Australian Government
Anti-Dumping Commission

FILE NOTE

CERTAIN CRYSTALLINE SILICON PHOTOVOLTAIC MODULES OR PANELS EXPORTED TO AUSTRALIA FROM THE PEOPLE'S REPUBLIC OF CHINA

Anti-Dumping Commission Case 239

This file note relates to the investigation by the Anti-Dumping Commission (the Commission) into the allegations made by Tindo Manufacturing Pty Ltd (Tindo Solar), that certain crystalline silicon photovoltaic modules or panels (PV modules or panels) exported to Australia from the People's Republic of China (China) at dumped prices have caused material injury to the Australian industry producing like goods (Case 239).

The purpose of this file note is to notify interested parties of how the Commission will use a report titled "*Assessment of the market situation factors in the People's Republic of China for crystalline silicon photovoltaic modules or panels*" that has been completed by Dr George Barker of Law and Economics Consulting Associates Ltd (LECA). This report (attached) was completed at the request of the Commission for the purposes of the investigation (see file note folio EPR 239/126).

Please note that the language and interpretations of the report are those of the author. As with all submissions, the report does not necessarily represent the views of the Commission and is not necessarily endorsed by the Commission[1].

The Commission will consider findings of the report, among other evidence, when assessing whether:

- the situation in the domestic market in China for crystalline silicon photovoltaic modules or panels is such that sales in that market are not suitable[2] for assessing the normal value during the investigation period; and
- the records of the four sampled exporters relating to like goods reasonably reflect competitive market costs associated with the production or manufacture of PV modules or panels[3].

BACKGROUND TO INVESTIGATION

Refer to http://adcommission.gov.au/cases/Pages/CurrentCases/ADC239.aspx

[1] The Commission's full disclaimer regarding submissions that are published on the Electronic Public Record can be viewed on the Commission's website at http://adcommission.gov.au/cases/EPR%20193%20%20250/Disclaimer%208Jul15.pdf

[2] In terms of paragraph 269TAC(2)(a)(ii) of the *Customs Act 1901*.

[3] In terms of Regulation 43 of the Customs (International Obligations) Regulation 2015 - paragraph (2)(b)(ii)

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Final Report

ASSESSMENT OF THE MARKET SITUATION FACTORS IN THE PEOPLE'S REPUBLIC OF CHINA FOR CRYSTALLINE SILICON PHOTOVOLTAIC MODULES OR PANELS

Prepared for the Australian Anti-Dumping Commission

By

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13 July 2015

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1.0 Introduction

The Anti-Dumping Commission commenced an investigation into the alleged dumping of PV modules or panels exported to Australia from China on 14 May 2014, following an application from the Australian industry, which claimed the dumping from China was causing it material injury. On 7 April 2015 the Commissioner found that:

- PV modules or panels exported from China during the period 1 July 2012 to 31 December 2013 (the investigation period) were exported at dumped prices.
- the injury to the Australian industry or the hindrance to the establishment of an Australian injury that has been, or may be, caused by those exports is negligible.

Based on these findings, and subject to any submissions received in response to this SEF, the Commissioner proposes to terminate the investigation under subsection 269TDA(13) of the Customs Act 1901(the Act).[1]

To calculate the dumping margin, the Commission estimated the goods' "*normal value*", using the weighted average domestic selling price of the exporters to unrelated parties in China, and subtracted the goods *export price*, calculated using the weighted average export price of the four selected exporters.

This report identifies, analyses and explains matters relevant to the Anti-Dumping Commission's (the Commission's) assessment about whether the situation in the domestic market in the People's Republic of China (China) for crystalline silicon photovoltaic modules or panels (PV modules or panels) is such that sales in that market are not suitable for assessing the normal value of PV modules or panels in China during 2012 and 2013.[2]

The report does not draw conclusions as to whether a 'market situation' exists.

The report includes information relevant to the production and sales of:

- PV modules or panels; and
- Upstream major raw materials (cells, wafers, ingots and polysilicon) used in the manufacturing of PV modules or panels.

The report includes, but is not be limited to, examination of:

- direct and indirect payments made to PV modules or panels manufacturers by the Government of China[3] (henceforth GOC);
- government regulations on the production of PV modules or panels, cells, wafers, ingots and polysilicon;

[1] See The Statement of Essential Facts no. 239: http://www.adcommission.gov.au/cases/Documents/112-SEF.pdf.
[2] The Commission will examine exportations of PV modules or panels to Australia from China (by certain exporters) during the period from 1 July 2012 to 31 December 2013 (the investigation period) to determine the level of dumping.
[3] For the purposes of this report, GOC refers to all levels of government, i.e., central, provincial, regional, city, special economic zone, municipal, township, village, local, legislative, administrative or judicial, singular, collective, elected or appointed. It also includes any person, agency, enterprise, or institution acting for, on behalf of, or under the authority of any law passed by, the government of that country or that provincial, state or municipal or other local or regional government.

- government regulations on imports of major upstream raw materials (cells, wafers, ingots and polysilicon);
- government regulations on export of major upstream raw materials (cells, wafers, ingots and polysilicon);
- any direct or indirect financial support offered by the GOC to the manufacturers of PV modules or panels and/or to the suppliers of upstream raw materials; and
- any other factors seen as relevant to be influencing the cost of production and/or the prices of PV modules or panels in the Chinese domestic market.

The report includes discussion of whether and to what extent certain specified factors impact upon supply, demand and prevailing prices in the relevant market. Supporting evidence is included with appropriate references.

The report suggests a means for the Commission to estimate the price of major upstream raw materials (i.e. cells/wafers/ingots/polysilicon) if any significant distortions in the relevant markets found were removed.

Where appropriate, the report also provides indications of how/where to probe the issues further during the Anti-Dumping Commission's investigation.

1.1 The Competitive Market Test

In order to assess whether sales in a market are suitable for assessing the normal value, one needs to adopt a market test, or standard, involving a counterfactual or comparator, against which a given market can be judged. It is proposed here to use a competitive market test to examine whether or not there is a distortion of competitive market conditions in relation to the subject goods such that domestic sales are likely to be significantly distorted from normal competitive market value.

This is consistent with the Commission's approach, for example, which must assess whether relevant policies affect the conditions of commerce related to the production or manufacture of like goods such that the records of an exporter or producer of like goods do not "reasonably reflect *competitive market costs* associated with the production or manufacture of like goods"[4] in accordance with provisions in Regulation 43(2) of the Customs (International Obligations) Regulation 2015. The Commission considers that sales that would otherwise be relevant for determination of normal value may be unsuitable because the price does not reflect a fair price in normal market conditions. In assessing whether sales are suitable, the Anti-Dumping Commission would consider whether a situation in the market causes prices to be artificially low. In this assessment it would be relevant to also examine the degree of government influence.

1.2 Outline

This report consists of three main sections:

a) *Market Definition*. The first section reviews the market definition relevant to the case. Market definition is required to frame the analysis of factors

[4] See Regulation 43(2)b(2)of the Customs (International Obligations) Regulation 2015.

affecting the domestic market in the People's Republic of China (China) for crystalline silicon photovoltaic modules or panels (PV modules or panels) in China during 2012 and 2013;

b) *Institutional arrangements*. The second section reviews the relevant institutional arrangements that are likely to have caused a distortion to the domestic market in China for PV modules or panels during 2012 and 2013;
c) *Impact Analysis*. The third and final section analyses the likely impact of the foregoing institutional arrangements on the domestic market in China for PV modules or panels during 2012 and 2013.

Before proceeding, we shall briefly summarise the main findings on the above points, in the next subsection.

1.3 Summary of Findings

Our analysis of market definition concludes it is important to focus our analysis not only on the PVMP market directly, but also on

- Upstream input markets in China contributing inputs which constitute a significant share of cost of making PVMP, including in particular
  - the PV cells market, and further upstream
  - the Polysilicon market.
- Downstream markets affecting PVMP, and in particular downstream electricity markets. Of particular concern is the market power of large electricity companies operating in downstream electricity markets. The institutional arrangements influencing the behaviour of these large electricity companies in solar power markets downstream to the PVMP market are likely to have significant effects on the prices in the PVMP market.

Our analysis of institutional arrangements suggests that the level of distortion of all these relevant domestic markets is very high. We examine the effect of relevant policies in the following areas:

1) Fiscal intervention – expenditure, or tax related;
2) Regulation of domestic markets – including price, market entry, competition, standards etc;
3) Trade Related Regulation – including exports and imports;
4) State ownership of enterprises.

We conduct our analysis of the effects of these policies in each of the relevant market segments including:

i) the market for PVMP;
ii) upstream input markets in particular the PV cells market, and the polysilicon market; and
iii) Downstream markets in particular downstream electricity markets.

On the first, or *the market for PVMP*, in summary our analysis identifies a number of specific policies that directly and significantly distort the market for PVMP. These

policies were designed to increase output and lower costs in the solar PV module and panel market. They therefore would have put downward pressure on prices, and ultimately led to chronic excess supply and overcapacity, leading to further serious price depression below competitive market levels. This outcome is indeed confirmed by an opinion of the State Council that "*...the photovaltatic industry of China is currently in a condition* due to such severe problems as *serious redundancy in production capacity*." by 2013.[5]

Our analysis of GOC interventions in *upstream input markets* further identifies reasons to believe that domestic prices in these input markets are not substantially the same as they would be in a competitive market, including the market for PV cells and further upstream in the polysilicon market. The distortions identified in these input markets would have had a flow on effect for the PVMP market. For example fiscal support in the photovoltaic cell market would have had the effect of lowering price and increasing output of PV cells. As a key component in the production of PV modules or panels, intervention in the upstream PV cells market that lowers its price will likely have flowed on to lower prices for PVMPs. This would have been exacerbated by the extent of interventions lowering prices even further upstream in the polysilicon market, which is a key input to the manufactur of PV cells and therefore PVMP. The impact of interventions in the polysilicon market would have flowed downstream to affect PV cell prices and PVMP prices. This is particularly significant for those exporters who manufactured their own cells, rather than bought them. There would have been 100% flow on from any reduction in upstream polysilicon prices to exporters who manufactured their own cells, rather than bought them, significantly reducing their costs of manufacturing PV cells. This implies that the costs of manufacturing PVMP recorded in the accounts of domestic manufacturers in China cannot be relied on as competitive market costs. These records therefore cannot be used to estimate a competitive market cost of making PVMP.

In *the downstream market* for solar electricity, we find that substantial monopsony and monopoly power of downstream electricity companies is likely to have further depressed feed-in tarrifs for solar power, and as a result depressed PVMP prices upstream. There is moreover extensive state ownership of the dominant electricity companies in China, which long predates, and continues throughout the investigation period.[6] State Owned Enterprises (SOE) are generally known to enjoy privileges and immunities that are not available to their privately-owned competitors, giving them even greater competitive edge over their rivals, preventing market entry, enhancing their incumbent market power and further distorting competitive outcomes in the market. We also find price control in the downstream market in the form of a price ceiling, and a 13% reduction on price paid for PV solar power. This would have had a flow on effect to the PVMP market. It would have reduced the return that could be earned from investing in PVMP, and therefore reduced demand and the price for PVMP. At the same time a

[5] Article 1 *Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry* (Guo Fa [2013] No.24).

[6] The five major Chinese electricity companies are all state owned enterprises, directly administered by the State-owned Supervision and Administration Commission of the State Council (SASAC). See http://www.sasac.gov.cn/n1180/n1226/n2425/index.html for a list of companies under control of the State Council. These companies own listed subsidiaries, but see recent story "China SOE's restructuring leaves state ownership intact" http://www.ft.com/cms/s/0/902826f4-c878-11e4-8617-00144feab7de.html#axzz3fkLv7Tg8
https://en.wikipedia.org/wiki/Electricity_sector_in_China#Companies

targeted fiscal intervention in the form of a 50% VAT refund on the purchase of PVMP is likely to have increased the demand for PVMPs and increased the supply of PV solar electricity at the regulated lower prices for PV solar power. Altogether it is likely these interventions downstream in the electricity market combined would have had a significant flow on effect to the PVMP market, exacerbating depressed PVMP prices and excess capacity for PVMP relative to a competitive market outcome.

As we discuss in detail in sections 3 and 4 the extent and nature of the interventions reviewed indicates significant distortions of competitive market conditions in relation to the subject goods such that domestic sales are likely to be significantly distorted from normal competitive market value. Indeed to use the GOC's own words, there is susbstantial evidence that the PV market was in a "dire" situation of excess capacity or excess supply, due to over-expansion, which inevitably would have depressed prices, during the investigation period.

The wide range and material nature of the GOC measures have significant influence directly on the market for photovoltaic modules and panels, and indirectly through upstream PV Cells, and polysilicon markets and the downstream electricity markets. Our review suggests there is sufficient reason to believe that domestic prices in China in all these markets are not substantially the same as they would be in a competitive market. Indeed as a result it appears likely that normal values could not be determined on the basis of

i) domestic selling prices of PVMP in China or on
ii) the domestic full cost of making and selling PVMP plus profit.

On the second point the problem is that GOC interventions in the upstream markets, which includes photovoltaic cells and polysilicon markets, mean the costs to make and sell using recorded domestic costs in China would not reflect a competitive market cost.

One thus can't use domestic prices of PVMP, nor constructed cost, because the records of input costs to the manufacture of PVMP in China are unreliable, due to GOC interventions in those input markets distorting relevant prices, or costs. Ultimately one must instead turn to a *reasonable comparison* between export price and normal value [7] for which one can use various economic methodologies for identifying *reasonable* or competitive market values which we discuss in section 5. On a brief review of the options available in the time available in the end it is proposed two methodologies and two data sets be used to estimate market prices:

i. RPM methodology starting with price from the PV-Exchange Europe for relevant products and *Bloomberg New Energy Finance* reports for the investigation period. The Bloomberg *New Energy Finance* reports contain the current prevailing price data and cost components of photovoltaic modules and panels from major suppliers and customers in the industry
ii. Cost plus methodology - although we do not have information regarding the competitive cost of production, administrative, selling and all other costs, or an amount for profit from producers in China, we have access to published

[7] This constraint is from WTO ADA art 2.4

information which represents the international average of these items, based on information provided in *Bloomberg New Energy Finance* reports for the investigation period. These reports contain the current prevailing price data and cost components of photovoltaic modules and panels from major suppliers and customers in the industry. It is then possible to use the monthly cost build-up information, including an amount for profits, for the purposes of determining the normal values of the subject goods for each respective month of the investigation period.

2.0 Market Definition

In applying a competitive market test to assess whether the situation in the domestic market in China for PV modules or panels (PVMP) during 2012 and 2013 is such that sales in that market are not suitable for assessing the normal value of PVMP in China during 2012 and 2013, it is first important to define the relevant market under investigation. Market definition is required to frame the analysis of factors affecting the domestic market in China PVMP during the investigation period (2012 and 2013).

There are a number of dimensions for market definition which we address in this section including:

1. Product
2. Geography
3. Function

The best place to start is with a narrow market definition in relation to each of the above dimensions. Related markets can then be identified by asking the question whether a small non-transitory increase in price (SNIP) would induce shifts in demand, or supply, to or from other markets. For example with a narrow geographic definition the question is whether a SNIP would encourage supply from an adjacent region. If so then these markets actually form part of a broader market. This is something we explore later in relation to geographic market definition in China.

Not only does our market definition help frame analysis of distortions to supply and demand of products which are substitutes and complements, it also helps an investigation of *competitive conditions*. Policies affecting competitve conditions such as GOC interventions affecting *market entry, organisation, composition, or market structure,* of relevant industries are highly relevant. These factors affect the extent of market power, either of *buyers market power* (i.e. monopsony and oligopsony power)[8] which might push prices *down* relative to a competitive market, or *sellers market power* (monopoly and oligopoly power) which may push prices *up* relative to a competitive market. Thus to the extent there are many players in any market, quite a different competitive dynamic may result. Not only entry conditions, and the number of players but also *the nature of the relevant players* in the markets is relevant. For

[8] In economics, a monopsony is a market form in which there is only one buyer for would-be sellers of a particular product. Oligopsony refers to a market form in which there are only a few large buyers for a product or service. Under both market forms, the buyer(s) can exert a great deal of control over the sellers and can effectively drive down prices.

example state owned enterprises, might behave differently from privately owned ones, and producer organisations or industry associations may behave differently from privately or state owned enterprises.

