

Think Corner Research Note

Government support for energy technologies and green jobs

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Recent news on the bankruptcy of Solyndra, a solar manufacturer that received more than \$500 million from the Department of Energy has attracted a lot of attention. Most of the criticism, however, is misplaced. The issue is not so much whether the federal government should be in the business of supporting technology research and development but it is rather whether the federal support should be picking winners based on the idea that “green jobs” can pull the U.S. out of the economic doldrums. After all, federal support for R&D led to many of the widespread technologies we take for granted today, including the internet. Also, one failed project out of 38 projects supported since 2009 and \$535 million out of \$35.9 billion is not a bad batting average for R&D support.¹

More relevant is the scalability and commercial sustainability of the projects that did not go bankrupt. How large of an impact can they be expected to have? Can they survive in globally competitive markets? Only if these two questions are answered in the affirmative, significant positive economic impacts can be expected.

Promotion of clean energy options based on job creation prospects, albeit politically very appealing, takes away from the focus on potential benefits of these options: improving efficiency, reducing negative environmental impacts and contributing to energy security. All of these are legitimate aspects of our energy options that require transparent, scientific and rigorous ‘cradle-to-grave’ evaluation against the fundamental decision criteria of Btus per dollar spent and reliability.

Difficulty of defining green jobs

The definition of “green jobs” is imprecise, hence creating ample opportunities for misquoting. Researchers at the Metropolitan Policy Program at Brookings recently added a new study to the long list of studies on green, or clean, jobs.² The authors state that “...the clean economy remains an enigma: hard to assess” because green or clean activities are “...tricky to define and isolate – and count.” The Brookings report is the result of an effort to develop a detailed database of clean jobs at the establishment level based on the following definition of a clean economy: “the sector of the economy that produces goods and services with an environmental benefit.”

The Brookings definition is consistent with those from the Bureau of Labor Statistics (BLS) and the Worldwatch Institute (see box);³ but they all are too wide-ranging and nebulous to be practical. These definitions cannot be used to evaluate energy generation technologies such as solar, wind, biomass and

¹ U.S. DOE’s Loan Programs Office (LPO) manages loans under Section 1703 of Title XVII of the Energy Policy Act of 2005, Section 1705 added to EAct by the American Recovery and Reinvestment Act of 2009 and Section 136 of the Energy Independence and Security Act of 2007, which established the Advanced Technologies Vehicles Manufacturing (ATVM) program. The LPO facilitates the financing of wind, solar, geothermal, nuclear, biofuels and energy efficiency projects (https://lpo.energy.gov/?page_id=45).

² *Sizing the Clean Economy – A National and Regional Green Jobs Assessment*, by Mark Muro, Jonathan Rothwell, and Devashree Saha with Battelle Technology Partnership Practice. 2011.

³ *Green Jobs: Towards decent work in a sustainable, low-carbon world*. Prepared for the United Nations Environment Programme by the Worldwatch Institute with technical assistance from Cornell University Global Labor Institute, September 2008.

other emerging alternatives because these technologies represent a small share of the total “green” economy. The Brookings study remarks that “Most clean economy jobs reside in mature segments that cover a wide swath of activities including manufacturing and the provision of public services such as

The Bureau of Labor Statistics (BLS) classifies “jobs involved in economic activities that help protect or restore the environment or conserve natural resources” as green jobs, which includes recycling, pollution reduction, organic farming, and similar non-energy activities. Similarly, the Worldwatch Institute defines “...green jobs as work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution.”

wastewater and mass transit. *A smaller portion of the clean economy encompasses newer segments that respond to energy-related challenges. These include the solar photovoltaic (PV), wind, fuel cell, smart grid, biofuel, and battery industries”* (emphasis added). The study estimates that about 2.7 million people are employed in the clean economy, out of the U.S. labor force of 154 million. Even with 9% unemployment, less than 2% of those employed in 2010 were in the clean economy sector.

Excluding hydro,⁴ **only about 90,000 were employed in the renewable energy sector – less than 0.06% of total employed.** About 830,000 were employed in a wide range of activities that help conserve energy and improve efficiency in energy use, only some of which can be considered new energy technologies (e.g., battery technologies, smart grid). Again, some consideration is necessary: 350,000 of these jobs were in public mass transportation, which has been around for a long time.⁵ Clearly, new clean technologies for energy generation and efficiency, which are presumably most in need of government R&D support, cannot be expected to have a large employment impact since

they are starting from a low baseline of 200,000 to 300,000 at best. Indeed, the Brookings study concludes that “..., the data counsel against excessive hopes for large-scale, near-term job-creation from the sector” referring to the complete clean economy sector of 2.7 million employees. This conclusion applies multifold to green energy generation technologies since employment in those sectors represent less than 0.06% of the U.S. labor force.

