Economic Impact of Extending the Section 1603 Treasury Program

EuPD Research – Exclusive Research Services

October 12, 2011
Prepared for the Solar Energy Industries Association® (SEIA®)
# Table of Contents

Executive Summary

A. U.S. Solar Electric

B. Photovoltaics

C. Concentrating Solar Power

Appendix

About EuPD Research
This study analyzes the economic impact of extending the Section 1603 Treasury Program (TGP). It finds that extending the program would yield thousands of additional jobs and that longer extensions would result in even greater employment gains. EuPD examined the impact of extending the TGP for one, two and five years on additional employment and installed capacity for the years 2011-2016.

The 1603 Treasury Program was created to address the shortage of tax equity available to renewable energy projects due to the collapse of the financial markets. The TGP allows developers to receive a cash grant in lieu of the Section 48 Investment Tax Credit (ITC). The TGP has supported more than a thousand solar projects representing over $3 billion in total investment, contributing to a nearly two-fold increase in solar electric capacity in 2010.
Executive Summary
Executive Summary

The U.S. solar market has experienced rapid growth in the last few years and is poised to continue growing over the next five years according to our baseline forecast. However, extending the TGP would significantly accelerate this growth, increasing investment, employment and deployment across the U.S. While an extension would benefit all sectors of the solar industry, utility-scale solar development would see some of the longest lasting impacts due to the long project development process.

Extension of the 1603 Treasury Program
A one-year extension of the 1603 Treasury Program through 2012 would have the greatest impact on economic activity in 2012 and 2013, as well as enable growth through 2016 as projects complete construction and come online.

- An additional 37,000 jobs would be supported by the solar energy industry in 2012, a 12% increase over baseline.
- The additional cumulative capacity installed through 2016 would be 2,000 megawatts over baseline, enough to power 400,000 homes.
Executive Summary (cont.)

Two-Year Extension

A two-year extension of the TGP commence construction deadline through 2013, would yield 51,000 additional jobs in the solar energy industry in 2013, a 16% increase over baseline, and would result in 3,650 megawatts of cumulative additional capacity installed through 2016.

Five-Year Extension

A five-year extension of the TGP to coincide with the term of the investment tax credit would support an additional 114,000 jobs in the solar energy industry in 2015, a 32% increase over baseline, and would result in 7,450 megawatts of cumulative additional capacity installed through 2016. A predictable five year policy framework will generate an environment that fosters industry growth larger than the potential year-to-year extensions and would create sustained momentum for the industry.
The baseline U.S. solar employment forecast calls for significant growth. However, if the program is extended by 1 year, total employment will exceed the baseline forecast by over 37,000 in 2012. Of that, over 18,000 will be directly employed by solar companies or employed indirectly by firms that support the solar industry. An additional 19,000 jobs will be induced by the industry’s economic activity.

If the program is extended by 2 years, total employment will grow an additional 51,000 in 2013. A 5-year extension will push the U.S. employment supported by the solar energy industry to almost 114,000 over baseline including 55,000 direct & indirect solar workers.

Note:
Employment is calculated in job-years for calendar year 2016. Direct employment includes solar workers in installation of PV systems, construction of CSP and PV power plants, manufacturing of PV modules and components and key CSP components. Indirect employment includes employment at suppliers to the solar industry. Induced employment is the result of the broader economic activity created by the solar industry.

*Source: EuPD Research 2011*
Additional Employment by Extension Scenario

Additional Employment Supported by Extending the 1603 Treasury Program

- Extending the program by 1 year will yield an additional 37,000 jobs in 2012 supported by the solar industry compared to the baseline.
- A 2-year extension would support an additional 51,000 jobs in 2013.
- Extending the program by 5 years will yield an additional 114,000 jobs supported by the solar industry in 2016 compared to baseline.
- Each scenario results in an employment peak in a different year.

Note:
The baseline scenario assumes that the 1603 Treasury Program will expire as currently scheduled. The one-, two- and five-year extension scenarios assume that the "commence construction" date will be extended one, two and five years, respectively. Estimates include direct, indirect and induced employment.
Additional Installations by Extension Scenario

Additional Installations of CSP and PV Systems in the U.S. above the Baseline Forecast

- Extending the program by 1 year would result in an additional 276 MW installed in 2016 and 1,979 MW of cumulative additional installations from 2012-2016.
- Extending the program by 2 years would drive additional installations of 525 MW in 2016 and 3,614 MW of cumulative additional installations from 2012-2016.
- Compared to the baseline scenario, extending the program by 5 years will support an additional 1,974 MW in installations in 2016 and 7,334 MW of cumulative additional installations from 2012-2016.