In what follows, we proceed to investigate market definition to help frame our investigation of institutional arrangements addressing the folowing key market dimensions in turn:

1. Product
2. Geography
3. Function

2.1 Product Dimension

The goods under consideration in this report, (i.e. the goods exported to Australia - the goods) are:

> *Certain crystalline silicon photovoltaic modules or panels, whether exported assembled or unassembled, and whether or not they have an inverter, capable of producing any power in terms of watt (PV modules or panels).*
>
> *Exclusions:The following product types are excluded:*
>
> - *cells and wafers of the type used in PV modules or panels;*
> - *solar chargers that consist of less than six cells, are portable and supply electricity to devices or charge batteries; and*
> - *PV products that are permanently integrated into electrical goods, where the function of the electrical goods is other than power generation, and where these electrical goods consume the electricity generated by the integrated crystalline silicon photovoltaic cell(s).*

The demand for PV modules, or panels is derived from demand for the photovoltaic (PV) electricity they can produce. PV energy or electricity is a byproduct of the so called photovoltaic effect, whereby electrons in a material become excited upon exposure to light leading to the creation of voltage or electric current in the material.[9] This PV electricity can then act as a subsitute for other sources of energy, for example from fossil fuels. In China, 90% of energy comes from carbon intensive fossil fuels such as coal, crude oil and natural gas - with coal generating around 70% of China's energy in 2008.[10] One can then distingush three market segments for PV energy or electricity including: residential, and commercial, with the Commission seeing the commercial sector to include the industrial sector, and distinguished between the following segments:

- commercial-scale system (>30kW); and
- small-scale systems (<30kW).

A PV module or panel (PVMP) is a packaged, connected assembly of solar PV cells.

[9] By contrast, in the photoelectric effect, electrons are ejected from a material's surface into vacuum, upon exposure to light.
[10] See IEA https://www.iea.org/publications/freepublications/publication/oil-and-gas-emergency-policy---china-2012-update.html and http://phemonoe.eu/china-hungry-energy.

PV cells are semiconductor devices that generate direct current (DC) electricity. PV modules or panels (PVMP) are made from mono-crystalline or poly-crystalline cells. Mono-crystalline cells are more efficient and more expensive than those made from poly-crystalline cells, with poly-crystalline cells having an efficiency of approximately two-thirds of mono-crystalline cells. PV modules or panels produced using mono-crystalline and poly-crystalline cells - *crystalline silicon photovoltaic modules or panels* - are the goods that are the subject of this application.

PV modules or panels can be further combined to form *PV strings, arrays and systems.*[11] A solar panel (or array) is a set of PV modules electrically connected and mounted on a supporting structure. The PV module or panel can then be used as a component of a larger PV system to generate and supply electricity in commercial and residential applications - and for large scale or utility demand.

Although PV cells initially generate direct current (DC) electricity, this can be changed to alternating current (AC) power by use of *inverters.* The reason why this is done is that the AC current is used to deliver electricity onto the power grid. The key reason why users of PVMP generated electricity require the ability to connect their PVMP power to the grid and be integrated into the wider power network is that solar power suffers from one major drawback, namely that there is no way to store surplus electricity during daylight hours for use during the evening. To be economic and most effective then, there needs to be a means to offload surplus PVMP generated power onto the grid during the day, and draw from the grid for power in the evening. The big advantage that alternating current (AC) provides for the power grid is the fact that it is relatively easy to change the voltage of the power, using a device called a transformer. Power companies save a great deal of money this way, using very high voltages (such as 1 million volts) to transmit power over long distances, then drop it back down to lower voltages for local distribution (such as 1,000 volts), and finally in the Australian market down to 240 Volts AC power at a wall socket inside the house for safety.[12]

All PV modules or panels are demanded to convert sunlight to electricity. There are two types of PV modules and panels depending on the type of inverter used to convert to AC power:

- DC PV Modules or Panels - which use a separate stand-alone single inverter attached to the PV module. DC PV modules or panels then are connected to a separate single inverter that converts the electricity generated to AC power for connection to the grid.
- AC PV Modules or Panels - which use an on-board micro-inverter. AC PV modules or panels are made ready to be plugged into the grid by the use of an on-board micro-inverter.

While the AC and DC PV modules can thus fulfill the same end use, there are differences between the AC and DC PV modules or panels.[13] On the one hand, DC PV panels require only one standalone inverter for multiple PV modules connected in

[11] IEA (2014) "Technology Roadmap: Solar Photovoltaic Energy" p. 10. .https://www.iea.org/publications/freepublications/publication/TechnologyRoadmapSolarPhotovoltaicEnergy_2014edition.pdf. Retrieved 15 June 2015

[12] In the United States the standard is 120-volt, 60-cycle AC power For most other countries, this is between 220-240 volts on a 50-60 cycle AC power.

[13] See Statement of Essential Facts 239 (henceforth SEF 239) Certain Crystalline Silicon Photovoltaic Modules or Panels - China p. 14.

'series' in a panel. As a result:

- the price of DC PV modules or panels is lower than AC PV modules or panels;
- in an event of any damages or any performance issues with a particular module and/or the inverter, the whole DC PV system needs to be disconnected leading to loss of electricity produced by the other functioning modules in the panel.

On the other hand the AC PV modules or panels require multiple in-built micro-inverters which:

- make them more expensive and considered to be a 'premium' product to DC PV modules or panels. The micro-inverters add to the price of the panel because each PV module requires a separate micro-inverter;
- makes each AC PV module independent in a solar panel[14] that can feed electricity directly into the electricity grid which means each AC PV module can be removed from the panel and repaired individually in the event of any damage or any performance issues with a particular module and/or micro-inverter while other modules used in the panel continue to operate normally;
- are considered to make them more flexible with regards to installation on varied roof designs, intermittent shading areas, etc.

The description of the goods under consideration in this case includes both AC and DC PV modules or panels, produced using either mono-crystalline or poly-crystalline silicon cells - *crystalline silicon photovoltaic modules or panels*. Table 1 indicates the four different types of PV module and panel products identified so far, identifying by column their relevant crystalline characteristics and by row their inverter characteristics.

Table 1: Characteristics of PV Panels and Modules

	Poly-Crystalline Cells	Mono-Crystalline Cells
DC PV Module	Least Expensive & Least Efficient	Least Expensive & Most Efficient
AC PV Module	Most Expensive and Least Efficient	Most Expensive & Most Efficient

From the ACBPS import database the Commission identified the top four exporters of PVMP to Australia, which were selected for examination and were asked to complete an exporter questionnaire. The exports transactions to Australia of the following four exporters of PV modules or panels from China were selected for examination:

1. Renesola Jiangsu Ltd;
2. Trina Solar Ltd;
3. ET Solar Energy Limited; and
4. Wuxi Suntech Power Co. Ltd.[15]

These four exporters are considered to be responsible for the largest volume of exports to Australia that can reasonably be examined. The Commission identified that the percentage of the export volume to Australia represented by the top four exporters is around 35 per cent.[16] The Commission classified all other exporters from China as 'residual' exporters – their individual export volumes each represented 2 per cent or

[14] A solar panel (or array) is a set of PV modules connected and mounted on a supporting structure.
[15] Ibid pp. 27-28
[16] SEF 239 p. 27

less of the total export volume from China.[17]

None of the four selected exporters in this investigation exported AC PV modules or panels to Australia during the investigation period, and their imported panels are *without the inverters* (DC modules). Towards the end of the investigation period there was a clear shift in exporters to Australia moving away from mono-crystalline cells (as they are more expensive) to poly-crystalline cells.[18] The only local manufacturer of PV modules and panels (Tindo) used only poly-crystalline PV cells to produce PV module or panels during the investigation period.

2.2 Geographic Dimension

The information available suggests three of the four exporters who are the subject of the investigation are located in the same province, Jiangsu Province in China, while a third is in Wuxi as follows:

1. Trina Solar Ltd - Xinbei District, Changzhou, Jiangsu Province, China
2. Renesola Jiangsu Ltd - Yixing Economic and Development Zone, Jiangsu Province, China
3. ET Solar - Jiulong Industry Zone, Taizhou, Jiangsu Province, China
4. Wuxi Suntech Power Co. Ltd - New District, Wuxi, China

This may be important to the extent that the nature and extent of Government interventions may vary by province. The best place to start then is with a narrow market definition. Related markets can then be identified by asking the question whether a small non-transitory increase in price (SNIP) would induce shifts in demand, or supply, to or from other markets? For example would a SNIP encourage supply from an adjacent region? If so then these markets actually form part of a broader market. Applying this test , it seems likely that both the final output or product market for PV modules and panels (PVMP), and any relevant input markets in China are likely to be at least China wide - and potentially global given Chinese exporters involved in the investigation are the largest producers of PV modules and panels in the world. [19] This is important as, if it is necessary to find comparable prices for any domestic PVMP market in China, and one turns to examine prices in other countries, it is important to recognise that the distortions in the domestic chinese market may have also impacted observed prices in other countries markets if they have imported PVMP from China. Thus for example if there is a distortion in the Chinese domestic market for PV modules and panels, which may have depressed prices, then given China's share of global trade in PV modules and panels, the price of PVMP in other countries may also be depressed. The comparable prices from other countries then may also needed to be adjusted upwards to better reflect competitive market conditions. This depends on the extent to which the Chinese market has a flow on effect to the global market for PVMP, and other related markets including upstream and downstream which we turn to next.

2.3 Functional Dimension

So far we have been focused on the relevant product and its market, including its geographic dimension. Although primary concern is with the product market for PV

[17] Ibid p. 27
[18] SEF 239 p. 21
[19] http://www.forbes.com/sites/uciliawang/2014/12/03/guess-who-are-the-top-10-solar-panel-makers-in-the-world/

modules and panels (PVMP) defined above, there is a risk with a too narrow focus on just that market. In particular there is a risk that distortions in related *upstream or input markets* (e.g. PV Cells and Polysilicon) or *downstream final output markets* (eg for solar electricity) which have an indirect and hidden effect on the primary market may be missed.

This is known as involving consideration of the *functional or supply chain* dimension of the market. Analysis needs to extend therefore to consider:

- upstream markets for major *inputs* utilised by the exporters of PVMP.
- downstream markets of PVMP

We discuss each in turn.

2.3.1 Upstream Markets

There are a number of inputs to the manufacture of a PV module or panel worth considering. PV modules or panels manufactured in Australia, and imported PV modules or panels are produced in a similar manner subject only to varying degrees of automation.[20] Relevant upstream markets to consider include:

1. *PV Cells.* A PVMP is a packaged, connected assembly of solar PV cells which are semiconductor devices and under a separately patented technology. So factors affecting the PV cells market need to be considered.
2. *Inverters.* As noted earlier, PV cells generate direct current (DC) electricity that needs to be changed to AC power by use of separate inverters or on-board micro-inverter. This suggests factors affecting the market for inverters may also be relevant.
3. *Markets for Crystalline Silicon.* PV cells are typically made from crystalline silicon *wafers* (silicon cell precursors). It is possible to make PV cells using other materials, but crystalline silicon (c-Si), whether single or mono crystalline (sc-Si) or multi- or poly-crystalline (mc-Si), currently dominates the PV market with around 90% share.[21] Silicon cells are thus usually sliced (wafers) from ingots or castings of highly purified silicon. So again factors affecting the silicon wafers market need to be considered. Single or mono-crystalline cells[22] are made from a single crystal of silicon and are more expensive to produce than poly-crystalline cells because mono-crystalline wafers are cylindrical in shape and when produced (wafers cut in octagonal shape), there is loss of material. Mono-crystalline cells require more rigid framework and specialised adhesives, with larger panels being more costly and more fragile[23] but are considered to be more efficient than poly-crystalline cells. Poly-crystalline cells[24] also referred to as multi-crystalline cells are effectively multiple silicon cells made from wafers which are rectangular in shape. The cells are square in shape therefore there is no loss of wafers and they are less expensive to produce than mono-crystalline cells. Poly-

[20] SEF 239 p. 17.
[21] IEA (2014) "Technology Roadmap: Solar Photovoltaic Energy" p. 9. https://www.iea.org/publications/freepublications/publication/TechnologyRoadmapSolarPhotovoltaicEnergy_2014edition.pdf. Retrieved 15 June 2015
[22] SEF 239 p. 13
[23] IBIS World Industry Report OD4042 Solar Panel Installation in Australia.
[24] SEF 239 p. 13

crystalline cells have an efficiency of approximately two-thirds of the efficiency gained by mono-crystalline cells. As noted towards the end of the investigation period there was a clear shift in exporters to Australia moving away from mono-crystalline cells (as they are more expensive) to poly-crystalline cells.[25]

4. *The Frame and other inputs*. PV cells are grouped into *PV modules, or panels,* through a manufacturing process which creates a charge separating junction, deposits passivation layers and an anti-reflective coating, and adds metal contacts, transparent glass for the front, a weatherproof material for the back and often a surrounding frame. The frame for example may be made from aluminium extrusions.

A key major input to PVMP are PV cells which the Commission has informed us may constitute at least 60% of the cost of making PVMP. GOC interventions directly in the PV Cells market then could significantly affect the operation of the PVMP market, making the PV cells market worthy of further investigation in our later sections of institutional arrangements, and economic impacts.

A highly simplified market definition of particular interest in this investigation then is depicted in Figure 1 below. As shown in the diagram, an Australian industry (depicted on the right hand side) is concerned about the impact of low cost imports of a product B ("B" = in our case "PV modules or panels" PVMP) from country X (on the left hand side = in our case "China") which is being sold to Australian customers.

As noted in the case of distortionary factors that only affect the primary market "B" the analysis is likely to be quite simple or relatively straightforward. This is the analysis we shall turn to in the next section first. The analysis becomes more complicated if "B" is produced in country X using the factor product A ("A" = in our case for example PV Cells or aluminium extrusions used in frames) and there are significant distortionary factors in the factor market "A" which may be having an *indirect effect* on the product market for "B".

[25] SEF 239 p. 21

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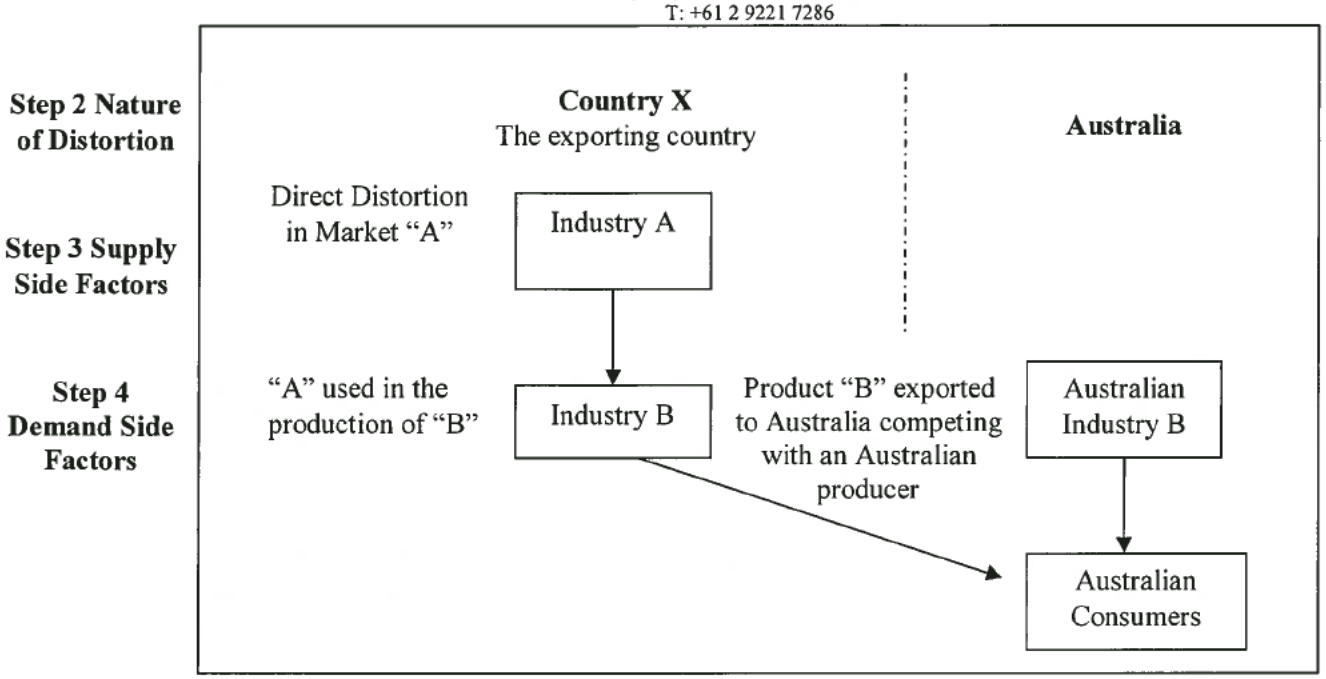

Figure 1: Market map

As indicated in the diagram in country X (China) there may be distortionary arrangements directly affecting the production of upstream inputs "A" (e.g. PV cells) but not the production of "B" (PV modules or panels). The nature of any distortion will first need to be assessed for its likely effects. This will resolve itself into two alternative options: (i) an effect that can be modelled as having a positive initial impact on a key variable (e.g. an effective fiscal support may reduce costs of supply); and (ii) an effect that can be modelled as having a negative initial impact on a key variable (e.g. an effective tax, like a tariff or quota on supply may reduce supply).

