

Institutions of Renewable Energy Governance in China

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Abstract

China's renewable energy market has gained rapid progress over the past few years. However, the product export expansion has also induced international trade allegations that intensified bilateral trade relations between partners. To study the institutions of renewable energy governance in China provides a useful insight into understanding how China has shaped its policies and facilitated its institutions to promote renewable energy development. This paper conducts an overview of the institutional development in China's renewable energy industry and the solar PV industry in particular, and summarizes key features of institutions in the Chinese renewable energy governance. The paper concludes that strong target control from the state government, improved institutional capacity, and flexible and supportive incentive policies are main engines for China's achievements in renewable energy development. Furthermore, trade disputes over China's solar product exports will not only boost the domestic solar market, but also spur further reforms. The paper argues that from the view of global supply chain, the punitive trade litigation may be harmful to the whole renewable energy industry. A global solution of renewable energy governance needs to be sought.

1 Introduction

The past decade has seen tremendous growth in the Chinese renewable energy market. By adopting strong but flexible policies and measures, the Chinese government has strengthened its capacity to ensure institutional coherence and policy integration. Renewable energy now supplies nearly 10 percent of the nation's energy demand. In 2011, China surpassed the US and was responsible for one fifth of the total global investment on renewable energy volume (Jordans, 2011). China is taken as an example that succeeds in quickly moving from a humble latecomer into a powerful clean-tech investment leader (e.g. ESCAP, 2012; UNEP, 2012). However, with the related clean-tech industry gaining growing international competitiveness in the world, the country confronts some international trade disputes resulting from uneven adoption of environmental measures. The development of solar photovoltaic (PV) panel industry follows the trajectory.

There is extensive literature and information on China's renewable energy policy-making, implementation and outcomes, and discussion on what experience and lessons other countries can learn from. What lies behind the fast growth of renewable energy market in China is the less eye-catching fact that China's persistent efforts in strengthening its institutions of renewable energy governance. How have the renewable energy institutions been developed in China? How the institutions of renewable energy governance contribute to the final results? Will current trade disputes impede the expanding Chinese clean-tech and renewable energy industry? Getting credible answers to these questions are important on the premise that an improved

understanding of the institutions will provide us with valuable insights to the complex Chinese energy governance architecture and policy reforms.

This study aims to identify some key features of institutions of Chinese renewable energy governance. One way to address this objective is to examine the process of renewable energy policy making and assess how well suited the institutions of governance are to the real performance of policy implementation. An opportunity of policy change may be provided by the failure of a policy or of a paradigm, or by incompatibility or friction between new ideas and existing institutions of governance (Andrews-Speed, 2010). Policy change involves policy learning, which acts as an educational dynamic that stimulates policy change and improved performance. The concept of policy learning is used to understand the overall process of Chinese renewable energy policy development. Since the study does not intend to be comprehensive in dealing with all institutional factors. Rather, it focuses on three main tasks: to examine the historical evolution of China's renewable energy policy (policy learning process); identify main institutional factors that has affected the policy outcomes and change; and discuss policy coordination challenges within the current system of economic and trade governance.

Furthermore, since renewable energy includes a variety of non-fossil fuels (such as solar and wind power, tidal power, biomass, geothermal and ocean energy) and specific types of energy sources are addressed by specific policies, this study selects solar photovoltaic power generation industry in China as a case to present the features of its governance. Globally, solar photovoltaic industry has surpassed wind energy as the fastest growing energy source since 2004 and China has become the leading manufacturer in photovoltaic cell and module. Special focus will be given to how the generic national renewable energy policy and the solar photovoltaic policies and measures are integrated to pave the way for solar market expansion and what lessons can we draw from the solar PV cell trade disputes that happened more recently.

The paper is organized as follows. Following this introduction, the next section presents the institutional framework of China's renewable energy policy development, followed by the historical development of solar photovoltaic power generation industry in China and current trade disputes on Chinese-made solar PV cells and modules. Section 4 subsequently discusses some key features of institutions of renewable energy governance in China. Finally, conclusions regarding the practical working mechanisms of policy-making process in China are drawn.

