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Solar trade tariffs

Suhail Abboushi
Duquesne University, Pittsburgh, Pennsylvania, USA

Abstract

Purpose – The purpose of this paper is to survey the growth of solar energy worldwide, analyze US-China trade dispute in the solar industry, and evaluate the merits of US trade tariffs.

Design/methodology/approach – The study surveyed archival data, publications by international organizations, government agencies, industry groups, and some academic research papers.

Findings – Global demand for solar energy has been rising steadily and is projected to generate growing source of electric power. There is worldwide consensus that public support for solar industry in the development stages is necessary. The US Government provides generous support programs and subsidies to US solar industry. Accordingly, US punitive tariffs against China's solar industry on grounds of government subsidies are of questionable merit.

Originality/value – This paper presents a concise profile of global solar energy and evaluates US trade policy toward China. The findings can be of value to government officials as they consider trade policies and their impact on the future of solar energy.

Keywords China, USA, Trade, Solar industry, Tariffs

Paper type Research paper

Introduction

Solar energy is the most abundant source of energy on earth and a modern technology referred to as crystalline silicon photovoltaic systems (C-Si-PV, abbreviated to PV) is used to convert solar energy to electricity. The basic element of the technology is the PV cell, a semiconductor device which does the conversion. When connected, PV cells form a PV module (panel), which, when integrated with additional accessories, create PV systems which can produce megawatts (MW – million watts) of electric power. OECD's International Energy Agency (IEA) predicts PV technology to supply over 10 percent of global electric power (Technology Roadmap, 2010). The G-8 summit, in 2008 in Aomori, Japan, adopted a common policy to provide concerted public support and incentive systems to make PV technology more efficient, because solar power holds the promise to address global challenges of energy security, climate change, and sustainable development. In the midst of concerted and unified global efforts, however, cross-national disputes arise, as in the case of US-China dispute. In October 2011, seven US solar manufacturers filed petition with Department of Commerce (DOC) seeking action against the Chinese PV industry. The seven companies were led by an affiliate of a German company named Solar World AG who had filed a similar complaint with the German government and the EU in 2009, but was turned down in Europe (USITC, 2011). The countervailing duty (CVD) petition claimed producers in China received unfair government subsidies. In December 2011, DOC imposed countervailing (CVD) duties on Chinese companies (Bradsher, 2011).

Solar industry

Global demand for PV systems has been growing at 40 percent a year and in 2010 there were 23,000 MW of PV installations worldwide, generating the equivalent of 23 nuclear power plants. The rapid growth has been spurred by numerous government subsidy programs.

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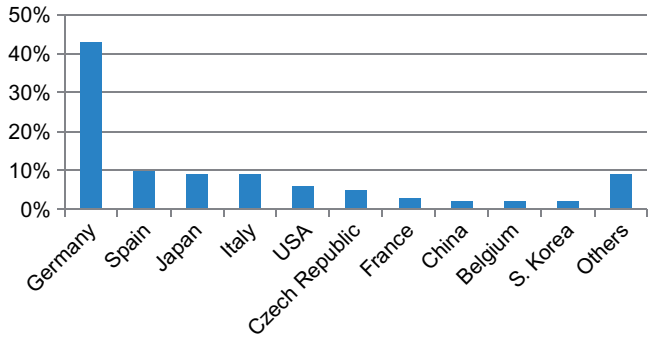
A famous such program is known as feed-in-tariff (FIT), which guarantees fixed prices for solar energy producers and is used in over 60 countries worldwide including the USA, where solar PV systems are projected to grow to 50,000 MW and supply 8 percent of the nation's electricity by the year 2025 (Study, 2008). The US Government also supports solar energy by subsidized loans, tax credits, land grants, and, on a state-by-state basis, mandates the use of solar electric power. An example is the state of California which recently enacted legislation requiring utility companies to obtain a minimum of 33 percent of their electric power from renewable energy (Baker, 2011). Solar power in the USA has been growing at about 40 percent a year, and the cost per kilowatt-hour of solar PV systems has been declining, in part due to declining cost of components.

Globally, the largest country installer of PV systems is Germany with a capacity of 10,000 MW. Europe's share of the global PV market was about 73 percent in 2010, as Figure 1 shows. The US share was 6 percent and growing, China and Korea 2 percent each and growing rapidly, and the rest of the world 9 percent.

Demand

Between 2010 and 2011, as the data in Table I shows, world demand grew by 69.3 percent, and the rate of growth for the regions in the world ranged from 941 percent in the UK, 257 in Italy, 224 in China, 211 in Israel, 144 in France, 66.7 in the USA, 29.9 in Japan, and so on. Even Greece, the country facing a dismal economic outlook, increased its capacity by an impressive 167 percent. Enticed by such phenomenal demands, new producers entered the industry and existing producers expanded by means of added capacity, mergers and acquisitions. In China, many companies entered the industry anew in the middle of the decade contributing to the significant increase in China's output, both in absolute as well as relative terms.