The question is not only whether distortions to market A in Country X will affect the price of A in country X, but also as a result cause an indirect distortion to market B. The question of interest thus is to what extent the distortion in market A impacts on the price of "A" by, for example, reducing the price of "A" in country X and thereby reducing the costs of production of "B" and thus "flows on" to "B". This will involve both supply side considerations in market B and demand side considerations.

On the supply side for factor "A" the market definition may be more complex than the simple one outlined in the above diagram, in particular where factor "A", as in this case, is not a primary resource or raw material, but itself an intermerdiate output, like a PV cell, which relies on other inputs for its production, with a major one of course being *polysilicon*. Polices affecting markets for inputs further upstream like *polysilicon* may thus distort the PV cell market, the intermediate market "A" in the above diagram, with the effect of this distortion flowing onto the product "B" of interest, in this case PVMP. In our analysis of institutional arrangements and economic impacts therefore, we extend our analysis further upwards in the above diagram, or "upstream", and take into account factors that may be affecting polysilicon markets further upstream than product "A" focusing on the polysilicon market.

In summary then based on the above analysis in the following sections on institutional arrangements, and their economic impacts we shall explore factors affecting upstream markets including:

- PV cells market, and
- Polysilicon market.

2.3.2 Downstream Market

As noted at the ouset, the demand for PV modules or panels (PVMP) is derived from demand for the photovoltaic (PV) energy they can produce. In the domestic market in China the customers on the demand side of the PVMP markets are thus likely to be buying PVMP because they are a substitute source of electricity. These customers on the demand side of the PVMP markets are thus likely to be involved in downstream electricity markets - either on the supply or demand side – which in turn affects their behaviour. As noted, these downstream electricity markets are often said to break down into the residential and commercial sectors. It is useful however to also distinguish the large scale utility sector which involves the major electicity companies.

In the downstream residential electricity market, households are on the demand side of the market buying electricity to power their homes. For this purpose households may of course buy and install PV modules and panels themselves to power their home, thereby making use of a form of "self help" or self sufficiency, that the oportunity that distributed or decentralised energy distribution provides, substituting photovoltaic (PV) electricity for other forms of energy (e.g. fossil fuels). Having said that, in China a large part of the population has now moved to cities where they can also connect to the general power grid or a micro grid. That part of China's population in remote areas or on low incomes that cannot connect to the grid will probably not represent a significant part of the PVMP market.

Indeed the reality is that households who adopt or demand PVMP generated power or energy in the residential sector will require the ability to connect their PVMP power at home to the grid and be integrated into the wider power network. The reason is that solar power suffers from the major drawback that it has not generally been possible to store surplus electricity during daylight hours for use during the evening. To be economic and cost effective then there needs to be a means to offload surplus PVMP generated power onto the grid during the day, and draw from the grid for power in the evening. Everything in the residential sector then leads to the large power companies engaged in network management and power generation on the grid. The same is true for the small scale commercial sector. For the large commercial sector they may be significant players on the demand side, however they will also need to be able to connect to the grid. For them too, everything then leads to the large power companies engaged in network management and power generation on the grid.

Thus one can simplify the analysis. The key players in the markets downstream to PVMP market are actually on the supply side of downstream energy markets, namely the large electricity companies managing the grid. These large electricity suppliers can substantially affect the economics of solar power in two ways:

1. directly by either buying PVMP themselves to build large scale solar power plants to generate power for the grid; or

2. indirectly by
    a. negotiating to buy solar power from large scale independent solar power plants operators - who buy PVMP.
    b. by offering a "feed-in tariff" for surplus electricity fed back into the grid by small scale "self-help" solar users - who buy PVMP.

A critical issue for both these direct and indirect ways downstream electricity companies can affect outcomes in the PVMP market is the degree of market power of these downstream electricity companies.

On the first point (1. above) large downstream electricity suppliers in local regions directly buying PVMP themselves to build large-scale solar power plants to generate power for the grid, are likely to have considerable monopsony power, or buyer market power and be able to push down PVMP market prices. The institutional arrangements influencing the behaviour of large electricity companies in solar power markets downstream to the PVMP market will thus have significant effects on the prices in the PVMP market. The same is true for the indirect effects identified above but for slightly less obvious reasons.

On the indirect effects of the market power of large electricity companies (2. above), the key point is that the value of solar power generation to the large scale independent solar power plants who buy PVMP (identified in 2.a.) or the small scale users deciding whether to buy and install PVMP themselves (identified in 2.b.) depends on the feed-in tariff each receives. The lower the feed-in tariff the less valuable is solar power generation to PVMP users, which will drive down prices for PVMP. In Australia for example the feed-in tariff is typically one-third to a quarter the amount charged for electricity off the grid.

The development and availability of batteries that enable solar power users to store surplus energy from the day for use at night may of course offer an alternative to dependence on the grid, and feed-in tariff rates. However during the investigation period the relevant battery technology was in early stages of development. It was only recently for example in March 2015, that US billionaire Elon Musk, a co-founder of PayPal, launched a lithium-ion battery called the Powerwall which was developed alongside his revolutionary Tesla electric car.[26] It can serve as a battery pack for people's homes that would enable solar users to store surplus electricity during the day for use at night, and potentially enable them to disconnect from the grid entirely. This of course adds a further downstream market price into the equation, the price of batteries for solar power storage. The higher the price of such batteries the less valuable is solar power generation to users. The recently launched Teslar lithium-ion battery called the Powerwall, for example, is expected to sell in Australia next year for about $5,500. They come coupled with solar PV (photo-voltaic panels) that enable consumers to become their own new power stations. These batteries however were unavailable in China during the investigation period, implying a greater reliance on the feed-in tariffs for solar energy.

The implication then is the households and businesses interested in buying PVMP

[26] http://www.abc.net.au/news/2015-05-21/powerwall-solar-batteries-to-transform-electricity-industry/6488230

panels have little alternative than accept the feed-in tariffs offered by the electricity companies. The institutional arrangements influencing the behaviour of large electricity companies in solar power markets downstream to the PVMP market will thus have significant effects on the prices in the PVMP market. In particular there is the issue of the degree of market power of the downstream electricity companies. In this regard one needs to distinguish between the local distribution network (LDN), and the national distribution network (NDN).

The local distribution network (LDN) directly connects local households and commercial premises to the grid, usually through the familiar overground system of poles and wires seen on streets, but also by less visible underground distribution systems. If surplus solar power is generated by households or local businesses on a decentralized basis during the day they will want to offload this power onto the local network during the day, and draw down power from the grid at night. In addition one needs to consider the national distribution network (NDN), or inter regional network, which connects local distribution networks to the large centralized coal fired, nuclear or hydro-electric power generator plants sometimes located a long way from major cities. If decentralized power generation during the day produces surplus power in a local network overall, then that local network will need to offload this power to the national or central grid.

There are a number of relevant and related services, and therefore related prices in the electricity market, including prices for network services charged by the LDN and NDN, (which are the equivalent of transport services), and prices for the energy being delivered. On the one hand the owners of the local distribution networks will need to levy charges for their network, distribution or transport services if decentralized surplus solar power of households or local businesses is to be offloaded onto the local distribution network. At the same time the energy they receive is valuable so they may also be understood to pay for the power that is being offloaded onto their networks if there is a potential user for it on their network who can in turn be charged for it. The NDN's owners will also then need to levy charges for their services if decentralized surplus power from an LDN has to be offloaded onto the national network, but also pay for the power that is being offloaded onto their networks if there is a potential user for it on the national network who can in turn be charged for it.

The feed-in tariff for solar power can thus be seen as a net price. It is a price paid to households and businesses for the right to sell their surplus electricity, net of the transport and other distribution charges incurred by network companies to then resell and redeliver that electricity, including grid security charges to ensure excess network capacity to protect against black out.

In general the LDN and NDN are natural monopolies in those markets where they sell services (i.e. transport), but also often natural monopsonies in those markets where they buy services (e.g. electricity). While there may be many LDN's in a country (e.g. one in Beijing and one in Shanghai, ...etc) each of the local network companies tend to be local monopoly suppliers of "local network services" (i.e. local monopoly transporters of electricity in Beijing, etc) and potentially local monopsonist "buyers" of local electricity. This depends on how ownership is structured or the degree of vertical integration and therefore whether they have a role in both markets. The NDN

on the other hand tends to have a national monopoly, over the supply of "national network services" (i.e. national transport of electricity) and a national monopsony of buying electricity at a national level – again depending on ownership structure. Thus when negotiating between each other they tend to have countervailing power. The problem is that when they deal with households and businesses, they can put a squeeze on the profitability of PV solar power generation. On the one hand, they can use their monopoly power over network charges to push up network charges for distribution, and on the other can use their monopsony power to push down prices they may pay for accepting solar electricity, which is valuable for resale.

If the large network companies can push down the price they in effect have to pay for solar power using their monopsony power, and push up the price they charge for their transport and other distribution services, they will force down the net price or feed-in tariffs, reduce the profitability of solar power, and therefore reduce demand and prices paid in the PVMP market. The institutional arrangements influencing the behaviour of large electricity companies in solar power markets downstream to the PVMP market will thus have significant effects on the prices in the PVMP market.

2.4 Conclusion

Our analysis of market definition concludes it is important to include consideration of

- Upstream input markets in China that form a significant share of cost of making PVMP including in particular
  - the PV Cells market, and further upstream
  - the Polysilicon market.
- Downstream markets affecting PVMP, and in particular downstream electricity markets. The institutional arrangements influencing the behaviour of large electricity companies in solar power markets downstream to the PVMP market are likely to have significant effects on the prices in the PVMP market.

3.0 Relevant Institutional Arrangements

This section is largely descriptive. It seeks to catalogue and describe relevant institutional arrangements, and specific GOC interventions that are likely to affect the domestic market for PVMP in China for use in further economic analysis. It will quickly become clear that there are a large number of complex GOC interventions that are relevant to our economic analysis.

Indeed it has proven very difficult to identify, and find information let alone document every policy intervention in detail, and to carry out a deep economic analysis of each of these in the time available to prepare this report. We have however been able to identify the broad nature of major interventions in the most significant markets, and extent of the effects of the key policy intervention in our analysis. Thus in the major section that follows this one, section 4, we present an overview of the likely economic effect of various types of interventions. We also also include brief summaries of the likely economic effects of the interventions we describe in this section as we go along as well, simply to clarify their relevance on a preliminary basis, and lay the foundation for the more integrated analysis latter in section 4.

On the relevant institutional arrangement the brief for this report identifies examination of:

1. direct and indirect payments made to PV modules or panels manufacturers by the Government of China (GOC);
2. government regulations on the production of PV modules or panels, cells, wafers, ingots and polysilicon;
3. government regulations on imports of major upstream raw materials (cells, wafers, ingots and polysilicon);
4. government regulations on export of major upstream raw materials (cells, wafers, ingots and polysilicon);
5. any direct or indirect financial support offered by the GOC to the manufacturers of PV modules or panels and/or to the suppliers of upstream raw materials; and
6. any other factors seen as relevant to be influencing the cost of production and/or the prices of PV modules or panels in the Chinese domestic market.

Table 2 below re-organises the above factors into four major relevant groupings A-D in the first column, including:

A. Fiscal intervention – expenditure, or tax related;
B. Regulation of domestic markets;
C. Trade-related regulation; and
D. Other interventions affecting prices or costs.

Table 2 further separately identifies in the last two major columns, the relevant markets identified in each of the above points 1-6 by an "X". It is noteworthy the brief only identified two market segments from a functional point of view i) the output or goods (PVMP) market, and ii) upstream input markets related to the PVMP market.

Table 2: Classification of Institutional Arrangements Identified in Brief

Intervention	Item Listed	Output	Inputs			
		PVMP	Cells	Wafers	Ingots	Polysilicon
A: Fiscal	1. Payments	X				
	5. Financial Support	X	X	X	X	X
B: Domestic Regulation	2. Production	X	X	X	X	X
C: Trade Regulation	3. Imports		X	X	X	X
	4. Exports		X	X	X	X
D: Other Factors	6. Price or costs	X	X	X	X	X

In what follows we summarise how we have interpreted the brief in terms of the focus we have adopted on identifying relevant institutional arrangements.
The institutional arrangements 1) and 5) identified in the brief listed above, are now identified in the second column of table 2 under *"Group A: Fiscal Interventions"* These include both "payments" and "financial support" offered by the GOC. These

items 1) and 5) in the brief are assumed more generally to refer to any form of direct or indirect *fiscal support*, including both expenditure or tax related, and so are grouped together. The distingushing feature of the two rows in *"Group A Fiscal Interventions"* identified in the brief then is that whereas the first row focuses only on payments directly related to the primary market for PV modules and panels (identified in the third column), in the second row the "financial support" is also related to relevant input to the production of PVMP identified in the final major column - including cells, wafers, ingots and polysilicon in the last four sub columns.

Item 2 in the brief "government regulations on … production" have been assigned to *Group B: Domestic Regulation.* Rather than limiting attention to *regulations on ..production* however it is assumed interest in *Group B: Domestic Regulation* interventions relates more generally to any form of domestic regulation (not only production related) that may affect the operation of the relevant PVMP market significantly – e.g. price regulation, and regulation of market entry. Moreover the relevant markets identified in the brief include both the primary output market for PVMP, but also the identified input markets as shown in the last 5 columns of table 3.

The items 3) and 4) identified in the brief are grouped together under *Group C: Trade Regulation* in table 2 as shown in the second colum - including both import and export regulation. In the brief, these items 3) and 4) were related *only* to the input markets - as shown in later columns in the table. It is assumed however that it is also intended to investigate trade regulation relating to PVMP – or the export and import of PVMP themselves.

Finally in table 2 there is the catch all category *Group D: Other Factors* – in the brief however the items listed related only to cost or price. It is assumed this can be taken to relate to any factor likely to affect market price (which of course includes costs or price of inputs) but also other factors. Of particular interest in this category is the nature and extent of government ownership of resources required, or entities operating in relevant markets.

In our work supporting the analysis of institutional arangements in this section then we have:

a. generalised the coverage of interventions as identified in four Groups A-D in table 2, and outlined above; and
b. expanded the markets to which the various four groups of interventions relate to, including both PVMP and all relevant major input markets upstream of PVMP, in each case shown in table 2.

We have also however further expanded our analysis to consider markets downstream to the PVMP market as well as the upstream input markets in keeping with our discussion in the market definition section earlier of the importance of downstream electricity markets in China.