Note:
The baseline scenario assumes that the 1603 Treasury Program will expire as currently scheduled. The one-, two- and five-year extension scenarios assume that the program’s “commence construction” date will be extended one, two and five years, respectively.
A. U.S. Solar Electric
Contents

Executive Summary

A. U.S. Solar Electric
   1. U.S. Employment by State
   2. U.S. Installation by State

B. Photovoltaic

C. Concentrating Solar Power

Appendix

About EuPD Research
Increased Employment Supported by the U.S. Solar Energy Industry by State

Employment Supported in 2012 by a 1-Year Program Extension

- Extending the program for one year will spur additional employment growth in all states analyzed.
- States that deploy CSP plants or build CSP components, like Arizona and Texas, will benefit the most.
- Arizona, California, New Mexico and North Carolina show the greatest percentage gain over baseline.
- The major growth in Texas is driven by the state’s manufacturing base.

Note:
The map shows the 2012 U.S. employment level associated with the solar electric (Photovoltaic & Concentrating Solar Power) power industry, including direct, indirect and induced jobs. This scenario evaluates a 1-year extension of the 1603 Treasury Program.
Increased Employment Supported by the U.S. Solar Energy Industry by State

Employment Supported in 2013 by a 2-Year Program Extension

- A two-year extension would spur further employment growth in all states.
- In this scenario California would support over 106,000 solar jobs in 2013.
- The solar industry in Texas would support over 33,000 jobs in 2013.

Note:
The map shows the 2013 U.S. employment level associated with the solar electric (Photovoltaic & Concentrating Solar Power) power industry, including direct, indirect and induced jobs. This scenario evaluates a 2-year extension of the 1603 Treasury Program.
Increased Employment Supported by the U.S. Solar Energy Industry by State

Employment Supported in 2016 by a 5-Year Program Extension

- All 19 states shown except for Hawaii show more than 10% solar job growth over the baseline scenario.
- Arizona shows a tremendous level of job creation in 2016 under this scenario – surpassing 67,000 jobs.
- Arizona, Texas and New Mexico show the greatest percentage gain over baseline.
- 9 out of 19 analyzed states will generate over 10,000 solar-related jobs in 2016, with three others close to that mark.

Note:
The map shows the 2016 U.S. employment level associated with the solar electric (Photovoltaic & Concentrating Solar Power) power industry, including direct, indirect and induced jobs. This scenario evaluates a 5-year extension of the 1603 Treasury Program.
A.2.1. Solar Electric Installations by State

Baseline Installation Forecast 2011–2016 (MW)

- California will remain the leading state in terms of solar installations – adding a cumulative 16,000 MW between 2011 and 2016, just over a third of the national total.
- Driven by its strong CSP sector, Arizona will approach 4,800 MW in new installations between 2011 and 2016.
- New Jersey, Nevada and Texas also show significant growth in solar deployment over the next five years.

Note:
The map shows the cumulative 2011-2016 installed solar electric (Photovoltaic & Concentrating Solar Power) power capacity in peak megawatts (MW). This assumes that the Section 1603 Treasury Program will expire as currently scheduled.
A.2.2. Increased Solar Electric Installations by State

Installation Forecast with a 1-Year Program Extension (Cumulative megawatts added 2011–2016)

- All states analyzed show increased solar deployment under a 1-year extension.
- The increases are most significant for the southwestern states that have a strong CSP component in their installation mix, including Arizona and California.

Gains over Baseline:
- 0 – 10 %
- 10 – 20 %
- > 20 %

Note:
The map shows the cumulative 2011-2016 installed solar electric (Photovoltaic & Concentrating Solar Power) power capacity in peak megawatts (MW). This scenario assumes that the 1603 Treasury Program will be extended for one year through 2012.
A.2.3. Increased Solar Electric Installations by State

Installation Forecast with a 2-Year Program Extension (Cumulative megawatts added 2011–2016)

- Compared to the baseline scenario, all 19 states analyzed show 5-11% growth in cumulative solar electric power installed.
- Arizona and California show the strongest growth, in large part driven by newly installed CSP systems.
- Nevada and Colorado also show growth of 7-8% driven by the CSP sector.

