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National Renewable Energy Laboratory
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Rooftop Photovoltaics Market Penetration Scenarios

Subcontract Report
NREL/SR-581-42306
February 2008

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Navigant Consulting, Inc.
Burlington, Massachusetts

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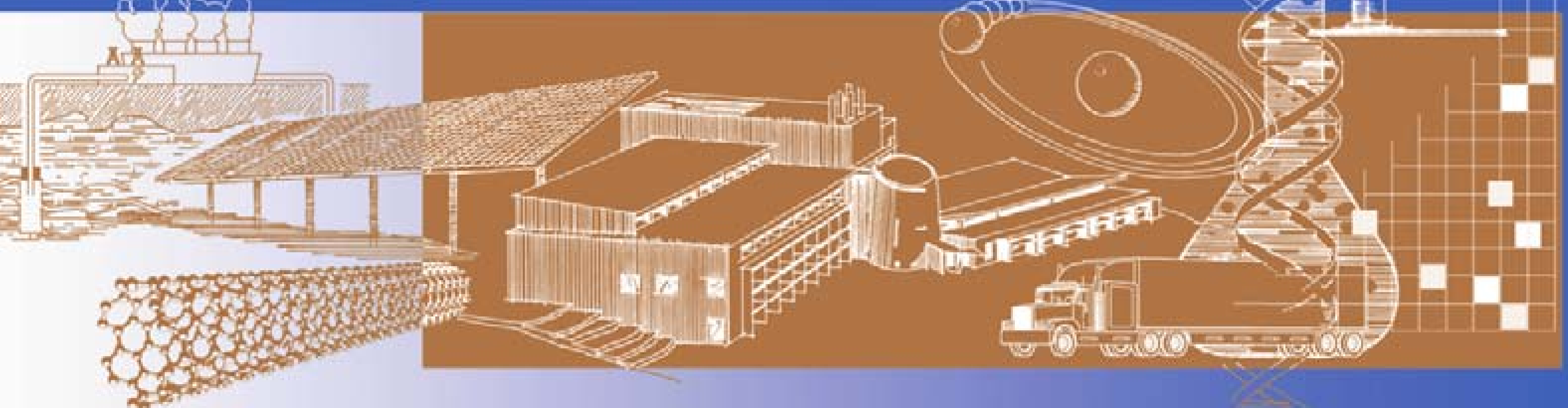

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Preface

Now is the time to plan for the integration of significant quantities of distributed renewable energy into the electricity grid. Concerns about climate change, the adoption of state-level renewable portfolio standards and incentives, and accelerated cost reductions are driving steep growth in U.S. renewable energy technologies. The number of distributed solar photovoltaic (PV) installations, in particular, is growing rapidly. As distributed PV and other renewable energy technologies mature, they can provide a significant share of our nation's electricity demand. However, as their market share grows, concerns about potential impacts on the stability and operation of the electricity grid may create barriers to their future expansion.

To facilitate more extensive adoption of renewable distributed electric generation, the U.S. Department of Energy launched the Renewable Systems Interconnection (RSI) study during the spring of 2007. This study addresses the technical and analytical challenges that must be addressed to enable high penetration levels of distributed renewable energy technologies. Because integration-related issues at the distribution system are likely to emerge first for PV technology, the RSI study focuses on this area. A key goal of the RSI study is to identify the research and development needed to build the foundation for a high-penetration renewable energy future while enhancing the operation of the electricity grid.

The RSI study consists of 15 reports that address a variety of issues related to distributed systems technology development; advanced distribution systems integration; system-level tests and demonstrations; technical and market analysis; resource assessment; and codes, standards, and regulatory implementation. The RSI reports are:

- *Renewable Systems Interconnection: Executive Summary*
- *Distributed Photovoltaic Systems Design and Technology Requirements*
- *Advanced Grid Planning and Operation*
- *Utility Models, Analysis, and Simulation Tools*
- *Cyber Security Analysis*
- *Power System Planning: Emerging Practices Suitable for Evaluating the Impact of High-Penetration Photovoltaics*
- *Distribution System Voltage Performance Analysis for High-Penetration Photovoltaics*
- *Enhanced Reliability of Photovoltaic Systems with Energy Storage and Controls*
- *Transmission System Performance Analysis for High-Penetration Photovoltaics*
- *Solar Resource Assessment*
- *Test and Demonstration Program Definition*
- *Photovoltaics Value Analysis*
- *Photovoltaics Business Models*

- *Production Cost Modeling for High Levels of Photovoltaic Penetration*
- *Rooftop Photovoltaics Market Penetration Scenarios*.

Addressing grid-integration issues is a necessary prerequisite for the long-term viability of the distributed renewable energy industry, in general, and the distributed PV industry, in particular. The RSI study is one step on this path. The Department of Energy is also working with stakeholders to develop a research and development plan aimed at making this vision a reality.

Acknowledgments

Navigant Consulting Inc. (NCI) would like to first thank the U.S. Department of Energy (DOE) and the DOE National Renewable Energy Laboratory (NREL) for sponsoring this work. NCI would also like to thank the McGraw-Hill Companies for providing floor space data, a crucial component of this study. Furthermore, many independent reviewers took the time to review this report and provide valuable insights; their efforts were very much appreciated.

List of Acronyms

BAU	business as usual scenario
CBECS	Commercial Building Energy Consumption Survey
DOE	U.S. Department of Energy
EIA	Energy Information Administration
FERC	Federal Energy Regulatory Commission
IREC	Interstate Renewable Energy Council
MW	megawatt
MWh	megawatt-hour
NCI	Navigant Consulting, Inc.
NREL	National Renewable Energy Laboratory
O&M	operation and maintenance
RECS	Residential Energy Consumption Survey
RPS	Renewable Portfolio Standard
RSI	Renewable System Integration (study)
SAI	Solar America Initiative
TOU	time of use

Executive Summary

The goal of this study was to model the market penetration of rooftop photovoltaics (PV) in the United States under a variety of scenarios, on a state-by-state basis, from 2007 to 2015. The study was performed by Navigant Consulting Inc. (NCI) for the U.S. Department of Energy (DOE) under a subcontract to the DOE National Renewable Energy Laboratory. The model looked at the retrofit and new construction segments of the residential and commercial rooftop markets. For each state, the model calculated the market penetration percent, annual installations, and cumulative installations. The scenarios studied included net metering rules, electric rate tariff levels and structures, the availability of financial incentives, system pricing, and carbon legislation.

To perform the market penetration analysis, NCI first calculated the technical potential for PV implementation for each of the 50 states by using data on floor space, building characteristics, PV solar access factors, and PV system efficiency. Next, based on a selection of 98 representative utilities within the states and the District of Columbia, NCI calculated economic potential using current electric rate structures and tariffs, local and federal incentive levels, system costs, operation and maintenance (O&M) and inverter replacement costs, building load profiles, PV output profiles, and net metering rules. This work yielded a simple payback period, which was incorporated into a market penetration curve. To arrive at the final estimate of economic potential, the market penetration results were augmented by a technology adoption curve, screens related to interconnection standards, and Renewable Portfolio Standard (RPS) solar set-aside requirements.

NCI ran a variety of scenarios to examine the impacts of different variables, including variations on system pricing, interconnection standards, net metering availability, net metering caps, carbon legislation, electric price escalation, availability of time-of-use rates, RPS enforcement, and availability of federal and local incentives for PV. The variables with the largest impact on market penetration were system pricing, net metering policy, extending the commercial and residential federal tax credits to 2015 (as opposed to our baseline assumption of commercial incentives to 2015 and residential ones to 2010), and interconnection policy, as shown in Figure E-1.

Figure E-1 illustrates that there is significant potential in the United States for PV on buildings. However, several variables that were not modeled in this study could impact the results. Constraints along the PV supply chain (such as the current silicon shortage) could result in higher module prices or constrained supply, thus decreasing market penetration. In addition, significant international demand could draw supply away from the U.S. market, thus decreasing U.S. market penetration. In contrast, new state or federal policies, such as incentive programs or RPS, could drive U.S. demand even higher.

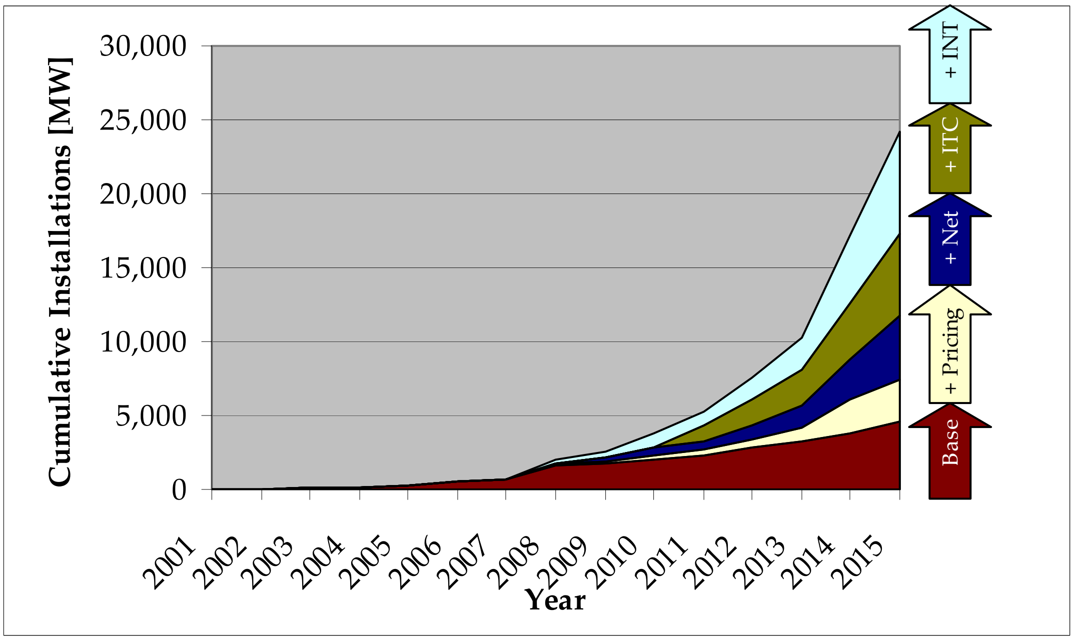

Figure E-1. Influence on cumulative U.S. PV installations of system pricing, net metering policy, federal tax credits, and interconnection standards

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1.0 Introduction

The economic viability of photovoltaics (PV) in the United States is a function of several variables, including electricity prices, system costs, net metering laws, and incentives. Given the fragmented nature of electricity markets, regulations, and incentives, the economics of PV need to be assessed locally. Accordingly, for this study, we modeled the market penetration of rooftop PV in the United States under a variety of scenarios, on a state-by-state basis, from 2007 to 2015.

The study was performed by Navigant Consulting Inc. (NCI) for the U.S. Department of Energy (DOE) under a subcontract to the DOE National Renewable Energy Laboratory (NREL). The analysts were challenged to ensure that the modeling methodology was highly clear and transparent. The model looked at the retrofit and new construction segments of the residential and commercial rooftop markets. It did not include field-based systems, a potentially significant market segment for growth. It also did not capture price dynamics related to international competition for PV modules, or downward changes in electricity prices resulting from a potential drop in demand because of PV.

For each state, the model calculated the percent market penetration, annual installations, and cumulative installations. The scenarios studied included net metering rules, electric rate tariff levels and structures, availability of financial incentives, system pricing, and carbon legislation. This report and the current version of the model are important early steps in the development of a better understanding of the market dynamics of the U.S. PV industry.

2.0 Current Status of the Research

Many market studies of the PV industry have been performed during the past few years. Examples include DOE PV road maps (www.eere.energy.gov/solar/deployment.html), PV Services Program reports (www.navigantconsulting.com), Solarbuzz projections (www.solarbuzz.com), and reports from the Prometheus Institute (www.prometheus.com). NCI and others have completed in-depth market penetration studies for constrained areas (Arizona, California, and Austin, Texas), but each of these markets is unique, so study results cannot be extrapolated to the entire nation.

Most previous studies have not used a market penetration approach that captures all facets of project economics. Prior projections have used a variety of approaches:

- A simple extrapolation of historical PV demand, using factors to represent aggressive or decreasing demand
- Market surveys to obtain key player views on future projections
- Reviews of the projected levelized cost of electricity for PV versus retail electricity rates to assess project attractiveness.

None of these methods, however, are in publicly available models. The goal of this research was to create a publicly available model that captures local variables such as retail electric rates, insolation levels, weather (and hence building load), incentives, net metering policy, and interconnection policy.

3.0 Project Approach

NCI created a Microsoft Excel©-based spreadsheet tool for calculating market penetration. shows a flow diagram of the model. This chapter discusses each section of the model: technical potential, economic potential, and the scenarios studied.

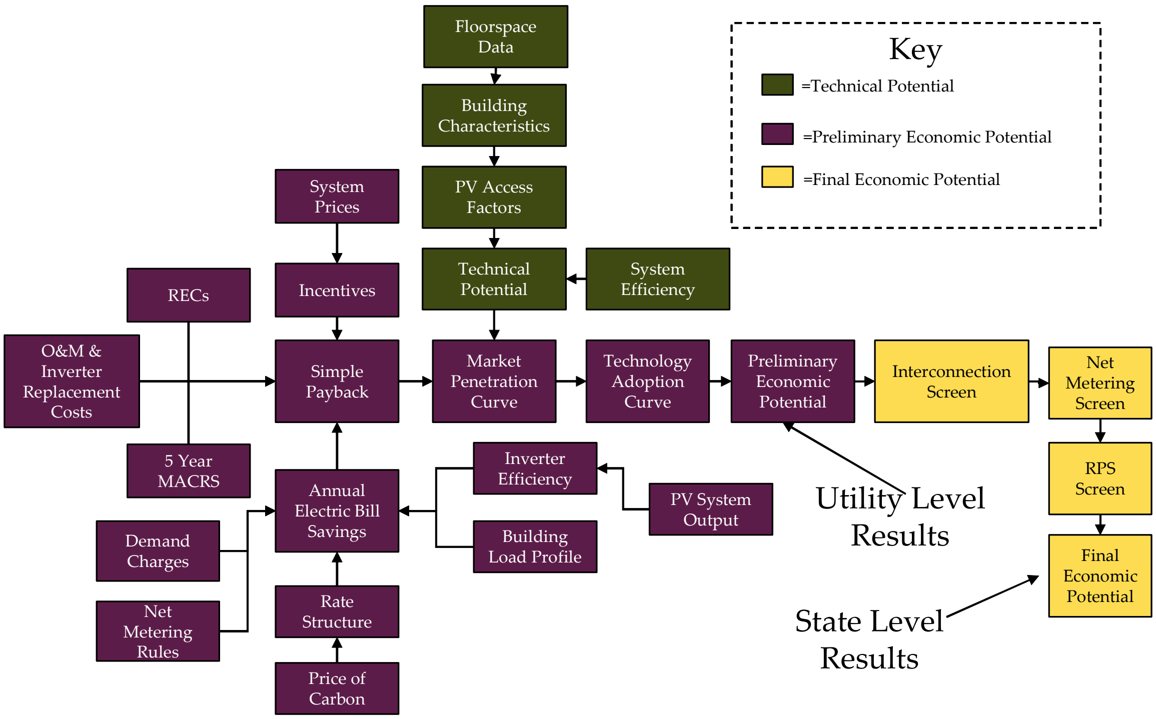

Figure 1. Market penetration flow diagram

3.1 Technical Potential

To calculate the market penetration of PV, we must first know the size of the available market. Current and projected total U.S. roof space was thus estimated for 2007 through 2015, by state, for residential and commercial buildings. A PV solar access factor was then applied to the roof space data to estimate how much roof space is actually available for PV. The PV access factor takes into account shading, building orientation, and roof structural soundness. PV power density data are then used to calculate potential installed capacity on a state-by-state basis.

To calculate total roof space, we began with data on the total amount of floor space in residential and commercial buildings, by state, from McGraw-Hill for 2007 through 2011. They used the growth (or decline) trends from 2007 to 2011 to project growth (or decline) from 2012 to 2015. To estimate how floor space translates into roof space, we used data on the average number of floors per building from the Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS) and Commercial Building Energy Consumption Survey (CBECS) databases. For pitched roofs, assumed to be 92% of the residential market, NCI assumed an 18-degree pitch to calculate roof space. Although 18 degrees is a typical number, the angle can very from 0 to 45 degrees in any given region. We defined new construction based upon the floor space added in any year.

To estimate how much of the total roof space is available for PV, NCI developed PV access factors based on a study for a major U.S. utility company. The study was adjusted for California conditions after interviews with Ed Kern of Irradiance, who has many years of installation experience in the industry. Separate access factors were developed for cooler and warmer climates. State designations are shown in Figure 2. Figure 3, 4, 5, and 6 show the different analyses with the assumptions used for flat residential roofs. The PV access factors were then applied to state-level roof space data to estimate the available roof area for PV. The results should not be confused with the share of homes that are not suitable for PV, however, since the study is focusing on roof space. However, the factors used in the study (~25% for residential and ~60% for commercial) are similar to the space taken up by current PV systems.

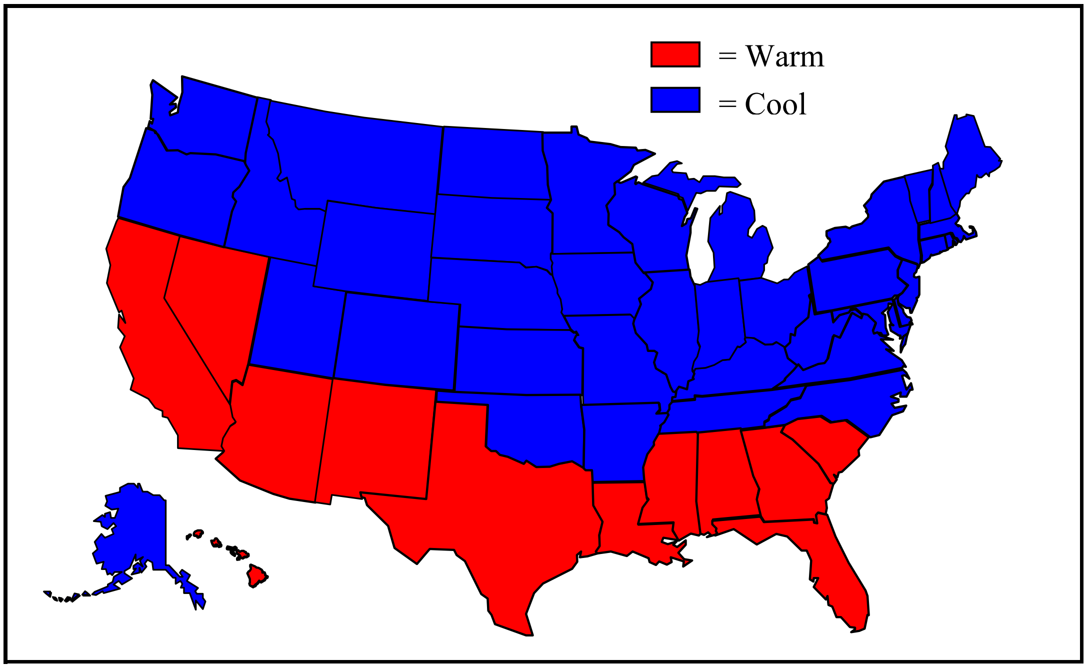

Figure 2. State-level climate type designations

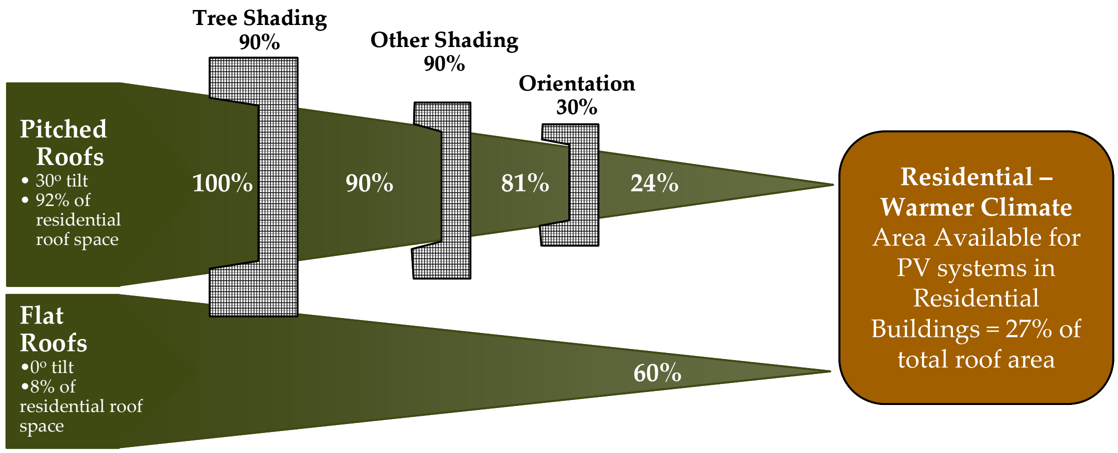

Figure 3. PV access factor for residential buildings in warmer climates

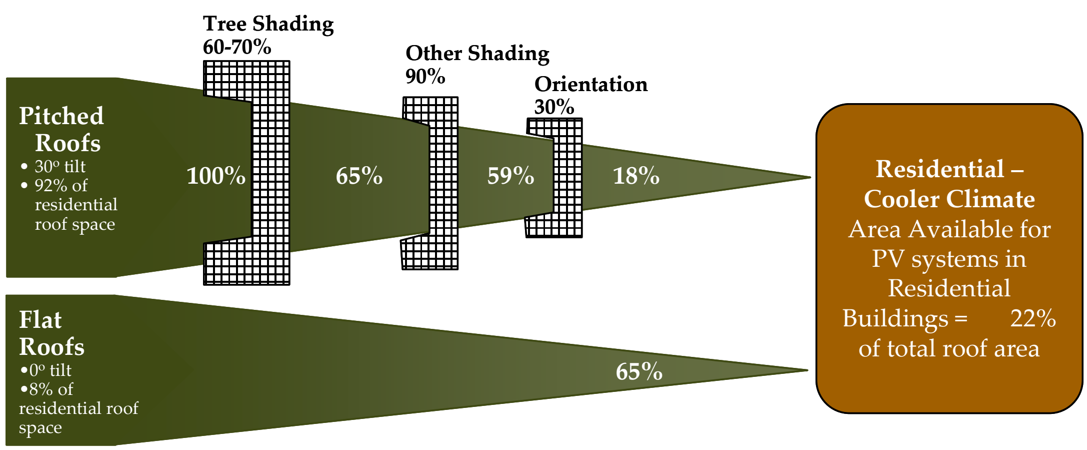

Figure 4. PV access factor for residential buildings in cooler climates

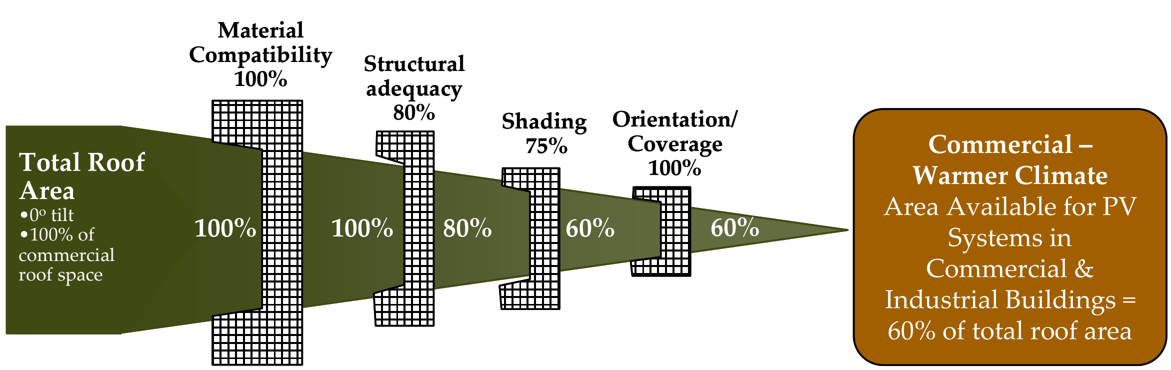

Figure 5. PV access factor for commercial buildings in warmer climates

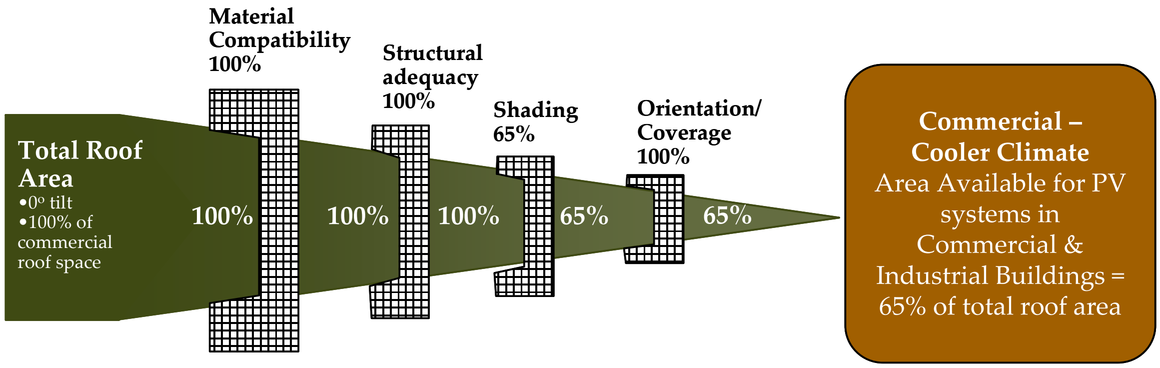

Figure 6. PV access factor for commercial buildings in cooler climates

We estimated the technical potential using data on PV power density from DOE's Solar America Initiative Technology Pathway Partnership (for information, see www.eere.energy.gov/solar/solar_america/index.html). Technical potential is defined as PV system power density (in MW_{pDC} per million square feet) times the roof space available for PV in a given area.

To calculate the power density of a solar PV system in 2007, we developed a weighted-average module efficiency using market share for the three most prevalent technologies in the market today. The power density of a module was then calculated on a square-footage basis, and the power density of a PV system was calculated by applying a packing factor of 1.25 for residential and commercial systems. The packing factor modifies (as a decrease) the PV power density by taking into account space need for the system, such as space for access between modules, wiring, and inverters.

The resulting system power density is 10 MW/million ft^2, as derived from an average module efficiency of 13.5%. For 2015, we assumed an average module efficiency of 18.5% for all installations, resulting in a power density of 13.7 MW/million ft^2 in 2015. Figure 7 shows the technical potential in 2015. Technical potential increases over time for two reasons: rooftop area grows over time and system efficiencies increase over time. See the appendix in this report for a table of state-by-state results.