Efficiency of fiscal stimulus and comparative advantage

In tough economic times, there is room for fiscal stimulus but that stimulus should be directed to sectors that would create more jobs and economic activity for dollar invested (e.g., infrastructure) and/or industries, in which the U.S. has comparative advantage given its natural, human and technological resources not to mention financial resources. This financial efficiency is even more important during current times of large and growing fiscal burden of the government. The U.S. does not have financial comparative advantage against, say, China, which reportedly poured \$30 billion of subsidies into its solar industry in 2010. Although China may be the biggest competition currently, it is also India, South Korea, Brazil, United Arab Emirates and other emerging economies that can challenge higher cost producers in the U.S. and Europe.

Energy is a key input to the rest of the economy. Since energy supply is capital rather than labor intensive, the sector will not create as many jobs as many other sectors of the economy for the same dollar invested but reliable and affordable supply of energy will certainly increase economic activity and job creation in the rest of the economy.

⁴ The hydro sector, which had more than 55,000 jobs in 2010, is excluded because large hydro facilities have been around for a long time and cannot be considered as eligible for new federal support. More importantly, no new large hydro facilities are getting built due to opposition from local communities and environmental groups; if anything, this sector may lose jobs if some facilities are retired.

⁵ Some of the other “existing” jobs included in the count are 75,000 nuclear industry jobs, 386,000 waste management and treatment jobs, 130,000 organic farming jobs, and 315,000 conservation jobs (agricultural and natural resources).

As long as the products are up to quality, safety and international trade standards, the cheaper supplies of solar and other renewable technology parts from abroad should be good for the U.S. economy as well since renewable targets can be met at lower cost. In fact, when foreign supplies of green technologies and fuels (such as Brazilian ethanol) are cheaper than domestically produced alternatives, forcing consumers pay more for domestically produced alternatives would reduce consumers' spending on other goods and services and hurt international competitiveness of businesses, some of which will also lose sales due to reduced consumer spending.

In our report *Defining, Measuring, and Predicting Green Jobs* prepared for the Copenhagen Consensus Center, we pointed out that many, if not all, jurisdictions supported various alternative technologies with the explicit goal of exporting their products.⁶ In their survey of green stimulus programs across several jurisdictions, Ladislav and Goldberger observe that: "...each of the countries examined below see green stimulus as part of a larger strategic goal to be a leader in clean energy and climate-friendly technologies in the years to come."⁷ Most U.S. states structured their renewable portfolio standards (RPS) programs to favor local economic development and, as such, do not favor a national market for trading renewable energy credits, which would favor lowest cost renewables development wherever that might take place across the U.S.⁸ In many cases, domestic markets are small, and the desired levels of job creation and economic development can only happen if large amounts of exports can be sustained.

Chinese and Indian companies are already supplying their domestic markets and competing in other markets; and they often offer cost advantages. South Koreans and others are not far behind.⁹ There are more than 120 wind turbine or parts manufacturers in more than 30 countries around the world.¹⁰ The solar industry is no different with many countries joining the ranks of solar manufacturers practically every day. On the one hand, these trends show that manufacturing of wind turbines, solar panels and other parts in the supply chain of renewable technologies can be done in most locations with an industrial base; but on the other hand, it points to highly competitive nature of the market and difficulty of establishing and sustaining competitive positions.

From the perspective of increasing global competition, more important than Solyndra's bankruptcy are the bankruptcies of Evergreen Solar and Spectrawatt, a company backed by Intel Corp. and Goldman Sachs. Also, German companies, SolarWorld and Solon, decided to close plants in the U.S. and BP Solar recently closed its Maryland manufacturing facility. Since early 2010, seven solar manufacturers shut down facilities or went bankrupt¹¹ while Suntech, a Chinese company – one of the world's largest producers of solar panels, opened a manufacturing facility in Arizona.¹² In Europe too, local solar

⁶ <http://www.copenhagenconsensus.com/Default.aspx?ID=1542#7056>.

⁷ Ladislav Sarah O. and Nitzan Goldberger, February 16, 2010. *Assessing the Global Green Stimulus*, Commentary, Center for Strategic and International Studies.

⁸ *Harmonization of Renewable Energy Credit (REC) Markets across the U.S.* (2009), CEE-UT project report to State Energy Conservation Office (http://www.beg.utexas.edu/energyecon/transmission_forum/CEE_National_RECs_study.pdf).

⁹ "Asia's green-tech rivals: Clean-energy competition in the region will be intense," *The Economist*, November 13, 2009.

¹⁰ The following web site lists 129 wind turbine manufacturers in 31 countries and 17 U.S. states:

<http://energy.sourceguides.com/businesses/byP/wRP/lwindturbine/byB/mfg/mfg.shtml>. The number of main manufacturers is 130 at <http://www.thewindpower.net/manufacturers.php> but 34 companies have been acquired or do not exist any longer. Clearly, these lists are not definitive in that companies self-report, some of the companies are subsidiaries of others and not all produce large scale turbines or supply only parts of a wind system; but the lists are also not complete and have been growing (both sites accessed on October 11, 2011).

¹¹ According to the Coalition for American Solar Manufacturing (<http://www.americansolarmanufacturing.org/> accessed on October 23, 2011).

