

Where are photovoltaic solar cells made?

Over 90% of worldwide photovoltaic (PV) solar panel production occurs outside the United States. In 2007, Japan was the world's largest PV solar cell producer, manufacturing nearly 1 gigawatt (1,000 megawatts, MW) each year. China was the second largest PV producer, followed by Germany, Taiwan, and the U.S., in fifth place producing 266 MW, nearly one-quarter the amount produced by Japan and less than 10% of the world's production.

Why is the U.S. so far behind in solar PV manufacturing?

Generally other countries have done far more to create domestic demand for solar cells, and they offer much greater incentives for solar manufacturing than available in the US. Germany and Japan, for example, have had feed-in-tariffs in place for years. These programs create demand for solar cells by guaranteeing long-term favorable price contracts for solar energy provided to utilities, in place for years. Furthermore, many nations also offer generous incentives to locate solar manufacturing in-country, examples are below:

- Philippines – Board of Investment (BOI) order 226 offers income tax holidays and other incentives for “preferred areas of economic activity” specified by BOI in Investment Priorities Plan (IPP). Renewable energy production is included in the list – BOI-registered enterprises are eligible for tax holidays of 6 yrs if they are new projects with a pioneer status.
 - o Sunpower – \$320 million investment, maximum output of 150 MW. \$200 million loan guarantee, 6-year tax holiday.
- Malaysia – Government provides a 15-year income tax holiday as incentive to locate solar facilities.
 - o First Solar – Total investment of \$150 million for 150 MW production.
- Germany – Incentives to invest in the former East Germany include incentives up to 30% of investment for large enterprises (40-50% for smaller enterprises), along with an additional Investment Allowance that takes the form of a tax-free cash payment or tax credit.
 - o First Solar – 192 MW (est. \$200 million investment), 45.5 million euro (\$62 million) incentive package for Frankfurt (Oder) plant.

What is the U.S. market for solar PV cells?

According to SEIA, in 2007 the U.S. had 720 MW of solar PV installed, a distant third in the world behind Germany with 3080 MW installed and Japan with 1938 MW. However, the U.S. market is poised for rapid growth with the long-term extension of the commercial and residential solar investment credits enacted last year will create a robust domestic solar market in the years to come. SEIA predicts the US will become the world's largest solar PV market.

What has been done to establish domestic U.S. solar PV production?

Where there is domestic production, this has generally been a result of large incentive packages offered by states. Where large state incentives have been put in place solar PV production has grown. Some examples include:

- Schott Solar in New Mexico – \$130 million to lure 350 jobs initially, with plans to scale to 1500 jobs. \$450 million overall planned investment. \$8 million in 2008 for infrastructure – roads, utility upgrades – \$4 million more in 2009, another \$120 million in training funds, energy and high-wage tax credits, and bonds.
- First Solar in Ohio – “First Solar says incentives are central to expansion plans in OH.” Will increase annual capacity by adding 4th line to reach 192 MW. Headline – “First Solar to expand Ohio mfg plant if incentives granted.” Would add 134 workers to 700 already employed.
- Signet in New Mexico – 200 jobs initially, possibly 600 in future. Total \$185 million in tax incentives including manufacturing, high-wage, rural jobs and energy jobs credits, and training program.
- SolarWorld AG and Solaicx in Oregon – Oregon Business Energy Tax Credit offers 50% of cost of renewable energy manufacturing facilities, and 50% of cost credit for installed panels in Oregon. Both are capped at \$20 million.
- United Solar Ovonic in Michigan – Total \$37 million state and local incentive package for a 50 MW expansion of solar manufacturing facility in Greenville.

What could be done to increase domestic solar PV production?

The U.S. has fallen behind other nations because those nations have created more local demand and offered greater incentives for solar manufacturing. The long-term extension of the federal tax credit for installed solar cells enacted last year will create demand in the U.S. However, this is only a part of the solution. Without greater incentives to locate manufacturing in the U.S., current trends will likely continue and increased demand in the U.S. would be met by solar cells imported from nations that offer production incentives. The U.S. could compete for this manufacturing by broadening the current-law 30 percent solar investment tax credit (ITC, sections 48 and 25D of the tax code) to include solar manufacturing equipment. This would qualify equipment to produce solar cells for the same 30% tax credit now offered to solar cells installed for U.S. use.

Why should this be considered in the Economic Recovery and Reconstruction Act?

Broadening the current solar ITC to include solar manufacturing equipment fulfills many of the goals of the stimulus identified by policymakers. These include job creation and retention, investment in renewable energy infrastructure, a large positive impact with a relatively small cost to the Treasury (because of the limited current U.S. solar manufacturing), and assistance to the states.

How would this credit retain and create U.S. jobs?

This credit would create a strong incentive to manufacture solar cells in the United States. SEIA estimates this would create 315,000 jobs. These would be well-paid, “green” jobs manufacturing the solar cells that will be installed in the U.S. to reduce our reliance on fossil fuels and begin to address climate change. This figure includes the construction jobs created and retained which would begin work immediately building new solar PV manufacturing facilities. Over the next 2 years, thousands of jobs will be created to produce the solar manufacturing equipment itself, along with the first new solar production facilities going on line. Over the long-term, hundreds of thousands of jobs

will be created producing solar manufacturing equipment, constructing and operating solar manufacturing facilities, as well as producing the components of solar cells such as polysilicon and glass.

Who produces solar manufacturing equipment and how would this affect them?

Some solar cell makers like First Solar, as well as smaller manufacturers, custom produce their own manufacturing equipment. Most solar cell producers buy their solar manufacturing equipment from third parties (such as Applied Materials and Oerlikon) who also manufacture semiconductor and flat panel display equipment. Many of the solar manufacturing machines are so big they cannot fit in a cargo 747 so they need to be made fairly close to the end user – therefore an incentive for U.S. solar cell manufacturing will also create incentives for U.S. production of solar manufacturing equipment.

With manufacturing growing rapidly abroad, these same factors that would help create domestic equipment manufacturing are currently driving equipment manufacturing abroad. Shipping logistics have necessitated manufacturing abroad. Furthermore, pressure to manufacture this equipment abroad is mounting as chip production grows overseas, and the same logistical concerns apply. This incentive would be a key boost to a limited U.S. industry and create an additional boost to 2nd tier suppliers to the industry.

How would this credit help the U.S. meet its renewable energy needs?

This credit would enable the U.S. to domestically produce more of the technology needed to reduce reliance on fossil fuels and curb carbon emissions. The U.S. is already forecast to become the world's largest solar PV market, and several initiatives Congress plans to consider, such as a cap-and-trade system and a federal renewable energy standard, will likely increase solar PV demand even more. Without incentives to manufacture those cells in the U.S., imports will likely meet most of that demand and the nation will lose an opportunity to create a manufacturing infrastructure employing hundreds of thousands producing the green technology we need.

How would this affect or aid states?

Creating a federal solar manufacturing incentive reduce financial burdens on the states, increase tax revenue as production is located and jobs are created, and it would create a more level playing field for states to compete for solar manufacturing. This proposal would alleviate states of the financial burden of offering these incentives while still creating the jobs and revenues that states have hoped to attract. With many states in dire financial straits, they more than ever need to reduce outlays and attract investment and revenue. Furthermore, even before the current conditions took effect, many states which have excellent solar resources were unable to offer competitive incentive packages. This federal credit would allow them to attract jobs and investment that in the past may have followed incentives to other states, despite otherwise favorable business conditions.