2 Evolution of Renewable Energy Governance in China

(1) Renewable Energy Policy

Due to the slow progress in energy legislation, it takes a long time for China to establish a renewable energy policy and legal system. The early-stage policies and measures to promote renewable energy were included in articles of other laws, such as the Electric Power Law, the Energy Conservation Law, and the Law on Prevention and Control of Atmospheric Pollution. In 1995, the New and Renewable Energy Development Program (1996 - 2010) was developed and

taken as the important policy reference. However, renewable energy market was not mature and lacked of capacity to attract investment.

The entry of the WTO provided China an opportunity to be involved and integrated with the global economy. With China’s rapid economic growth and higher demand for energy supply diversity, as well as increased concerns on climate change mitigation and environmental protection, the promotion of renewable energy has risen to become a strategic choice on China’s environmental and development agenda. In 2003, after the adoption of dozens of renewable energy related policy instruments, the China’s top legislature, the National People’s Congress (NPC) put the development of the Renewable Energy Law on the legislative schedule. The goal of the law was set to meet short-term energy needs while strengthening long-term sustainable development objectives (NREL, 2004).

The National Renewable Energy Law was promulgated on February 28, 2005 and came into force in 2006. It covered subsidies, pricing management and supervision measures and embodied five important systems: total volume targeting system, compulsory grid-connecting system, categorized pricing system, cost sharing mechanism and special funding mechanism (Wang et al. 2007). This was a milestone achievement for Chinese renewable energy development. Centered on this Renewable Energy Law, a bunch of policies and measures have been constantly revised with more experience gained through implementation. These policies can be categorized in forms of laws, ministerial regulations, technical standards, development planning, economic incentive policies, etc. With the five systems as fundamental guiding regulations and adoption of follow-up policies and measures, the policy framework for China’s renewable energy development was formed. Table 1 shows the policy framework for Chinese renewable energy development.

Table 1 Renewable Energy Policy Framework in China

Category	Selected Laws, Policies, and Measures	Time Adopted
Law and Regulation	Renewable Energy Law	2005, amended in 2009
	Relevant laws (Electric Power Law, Law of Coal Industry, etc.)	Various years
Ministerial Regulation	The trial Management Measures for Renewable Power Pricing and Cost share	2006
	The Trial Management Measure for Allocation of Renewable Energy Tariff Surplus Revenue	2006
	Notice of Strengthening the Construction and Management of Biofuel Ethanol and Promoting Sound Industrial Development	2006
	The Trial Management Measures for the Special Development Fund	2006
	Implementation Guidelines on Promoting Wind Power Industry	2006
	The Catalogue of Guide to Renewable Energy Development	annually
Technical Standards	Technical Regulations of Wind Farm Integration into Power Grid	2006

	The standard of Mixed Bio-diesel for Diesel Engines	2007
Development Planning	Mid-long Term Development Plan for Renewable Energy	2007
	The 11th Five-year Program of Renewable Energy Development	2008
	The 12th Five-year Program of Renewable Energy Development	2012
Economic Incentive Policy	The Evaluation Measures for Renewable Energy Building Pilot Project	2006
	Notice of Perfecting Grid-connected Electric Price Policy for Wind Power	2009
	Notice of Perfecting Price Policy of Agricultural and Forest biomass Power Generation	2010
	Golden Sun Program	2009
	Outline of National Plan for Mid-long Term Scientific and Technological Development	2006

Source: Wang et al. 2008, 2010, 2012

The 2005 Renewable Energy Law provides preliminary and basic principles of the promotion of renewable energy development in China. For practical enforcement, it needs to be amended and be supplemented with other implementation regulation. At the late 2009, the NPC adopted an amendment to the renewable energy law to require grid utilities to purchase all the power produced by renewable energy generators.

With the fast development of renewable energy market and the support from central government, provincial and local governments showed their interests in renewable energy development. More than 20 provinces, autonomous regions and municipalities, have issued renewable energy development plans and implementation schemes.