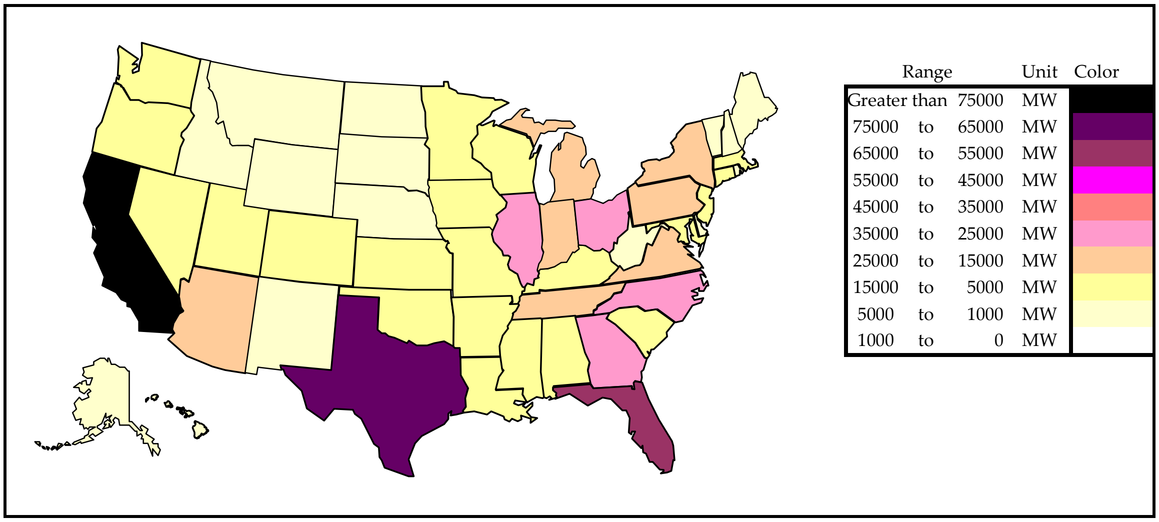

Figure 7. U.S. rooftop PV technical potential in 2015 (independent of economics)

3.2 Preliminary Economic Potential

After calculating the technical potential for each state, we looked at the economics of PV to assess the economic potential. Referring back to Figure 3-1, economic potential is calculated by taking market penetration as a percentage of technical potential and multiplying the results by a technology adoption curve.

The input to NCI's market penetration curves is simple payback, so we picked from one to five utilities in each state to represent PV economics. For each utility analyzed (or state, for certain variables), we collected rate structure and tariff data, net metering rules, incentives data, building load profiles, and PV output profiles. See the appendix for more details about the sources and values of each of these variables and the list of utilities analyzed, by state.

Equation 1 shows the simple payback calculation for the residential market, and Equation 2 shows the calculation for the commercial market. Note that, according to EIA's CBECS database, approximately 25% of all commercial building floor space is contained in buildings that do not pay taxes (such as schools and government buildings), so this calculation is somewhat conservative for those segments.

$$\text{Simple Payback} = \frac{[\text{Installed Cost} - \text{Federal Incentives} - \text{Capacity Based Incentives} + \text{Tax Rate*Rebate Amount}]}{[\text{Annual Electric Bill Savings} + \text{Performance Based Incentives} - \text{O\&M Costs}]}$$

Equation 1. Residential simple payback

$$\text{Simple Payback} = \frac{[\text{Installed Cost} - \text{Federal Incentives} - \text{Capacity Based Incentives} + \text{Tax Rate*Rebate Amount}]}{[(\text{1-Tax Rate})\text{*}(\text{Annual Electric Bill Savings-O\&M Costs}) + \text{Performance Based Incentives} + \text{Amortized MACRS savings}]}$$

Equation 2. Commercial simple payback

We used two different market penetration curves (both of which use simple payback as inputs): one for the retrofit market and one for the new construction market. Figure 8 shows the market penetration curves used. Based on interviews with key stakeholders, we used a different curve for new construction because builders are in general reluctant to add PV as a standard feature and require shorter paybacks before making it standard. We used two studies of market penetration to develop curves for this study. Kastovich et al. calculated market penetration curves for retrofit and new construction markets of energy technologies. They surveyed customer behaviors based on simple payback. NCI produced a curve based on field interviews, consumer surveys, and market data on the adoption of efficient energy technologies in the market, again based on simple payback.

Several variables could influence the evolution of these market penetration curves over time. The most important would be government policies that support the adoption of PV. One example is the California Solar Initiative, which after 2010 requires that all new subdivisions with more than 50 homes must offer PV as an option to potential homebuyers. Another variable could be consumer awareness campaigns that shift consumer behavior to adopt PV at higher paybacks.

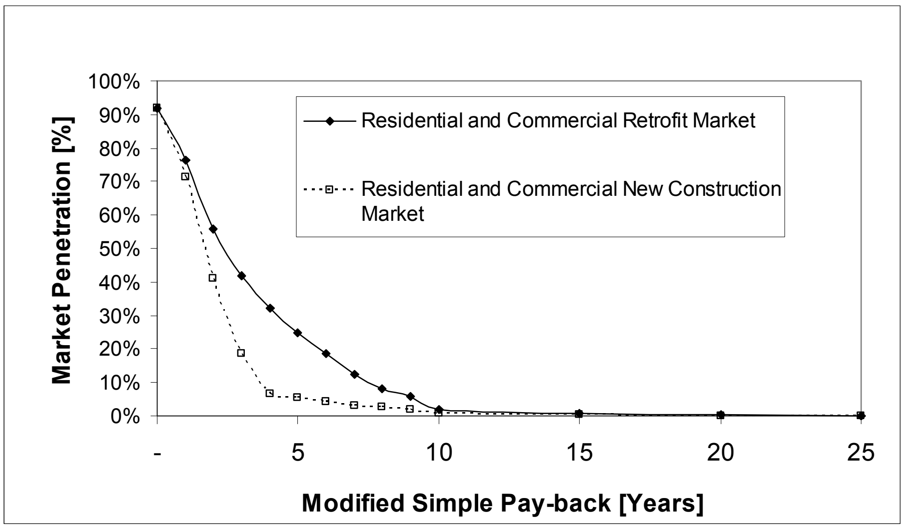

Figure 8. Market penetration curves used

After calculating the percent market penetration, we used an S-curve to model technology adoption. An S-curve provides the rate of adoption of technologies as a function of the technology's characteristics and market conditions. Figure 9 shows the S-curves used, which are Fisher-Pry curves. The Fisher-Pry technology substitution model predicts the market adoption rate for an existing market of known size. We used this model because consumers are replacing grid power with PV power. The market of known size comes from technical potential and market potential calculations.

The rate at which technologies are adopted depends on several market characteristics: technology characteristics (e.g., technology economics, new vs. retrofit); industry characteristics (e.g., industry growth, competition); and external factors (e.g., government regulation, trade restrictions). Historical data collected by Fisher-Pry and NCI reveal that major classes of technology/segment with common segment-penetration characteristics can be classified into five categories, each with its own time to segment saturation, as shown in Table 3-1.

For PV, we picked the two classes that closely resembled the PV market in the United States, class B and class C. They then used the average of the two classes' curves, as shown in Figure 9.

Table 1. Five Classes of Technology Adoption Characteristics (Fisher-Pry)

Characteristics	A	B	C	D	E
Time to Saturation (t_s)	5 years	10 years	20 years	40 years	>40 years
Technology Factors					
Equipment Life	< 5 years	5–15 years	15–25 years	25–45 years	>40 years
Equipment Replacement	None	Minor	Unit operation	Plant section	Entire plant
Technology Experience	New to U.S. only	New to U.S. only	New to U.S. only	New	New
Industry Factors					
Growth (% per year)	>5%	>5%	2~5%	1–2%	<1%
Attitude to Risk	Open	Open	Cautious	Conservative	Adverse
External Factors					
Government Regulation	Forcing	Forcing	Driving	None	None

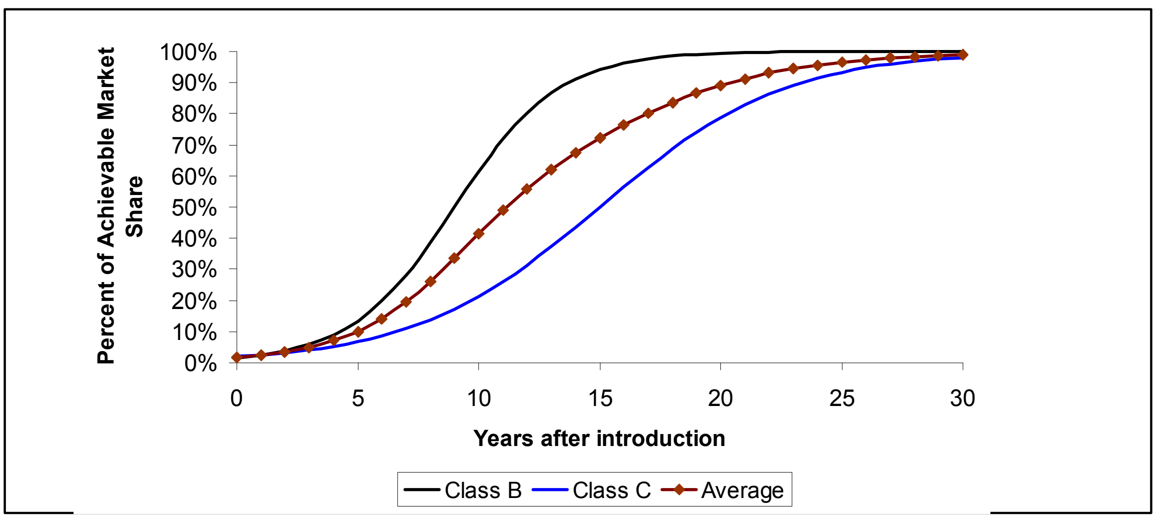

Figure 9. Technology adoption curve used

Because 2007 was more than half over when this report was written, the model assumes annual installations and cumulative installations through 2007 and starts calculating penetration for 2008.

After applying these curves, we arrived at cumulative installations up to the year of analysis. A final market penetration was calculated after applying the RPS and interconnection screens discussed in the next section. Final market penetration is defined as cumulative installations (defined by peak DC rating) in a given area as a percentage of the technical potential in that area.

3.3 Scenarios Analyzed

We developed a set of scenarios dealing with interconnection policy, RPS solar set-aside policy, system pricing, net metering policy, carbon legislation, rate structure policy, electric rate escalation, and federal incentives. For the first of the scenarios, we used data provided to DOE from the Interstate Renewable Energy Council's (IREC) assessment of each state's interconnection standards (or utility's, in states without state-level laws) in regard to facilitating distributed generation. IREC gave each location a rating on a five-point scale, as shown in Table 2, that assesses the likelihood of a system being installed. We then translated these assessments into an assumed percentage of achievable market, also shown in Table 2. They scaled preliminary economic potential by this amount. (See the appendix for a complete list of state rankings.)

Many states' interconnection standards are a barrier to the wider adoption of PV, although several are considering revising them. Recognizing this, we created a scenario in which all states improve their interconnection standards to the point at which the standards do not hinder PV interconnection (i.e., a "superior" ranking in IREC's scale in Table 2).

Table 2. IREC's Interconnection Assessment Rating System

IREC Rating	IREC's Assessment	NCI's Assumed Achievable Market
Superior (A)	Interconnection policies encourage distributed generation	100%
Good (B)	Interconnection policies contain some difficulties but less than 5% of solar projects will incur needless costs or delays because of interconnection problems	95%
Fair (C)	Interconnection policies allow interconnection but with some difficulty. Up to 25% of proposed solar projects will incur needless delays, costs, or some will fail because of interconnection	75%
Poor (D)	Interconnection policies are very poor. Costs of systems and time to complete interconnection will be significant. Up to 50% of projects will incur significant costs and delays to complete interconnection process. An undesirable number of projects will fail.	60%
Barrier (E)	Interconnection policies represent a major barrier to the use of solar. 50% or greater will experience significant costs, delays or project cancellation because of interconnection policies	40%

Some states or utilities have net metering caps, typically expressed as a percentage of the utility's or state's peak load. This study used EIA peak demand data to translate net metering caps as percentages into megawatts. For each year of analysis, market penetration is the ratio of cumulative installations to net metering caps. The model assumes that if net metering caps are reached in a given year, net metering is not allowed in the next year of analysis. We used EIA's Annual Energy Outlook projections for load growth to estimate how peak demand will change over time.

The next two scenarios concern net metering standards. The first net metering scenario assumes all net metering caps are lifted in 2007. The second one concerns the availability of net metering. Currently, most states and the District of Columbia offer net metering, but some states and utilities still do not allow it. Figure 10 shows net metering assumptions for the utilities used in this study, by state. This scenario assumes net metering is available nationwide, starting in 2008.

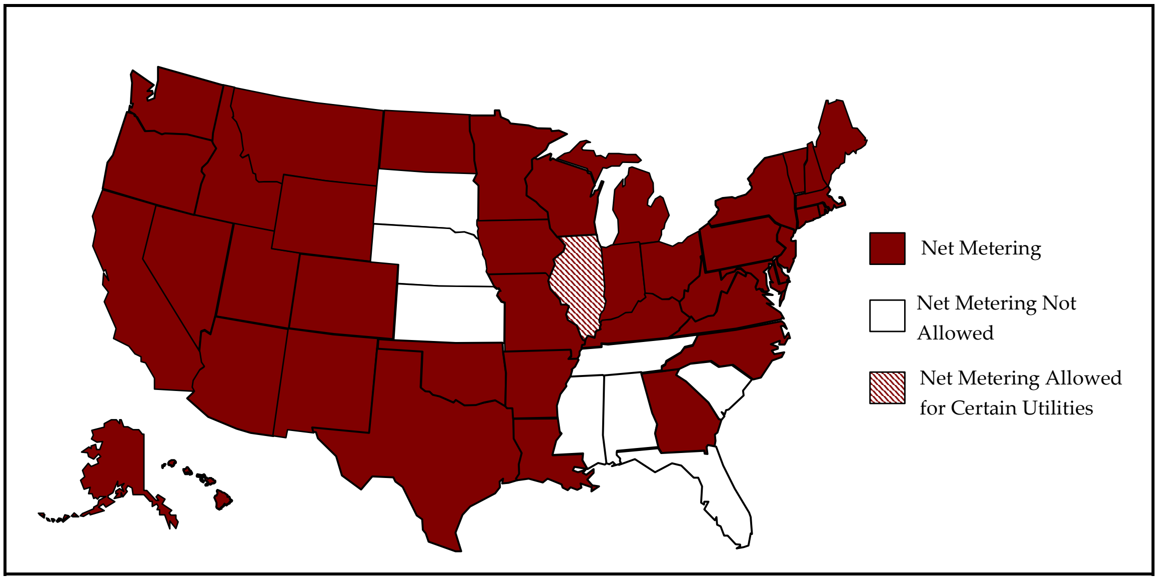

Figure 10. Availability of net metering

The next scenario involved RPS solar set-asides. Several states have solar set-asides or distributed generation set-asides as part of their RPS (i.e., a certain percentage of RPS megawatt-hours must be from PV systems). For each year of analysis, the market penetration model will ensure that market penetration at least meets the level required by solar set-asides, independent of net metering caps, economics, or poor interconnection standards. The exact mechanisms for this are not specified, but examples could be extra utility rebates or utilities owning rooftop PV systems.

For reference, Figure 11 shows solar set-aside requirements in 2015. As shown in the figure, RPS could account for a total of ~2,200 MW of installed PV in 2015. Achieving these goals will depend on a number of factors, such as compliance mechanisms, so they may or may not be met. The model has a switch in which RPS solar set-asides goals are met or not met.

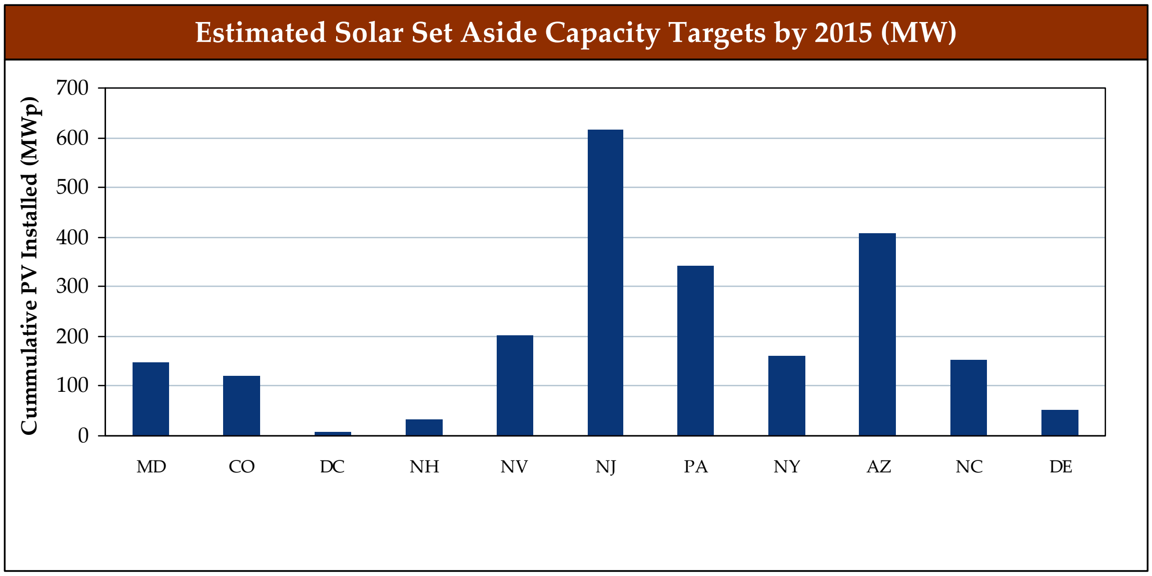

Figure 11. Solar set-aside targets

NCI used two different system pricing cases. The first case assumed that system prices decline at historical rates. The second case used targets from the DOE's Solar America Initiative (SAI) program. DOE's targets are based on a combination of internal analysis of potential cost reductions in PV technologies and a review of information provided in applications submitted to the SAI Technology Pathway Partnership solicitation during 2006. Table 3 lists the two pricing cases.

Table 3. System Pricing Assumptions

System Price Scenario	Market Segment	Retrofit Installed System Price ($2007/Wpdc)			New Construction Installed System Price ($2007/Wpdc)		
		2007	2010	2015	2007	2010	2015
Business as Usual (BAU)	Residential	$7.40	$6.20	$4.80	$7.40	$5.90	$4.50
	Commercial	$6.41	$5.80	$4.50	$6.70	$5.50	$4.20
Solar America Initiative (SAI)	Residential	$7.40	$5.11	$3.10	$7.10	$3.86	$2.44
	Commercial	$6.41	$3.75	$2.49	$6.23	$3.60	$2.32

At the time of this project, several bills were circulating through the U.S. House of Representatives and the U.S. Senate that would introduce some type of carbon legislation. During the course of this project, for illustration purposes the study used the Senate's Low Carbon Economy Act bill sponsored by Senator Bingaman of New Mexico. The Act creates a national cap-and-trade system with a ceiling on the price of carbon, as shown in Table 4. We assume that carbon will trade at the ceiling price. To assess the effect of this on potential PV customers, we used carbon intensity data from EIA (in tonnes of CO_2 per kWh) and modeled the price of carbon as a surcharge on electric bills. Refer to the appendix for details on the calculations. Thus, we modeled a scenario that assumes the legislation is introduced.

Table 4. Provisions of Low Carbon Economy Act

Year	Ceiling on Carbon Price [$/Tonne CO_2]
2007	$0.00
2008	$0.00
2009	$0.00
2010	$0.00
2011	$0.00
2012	$12.00
2013	$12.60
2014	$13.23
2015	$13.89

Time-of-use (TOU) rates can significantly impact PV economics, yet they are not available in all areas. We created a scenario in which TOU rates are made available from every utility. To create TOU rates, we used a rate-multiplier approach. Within the eight North American Electric Reliability Corporation (NERC) regions, utilities from each state with established TOU rates were selected for analysis. For each utility, we calculated the ratio of peak-to-standard and non-peak-to-standard rates for both the summer and winter seasons. Overall averages of those ratios were then taken for each region to use as benchmarks when estimating TOU rates for utilities that do not offer them. Another component of the rate-multiplier analysis involved calculating an average number of peak hours and start times of those peak periods within each region. See the appendix for more detail.

Given the influence of electricity prices on simple payback, we looked at three different forward price projections. The first (and most conservative) projection uses EIA's Annual Energy Outlook pricing projections. These projections show real cost decreases over time. The second projection uses state-by-state projections developed by NCI using NERC reports, ISO reports, and other data sources to look at the impact of policy changes (e.g., rate caps lifted), capacity shortfalls, and market dynamics. The result was an annual percentage year-over-year change in price, by state.

The final two scenarios we analyzed involved federal incentives for PV. Federal residential incentives (tax credits) are set to expire at the end of 2008; at that time, the commercial incentive will be reduced from 30% to 10%. However, the U.S. House of Representatives and the U.S. Senate are working on legislation to extend those tax credits. Each chamber has different provisions for extension, and we worked with the Solar Energy Industries Association to come up with a best estimate about which legislation will pass. The first scenario assumes the commercial incentive is extended to 2015 and the residential incentive is extended to 2010, with the $2,000-per-system cap lifted. The second scenario assumes that both the residential and commercial credits are fully extended to 2015, with the $2,000-per-system cap lifted.

Many participants in the PV market have concerns regarding the availability of installers to meet a growing demand. In discussing this issue with stakeholders, we found that the time to train a qualified PV installer ranges from six weeks to three months, which fits within the one-year temporal resolution of this model. To understand future requirements for installers, we calculated estimated installer requirements state by state for each year of analysis.

4.0 Project Results

We conducted several model runs, varying each of the scenarios. The first run used values for each variable that provided the least support for PV penetration. The next run served as a base case and used inputs that are more representative of what is likely to occur. Next, using the base case as a starting point, we looked at the impact of individual policy improvements for net metering, interconnection standards, and TOU rates, along with a full extension of the residential federal tax credit. Using the results of these four runs, we chose the two variables with the largest impact and looked at the results. Finally, we conducted a best-case run within the context of this model/set of assumptions. There is potential for more rapid market penetration, for example, if electricity prices rise faster then projected here, if states (or the federal government) institute more aggressive solar or climate-related policies, and so on. All runs were done using business-as-usual (BAU) and SAI system pricing.

Table 5. Inputs into Each Run

Scenario	Worst-Case	Base-Case	Focused Policies	Best-Case
Interconnection Policy Scenario	Current Rules	Current Rules	Current Rules	Improved
Net Metering Availability Scenario	Current Availability	Current Availability	Nationwide Availability	Nationwide Availability
Net Metering Cap Scenario	Current Caps	Current Caps	Caps Lifted	Caps Lifted
Cap and Trade Scenario	None	Low Carbon Economy Act	Low Carbon Economy Act	Low Carbon Economy Act
Electricity Price Escalation	EIA's Projections	Accelerated	Accelerated	Accelerated
Federal Tax Credit	Baseline	Extended	Fully Extended	Fully Extended
Time-of-Use Rates	Current Availability	Current Availability	Current Availability	Nationwide Availability
RPS Solar Set Aside Enforcement	No	Yes	Yes	Yes

4.1 The Worst Case

The first run used the worst case for each input assumption, as shown in Table 6. The run assumed that federal tax credits are not extended, carbon legislation is not passed, system price declines occur at historical rates, and electricity prices evolve per the EIA's projections. All of these factors combine to decrease the economic attractiveness of PV.

Table 6. Worst-Case Scenario Inputs

Scenario	Value
System Pricing Scenario	Business-As-Usual
Interconnection Policy Scenario	Current Rules
Net Metering Availability Scenario	Current Availability
Net Metering Cap Scenario	Current Caps
Cap and Trade Scenario	None
Electricity Price Escalation	EIA's Projections
Federal Tax Credit	Baseline
Time-of-Use Rates	Current Availability
RPS Solar Set-Aside Enforcement	No

Figure 12 shows cumulative installations by state for 2015. See the appendix for a table of state-by-state results. Installations are strong in 2007 and 2008, but once the federal tax credits expire, the market shrinks by 90% in 2009. The only state in which significant installations occur is California, where the California Solar Initiative mitigates the loss of federal tax credits. The assumption that RPS solar set-asides are not enforced has a large impact, as shown in Figure 13. Given that most RPS have a ceiling on alternative compliance payments, market forces (i.e., a lucrative renewable energy credit, or REC, price improves system economics) can only go so far in enforcing the solar set-asides.

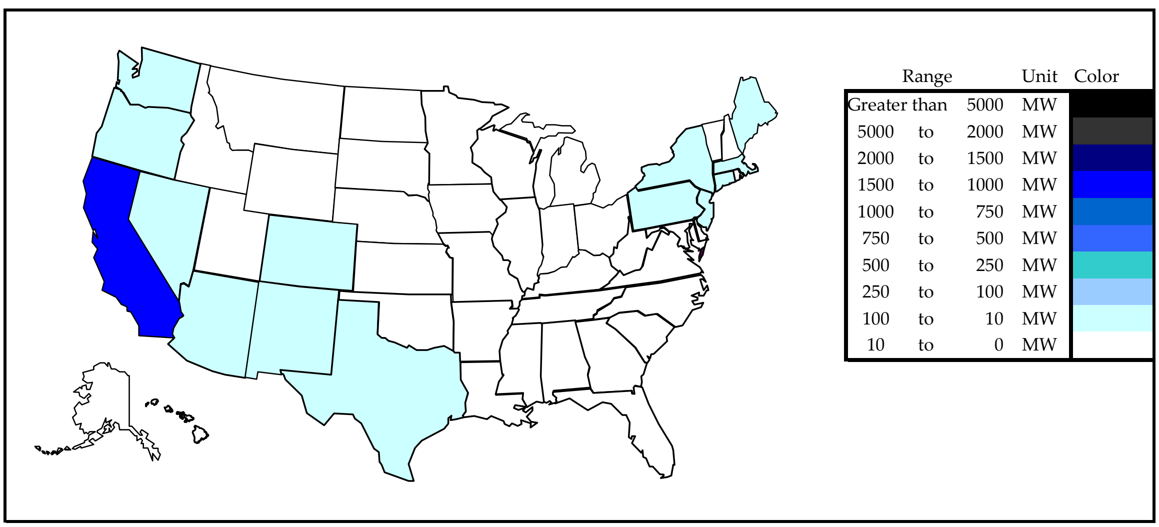

Figure 12. Cumulative installations in 2015 under the worst case

Table 7. Nationwide Results for the Worst Case

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	155	889	1,117	0.19%
2009	35	924	245	0.18%
2010	100	1,024	670	0.19%
2011	54	1,077	336	0.19%
2012	216	1,293	1,251	0.21%
2013	275	1,568	1,466	0.25%
2014	326	1,895	1,592	0.28%
2015	70	1,965	309	0.28%

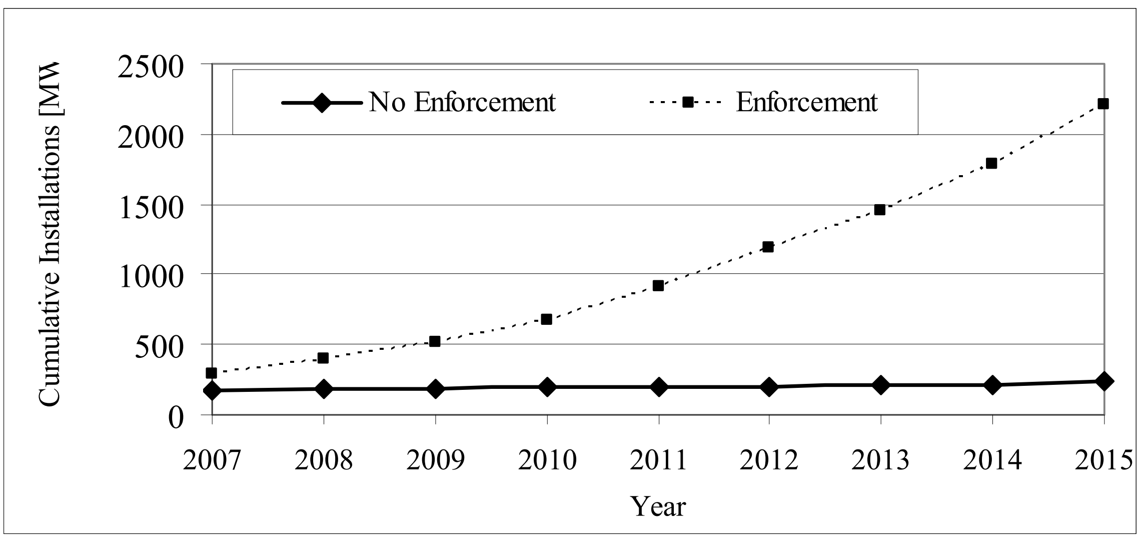

Figure 13. Impact of RPS solar set-asides, with all other scenarios at worst case

4.2 The Base Case

The next case used more probable scenario inputs. An extension to the federal tax credits was assumed to pass (only to 2010 in the case of the residential tax credit, electricity prices were assumed to increase over time, carbon legislation was assumed to be enacted, and RPS solar set-asides were enforced, as detailed in Table 8. We ran this scenario with BAU and SAI pricing to show not only the impact of the Solar America Initiative, but also what would happen if demand outpaced supply and prices do not decrease.