As noted it has proven very difficult to identify, and find information let alone document every policy intervention in detail, and to carry out a deep economic analysis of each of these in the time available to prepare this report. We have however been able to identify the broad nature of major interventions in the most significant markets, and extent of the effects of the key policy intervention in our analysis. Table

3 below summarises the work we have done and the discussion of interventions that follows by each of the key relevant domestic market segments in China. The last three columns of table 3 then identify the three relevant markets identified above in the market definition section, including the PVMP market, upstream markets, and downstream markets. The last four rows of the table identify groups of interventions we will consider in each of the three markets, by the four major relevant groupings A-D identified above, and as shown in the first column of table 3 below, including:

A. Fiscal intervention – expenditure, or tax related;
B. Regulation of domestic markets – including price, market entry, competition, standards etc;
C. Trade Related Regulation – including exports and imports; and
D. Other interventions affecting prices or costs – including state ownership of enterprises

Table 3: Expanded Relevant Institutional Arrangements

Intervention	The PVMP Market	Upstream / Input Markets	Downstream Markets
A: Fiscal	X	X	X
B: Domestic Regulation	X	X	X
C: Trade regulation	X	X	X
D: Other Factors	X	X	X

The problem at the outset then is that to conduct economic analysis one needs to be able to focus on specific interventions, based on detailed information on the nature of the intervention. Turning to the specific institutional arrangements to be considered in the above cells of table 3, then the brief suggested there may be, for example, evidence of:

i. GOC policies including *"12th Five Year Plan for the Solar Photovoltaic Industry"*, *"12th Five Year Plan for Renewable Energy Development"* etc., indicating the GOC's influence on the production costs leading to lower selling prices of PV modules or panels;
ii. GOC policies or regulations in relation to increased production of PV modules or panels creating an oversupply of PV modules or panels in the Chinese domestic market;
iii. GOC policies or regulations for re-organisation of the PV modules or panels industry (including major upstream raw material suppliers) such as vertical integration, mergers and acquisitions providing significant cost advantages to the PV modules or panels manufacturers;
iv. various forms of financial support and other subsidies provided to the domestic PV modules or panels industry including refund or exemption of land fee, reduced corporate income tax, full or partial refund of value-added tax and reduced interest rates on loans by the GOC (including state banks);
v. GOC policies through the *National Development & Reform Commission* providing refund of import taxes to 'research and development equipment' used by the PV modules or panels manufacturers or upstream raw material industries;

vi. GOC's control on entry-level prices, external tariffs, import quotas and import levies affecting the production and pricing of PV modules or panels in China.

We address these policies in what follows, along with other specific interventions that we have identified. Beyond these identified specific policies as guidance however, the list of specific items i) to vi) above is otherwise quite general, and wide-ranging. In order therefore to assure complete coverage of everything in specific items i) to vi) above taken from the brief, and indicate where this analysis was undertaken in our work plan, the above items i) to vi) are thus regrouped in table 4 below to identify where they have been integrated into our work on institutional arrangements.

Table 4 – Summary of Specific policy areas Identified in Brief

Intervention	The PVMP Market	Upstream / Input Markets	Downstream Markets
A: Fiscal	i, ii, iv	x	
B: Domestic Regulation	i, ii, x	x	
C: Trade regulation	i, ii, v, vi	v	
D: Other Factors	i, ii, iii	iii	

In what follows we present our description of major institutional arrangements for which adequate information was available, in three major subsections, according to the three market segments. Thus we discuss interventions in the following order:

1. *The PVMP Market Interventions*. First interventions directly related to the PVMP market.
2. *Upstream Market Interventions*. Those directly related to input markets upstream to the PVMP market (e.g. cells and polysilicon).
3. *Downstream Market Interventions*. Those directly related to markets downstream to the PVMP market.

In doing so, we discuss the National People's Congress (NPC) 12th Five-Year Plan (NPC 12th 5YP) which affects all markets and the following specific policies affecting each of the main specific market segments:

Affecting the PVMP Market

a. 12th Five Year Plan for the Solar Photovoltaic Industry
b. "Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry"; "12th Five Year Plan for Renewable Energy Development"
c. The Standard Conditions for the Photovoltaic Manufacturing Industry
d. Notice Concerning the Implementation of the Golden Sun Demonstration Project and other Fiscal Interventions

Affecting the Upstream Input Markets

a. 12th Five Year Plan for the Solar Photovoltaic Industry
b. Standard Conditions for Photovoltaic Manufacturing Industry
c. Standards for the Polysilicon Industry Access

d. Notice of Several Opinions on Curbing Overcapacities and Redundant Constructions in Certain Industries and Guiding the Healthy Development of Industries

Affecting the Downstream Electricity Market

a. 12th Five Year Plan for the Solar Photovoltaic Industry
b. "The Notice of the National Development and Reform Commission on Improving the Policies for Solar PV Electricity Price".[27] This Notice was directed.
c. "Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry"
d. GOC ownership of electricity companies

Before considering the nature and effect of government policy it is useful to first elaborate our understanding of the underlying structure and machinery of government in China - starting at the top.

The *Communist Party of China* (CPC) is the founding and ruling political party of the People's Republic of China (PRC). The CPC is the sole governing party of China. The highest body of the CPC is the National Congress, convened every fifth year, with the last being the 18th Congresss of the CPC held in 2012. When the National Congress is not in session, the Central Committee is the highest body, but since the body meets normally only once a year, most duties and responsibilities are vested in the Politburo and its Standing Committee. The party's leader holds the offices of General Secretary (responsible for civilian party duties), Chairman of the Central Military Commission (CMC) (responsible for military affairs) and state president (a largely ceremonial position). Through these posts the party leader is the country's paramount leader. The current party leader is Xi Jinping, elected at the 18th National Congress (held in 2012).

The *National People's Congress* (usually abbreviated NPC) is *the national legislature* of the People's Republic of China. Under China's current Constitution, the NPC is structured as a unicameral legislature, with the power to legislate, the power to oversee the operations of the government, and the power to elect the major officers of state, including electing the *President of the People's Republic of China* and approving the appointment of the *Premier of the State Council* as well as approving the work reports of top officials.

The *State Council* is the chief *administrative authority* of the People's Republic of China, constitutionally synonymous with the Central People's Government since 1954 (particularly in relation to local governments). It is chaired by the *Premier* and includes the heads of each governmental department and agency. The State Council directly oversees the various subordinate People's Governments in the provinces, and in practice maintains membership with the top levels of the Communist Party of China.

At the lower level then one has the subordinate central governmental departments and agencies, and Provincial People's Governments and their departments and agencies

[27] Westlaw Reference: Promulgating Institution: National Development Reform Commission: Document Number: Fa Gai Jia Ge (2011) No 1594; Promulgating Date: 07/24/2011; Effective Date: 07/24/2011

3.1 The Domestic Market For PV Modules and Panels

Several GOC policies and measures affect the domestic market for PV modules and panels in China. These policies are all best understood first of all in the context of the overarching *National People's Congress (NPC) 12th Five-Year Plan (NPC 12th 5YP)* endorsed by the NPC as China's legislature on 14 March 2011, and covering the period 2011-2015 which incorporates the investigation period.[28] The plan in the introduction states that:

> *"The Plan is a grand blueprint for the economic and social development of China in the next five years, the common guideline for all the Chinese people, and the important basis for government to perform the duties of economy regulation, market supervision, social administration and public service."*[29]

Five Year plans agreed by China's legislature are widely accepted and expected to be a key driver of Government policy in China. They are a key component of China's centrally planned society.[30] Thus as KPMG noted in 2011 at the time of the 12th Five-Year Plan announcement:

> *"the social and economic measures contained in the plan will have a deep impact on the business landscape, both within China and in countries that do business with China."*[31]

This NPC 12th 5YP thus set the nation's course for the five years from 2011 to 2015. As KPMG noted about the 12th Five-Year Plan at the time of its release however:

> *"The themes and targets in the plan will now form the basis for industry-specific and provincial five year plans which will be rolled out over the next few months"*[32]

KPMG noted that after the release of the 12th Five-Year Plan:

> *"each province, municipality and ministry will need to develop their own five year plan with implementation measures. As this cascading effect gets underway implications in specific regions and industry sectors will become clearer and some could have direct impacts on operations, costs and future opportunities, for particular businesses"*[33]

We thus begin our analysis of relevant policy interventions in the PV modules and panels market in China by briefly identifying key relevant policies in the NPC 12th 5YP, and then trace how these "cascaded down" to relevant PV market policy interventions promulgated respectively by the State Council, and then Central Government Departments, and Provincial Governments.

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[28] Resolution of the National People's Congress on the Outline of the Twelfth Five-Year Plan for National Economic and Social Development Westlaw China Reference: Promulgating Institution: National People's Congress Promulgating Date: 03/14/2011 Effective Date: 03/14/2011 Validity Status: Valid

[29] Ibid p. 4 Introduction

[30] http://epi.yale.edu/the-metric/timeline-chinas-13th-five-year-plan

[31] See http://www.kpmg.com/cn/en/issuesandinsights/articlespublications/publicationseries/5-years-plan/pages/default.aspx visited 23 June 2015

[32] KPMG "China's 12th Five Year Plan: Overview" March 2011 p. 1 see: http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Publicationseries/5-years-plan/Documents/China-12th-Five-Year-Plan-Overview-201104.pdf

[33] KPMG "Six Reasons Why the Five Year Plan matters for your business" http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Publicationseries/5-years-plan/Pages/6-reasons-it-matters.aspx

In what follows therefore we first review key elements of the NPC 12th 5YP relevant to the solar PV market. In that regard we identify a number of elements implying a potentially high level of intervention in the domestic PV market.

We then turn to key relevant promulgations of the State Council. In particular we focus on the *"Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry"* promulgated in July 2013. This followed the 18th National Congress of the Communist Party of China (CPC) held on November 8 2012 (20 months after the the NPC 12th 5YP was passed) and which represented an important potential turning point. Due to term and age limits restrictions, seven of the nine members of the powerful Politburo Standing Committee (PSC) retired during the Congress, including President Hu Jintao, who was replaced by Xi Jinping as General Secretary of the CPC. The Congress also elected the 18th Central Committee of the Communist Party of China, and saw the number of Politburo Standing Committee seats reduced from nine to seven.

Even though the "Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry" (OSCDPV) was promulgated by the State Council in July 2013, eight months after major changes at the top, including to the General Secretary, the PSC, and the Central committee of the CPC, our review suggests that the State Council in this promulgation clearly continued to implement the high level of intervention in the solar PV market in line with the NPC 12th 5YP.

Continuing our review of the implementation of PV industry policy as it cascaded down from NPC 12th 5YP, through the State Council to Central Government departments and provincial Governments, we also examine policies of the Ministry of Industry and Information Technology (MIIT), which has been identified as one of the key government departments at the central government level in China under the State Council, which is responsible for the administration of the Government of the People's Republic of China (GPRC) measures concerning the solar sector.[34] The role of MIIT identified by the GPRC includes to:

- put forward policy suggestions on optimizing industry layout and structure;
- draft the drafting of relevant laws and regulations;
- formulate rules and regulations; formulate the norms and standards of industries and organize their implementation;
- guide the industry quality management.[35]

We therefore review two major MIIT initiatives which focused specifically on the PV industry, in particular:

i) Eleven months after the release of the NPC-5YP outlined above, MIIT released the *12th Five Year Plan for the Solar Photovoltaic Industry*[36] *(12-5YP-SPVI)* on February 24, 2012. This is a sector specific plan that identifies specific goals and policy measures for the Solar Photovoltaic

[34] See The Government of the People's Republic of China (GPRC) public submission to the Canadian Border Services Agency (CBSA) Dumping Investigation Section 20 Inquiry RFI – People's Republic of China Public (Henceforth Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China) p61 - citing appendix A.1.a p. 65
[35] Ibid p. 65
[36] CBSA Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 297-314

Industry which we review below. As we show it evidences a high degree of intervention in the PVMP market.

ii) Half way into the NPC-5YP, 10 months after the major leadership changes in the 18th national Congress of the CPC, and 2 months after the State Council issued its "Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry", MIIT promulgated *"The Standard Conditions for the Photovoltaic Manufacturing Industry"* on September 16, 2013. The document states that its purpose was: "To further strengthen the administration of photovoltaic manufacturing industry, standardize the order of industry development, improve the industry development, and accelerate and promote the transformation and upgrading of photovoltaic industry in accordance with *"Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry* (Guo Fa [2013] No.24)" [37]. As we show below once again this document evidences a high degree of intervention in the PVMP market.

As we shall see, all these documents together reveal the GOC has had a significant influence on the market for PV modules or panels in China through interventions that significantly affect costs and/or prices of PV modules or panels.

3.1.1 The NPC 12th Five-Year Plan- 2011-2015

Of particular relevance to the investigation is the fact that both "energy saving and environmental protection" (which is relevant to solar power) and "new energy" (which includes solar power) were identified as two of the 7 priority industries in the 12th Five-Year Plan as follows:[38]

> *Chapter 10: Nurturing and Developing the Strategic and Emerging Industries*
> *Section 1: Boosting the Breakthrough Development of Key Fields*
> *Making great effort in developing strategic emerging industries such as energy saving and environmental protection, ... renewable energy,... renewable energy industry will focus on developing* ***..... photovoltaic solar power*** *...*

The NPC 12th 5YP also highlighted an intention to strengthen policy support for the 7 strategic emerging industries like photovoltaic solar power, using industry development and investment funds, social funds, start up investment, multi-level capital market financing, financial incentives, risk compensation, credit support, tax support policies, and beneficial technical and industry standards. These are outlined in chapter 10, section 3 of the NPC 12th 5YP as follows:

> *Chapter 10 Nurturing and Developing the Strategic and Emerging Industries*
> *Section 3: Strengthening Policy Support and Guidance*
> *Setting up strategic emerging industry development fund and industry investment fund, increasing the government's emerging industry startup investment, leveraging the role of multi-level capital market financing, and pushing forward investment of social funds in innovative start-ups that are at their early or intermediate stages. We will make comprehensive use of*

[37] CBSA Dumping Exhibit 106 (NC) – Response to Section 20 RFI – Government of China – p. 449
[38] See Chapter 10 Resolution of the National People's Congress on the Outline of the Twelfth Five-Year Plan for National Economic and Social Development Westlaw China Reference: Promulgating Institution: National People's Congress Promulgating Date: 03/14/2011; Effective Date: 03/14/2011; Validity Status: Valid.

financial incentive policies such as risk compensation to encourage financial institutions to provide more credit support; improve tax support policies that encourage innovation and guide investment and consumption; accelerate the formation of technical standards for important products and industry standards that are beneficial for development of strategic emerging industries; and support the construction of supporting infrastructure for the application of new products to create a positive environment for cultivating and expanding market demands.

In China, 90% of energy comes from carbon intensive fossil fuels such as coal, crude oil and natural gas - with coal generating around 70% of China's energy in 2009.[39] The priority for new energy to assist the proposed shift away from fossil fuels was reflected in a number of key targets in the 12th Five-Year Plan including:

- increasing the ratio of non-fossil energy to primary energy consumption to 11.4%;
- reducing the energy consumption per unit of GDP by 16%;
- reducing the carbon dioxide emission per unit of GDP by 17%.[40]

To support these targets as noted, clean energy and energy conservation were identified as two of the seven strategic investment areas in the 12th Five-Year Plan, with the aim presumably of increasing supply of clean energy - like photovoltaic solar power.

The NPC 12th 5YP thus highlighted an emphasis on energy production and utilitzation that would benefit solar energy as well as follows:

"Chapter 11: Pushing Forward the Transformation of Energy Production and Utilization

We will adhere to the principles of "giving priority to energy conservation, focusing on domestic issues, carrying out diversified development, and protecting the environment" strengthen mutually beneficial cooperation between countries, adjust and optimize the energy structure, and construct a sound, stable, economic, and clean modern energy industrial system.

Section 1: Promoting the Development of Diversified Clean Energy

... actively develop other renewable energy sources such as solar energy.."

Plans were also announced to consolidate coal companies which compete with solar energy.

Economic Implications for the Domestic Market in China for PVMP

The NPC 12th 5YP clearly identifies targets and policies to increase supply and capacity of non-fossil fuel production, including photovoltaic solar power. Policies identified included various funds for start up and investment, financial incentives, compensation for risk, credit support, tax support and beneficial technical and

[39] See IEA https://www.iea.org/publications/freepublications/publication/oil-and-gas-emergency-policy---china-2012-update.html and http://phemonoe.eu/china-hungry-energy/
[40] Chapter 3 Main Objectives NPC 12th Five Year Plan Ibid

industry standards.

These policies would all tend to increase supply and capacity in the solar PV module and panel market. This in turn would tend to put downward pressure on prices. It could also potentially lead to chronic excess supply and overcapacity, and serious price depression below competitive market levels. This would be exacerbated if at the same time it was planned to reduce demand or energy consumption per unit of GDP by 16%. Increasing supply in the face of falling demand will tend to depress prices.