(2) Organizational Arrangements

To ensure the policies and programs achieve the planned goals, the State Council keeps on restructuring its administrative institutions. After the dissolution of the Ministry of Energy in 1993, China has been running without a ministerial agency effectively managing the country's energy. During 1993 to 2003, the National Development and Reform Commission (NDRC) and the State Economic and Trade Commission (SETC) were the two key policy-making institutions for renewable energy development. In 2003, the State Economic and Trade Commission was dissolved and the Bureau of Energy was formed within the National Development and Reform Commission (NDRC). In 2008, the Bureau was reshuffled as National Energy Administration (NEA) – a vice-ministerial level agency, though it lacked power to carry out its tasks because the energy sector management was spread between various agencies. At the same year, to address the climate change challenges and to improve “energy-saving and emission reduction” action, China strengthened the leadership by establishing the National Climate Change Leading Group (NCCLG) and the National Energy Conservation and Emission Reduction Leading Group (NECERLG). The two leading groups were chaired by Premier Wen Jiabao, and included the Commissioners and Ministers from 20 different ministerial agencies. In the early 2010, the National Energy Commission was established as the highest-level agency to coordinate the overall energy policies. The Commission is chaired by current Premier Wen Jiabao (Wan, 2010).

On the whole, there is no single agency that is in full charge of the overall renewable energy policy development and implantation issues. The various functions are undertaken by different governmental agencies, making the administrative coordination very difficult. In general, under the State Council, the National Development and Reform Commission, the National Energy Administration, the Ministry of Finance, the Ministry of Science and Technology (MOST), and the State Electricity Regulatory Commission (SERC) are the most important government actors at the central level that influence the renewable energy policy implementation and supervision. Other governmental agencies, such as the Ministry of Agriculture, the Ministry of Environmental Protection, the Ministry of Construction, the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) are also involved. The NDRC is responsible for drafting the overall national economic development plan, while the National Energy Commission is in charge of specific planning for specific energy sources.

The civil organizations have become an important force in the supervision of the Renewable Energy Law. These organizations can be divided into categories: the ones on behalf of the industrial associations; the ones focusing on academic research; and the ones that conduct special activities in relevant area (Wang et al., 2010). The organizations vary greatly in their capacities and power. The organization, such as the Chinese Renewable Energy Society has been actively involved in the research and drafting of the renewable energy laws, regulations, technical norms and standards.

(3) Renewable Energy Policy Results

The renewable energy market has been developed rapidly since the Law is adopted and the Chinese government has developed multiple ambitious policies and instruments to promote renewable energy. In the Mid-Long Term Development Plan for Renewable Energy (promulgated in 2007) and the 11th Five-year Renewable Energy Program (promulgated in 2008), the accumulated renewable energy development targets in 2010 were set: the hydropower 190 GW, the biomass 5.5 GW, the solar PV 300 MW, and the on-grid wind power 10 GW (NDRC, 2008). The actual data in 2010 shows that the accumulated installed capacity of hydropower reached to 216 GW; the biomass 5.5 GW; the solar PV 860 MW; and the on-grid wind power 31.31 GW. In 2010, 18.2% of the total power consumption are generated from renewable energy, and the total annual utilization of renewable energy was 294 Mtc (million tons of coal equivalent), accounting for 9.09% of the total primary energy consumption (NEA, 2012). However, this proportion is slightly lower than the intended 10% target. Figure 1 shows the proportion trend of renewable energy in China from 2005 to 2010.