Note:
The map shows the cumulative 2011-2016 installed solar electric (Photovoltaic & Concentrating Solar Power) power capacity in peak megawatts (MW). This scenario assumes that the 1603 Treasury Program will be extended for two years through 2013.
A.2.4. Increased Solar Electric Installations by State

Installation Forecast with a 5-Year Program Extension (Cumulative megawatts added 2011–2016)

- California shows by far the most capacity installed – reaching 19,200 MW (38% of U.S. capacity).
- Arizona shows the highest percentage growth over baseline, with a total of 6,600 MW installed between 2011 and 2016, nearly 1,800 MW more than the baseline forecast.
- New Jersey will reach 3,700 MW.
- Other states that are expected to surpass the 2,000 MW mark are Nevada and Texas.

Note:
The map shows the cumulative 2011-2016 installed solar electric (Photovoltaic & Concentrating Solar Power) power capacity in peak megawatts (MW). This scenario assumes that the 1603 Treasury Program will be extended for five years through 2016.
B. Photovoltaics
Contents

Agenda/Outline
Executive Summary

A. U.S. Solar Electric

B. Photovoltaics
  1. Employment Supported by PV Sector vs. Baseline Forecast (through 2016)
  2. Photovoltaic Installations vs. Baseline Forecast (through 2016)

C. Concentrating Solar Power

Appendix

About EuPD Research
B.1. Employment Supported by the PV Sector vs. Baseline Forecast

Additional U.S. Employment Supported by the PV Sector vs. Baseline Forecast

- This graph shows estimates for PV only.
- The 1-year extension has the greatest impact in 2012, yielding more than 16,000 additional jobs.
- A 2-year extension results in an additional 22,000 jobs in 2013.
- Extending the program by 5 years will have the strongest positive impact on employment in the U.S., with an additional 40,000 jobs supported in 2016.

Note:
The employment estimates for all scenarios includes all direct, indirect and induced jobs.
B.2. Photovoltaic Installations vs. Baseline Forecast

Additional U.S. PV Installations vs. Baseline Forecast

- This slide shows estimates for PV only.
- Cumulatively (2012-2016), a 1-year extension would result in 1,012 MW of additional installations, the 2-year extension would yield over 1,995 MW of additional installations, and the 5-year extension would deploy over 4,193 MW of additional PV capacity.
C. Concentrating Solar Power
Contents

Agenda/Outline

Executive Summary

A. U.S. Solar Electric

B. Photovoltaics

C. Concentrating Solar Power
  1. Employment Supported by the CSP Sector vs. Baseline Forecast (through 2016)
  2. Increased CSP Installations vs. Baseline Forecast (through 2016)

Appendix

About EuPD Research
This slide shows concentrating solar power (CSP) only.

- A 1-year extension yields an additional 21,000 jobs and a 2-year extension would add 31,000 jobs in 2012.
- The 5-year extension would have the strongest positive impact on CSP-related employment in the U.S. Under this scenario, an additional 82,000 CSP jobs will be supported in 2015.

**Note:**
The employment estimates for all scenarios include all direct, indirect and induced jobs.
C.2. Increased CSP Installations vs. Baseline Forecast

Additional U.S. CSP Installations vs. Baseline Forecast

- This slide shows concentrating solar power (CSP) only.
- A 2-year extension would add 667 MW of additional CSP in 2014 and a cumulative 1,619 MW through 2016.
- CSP shows significant growth in installations under the 5-year extension, adding 934 MW of additional CSP in 2015 alone, as well as a cumulative 3,149 MW through 2016.

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<th>2 years ext.</th>
<th>5 years ext.</th>
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Appendix 1
Contents

Executive Summary

A. U.S. Solar Electric

B. Photovoltaics

C. Concentrating Solar Power

Appendix 1
Additional Research Results

About EuPD Research
Total Employment by Scenario

U.S. Jobs in the Solar and Supporting Industries

Note:
The baseline scenario assumes that the 1603 Treasury Program will expire as currently scheduled. The one-, two- and five-year extensions assume that the “commence construction” date will be extended one, two and five years, respectively.
Total Installations by Scenario

U.S. Installations for CSP and PV Systems by the Year of Operation

Note:
The baseline scenario assumes that the 1603 Treasury Program will expire as currently scheduled. The one-, two- and five-year extensions assume that the “commence construction” date will be extended one, two and five years, respectively.
Employment Supported by the U.S. Solar Energy Industry by State

Baseline Employment Forecast 2016

- While California is expected to host more solar jobs than any other state, it will account for less than one quarter of the national total with 93,000 jobs supported by the solar industry in the state in 2016.
- Other major solar employment hubs include Ohio, Michigan, Arizona and Texas —benefitting from more than 35,000 jobs each.
- Due to its strong manufacturing base, the solar industry in Ohio will support over 61,000 jobs in 2016.