¹² <http://www.renewableenergyworld.com/rea/news/article/2010/10/suntech-opens-new-u-s-manufacturing-plant> (accessed on November 8, 2011).

manufacturers are facing challenges. QCells (Germany) and Renewable Energy Corp (Norway) incurred large financial losses and are cutting production. Solyndra and Stirling Energy Systems went bankrupt primarily because their technologies could not compete with the falling prices of PVs. In contrast, Evergreen, Spectrawatt, QCells, Renewable Energy Corp and others are losing to competition from low-cost foreign companies, which started stealing market shares in high subsidy markets.¹³ Cuts in subsidies by Germany, Italy and Spain help the foreign companies further since the higher-cost local producers cannot compete.

Trade wars

In response to bankruptcies and factory closures, a group of U.S. solar manufacturers petitioned the U.S. International Trade Commission to investigate China's support of its solar industry with respect to dumping and illegal subsidies.¹⁴ This action is one of the latest international trade battles caused by support programs for clean energy technologies across the globe. For example, in late 2010, the United Steelworkers filed a complaint (5,800 pages long) with U.S. trade officials charging China with violating World Trade Organization (WTO) rules by providing subsidies to its clean-energy sector and supporting it with domestic content preferences and similar policies.¹⁵ In September 2010 Japan complained to WTO about Ontario's green energy program that requires the purchase of certain amount of supplies from domestic producers.¹⁶

These conflicts arise and will continue to make the headlines because each jurisdiction develops the support programs for new technologies with the implicit assumption that trade barriers will be erected in order to ensure domestic job creation. Rhone Resch, president and CEO of the Solar Energy Industries Association (SEIA), observed that the U.S. benefited from the global trade of solar products.¹⁷ A study prepared for the SEIA concluded that the U.S. was a significant net exporter of solar products with \$723 million in 2009 and that 74% of the \$3.6 billion in direct value created via solar installations was created in the U.S.¹⁸ The study also reported that PV related imports from China represented \$430 million out of total imports of \$1,591 million while the U.S. exports to China were \$280 million in 2009. Interestingly, the U.S. had \$504 million surplus in its PV trade with Germany, a leader among the countries supporting the solar PV industry. It appears that the global solar market is no different than any other product market with many players trying to gain market share based on their comparative advantages; and it is a dynamic market.

¹³ "Reports: Stirling Dish Maker Is Newest Casualty of PV Price Plummet." Power Magazine, October 5, 2011 http://www.powermag.com/POWERnews/4078.html?hq_e=el&hq_m=2297764&hq_l=10&hq_v=da3079b614 (accessed on October 6, 2011) and "Solar shakeout will bring more failures, few deals", Reuters, August 25, 2011 http://news.cnet.com/8301-11128_3-20097395-54/solar-shakeout-will-bring-more-failures-few-deals/ (accessed on October 6, 2011).

¹⁴ "U.S. Solar Panel Makers Petition Govt. to Investigate Chinese Solar Subsidies, Dumping." Power Magazine, October 19, 2011 <http://www.powermag.com/POWERnews/4113.html> (accessed on October 23, 2011).

¹⁵ <http://online.wsj.com/article/SB10001424052748704644404575481743747170692.html> (accessed on October 23, 2011).

¹⁶ <http://www.theglobeandmail.com/report-on-business/ontario-clean-power-subsidies-draw-wto-challenge-from-japan/article1705239/> (accessed on October 23, 2011).

¹⁷ "U.S. Solar Panel Makers Petition Govt. to Investigate Chinese Solar Subsidies, Dumping." POWERnews, October 19, 2011 http://www.powermag.com/POWERnews/4113.html?hq_e=el&hq_m=2307417&hq_l=7&hq_v=da3079b614 accessed on October 23, 2011).

¹⁸ *U.S. Solar Energy Trade Assessment 2010: Trade Flows and Domestic Content for Solar-Energy Related Goods and Services in the United States*. A GTM Research Study prepared for SEIA, November 2010.

The need to understand multiple dimensions of our energy options

Every economy is different in terms of its resources (natural, human, technological, financial), its industrial composition, stage of its economic development, and the extent and quality of infrastructure. The totality of these conditions determines comparative advantages. Ignoring these conditions and trying to build such advantages based on government grants, subsidies and trade barriers have rarely succeeded and when they appear to have succeeded they cost large sums; and, worse, such support programs are subject to change with political changes, undermining sustainability.

With respect to the energy sector, these policies are even more misguided if they are based on false promises such as green jobs and energy independence. A lack of understanding multiple dimensions of our energy options in terms of resources and technologies is at the root of the problem. Dimensions are numerous, interactions are complex, and issues are often hard to frame and analyze; but ignoring these problems is not an option. There are no silver bullets; we can move forward with sensible energy policies only armed with the multifaceted understanding of the pros and cons of energy options. Public's understanding of the energy realm is critical. To that effect, in coming months, CEE-UT will deploy a web-based tool, backed with extensive fundamental research, for all interested individuals to evaluate cost, efficiency, reliability, scalability, environmental impact and other dimensions of our energy options holistically. See *The [Energy] Webs We Weave* by Michelle Michot Foss for a more detailed description of these concepts.