The Plan itself states it is a *"grand blueprint for the economic and social development of China in the next five years... and the important basis for government to perform the duties of economy regulation, market supervision, social administration and public service."*[41] In what follows we will examine how this plan for photovoltaic solar power cascades down and was implemented by lower levels of government within the GOC.

3.1.2 The 12th Five Year Plan for the Solar Photovoltaic Industry

As noted above the Ministry of Industry and Information Technology (MIIT), has been identified as one of the key government departments at the central government level in China under the State Council, that is responsible for the administration of the Government of the People's Republic of China (GPRC) measures concerning the solar sector. Eleven months after the release of the NPC-5YP outlined above, MIIT released the *12th Five Year Plan for the Solar Photovoltaic Industry*[42] *(12-5YP-SPVI)* on February 24, 2012.

The introduction to the 12-5YP-SPVI states it is *"to be the guiding document for our country's PV industry development during the 12th five-year period."*[43] More specifically, as we outline below, the 12-5YP-SPVI clearly identifies a clear intention to reduce costs and prices, and expand output with specific targets for each being enumerated that align to the overarching 12-5YP outlined above. The 12-5YP-SPVI in section VI further identifies specific "Policy Measures" to achieve these goals.

We discuss the relevant goals and policy measures in separate sections below in turn, all of which point to the conclusion that there were significant interventions which distorted prices to the extent that they were not substantially the same as they would be in a competitive market in the domestic PVMP market in China.

Cost Reduction and Output Expansion Goals

In section II of the 12-5YP-SPVI under the heading *"Situation During the 12th Five-Year Plan Period"* the document states that *"Cost reduction is the main issue facing the industry"* and that *"The cost of solar cells and PV systems will continue to decline and will gradually approach conventional power generation costs. Prices of silicon materials, modules, and ancillary parts will rapidly decline as a result of market pressure. Solar cells will continue to evolve toward high efficiency and low cost."*

In section III (b) ii entitled *"Basic Principles"* the document further identifies cost reduction as a basic principle emphasizing the *"Endeavor to reduce the costs of PV*

[41] Chapter 3 Main Objectives NPC 12th Five Year Plan Ibid
[42] CBSA Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 297-314
[43] CBSA Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 301

power generation through the mass production of high-purity silicon materials, enhancement of cell conversion efficiency rates, localization of production equipment manufacturing, R&D of new types of cells and raw materials, and system integration."

In Section III (c) headed *"Development Goals"* the 12-5YP-SPVI further identifies specific targets relating to cost reductions:

> *"III c (iv) Targets for the Cost of PV Power Generation by 2015, ... the cost of PV modules will drop to 7,000 yuan/kW, that of PV systems will drop to 13,000 yuan/kW, and that of PV power generation will drop to 0.8 yuan/kW. By 2020 .... the cost of PV modules will fall to 5,000 yuan/kW, that of PV systems to 10,000 yuan/kW, and that of power generation costs to 0.6 yuan/kW."* [44]

In Section III (c) headed *"Development Goals"* the 12-5YP-SPVI further identifies that a clear goal of the government is to expand capacity and output of polysilicon, solar cells, and PV output.

> *"III c (i) Economic objectives ... Support will be provided to major enterprises to grow stronger so that by 2015, leading polysilicon enterprises will reach 50,000 metric tons per year, and major enterprises will reach 10,000 metric tons per year; leading solar cell enterprises will reach the 5GW level, and major enterprises will reach the 1GW level. By 2015, in China there will be one PV enterprise with annual sales revenue exceeding RMB 100 billion, 3-5 PV enterprises with annual sales revenue exceeding RMB 50 billion, and 3-4 enterprises specializing in PV equipment manufacturing with annual sales revenue exceeding RMB 1 billion."*[45]

This proposed expansion of capacity and output would of course tend to lead to lower prices, and potentially lower costs through economies of scale.

Policy Measures

Under section VI entitled *"Policy measures"* the 12-5YP-SPVI clearly enumerates policy measures designed to directly and indirectly achieve the goals outlined above or reduce costs and prices, and expand output, and more generally interfere with the competitive operation of the market.

In particular the following policy measures which are designed to directly and indirectly reduce costs and prices, and expand output are listed in section III:

> *"VI a) Enhance the Status of PV Energy and Strengthen Strategic Industrial Deployment.... By implementing relevant planning on industrial transformation, upgrading, and renewable energy, map out policies in the areas of industry, taxation, and finance to actively promote the healthy development of China's PV industry."* [46]

> *"VI c) Focus on Overall Planning and Promote Reasonable Industrial Layout*

[44] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 308
[45] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 307
[46] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 312

.... promote industrial transformation and upgrading, adhere to the combination of "led by the market and guided by the government," support leading enterprises ...to allow them to grow stronger. Encourage leading PV enterprises to expand .. actively participating in international competition. .... guide industries like polysilicon to move toward the western regions. Promote resource integration and encourage enterprises to engage in intensive development and operations. Support highly competitive enterprises with low production costs to merge and transform ailing PV enterprises." [47]

"VI (d) Actively Foster a Diversified Market and Promote the Industry's Healthy Development ... Continue to implement the "Golden Sun Project" and other supporting measures. .... Accelerate the development of the domestic PV market. Insist on a combination of grid-connected power generation and off-grid application.... Through reasonable tariffs, moderate financial subsidies, and active financial support, actively expand the domestic PV market."[48]

"VI (e) Support Enterprises' Independent Innovation and Strengthen the Industry's Core Competitiveness.... Enhance support for the PV industry's technological innovation. Focus support on energy-conservation in polysilicon production, comprehensive utilization of by-products, R&D, and industrialization of efficient and high quality solar cells and low-cost new techniques." [49]

Also listed in section VI of the 12-5YP-SPVI were policy measures involving direct interference with the competitive operation of the market, including penalties for enterprises that "*disrupt normal order*":

"VI (b) Strengthen Industry Administration and Standardize the Development of the PV Industry ... take measures to strengthen industry administration, ...standardize the development of China's PV industry, ... guide local governments ... Prompt relevant departments' ... Enterprises that ... disrupt normal order of market competition should be penalized and rectified in accordance with relevant regulations." [50]

"VI (f) Improve the Standards System and Promote the Establishment of Inspection Certification and Monitoring Systems ...promote the establishment of relevant standards for polysilicon, silicon ingots/silicon wafers, solar cells, and PV systems. Actively participate in the establishment of international standards, and establish and improve product inspection, certification, and monitoring systems. Promote the development of industry standardization." [51]

"VI (g) Strengthen Industry Organization and Actively Participate in International Competition....create cooperation and innovation platforms for the domestic PV industry. Improve the industry's capability to cope with international competition and market risks, ... Strengthen international exchanges and cooperation, optimize the industry's development environment,

[47] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 313
[48] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 313.
[49] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 313.
[50] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 312.
[51] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – pp. 313-314.

improve export risk insurance mechanisms, encourage enterprises to actively seek overseas investments, and reinforce and expand domestic enterprises' presence in the international market." [52]

Economic Implications for the Domestic Market in China for PVMP

The 12-5YP-SPVI clearly identifies specific policies to deliver cost reduction and output expansion for photovoltaic solar power. Policies identified included "policies in the areas of industry, taxation, and finance", including "tariffs", "financial subsidies", and "financial support", to actively "expand output" and reduce costs and prices in the domestic PV market. These policies to increase ouput and lower costs in the solar PV module and panel market, would tend to put downward pressure on prices. It could also potentially lead to chronic excess supply and overcapacity, and serious price depression below competitive market levels. This would be exacerbated if planned at the same time policies were in place to interfere with the competitive operation of the market, including penalties for enterprises that "disrupt normal order".

3.1.3 "Notice concerning the Implementation of the Golden Sun Demonstration Project

As noted, 12-5YP-SPVI in article VI (d) notes that the GOC will *"Continue to implement the 'Golden Sun Project' and other supporting measures"*. The Golden Sun Project is an example of a significant fiscal programme affecting the operation of the PVMP market.

The Golden Sun programme was launched in July 2009 initially involving a plan to install at least 500 megawatts (MW) of solar farms across the country over the following two to three years.[53] Article 2 of Chapter 1 of the *"Notice concerning the Implementation of the Golden Sun Demonstration Project (Cai Jian {2009} 397)"*[54] promulgated by the Ministry of Finance, Ministry of Science and Technology and National Energy Bureau states that the Golden Sun program is a combination of financial assistance, technological support, and market approaches *"used to accelerate the industrialization and development of the domestic photovoltaic power industry, and to promote the progress of photovoltaic (PV) power generation technology"*. Article 4 of Chapter 2 of the notice indicates that financial assistance from this program is not only for constructing power plants but includes support for the *"development and industrialization of key PV technologies, including silicon purification, control inverters, and other key network technologies."* Thus funds from this program are not only provided for the construction of power generation projects, but they are also provided to develop photovoltaic technologies, such as solar cells and modules.

The fiscal interventions under the programme were also quite high. Thus article 7 of the Notice states:

"Article 7 .... Regarding the grid-connected photovoltaic power generation

[52] CBSA Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 314.
[53] See "Chinese Gov't Will Pay to Install 500MW Solar Ucilia Wang Green Tech Media July 21, 2009 https://www.greentechmedia.com/articles/read/china-govt.-will-pay-to-install-500mw-solar.
[54] Promulgating Institution: Ministry of Finance; Ministry of Science and Technology; National Energy Bureau Document Number: Cai Jian [2009] No. 397 Promulgating Date: 07/16/2009.Effective Date: 07/16/2009.

projects, the subsidy shall be granted at the rate of 50% of the total investment in the photovoltaic power generation system and its transmission and distribution projects in principle, and the subsidy for independent photovoltaic power generation systems in remote areas of the country that have no access to electricity supply shall be granted at the rate of 70% of the total investment therein."

The 5YP-SPVI clearly identified would be continued during 2011-2015.[55]

Thus the Golden Sun project offered 50% subsidies to photovoltaic solar power projects that connected to the grid during the investigation period. Most of the Chinese population lives in regions that offer connections to the grid. Remote areas without connections to the grid would constitute a smaller share of the population, and an even smaller share of the potential market demand for PV energy. The importance of PV projects that connect to the grid introduces two further key forms of Government intervention in the PV industry on the demand side, namely regulation of grid access and state-owned energy enterprises on the demand side. The grid and the energy companies associated all tend to be government-owned, and heavily regulated.

As a final point it is important to emphasise that the 12-5YP-SPVI in VI (d) notes not only that the GOC will *"Continue to implement the 'Golden Sun Project'"* but also *"other supporting measures"*. It turns out there are a vast number of fiscal interventions affecting the operation of the PVMP market. For example the Canadian Border Services Agency (CBSA) recently identified 189 potential fiscal support programs in the following seven categories:[56]

- Special Economic Zones (SEZ) and other Designated Areas Incentives;
- Preferential Loans and Loan Guarantees;
- Grants and Grant Equivalents;
- Preferential Income Tax Programs;
- Relief from Duties and Taxes on Inputs, Materials and Machinery;
- Goods/Services Provided by the Government at Less than Fair Market Value; and
- Equity Programs.

As a result of information obtained in the course of its investigation, 170 new programs were found to exist, giving a total of 359 fiscal interventions.

Economic Implications of the Golden Sun Project and other Fiscal Interventions

The sheer extent of the 359 fiscal programmes run by the GOC affecting the PVMP market makes it impossible to conduct a full review in the time available of their likely economic effects. The Golden sun project however was a significant one worth noting and its implications are clearly significant. The project aimed to provide 50% subsidies to photovoltaic solar power projects that are connected to the grid during the investigation period and would likely have had a major impact on the PVMP market. The government said it would subsidize 50% of the costs of transmitting and distributing the solar power from a solar power project producing a total of no less

[55] Ibid.
[56] Canada Border Service Agency (Dec 2014). STATEMENT OF REASONS Concerning the initiation of investigations into the dumping and subsidizing of CERTAIN PHOTOVOLTAIC MODULES AND LAMINATES ORIGINATING IN OR EXPORTED FROM THE PEOPLE'S REPUBLIC OF CHINA.

than 500MW. The 12-5YP-SPVI further identifies specific targets relating to cost reductions: in section III c (iv) *"Targets for the cost of PV power generation"* it notes *"that of PV systems will drop to 13,000 yuan/kW, and that of PV power generation will drop to 0.8 yuan/kW"*. At the time of initial announcement (July 2009) of its support for the Golden Sun programme, the government did not specify a budget for the support programme. However, in November 2009, the GOC's Ministry of Finance announced it had selected 294 projects totalling 642 megawatts, which they estimate would require a total construction costs of roughly RMB 20 billion.[57] Hence, the GOC's support on this programme stood at RMB 10 billion.

Fiscal support of this kind and on this scale is likely to have led to excess capacity, excess supply and depressed prices. For producers, the fiscal support is equivalent to a reduction in cost, and in a demand and supply analysis, this causes a rightward shift in the supply curve. All else equal, this translates into a lower price for PVMP. Indeed as we shall see in the next section, a dire situation of over investment and over capacity seems to have resulted, and to have led to the decision to terminate the programme, and any further expansion of capacity in 2013.[58] Although by early 2013, the government had terminated the subsidy programme for Golden Sun the effect of the programme in dramatically increasing supply and leading to excess capacity, would likely have been depressed prices, all else equal, which would have been felt throughout the investigation period.

3.1.4 Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry

Half way into the five year plan in 2013, it appears to be clear that efforts to reduce costs and expand output of the solar PV industry had led to excess capacity. As a result the State Council in its policy annoucement in July 2013, *Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry* (Guo Fa [2013] No.24) describes the current situation of excess capacity in the phtovoltaic industry as dire as follows

> *"In recent years , China's photovoltaic industry has undergone tremendous expansion....the cost of power generation has been dramatically lowered...However ...the photovaltatic industry of China is currently in a condition due to such severe problems as serious redundancy in production capacity."*[59]

Such conditions of excess capacity might have been expected to follow from the aggressive plan of expansion established in earlier years, but more importantly for this project would have clearly led to depressed domestic prices in the PVMP industry.

This Directive then seeks to address this dire situation by trying to, first on the supply side, *"accelerate structural adjustment"*, and second on the demand side, expand *"the application of photovoltaic power generation"*. It is addressed to *"People's Governments of all provinces, autonomous regions and municipalities under the Central Government, all ministries and commissions of an departments direclty under*

[57] http://www.greentechmedia.com/articles/read/here-comes-chinas-3b-golden-sun-projects.
[58] http://pv.energytrend.com/research/20130423-5140.html
[59] Article 1 *Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry* (Guo Fa [2013] No.24).

the State Council". As noted above the *State Council* is the chief *administrative authority* of the People's Republic of China.