The size of PV market in Europe did not go unnoticed by US producers who have concentrated their production and marketing strategies to serve the European export market. An executive at one US company involved in the case put it this way, "demand outside the USA is the critical driver of success in the (US) industry" (USITC, 2011). Demand in Europe, however, is beginning to decline. Beginning in March 2012, Germany scaled back its subsidy program by 29 percent and plans to continue cutting. Other European countries like the UK, France, Spain, and Italy have also begun scaling back their subsidies due to financial constraints facing European governments.



Source: Earth Policy Institute, www.earth-policy.org

Figure 1.
Installed solar PV, % of world capacity – 2010

Region	2010	2011	% change (increase)
World	39,778	67,350	69.3
European Union	29,328	50,300	71.5
Germany	17,320	24,700	42.6
Japan	3,617	4,700	29.9
Italy	3,502	12,500	257
USA	2,519	4,200	66.7
France	1,025	2,500	144
China	893	2,900	224.7
Australia	504	1,200	138
Greece	206	550	166.9
India	189	450	138
UK	72	750	941.6
Israel	61	190	211.4

Source: http://en.wikipedia.org/wiki/Solar_power_by_country#cite_note-bp-51 (accessed June 20, 2012)

Table I.
PV power capacity in megawatts, 2010-2011

Demand in the USA, however, has been growing steadily due to government mandates and a national policy of increasing reliance on renewable energy. As of 2011, the USA has under construction some 77 utility-scale projects with a total capacity of 13,200 MW. Suddenly, US producers' export market in Europe is stagnating and domestic market in the USA is expanding. Arguably, that may have caused US producers to lobby the government to protect the domestic market against foreign imports.

Production

Spurred by remarkable demand and government support programs, production of PV systems has been growing spectacularly. Global output was 277 MW in 2000 and rose to 24,000 MW in 2010 (1,000 MW is equal to a gigawatt, GW), an increase of 6,376 percent. As the data in Table II shows, all countries increased their production. In the USA, output in 2010 was 1,486 percent the 2000 level; Germany 8,791 percent; Japan 1,681 percent, and so on. Japan was the world leader between 2000 and 2007. In 2001, Japan produced

Year	China	Taiwan	Japan	Germany	USA	Others	World
2000	3	N/A	129	23	75	48	277
2001	3	4	171	24	100	70	371
2002	10	8	251	55	121	97	542
2003	13	17	364	122	103	131	749
2004	40	39	602	193	139	186	1,199
2005	128	88	833	339	153	241	1,782
2006	342	170	926	469	178	374	2,459
2007	889	387	938	777	269	542	3,801
2008	2,038	813	1,268	1,399	401	1,207	7,126
2009	4,218	1,411	1,503	1,496	580	2,107	11,315
2010	10,852	3,639	2,169	2,022	1,115	4,248	24,047

Source: Many sources compiled by Earth Policy Institute (EPI), www.earth-policy.org/data_highlights/2010

Table II.
Annual megawatt solar production by country, 2000-2010

46 percent of world output, and the USA produced 27 percent. China produced less than one percent. In the second half of the decade, though, China accelerated its production capacity and replaced Japan as the world leader producing 46 percent of world output in 2010.

Price

PV price in world markets seems to fall 20 percent when production capacity rises 100 percent. Volume doubled between 2002 and 2004, and price fell from 2.20 to $1.80, and between 2007 and 2009 volume more than doubled and price fell by almost 40 percent. After 2008, price declined faster and reached $1.00 in 2011 (World Solar, 2012). Considering that China's output was less than 7 percent of world PV production until the middle of the decade, it is doubtful that China was the driver behind the price decline in world markets. In his address before USITC, economist Button (2011) stated that:

> [. . .] consistent with the history of wide range of semiconductor type products, the price of PV modules has been declining progressively for many years, long before Chinese producers entered the PV market.

Studies at George Washington University concluded that once Chinese producers began to achieve economies of scale, their prices for PV modules became more efficient and gradually became identical to world prices, not lower (Bayaliyev *et al.*, 2011). The decline in price of PV produced in China can better be explained by pointing to classic competitive imperatives: the fall in the price of production inputs especially polysilicon, erosion of barriers to entry to the market resulting in an industry with fierce price rivalry, cost efficiencies resulting from economies of scale and industry oversupply.

US policy

US policy toward solar energy is one of long term and multi-faceted support, as manifested by numerous policies and programs such as the Solar America Initiative (SAI) to make solar energy cost efficient and competitive with conventional forms of electricity (grid parity), and the Department of Energy's (DOE) Sun Shot Initiative and Solar Energy Technology Program (SETP) to provide financial and other forms of assistance to industry in the following areas: market transformation, to address marketplace barriers and create opportunity for market expansion; device and process proof of concept, to support R&D to develop more efficient devices and processes; component prototype and pilot scale production, to support R&D to generate prototype PV components; and, system development and manufacturing, to support industry and university collaboration to develop solar technologies (Solar Power, 2012). As recently as June 2012, DOE announced awarding $56 million to support advanced solar power technologies (Energy Department, 2012).