The positive impact on market penetration is noticeable compared with the worst case, as shown in the figures. The extension of the tax credits and RPS enforcement have the greatest impact. However, the market stalls temporarily in 2011 because the residential tax credit has expired. BAU system pricing yields a 26% compound annual growth rate (CAGR) to 2015. SAI system pricing results in a ~65% increase in cumulative installations over BAU pricing, with a 34%/year CAGR. State-by-state results are shown in the appendix.

Table 8. Base-Case Scenario Inputs

Scenario	Value
System Pricing Scenario	BAU/SAI
Interconnection Policy Scenario	Current Rules
Net Metering Availability Scenario	Current Availability
Net Metering Cap Scenario	Current Caps
Cap and Trade Scenario	Low Carbon Economy Act
Electricity Price Escalation	Medium
Federal Tax Credit	Extended
Time-of-Use Rates	Current Availability
RPS Solar Set Aside Enforcement	Yes

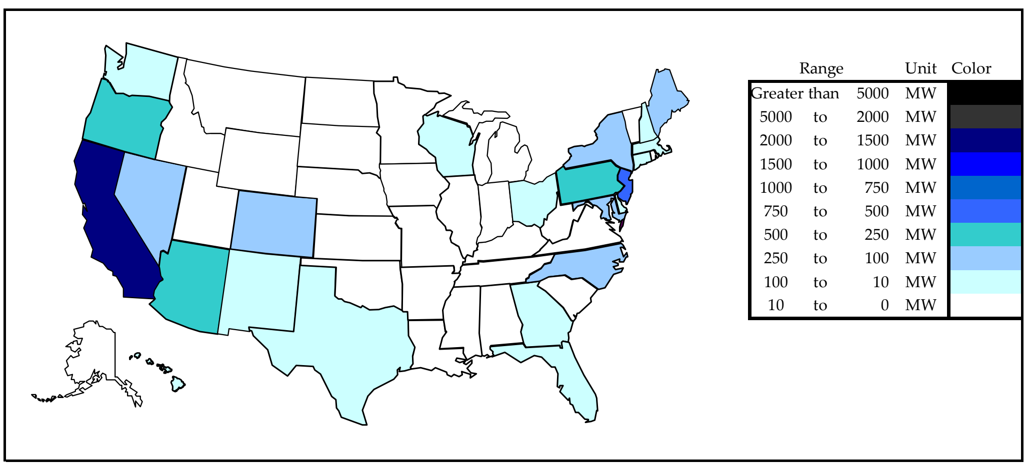

Figure 14. Cumulative installations in 2015 under the base case, with BAU system pricing

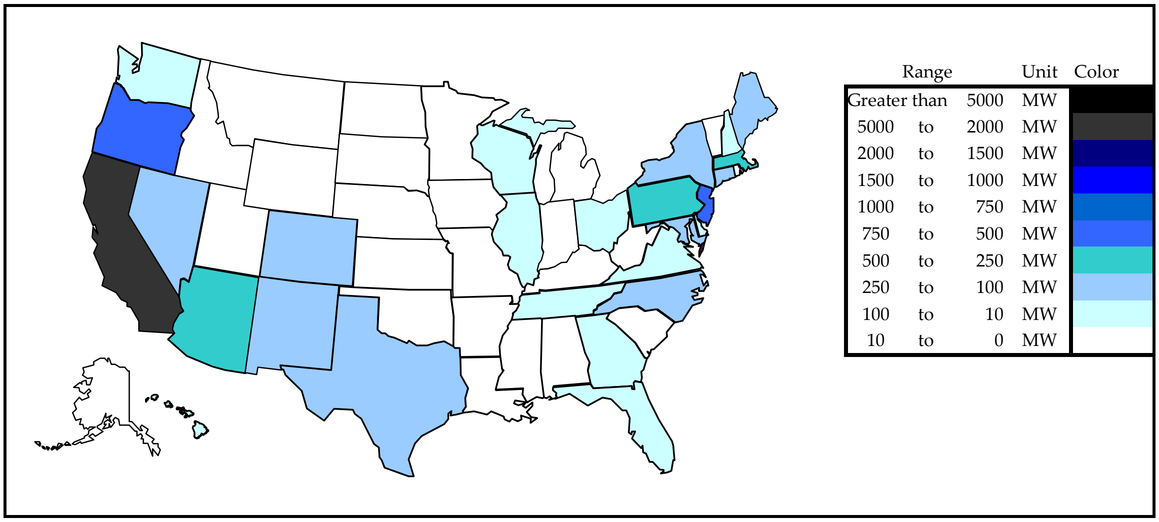

Figure 15. Cumulative installations in 2015 under the base case, with SAI system pricing

Table 9. Nationwide Results for the Base Case, with BAU System Pricing

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	833	1,567	4,885	0.33%
2009	223	1,790	1,554	0.35%
2010	288	2,078	1,937	0.39%
2011	270	2,348	1,687	0.41%
2012	527	2,875	3,055	0.48%
2013	313	3,188	1,668	0.50%
2014	544	3,732	2,654	0.55%
2015	813	4,545	3,588	0.64%

Table 10. Nationwide Results for the Base Case, with SAI System Pricing

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,012	1,745	6,172	0.37%
2009	196	1,941	1,362	0.38%
2010	408	2,349	2,737	0.44%
2011	364	2,713	2,280	0.48%
2012	648	3,361	3,778	0.56%
2013	842	4,203	4,491	0.66%
2014	1,922	6,125	9,394	0.91%
2015	1,367	7,492	6,035	1.05%

4.3 Focused Policy Cases

Realizing that large amounts of effort are required to change state-level policies on a national scale, we took the two policies with the greatest impact and ran them together with the base case. Our analysis (shown in the appendix) found that improved net metering policy had the greatest impact on cumulative installations in 2015 (a 58% increase over the base case with SAI pricing). Next, fully extending the residential Investment Tax Credit (ITC) to 2015 had a 40% impact on cumulative installations. Table 11 shows the corresponding scenario inputs for the focused policy case. Figure 16 and Table 12 show the results. With SAI system pricing, these two policies combine to increase cumulative installations by more than double by 2015 over the base-case, from 7,492 MW to 17,353 MW. State-by-state results can be found in the appendix.

Table 11. Focused Policy Case Inputs

Scenario	Value
System Pricing Scenario	BAU/SAI
Interconnection Policy Scenario	Current Rules
Net Metering Availability Scenario	Nationwide Availability
Net Metering Cap Scenario	Caps Lifted
Cap and Trade Scenario	Low Carbon Economy Act
Electricity Price Escalation	Accelerated
Federal Tax Credit	Fully Extended
Time-of-Use Rates	Current Availability
RPS Solar Set Aside Enforcement	Yes

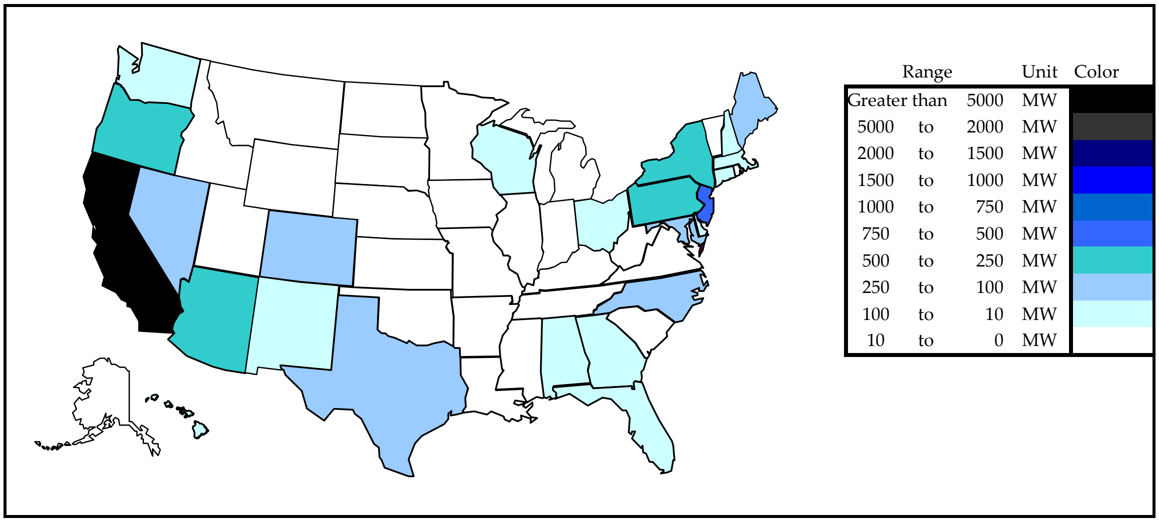

Figure 16. Cumulative installations in 2015 in the focused policy case, BAU system pricing

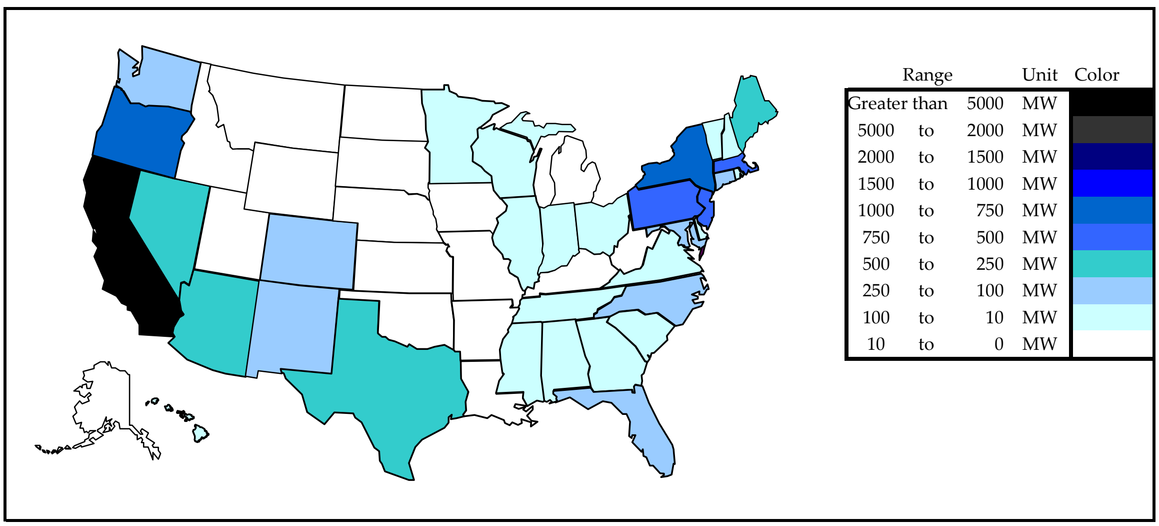

Figure 17. Cumulative installations in 2015 in the focused policy case, SAI system pricing

Table 12. Nationwide Results for the Focused Policy Case, BAU System Pricing

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	835	1,568	4,897	0.33%
2009	223	1,792	1,554	0.35%
2010	288	2,080	1,937	0.39%
2011	781	2,861	4,888	0.50%
2012	1,144	4,005	6,629	0.66%
2013	709	4,715	3,785	0.74%
2014	2,289	7,004	11,176	1.04%
2015	1,637	8,641	7,229	1.21%

Table 13. Nationwide Results for the Focused Policy Case, SAI System Pricing

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,014	1,747	6,187	0.37%
2009	417	2,165	2,903	0.43%
2010	739	2,903	4,960	0.54%
2011	1,372	4,275	8,582	0.75%
2012	1,822	6,097	10,582	1.01%
2013	2,052	8,149	10,947	1.28%
2014	4,368	12,517	21,320	1.86%
2015	4,836	17,353	21,351	2.44%

4.4 The Best Case

The final case used inputs most favorable for PV market penetration, as shown in Table 14. Figure 18 and Table 15 show the national results. Achieving policy improvements in all these areas would require a large effort and potentially a considerable amount of federal funding. However, if this were successful, a very large, sustained demand (55%/year CAGR to 2015 with SAI pricing) can be created. State-by-state results are shown in the appendix.

Table 14. Best-Case Scenario Inputs

Scenario	Value
System Pricing Scenario	BAU/SAI
Interconnection Policy Scenario	Improved
Year of Policy Implementation	2008
Net Metering Availability Scenario	Nationwide Availability
Net Metering Cap Scenario	Caps Lifted
Cap and Trade Scenario	Low Carbon Economy Act
Electricity Price Escalation	Accelerated
Federal Tax Credit	Fully Extended
Time-of-Use Rates	Nationwide Availability
RPS Solar Set Aside Enforcement	Yes

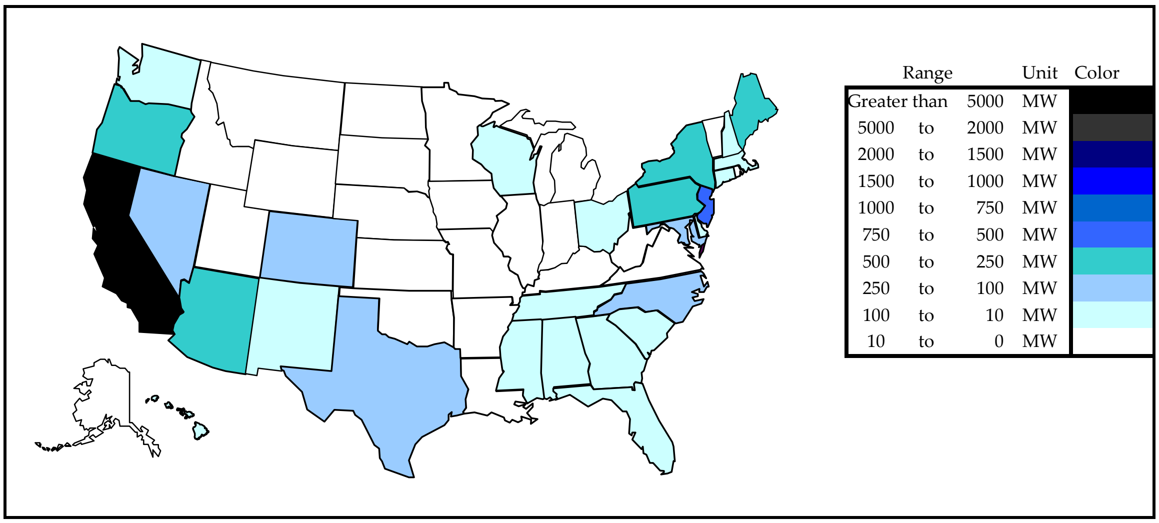

Figure 18. Cumulative installations in 2015 in the best case, BAU system pricing

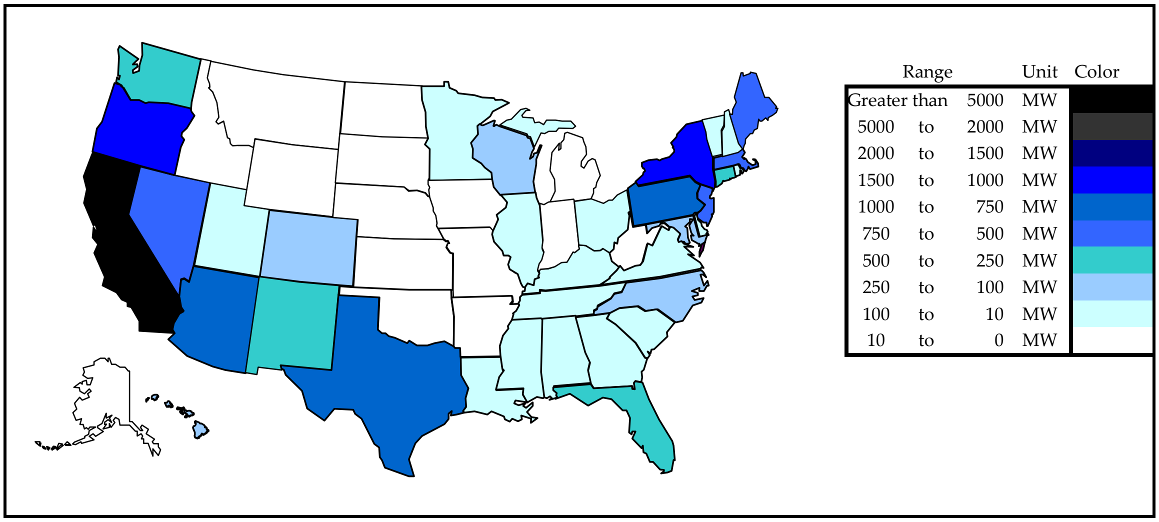

Figure 19. Cumulative installations in 2015 in the best case, SAI system pricing

Table 15. Nationwide Results for the Best Case, BAU System Pricing

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,019	1,753	6,226	0.37%
2009	314	2,067	2,183	0.41%
2010	420	2,487	2,822	0.46%
2011	1,004	3,491	6,282	0.61%
2012	1,372	4,864	7,953	0.81%
2013	1,045	5,909	5,577	0.93%
2014	2,633	8,542	12,886	1.27%
2015	2,565	11,107	11,326	1.56%

Table 16. Nationwide Results for the Best Case, SAI System Pricing

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,237	1,970	7,793	0.41%
2009	622	2,593	4,328	0.51%
2010	1,187	3,780	7,974	0.70%
2011	1,496	5,276	9,357	0.92%
2012	2,383	7,659	13,868	1.27%
2013	2,807	10,466	14,989	1.64%
2014	6,724	17,190	32,780	2.55%
2015	7,522	24,712	33,208	3.47%

5.0 Conclusions and Recommendations

The critically important findings in this report are the influences of each scenario discussed. System pricing is the input with the largest impact. In the base case, the focused policy case, and the best case, using SAI system pricing caused cumulative installations to more than double by 2015. Other high-impact factors are net metering policy, extension of the federal tax credits, and interconnection policy. Figure 20 shows the cumulative effects of these variables.

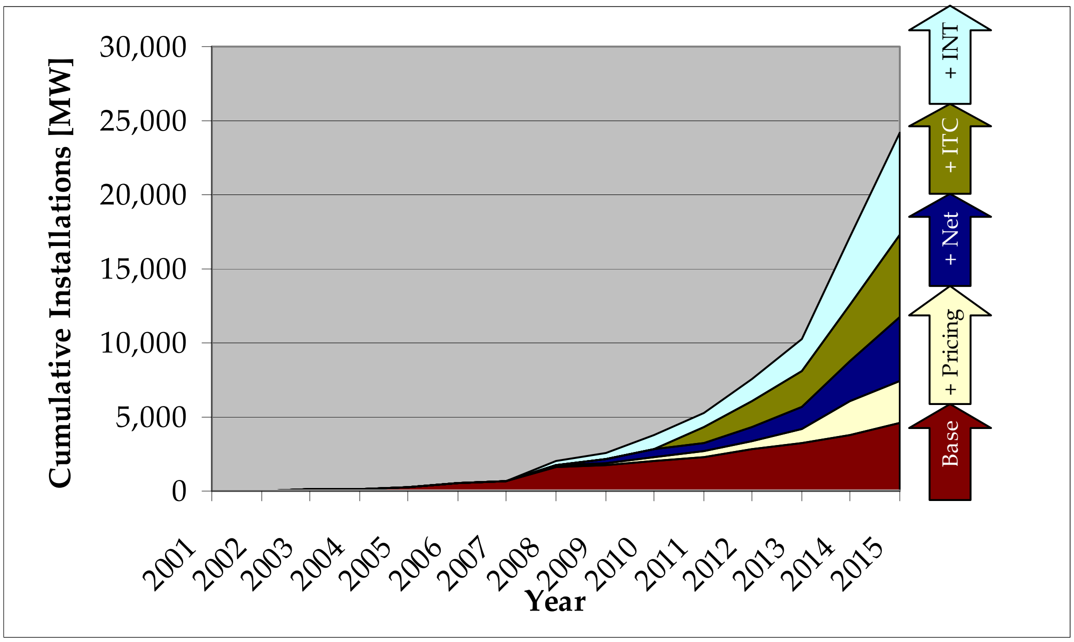

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Figure 20. Influence of system pricing, net metering policy, federal tax credits, and interconnection policy on cumulative installations

To understand the implication of these scenarios relative to planned generating capacity additions, we used data from EIA's 2007 Annual Energy Outlook. We compared the planned capacity projections in EIA's reference case from 2007 to 2015 to the cumulative installations of PV by 2015, as shown in Table 17. Table 17 shows that PV could contribute between 27% to 91% of planned capacity additions per EIA's projections. Given that the U.S. market has strong regional variations, PV's contribution to capacity additions could be much higher on a regional or interconnect basis. This would have significant implications for utility planning and grid operations.

Table 17. Comparison of Planned Capacity Additions to Cumulative PV Installations with SAI Pricing

Scenario	EIA Projected Capacity Additions, 2007 to 2015 [MW]	2015 Cumulative PV Installations [MW]	PV as % of Planned Capacity Additions [%]
Base-Case	27,038	7,423	27%
Focused Policy Initiatives	27,038	17,353	64%
Best-Case	27,038	24,712	91%

During the course of this project, we identified several items that might enhance this analysis. The first would be an easily accessible database for building load profiles that might be similar to PV Watts for output profiles. Fortunately, NREL's commercial building load profiles were readily available for use, but the time required to generate profiles prevented us from using a unique residential profile for each utility analyzed. If a database of sample profiles were available, we could have used them for each utility's residential analysis.

Our analysis focused on rooftop applications, but other potential structures, such as parking garages or carports, are also suitable for PV installations. A useful activity might be to assess the feasibility of conducting a market potential analysis for PV on unoccupied structures. In addition, this study did not assess the potential for ground-mounted structures. A feasibility study should be conducted to identify or create methods and models for calculating the market potential for ground-mounted systems.

As discussed in Section 0, many groups within the PV industry, and those who monitor the PV industry (such as the investment community), have concerns about the availability of installers to meet a growing demand. For this study, we estimated installer requirements on a state-by-state basis for each year. However, it would provide valuable insights to model actual installer availability dynamics and feed the results back into the model.

The model we developed looks solely at the U.S. market and uses pricing assumptions that do not take into account demand outside the United States. If international markets (such as Spain or South Korea) experience dramatic surges in demand, module supplies could be diverted to those markets. A supply-constrained environment would then develop in the United States, however, and prices might not fall.

One key variable that the model does not now address is the impact of system financing. The market penetration curves used simple paybacks as inputs and did not consider financing. In reality, interest payments for financed systems affect economic attractiveness. Also, this model cannot assess the impact of innovative financing mechanisms or new business models (such as the power purchase agreement model) developing in the U.S. market. These drawbacks point to the need to develop a market penetration model based on return on investment or demand elasticity.

Finally, the model did not take into account possible electricity price feedbacks if the demand for grid power drops because of significant PV deployment.

However, even with these few shortcomings, this model reasonably simulates a very complex, intricate market by analyzing a large number of variables including system prices, electricity price forecasts, public policy, consumer behavior, and technology diffusion. The key findings of this study indicate that the technical potential and market opportunity for photovoltaics in the United States is significant if the government supports the appropriate policy mechanisms analyzed in the study.

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Appendix: Detailed Results

A-1. Net Metering Improvements

After establishing a base case, NCI looked at the impact of lifting net-metering caps and allowing net metering in all states, as shown in Table A-1. Figure A-1 and Table A-2 show the cumulative installations in 2015 and nationwide results, respectively.

Table A-1. Net Metering Improvements (Case Scenario Inputs)

Scenario	Value
System Pricing Scenario	**SAI**
Interconnection Policy Scenario	Current Rules
Net Metering Availability Scenario	Nationwide Availability
Net Metering Cap Scenario	Caps Lifted
Cap and Trade Scenario	Low Carbon Economy Act
Electricity Price Escalation	Accelerated
Federal Tax Credit	Extended
Time-of-Use Rates	Current Availability
RPS Solar Set Aside Enforcement	Yes

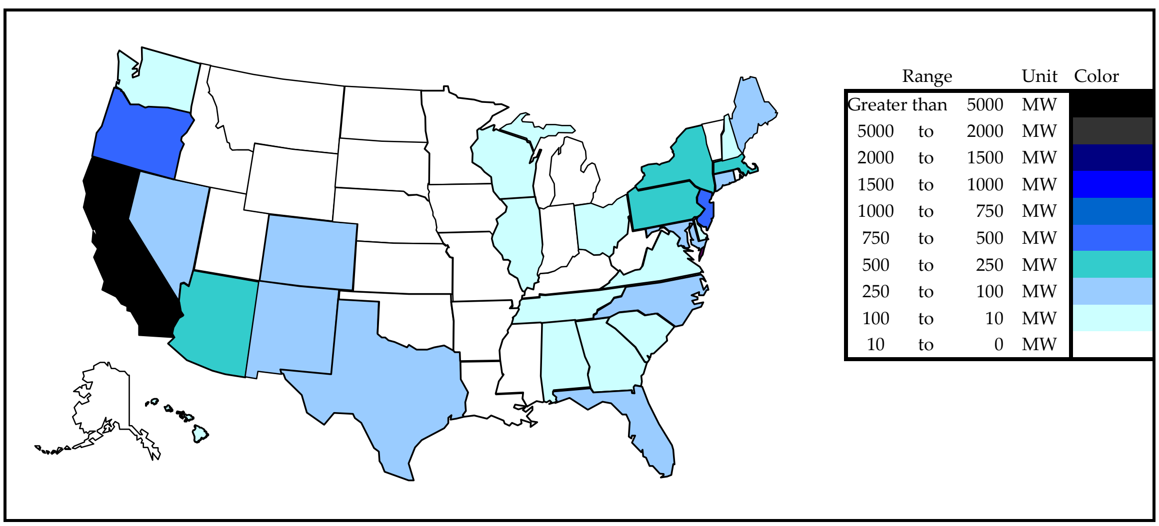

Figure A-1. Cumulative installations in 2015 in the net metering improvement case

Table A-2. Nationwide Results for the Net Metering Improvement Case

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,014	1,747	6,187	0.37%
2009	417	2,165	2,903	0.43%
2010	739	2,903	4,960	0.54%
2011	329	3,232	2,059	0.57%
2012	1,140	4,372	6,630	0.72%
2013	1,333	5,705	7,109	0.89%
2014	3,136	8,841	15,311	1.31%
2015	2,973	11,813	13,124	1.66%

Lifting net metering caps and establishing net metering have noticeable impacts in a few states—California, Florida, New York, and Oregon. This means that installations do not reach net-metering cap amounts in any other states, and net metering improves system economics in states that do not allow net metering. California has a net-metering cap of 2.5% of a utility's peak load, New York has a net metering cap of 0.1% of a utility's peak load, and Oregon has a net metering cap of 0.5% of a utility's peak load. Florida does not currently allow net metering. Figure A-2 shows the combined impact of improved net-metering policies in these states, but most is driven by California.