In article 3 the directive identifies specific limits on capacity to be achieved from 2013-2015:

> *"From 2013 to 2015, the average annual increase in installed photovoltaic power generation capacity will be kept at about 10 million kw, and the total installed capacity nationwide by the year 2015 will be above 35 million kw."*[60]

Article 4 accordingly identifies initiatives to *"Accelerate structural adjustment"* including:

> *"Article 4(1) Curb Blind expansion of the production capacity of the photovoltaic industry. New photovoltaic projects that purely expand the production capacity ... shall be strictly controlled."*[61]

> *"Article 4(2) Merger and acquisitions among photovoltaic enterprises shall be promoted...Policy based guidance and promotion shall be enhanced to set up a permanent mechanism for elimination of outdated production capacity, and accelerate exit of outdated photovoltaic production capacity"*

In Article 3 it also outlines initiatives to concentrate support on strong enterprises and eliminate poor performing ones:

> *"Support shall be allocated among photovoltaic enterprises on a differentiated basis, with support to be focused on key strong enterprises that are technologically advanced and competitive on the market and poor-performance enterprises to be eliminated."*[62]

Elsewhere the directive outlines separate industrial re-organisation interventions with similar goals:

> *"Mergers and acquisitions between enterprises in the industry will be encouraged so that enterprises producing poor quality products and using outdated technologies will be eliminated and a number of leading enterprises with reasonably strong technological research and development capabilities and market competitiveness will be cultivated."*[63]

Having established a situation of excess capacity and oversupply that needs to be addressed by policies to *"Accelerate structural adjustment"* including limits on expansion and rationalization policies, the State Council also highlights nevertheless an intention to proceed with further expansion of demand, commenting in Article 2 *"On the one hand the application of photovoltaic power generation must be expanded; on the other hand total photovoltaic production capacity must be controlled"*. Later in Article 3, the State Council elaborates on a number of major initiatives to expand the *"application of photovoltaic power"* which presumably

[60] Ibid Article 3.
[61] Ibid Article 4(1).
[62] Ibid Article 3.
[63] Ibid Article 2.

means demand side interventions, including a policy to:

> *"...build 100 sizeable exemplary application zones of distributed photovoltaic power generation application, and 1000 exemplary towns and villages of distributed photovoltaic power generation application. Pilot and exemplary projects of micro power based grids to which photovoltaic power generation may be applied on a sizeable basis...remote regions and sea islands...to utilize photovoltaic power generation...apply distributed photovoltaic power in such areas as urban street lighting, urban landscape and communications base stations and traffic lights..."* [64]

Other demand side factors are also highlighted in Article 3(2) including *"construction of photovoltaic power stations and corresponding power grids"*. This is further picked up in Article 6 entitled *"Improve Power Grid connection management and service"*. The terms of access to the power grid ultimately affect the demand side of the PVMP modules market. The power grid enterprises are all state owned and under the control of the State Council. The following Directives involve the State Council directing these enterprises to provide funding and free services to support photovoltaic power generation:

> Article 6(1) *"Power Grid enterprises shall step up their construction and renovation of power grids pertinent to photovoltaic power generation, and ensure that the supporting power grids will be built and commissioned along with corresponding photovoltaic power generation projects ...Regarding photovoltaic power projects connected to public power grids, the renovations of public power grids necessary for such connection shall be funded by relevant power grid companies...with regard to distributed power generation on the side of users, the renovations of public power grids...shall be funded by the power grid enterprises concerned"*
>
> Article 6(2) *"Power grid enterprises shall provide interconnection services for photovoltaic power generation, optimize their systems, and give priority to the proper operation of photovoltaic generation and timely interconnection between photovoltaic power grids and public power grids and full purchase of all photovoltaic power... interconnection of distributed Photovoltaic power grids...shall be streamlined...In addition back up storage fee and , and other relevant service fees shall be exempted for distributed power projects "*

Finally in Article 7 entitled *"Improve Support Policies"* one finds a long list of major fiscal and other financial support policies involving funding for the demand side of the photovoltaic industry:

> Article 7(1) *"Vigorous support shall be given to the user side application of photovoltaic technology...enterprises, institutions, communities and households are encouraged to install and use photovoltaic power generation systems...energy companies... to invest in and manage photovoltaic facilities...Record filing management (instead of stricter registration regimes)...Distributed photovoltaic power generation shall be exempt from licensing. Distributed photovoltaic power generation that do not need state*

[64] Ibid Article 3(1).

fiscal subsidy may be exempt from restriction on their scale... the amount of electrical power generated through photovoltaic projects shall be included....as one of indexes by which performance of local governments and power grid companies is assessed."

Article 7(2) "*Improve Pricing and Subsidy Policies. Distributed photovoltaic power generation is entitled to the policy of subsidy according to the amount of power generated...the on-grid price of power generated by distributed photovoltaic power generation shall be reasonably adjusted according to... the cost of photovoltaic power generation...the rate of renewable energy surcharge shall be adjusted so as to increase the development fund for renewable energy sources...*"

Article 7(3) "*Improve management of subsidies .... The method and procedure of subsidy payment will be improved. These subsidies for photovoltaic power stations shall be settled and paid by power grid companies on a monthly basis.... In the case of distributed photovoltaic power generation, a subsidy system will be set up*

Article 7(4) "*Preferential fiscal and taxation policies shall be enhanced. The mechanism under which central government appropriations are used to support the development of the photovoltaic power industry shall be improved with support to be enhanced...The amount of power generated by distributed photovoltaic power generation to be used by themselves is exempted from surcharge...and other governmental charges....the research development...cost plus an additional amount may be deducted from income of the enterprise in calculating the amount of income tax payable...Mergers and acquisitions ...may be granted preferential taxation policies"*

The State Council also outlined regulatory "interventions including:

Article 3 *"...and corresponding electrical power regulation system and management mechanism shall be established, so as to form a new and suitable regime for development management and consumption of electrical power generated through photovoltaic technology"* [65]

The extent and nature of the interventions listed above are sufficient alone to conclude that there is a distortion of competitive market conditions in relation to the subject goods such that domestic sales are likely to be significantly distorted from normal competitive market value.

The State Council further clearly also tightened control on both subordinate central departments, agencies and provinces so as to ensure these policies would be implemented. Thus in Article 5, titled *"Regulate the Order of the Development of the Photovoltaic Industry"* one finds statements like:

Article 5(1) *"...Proper connection and coordination between national plans and local plans. Photovoltaic manufacturing and industrial application, photovoltaic power generation and development of corresponding power grids must be ensured..."*

[65] Ibid Article 3.

And later perhaps most explicitly of all one finds the following directive to subordinate organisations to the State Council:

> Article 8 *"...Enhance organization and leadership of the industry. All Departments concerned shall, in accordance with these Opinions formulate their respective support documents for the industry according to their respective duties on an early date, improve support policies on the pricing and taxation as well as credit and land supply to photovoltaic power generation, and ensure that all measures are properly carried out. All provisional people's governments shall,...enhance their administration of the photovoltaic industry....Formulate plans and properly implement relevant policies...Furthermore associations and institutions relating to industry shall be enhanced and full play shall be given to the role of industry organisations in enhancing industry self-discipline...In addition services to industry will, be improved..."*

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The above directive of the State Council is important for a number of reasons.

1. First the *State Council* is the chief *administrative authority* of the People's Republic of China and its directives can be relied upon as evidence of GOC intervention in the domestic market in China for PV modules and panels.
2. Second the directive was issued in July 2013, towards the end of the investigation period which is 1 July 2012 to 31 December 2013, and the State Council clearly admits that at that time *"...the photovaltatic industry of China is currently in a dire condition due to such severe problems as serious redundancy in production capacity."*[66] This tends to be reasonably conclusive evidence that the domestic prices for PV modules and panels were depressed during the investigation period.
3. Finally the extent and nature of the interventions listed by the State Council above are sufficient alone to conclude that there is a substantial degree of distortion of competitive market conditions in relation to the subject goods such that domestic sales are likely to be significantly distorted from normal competitive market value.

3.1.5 The Standard Conditions for the Photovoltaic Manufacturing Industry

In compliance with the strong Directive outlined above by the State Council, the MIIT issued *"The Standard Conditions for the Photovoltaic Manufacturing Industry" (SCPVMI)* on September 16, 2013 which sought to limit capacity expansion *'in accordance with "Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry* (Guo Fa [2013] No.24)"[67]

The MIIT "Standard Conditions" document SCPVMI, clearly indicates an intention to intervene in the PV market where it states that its purpose was: *"To further strengthen the administration of photovoltaic manufacturing industry, standardize the order of industry development, improve the industry development, and accelerate and promote the transformation and upgrading of photovoltaic industry"*

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[66] Article 1 *Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry* (Guo Fa [2013] No.24).
[67] CBSA Dumping Exhibit 106 (NC) – Response to Section 20 RFI – Government of China – p. 449.

The document includes measures restricting new entrants and capacity expansion, stating:

> *"New photovoltaic manufacturing projects only for the purpose of capacity expansion shall be strictly controlled. New, renovation and expansion projects that are necessary for enhancing technological innovations and reducing production costs shall be reported to the competent industry authority and competent investment authority for records. The minimum proportion of capital funds for new, renovation and expansion photovoltaic manufacturing projects shall be 20%."*[68]

In Article 2 *Production Scale and Process Technology,* MIIT identifies minimum R&D expenditures for photovoltaic manufacturers, namely a minimum of 3% of total sales or 10 million RMB. The document also lists minimum production requirements for polysilicon, silicon ingots, rods and wafers, as well as photovoltaic cells and photovoltaic modules. Finally, specific technological and efficiency requirements are identified for products including polysilicon, photovoltaic cells and photovoltaic modules.[69]

Instructions regarding how photovoltaic manufacturing enterprises shall comply with these requirements, as well as information concerning the monitoring, enforcement and repercussions of these measures are also found in this document.[70] The repercussions for not complying with the Standard Conditions, as identified in Article 7 *Supervision and Management*, include:

1. *New, renovation and expansion of photovoltaic manufacturing enterprises and projects shall comply with the requirements of the Standard Conditions.*
2. *Existing photovoltaic manufacturing enterprises and projects shall comply with the requirements of the Standard Conditions. Enterprises or projects that fail to comply shall, according to the requirement of industry transformation and upgrading and under the guidance of national industrial policies, reach the requirements of the Standard Conditions as soon as possible by merger and reorganization or technical transformation.*
3. *Investment in, land supplies and environment assessment, energy conservation assessment, quality supervision, safety regulation, credit granting for photovoltaic manufacturing enterprises and projects shall be subject to the Standard Conditions. Enterprises and projects that fail to comply with the Standard Conditions shall not be entitled to policy supports.*

3.1.6 Conclusion

China's legislature, the National People's Congress, is the supreme or overarching legislative authority in the GOC. It is reasonable to assume that once the National People's Congress endorsed the overarching 12th Five-Year Plan to cover the period 2011-2015, on 14 March 2011, this required *"each responsible agency to take action within its jurisdiction as appropriate to effect implementation"* which would have

[68] CBSA Dumping Exhibit 106 (NC) – Response to Section 20 RFI – Government of China – p. 450.
[69] CBSA Dumping Exhibit 106 (NC) – Response to Section 20 RFI – Government of China – p. 451.
[70] CBSA Dumping Exhibit 106 (NC) – Response to Section 20 RFI – Government of China – p. 457.

affected market outcomes within the investigation period. The development of a sector plan for example by MIIT, a responsible government agency, is consistent with this prediction. The MIIT is one of the responsible agencies for implementing policy on the Solar industry. In turn as we have seen the MIIT translated the overarching NPC-12-5YP endorsed by the National Peoples Congress (NPC) in March 2011 into the *12-5YP-SPVI* on February 24, 2012 or 11 months later. The *12-5YP-SPVI* itself further notes it was compiled *"According to the requirements of the "Industrial Transformation and Upgrading Plan for 2011-2015," the "12th Five-Year Plan for Information Industry"* and the *"12th Five-Year Plan for Electronic Information Manufacturing Industry"*.[71] The existence of all these related and mutually supporting sector plans all clearly based on the overarching National Legislatures NPC-5YP is then further evidence that responsible agencies were taking delegated action within their jurisdiction over time as appropriate to effect implementation of the National NPC-5YP. Thus the National NPC-5YP and the sector plans are directly relevant to assessing policy measures that might distort prices to the extent that they were not substantially the same as they would be in a competitive market in the domestic PVMP market in China.

At this point we are no longer looking for evidence that the GOC influenced the solar PV industry during the investigation period, but rather evidence that would refute that proposition. In short it is reasonable to say the burden of proof has shifted. There is sufficient evidence in the 5YP of the National Legislature that lower levels of Government were being directed to intervene substantially in the solar PV industry, and then further evidence in the *5YP-SPVI* developed by the responsible agency for implementing the policy that there were policy measures that were going to be used to implement them. As we have further seen, there were additional specific and significant policy measures mentioned in the *5YP-SPVI*. To quote from the *5YP-SPVI:*

i) section VI a) mentions "*policies in the areas of industry, taxation, and finance"*
ii) section VI b) further identifies planned affirmative actions, and enforcement measures such as *"take measures to strengthen industry administration, ...standardize the development of China's PV industry, ... guide local governments ... Prompt relevant departments' ... Enterprises that ... disrupt normal order of market competition should be penalized and rectified in accordance with relevant regulations."*
iii) section VI d) indeed mentions a major specific fiscal programme *"... Continue to implement the "Golden Sun Project" and other supporting measures"*
iv) section VI (d) further identifies specific policy measures *"Through reasonable tariffs, moderate financial subsidies, and active financial support, actively expand the domestic PV market."*
v) Section VI f) mentions specific plans to *"Actively participate in the establishment of international standards and establish and improve product inspection, certification, and monitoring systems. Promote the development of industry standardization."*
vi) Section VI g) further mentions other specific instruments such as *"improve export risk insurance mechanisms"*

[71] Dumping Exhibit 106 (NC) – Response to CBSA Section 20 RFI – Government of China – p. 301.

The above statements are all consistent with the prediction that the GOC during the investigation period engaged in specific interventions to influence the solar PV market. To focus on one example, take the fiscal programme identified in section VI d) in the statement "... *Continue to implement the "Golden Sun Project"...*". The Golden Sun programme involved a major fiscal intervention in the solar PV industry, which the 5YP-SPVI clearly identified would be continued. The Golden Sun project involved specific Government responsibilities and affirmative action. The 5YP-SPVI not only records a decision to continue to implement the "Golden Sun Project" but also *"other supporting measures*" and as we outline below these specific and major interventions significantly affect the PVMP market. The Golden Sun project is thus a specific example of *"policies in the areas of industry, taxation, and finance"* involving government responsibility and affirmative action in the form of fiscal support being offered for solar PV installations, government regulation of grid access, and state owned enterprises involvement in providing grid-related network services. This implies specific forms of government responsibility and affirmative action were identified in the *5YP-SPVI.* Taking the Golden Sun project alone it is clearly significant as outlined above.

3.2 Upstream Input Market

In this section we examine the nature and extent of GOC interventions in input or upstream markets to the PVMP in particular photovoltaic cells which constitute 70% of the cost of the manufacture of PVMP. We shall also discuss the polysilicon market.

3.2.1 Photovoltaic Cells Market

The *12th Five Year Plan for the Solar Photovoltaic Industry* includes goals and directives which relate to the production of photovoltaic cells. These directives include:

- Enhancement of cell conversion efficiency rates;
- Endeavor to reduce the costs of photovoltaic power generation through the mass production of high-purity silicon materials, enhancement of cell conversion efficiency rates, localization of production equipment manufacturing, R&D of new types of cells and raw materials, and system integration;
- By 2015, the conversion efficiency for monocrystal silicon cells will reach 21%, that of polysilicon cells will reach 19%, and that of amorphous silicon thin-film cells will reach 12%;
- Polysilicon, solar cells, and other products can meet the installed capacity requirements set by the national development plans for renewable energy, and can also meet demand in the international market;
- Support will be provided to major enterprises to grow stronger so that by 2015 leading solar cell enterprises will reach the 5GW level, and major enterprises will reach the 1 GW level.

The document *Standard Conditions for Photovoltaic Manufacturing Industry* also includes directives respecting the production of photovoltaic cells. The document outlines minimum production capacity requirements, and minimum product efficiency requirements for photovoltaic cell manufacturers and new market entrants.

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This information serves to demonstrate extensive GOC interventions in the photovoltaic cell industry in China. It also provides evidence that the GOC attempts to influence the structure and composition of the domestic photovoltaic cell industry by providing support for leading enterprises. Further, the GOC has set clear economic objectives which require domestic photovoltaic cell production in sufficient quantities to meet the domestic installed capacity requirements also set by the GOC.

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The photovoltaic cells market policies outlined above then, by offsetting or reducing the costs of making photovoltaic cells, may have a "flow on" to domestic PVMP prices. Whether photovoltaic cells (PVC) producers would in fact pass on a reduction in PVC costs to PVMP makers, thereby leading to a reduction in the price of PVMP depends on several factors we discuss further later including.

(i) the share of PVC costs in total costs of PVMP production;

(ii) the margin on PVMP.

(iii) the degree of competition in PVMP products, which affects the degree to which producers are able to retain any fiscal support in their margins.

(iv) the costs of other factors of production (labour, frames etc.)