Note:
The map shows the 2016 U.S. employment level associated with the solar electric (Photovoltaic & Concentrating Solar Power) power industry. Included are direct, indirect and induced jobs in 2016.
### Increased Employment by State vs. Baseline Forecast in 2012

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**Growth over Baseline**

- 1 year TGP Extension over baseline: 12%
- 1 year TGP Extension over baseline: 12%
- 2 year TGP Extension over baseline: 16%
- 2 year TGP Extension over baseline: 16%
- 5 year TGP Extension over baseline: 18%
- 5 year TGP Extension over baseline: 18%

**Note:**
The total employment estimates for all scenarios include all direct, indirect and induced jobs.
Increased Employment by State vs. Baseline Forecast in 2013

<table>
<thead>
<tr>
<th>State</th>
<th>1 year TGP Extension over baseline</th>
<th>2 year TGP Extension over baseline</th>
<th>5 year TGP Extension over baseline</th>
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Growth over Baseline: 6% 23%

Note: The total employment estimates for all scenarios includes all direct, indirect and induced jobs.
# Increased Employment by State vs. Baseline Forecast in 2016

## Additional solar electric employment by state in 2016

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<th>1 year TGP Extension over baseline</th>
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<td>74</td>
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<td>1,470</td>
<td>1,438</td>
<td>2,722</td>
<td>4,582</td>
<td>8,650</td>
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<td>OR</td>
<td>294</td>
<td>585</td>
<td>527</td>
<td>1,038</td>
<td>1,630</td>
<td>3,173</td>
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<td>384</td>
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<td>110</td>
<td>76</td>
<td>150</td>
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<td>1,073</td>
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<td>7,095</td>
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<td>WA</td>
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<td>216</td>
<td>188</td>
<td>363</td>
<td>662</td>
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<td>Other</td>
<td>712</td>
<td>1,417</td>
<td>874</td>
<td>1,761</td>
<td>4,718</td>
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<td>Total</td>
<td>8,424</td>
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<td>11,889</td>
<td>24,293</td>
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<td>Growth over Baseline</td>
<td>4%</td>
<td>4%</td>
<td>6%</td>
<td>6%</td>
<td>26%</td>
<td>26%</td>
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</tbody>
</table>

**Note:**
The total employment estimates for all scenarios includes all direct, indirect and induced jobs.
# Increased Installations vs. Baseline Forecast

The table shows the additional solar electric capacity installed between 2011 and 2016 in megawatts (MW) compared to the baseline forecast.

<table>
<thead>
<tr>
<th>State</th>
<th>1 year TGP Extension over baseline</th>
<th>2 year TGP Extension over baseline</th>
<th>5 year TGP Extension over baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ</td>
<td>309 MW</td>
<td>544 MW</td>
<td>1,814 MW</td>
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<tr>
<td>CA</td>
<td>1,007 MW</td>
<td>1,807 MW</td>
<td>2,857 MW</td>
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<td>CO</td>
<td>61 MW</td>
<td>89 MW</td>
<td>162 MW</td>
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<tr>
<td>CT</td>
<td>29 MW</td>
<td>58 MW</td>
<td>139 MW</td>
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<tr>
<td>FL</td>
<td>33 MW</td>
<td>64 MW</td>
<td>184 MW</td>
</tr>
<tr>
<td>HI</td>
<td>18 MW</td>
<td>33 MW</td>
<td>63 MW</td>
</tr>
<tr>
<td>MA</td>
<td>30 MW</td>
<td>59 MW</td>
<td>128 MW</td>
</tr>
<tr>
<td>MI</td>
<td>5 MW</td>
<td>11 MW</td>
<td>26 MW</td>
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<td>NV</td>
<td>95 MW</td>
<td>197 MW</td>
<td>349 MW</td>
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<td>195 MW</td>
<td>406 MW</td>
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<td>31 MW</td>
<td>51 MW</td>
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<td>NC</td>
<td>11 MW</td>
<td>21 MW</td>
<td>43 MW</td>
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<td>OH</td>
<td>16 MW</td>
<td>31 MW</td>
<td>75 MW</td>
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<tr>
<td>OR</td>
<td>26 MW</td>
<td>52 MW</td>
<td>127 MW</td>
</tr>
<tr>
<td>PA</td>
<td>46 MW</td>
<td>86 MW</td>
<td>183 MW</td>
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<tr>
<td>TN</td>
<td>4 MW</td>
<td>8 MW</td>
<td>20 MW</td>
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<tr>
<td>TX</td>
<td>60 MW</td>
<td>117 MW</td>
<td>259 MW</td>
</tr>
<tr>
<td>WA</td>
<td>6 MW</td>
<td>12 MW</td>
<td>29 MW</td>
</tr>
<tr>
<td>Other</td>
<td>72 MW</td>
<td>138 MW</td>
<td>323 MW</td>
</tr>
<tr>
<td>Total</td>
<td>2,003 MW</td>
<td>3,651 MW</td>
<td>7,449 MW</td>
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</tbody>
</table>