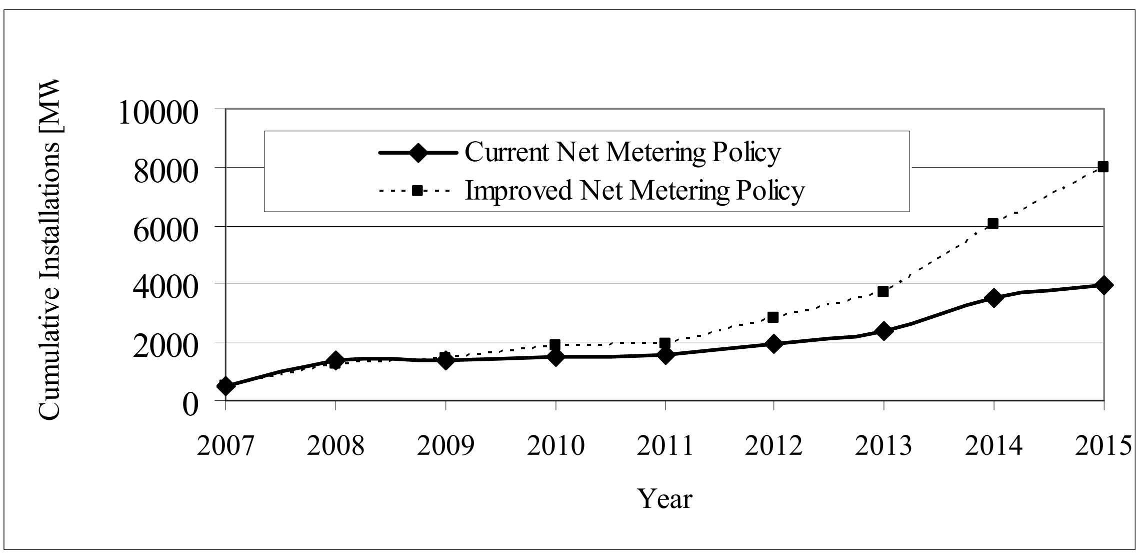

Figure A-2. Impact of improved net metering policies in California, Florida, New York, and Oregon

A-2. Interconnection Standard Improvements

The next case started back at the base case and looked at improved interconnection standards, as shown in Table A-3. Many states (or utilities) have interconnection standards that inhibit PV adoption. However, many state legislatures are in the process of revising their interconnection standards. This case examines the impact of all states improving their interconnection standards to "superior" per the IREC rating shown in Table 2 and assumes that improved standards are in place by 2008. Results are shown in Figure A-3 and Table A-4.

Table A-3. Interconnection Standard Improvements Case Scenario Inputs

Scenario	Value
System Pricing Scenario	SAI
Interconnection Policy Scenario	Improved
Year of Policy Implementation	2008
Net Metering Availability Scenario	Current Availability
Net Metering Cap Scenario	Business-As-Usual
Cap and Trade Scenario	Low Carbon Economy Act
Electricity Price Escalation	Accelerated
Federal Tax Credit	Extended
Time-of-Use Rates	Current Availability
RPS Solar Set-Aside Enforcement	Yes

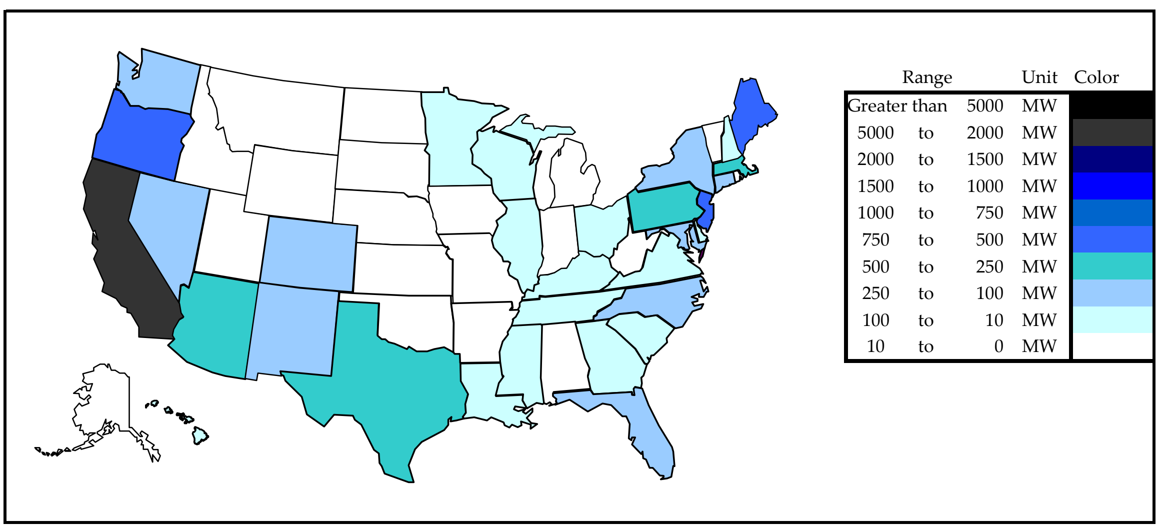

Figure A-3. Cumulative installations in 2015 in the interconnection standards improvement case

Table A-4. Nationwide Results for the Interconnection Standards Improvement Case

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,221	1,955	7,678	0.41%
2009	284	2,239	1,979	0.44%
2010	797	3,036	5,350	0.56%
2011	300	3,336	1,876	0.58%
2012	948	4,284	5,494	0.71%
2013	821	5,104	4,399	0.80%
2014	2,603	7,707	12,731	1.14%
2015	1,899	9,606	8,398	1.35%

Improving interconnection standards has a large impact in the following states, which have interconnection assessments of "poor" or below: Connecticut (poor), Florida (poor), Hawaii (barrier), Illinois (barrier), Maine (barrier), Pennsylvania (poor), Washington (barrier), and Wisconsin (poor). Figure A-4 shows a combined increase of ~60% in cumulative installations by 2015 in these states if interconnection standards are improved.

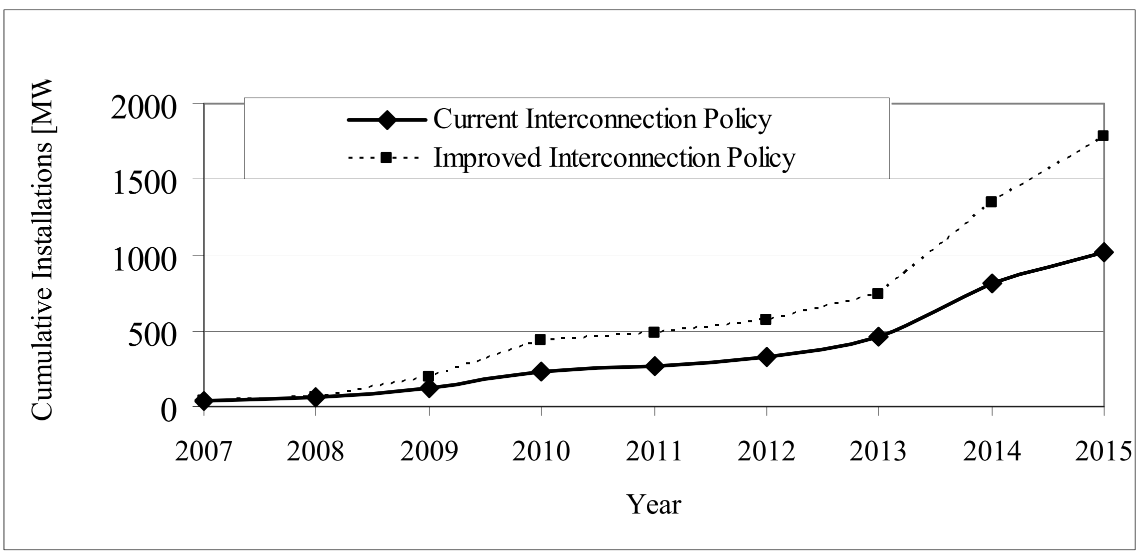

Figure A-4. Result of improved interconnection standards in Connecticut, Florida, Hawaii, Illinois, Maine, Pennsylvania, Washington, and Wisconsin

A-3. Nationwide Availability of Time-of-Use Rates

The next case run assumed that TOU rates were available from every utility, as shown in Table A-5. We reviewed the economics in each utility region to determine if standard or TOU rates resulted in lower annual electric bills and then chose the cheaper option. This yielded some interesting results (see Figure A-5 and Table A-6). Some utilities in Hawaii (specifically, Maui Electric Company) and Texas (all the utilities analyzed except Entergy Gulf States) do not have TOU rates, so this increased penetration. However, the establishment of TOU rates actually decreases market penetration in Massachusetts, New Jersey, and Tennessee. Some utilities in these states do not offer TOU rates; implementing them results in lower electric bills, which in turn results in lower annual electric bill savings as a result of using PV. Thus, the simple payback increases and market penetration decreases.

Table A-5. Time-of-Use Availability Scenario Inputs

Scenario	Value
System Pricing Scenario	SAI
Interconnection Policy Scenario	Current Rules
Net Metering Availability Scenario	Current Availability
Net Metering Cap Scenario	Business-As-Usual
Cap and Trade Scenario	Low Carbon Economy Act
Electricity Price Escalation	Accelerated
Federal Tax Credit	Extended
Time-of-Use Rates	Nationwide Availability
RPS Solar Set Aside Enforcement	Yes

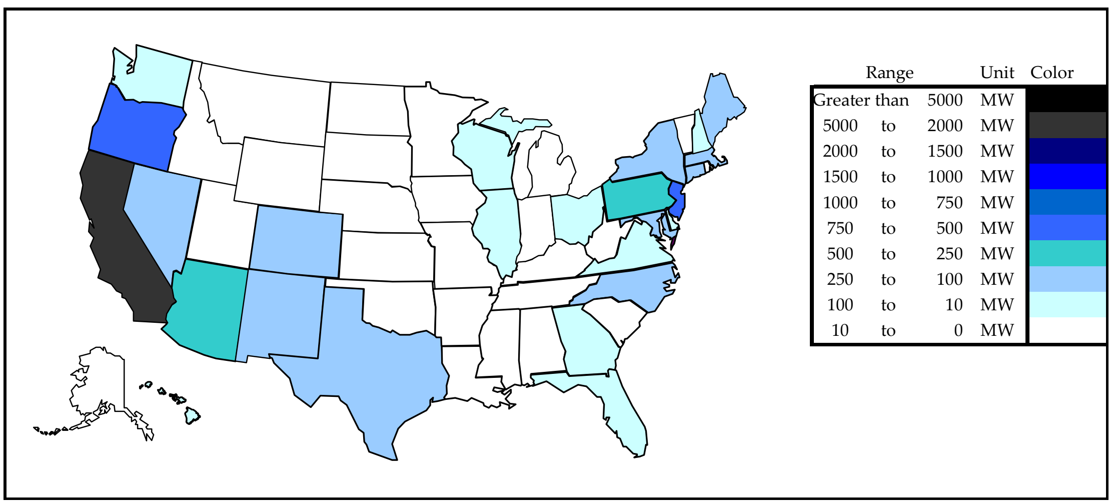

Figure A-5. Cumulative installations in 2015 in the time-of-use availability case

Table A-6. Nationwide Results for the Time-of-Use Availability Case

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,016	1,749	6,200	0.37%
2009	201	1,950	1,396	0.38%
2010	411	2,361	2,762	0.44%
2011	360	2,722	2,254	0.48%
2012	638	3,359	3,720	0.56%
2013	841	4,201	4,488	0.66%
2014	1,845	6,046	9,019	0.90%
2015	1,370	7,415	6,048	1.04%

A-4. Fully Extended Residential Federal Tax Credit

To look at the impact of the federal tax credit, we assumed the residential federal tax credit would be extended until 2016. Table A-7 shows the scenario inputs, while Figure A-6 and Table A-8 show the resulting cumulative installations. The extension affects all markets, but the impacts are strongest in California, Massachusetts, Pennsylvania, and Texas, as shown in Figure A-7.

Table A-7. Fully Extended Federal Tax Credit Scenario Inputs

Scenario	Value
System Pricing Scenario	SAI
Interconnection Policy Scenario	Current Rules
Net Metering Availability Scenario	Current Availability
Net Metering Cap Scenario	Business-As-Usual
Cap and Trade Scenario	Low Carbon Economy Act
Electricity Price Escalation	Accelerated
Federal Tax Credit	Fully Extended
Time-of-Use Rates	Current Availability
RPS Solar Set Aside Enforcement	Yes

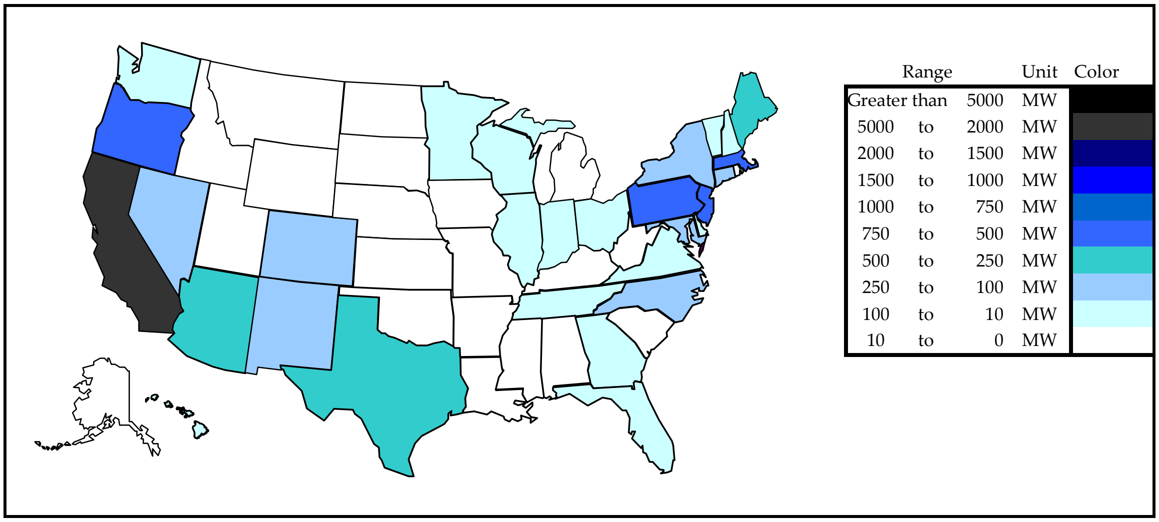

Figure A-6. Cumulative installations in 2015: fully extended tax credit case

Table A-8. Nationwide Results for the Fully Extended Tax Credit Case

Year	Annual Installations [MW]	Cumulative Installation [MW]	Installers Required [FTE]	Market Penetration [%]
2007	251	733	1,864	0.16%
2008	1,012	1,745	6,172	0.37%
2009	196	1,941	1,362	0.38%
2010	408	2,349	2,737	0.44%
2011	562	2,911	3,520	0.51%
2012	1,097	4,008	6,378	0.66%
2013	655	4,663	3,497	0.73%
2014	2,292	6,955	11,196	1.03%
2015	3,044	9,998	13,438	1.40%

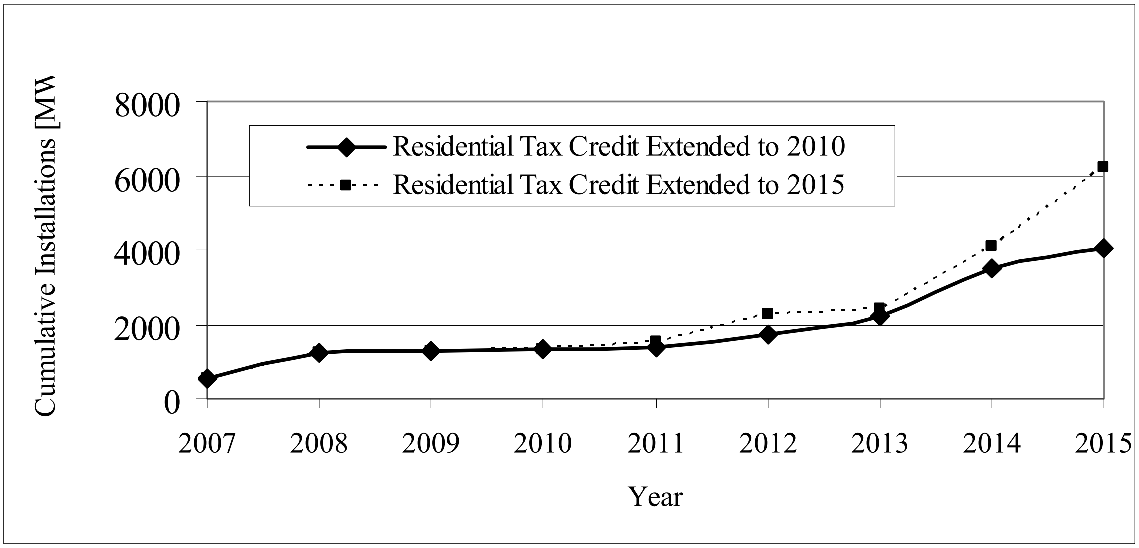

Figure A-7. Impact of extending the residential federal tax credit through 2015 in California, Connecticut, Pennsylvania, and Texas

A-5. State-by-State Results

Table A-9. State-by-State Technical Potential, Over Time

	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
2007	9,376	840	10,515	4,655	51,667	7,778	3,986	1,217	34,087	16,574	1,883	2,194	17,594
2008	9,989	889	11,455	4,948	54,975	8,350	4,197	1,312	37,062	17,915	2,003	2,379	18,604
2009	10,601	943	12,447	5,261	58,344	8,955	4,414	1,400	40,062	19,321	2,119	2,572	19,648
2010	11,227	997	13,499	5,552	61,835	9,596	4,636	1,489	43,070	20,771	2,242	2,770	20,705
2011	11,855	1,050	14,579	5,849	65,377	10,249	4,858	1,579	46,133	22,254	2,366	2,968	21,771
2012	12,495	1,104	15,701	6,153	69,021	10,923	5,087	1,674	49,394	23,802	2,493	3,172	22,848
2013	13,178	1,161	16,946	6,479	72,828	11,644	5,317	1,777	52,985	25,487	2,626	3,402	23,974
2014	13,882	1,219	18,268	6,815	76,753	12,397	5,552	1,885	56,770	27,257	2,762	3,645	25,125
2015	14,606	1,279	19,671	7,160	80,798	13,184	5,790	1,997	60,760	29,119	2,903	3,901	26,302

	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
2007	9,909	4,602	4,444	7,596	8,359	1,483	8,203	6,959	14,347	8,081	5,207	8,487
2008	10,521	4,867	4,700	8,065	8,887	1,569	8,730	7,329	15,137	8,571	5,534	9,014
2009	11,167	5,140	4,968	8,562	9,431	1,654	9,262	7,704	15,958	9,087	5,860	9,549
2010	11,822	5,418	5,242	9,068	9,954	1,742	9,804	8,091	16,792	9,609	6,198	10,092
2011	12,487	5,692	5,521	9,575	10,484	1,831	10,356	8,482	17,635	10,137	6,537	10,639
2012	13,167	5,970	5,805	10,089	11,022	1,923	10,921	8,882	18,500	10,683	6,876	11,201
2013	13,881	6,264	6,098	10,635	11,599	2,017	11,517	9,285	19,385	11,248	7,240	11,790
2014	14,617	6,564	6,397	11,198	12,192	2,113	12,130	9,695	20,288	11,829	7,615	12,395
2015	15,376	6,870	6,703	11,777	12,800	2,212	12,761	10,111	21,211	12,427	7,999	13,016

	Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvani a
2007	1,234	2,712	5,040	1,413	7,801	2,852	14,521	15,144	1,040	18,159	6,399	5,231	11,362
2008	1,304	2,881	5,535	1,499	8,228	3,036	15,262	16,234	1,099	19,162	6,775	5,581	11,969
2009	1,376	3,051	6,061	1,588	8,685	3,230	16,011	17,398	1,159	20,208	7,169	5,962	12,605
2010	1,450	3,226	6,615	1,679	9,138	3,437	16,766	18,569	1,219	21,266	7,561	6,351	13,246
2011	1,525	3,402	7,177	1,771	9,596	3,645	17,520	19,762	1,279	22,331	7,963	6,747	13,886
2012	1,601	3,583	7,760	1,866	10,064	3,858	18,285	21,010	1,339	23,420	8,370	7,152	14,539
2013	1,680	3,772	8,429	1,965	10,545	4,080	19,067	22,341	1,403	24,540	8,795	7,582	15,209
2014	1,760	3,967	9,145	2,066	11,036	4,311	19,858	23,728	1,468	25,682	9,230	8,029	15,891
2015	1,842	4,167	9,911	2,170	11,536	4,549	20,659	25,175	1,534	26,847	9,675	8,492	16,585

	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
2007	1,036	7,619	1,106	11,774	42,773	3,691	708	13,565	9,025	1,236	2,467	8,158	768
2008	1,090	8,208	1,174	12,561	45,863	3,985	749	14,506	9,646	1,297	2,599	8,647	816
2009	1,145	8,817	1,245	13,370	49,089	4,279	789	15,444	10,309	1,369	2,728	9,139	865
2010	1,200	9,422	1,317	14,206	52,320	4,603	830	16,421	10,989	1,443	2,858	9,649	914
2011	1,255	10,039	1,388	15,049	55,632	4,927	872	17,417	11,681	1,516	2,985	10,165	964
2012	1,312	10,694	1,461	15,912	59,039	5,261	915	18,448	12,395	1,588	3,112	10,696	1,013
2013	1,369	11,398	1,538	16,829	62,708	5,625	959	19,538	13,152	1,663	3,246	11,246	1,067
2014	1,428	12,133	1,618	17,776	66,527	6,006	1,004	20,667	13,938	1,740	3,383	11,810	1,123
2015	1,487	12,902	1,700	18,757	70,499	6,407	1,050	21,837	14,755	1,818	3,522	12,389	1,180

Table A-10. State-by-State Results for the Worst Case

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	21	1	598	23	3	5	2	1	9	1	1
	2009	1	1	21	1	625	23	3	5	3	1	9	1	1
	2010	1	1	21	1	678	23	4	5	4	1	9	1	1
	2011	1	1	21	1	723	23	4	5	4	1	9	1	1
	2012	1	1	21	1	923	23	5	5	4	1	9	1	1
	2013	1	1	21	1	1,164	25	8	5	4	1	9	1	1
	2014	1	1	21	1	1,445	27	10	5	4	1	9	1	1
	2015	1	1	21	1	1,445	30	13	5	4	1	9	1	1
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	7	0	100	2	0	4	1	0	3	0	0
	2009	0	0	0	0	27	0	0	0	1	0	0	0	0
	2010	0	0	0	0	53	0	0	0	1	0	0	0	0
	2011	0	0	0	0	45	0	1	0	0	0	0	0	0
	2012	0	0	0	0	199	1	1	0	0	0	0	0	0
	2013	0	0	0	0	241	2	2	0	0	0	0	0	0
	2014	0	0	0	0	281	2	2	0	0	0	0	0	0
	2015	0	0	0	0	0	3	3	0	0	0	0	0	0
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	52	0	717	18	2	26	6	0	23	1	0
	2009	0	0	0	0	189	0	2	0	6	0	0	0	0
	2010	0	0	0	0	357	0	2	0	6	0	0	0	0
	2011	0	0	0	0	281	0	4	0	0	0	0	0	0
	2012	0	0	0	0	1,155	4	8	0	0	0	0	0	0
	2013	0	0	0	0	1,286	9	11	0	0	0	0	0	0
	2014	0	0	0	0	1,369	8	10	0	0	0	0	0	0
	2015	0	0	0	0	0	13	15	0	0	0	0	0	0
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	1	1	2	2	9	1	1	1	1
	2009	1	1	1	1	1	5	2	10	1	1	1	1
	2010	1	1	1	1	1	42	2	12	1	1	1	1
	2011	1	1	1	1	1	42	2	12	1	1	1	1
	2012	1	1	1	1	1	42	2	14	1	1	1	1
	2013	1	1	1	1	1	51	2	18	1	1	1	1
	2014	1	1	1	1	1	67	2	23	1	1	1	1
	2015	1	1	1	1	1	90	3	31	1	1	1	1
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	1	0	0	0	2	0	0	0	0
	2009	0	0	0	0	0	2	0	2	0	0	0	0
	2010	0	0	0	0	0	37	0	2	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0	2	0	0	0	0
	2013	0	0	0	0	0	9	0	5	0	0	0	0
	2014	0	0	0	0	0	16	0	5	0	0	0	0
	2015	0	0	0	0	0	23	1	7	0	0	0	0
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	7	0	1	0	13	0	2	0	0
	2009	0	0	0	0	0	17	0	13	0	0	0	0
	2010	0	0	0	0	0	250	0	12	0	0	0	0
	2011	0	0	0	0	0	0	0	0	0	0	0	0
	2012	0	0	0	0	0	0	0	9	0	0	0	0
	2013	0	0	0	0	0	47	0	25	0	0	0	0
	2014	0	0	0	0	0	80	0	22	0	0	0	0
	2015	0	0	0	0	0	100	3	33	0	0	0	0
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	16	1	73	12	35	6	1	6	1	6	9
	2009	1	1	16	1	73	12	35	6	1	6	1	9	9
	2010	1	1	16	1	73	12	36	9	1	6	1	9	9
	2011	1	1	16	1	73	12	38	9	1	6	1	11	9
	2012	1	1	17	1	73	12	41	9	1	6	1	14	10
	2013	1	1	18	1	73	12	45	9	1	6	1	16	11
	2014	1	1	19	2	73	12	49	9	1	6	1	20	13
	2015	1	1	21	3	73	14	56	9	1	6	1	24	17
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	1	0	3	3	3	3	0	4	0	4	0
	2009	0	0	0	0	0	0	0	0	0	0	0	3	0
	2010	0	0	0	0	0	0	0	2	0	0	0	0	0
	2011	0	0	0	0	0	0	2	0	0	0	0	2	0
	2012	0	0	1	0	0	0	3	0	0	0	0	3	1
	2013	0	0	1	0	0	0	4	0	0	0	0	3	1
	2014	0	0	1	1	0	0	4	0	0	0	0	3	2
	2015	0	0	2	1	0	2	7	0	0	0	0	4	4
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	6	0	22	21	20	24	0	26	0	30	0
	2009	0	0	0	0	0	0	0	0	0	0	0	18	0
	2010	0	0	0	0	0	0	3	16	0	0	0	0	0
	2011	0	0	2	0	0	0	14	0	0	0	0	14	0
	2012	0	0	3	0	0	0	19	0	0	0	0	15	3
	2013	0	0	5	2	0	0	20	0	0	0	0	15	7
	2014	0	0	6	3	0	2	18	0	0	0	0	17	9
	2015	0	0	8	5	0	7	30	0	0	0	0	19	16
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	6	9	1	2	1	8	1	1	9	1
	2009	1	2	1	6	9	1	2	1	8	1	1	9	1
	2010	1	2	1	6	12	1	2	1	8	1	1	9	1
	2011	1	2	1	6	15	1	2	1	9	1	1	9	1
	2012	1	2	1	6	20	1	2	1	10	1	1	9	1
	2013	1	2	1	6	25	1	2	1	11	1	1	9	1
	2014	1	2	1	6	33	1	2	1	13	2	1	9	1
	2015	1	2	1	6	45	1	2	1	13	2	1	10	1
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	5	3	0	0	1	2	0	0	3	0
	2009	0	0	0	0	0	0	0	0	0	0	0	0	0
	2010	0	0	0	0	3	0	0	0	0	0	0	0	0
	2011	0	0	0	0	3	0	0	0	1	0	0	0	0
	2012	0	0	0	0	5	0	0	0	1	0	0	0	0
	2013	0	0	0	0	6	0	0	0	1	0	0	0	0
	2014	0	0	0	0	8	0	0	0	1	0	0	0	0
	2015	0	0	0	0	12	0	0	0	0	0	0	1	0
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	36	20	0	1	4	13	0	0	22	0
	2009	0	0	0	0	0	0	0	0	0	0	0	0	0
	2010	0	0	0	0	22	0	0	0	2	1	0	0	0
	2011	0	0	0	0	17	0	0	0	5	0	0	0	0
	2012	0	0	0	0	29	0	0	0	6	1	0	0	0
	2013	0	0	0	0	31	0	0	0	7	1	0	0	0
	2014	0	0	0	0	37	0	0	0	7	1	0	0	0
	2015	1	0	0	0	52	0	1	0	0	1	0	3	0
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table A-11. State-by-State Results for the Base-Case, with BAU System Pricing