Focusing on the share of PVC in total costs of production, obviously the effect of any fiscal support to PVC on final PVMP prices however will be greater, the greater the share of PVC in the total cost of PVMP. This suggests a formula for flow on effects below. Let PVC share of the cost of PVMP be represented by s_{pvc}. Assuming a constant margin for production, the degree of flow on (τ_{pvc}) in this case can be expressed as:

$$\tau_{pvc} = \frac{\varpi}{\varpi + |\gamma|} \times s_{pvc}$$

where:

ϖ = price elasticity of supply for PVMP
$|\gamma|$ = price elasticity of demand for PVMP

Exporters data suggests the share of PVC costs in PVMP, s_{pvc} may be around 60%. If that is true already the effect of a 10% fall in PVC prices could translate to a 6% fall in the price of PVMP depending on $|\gamma|$ and ϖ.

This leads to interest in factors on affecting $|\gamma|$ and ϖ. In particular factors which make demand more elastic, and supply less elastic will lead to lower flow on of the 6% effect on removal of the fiscal support on PVC in China.

3.2.2 Polysilicon Market

Polysilicon is an input used in the production of photovoltaic cells and constitutes a significant portion of the cost of production of PV cells. Thus interventions in the polysilicon market may be expected to flow through and affect the PV cells market and, given PV cells are approximately 60% of the costs of PVMP, ultimately affect the PVMP market price.

The *12th Five Year Plan for the Solar Photovoltaic Industry* includes the following goals and directives with respect to the polysilicon industry:

- Endeavor to reduce the costs of photovoltaic power generation through the mass production of high-purity silicon materials;
- Support will be provided to major enterprises to grow stronger so that by 2015, leading polysilicon enterprises will reach 50,000 metric tons per year, and major enterprises will reach 10,000 metric tons per year;
- Polysilicon, solar cells, and other products can meet the installed capacity requirements set by the national development plans for renewable energy, and can also meet demand in the international market.

The State Council issued the "*Notice of Several Opinions on Curbing Overcapacities and Redundant Constructions in Certain Industries and Guiding the Healthy Development of Industries*" in 2009 which prescribes specific policy directives to control the expansion of production capacity of polysilicon.[72] The Notice is directed *"To the people's governments of all provinces, autonomous regions and municipalities directly under the Central Government and the ministries, commissions and offices directly under the State Council":*

> **Article 1.** ***"The overcapacities and redundant constructions in certain industries require serious attention*** *.... The problem of overcapacities and redundant constructions is still very prominent in many sectors with some even aggravating. The following issues are of particular concern: Not only traditional industries with overcapacities, such as the iron and steel industry and the cement industry, are still expanding blindly, emerging industries such as wind power equipment and polysilicon are also showing the tendency of redundant constructions. The phenomena of examination and approval in violation of laws and regulations, construction before approval, construction alongside with approval have again gained ground in some regions."*
>
> **Article 1(5).** ***"Polysilicon.*** *Polysilicon, the basic material in the information industry and the photovoltaic industry, belongs to products of high energy consumption and high pollution. The integrated power consumption of the whole process from the production of industrial silicon to the production of solar cells is about 2.2 million kWh/MW. The production capacity of polysilicon of our country in 2008 was 20,000 tons with the output being around 4000 tons. The production capacity under construction being around*

[72] Westlaw Reference: Promulgating Institution: State Council: Document Number: Guo Fa (2009) No. 38; Promulgating Date: 09/26/2009 Effective Date: 09/26/2009. See also CBSA Dumping Exhibit 106 (NC) – Response to Section 20 RFI – Government of China – pp. 82-95.

80,000 tons, there has already been marked overcapacity. The photovoltaic power generation market of our country is developing very slowly, with 98% of the domestic solar cells used for export, which means exporting large amount of energy of which the country is in serious shortage."

Article 2(2). "Industrial policy orientations *....*
Polysilicon: Study the policies to expand the consumption of the domestic photovoltaic market, support the production of solar cells made of domestic polysilicon materials and focus on meeting the domestic demand while taking into account the international market. Strictly control the development of new polysilicon projects in regions with energy shortage and high electricity prices. Polysilicon projects which are lacking in ancillary comprehensive utilization and which are not in compliance with environmental protection standards shall not be approved or filed; encourage polysilicon production enterprises to strengthen alliance and cooperation with downstream solar cell manufacturers to extend the industrial chain. The scale of new polysilicon projects shall be larger than 3000 tons/year, and shall cover an area of less than 6 ha/thousand tons of polysilicon. The restoration power consumption of polysilicon of solar energy grade shall be less than 60 kWh/kg, and the recovery utilization rate of restored exhausts shall be no less than 98.5% for tetrachloro silicon, 99% for hydrogen chloride and 99% for hydrogen; guide and support polysilicon enterprises to realize joint operation among polysilicon, power plants and the chemical industry in various forms, support the technological development of energy-saving and environmental-friendly polysilicon of solar energy grade to reduce production costs. Polysilicon production capacities with an integrated power consumption of more than 200 kWh/ kg shall be phased out by 2011."

The *Standards for the Polysilicon Industry Access*[73] was promulgated by the Ministry of Industry and Information Technology, the National Development and Reform Commission and the Ministry of Environmental Protection on 31 December 2010, the introduction states *"In order to ... resolutely restrict redundant construction and excess capacity of the industry"*. The promulgation thus identifies a number of conditions which restrict access to the polysilicon industry including capacity restrictions and investment and technology requirements.

The implication of these interventions and policies is that the polysilicon market had reached a situation of excess supply or disequilibrium associated with the extent of GOC interventions causing a major distortion to the market. Such excess supply and excess capacity would be very likely to cause excessively low market prices.

3.3 Downstream Markets

As noted earlier the customers on the demand side of the PVMP are typically buying PVMP because they are involved in downstream energy markets either on the supply side or demand side. The downstream energy markets are often said to break down into the residential and commercial sector.

[73] Westlaw China Reference: Promulgating Institution: Ministry of Industry and Information; National Development and Reform Commission; Ministry of Environmental Protection Document Number: Gong Lian Dian Zi [2010] No. 137 Promulgating Date: 12/31/2010 Effective Date:12/31/2010 Validity Status: Valid.

In the residential market households may be trying to make use of a form of self help or self sufficiency that the opportunity that distributed or decentralised energy distribution provides. Having said that, in China a large part of the population has now moved to cities where they can also connect to the general power grid or a micro grid. Moreover, and for reasons noted already, the reality is that the relevant household demand for PVMP generated power or energy in the residential sector will also be integrated into the wider power network and will require the ability to connect their PVMP power at home to the grid, as solar power could not be cost-effectively stored for night use in the investigation period. That part of China's population in remote areas or on low incomes who do not connect to the grid, will also probably not represent a significant part of the PVMP market. Everything then leads to the large power companies engaged in network management and power generation on the grid.

The same is true for the small scale commercial sector. For the large commercial sector they may be significant players on the demand side, however they will also need to be able to connect to the grid. For them too, everything then leads to the large power companies engaged in network management and power generation on the grid.

Thus one can simplify the analysis. The key players in the markets downstream to PVMP market are actually on the supply side of downstream energy markets, namely the large energy companies. In this regard the GOC thus exerts significant influence on the domestic photovoltaic module industry at the customer level through state ownership of the electricity sector.

It also exerts major indirect influence through its role in regulating and subsidising the downstream energy markets, for example through the restrictions it imposes on new entrants to the electricity market, and restraints on the merger and acquisition of existing power generation companies, and regulation of electricity prices in China. It also does so through subsidies and by imposing requirements for installation of solar generation capacity. The GOC thus influences the domestic price of PVMP through a combination of measures which impact the demand for PVMP and solar generated electricity. These measures include plans and policies which set specific targets for solar electricity generation capacity and feed-in-tariffs which influence the price of solar generated electricity.

3.3.1 NDRC Solar PV Price Regulation

The National Development Reform Commission (NDRC) on July 24 2011 issued price regulations for the solar PV electricity price in *"The Notice of the National Development and Reform Commission on Improving the Policies for Solar PV Electricity Price"*.[74] This Notice was directed *"To the development and reform commissions and price bureaus of all provinces, autonomous regions and municipalities directly under the Central Government"*. With a view to standardizing the administration of solar PV electricity price the National Development and Reform Commission (NDRC) decided to reduce the benchmark price uniformly fixed by about 13 %, from RMB 1.15 per kilowatt hour (including taxes, the same below) to RMB 1.00 per kilowatt hour for new solar PV projects from July 2011 for projects *"approved to be constructed on and after July 1, 2011 as well as those approved prior to July 1, 2011 but not completed and put into operation by December 31,*

[74] Westlaw Reference: Promulgating Institution: National Development Reform Commission: Document Number: Fa Gai Jia Ge (2011) No 1594; Promulgating Date: 07/24/2011; Effective Date: 07/24/2011.

2011".

The full text of the NDRC *"Notice of the National Development and Reform Commission on Improving the Policies for Solar PV Electricity Price"* reads:

> "…the National Development and Reform Commission (NDRC) has decided to improve the policies for solar PV electricity price, and hereby notifies the relevant matters as follows:
>
> *Article 1. Formulating the unified national benchmark price of solar PV projects.*
> 1. Exercising the unified national benchmark price of non-bidding solar PV projects based on the average social investment and operating cost, by reference to the bidding prices of solar PV stations, and in light of the actualities of China's solar resources.
>
> (ii) For solar PV projects approved to be constructed prior to July 1, 2011, completed and scheduled to be put into operation prior to December 31, 2011, the price of which has not been determined by NDRC, the solar PV electricity price shall be uniformly fixed at RMB 1.15 per kilowatt hour (including taxes, the same below).
>
> (ii) For solar PV projects approved to be constructed on and after July 1, 2011, as well as those approved prior to July 1, 2011 but not completed and put into operation by December 31, 2011, all provinces (autonomous regions, municipalities directly under the Central Government) other than Tibet, which shall still exercise the price of RMB 1.15 per kilowatt hour, shall exercise the price of RMB 1 per kilowatt hour. In the future, NDRC will make appropriate adjustments based on factors such as investment cost changes and technical progress.
>
> 2. For solar PV projects whose owners are determined through concession bidding, the solar PV electricity price shall be subject to the bid-winning price, which shall not be higher that the benchmark price of solar PV projects.
>
> 3. For solar PV projects subsidized by the central finance, the solar PV electricity price shall be subject to the benchmark price of power generation of local desulfurization coal-fired units.
>
> 4. The difference between the price of power generation of solar PV projects and the benchmark price of power generation of local desulfurization coal-fired units shall still be solved by collecting the price of power generated by renewable energy nationwide in accordance with the Trial Measures for Administration of Allocation of Prices and Costs of Power Generated by Renewable Energy (Fa Gai Jia Ge [2006] No. 7).

Economic Implications for the Domestic Market in China for PVMP

The National Development and Reform Commission (NDRC) decision for example to reduce the benchmark price uniformly fixed for solar PV electricity by about 13 %, could have a significant effect on the market for PVMP upstream. The profit from selling PV generated electricity helps to recover the purchase of PVMP over time. A 13% fall in prices for PV electricity, holding other things constant, could thus wipe out any profit, and significantly depress demand for PVMP, thereby lowering their price.

3.3.2 MIIT 12th Five year Plan on Solar Power Development

The *12th Five-Year Plan on Solar Power Development* dicussed earlier identifies a number of main tasks to be accomplished over the twelfth five year period. These tasks include:

- Vigorously promote distributed solar photovoltaic power generation - during the "Twelfth five-year" period, installed gross capacity shall reach 10 million KW or more.
- Construct new energy demonstration city - during the "Twelfth five-year" period, construct 100 new energy demonstration city and 1000 industrial development parks.
- Promote the healthy development of the photovoltaic manufacturing industry. Expand domestic photovoltaic products market. Promote the structure optimization of the PV industry. Encourage enterprise merger and reorganization according to market rules. Close down outdated production facilities.

Further, under the heading *"Investment estimation and the social environment impact analysis"*, the document identifies a specific investment amount required to achieve these objectives, stating: *"Investment estimation: The total investment demand of about 250 billion Yuan"*.

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The GOC further influences the domestic price of photovoltaic modules through a combination of measures which impact the demand for photovoltaic modules and solar generated electricity. These measures include plans and policies which set specific targets for solar electricity generation capacity and feed-in tariffs which influence the price of solar generated electricity.

The decisions in the *12th Five-Year Plan on Solar Power Development* to expand capacity with installed gross capacity of 10 million KW or more, and to drive down costs, can be expected to have led to excess solar power capacity and production and lower prices. It appears likely then that excess capacity and downward pressure on prices existed througout the investigation period, and this is supported by the State Council's opinion that there was dire excess capacity in the solar sector.

3.3.3 State Council Directive On the Photovoltaic Industry

The document refered to earlier the *"Several Opinions of the State Council on Promoting the Healthy Development of Photovoltaic Industry"* includes directives which further demonstrate the GOC's influence on the demand for photovoltaic modules and panels. In the section titled Development Goals, the document states

> *"From 2013 to 2015, the average annual increase in installed photovoltaic power generation capacity will be kept at about 10 million KW, and the total installed capacity nationwide by the year 2015 will be above 35 million KW".*[75]

There is also evidence of preferential tax policies which may influence the purchase of photovoltaic modules and panels. *The Notice of the Ministry of Finance and the*

[75] The CBSA finds that this statement demonstrates the GOCs intention to control the demand for photovoltaic modules and panels in China.

State Administration of Taxation on Value-Added Tax Policies Applicable to Photovoltaic Power Generation [76] outlines changes "to the value-added tax (VAT) policies applicable to photovoltaic power generation according to replies from the State Council." The Notice states that:

> *"With a view to encouraging the use of solar energy in power generation, and promoting the healthy development of related industries…… From October 1, 2013 to December 31, 2015, taxpayers that sell electric power products manufactured by themselves with solar energy shall enjoy the policy of immediate refund of 50% of the VAT levied."*

The Notice is addressed *"To the finance departments (bureaus) and offices of the State Administration of Taxation of all provinces, autonomous regions, municipalities directly under the Central Government and cities separately designated in the State plan"*. It is designed *"With a view to encouraging the use of solar energy in power generation, and promoting the healthy development of related industries"*

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The policies and plans identified above demonstrate the level of the GOC's influence on all aspects of the photovoltaic module industry. As photovoltaic modules are a key component in solar power generation, government influence on the price of solar generated electricity can significantly impact the domestic demand and price of photovoltaic modules.

3.3.4 GOC Ownership of Electricity Companies

As noted earlier the substantial monopsony and monopoly power of downstream electricity companies is likely to lead to depressed feed-in tarrifs for solar power, and as a result depressed PVMP prices upstream. There is moreover extensive state ownership of electricity companies in China, which long predates, and continues throughout the investigation period.[77] State Owned Enterprises (SOE) are generally known to enjoy privileges and immunities that are not available to their privately-owned competitors, giving them greater competitive edge over their rivals, and enhancing their market power. Such advantages are not necessarily based on better performance, superior efficiency, better technology or superior management skills but are merely government-created and would further serve to distort competition in the market.

4.0 Evaluating the Combined Effect of Distortions on the Market

As noted earlier, an underlying feature of the goods under investigation is that they are in the penultimate part of the supply chain (the ultimate part being the energy market). The goods are made up of components produced in upstream markets which themselves could be subject to intervention of different forms. As discussed earlier, the GOC intervenes in various parts of the supply chain and in many forms through:

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[76] Westlaw China Reference: Promulgating Institution:Ministry of Finance; State Administration of Taxation Document Number: Cai Shui [2013] No.66 Promulgating Date: 09/23/2013 Effective Date: 10/01/2013

[77] The five major Chinese electricity companies are all state owned enterprises, directly administered by the State-owned Supervision and Administration Commission of the State Council (SASAC). See: http://www.sasac.gov.cn/n1180/n1226/n2425/index.html for list of companies under control of the State Council. These companies own listed subsidiaries, but see recent story "China SOE's restructuring leaves state ownership intact" http://www.ft.com/cms/s/0/902826f4-c878-11e4-8617-00144feab7de.html#axzz3fkLv7Tg8. Also see https://en.wikipedia.org/wiki/Electricity_sector_in_China#Companies

(i) Fiscal intervention – expenditure, or tax related;
(ii) Regulation of domestic markets – including price, market entry, competition, standards etc;
(iii) Trade Related Regulation – including exports and imports; and
(iv) Other interventions affecting prices or costs – including state ownership of enterprises

Each of these types of interventions has economic consequences in terms of their effects on prices and outputs. Hence, intervention in the market for an upstream input that distorts prices and output will likely cascade down the supply chain in terms of distorted input prices for the final good, i.e. such distortions in the upstream markets will have a flow on effect on the downstream markets. However, the degree of flow on to the price of the final product will not be uniform across all elements of the upstream market. This will depend to a large extent on the competing uses for the various inputs that enter the production of the downstream market. As an example, PV cells, a key ingredient of PVMP, are produced solely for PVMP. Targeted intervention in the form of a producer fiscal support for that industry is likely to be effective at influencing price and output of PV cells.