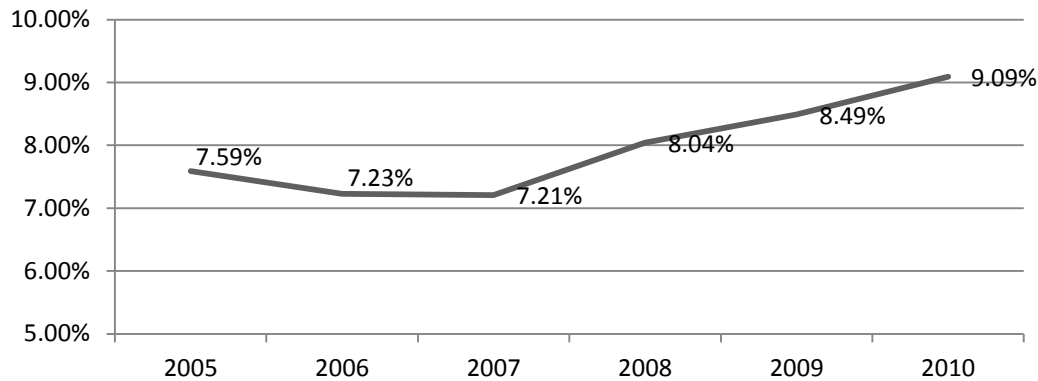


Figure 1 Proportions of Renewable Energy to the Primary Energy Consumption in China

China has held the top spot in the global clean energy investment since 2008. The 12th Five-year Program also gave great emphasis on green energy and allocated a significant share of investments to renewable energy and energy efficiency. Over the next 5 years, the country will spend \$473.1 billion on clean energy investments (Perkowski, 2012). According to the 12th Five-year Renewable Energy Program, by the year 2015, the total annual utilization of renewable energy will reach 478 Mtc, accounting for 9.5% of the total primary energy consumption. The share of renewable energy in the power generation mix will be raised. 160 GW newly installed capacity will be added from renewable energy, and it is planned that 20% of the total power consumption are generated from renewable energy (NEA, 2012).

3 The Case of Solar Photovoltaic Industry in China

(1) What has achieved?

China's solar energy potential is enormous. However, the solar energy market has not been really activated until 2006. In 2005, China had just 49 megawatts (MW) of solar photovoltaic (PV) capacity installed, compared to 4573 MW globally. The production of solar PV cell in China was 128 MW, accounting for 7.18% of the global production and lagging behind Japan, Germany and the USA.

Inspired by the Renewable Energy Law and driven by international market demand, Chinese solar PV cell industry has been developed dramatically and topped other countries since 2007, as shown in Figure 2. The rapid progress of the Chinese solar PV production was based on its quick achievements of cost effectiveness, due to its lower labor cost, growing stronger domestic manufacturers, price reduction of the silicon materials, and so on (Heechan, 2012; Wang et al., 2012). In 2010, Chinese outputs of solar PV panel were 10.85 GW, an increase of 157% comparing with that of 2009 and accounting for 45% of the world production. There were more than 400 newly installed PV cell and module production line in 2010, which made the Chinese accumulated solar PV cell production reach to 20 GW, twice the amount of the global total production in 2009 (Wang et al., 2012).