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	41	1	1,051	34	3	10	2	1	10	1	1
	2009	1	1	72	1	1,105	35	6	10	3	1	10	1	1
	2010	1	1	122	1	1,105	36	8	10	4	1	10	1	1
	2011	1	1	187	1	1,105	73	8	10	5	1	10	1	1
	2012	1	1	268	1	1,272	75	10	10	9	1	10	1	1
	2013	1	1	313	1	1,272	77	14	10	13	1	10	1	1
	2014	1	1	360	1	1,275	78	21	16	21	9	10	1	1
	2015	1	1	408	1	1,566	120	24	20	30	11	12	1	2
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	27	0	552	14	0	9	1	0	4	0	0
	2009	0	0	31	0	55	1	3	0	1	0	0	0	0
	2010	0	0	50	0	0	1	1	0	1	0	0	0	0
	2011	0	0	65	0	0	37	0	0	1	0	0	0	0
	2012	0	0	81	0	167	2	3	0	4	0	0	0	0
	2013	0	0	45	0	0	2	4	0	3	1	0	0	0
	2014	0	0	47	0	3	2	7	6	9	7	0	0	0
	2015	0	0	49	0	291	42	4	4	9	3	1	0	1
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	171	0	3,973	102	2	64	6	0	27	1	0
	2009	0	0	214	0	379	5	24	0	6	0	0	1	0
	2010	0	0	339	0	0	5	9	0	6	0	0	0	0
	2011	0	0	407	0	0	235	0	0	8	0	0	0	0
	2012	0	0	467	0	965	9	16	0	26	0	0	0	0
	2013	0	0	239	0	0	9	19	0	17	5	0	0	0
	2014	0	0	228	0	15	8	33	28	44	35	2	0	0
	2015	0	0	214	0	1,286	184	16	18	38	12	6	0	5
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2009	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2010	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2011	0%	0%	1%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%
	2012	0%	0%	2%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%
	2013	0%	0%	2%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%
	2014	0%	0%	2%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%
	2015	0%	0%	2%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	2	1	2	3	9	1	1	1	1
	2009	1	1	1	2	1	25	15	10	1	1	1	1
	2010	1	1	1	2	1	79	24	12	1	1	1	1
	2011	1	1	1	2	1	79	24	18	1	1	1	1
	2012	1	1	1	2	1	79	59	26	1	1	1	1
	2013	1	1	1	2	1	79	59	34	1	1	1	1
	2014	1	1	1	2	1	96	149	49	2	1	2	1
	2015	1	1	1	2	1	122	149	57	2	1	2	1
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	1	0	0	1	2	0	0	0	0
	2009	0	0	0	0	0	22	13	2	0	0	0	0
	2010	0	0	0	0	0	55	9	2	0	0	0	0
	2011	0	0	0	0	0	0	0	5	0	0	0	0
	2012	0	0	0	0	0	0	35	9	0	0	0	0
	2013	0	0	0	0	0	0	0	8	0	0	0	0
	2014	0	0	0	0	0	17	90	16	1	0	1	0
	2015	0	0	0	0	0	25	0	8	1	0	1	0
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	8	0	3	4	13	0	2	0	0
	2009	0	0	0	0	0	155	88	13	0	0	0	0
	2010	0	0	0	0	0	367	57	12	0	0	0	0
	2011	0	0	0	0	0	0	0	33	0	0	0	0
	2012	0	0	0	0	0	0	202	49	0	0	2	0
	2013	0	0	0	0	0	0	0	41	0	0	1	0
	2014	0	0	0	0	0	84	441	76	5	0	3	0
	2015	0	0	0	0	0	111	0	33	3	0	3	0
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	4%	1%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	4%	1%	0%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	5%	1%	1%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	6%	1%	1%	0%	0%	0%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	79	1	103	12	128	6	1	6	1	6	10
	2009	1	1	107	1	140	12	134	10	1	6	1	9	23
	2010	1	1	109	4	194	12	140	22	1	6	1	76	37
	2011	1	1	140	8	253	12	146	22	1	6	1	112	58
	2012	1	1	143	16	321	14	153	76	1	6	1	150	96
	2013	1	1	175	22	405	16	159	76	1	6	1	193	166
	2014	1	1	179	33	502	21	160	76	1	9	1	258	290
	2015	1	1	203	33	614	25	161	154	1	14	1	333	343
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	64	0	34	3	95	3	0	4	0	4	0
	2009	0	0	28	0	37	0	6	4	0	0	0	3	13
	2010	0	0	2	3	55	0	6	12	0	0	0	67	14
	2011	0	0	30	4	59	0	6	0	0	0	0	36	21
	2012	0	0	3	8	68	2	6	54	0	0	0	38	38
	2013	0	0	32	6	83	2	6	0	0	0	0	43	70
	2014	0	0	4	11	98	5	1	0	0	3	1	65	124
	2015	0	0	24	0	111	4	1	77	0	5	0	75	53
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	12	0	243	23	43	22	0	26	0	30	3
	2009	0	0	198	2	255	1	42	27	0	0	0	18	91
	2010	0	0	16	19	366	0	41	82	0	0	0	451	93
	2011	0	0	189	27	366	0	39	0	0	0	0	226	133
	2012	0	0	17	44	397	9	37	310	0	0	0	220	221
	2013	0	0	172	30	444	11	34	2	0	1	0	231	373
	2014	0	0	18	54	475	25	6	2	0	16	3	315	606
	2015	0	0	107	2	492	20	5	341	0	24	1	332	233
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	1%	0%
	2011	0%	0%	2%	0%	3%	0%	1%	0%	0%	0%	0%	2%	0%
	2012	0%	0%	2%	1%	3%	0%	1%	0%	0%	0%	0%	2%	1%
	2013	0%	0%	2%	1%	4%	0%	1%	0%	0%	0%	0%	3%	1%
	2014	0%	0%	2%	2%	5%	0%	1%	0%	0%	0%	0%	3%	2%
	2015	0%	0%	2%	2%	5%	1%	1%	1%	0%	0%	0%	4%	2%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	6	8	1	2	1	8	1	1	10	1
	2009	1	2	1	6	12	1	2	1	9	1	1	10	1
	2010	1	2	1	6	20	1	2	1	11	3	1	10	1
	2011	1	2	1	6	23	1	2	1	11	3	1	10	1
	2012	1	2	1	6	27	1	3	1	13	7	1	10	1
	2013	1	2	1	6	32	1	3	1	15	7	1	10	1
	2014	2	2	1	6	45	1	3	2	21	7	1	15	1
	2015	2	3	1	6	63	1	4	3	21	7	1	17	1
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	5	2	0	0	1	2	0	0	4	0
	2009	0	0	0	0	4	0	0	0	1	0	0	0	0
	2010	0	0	0	0	8	0	0	0	2	1	0	0	0
	2011	0	0	0	0	3	0	0	0	0	0	0	0	0
	2012	0	0	0	0	4	0	0	0	2	4	0	0	0
	2013	0	0	0	0	4	0	0	0	2	0	0	0	0
	2014	1	0	0	0	13	0	1	0	6	0	0	5	0
	2015	0	1	0	0	18	0	0	2	0	0	0	2	0
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	37	16	0	1	4	17	1	0	29	0
	2009	0	0	0	0	26	0	0	0	5	2	0	0	0
	2010	1	0	0	0	51	0	0	0	12	8	0	0	0
	2011	1	0	0	0	20	0	1	0	0	0	0	0	0
	2012	1	0	0	0	25	0	1	0	12	24	0	0	0
	2013	1	0	0	0	24	0	1	0	13	0	0	2	0
	2014	5	1	0	0	65	0	3	1	30	1	0	24	1
	2015	0	3	0	1	81	0	1	8	0	0	0	7	1
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table A-12. State-by-State Results for the Base Case, with SAI System Pricing

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	41	1	1,220	34	3	11	2	1	10	1	1
	2009	1	1	72	1	1,220	35	8	11	3	1	10	1	1
	2010	1	1	122	1	1,220	36	11	11	4	3	10	1	1
	2011	1	1	187	1	1,256	73	13	11	15	6	10	1	1
	2012	1	1	268	1	1,524	75	19	11	24	9	11	1	1
	2013	1	1	313	1	1,886	77	26	11	32	14	12	1	1
	2014	1	1	360	1	2,890	78	82	16	48	24	22	1	6
	2015	3	1	408	1	3,202	146	108	18	69	31	27	2	14
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	27	0	721	14	0	10	1	0	4	0	0
	2009	0	0	31	0	0	1	5	0	1	1	0	0	0
	2010	0	0	50	0	0	1	4	0	1	2	0	0	0
	2011	0	0	65	0	36	37	2	0	11	3	0	0	0
	2012	0	0	81	0	269	2	6	0	9	3	0	0	0
	2013	0	0	45	0	361	2	7	0	8	4	2	0	0
	2014	0	0	47	0	1,005	2	56	5	16	11	10	0	5
	2015	2	0	49	0	311	67	26	1	21	6	4	1	8
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	171	0	5,192	102	2	75	6	0	32	2	0
	2009	0	0	214	0	0	5	33	0	6	4	0	1	0
	2010	0	0	339	0	0	5	25	0	6	16	0	0	0
	2011	0	0	407	0	225	235	10	0	69	16	0	0	0
	2012	0	0	467	0	1,557	9	34	24	52	20	1	0	0
	2013	0	0	239	0	1,927	9	38	0	44	23	9	0	2
	2014	0	0	228	0	4,898	8	274	49	80	51	48	2	25
	2015	9	0	214	0	1,374	298	114	6	91	28	20	3	37
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%
	2009	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2010	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2011	0%	0%	1%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%
	2012	0%	0%	2%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%
	2013	0%	0%	2%	0%	3%	1%	0%	1%	0%	0%	0%	0%	0%
	2014	0%	0%	2%	0%	4%	1%	1%	1%	0%	0%	1%	0%	0%
	2015	0%	0%	2%	0%	4%	1%	2%	1%	0%	0%	1%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	2	1	3	3	9	1	1	1	1
	2009	1	1	1	2	1	41	15	10	1	1	1	1
	2010	1	1	1	2	1	119	15	12	1	1	1	1
	2011	1	1	1	2	1	119	35	31	1	1	1	1
	2012	1	1	1	2	1	119	35	64	2	1	2	1
	2013	1	1	1	2	1	129	89	94	5	2	2	1
	2014	1	1	1	3	3	176	89	213	12	7	3	1
	2015	1	1	1	5	4	216	212	283	16	9	5	1
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	1	0	1	1	2	0	0	0	0
	2009	0	0	0	0	0	38	13	2	0	0	0	0
	2010	0	0	0	0	0	78	0	2	0	0	0	0
	2011	0	0	0	0	0	0	20	19	0	0	0	0
	2012	0	0	0	0	0	0	0	33	1	0	1	0
	2013	0	0	0	0	0	9	53	30	3	1	0	0
	2014	0	0	0	1	2	47	0	119	7	5	1	0
	2015	0	0	0	2	1	40	123	71	4	2	2	1
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	10	0	4	4	13	0	2	0	0
	2009	0	0	0	0	0	268	89	13	0	0	1	0
	2010	0	0	0	0	0	526	0	12	0	0	2	0
	2011	0	0	0	0	0	0	125	118	2	0	2	0
	2012	0	0	0	0	2	0	0	191	5	2	3	0
	2013	0	0	0	0	3	50	284	159	13	6	3	0
	2014	0	1	1	4	10	230	0	580	36	22	5	0
	2015	0	2	1	10	4	176	545	312	18	10	8	4
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	6%	0%	1%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	6%	1%	1%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	8%	1%	2%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	10%	2%	3%	0%	0%	0%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	79	1	103	13	128	6	1	7	1	6	10
	2009	1	1	107	2	140	14	134	13	1	7	1	9	23
	2010	1	1	109	6	194	14	140	55	1	7	1	118	37
	2011	1	1	140	8	253	15	146	55	1	7	1	167	58
	2012	1	1	143	16	321	22	153	76	1	9	1	232	96
	2013	1	1	175	22	405	32	159	76	1	12	2	295	166
	2014	2	1	179	33	568	73	160	76	1	23	3	400	290
	2015	2	1	203	34	736	110	161	154	1	40	4	508	343
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	64	0	34	4	95	3	0	5	0	4	1
	2009	0	0	28	1	37	1	6	6	0	0	0	3	13
	2010	0	0	2	4	55	0	6	43	0	0	0	109	14
	2011	0	0	30	3	59	1	6	0	0	0	0	50	21
	2012	0	0	3	8	68	7	6	20	0	2	0	64	38
	2013	0	0	32	6	83	10	6	0	0	3	0	63	70
	2014	1	0	4	11	164	40	1	0	0	10	2	106	124
	2015	1	0	24	1	167	38	1	77	0	17	1	108	53
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	12	0	243	32	43	22	0	34	0	30	6
	2009	0	0	198	5	255	4	42	45	0	0	0	18	88
	2010	0	0	16	28	366	0	41	287	0	0	1	730	93
	2011	0	0	189	16	366	8	39	0	0	1	1	312	133
	2012	0	0	17	44	397	41	37	118	0	11	3	373	221
	2013	0	0	172	30	444	54	34	2	0	19	2	334	373
	2014	3	1	18	54	798	197	6	2	0	51	9	514	606
	2015	3	1	107	6	738	166	5	341	0	76	4	477	233
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	2%	0%
	2011	0%	0%	2%	0%	3%	0%	1%	0%	0%	0%	0%	2%	0%
	2012	0%	0%	2%	1%	3%	1%	1%	0%	0%	0%	0%	3%	1%
	2013	0%	0%	2%	1%	4%	1%	1%	0%	0%	0%	0%	4%	1%
	2014	0%	0%	2%	2%	5%	2%	1%	0%	0%	0%	0%	5%	2%
	2015	0%	0%	2%	2%	6%	2%	1%	1%	0%	0%	0%	6%	2%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	7	9	1	2	1	9	1	1	11	1
	2009	1	2	1	7	17	1	2	1	11	1	1	11	1
	2010	1	2	1	7	41	1	3	1	17	4	1	13	1
	2011	1	2	1	7	41	1	3	1	17	4	1	13	1
	2012	2	3	1	7	52	1	3	2	24	7	1	16	1
	2013	2	4	1	7	64	1	4	4	39	9	1	23	1
	2014	4	8	1	10	112	1	6	10	79	9	2	37	1
	2015	4	10	1	16	219	2	8	14	79	9	3	46	1
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	6	3	0	0	1	3	0	0	5	0
	2009	0	0	0	0	8	0	0	0	2	0	0	0	0
	2010	1	0	0	0	25	0	1	0	6	3	0	2	0
	2011	0	0	0	0	0	0	0	0	0	0	0	0	0
	2012	0	1	0	0	10	0	1	1	7	2	0	3	0
	2013	1	1	0	0	12	0	1	2	16	2	0	6	0
	2014	1	3	0	4	48	0	2	5	40	0	1	15	0
	2015	1	2	0	5	107	2	2	4	0	0	1	9	0
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	43	24	0	2	4	23	1	0	37	0
	2009	1	0	0	0	53	0	0	0	16	2	0	0	0
	2010	5	0	0	0	165	0	4	0	37	20	0	13	0
	2011	0	2	0	0	0	0	0	0	1	0	0	0	1
	2012	2	5	0	0	60	0	4	6	39	13	0	19	1
	2013	3	6	0	0	64	0	5	9	83	13	0	33	1
	2014	5	17	0	18	234	0	10	27	195	0	5	71	1
	2015	4	8	0	24	474	7	7	19	0	0	5	41	1
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%

Table A-13. State-by-State Results for the Focused Policy Case, BAU System Pricing

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	41	1	1,051	34	3	10	2	1	10	1	1
	2009	1	1	72	1	1,105	35	6	10	3	1	10	1	1
	2010	1	1	122	1	1,105	36	8	10	4	1	10	1	1
	2011	1	1	187	1	1,603	73	10	10	5	1	10	1	1
	2012	1	1	268	1	2,364	75	15	10	10	1	10	1	1
	2013	1	1	313	1	2,713	77	20	10	13	1	12	1	1
	2014	5	1	360	1	4,317	78	30	16	22	9	15	1	1
	2015	11	1	408	1	5,314	120	35	18	44	11	18	1	2
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	27	0	552	14	0	9	1	0	4	0	0
	2009	0	0	31	0	55	1	3	0	1	0	0	0	0
	2010	0	0	50	0	0	1	1	0	1	0	0	0	0
	2011	0	0	65	0	497	37	3	0	1	0	0	0	0
	2012	0	0	81	0	761	2	5	0	5	0	0	0	0
	2013	0	0	45	0	349	2	5	0	3	1	2	0	0
	2014	4	0	47	0	1,604	2	10	6	9	7	3	0	0
	2015	6	0	49	0	997	42	5	1	22	3	3	0	1
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	171	0	3,973	102	2	64	6	0	27	1	0
	2009	0	0	214	0	379	5	24	0	6	0	0	1	0
	2010	0	0	339	0	0	5	9	0	6	0	0	0	0
	2011	0	0	407	0	3,112	235	17	0	8	0	0	0	0
	2012	0	0	467	0	4,413	9	28	0	28	0	0	0	0
	2013	2	0	239	0	1,861	9	27	0	17	5	11	0	0
	2014	18	1	228	0	7,821	8	48	49	43	35	17	0	0
	2015	28	1	214	0	4,401	184	22	6	98	12	13	0	5
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2009	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2010	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2011	0%	0%	1%	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%
	2012	0%	0%	2%	0%	3%	1%	0%	1%	0%	0%	0%	0%	0%
	2013	0%	0%	2%	0%	4%	1%	0%	1%	0%	0%	0%	0%	0%
	2014	0%	0%	2%	0%	6%	1%	1%	1%	0%	0%	1%	0%	0%
	2015	0%	0%	2%	0%	7%	1%	1%	1%	0%	0%	1%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	2	1	2	3	9	1	1	1	1
	2009	1	1	1	2	1	25	15	10	1	1	1	1
	2010	1	1	1	2	1	79	24	12	1	1	1	1
	2011	1	1	1	2	1	79	24	25	1	1	1	1
	2012	1	1	1	2	1	84	59	36	1	1	1	1
	2013	1	1	1	2	1	108	59	48	1	1	1	1
	2014	1	1	1	2	1	139	149	70	2	1	2	1
	2015	1	1	1	2	1	168	149	81	2	1	2	1
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	1	0	0	1	2	0	0	0	0
	2009	0	0	0	0	0	22	13	2	0	0	0	0
	2010	0	0	0	0	0	55	9	2	0	0	0	0
	2011	0	0	0	0	0	0	0	13	0	0	0	0
	2012	0	0	0	0	0	5	35	11	0	0	0	0
	2013	0	0	0	0	0	24	0	12	0	0	0	0
	2014	0	0	0	0	0	30	90	22	1	0	1	0
	2015	0	0	0	0	0	29	0	11	1	0	1	0
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	8	0	3	4	13	0	2	0	0
	2009	0	0	0	0	0	155	88	13	0	0	0	0
	2010	0	0	0	0	0	367	57	12	0	0	0	0
	2011	0	0	0	0	0	0	0	81	0	0	0	0
	2012	0	0	0	0	0	29	202	63	0	0	2	0
	2013	0	0	0	0	0	129	0	62	0	0	1	0
	2014	0	0	0	0	0	148	441	109	5	0	3	0
	2015	0	0	0	0	0	128	0	49	3	0	3	0
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	4%	1%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	5%	1%	1%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	7%	1%	1%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	8%	1%	1%	0%	0%	0%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	79	1	103	12	128	6	1	6	1	6	10
	2009	1	1	107	1	140	12	134	10	1	6	1	9	23
	2010	1	1	109	4	194	12	140	22	1	6	1	76	37
	2011	1	1	140	8	253	13	146	22	1	6	1	112	58
	2012	1	1	143	16	321	17	153	76	1	6	1	152	96
	2013	1	1	175	22	405	21	159	76	1	6	1	199	166
	2014	1	1	179	33	502	29	239	76	1	9	1	271	290
	2015	1	1	203	33	614	35	280	154	1	14	1	352	343
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	64	0	34	3	95	3	0	4	0	4	0
	2009	0	0	28	0	37	0	6	4	0	0	0	3	13
	2010	0	0	2	3	55	0	6	12	0	0	0	67	14
	2011	0	0	30	4	59	1	6	0	0	0	0	36	21
	2012	0	0	3	8	68	4	6	54	0	0	0	40	38
	2013	0	0	32	6	83	4	6	0	0	0	0	47	70
	2014	0	0	4	11	98	8	80	0	0	3	1	72	124
	2015	0	0	24	0	111	6	41	77	0	5	0	81	53
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	12	0	243	23	43	22	0	26	0	30	3
	2009	0	0	198	2	255	1	42	27	0	0	0	18	91
	2010	0	0	16	19	366	0	41	82	0	0	0	451	93
	2011	0	0	189	27	366	5	39	0	0	0	0	226	133
	2012	0	0	17	44	397	25	37	310	0	0	0	230	221
	2013	0	0	172	30	444	21	34	2	0	1	0	249	373
	2014	0	0	18	54	475	38	390	2	0	16	3	352	606
	2015	0	0	107	2	492	26	182	341	0	24	1	357	233
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	1%	0%
	2011	0%	0%	2%	0%	3%	0%	1%	0%	0%	0%	0%	2%	0%
	2012	0%	0%	2%	1%	3%	0%	1%	0%	0%	0%	0%	2%	1%
	2013	0%	0%	2%	1%	4%	1%	1%	0%	0%	0%	0%	3%	1%
	2014	0%	0%	2%	2%	5%	1%	1%	0%	0%	0%	0%	3%	2%
	2015	0%	0%	2%	2%	5%	1%	1%	1%	0%	0%	0%	4%	2%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	7	8	1	2	1	8	1	1	10	1
	2009	1	2	1	7	12	1	2	1	9	1	1	10	1
	2010	1	2	1	7	20	1	2	1	11	3	1	10	1
	2011	1	2	1	7	23	1	2	1	14	3	1	10	1
	2012	2	2	1	7	27	1	3	1	19	7	1	14	1
	2013	3	2	1	7	32	1	4	1	24	10	1	18	1
	2014	4	7	1	7	56	1	5	2	32	10	1	28	1
	2015	5	8	1	7	117	1	6	3	32	10	1	31	1
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	7	2	0	0	1	2	0	0	4	0
	2009	0	0	0	0	4	0	0	0	1	0	0	0	0
	2010	0	0	0	0	8	0	0	0	2	1	0	0	0
	2011	0	0	0	0	3	0	0	0	3	0	0	0	0
	2012	1	0	0	0	4	0	1	0	5	4	0	4	0
	2013	1	0	0	0	4	0	1	0	5	3	0	4	0
	2014	1	5	0	0	25	0	1	0	8	0	0	10	0
	2015	1	1	0	0	60	0	1	2	0	0	0	3	0
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	50	16	0	1	4	17	1	0	29	0
	2009	0	0	0	0	26	0	0	0	5	2	0	0	0
	2010	1	0	0	0	51	0	0	0	12	8	0	0	0
	2011	2	0	0	0	20	0	2	0	18	0	0	0	0
	2012	5	0	0	0	25	0	4	0	28	24	0	21	0
	2013	3	0	0	0	24	0	3	0	27	16	0	23	0
	2014	6	24	0	0	121	0	6	1	40	0	0	48	1
	2015	3	4	0	0	266	0	2	8	0	0	0	14	1
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%

Table A-14. State-by-State Results for the Focused Policy Case, SAI System Pricing