The US Energy Information Administration (EIA) published a report in August, 2011 titled *Direct Federal Financial Interventions and Subsidies in Energy* (Analysis, 2011). EIA identifies five subsidy and support programs for energy industries: direct cash expenditures to producers and consumers; tax subsidies to reduce federal tax liability for producers and consumers; R&D expenditures primarily to producers; loans and loan guarantees; and electricity expansion programs for certain geographic regions in the country. According to EIA, the value of direct federal financial subsidies in energy markets doubled between 2007 and 2010, growing from $17.9 billion to $37.2 billion. With regard to solar power, EIA identifies key expenditures and subsidies, summarized in Table III.

Another government support program is the dedication of vast areas of federal lands for solar power projects. In 2012, the Bureau of Land Management is dedicating solar energy zones, the combined areas of which come up to 98 million acres in many states for the long term goal of facilitating the generation of up to 10 million MW (Renewable Energy, 2012). Table IV shows a sample of the zones.

In addition to all federal support programs, governments at many state and even municipality levels give support and subsidy to solar producers and users. States like California, New Hampshire, New Jersey, Louisiana, Hawaii, Michigan and many others have diverse support and subsidy programs. Government subsidies to solar industry are popular in America. According to a 2011 survey of public opinion, nine out of ten Americans support the development and use of solar technology, and eight out of ten people say that the federal government should support solar manufacturing in the USA and should give federal subsidies for solar energy (Leone, 2011).

Analysis and conclusion

The CVD petition that started this trade dispute was filed by a local affiliate to a German company and six anonymous US companies, claiming material "injury" from Chinese imports. In response, a much larger number of companies in the US solar industry, including the over 100 companies represented by the coalition of affordable solar energy (CASE), spoke up against the petition. CASE made the argument that companies in the industries of selling, installing, distributing and servicing PV panels, and employing thousands of workers, would get hurt and possibly go out of business if the government were to impose punitive duties on Chinese products. It turns out that the US solar industry employs about 100,000 workers of which 57 percent are in the installation business, 21 percent are in sales and distribution, and only 14 percent in manufacturing (Nash-Hoff, 2012). Demand for PV systems continues to be price sensitive, and any increase in price due to punitive tariffs could dampen demand and hurt the business of the US companies employing 86 percent of the industry's workforce. A recent study published in January of 2012 predicted that tariffs on imported PV products from China will result in as many as

Year	Direct expenditures	Tax expenditures	R&D	Loans and loan guarantees	Total
2007	0	8	171	N/A	179
2010	496	120	348	173	1,134

Source: www.eia.gov/analysis/requests/subsidy

Table III.
Federal government expenditures and subsidies to solar industry, $ billions, 2007-2010

State	Area/project and acreage	Planned MW capacity
Arizona	Brenda 3,865 acres	345-620
California	Riverside East 147,910 acres	18,035-32,463
Colorado	Antonito Southeast 9,712 acres	865-1,557
Nevada	Dry Lake Valley North 25,069 acres	6,833-12,300
New Mexico	Afton 29,964 acres	6,900-12,400
Utah	Escalante Valley 6,533 acres	588-1,058

Source: Solar Energy Zones (http://solareis.anl.gov/sez/)

Table IV.
Solar energy zones

50,000 lost jobs in the USA. Furthermore, retaliatory tariffs placed on US exports of polysilicon to China would put another 11,000 American jobs at risk in the first year alone (Brattle Group, 2012).

As for the world view of the industry and financial support, the world community considers solar energy to be a promising solution to important environmental and economic challenges that is worthy of public support. In a recent publication by the IEA of the OECD, IEA stated that:

> [...] development of affordable, inexhaustible and clean solar energy technologies will have huge long-term benefits. It will increase countries' energy security through reliance on an indigenous, inexhaustible and mostly import-independent resource, enhance sustainability, reduce pollution, lower the costs of mitigating climate change, and keep fossil fuel prices lower than otherwise. These advantages are global. Hence the additional costs of the incentives for early deployment should be considered learning investments (Solar Energy, 2011).

IEA estimates that by 2050, PV will provide 11 percent of global electricity production and avoid 2.3 gigatonnes of CO2 emissions per year (Gigatonne is equal to ten billion tons). IEA advocates the continuation of government support until PV achieves grid parity, i.e. competitiveness with electricity grid retail prices, estimated to occur in 2020. Once grid parity is achieved, IEA endorses progressive phase-out of the majority of economic incentives, but continued support for R&D to advance the technology and reduce cost (Technology Roadmap, 2010).

As for government subsidies of solar industry, the US Government has a strong policy of advocating and supporting solar energy. The *Economic Report of the President in 2010* boasts of government subsidies of tens of billions of dollars for production and generous tax credits for consumption of PV systems (Ikenson, 2012). Even the USITC, the government agency that investigated the CVD petition, made reference to the environment-friendly government incentive measures, and other policies, including those that stem from national obligations under international environmental agreements (such as the Kyoto Protocol), have contributed to the growth of certain segments of the industry of producing electricity from renewable energy, especially solar and wind (USITC, 2011). In this global environment of worldwide and US Government support for solar energy by means of subsidies and other financial and non-financial incentives, it is an occasion for the DOC to reconsider the imposition of CVD tariffs.

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Corresponding author
Suhail Abboushi can be contacted at: office.asc53@aol.com