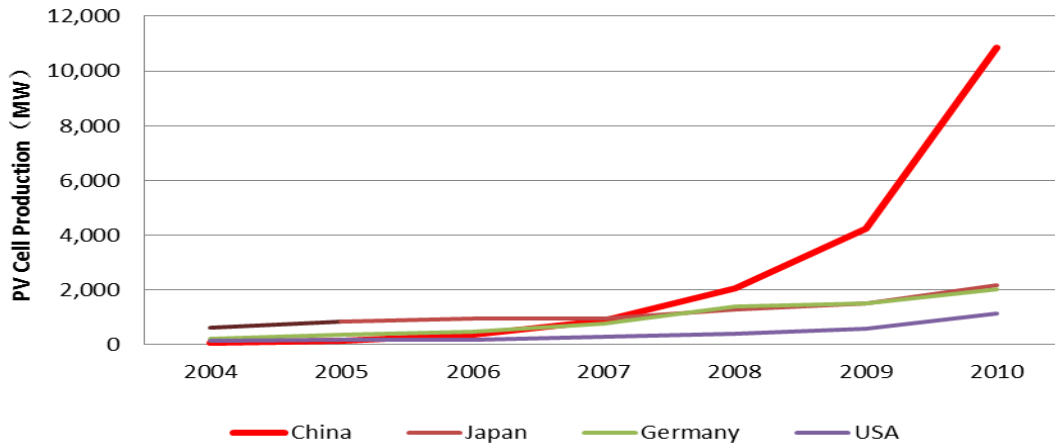


Figure 2 Trend of Solar PV Cell Production in China

Although China's solar PV manufacturing industry has earned international competence, its domestic PV panel application has not match with the cell production. 95% of the Chinese-made cells are exported, mainly to the USA and EU countries. Besides, China is highly dependent on imported poly-silicon materials though it had made some improvements. In 2010, 47% of the poly-silicon was imported from countries such as Korea and the USA, decreasing from almost 100% before 2005 (Wang et al., 2012). It should be noted that The Chinese government has adopted incentive policies to promote domestic solar PV market demand. The annual installed PV products increased from 20 MW in 2008 to 520 MW in 2010, and have showed great potential to grow.

(2) Policy Arrangements

The main barrier for solar PV market development is the higher cost of solar PV power generation. The Chinese government has made efforts to formulate and implement incentive policies in the domestic solar PV market.

The Renewable Energy Law, the Trial Management Measures for Renewable Power Pricing and Cost sharing, and the Trial Management Measure for Allocation of Renewable Energy Tariff Surplus Revenue enacted in mid 2000s set principles for China's renewable energy development in power generation: (1) Grid utilities must purchase full amount of renewable energy from on-grid generation; (2) Grid utilities shall purchase renewable energy generation at a reasonable price which consists of the reasonable cost plus a reasonable profit; (3) the amount beyond the regular on-grid price will be shared by the users at the national grid. In practice, China first took the tendering approach for wind power concession projects. After 5 years' experience, it began to switch to feed-in tariff in 2009, which had a stabilizing and maturing impact on the domestic market. The development of pricing mechanism for biomass and solar PV generation also follow the same trajectory. After China has conducted bidding process twice for solar PV projects in West China, in August 2011, China standardized solar PV tariff management by developing an unified national solar PV benchmarking on-grid tariff. The unified

national benchmarking tariff for non-bidding solar PV projects is formulated based on average investment and operation costs, solar PV plant bidding prices, and solar resources in the country.

In addition to the feed-in tariff incentive policy, China also implemented the Golden Sun Program to provide financial subsidies, technology support and market incentives to nurture the emerging development of domestic solar photovoltaic power industry. The program was launched in 2009, and is jointly managed by the NDRC, the Ministry of Science and Technology, the Ministry of Finance and the National Energy Administration. It is estimated that the central government would allocate roughly 10 billion Yuan to support commercialization and application of solar energy production through the program. The beneficiaries of fund provided by the program must meet requirements set for by every year's government circular. For the on-grid solar projects, the subsidy level is set at an equivalence of 50% of the combined cost of the electricity system and the accompanying power transmission equipment and facilities; for standalone solar projects in distant countryside, the subsidy equivocates to 70% of the power generation system's entire investment. The program also set strengthened demands for assets level, project size, completion time of period, etc. As the dropping down of the costs for PV cell production, the subsidies are reduced annually, forcing the program beneficiaries to put more attention to cost and quality control.

(3) Trade Disputes

As China topped solar PV cell production and its product exports has been rising, the country has confronted trade allegations filed by the US and EU. In 2010, Under the Section 301 of the 1974 Trade Act, the US initiated an investigation into Chinese policies and practices in green technology sector, covering wind and solar energy products, advanced batteries and energy-efficient vehicles. One year later, the Solar World Company, together with 6 other solar companies filed anti-dumping and countervailing duty petitions, alleging that Chinese solar PV cell and module manufacturers have injured the US producers by selling their products at below-marketing prices. This formally unveiled the China-U.S. solar trade dispute.