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	41	1	1,220	34	3	11	2	1	10	1	1
	2009	1	1	72	1	1,441	35	8	11	3	1	10	1	1
	2010	1	1	122	1	1,771	36	11	11	4	3	10	1	1
	2011	2	1	187	1	2,757	73	18	11	15	6	12	1	1
	2012	4	1	268	1	4,009	75	27	11	31	9	16	1	1
	2013	10	1	313	1	5,210	77	50	11	63	14	21	1	1
	2014	22	2	360	1	7,961	95	176	16	135	24	39	1	6
	2015	35	2	408	1	10,772	179	246	28	198	31	70	2	16
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	27	0	721	14	0	10	1	0	4	0	0
	2009	0	0	31	0	222	1	5	0	1	1	0	0	0
	2010	0	0	50	0	330	1	4	0	1	2	0	0	0
	2011	1	0	65	0	985	37	6	0	11	3	2	0	0
	2012	3	0	81	0	1,252	2	9	0	16	3	4	0	0
	2013	5	0	45	0	1,201	2	24	0	32	4	5	0	0
	2014	12	0	47	0	2,751	18	126	5	72	11	18	0	5
	2015	13	1	49	0	2,810	84	70	12	64	6	31	1	10
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	171	0	5,192	102	2	75	6	0	32	2	0
	2009	0	0	214	0	1,541	5	33	0	6	4	0	1	0
	2010	2	0	339	0	2,215	5	25	0	6	16	0	0	0
	2011	6	2	407	0	6,163	235	39	2	70	16	12	0	0
	2012	15	1	467	0	7,258	9	52	22	93	20	20	0	0
	2013	28	2	239	0	6,407	9	127	0	169	23	26	0	2
	2014	60	2	228	0	13,413	87	612	49	352	51	86	2	25
	2015	58	3	214	1	12,406	372	311	53	281	29	138	3	46
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%
	2009	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	0%	0%	0%
	2010	0%	0%	1%	0%	3%	0%	0%	1%	0%	0%	0%	0%	0%
	2011	0%	0%	1%	0%	4%	1%	0%	1%	0%	0%	1%	0%	0%
	2012	0%	0%	2%	0%	6%	1%	1%	1%	0%	0%	1%	0%	0%
	2013	0%	0%	2%	0%	7%	1%	1%	1%	0%	0%	1%	0%	0%
	2014	0%	0%	2%	0%	10%	1%	3%	1%	0%	0%	1%	0%	0%
	2015	0%	0%	2%	0%	13%	1%	4%	1%	0%	0%	2%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	2	1	3	3	9	1	1	1	1
	2009	1	1	1	2	1	41	15	10	1	1	1	1
	2010	1	1	1	2	1	119	15	12	1	1	1	1
	2011	1	1	1	2	1	119	35	41	1	1	1	1
	2012	1	1	1	2	1	126	35	80	2	1	2	1
	2013	1	1	1	2	1	165	89	136	5	2	2	1
	2014	1	1	1	3	3	213	89	405	22	12	8	1
	2015	11	1	1	5	4	266	212	573	32	16	14	1
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	1	0	1	1	2	0	0	0	0
	2009	0	0	0	0	0	38	13	2	0	0	0	0
	2010	0	0	0	0	0	78	0	2	0	0	0	0
	2011	0	0	0	0	0	0	20	29	0	0	0	0
	2012	0	0	0	0	0	7	0	39	1	0	1	0
	2013	0	0	0	0	0	39	53	56	3	1	1	0
	2014	0	0	0	1	2	47	0	268	17	10	6	0
	2015	11	0	0	2	1	53	123	168	10	4	6	1
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	10	0	4	4	13	0	2	0	0
	2009	0	0	0	0	0	268	89	13	0	0	1	0
	2010	0	0	0	0	0	526	0	12	0	0	2	0
	2011	0	0	0	0	0	0	125	179	2	0	2	0
	2012	0	0	0	0	2	42	0	226	5	2	3	0
	2013	0	0	0	0	3	208	284	301	16	6	3	0
	2014	0	1	1	4	10	231	0	1,308	83	47	29	0
	2015	48	2	1	10	4	233	545	743	43	19	26	4
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	7%	0%	1%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	8%	1%	1%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	10%	1%	4%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	12%	2%	6%	0%	0%	0%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	79	1	103	13	128	6	1	7	1	6	10
	2009	1	1	107	2	140	14	134	13	1	7	1	9	23
	2010	1	1	109	6	194	14	140	55	1	7	1	118	37
	2011	1	1	140	8	262	18	146	55	1	7	1	173	58
	2012	1	1	143	22	386	28	210	76	1	9	1	244	101
	2013	1	1	175	22	530	40	373	76	1	12	2	319	166
	2014	3	1	179	33	530	112	698	76	1	23	3	504	290
	2015	5	1	276	50	614	173	838	154	1	51	4	830	511
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	64	0	34	4	95	3	0	5	0	4	1
	2009	0	0	28	1	37	1	6	6	0	0	0	3	13
	2010	0	0	2	4	55	0	6	43	0	0	0	109	14
	2011	0	0	30	3	68	5	6	0	0	0	0	54	21
	2012	0	0	3	13	124	10	64	20	0	2	0	72	43
	2013	0	0	32	0	145	12	164	0	0	3	0	75	65
	2014	2	1	4	11	0	72	325	0	0	10	2	185	124
	2015	2	0	98	18	83	62	140	77	0	28	1	326	221
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	12	0	243	32	43	22	0	34	0	30	6
	2009	0	0	198	5	255	4	42	45	0	0	0	18	88
	2010	0	0	16	28	366	0	41	287	0	0	1	734	93
	2011	0	0	189	16	424	30	39	0	0	1	1	340	133
	2012	0	0	17	77	717	55	368	118	0	11	3	414	252
	2013	0	0	172	0	771	63	873	2	0	19	2	402	344
	2014	10	3	18	53	0	350	1,584	2	0	51	9	902	606
	2015	7	2	431	77	367	273	618	341	0	123	4	1,439	974
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	2%	0%
	2011	0%	0%	2%	0%	3%	1%	1%	0%	0%	0%	0%	3%	0%
	2012	0%	0%	2%	1%	4%	1%	1%	0%	0%	0%	0%	3%	1%
	2013	0%	0%	2%	1%	5%	1%	2%	0%	0%	0%	0%	4%	1%
	2014	0%	0%	2%	2%	5%	3%	4%	0%	0%	0%	0%	6%	2%
	2015	0%	0%	3%	2%	5%	4%	4%	1%	0%	0%	0%	10%	3%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	9	9	1	2	1	9	1	1	11	1
	2009	1	2	1	9	17	1	2	1	11	1	1	11	1
	2010	1	2	1	9	41	1	3	1	17	4	1	13	1
	2011	2	3	1	9	52	1	3	1	23	4	1	18	1
	2012	3	6	1	9	80	1	5	2	32	7	1	25	1
	2013	5	10	1	9	108	1	6	4	52	25	1	35	1
	2014	8	21	1	14	199	4	9	23	106	25	2	57	1
	2015	10	27	1	27	350	7	13	38	106	61	5	71	1
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	8	3	0	0	1	3	0	0	5	0
	2009	0	0	0	0	8	0	0	0	2	0	0	0	0
	2010	1	0	0	0	25	0	1	0	6	3	0	2	0
	2011	1	1	0	0	11	0	1	0	6	0	0	5	0
	2012	1	3	0	0	28	0	1	1	9	2	0	7	0
	2013	2	4	0	0	28	0	1	2	19	18	0	9	0
	2014	3	11	0	5	91	4	3	19	55	0	1	22	0
	2015	2	6	0	13	151	3	4	14	0	37	4	14	0
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	59	24	0	2	4	23	1	0	37	0
	2009	1	0	0	0	53	0	0	0	16	2	0	0	0
	2010	5	1	0	0	165	0	4	0	37	20	0	13	0
	2011	5	4	0	0	68	0	4	0	39	0	0	30	1
	2012	7	19	0	0	162	0	7	6	54	13	0	43	1
	2013	9	22	0	0	147	0	7	10	102	96	0	50	1
	2014	16	52	2	24	445	19	15	93	267	0	5	109	1
	2015	9	27	1	58	668	13	19	63	0	163	16	62	1
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%
	2014	1%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%
	2015	1%	0%	0%	0%	0%	0%	1%	0%	1%	3%	0%	1%	0%

Table A-15. State-by-State Results for the Focused Policy Case, SAI System Pricing

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	41	1	1,059	34	3	16	2	1	11	1	1
	2009	1	1	72	1	1,605	35	11	16	3	3	11	2	1
	2010	1	1	122	1	2,598	36	20	16	4	7	12	2	1
	2011	1	1	187	1	2,598	73	21	16	25	11	12	2	1
	2012	1	1	268	1	3,009	75	30	16	39	16	14	2	5
	2013	3	1	313	1	4,471	77	42	16	57	22	18	2	10
	2014	7	1	360	1	6,071	78	107	16	79	29	35	3	18
	2015	14	2	408	1	8,325	120	171	19	163	41	58	4	33
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	27	0	561	14	0	15	1	0	5	0	0
	2009	0	0	31	0	546	1	8	0	1	2	0	1	0
	2010	0	0	50	0	992	1	9	0	1	5	1	0	0
	2011	0	0	65	0	0	37	2	0	22	4	0	0	1
	2012	0	0	81	0	411	2	9	0	14	5	3	0	4
	2013	2	0	45	0	1,462	2	13	0	18	6	4	0	5
	2014	4	0	47	0	1,600	2	65	1	22	7	17	1	8
	2015	8	1	49	0	2,254	42	63	3	84	12	23	2	15
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	171	0	4,037	102	2	107	6	0	35	1	0
	2009	0	0	214	0	3,798	5	54	0	6	15	0	6	0
	2010	0	0	339	0	6,663	5	62	0	6	32	5	0	0
	2011	0	0	407	0	0	235	10	0	135	24	0	0	6
	2012	0	0	467	0	2,384	9	49	0	82	28	15	0	22
	2013	12	0	239	0	7,801	9	67	9	96	32	22	0	28
	2014	20	0	228	0	7,799	8	316	41	105	34	83	5	37
	2015	34	5	214	0	9,951	184	280	12	369	51	101	7	65
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%
	2009	0%	0%	1%	0%	3%	0%	0%	1%	0%	0%	1%	0%	0%
	2010	0%	0%	1%	0%	4%	0%	0%	1%	0%	0%	1%	0%	0%
	2011	0%	0%	1%	0%	4%	1%	0%	2%	0%	0%	0%	0%	0%
	2012	0%	0%	2%	0%	4%	1%	1%	3%	0%	0%	1%	0%	0%
	2013	0%	0%	2%	0%	6%	1%	1%	6%	0%	0%	1%	0%	0%
	2014	0%	0%	2%	0%	8%	1%	2%	8%	0%	0%	1%	0%	0%
	2015	0%	0%	2%	0%	10%	1%	3%	12%	0%	0%	2%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	2	1	3	3	9	1	1	1	1
	2009	1	1	1	2	1	100	15	10	1	1	1	1
	2010	1	1	1	2	1	302	15	12	2	1	1	1
	2011	1	1	1	2	1	302	35	30	3	1	2	1
	2012	1	1	1	2	1	302	35	42	5	1	4	1
	2013	1	1	1	3	2	319	89	55	9	1	5	1
	2014	1	1	1	6	4	424	89	124	14	1	7	1
	2015	1	1	1	12	7	536	212	194	24	2	11	3
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	2	0	1	1	2	0	0	0	0
	2009	0	0	0	0	0	97	13	2	0	0	0	0
	2010	0	0	0	0	0	203	0	2	1	0	1	0
	2011	0	0	0	0	0	0	20	17	1	0	1	0
	2012	0	0	0	0	0	0	0	12	2	0	1	0
	2013	0	0	0	1	1	17	53	13	4	0	1	0
	2014	0	0	0	3	1	106	0	70	5	0	2	0
	2015	0	1	0	6	4	112	123	70	11	1	4	2
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	12	0	5	4	13	0	2	0	0
	2009	0	0	0	0	0	674	89	13	0	0	0	0
	2010	0	0	0	0	0	1,360	0	12	6	0	6	0
	2011	0	0	0	0	0	0	125	108	6	0	6	0
	2012	0	0	0	0	3	0	0	70	13	0	7	0
	2013	0	0	0	6	6	88	284	69	20	0	8	0
	2014	0	0	0	13	7	515	0	341	25	0	9	0
	2015	0	3	0	28	17	494	545	308	47	5	19	11
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	17%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	17%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	16%	1%	1%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	20%	1%	1%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	24%	2%	2%	0%	0%	0%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	79	1	103	12	128	6	1	5	1	48	9
	2009	1	1	107	2	140	14	134	29	1	5	1	48	23
	2010	1	1	109	9	322	15	140	140	1	7	1	48	45
	2011	1	1	140	9	322	16	146	140	1	9	2	48	58
	2012	1	1	143	21	472	26	153	140	1	12	3	48	96
	2013	2	1	175	30	405	43	159	140	1	16	4	48	166
	2014	2	1	179	33	502	79	275	140	1	20	5	48	290
	2015	5	2	314	33	614	123	435	154	1	34	7	48	442
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	64	0	34	4	95	3	0	3	0	46	0
	2009	0	0	28	1	37	2	6	23	0	0	0	0	13
	2010	0	0	2	7	183	1	6	112	0	1	1	0	23
	2011	0	0	30	0	0	1	6	0	0	2	1	0	13
	2012	0	0	3	12	150	10	6	0	0	3	1	0	38
	2013	0	0	32	9	-68	17	6	0	0	4	1	0	70
	2014	1	0	4	2	98	36	116	0	0	4	1	0	124
	2015	3	2	136	0	111	44	160	13	0	14	2	0	152
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	12	0	243	27	43	22	0	25	0	329	1
	2009	0	0	198	8	255	12	42	158	0	0	0	0	93
	2010	0	0	16	48	1,226	4	41	750	0	9	6	0	152
	2011	0	0	189	0	0	7	39	0	0	15	3	0	78
	2012	1	0	17	68	868	56	37	0	0	18	4	0	221
	2013	3	0	172	50	-360	92	34	0	0	19	5	0	373
	2014	4	1	18	11	475	176	566	0	0	20	5	0	606
	2015	13	8	599	2	492	196	705	58	0	63	11	0	671
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	1%	0%
	2009	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	1%	0%
	2010	0%	0%	2%	1%	4%	0%	1%	1%	0%	0%	0%	1%	0%
	2011	0%	0%	2%	1%	3%	0%	1%	1%	0%	0%	0%	1%	0%
	2012	0%	0%	2%	1%	5%	1%	1%	1%	0%	0%	0%	1%	1%
	2013	0%	0%	2%	2%	4%	1%	1%	1%	0%	0%	0%	1%	1%
	2014	0%	0%	2%	2%	5%	2%	1%	1%	0%	0%	0%	1%	2%
	2015	0%	0%	3%	2%	5%	3%	2%	1%	0%	0%	0%	1%	3%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	11	9	1	2	1	10	1	1	12	1
	2009	1	2	1	11	13	1	2	1	19	1	1	12	1
	2010	3	2	1	11	21	1	3	1	36	13	1	20	1
	2011	3	2	1	11	27	1	3	2	37	13	1	20	1
	2012	4	3	1	11	35	1	4	4	53	13	1	25	1
	2013	6	4	1	16	45	1	6	8	109	24	1	35	2
	2014	8	6	1	24	56	1	7	13	211	24	2	48	2
	2015	12	11	1	39	83	1	10	22	211	37	4	70	3
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	11	3	0	0	1	4	0	0	6	0
	2009	0	0	0	0	3	0	0	0	10	0	0	0	0
	2010	2	0	0	0	8	0	1	0	16	11	0	8	0
	2011	0	0	0	0	6	0	0	0	1	0	0	0	0
	2012	1	1	0	0	8	0	1	3	16	0	0	5	0
	2013	2	1	0	5	9	0	1	4	55	11	0	10	0
	2014	3	2	0	8	11	0	2	5	103	0	1	13	0
	2015	4	5	0	15	27	1	2	10	0	13	2	21	1
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	77	25	0	1	4	27	1	0	43	0
	2009	2	0	0	0	24	0	0	0	67	2	0	0	0
	2010	12	0	0	0	57	0	7	0	109	77	0	52	1
	2011	0	1	0	0	37	0	0	3	6	0	0	0	1
	2012	7	4	0	0	47	0	5	15	95	0	0	29	2
	2013	11	7	0	27	49	0	8	19	296	93	2	56	2
	2014	12	10	0	40	55	0	9	23	501	0	5	65	2
	2015	17	21	0	66	119	3	10	43	0	56	9	94	3
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%
	2014	1%	0%	0%	0%	0%	0%	1%	0%	2%	1%	0%	0%	0%
	2015	1%	0%	0%	0%	0%	0%	1%	0%	1%	2%	0%	1%	0%

Table A-16. State-by-State Results for the Best Case, BAU System Pricing

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	41	1	1,215	34	3	17	2	1	13	1	1
	2009	1	1	72	1	1,302	35	9	17	3	1	13	1	1
	2010	1	1	122	1	1,302	36	11	17	4	1	13	1	1
	2011	1	1	187	1	1,971	73	16	17	8	1	18	1	1
	2012	1	1	268	1	2,940	75	24	17	16	1	24	1	1
	2013	2	1	313	1	3,429	77	32	17	21	2	31	1	1
	2014	11	1	360	1	5,293	78	49	17	36	11	40	1	1
	2015	27	2	408	1	6,917	120	57	18	72	15	54	1	3
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	27	0	716	14	0	16	1	0	7	0	0
	2009	0	0	31	0	88	1	6	0	1	0	0	0	0
	2010	0	0	50	0	0	1	2	0	1	0	0	0	0
	2011	0	0	65	0	668	37	5	0	4	0	5	0	0
	2012	0	0	81	0	970	2	8	0	8	0	6	0	0
	2013	1	0	45	0	489	2	8	0	5	1	7	0	0
	2014	9	0	47	0	1,864	2	17	0	15	9	9	0	0
	2015	16	1	49	0	1,624	42	8	1	37	3	14	0	3
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	171	0	5,156	102	2	116	6	0	53	1	0
	2009	0	0	214	0	609	5	41	0	6	0	0	3	0
	2010	0	0	339	0	0	5	16	0	6	0	0	0	0
	2011	0	0	407	0	4,180	235	28	0	25	0	30	0	0
	2012	0	0	467	0	5,621	9	47	0	46	0	36	0	0
	2013	6	2	239	0	2,609	9	44	1	29	7	36	0	0
	2014	44	2	228	0	9,086	8	81	48	71	46	44	0	0
	2015	71	3	214	0	7,171	184	37	6	163	15	63	0	12
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%
	2009	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%
	2010	0%	0%	1%	0%	2%	0%	0%	1%	0%	0%	1%	0%	0%
	2011	0%	0%	1%	0%	3%	1%	0%	1%	0%	0%	1%	0%	0%
	2012	0%	0%	2%	0%	4%	1%	0%	1%	0%	0%	1%	0%	0%
	2013	0%	0%	2%	0%	5%	1%	1%	1%	0%	0%	1%	0%	0%
	2014	0%	0%	2%	0%	7%	1%	1%	1%	0%	0%	1%	0%	0%
	2015	0%	0%	2%	0%	9%	1%	1%	1%	0%	0%	2%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	2	1	3	3	9	1	1	1	1
	2009	1	1	1	2	1	59	15	10	1	1	1	1
	2010	1	1	1	2	1	195	15	12	1	1	1	1
	2011	1	1	1	2	1	195	35	29	1	1	1	1
	2012	1	1	1	2	1	208	35	43	1	1	5	1
	2013	1	1	1	2	1	268	89	57	1	1	9	1
	2014	1	1	1	2	1	344	89	84	2	1	19	1
	2015	1	1	1	3	1	417	212	97	3	1	27	1
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	2	0	1	1	2	0	0	0	0
	2009	0	0	0	0	0	56	13	2	0	0	0	0
	2010	0	0	0	0	0	137	0	2	0	0	0	0
	2011	0	0	0	0	0	0	20	17	0	0	0	0
	2012	0	0	0	0	0	12	0	14	0	0	5	0
	2013	0	0	0	0	0	61	53	14	0	0	4	0
	2014	0	0	0	0	0	76	0	27	1	0	10	0
	2015	0	0	0	1	0	73	123	13	1	0	7	0
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	14	0	4	4	13	0	2	0	0
	2009	0	0	0	0	0	389	89	13	0	0	0	0
	2010	0	0	0	0	0	919	0	12	0	0	0	0
	2011	0	0	0	0	0	0	125	107	0	0	0	0
	2012	0	0	0	0	0	71	0	82	0	0	28	0
	2013	0	0	0	0	0	323	284	75	0	0	20	0
	2014	0	0	0	0	0	369	0	130	6	0	49	0
	2015	0	0	0	4	0	321	545	58	4	0	33	0
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	11%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	11%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	11%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	13%	1%	1%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	16%	1%	1%	0%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	19%	2%	1%	0%	0%	0%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	79	1	103	12	128	6	1	6	1	6	10
	2009	1	1	107	1	140	14	134	20	1	6	1	9	23
	2010	1	1	109	6	194	14	140	51	1	6	1	101	37
	2011	1	1	140	8	253	15	146	51	1	6	1	149	58
	2012	1	1	143	16	346	21	153	76	1	6	1	202	96
	2013	1	1	175	22	472	26	159	76	1	7	1	264	166
	2014	1	1	179	33	518	37	303	76	1	11	1	360	290
	2015	2	1	203	33	614	55	357	154	1	19	2	468	343
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	64	0	34	4	95	3	0	4	0	4	1
	2009	0	0	28	0	37	1	6	14	0	0	0	3	13
	2010	0	0	2	4	55	0	6	31	0	0	0	92	14
	2011	0	0	30	3	59	1	6	0	0	0	0	48	21
	2012	0	0	3	8	93	6	6	25	0	0	0	53	38
	2013	0	0	32	6	126	5	6	0	0	1	0	62	70
	2014	0	0	4	11	46	11	144	0	0	4	1	96	124
	2015	1	0	24	0	96	19	55	77	0	8	0	108	53
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	12	0	243	26	43	22	0	25	0	30	5
	2009	0	0	198	3	255	9	42	98	0	0	0	18	89
	2010	0	0	16	28	366	0	41	205	0	0	0	616	93
	2011	0	0	189	17	366	7	39	0	0	0	0	302	133
	2012	0	0	17	44	537	36	37	144	0	0	0	307	221
	2013	0	0	172	30	672	28	34	2	0	6	0	332	373
	2014	0	0	18	54	226	52	700	2	0	21	4	469	606
	2015	4	0	107	2	423	82	241	341	0	33	2	476	233
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	2%	0%
	2011	0%	0%	2%	0%	3%	0%	1%	0%	0%	0%	0%	2%	0%
	2012	0%	0%	2%	1%	3%	1%	1%	0%	0%	0%	0%	3%	1%
	2013	0%	0%	2%	1%	4%	1%	1%	0%	0%	0%	0%	3%	1%
	2014	0%	0%	2%	2%	5%	1%	2%	0%	0%	0%	0%	4%	2%
	2015	0%	0%	2%	2%	5%	1%	2%	1%	0%	0%	0%	6%	2%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	12	9	1	2	1	10	1	1	11	1
	2009	1	2	1	12	18	1	2	1	15	1	1	11	1
	2010	1	2	1	12	34	1	2	1	20	5	1	11	1
	2011	1	2	1	12	39	1	3	1	28	5	1	12	1
	2012	2	2	1	12	50	1	4	1	41	7	1	19	1
	2013	3	2	1	12	58	1	4	1	54	22	1	26	1
	2014	5	10	1	17	108	1	6	2	75	22	1	42	1
	2015	6	12	1	28	195	1	7	5	75	22	1	47	1
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	11	3	0	0	1	4	0	0	5	0
	2009	0	0	0	0	9	0	0	0	5	0	0	0	0
	2010	0	0	0	0	16	0	0	0	5	3	0	0	0
	2011	0	0	0	0	5	0	0	0	8	0	0	1	0
	2012	1	0	0	0	11	0	1	0	13	2	0	7	0
	2013	1	0	0	0	8	0	1	0	13	16	0	7	0
	2014	2	8	0	5	51	0	2	1	21	0	0	16	0
	2015	1	1	0	11	87	0	1	3	0	0	0	5	0
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	79	25	0	1	4	29	1	0	33	0
	2009	0	0	0	0	63	0	0	0	36	2	0	0	0
	2010	0	0	0	0	105	0	1	0	31	23	0	0	0
	2011	3	0	0	0	30	0	2	0	49	0	0	7	0
	2012	7	0	0	0	63	0	5	0	77	10	0	41	0
	2013	5	0	0	0	44	0	4	0	71	84	0	38	0
	2014	10	40	0	27	247	0	8	4	104	0	0	80	0
	2015	4	6	0	47	382	0	3	13	0	0	0	23	0
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%
	2015	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%

Table A-17. State-by-State Results for the Best Case, SAI System Pricing

		Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	Florida	Georgia	Hawaii	Idaho	Illinois
Cumulative Installations	2007	1	1	14	1	499	20	3	1	1	1	6	1	1
	2008	1	1	41	1	1,416	34	3	20	2	1	15	1	1
	2009	1	1	72	1	1,748	35	11	20	3	1	15	1	1
	2010	1	1	122	1	2,135	36	17	20	4	4	23	1	1
	2011	4	1	187	1	3,233	73	28	20	24	8	33	1	1
	2012	10	2	268	1	4,997	75	43	20	51	12	47	1	1
	2013	23	3	313	1	6,571	77	82	20	104	18	90	1	1
	2014	54	3	382	1	10,449	119	291	44	224	32	155	2	13
	2015	87	5	843	1	14,133	232	409	70	330	41	243	3	36
Annual Installations	2007	0	0	5	0	166	6	1	1	1	0	3	0	0
	2008	0	0	27	0	917	14	0	19	1	0	9	0	0
	2009	0	0	31	0	332	1	8	0	1	1	0	1	0
	2010	1	0	50	0	387	1	6	0	1	3	7	0	0
	2011	2	1	65	0	1,098	37	11	0	20	3	10	0	0
	2012	6	0	81	0	1,764	2	15	0	27	5	14	0	0
	2013	13	1	45	0	1,574	2	40	0	53	6	43	0	1
	2014	31	1	69	0	3,878	42	209	25	120	14	66	0	12
	2015	33	2	461	1	3,684	112	117	25	106	9	88	2	23
Installers Required	2007	0	0	35	0	1,232	48	7	4	4	0	23	0	0
	2008	0	0	171	0	6,602	102	2	136	6	0	68	1	0
	2009	0	0	214	0	2,313	5	56	0	6	5	0	5	0
	2010	6	1	339	0	2,599	5	42	0	6	21	49	0	0
	2011	14	4	407	0	6,868	235	66	0	128	21	65	0	0
	2012	36	3	467	0	10,222	9	86	0	154	26	79	0	0
	2013	70	4	239	0	8,399	12	211	0	282	31	228	0	4
	2014	150	4	335	0	18,904	205	1,020	120	586	68	319	2	57
	2015	146	8	2,036	2	16,264	496	518	111	469	38	388	8	101
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	3%	0%	0%	2%	0%	0%	1%	0%	0%
	2009	0%	0%	1%	0%	3%	0%	0%	1%	0%	0%	1%	0%	0%
	2010	0%	0%	1%	0%	3%	0%	0%	1%	0%	0%	1%	0%	0%
	2011	0%	0%	1%	0%	5%	1%	1%	1%	0%	0%	1%	0%	0%
	2012	0%	0%	2%	0%	7%	1%	1%	1%	0%	0%	2%	0%	0%
	2013	0%	0%	2%	0%	9%	1%	2%	1%	0%	0%	3%	0%	0%
	2014	0%	0%	2%	0%	14%	1%	5%	2%	0%	0%	6%	0%	0%
	2015	1%	0%	4%	0%	17%	2%	7%	3%	1%	0%	8%	0%	0%

		Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine	Maryland	Mass.	Michigan	Minnesota	Mississippi	Missouri
Cumulative Installations	2007	1	1	1	1	1	2	2	7	1	1	1	1
	2008	1	1	1	3	2	3	3	9	1	1	1	1
	2009	1	1	1	3	2	100	15	10	1	1	1	1
	2010	1	1	1	3	2	295	15	12	1	1	1	1
	2011	1	1	1	3	2	295	35	47	1	1	5	1
	2012	1	1	1	3	2	313	35	99	3	1	14	1
	2013	1	1	1	3	3	411	89	174	8	3	22	1
	2014	1	1	1	18	28	529	101	456	36	16	48	1
	2015	1	1	1	35	34	661	212	659	52	22	92	3
Annual Installations	2007	0	0	0	0	0	1	1	2	1	0	0	0
	2008	0	0	0	2	2	1	1	2	0	0	0	0
	2009	0	0	0	0	0	97	13	2	0	0	0	0
	2010	0	0	0	0	0	196	0	2	0	0	0	0
	2011	0	0	0	0	0	0	20	35	0	0	5	0
	2012	0	0	0	0	0	18	0	51	2	1	9	0
	2013	0	0	0	0	0	97	53	75	5	2	7	0
	2014	0	0	0	15	26	119	12	283	28	13	26	0
	2015	0	1	0	16	6	132	111	202	16	6	45	2
Installers Required	2007	0	0	0	0	0	7	7	16	4	0	0	0
	2008	0	0	0	17	14	7	4	13	0	2	0	0
	2009	0	0	0	0	0	672	89	13	0	0	0	0
	2010	0	0	0	0	0	1,314	0	12	0	0	2	0
	2011	0	0	0	0	0	0	125	220	2	0	29	0
	2012	0	0	0	0	0	104	0	298	9	4	52	0
	2013	0	0	0	2	2	520	284	398	27	9	39	0
	2014	0	1	0	74	125	578	61	1,379	138	63	126	0
	2015	0	3	0	73	26	581	489	893	71	25	197	11
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	17%	0%	0%	0%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	16%	0%	1%	0%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	16%	0%	1%	0%	0%	0%	0%
	2013	0%	0%	0%	0%	0%	20%	1%	2%	0%	0%	0%	0%
	2014	0%	0%	0%	0%	0%	25%	1%	5%	0%	0%	1%	0%
	2015	0%	0%	0%	0%	0%	30%	2%	7%	0%	0%	1%	0%

		Montana	Nebraska	Nevada	NH	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania
Cumulative Installations	2007	1	1	15	1	69	9	32	3	1	2	1	2	9
	2008	1	1	79	1	103	14	128	6	1	7	1	6	10
	2009	1	1	107	2	140	16	134	27	1	7	1	9	23
	2010	1	1	109	9	316	16	140	134	1	7	1	157	41
	2011	1	1	140	13	316	23	146	134	1	8	1	229	61
	2012	1	1	143	22	321	32	265	134	1	11	2	325	115
	2013	2	1	175	22	449	61	482	134	1	15	3	425	210
	2014	5	4	373	33	502	159	913	134	1	29	5	672	479
	2015	8	5	668	80	735	259	1,098	154	1	66	7	1,106	756
Annual Installations	2007	0	0	7	1	29	3	10	1	0	1	0	1	3
	2008	0	0	64	0	34	5	95	3	0	5	0	4	1
	2009	0	0	28	1	37	2	6	21	0	0	0	3	12
	2010	0	0	2	7	176	0	6	107	0	0	0	148	18
	2011	0	0	30	4	0	7	6	0	0	1	0	73	20
	2012	0	0	3	9	6	9	118	0	0	3	1	95	54
	2013	1	0	32	0	128	29	218	0	0	5	1	100	95
	2014	3	3	198	11	53	98	431	0	0	13	3	247	268
	2015	3	1	295	47	233	100	185	20	0	37	1	435	277
Installers Required	2007	0	0	56	4	213	24	71	7	0	4	0	4	19
	2008	3	0	12	0	243	35	43	23	0	33	0	30	8
	2009	0	0	198	8	255	14	42	145	0	0	0	18	86
	2010	0	0	16	46	1,182	0	41	718	0	3	1	994	120
	2011	0	0	189	26	0	43	39	0	0	8	2	454	125
	2012	0	0	17	50	89	55	687	0	0	15	4	553	316
	2013	6	1	172	0	683	154	1,161	0	0	25	4	535	508
	2014	17	13	966	53	257	479	2,100	0	0	65	14	1,203	1,308
	2015	13	6	1,304	209	1,028	440	815	88	1	163	6	1,919	1,223
Market Penetration	2007	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	2%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	2%	1%	3%	0%	1%	1%	0%	0%	0%	2%	0%
	2011	0%	0%	2%	1%	3%	1%	1%	1%	0%	0%	0%	3%	0%
	2012	0%	0%	2%	1%	3%	1%	1%	1%	0%	0%	0%	5%	1%
	2013	0%	0%	2%	1%	4%	1%	3%	1%	0%	0%	0%	6%	1%
	2014	0%	0%	4%	2%	5%	4%	5%	1%	0%	0%	0%	8%	3%
	2015	0%	0%	7%	4%	6%	6%	5%	1%	0%	0%	0%	13%	5%

		Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia	Washington	DC	West Virginia	Wisconsin	Wyoming
Cumulative Installations	2007	1	2	1	1	6	1	2	1	6	1	1	6	1
	2008	1	2	1	13	11	1	2	1	11	1	1	12	1
	2009	1	2	1	13	28	1	2	1	21	1	1	12	1
	2010	2	2	1	13	66	1	3	1	35	9	1	18	1
	2011	3	3	1	13	85	1	4	1	51	9	1	26	1
	2012	5	9	1	14	127	1	5	3	77	9	1	38	1
	2013	7	16	1	23	168	1	7	6	127	60	1	54	1
	2014	11	33	2	50	308	10	11	38	259	60	2	91	1
	2015	19	43	2	84	877	17	17	62	259	60	8	114	1
Annual Installations	2007	1	1	0	0	1	1	1	1	3	1	0	2	0
	2008	0	0	0	13	5	0	0	1	5	0	0	6	0
	2009	0	0	0	0	17	0	0	0	9	0	0	0	0
	2010	1	0	0	0	38	0	1	0	14	8	0	6	0
	2011	1	1	0	0	19	0	1	0	16	0	0	8	0
	2012	2	6	0	1	42	0	2	2	26	0	0	12	0
	2013	2	7	0	9	42	0	2	3	50	50	0	16	0
	2014	4	18	1	27	140	10	4	32	132	0	2	37	0
	2015	8	10	1	34	569	7	6	24	0	0	6	23	1
Installers Required	2007	4	7	0	0	8	4	7	4	22	4	0	15	0
	2008	0	0	0	93	38	0	2	4	38	1	0	43	0
	2009	0	0	0	0	117	0	0	0	65	2	0	0	0
	2010	7	2	0	0	254	0	5	0	96	54	0	39	0
	2011	7	6	0	0	119	0	6	0	99	0	0	50	0
	2012	10	32	0	4	242	0	9	12	152	0	0	72	0
	2013	13	37	0	46	223	0	9	16	265	284	1	83	0
	2014	22	86	5	131	682	47	20	155	646	0	8	182	1
	2015	34	44	3	152	2,512	32	26	105	0	0	26	103	3
Market Penetration	2007	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2008	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2009	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2011	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
	2012	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	0%
	2013	1%	0%	0%	0%	0%	0%	1%	0%	1%	4%	0%	0%	0%
	2014	1%	0%	0%	0%	0%	0%	1%	0%	2%	3%	0%	1%	0%
	2015	1%	0%	0%	0%	1%	0%	2%	0%	2%	3%	0%	1%	0%

A-6. Input Data

Table A-18. Utilities Analyzed

State	Utility Name
AL	Alabama Power Co.
AK	Chugach
AZ	Arizona Public Service
AZ	Salt River Project
AZ	Tucson Electric Power
AK	Entergy Arkansas
CA	Southern California Edison
CA	Sacramento Municipal Utility District
CA	Pacific Gas and Electric Company
CA	San Diego Gas & Electric Company
CA	Los Angeles Department of Water and Power
CO	Public Service Company of Colorado
CO	Colorado Springs
CT	Connecticut Light and Power
DE	Conective (Delmarva Power)
FL	Florida Power & Light Co.
FL	Progress Energy Florida Inc
FL	Tampa Electric Company
GA	Georgia Power
HI	Hawaiian Electric Company (Oahu)
HI	Maui Electric Company
ID	Idaho Power
IL	Commonwealth Edison Co.
IL	Illinois Power Company
IN	PSI Energy Inc.
IA	IES Utilities (Mid America)
IA	Interstate Power and Light
KS	Kansas Gas & Electric Co
KS	Westar Energy Inc
KY	Kentucky Utilities Co
KY	Louisville Gas & Electric Co
KY	Kenergy Corporation
LA	Entergy (Louisiana Power & Light)
ME	Central Maine Power
ME	Bangor Hydro Electric Company
MD	BGE (Baltimore Gas and Electric)
MD	Potomac Electric Power Company
MA	NSTAR (Boston Edison)

MA	Massachusetts Electric Company
MI	Detroit Edison
MI	Consumers Energy Company
MN	Xcel Energy (Northern States Power)
MS	Entergy Mississippi (Mississippi Power and Light)
MS	Mississippi Power Company
MO	AmerenUE - Missouri (Union Electric)
MT	Northwestern Energy (Montana Power Company)
NE	Omaha Public Power District
NV	Nevada Power
NV	Sierra Pacific Power Company
NH	Public Service of New Hampshire
NH	Unitil Energy Systems
NJ	PSE&G (Public Service Electric and Gas Co.)
NJ	Jersey Central Power and Light Co.
NJ	Atlantic City Electrical Company
NM	PNM (Public Service Company of New Mexico)
NM	Southwest Public Service Company
NY	Niagara Mohawk
NY	New York State Electric and Gas Corp
NY	Consolidated Edison
NY	Long Island Power Authority
NC	Duke Power
NC	Progress Energy Carolinas Inc
ND	Northern States Power Co
OH	Ohio Power Company
OH	Ohio Edison
OH	Cincinnati Gas & Electric Company
OK	AEP (Public Service Company of Oklahoma)
OK	Oklahoma Gas and Electric Company
OR	PacifiCorp (Pacific Power)
OR	Portland General Electric Company
PA	PPL Electric Utilities
PA	PECO Energy Co
PA	West Penn Power Co.
RI	Narragansett Electric
SC	South Carolina Electric and Gas
SC	Duke Energy Corporation
SD	Xcel Energy (Northern States Power)
TN	Nashville Electric Service
TN	Knoxville Electric Board

TN	City of Memphis
TX	TXU Electric
TX	Reliant Energy Services
TX	Entergy Gulf States Inc
TX	Constellation New Energy Inc
TX	City of San Antonio
UT	PacifiCorp (Utah Power & Light)
VT	Green Mountain Power
VT	Central Vermont Public Service Corporation
VA	Dominion (Virginia Electric and Power)
VA	Appalachian Power Co
WA	Puget Sound Energy
WA	Snohomish County PUD No 1
WA	City of Seattle
DC	PEPCO
WV	American Electric (Appalachian Power)
WI	We Energies (Wisconsin Electric)
WI	Wisconsin Public Service Corporation
WY	PacifiCorp (Pacific Power)

Table A-19. IREC's Interconnection Assessments

State	Utility	Interconnection Policy Assessment
Alabama	Alabama Power Co.	Barrier
Alaska	Chugach	Good
Arizona	Arizona Public Service	Good
Arizona	Salt River Project	Good
Arizona	Tucson Electric Power	Good
Arkansas	Entergy Arkansas	Poor
California	Southern California Edison	Fair
California	Sacramento Municipal Utility District	Fair
California	Pacific Gas and Electric Company	Fair
California	San Diego Gas & Electric Company	Fair
California	Los Angeles Department of Water and Power	Fair
Colorado	Public Service Company of Colorado	Fair
Colorado	Colorado Springs	Fair
Connecticut	Connecticut Light and Power	Poor
Delaware	Conective (Delmarva Power)	Barrier
Florida	Florida Power & Light Co.	Poor

Florida	Progress Energy Florida Inc	Poor
Florida	Tampa Electric Company	Poor
Georgia	Georgia Power	Fair
Hawaii	Hawaiian Electric Company (Oahu)	Barrier
Hawaii	Maui Electric Company	Barrier
Idaho	Idaho Power	Barrier
Illinois	Commonwealth Edison Co.	Barrier
Illinois	Illinois Power Company	Barrier
Indiana	PSI Energy Inc.	Poor
Iowa	IES Utilities (Mid American)	Poor
Iowa	Interstate Power and Light	Poor
Kansas	Kansas Gas & Electric Co	Barrier
Kansas	Westar Energy Inc	Barrier
Kentucky	Kentucky Utilities Co	Barrier
Kentucky	Louisville Gas & Electric Co	Barrier
Kentucky	Kenergy Corporation	Barrier
Louisiana	Entergy (Louisiana Power & Light)	Barrier
Maine	Central Maine Power	Barrier
Maine	Bangor Hydro Electric Company	Barrier
Maryland	BGE (Baltimore Gas and Electric)	Poor
Maryland	Potomac Electric Power Company	Poor
Massachusetts	NSTAR (Boston Edison)	Fair
Massachusetts	Massachusetts Electric Company	Fair
Michigan	Detroit Edison	Poor
Michigan	Consumers Energy Company	Poor
Minnesota	Xcel Energy (Northern States Power)	Fair
Mississippi	Entergy Mississippi (Mississippi Power and Light)	Barrier
Mississippi	Mississippi Power Company	Barrier
Missouri	AmerenUE - Missouri (Union Electric)	Barrier
Montana	Northwestern Energy (Montana Power Company)	Poor
Nebraska	Omaha Public Power District	Barrier
Nevada	Nevada Power	Good
Nevada	Sierra Pacific Power Company	Good
New Hampshire	Public Service of New Hampshire	Poor
New Hampshire	Unitil Energy Systems	Poor
New Jersey	PSE&G (Public Service Electric and Gas Co.)	Good
New Jersey	Jersey Central Power and Light Co.	Good
New Jersey	Atlantic City Electrical Company	Good
New Mexico	PNM (Public Service Company of New Mexico)	Fair
New Mexico	Southwest Public Service Company	Fair
New York	Niagara Mohawk	Fair

New York	New York State Electric and Gas Corp	Fair
New York	Consolidated Edison	Fair
New York	Long Island Power Authority	Fair
North Carolina	Duke Power	Barrier
North Carolina	Progress Energy Carolinas Inc	Barrier
North Dakota	Northern States Power Co	Poor
Ohio	Ohio Power Company	Fair
Ohio	Ohio Edison	Fair
Ohio	Cincinnati Gas & Electric Company	Fair
Oklahoma	AEP (Public Service Company of Oklahoma)	Poor
Oklahoma	Oklahoma Gas and Electric Company	Poor
Oregon	PacifiCorp (Pacific Power)	Fair
Oregon	Portland General Electric Company	Fair
Pennsylvania	PPL Electric Utilities	Poor
Pennsylvania	PECO Energy Co	Poor
Pennsylvania	West Penn Power Co.	Poor
Rhode Island	Narragansett Electric	Poor
South Carolina	South Carolina Electric and Gas	Poor
South Carolina	Duke Energy Corporation	Poor
South Dakota	Xcel Energy (Northern States Power)	Barrier
Tennessee	Nashville Electric Service	Barrier
Tennessee	Knoxville Electric Board	Barrier
Tennessee	City of Memphis	Barrier
Texas	TXU Electric	Fair
Texas	Reliant Energy Services	Fair
Texas	Entergy Gulf States Inc	Fair
Texas	Constellation New Energy Inc	Fair
Texas	City of San Antonio	Fair
Utah	PacifiCorp (Utah Power & Light)	Barrier
Vermont	Green Mountain Power	Fair
Vermont	Central Vermont Public Service Corporation	Fair
Virginia	Dominion (Virginia Electric and Power)	Poor
Virginia	Appalachian Power Co	Poor
Washington	Puget Sound Energy	Barrier
Washington	Snohomish County PUD No 1	Barrier
Washington	City of Seattle	Barrier
Washington, DC	PEPCO	Barrier
West Virginia	American Electric (Appalachian Power)	Poor
Wisconsin	We Energies (Wisconsin Electric)	Poor
Wisconsin	Wisconsin Public Service Corporation	Poor
Wyoming	PacifiCorp (Pacific Power)	Barrier

Rate Structures. NCI researched each utility's Web site to locate residential and commercial electric rates. We then confirmed with the Federal Energy Regulatory Commission (FERC) Form 1 Database about which standard and TOU rates are most representative of that utility. There are up to three rate structures for each utility's residential and commercial electric services: (1) standard; (2) TOU, weekday (if TOU is available); (3) TOU, weekend (if TOU is available). For each representative utility and assumed system size, we looked at TOU and standard rates to see which rate would yield a lower annual electric utility bill (with PV). We then used that rate structure for the analysis. Refer to the model for actual rate structures.

Demand Charges. NCI cataloged utility peak demand charges from utility Web sites and tariff sheets. We assumed that PV offsets only peak demand charges.

State and Local Incentives. NCI's PV Services Program provided a comprehensive list of local incentives for PV, broken down by state or utility. We divided incentives into three types: capacity-based (in $/kW), performance-based, and capacity-based (as a percentage of system cost). We found out when program funding was scheduled to run out and integrated that into the model. In cases where data could not be found, we implemented a switch to allow incentives to expire in 2009, 2012, or 2016. All the analysis performed in the study assumed the year to be 2009, to be conservative. In reality, if tax credits are extended, most state-level subsidies will be reduced or eliminated. Given that all cases analyzed, except the worst case, assume that federal tax credits are extended, we believe this is a good assumption.

For the California Solar Initiative, we implemented a feedback mechanism in the model that mimics the actual feedback mechanism being used in the initiative. In other words, when cumulative installations within a utility service area reach a certain level, the rebate amount is reduced. However, this model reduces the incentives on an annual basis only, rather than continuously.

Five-Year MACRS Depreciation. We amortized Modified Accelerated Cost-Recovery System (MACRS) benefits over the system life to account for the benefits of accelerated depreciation within the context of a modified simple payback in the commercial sector.

Net Metering Rules. NCI catalogued net metering rules for each state (or utility, where applicable) and accounted for the following: (1) Is net metering allowed? (2) If so, at what rate is electricity sold back to the grid? (3) Can customers get credit for electricity sold back in excess of their annual bill? (4) If so, at what rate is excess credit bought? Options for sell-back include retail, wholesale, and annual average rate. We collected data on these rates where necessary from EIA and internal NCI sources.

Table A-20. Net Metering Availability and Sell-Back Rules for Representative Utilities Analyzed

State	Utility	Net Metering Allowed?	Net Metering Sell Back Rates
Alabama	Alabama Power Co.	N	
Alaska	Chugach	N	
Arizona	Arizona Public Service	Y	Retail
Arizona	Salt River Project	Y	Retail
Arizona	Tucson Electric Power	Y	Retail
Arkansas	Entergy Arkansas	Y	Retail
California	Southern California Edison	Y	Retail
California	Sacramento Municipal Utility District	Y	Retail
California	Pacific Gas and Electric Company	Y	Retail
California	San Diego Gas & Electric Company	Y	Retail
California	Los Angeles Department of Water and Power	Y	Retail
Colorado	Public Service Company of Colorado	Y	Retail
Colorado	Colorado Springs	Y	Retail
Connecticut	Connecticut Light and Power	Y	Retail
Delaware	Conective (Delmarva Power)	Y	Retail
Florida	Florida Power & Light Co.	N	
Florida	Progress Energy Florida Inc	N	
Florida	Tampa Electric Company	N	
Georgia	Georgia Power	Y	Retail
Hawaii	Hawaiian Electric Company (Oahu)	Y	Retail
Hawaii	Maui Electric Company	Y	Retail
Idaho	Idaho Power	Y	Retail
Illinois	Commonwealth Edison Co.	Y	Retail
Illinois	Illinois Power Company	N	
Indiana	PSI Energy Inc.	Y	Retail
Iowa	IES Utilities (mid america)	Y	Retail
Iowa	Interstate Power and Light	Y	Retail
Kansas	Kansas Gas & Electric Co	N	
Kansas	Westar Energy Inc	N	
Kentucky	Kentucky Utilities Co	Y	Retail
Kentucky	Louisville Gas & Electric Co	Y	Retail
Kentucky	Kenergy Corporation	Y	Retail
Louisiana	Entergy (Louisiana Power & Light)	Y	Retail
Maine	Central Maine Power	Y	Retail
Maine	Bangor Hydro Electric Company	Y	Retail
Maryland	BGE (Baltimore Gas and Electric)	Y	Retail
Maryland	Potomac Electric Power Company	Y	Retail
Massachusetts	NSTAR (Boston Edison)	Y	Retail

Massachusetts	Massachusetts Electric Company	Y	Retail
Michigan	Detroit Edison	Y	Retail
Michigan	Consumers Energy Company	Y	Retail
Minnesota	Xcel Energy (Northern States Power)	Y	Retail
Mississippi	Entergy Mississippi (Mississippi Power and Light)	N	
Mississippi	Mississippi Power Company	N	
Missouri	AmerenUE - Missouri (Union Electric)	Y	Wholesale
Montana	Northwestern Energy (Montana Power Company)	Y	Retail
Nebraska	Omaha Public Power District	N	
Nevada	Nevada Power	Y	Retail
Nevada	Sierra Pacific Power Company	Y	Retail
New Hampshire	Public Service of New Hampshire	Y	Retail
New Hampshire	Unitil Energy Systems	Y	Retail
New Jersey	PSE&G (Public Service Electric and Gas Co.)	Y	Retail
New Jersey	Jersey Central Power and Light Co.	Y	Retail
New Jersey	Atlantic City Electrical Company	Y	Retail
New Mexico	PNM (Public Service Company of New Mexico)	Y	Retail
New Mexico	Southwest Public Service Company	Y	Retail
New York	Niagara Mohawk	Y	Retail
New York	New York State Electric and Gas Corp	Y	Retail
New York	Consolidated Edison	Y	Retail
New York	Long Island Power Authority	Y	Retail
North Carolina	Duke Power	Y	Retail
North Carolina	Progress Energy Carolinas Inc	Y	Retail
North Dakota	Northern States Power Co	Y	Wholesale
Ohio	Ohio Power Company	Y	Wholesale
Ohio	Ohio Edison	Y	Wholesale
Ohio	Cincinatti Gas & Electric Company	Y	Wholesale
Oklahoma	AEP (Public Service Company of Oklahoma)	Y	Retail
Oklahoma	Oklahoma Gas and Electric Company	Y	Retail
Oregon	PacifiCorp (Pacific Power)	Y	Retail
Oregon	Portland General Electric Company	Y	Retail
Pennsylvania	PPL Electric Utilities	Y	Retail
Pennsylvania	PECO Energy Co	Y	Retail
Pennsylvania	West Penn Power Co.	Y	Retail
Rhode Island	Narragansett Electric	Y	Retail
South Carolina	South Carolina Electric and Gas	N	
South Carolina	Duke Energy Corporation	N	
South Dakota	Xcel Energy (Northern States Power)	N	
Tennessee	Nashville Electric Service	N	
Tennessee	Knoxville Electric Board	N	

Tennessee	City of Memphis	N	
Texas	TXU Electric	Y	Retail
Texas	Reliant Energy Services	Y	Retail
Texas	Entergy Gulf States Inc	Y	Retail
Texas	Constellation New Energy Inc	Y	Retail
Texas	City of San Antonio	Y	Retail
Utah	PacifiCorp (Utah Power & Light)	Y	Retail
Vermont	Green Mountain Power	Y	Retail
Vermont	Central Vermont Public Service Corporation	Y	Retail
Virginia	Dominion (Virginia Electric and Power)	Y	Retail
Virginia	Appalachian Power Co	Y	Retail
Washington	Puget Sound Energy	Y	Retail
Washington	Snohomish County PUD No 1	Y	Retail
Washington	City of Seattle	Y	Retail
Washington, DC	PEPCO	Y	Retail
West Virginia	American Electric (Appalachian Power)	Y	Retail
Wisconsin	We Energies (Wisconsin Electric)	Y	Retail
Wisconsin	Wisconsin Public Service Corporation	Y	Retail
Wyoming	PacifiCorp (Pacific Power)	Y	Retail

Table A-21. Net Metering Caps for Representative Utilities Analyzed

Utility	Do Net Metering Caps exist?	Cap Amount (% of utilities peak demand unless otherwise noted)
Alabama Power Co.	N	
Chugach	N	
Arizona Public Service	N	
Salt River Project	N	
Tucson Electric Power	N	
Entergy Arkansas	N	
Southern California Edison	Y	2.50%
Sacramento Municipal Utility District	Y	2.50%
Pacific Gas and Electric Company	Y	2.50%
San Diego Gas & Electric Company	Y	2.50%
Los Angeles Department of Water and Power	Y	2.50%
Public Service Company of Colorado	N	
Colorado Springs	N	
Connecticut Light and Power	N	
Conective (Delmarva Power)	N	

Florida Power & Light Co.	N	
Progress Energy Florida Inc	N	
Tampa Electric Company	N	
Georgia Power	Y	0.2%
Hawaiian Electric Company (Oahu)	Y	0.5%
Maui Electric Company	Y	0.5%
Idaho Power	Y	0.1% Of 2000 peak demand
Commonwealth Edison Co.	N	
Illinois Power Company	N	
PSI Energy Inc.	Y	0.10%
IES Utilities (mid america)	N	
Interstate Power and Light	N	
Kansas Gas & Electric Co	N	
Westar Energy Inc	N	
Kentucky Utilities Co	Y	0.10%
Louisville Gas & Electric Co	Y	0.10%
Kenergy Corporation	Y	0.10%
Entergy (Louisiana Power & Light)	N	
Central Maine Power	N	
Bangor Hydro Electric Company	N	
BGE (Baltimore Gas and Electric)	Y	Fixed # of MW's
Potomac Electric Power Company	Y	Fixed # of MW's
NSTAR (Boston Edison)	N	
Massachusetts Electric Company	N	
Detroit Edison	Y	0.1%
Consumers Energy Company	Y	0.1%
Xcel Energy (Northern States Power)	N	
Entergy Mississippi (Mississippi Power and Light)	N	
Mississippi Power Company	N	
AmerenUE - Missouri (Union Electric)	Y	5.0%
Northwestern Energy (Montana Power Company)	N	
Omaha Public Power District	N	
Nevada Power	Y	1.0%
Sierra Pacific Power Company	Y	1.0%
Public Service of New Hampshire	Y	0.1%
Unitil Energy Systems	Y	0.1%
PSE&G (Public Service Electric and Gas Co.)	N	
Jersey Central Power and Light Co.	N	
Atlantic City Electrical Company	N	

PNM (Public Service Company of New Mexico)	N	
Southwest Public Service Company	N	
Niagara Mohawk	Y	0.1%
New York State Electric and Gas Corp	Y	0.1%
Consolidated Edison	Y	0.1%
Long Island Power Authority	Y	0.1%
Duke Power	Y	0.2%
Progress Energy Carolinas Inc	Y	0.2%
Northern States Power Co	N	
Ohio Power Company	Y	1.0%
Ohio Edison	Y	1.0%
Cincinatti Gas & Electric Company	Y	1.0%
AEP (Public Service Company of Oklahoma)	N	
Oklahoma Gas and Electric Company	N	
PacifiCorp (Pacific Power)	Y	0.5%
Portland General Electric Company	Y	0.5%
PPL Electric Utilities	N	
PECO Energy Co	N	
West Penn Power Co.	N	
Narragansett Electric	Y	Fixed # of MW's
South Carolina Electric and Gas	N	
Duke Energy Corporation	N	
Xcel Energy (Northern States Power)	N	
Nashville Electric Service	N	
Knoxville Electric Board	N	
City of Memphis	N	
TXU Electric	N	
Reliant Energy Services	N	
Entergy Gulf States Inc	N	
Constellation New Energy Inc	N	
City of San Antonio	N	
PacifiCorp (Utah Power & Light)	Y	0.1% of 2001 peak demand
Green Mountain Power	Y	1.0%
Central Vermont Public Service Corporation	Y	1.0%
Dominion (Virginia Electric and Power)	Y	0.1%
Appalachian Power Co	Y	0.1%
Puget Sound Energy	N	0.25% of 1996 peak
Snohomish County PUD No 1	N	0.25% of 1996 peak
City of Seattle	N	0.25% of 1996 peak
PEPCO	N	
American Electric (Appalachian Power)	Y	0.1%

We Energies (Wisconsin Electric)	N	
Wisconsin Public Service Corporation	N	
PacifiCorp (Pacific Power)	N	

REC Assumptions. NCI cataloged current renewable energy credit (REC) prices in existing REC markets. For states with an RPS that have not established a REC market, we used a REC value of 15% below the alternative compliance payment. For those states, we assumed a REC market is partially developed in 2009 and fully developed in 2010. For states with separate solar alternative compliance payments, we assumed that if, in the previous year of analysis, the RPS solar set-aside target is met for the current year, the market value of a REC drops to 15% below the normal alternative compliance payment level for the current year (which is necessary only in the District of Columbia, Delaware, Maryland, New Jersey, and Pennsylvania). More refined methods cannot be used because the model has a temporal resolution of only one year.

