid.
- ^{xv} Ibid.
- ^{xvi} Ibid.
- ^{xvii} Ibid.
- ^{xviii} Ibid.
- ^{xix} Drury, et al. “The Impact of Different Economic Performance Metrics on the Perceived Value of Solar Photovoltaics”. National Renewable Energy Laboratory (NREL). Accessible at: <http://www.nrel.gov/docs/fy12osti/52197.pdf>. Accessed 12 November 2013.
- ^{xx} Ibid.