In March 2012, the US Department of Commerce announced its preliminary results of countervailing duty investigation that Chinese solar companies benefited from 10 subsidy programs that were countervailable. The countervailing tariffs were set at an average of 5% on Chinese solar cells and modules. In May, the Department of Commerce announced a preliminary decision on anti-dumping duties. Chinese solar cells and modules will be charged high 90-day retroactive antidumping duties ranging from 31% to 250%, with the majority subject to the 31% duties. The two decisions have caused some opposition. For example, the Coalition for Affordable Solar Energy (CASE) in the US claimed that higher import tariffs to Chinese PV products would curb the domestic application of solar products, and reduce the competence of solar power compared with fossil fuels. To fight against these two tariff allegations, the Ministry of Commerce in China issued a decision in July that the Ministry would investigate whether a US polysilicon supplier had sold their products below cost and if tested true, anti-dumping trade duties will be charged. These escalated the US – China trade disputes on solar products. What

disturbed things even further is that in early September, the European Union launched an anti-dumping investigation into Chinese solar panels, claiming that Chinese products were being exported at low prices to drive competitors out of market. The allegations are believed to greatly harm the profits of Chinese solar manufacturers since 95% of their products are exported to EU and the US. The final decision made by the Commerce Department on antidumping and countervailing duties in October of 2012 does not differ much from the proposals made a few months ago (Xinhua, 2012).

4 Institutional Features of Chinese Renewable Energy Governance

The preceding two sections have outlined the situation and characteristics of Chinese renewable energy development in general, and the solar PV industrial development in particular. This section summarizes some key features of institutions of Chinese renewable energy governance. The features to be examined are policy-making and coordination, relations among government and non-state actors, and China's response to the trade barrier impacts.

(1) Pursuing policy consistency and integration

When treating policy making as a dynamic process, the renewable energy case have showed that China pursues policy consistency and integration through several approaches. The first one is it encourages policy experiment and diffusion. Since energy policy formulation, implementation and coordination is complex with involvement of actors from different sectors and levels. Normally, China initiates a pilot project on a smaller scale. Once the pilot project is proved to be successful, the experience and practices will be diffused on a larger scale. As the case of solar PV development has shown, the measures of feed-in tariffs are gained from the experience of wind industry development and experience of bidding project of on-grid solar power plant operation.

The second is that the development of renewable energy development is embedded in the framework policy plan of the country's "energy conservation and emission reduction" action, whose overall 5-year targets are quantified in the Five-year Plan but owns flexibility to be revised annually when implementing. The targets are taken as benchmark and, implementation activities are subdivided. In many cases, the governments at provincial and local levels are required to share the responsibility and supervise the policy implementation.

The third feature is that China is actively adopting innovative policies to promote incentives to renewable energy development. The incentive policies include tax credits, tariff concessions, investment subsidies, R&D policies. The policies are made not only by central governments, but also by local governments.

(2) Relationship among institutional actors

The governmental actors at the ministerial level have been dominating the policy-making processes in China. The institutional structure can be viewed as intertwined networks system.

Under the Chinese unitary political regime, these governmental actors are involved in formulating, implementing, and changing policies and measures that facilitate the renewable energy development. Different to Western Countries, the State Council of China, which receives substantial input from its affiliated ministries and commissions, holds the power in policy formulation and development, especially in the economic sectors. And in most cases, the agencies responsible for the policy implementation in a specific sector may also take responsibility in drafting the policies for that sector (Andrews-Speed, 2004). The NDRC, a macroeconomic management agency, acts as the core policy coordinating actor in the policy network. Although the National Energy Administration may enhance its authority in policy enforcement in the future, the specific policies of renewable energy development are still under the framework of the national Five-year plan. At the micro level, the cooperation, exchange, and coordination are organized around series of programs and projects.

China has tried to decentralize its decision making. The decentralization, characterized by local governments and officials assuming more power and responsibility in stimulating local economic growth, to some extent, weakens the authority of the central government, which results in inconsistency, conflict and ambiguity of policies. To address this problem, since mid-2000s, the central government has established the responsibility sharing system to request provincial and local government to fulfill their allocated plan targets. This top-down approach has proved to be quite a complex and time-consuming process, but it also proves to be the more reliable and effective in meeting the rigorous binding targets. Experiences have been accumulated in terms of balancing the interests of all parties and making constant adjustments by central government.

Local governments have provided some special incentive policies to renewable energy enterprises that can positively influence local GDPs and employment. As an example, Suntech Power Company, the world's largest solar panel maker by capacity, benefited from the local government economic and financing support when it was founded ten years ago. In 2005, the company went listed in the New York Stock Exchange. However, with the US and EU launching anti-dumping and anti-subsidy investigations into the Suntech's solar exports, the company has reduced its plan and closed a few production lines. A recent report showed that the city government has carried out a series of measures, including granting subsidies and loans guaranty, to help the company to weather the difficult situation.