Building Load Profiles. For residential buildings, NREL provided 8,760 building load profiles on a regional basis using weather for 2003 as an input. NCI and NREL identified 10 representative cities. We then assigned each utility a representative load profile based upon the utility's climate zone, as specified by Building America. The 15 cities were Phoenix, Sacramento, Los Angeles, Boulder, Tampa, Atlanta, Chicago, New York City, Houston, Seattle, Honolulu, Lexington, Dallas, Medford, and Helena.

For commercial buildings, NREL provided 8,760 building load profiles for all 98 utilities being analyzed, using weather data for 2003. Typical building load profiles were for office buildings, warehouses, or hospitals.

PV Output Profiles. For residential buildings, NREL provided 8,760 PV output profiles on a regional basis using 2003 weather as an input into PV Watts with a 30-degree tilt. NCI and NREL identified 15 representative cities. We then assigned each utility a representative PV system output profile.

For commercial buildings, NREL provided 8,760 PV output profiles for all 98 utilities being analyzed, using 2003 weather data as an input to PV Watts with a 0-degree tilt.

O&M and Inverter Costs. DOE provided NCI with aggregated, combined O&M and inverter replacement costs from applicants and awardees of the Solar America Initiative.

Table A-22. O&M and Inverter Replacement Costs

	O&M Costs and Inverter Replacement Costs ($kW/yr)		
Market Segment	**2007**	**2010**	**2015**
Residential	$57.98	$39.45	$35.00
Commercial	$51.28	$38.07	$27.33

System Size. NCI started with default system sizing of 5 kW in the residential sector and 250 kW in the commercial sector. We then reduced system size based on net-metering rules, interconnection standards and local incentive amounts to maximize the value of the incentive (i.e., if a utility offers rebates only for the first 100 kW, a 100-kW system size was used).

Calculation of Annual Electric Bill Savings. Using 8,760 building load profiles provided by NREL and actual utility rate structures (accounting for seasonal variation, TOU rates, and so on), first we calculated a customer's annual electric bill. Next, we calculated annual electric bill savings by combining 8,760 PV output profiles, actual utility rate structures, and the local net-metering laws (i.e., whether net metering is allowed, the rate at which power is sold back to the grid, and whether a customer can sell back power in excess of their annual electric bill).

Information on Calculated TOU Rates. Not all state utility rates used in the analysis conform nicely to average TOU structures. Where applicable, extreme outliers were ignored in the calculation. For example, PSI Energy, Inc., was ignored in the analysis of the Reliability*First* Corporation (RFC) region because its existing TOU rate is available only to those customers with its low-load factor service, a very specific rate. Within the Northeast Power Coordinating Council (NPCC) region, Central Maine Power is the only utility with a shoulder period and rate; thus, a weighted average of the peak and shoulder rates and times was taken to create a new, representative peak rate and length of time.

As expected, TOU structures tended to vary within each region. For example, Florida utilities all establish a morning peak and an evening peak period with nonpeak rates throughout the middle of the day. The average changes in peak-hour rates and non-peak-hour rates between the the winter and summer seasons vary the most between the Northeast (NE) and Pacific states; the NE shows almost no change between seasons, and the Southwest and West show as much as a 147% increase in commercial peak rates between the two seasons. The utility structures within the RFC region vary the most, potentially as a result of the recent merger of the East Central Area Reliability Coordination Agreement (ECAR), the Mid-Atlantic Area Council (MAAC), and the Mid-America Interconnected Network (MAIN) regional reliability councils.

Impact of Carbon Pricing. To examine the impacts of potential national carbon legislation, we modeled the price of carbon as a surcharge on retail electric rates. To assess the impact on electric rates, we used carbon intensity data from EIA's Annual Energy Outlook, by EMMR, and developed $/kWh impacts for $/ton pricing. See below for the values calculated.

Table A-23. Impact of Carbon Cap

Utility IDs	Utility Names	Impact of Carbon Cap [$/kWh per $/ton]
1	Alabama Power Co.	0.00058
2	Chugach	0.00016
3	Arizona Public Service	0.00064
4	Salt River Project	0.00064
5	Tucson Electric Power	0.00064
6	Entergy Arkansas	0.00058
7	Southern California Edison	0.00031
8	Sacramento Municipal Utility District	0.00031
9	Pacific Gas and Electric Company	0.00031
10	San Diego Gas & Electric Company	0.00031
11	Los Angeles Department of Water and Power	0.00031
12	Public Service Company of Colorado	0.00064
13	Colorado Springs	0.00064
14	Connecticut Light and Power	0.00039
15	Conective (Delmarva Power)	0.00051
16	Florida Power & Light Co.	0.00057
17	Progress Energy Florida Inc	0.00057
18	Tampa Electric Company	0.00057
19	Georgia Power	0.00058
20	Hawaiian Electric Company (Oahu)	0.00016
21	Maui Electric Company	0.00016
22	Idaho Power	0.00037
23	Commonwealth Edison Co.	0.00060
24	Illinois Power Company	0.00060
25	PSI Energy Inc.	0.00083
26	IES Utilities (mid america)	0.00060
27	Interstate Power and Light	0.00060
28	Kansas Gas & Electric Co	0.00084
29	Westar Energy Inc	0.00084
30	Kentucky Utilities Co	0.00083
31	Louisville Gas & Electric Co	0.00083
32	Kenergy Corporation	0.00083
33	Entergy (Louisiana Power & Light)	0.00058
34	Central Maine Power	0.00039
35	Bangor Hydro Electric Company	0.00039
36	BGE (Baltimore Gas and Electric)	0.00051

37	Potomac Electric Power Company	0.00051
38	NSTAR (Boston Edison)	0.00039
39	Massachusetts Electric Company	0.00039
40	Detroit Edison	0.00083
41	Consumers Energy Company	0.00083
42	Xcel Energy (Northern States Power)	0.00077
43	Entergy Mississippi (Mississippi Power and Light)	0.00058
44	Mississippi Power Company	0.00058
45	AmerenUE - Missouri (Union Electric)	0.00060
46	Northwestern Energy (Montana Power Company)	0.00037
47	Omaha Public Power District	0.00077
48	Nevada Power	0.00037
49	Sierra Pacific Power Company	0.00037
50	Public Service of New Hampshire	0.00039
51	Unitil Energy Systems	0.00039
52	PSE&G (Public Service Electric and Gas Co.)	0.00051
53	Jersey Central Power and Light Co.	0.00051
54	Atlantic City Electrical Company	0.00051
55	PNM (Public Service Company of New Mexico)	0.00064
56	Southwest Public Service Company	0.00064
57	Niagara Mohawk	0.00033
58	New York State Electric and Gas Corp	0.00033
59	Consolidated Edison	0.00033
60	Long Island Power Authority	0.00033
61	Duke Power	0.00058
62	Progress Energy Carolinas Inc	0.00058
63	Northern States Power Co	0.00077
64	Ohio Power Company	0.00083
65	Ohio Edison	0.00083
66	Cincinnati Gas & Electric Company	0.00083
67	AEP (Public Service Company of Oklahoma)	0.00084
68	Oklahoma Gas and Electric Company	0.00084
69	PacifiCorp (Pacific Power)	0.00037
70	Portland General Electric Company	0.00037
71	PPL Electric Utilities	0.00051
72	PECO Energy Co	0.00051
73	West Penn Power Co.	0.00051
74	Narragansett Electric	0.00039
75	South Carolina Electric and Gas	0.00058
76	Duke Energy Corporation	0.00058
77	Xcel Energy (Northern States Power)	0.00077

78	Nashville Electric Service	0.00058
79	Knoxville Electric Board	0.00058
80	City of Memphis	0.00058
81	TXU Electric	0.00057
82	Reliant Energy Services	0.00057
83	Entergy Gulf States Inc	0.00057
84	Constellation New Energy Inc	0.00057
85	City of San Antonio	0.00057
86	PacifiCorp (Utah Power & Light)	0.00037
87	Green Mountain Power	0.00039
88	Central Vermont Public Service Corporation	0.00039
89	Dominion (Virginia Electric and Power)	0.00058
90	Appalachian Power Co	0.00058
91	Puget Sound Energy	0.00037
92	Snohomish County PUD No 1	0.00037
93	City of Seattle	0.00037
94	PEPCO	0.00051
95	American Electric (Appalachian Power)	0.00083
96	We Energies (Wisconsin Electric)	0.00060
97	Wisconsin Public Service Corporation	0.00060
98	PacifiCorp (Pacific Power)	0.00037

Electricity Escalation Rates. We used two rate escalation scenarios, all in real terms. EIA's Annual Energy Outlook provided the first, but it shows rates staying constant or dropping in all markets. As a result, NCI conducted an analysis looking at projections of supply, capacity, and policy changes that will impact the annual wholesale price. NCI then assumed that changes in wholesale prices will be 100% translated to the retail market (the model allows the user to alter this function). This is a strong assumption, but looking at the dynamics between wholesale and retail markets is outside the scope of the project. The resulting annual percent changes in prices are shown in the tables that follow.

Table A-24. Annual Year Over Year Changes in Electricity Prices as Projected by EIA for the Residential Market

State	2008	2009	2010	2011	2012	2013	2014	2015
Alabama	-0.68%	0.05%	-0.02%	-1.26%	-2.02%	-1.17%	-0.61%	-0.39%
Alaska	-0.95%	-1.29%	-1.53%	-2.34%	-1.93%	-1.04%	-0.46%	0.35%
Arizona	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%
Arkansas	-1.31%	-2.37%	-2.19%	-2.68%	1.18%	-0.10%	-0.20%	-0.52%
California	-0.95%	-1.29%	-1.53%	-2.34%	-1.93%	-1.04%	-0.46%	0.35%
Colorado	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%
Connecticut	-1.98%	-0.12%	-0.06%	-1.29%	-1.01%	1.28%	-1.44%	1.61%
Delaware	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
Florida	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
Georgia	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
Hawaii	-0.95%	-1.29%	-1.53%	-2.34%	-1.93%	-1.04%	-0.46%	0.35%
Idaho	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%
Illinois	-0.89%	0.42%	-0.12%	0.12%	-1.18%	-0.12%	0.02%	0.03%
Indiana	-0.89%	0.42%	-0.12%	0.12%	-1.18%	-0.12%	0.02%	0.03%
Iowa	0.82%	1.45%	1.43%	-0.10%	-1.52%	-0.64%	-0.90%	-1.12%
Kansas	0.82%	1.45%	1.43%	-0.10%	-1.52%	-0.64%	-0.90%	-1.12%
Kentucky	-0.68%	0.05%	-0.02%	-1.26%	-2.02%	-1.17%	-0.61%	-0.39%
Louisiana	-1.31%	-2.37%	-2.19%	-2.68%	1.18%	-0.10%	-0.20%	-0.52%
Maine	-1.98%	-0.12%	-0.06%	-1.29%	-1.01%	1.28%	-1.44%	1.61%
Maryland	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
Massachusetts	-1.98%	-0.12%	-0.06%	-1.29%	-1.01%	1.28%	-1.44%	1.61%
Michigan	-0.89%	0.42%	-0.12%	0.12%	-1.18%	-0.12%	0.02%	0.03%
Minnesota	0.82%	1.45%	1.43%	-0.10%	-1.52%	-0.64%	-0.90%	-1.12%
Mississippi	-0.68%	0.05%	-0.02%	-1.26%	-2.02%	-1.17%	-0.61%	-0.39%
Missouri	0.82%	1.45%	1.43%	-0.10%	-1.52%	-0.64%	-0.90%	-1.12%
Montana	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%
Nebraska	0.82%	1.45%	1.43%	-0.10%	-1.52%	-0.64%	-0.90%	-1.12%
Nevada	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%
New Hampshire	-1.98%	-0.12%	-0.06%	-1.29%	-1.01%	1.28%	-1.44%	1.61%
New Jersey	0.14%	-0.77%	-1.99%	-0.84%	1.67%	0.34%	-0.39%	0.09%
New Mexico	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%
New York	0.14%	-0.77%	-1.99%	-0.84%	1.67%	0.34%	-0.39%	0.09%
North Carolina	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
North Dakota	0.82%	1.45%	1.43%	-0.10%	-1.52%	-0.64%	-0.90%	-1.12%
Ohio	-0.89%	0.42%	-0.12%	0.12%	-1.18%	-0.12%	0.02%	0.03%
Oklahoma	-1.31%	-2.37%	-2.19%	-2.68%	1.18%	-0.10%	-0.20%	-0.52%
Oregon	-0.95%	-1.29%	-1.53%	-2.34%	-1.93%	-1.04%	-0.46%	0.35%
Pennsylvania	0.14%	-0.77%	-1.99%	-0.84%	1.67%	0.34%	-0.39%	0.09%
Rhode Island	-1.98%	-0.12%	-0.06%	-1.29%	-1.01%	1.28%	-1.44%	1.61%

South Carolina	0.82%	1.45%	1.43%	-0.10%	-1.52%	-0.64%	-0.90%	-1.12%
South Dakota	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
Tennessee	-0.68%	0.05%	-0.02%	-1.26%	-2.02%	-1.17%	-0.61%	-0.39%
Texas	-1.31%	-2.37%	-2.19%	-2.68%	1.18%	-0.10%	-0.20%	-0.52%
Utah	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%
Vermont	-1.98%	-0.12%	-0.06%	-1.29%	-1.01%	1.28%	-1.44%	1.61%
Virginia	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
Washington	-0.95%	-1.29%	-1.53%	-2.34%	-1.93%	-1.04%	-0.46%	0.35%
Washington, DC	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
West Virginia	0.11%	-0.88%	-0.48%	-1.80%	-2.03%	-1.20%	-0.78%	-0.34%
Wisconsin	-0.89%	0.42%	-0.12%	0.12%	-1.18%	-0.12%	0.02%	0.03%
Wyoming	0.08%	-1.83%	-1.85%	-2.29%	-0.24%	1.45%	-0.10%	-0.01%

Table A-25. Annual Year-Over-Year Changes in Electricity Prices as Projected by EIA for the Commercial Market

State	2008	2009	2010	2011	2012	2013	2014	2015
Alabama	-0.02%	0.33%	0.25%	-1.51%	-2.11%	-1.30%	-0.49%	-0.20%
Alaska	-0.80%	-1.90%	-2.27%	-2.90%	-2.34%	-1.47%	-0.69%	0.15%
Arizona	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%
Arkansas	0.07%	-2.02%	-2.20%	-3.27%	0.75%	-0.32%	-0.15%	-0.27%
California	-0.80%	-1.90%	-2.27%	-2.90%	-2.34%	-1.47%	-0.69%	0.15%
Colorado	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%
Connecticut	-2.96%	-2.81%	-2.36%	-4.29%	-1.95%	0.91%	-1.19%	2.71%
Delaware	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
Florida	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
Georgia	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
Hawaii	-0.80%	-1.90%	-2.27%	-2.90%	-2.34%	-1.47%	-0.69%	0.15%
Idaho	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%
Illinois	-0.04%	0.35%	-0.50%	-1.35%	-2.48%	-0.95%	-0.34%	0.07%
Indiana	-0.04%	0.35%	-0.50%	-1.35%	-2.48%	-0.95%	-0.34%	0.07%
Iowa	1.61%	1.72%	1.53%	-0.32%	-1.94%	-0.84%	-0.92%	-1.04%
Kansas	1.61%	1.72%	1.53%	-0.32%	-1.94%	-0.84%	-0.92%	-1.04%
Kentucky	-0.02%	0.33%	0.25%	-1.51%	-2.11%	-1.30%	-0.49%	-0.20%
Louisiana	0.07%	-2.02%	-2.20%	-3.27%	0.75%	-0.32%	-0.15%	-0.27%
Maine	-2.96%	-2.81%	-2.36%	-4.29%	-1.95%	0.91%	-1.19%	2.71%
Maryland	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
Massachusetts	-2.96%	-2.81%	-2.36%	-4.29%	-1.95%	0.91%	-1.19%	2.71%
Michigan	-0.04%	0.35%	-0.50%	-1.35%	-2.48%	-0.95%	-0.34%	0.07%
Minnesota	1.61%	1.72%	1.53%	-0.32%	-1.94%	-0.84%	-0.92%	-1.04%
Mississippi	-0.02%	0.33%	0.25%	-1.51%	-2.11%	-1.30%	-0.49%	-0.20%
Missouri	1.61%	1.72%	1.53%	-0.32%	-1.94%	-0.84%	-0.92%	-1.04%

Montana	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%
Nebraska	1.61%	1.72%	1.53%	-0.32%	-1.94%	-0.84%	-0.92%	-1.04%
Nevada	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%
New Hampshire	-2.96%	-2.81%	-2.36%	-4.29%	-1.95%	0.91%	-1.19%	2.71%
New Jersey	-1.17%	-3.63%	-4.75%	-4.13%	1.83%	-0.22%	-0.67%	0.47%
New Mexico	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%
New York	-1.17%	-3.63%	-4.75%	-4.13%	1.83%	-0.22%	-0.67%	0.47%
North Carolina	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
North Dakota	1.61%	1.72%	1.53%	-0.32%	-1.94%	-0.84%	-0.92%	-1.04%
Ohio	-0.04%	0.35%	-0.50%	-1.35%	-2.48%	-0.95%	-0.34%	0.07%
Oklahoma	0.07%	-2.02%	-2.20%	-3.27%	0.75%	-0.32%	-0.15%	-0.27%
Oregon	-0.80%	-1.90%	-2.27%	-2.90%	-2.34%	-1.47%	-0.69%	0.15%
Pennsylvania	-1.17%	-3.63%	-4.75%	-4.13%	1.83%	-0.22%	-0.67%	0.47%
Rhode Island	-2.96%	-2.81%	-2.36%	-4.29%	-1.95%	0.91%	-1.19%	2.71%
South Carolina	1.61%	1.72%	1.53%	-0.32%	-1.94%	-0.84%	-0.92%	-1.04%
South Dakota	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
Tennessee	-0.02%	0.33%	0.25%	-1.51%	-2.11%	-1.30%	-0.49%	-0.20%
Texas	0.07%	-2.02%	-2.20%	-3.27%	0.75%	-0.32%	-0.15%	-0.27%
Utah	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%
Vermont	-2.96%	-2.81%	-2.36%	-4.29%	-1.95%	0.91%	-1.19%	2.71%
Virginia	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
Washington	-0.80%	-1.90%	-2.27%	-2.90%	-2.34%	-1.47%	-0.69%	0.15%
Washington, DC	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
West Virginia	0.58%	-0.88%	-0.63%	-2.14%	-1.80%	-1.12%	-0.63%	-0.12%
Wisconsin	-0.04%	0.35%	-0.50%	-1.35%	-2.48%	-0.95%	-0.34%	0.07%
Wyoming	0.36%	-2.20%	-2.56%	-3.50%	-0.62%	1.89%	0.00%	0.10%

Table A-26. Annual Year-Over-Year Changes in Electricity Prices as Projected by NCI

State	2008	2009	2010	2011	2012	2013	2014	2015
Alabama	13.52%	2.76%	-5.60%	5.40%	7.72%	-0.01%	12.62%	3.13%
Alaska	0.29%	1.24%	1.47%	6.00%	-4.60%	-0.06%	-0.06%	-0.06%
Arizona	15.82%	-0.81%	-11.04%	10.69%	7.24%	0.59%	15.48%	0.78%
Arkansas	-9.78%	-1.38%	-2.97%	-0.75%	0.52%	-1.03%	14.80%	-8.39%
California	12.04%	-4.70%	-13.04%	9.91%	7.64%	-0.43%	14.75%	1.90%
Colorado	11.25%	-6.09%	-14.80%	9.68%	6.84%	-1.90%	13.77%	1.93%
Connecticut	8.85%	-1.09%	-8.47%	5.95%	7.73%	0.67%	13.70%	-4.63%
Delaware	11.99%	-3.40%	-7.53%	6.48%	6.56%	5.80%	14.99%	-3.38%
Florida	11.73%	1.73%	-11.50%	6.79%	4.32%	-1.18%	8.53%	-0.02%
Georgia	-9.03%	-0.92%	-4.26%	0.82%	0.68%	0.20%	14.29%	-7.25%
Hawaii	-0.32%	5.07%	-0.06%	-0.06%	-0.06%	-0.06%	-0.06%	-0.06%
Idaho	12.08%	-5.85%	-12.46%	5.00%	5.01%	-0.59%	13.71%	2.41%

Illinois	-1.78%	6.41%	-8.77%	-6.77%	-1.18%	2.17%	12.53%	9.08%
Indiana	-1.36%	6.51%	-7.83%	-7.13%	-1.18%	3.15%	11.95%	8.23%
Iowa	-11.84%	2.76%	6.04%	-1.85%	-1.44%	-1.39%	12.66%	-8.97%
Kansas	-11.16%	-2.55%	-2.04%	-1.02%	0.94%	-0.71%	17.98%	-7.99%
Kentucky	13.52%	2.76%	-5.60%	5.40%	7.72%	-0.01%	12.62%	3.13%
Louisiana	-9.78%	-1.38%	-2.97%	-0.75%	0.52%	-1.03%	14.80%	-8.39%
Maine	8.38%	-2.95%	-10.57%	5.68%	7.17%	1.11%	13.29%	-3.26%
Maryland	11.99%	-3.40%	-7.53%	6.48%	6.56%	5.80%	14.99%	-3.38%
Massachusetts	9.03%	-3.71%	-5.91%	5.89%	7.94%	0.49%	13.85%	-5.00%
Michigan	-9.73%	-0.06%	-2.73%	2.14%	0.44%	4.84%	13.77%	-6.53%
Minnesota	-11.84%	2.76%	6.04%	-1.85%	-1.44%	-1.39%	12.66%	-8.97%
Mississippi	13.52%	2.76%	-5.60%	5.40%	7.72%	-0.01%	12.62%	3.13%
Missouri	-11.84%	2.76%	2.01%	-1.92%	-1.50%	-1.44%	13.19%	-9.30%
Montana	11.35%	-5.48%	-12.17%	8.99%	5.32%	-0.03%	12.58%	1.90%
Nebraska	-11.84%	2.76%	6.04%	-1.85%	-1.44%	-1.39%	12.66%	-8.97%
Nevada	15.82%	-0.81%	-11.04%	10.69%	7.24%	0.59%	15.48%	0.78%
New Hampshire	10.81%	-4.02%	-9.85%	5.67%	7.16%	0.51%	15.68%	-6.59%
New Jersey	11.99%	-3.40%	-7.53%	10.17%	6.34%	2.47%	14.99%	-3.38%
New Mexico	15.82%	-0.81%	-11.04%	10.69%	7.24%	0.59%	15.48%	0.78%
New York	9.57%	-9.02%	-12.07%	4.35%	7.21%	0.51%	14.12%	-4.78%
North Carolina	-9.90%	0.22%	-3.46%	1.33%	0.93%	0.79%	14.20%	-6.54%
North Dakota	-11.84%	2.76%	6.04%	-1.85%	-1.44%	-1.39%	12.66%	-8.97%
Ohio	-1.36%	6.51%	-7.83%	-7.13%	-1.18%	3.15%	11.95%	8.23%
Oklahoma	-11.16%	-2.55%	-2.04%	-1.02%	0.94%	-0.71%	17.98%	-7.99%
Oregon	11.35%	-5.48%	-12.17%	5.42%	5.51%	-0.03%	12.98%	1.96%
Pennsylvania	12.55%	2.41%	-4.69%	6.27%	7.25%	4.90%	13.63%	2.89%
Rhode Island	7.87%	-3.17%	-8.44%	5.50%	8.06%	1.14%	13.67%	-4.49%
South Carolina	-9.90%	0.22%	-3.46%	1.33%	0.93%	0.79%	14.20%	-6.54%
South Dakota	-11.84%	2.76%	6.04%	-1.85%	-1.44%	-1.39%	12.66%	-8.97%
Tennessee	13.52%	2.76%	-5.60%	5.40%	7.72%	-0.01%	12.62%	3.13%
Texas	-3.56%	-1.87%	-12.18%	-10.19%	-8.05%	-7.65%	11.91%	9.54%
Utah	12.93%	-4.06%	-13.01%	10.20%	7.08%	-0.16%	14.33%	1.57%
Vermont	9.80%	-2.65%	-9.85%	3.30%	8.53%	0.51%	14.68%	-4.95%
Virginia	11.99%	-3.40%	-7.53%	6.48%	6.56%	2.55%	15.47%	-3.47%
Washington	11.35%	-5.48%	-12.17%	5.42%	5.51%	-0.03%	12.98%	1.96%
Washington, DC	11.99%	-3.40%	-7.53%	6.48%	6.56%	5.80%	14.99%	-3.38%
West Virginia	12.55%	2.41%	-4.69%	6.27%	7.25%	4.90%	13.63%	2.89%
Wisconsin	-11.09%	0.22%	1.52%	-0.20%	0.39%	0.12%	13.22%	-8.58%
Wyoming	11.35%	-5.48%	-12.17%	8.99%	5.32%	-0.03%	12.58%	1.90%

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14. ABSTRACT *(Maximum 200 Words)*
The goal of this study was to model the market penetration of rooftop photovoltaics (PV) in the United States under a variety of scenarios, on a state-by-state basis, from 2007 to 2015.

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photovoltaics; PV; PV market penetration; market penetration modeling; rooftop PV systems; solar energy; net metering; interconnection; federal solar energy tax credits; renewable systems interconnection; Navigant Consulting; National Renewable Energy Laboratory; NREL

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