### Note:
- Under each scenario of the program extension, all 19 analyzed states show a significant increase in solar electric capacity.
- State markets that grow the most with the extension are the southwestern states of Arizona, California, Colorado and Nevada.
Appendix 2
Contents

Executive Summary

A. U.S. Solar Electric

B. Photovoltaics

C. Concentrating Solar Power

Appendix 1

Appendix 2

Methodology, assumptions & sources

About EuPD Research
Appendix 2

Methodology

Most of the forecast data, especially for PV, is based on research data in EuPD Research’s extensive solar database and its continuous global market research. The other data points were modeled leveraging existing market data and industry knowledge of the PV and CSP markets. EuPD Research uses a combined upstream and downstream research methodology to forecast the baseline PV, which is illustrated graphically on the next page.

The three policy extension scenarios are modeled based on the substantial experience EuPD Research has in analyzing incentive policies in the U.S., Europe and Asia. The key modeling factors that were adjusted in EuPD Research’s PV and CSP models to reflect the policy change impact were primarily: demand factor, U.S. competitive factor, accelerated learning curve effects, labor rates and the likelihood that questionable CSP projects get completed as scheduled.

The CSP market is analyzed on a project by project basis. NREL’s JEDI models were used to calculate the employment and key component cost for solar trough plants.

CSP Projects sources included SEIA, NREL and CSP Today lists.

Model output data was crosschecked with other industry sources and expert interviews to validate key data points.
Economic Model

U.S. PV Market Modeling

Upstream Side
- Calculation of status quo and future Employment
- Calculation of status quo and future investment

Downstream Side
- Calculation of status quo and future Employment
- Calculation of status quo and future investment

U.S. PV Market Forecast through 2016
- Production figures
- Employment factor: Employees/Output
- Production capacity figures
- Investment factor: Million U.S.$/Output (MW)
- U.S. PV installation figures in MW (state and federal level)
- Installation factor: kWp per employee per segment
- PV system price figures
- PV system price per kWp per customer segment
Appendix 2

Assumptions PV

The baseline PV growth is driven by continued state and federal incentives that will not change significantly in the next five years beyond the changes known as of May 2011.

The 1603 Treasury Program will impact most of the open field PV installations and a minority of the commercial rooftop market. For these installations, the program provides a higher perceived value in the cost of capital compared to the ITC.

The learning curve cost reduction will be accelerated if the policy changes that stimulate the solar market come into effect.

The state PV incentives will be adjusted slowly and predictably over the next five years in a way that allows end-users and the industry to adjust accordingly.

The data for this study was gathered in May 2011. Impacts for 2011 from the 1603 extension scenarios are based on the assumption that the U.S. solar industry knew at that time, with a high degree of certainty, that the program would be extended.
Appendix 2

Assumptions CSP

1. The investment environment for CSP will remain favorable in the southwestern U.S. The CSP industry will continue to receive support at the state and local level.

2. The Treasury program will impact most projects. It will be strongest for projects that would otherwise have difficulty obtaining financing.

3. Implementing CSP for base load reasons, is considered to be a major strategic issue for the US.

4. The learning curve cost reduction will be accelerated if the policy changes that stimulate the solar market come into effect.
About EuPD Research

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