Societal actors have played a positive role in renewable energy policy development in China. The associations and societies that exerted more important influence are mostly GONGOs (Government Organized Non-governmental Organizations), such as All-China Federation of Industry and Commerce, Chinese Renewable Energy Society. The academic organizations and civil environmental protection organizations are also becoming more active in the research and discussion of national renewable energy policies and related rules and measures.

(3) The emerging trade disputes and implications

Although it is widely recognized that to develop green economy, clean-tech industries should be promoted and trade barrier should be set lower to encourage green trade, however, the reality does not look satisfying because protectionist measures against its trade partners still pervades due to the sluggish economic recovery in the US and EU. In the US congressional debates, both parties took China a convenient target for political recrimination. The subsidies and incentives provided by the Chinese central and local governments are criticized as unfair doings. However, what they ignored is that almost all developed economies, including themselves, have provided government funding and support to the relatively infant renewable energy industry. For example, to support the US domestic solar power industry, the federal funding and incentive policies include advanced energy manufacturing tax credit, loan guarantee program, investment tax credit, cash grant program, and so on. Many analyses showed that China's rapid development in renewable energy investment provides a successful case for other countries to learn and contributes to the pervasion of clean energies due to the cost reduction.

The punitive duties on Chinese exported solar PV products have generated big hit on Chinese solar PV manufacturing industry. Addressing the mismatch of solar panel production capacity and domestic use, in the revised 12th Five-year Renewable Energy Plan, China proposes a shift towards large scaled application in domestic market. This is consistent with the general principle of economic development that china shall shift in the country's economic model from export-led growth toward greater reliance on domestic demand, particularly household consumption. In September 2012, after China had just made solar PV development plan of installing 21 GW by 2015, the policy makers decided to raise the bar and set the target as 40 GW. This is seen as the strategy to rescue the domestic PV panel manufacturers and expand the domestic market after the anti-dumping and countervailing charges.

To promote the renewable energy development requires more efforts in strengthening institutional reforms. The biggest barrier of market expansion has been identified as the difficulties to connect clean power to the grid. Not only will China formulate new supportive policies and measures, but also it will streamline its administrative procedures to facilitate project approval. The NDRC, the National Energy Administration and the National Power Grid are negotiating the cost-effective ways to ensure all the electricity from renewable energies can enter the grid.

5 Conclusions

China's development is changing itself and influencing the world. With the adoption of the Renewable Energy Law in 2005, China has made great achievements in the promotion of renewable energy. It has become the leader of the world's clean energy investment. It also has developed ambitious plan to go even further.

The institutions play a central role in China's renewable energy governance and affect the policy outcomes. Although Chinese renewable energy policy outcomes cannot be claimed to an unambiguous success, as shown in the overcapacity in the solar PV industry; the important is

that China has built and persistently improved its institutionalized governance system. In China, the policy making process can be concluded as incremental, and heavily relies on the trial and error exercise of policy experimentation. Ineffective laws were amended and new regulations were revised and added to the policy mix. In addition, decentralizing is a very important part of reform, but policy experimentation and change are heavily directed by the central government and remain to be under its control. Top-down control and responsibility sharing system are the main characteristics of the policy and program evaluation.

The trade disputes, particularly in the case of solar PV panel export, contribute to the reshuffling of Chinese solar PV manufacturing industry. It forces China to concentrate on the domestic market and accelerates steps to reform its institutions and improve its professionalization. What we can expect is that over the coming few years, China's enthusiasm in renewable energy development will keep high and digest its "over-supplied" products for domestic use. However, the trade litigation and bilateral punitive duties may not be the best way to solve the complex challenges that exist. After all, the renewable energy presents a promising future than fossil fuels and certain extent of incentives are needed. It seems that the priority thing is to build a global consensus on acceptable forms of renewable energy governance.

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