The ultimate aim of the GOC is to increase the supply of solar electricity by lowering the cost of producing it, and hence targeted intervention in different parts of the supply chain and in different form can achieve these objectives.

It is not possible to assess all types of intervention – each of these will have different effects on the final price and output. However, basic economic principles offer some useful insights on a common type of intervention, a producer fiscal support. We analyse the effect of a fiscal intervention such as a producer fiscal support in the market for an upstream product and its effect on the downstream market. Our general conclusion is that as a result of multiple and significant interventions, the PVMP market in China is very likely to have been significantly distorted relative to a competitive market.

4.1 Fiscal Intervention

The Golden Sun project is a good example of fiscal support in key parts of the supply chains of the PVMP industry. It is a combination of financial assistance, technological support and market approaches *"used to accelerate the industrialization and development of the domestic photovoltaic power industry, and to promote the progress of photovoltaic (PV) power generation technology"*. Financial assistance from this program is not only for constructing power plants but includes support for the *"development and industrialization of key PV technologies, including silicon purification, control inverters, and other key network technologies."* Thus, funds from this program are not only provided for the construction of power generation projects, but they are also provided to develop photovoltaic technologies, such as solar cells and modules.

The financial assistance to the Golden Sun program can be interpreted as a producer subsidy which reduces the cost of inputs, and can be analysed in terms of its effects on demand, supply and price. Below, we analyse the effect of this fiscal support in one part of the supply chain, namely photovoltaic cells, which we noted earlier, is a

large component of the cost of PVMP. The other areas of fiscal support can be analysed in a similar way. For example, financial assistance towards Research and Development expenditure (with a view to developing photovoltaic technologies) can also be interpreted as a form of producer subsidy, which reduces input costs and shifts the supply curve rightward, causing a fall in price, all other things equal.

4.1.1 Fiscal Support in an Upstream Market – Photovoltaic Cells

Economic analysis suggests that the effect of a fiscal support to producers is to expand output and reduce the price of the good under consideration. Figure 2 illustrates the effect of the simple case of fiscal support on a per unit basis of RMB 100 on the price of photovoltaic cells.[78]

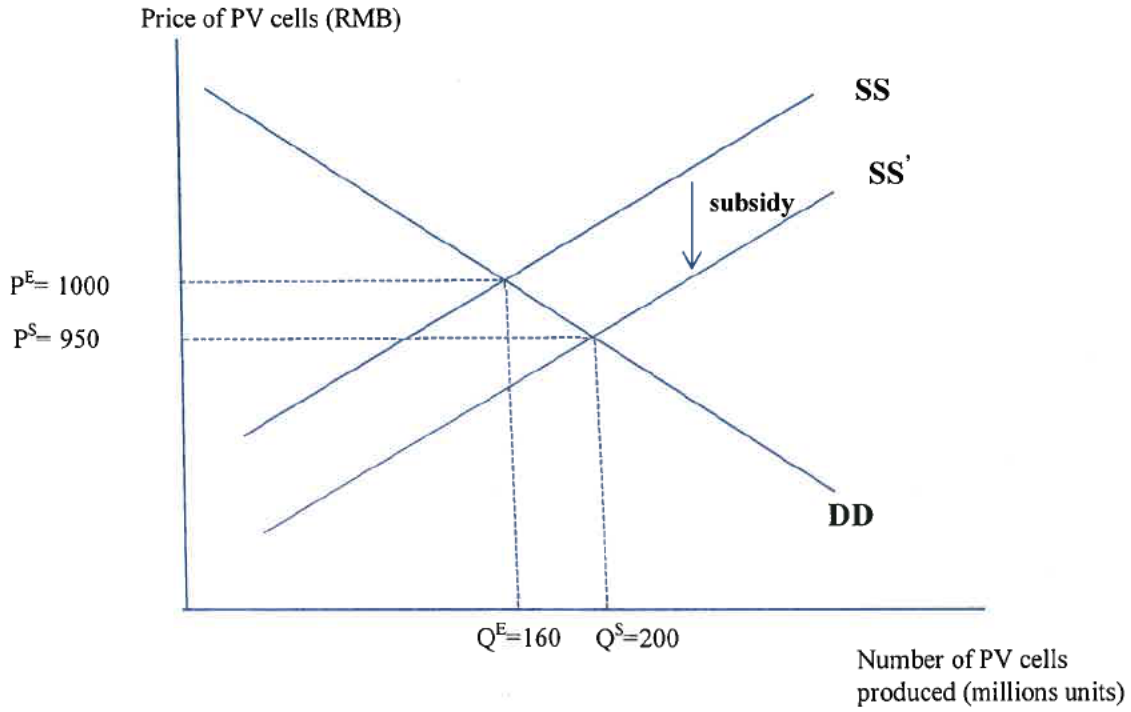

Figure 2: Impact of Fiscal Support on Market Price – PV Cells

The supply curve is upward sloping indicating that as price increases quantity supplied increases. The demand curve is downward sloping, indication that as price increases, quantity demanded falls. The equilibrium price in the market is found where demand equals supply. In the absence of the fiscal support, equilibrium is assumed to occur at the intersection of the demand curve DD and supply curve SS where price is P^E= RMB 1000 and the quantity traded is Q^E=160 million units.

The effect of the fiscal support is to move the supply curve down by RMB 100, indicating that with a fiscal support more is supplied at any given price. The fiscal support of RMB 100 shifts supply curve outwards and vertically by RMB 100. The equilibrium price then falls by RMB 50 from RMB 1000 to RMB 950, after an increase of production from Q=160 to Q=200.

[78] The numbers used are for illustration purposes only.

Flow on of the fiscal support

In this example, a fiscal support of RMB 100 per unit of PV cell flows on to a final price reduction of RMB 50, implying a flow on rate of 50% – with both suppliers and consumers sharing in the fiscal support. The extent of any price reduction however clearly depends on the slope of the demand and supply curves. From the above diagram, it is clear that if the demand curve is downward sloping demand (elasticity is negative) and the supply upward sloping supply (elasticity positive), the flow on rate will lie between zero and one – in this case, 0.5.

If instead firms compete away the fiscal support fully then the supply curve is horizontal (perfectly elastic) and there will be full flow on of the fiscal support to consumer price. Similarly, there will be full flow on if consumers are unresponsive to price changes, or demand is vertical (perfectly inelastic). If on the other hand consumers are extremely responsive to price changes, so much so that demand is horizontal (perfectly elastic) the flow on rate is zero. Between these extremes, the widespread rule of thumb is that the more inelastic side of the market enjoys a greater share of the fiscal support.

The price reduction of RMB 50 thus depends on the price elasticity of supply of ω, which measures the percentage change in quantity supplied that occurs in response to a percentage change in price, and the price elasticity of demand $|\epsilon|$ which measures the percentage change in quantity demanded that occurs in response to a percentage change in price In particular it depends on the ratio of ω to $(|\epsilon| + \omega)$, the flow on rate or $\left(\frac{\omega}{\omega+|\epsilon|}\right)$.

This provides a basis for first estimating the maximum possible effect of the fiscal support on one input in the downstream market on the price of PV modules or panels in the downstream market.

Table 5 below identifies the elasticities of demand and supply associated with the extreme outcomes where flow on is either 0% or 100%. As shown in the table the flow on rate will be zero if either demand is perfectly elastic ($|\varepsilon|=\infty$, horizontal demand), or supply is perfectly inelastic ($\omega = 0$, vertical supply). At the other extreme the flow on rate will be 100% if demand is perfectly inelastic ($\varepsilon = 0$ vertical demand) or supply is perfectly elastic ($\omega=\infty$, horizontal supply)

Table 5: Flow on Rate and Elasticities

Flow on Rate %	Demand Elasticity	Supply Elasticity
Flow on Rate 0%	perfectly elastic ($\|\varepsilon\|=\infty$, horizontal demand)	perfectly inelastic ($\omega = 0$, vertical supply
Flow on Rate 100%	perfectly inelastic ($\varepsilon = 0$ vertical demand)	perfectly elastic ($\omega=\infty$, horizontal supply)

Of interest then are factors which may limit the flow on of the producer fiscal support to the input price. In particular factors which make demand more elastic, and supply less elastic will lead to lower flow on of the fiscal support.

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Flow on of the fiscal support to downstream market – PVMP

The reduction in the price of PV cells discussed above is likely to have a flow on effect to domestic PVMP prices although the degree of flow on would depend on the ratio of elasticity of supply and demand for PV cells. Import policies and the market structure for PV cells will likely impact on these elasticity values.

Even if the flow on rate is at 100%, i.e. the producers pass on the fiscal support to consumers in terms of an equivalent reduction in price, whether the PVMP producers will pass on the reduction in costs fully onto their prices will depend on several factors such as:

(i) the share of PV cells costs in total costs of PVMP production;

(ii) the margin on PVMP;

(iii) the degree of competition in PVMP products, which affects the degree to which producers are able to retain any fiscal support in their margins;

(iv) the costs of other factors of production (labour, frames etc.)

Focusing on the share of PV cells in total costs of production, the effect of any fiscal support to PV cells on final PVMP prices will be greater, the greater the share of PV cells in the total cost of PVMP. This suggests a formula for flow on effects below. Let the PV cells share of the cost of PVMP be represented by s_{pvc}. Assuming a constant margin for production, the degree of flow on (τ_{pvc}) in this case can be expressed as:

$$\tau_{pvc} = \frac{\varpi}{\varpi + |\gamma|} \times s_{pvc}$$

where:

ϖ = price elasticity of supply for PVMP
$|\gamma|$ = price elasticity of demand for PVMP

The flow-on formula illustrated above illustrates the case of perfect competition in the market for the good under consideration. In the case of a monopoly, the degree of flow-on, taking into account the share of the upstream input into the downstream costs of production will be:

$$\tau_{pvc} = \frac{\text{slope of demand}}{\text{slope of marginal revenue}} \times s_{pvc}$$

The above discussion assumes vertical separation of firms, i.e. firms producing PV cells are not related to firms producing PVMP. Vertically integrated firms, e.g. PVMP producers manufacturing their own PV cells, give rise to an effective upstream flow on rate of 100%, i.e. the upstream division of the integrated firm flows on inputs at marginal cost and so no upstream mark-up is applied.

4.1.2 Fiscal Support: 50% VAT Refund on Purchase of PVMP for Solar Electricity Generation

The Notice of the Ministry of Finance and the State Administration of Taxation on Value-Added Tax Policies Applicable to Photovoltaic Power Generation[79] outlines changes *"to the value-added tax (VAT) policies applicable to photovoltaic power generation according to replies from the State Council"* as follows:

> *"From October 1, 2013 to December 31, 2015, taxpayers that sell electric power products manufactured by themselves with solar energy shall enjoy the policy of immediate refund of 50% of the VAT levied."*

In other words, users who buy PVMP products to generate their own electricity receive a refund of 50% on the VAT paid for such products. Consider the impact of this fiscal intervention on the market for PVMP in terms of a standard demand and supply analysis. The demand curve DD represents the demand for PVMP across all consumer groups. SS represents the supply curve of PVMP. Assuming all else equal, the 50% refund is equivalent to a 50% VAT cut, which translates into a rightward shift in the supply curve to SS'. This will result in a fall in the price of PVMP from an assumed initial RMB 1200 to RMB 1100. Note that because this is an advalorem tax, the shift in the supply curve will not be parallel. While in this example we used a 8% fall in price, in practice, the degree of price fall will depend on the price elasticity of demand and the elasticity of supply for PVMP, and these will determine which party enjoys the tax cut more. In the diagram below, it is clear that the effect of the 50% VAT refund is to lower price and increase the quantity demanded of PVMPs. This ultimately leads to a higher use of PV solar electricity.

[79] Westlaw China Reference: Promulgating Institution:Ministry of Finance; State Administration of Taxation Document Number: Cai Shui [2013] No.66 Promulgating Date: 09/23/2013 Effective Date: 10/01/2013

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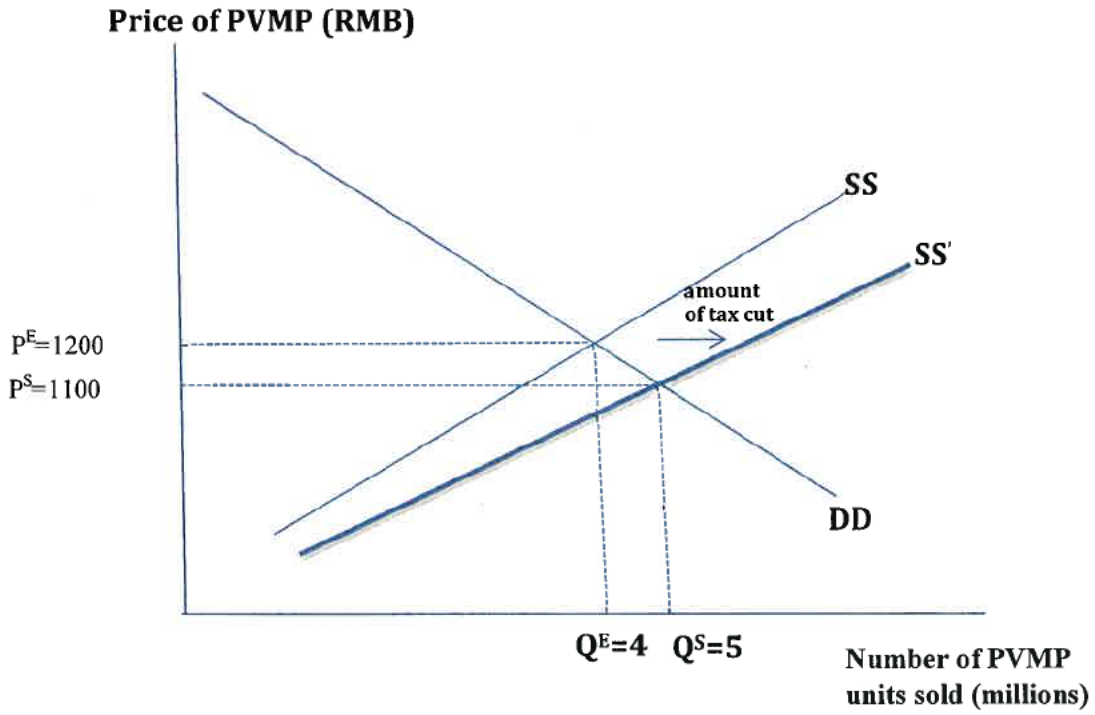

Figure 3: Impact of VAT Refund on PVMP Market Price

4.2 Regulation of Domestic Markets – Price Control in Downstream Market

The GOC further influences the domestic price of photovoltaic modules through a combination of measures which impact the demand for photovoltaic modules and solar generated electricity. These measures include plans and policies which set specific targets for solar electricity generation capacity and feed-in-tariffs which influence the price of solar generated electricity.

Government Regulation – Price Ceiling on Solar Electricity

The National Development and Reform Commission (NDRC) decision for example to reduce the benchmark price uniformly fixed for solar PV electricity by about 13 %, would have had a significant effect on the market for PVMP upstream. The profit from selling PV generated electricity helps to pay for the purchase of PVMP. A 13% fall in prices for PV electricity could thus wipe out any profit, and significantly depress demand for PVMP. In this section we outline the nature of the effect in two steps. First we start the analysis with the effect of the government's policy to reduce solar PV electricity price by 13% (from RMB 1.15 per kilowatt hour to RMB 1 per kilowatt hour) on the *downstream* PV electicity market, and then second we trace the *flow on* distortionary efect this has on the *upstream* PVMP market.

The first and direct effect of the government's policy to reduce solar PV electricity price by 13% can be discussed in terms of a price ceiling, as in the figure 4 below, where solar electricity production is mesured on the horizontal axis, and the price of solar electricity is measured on the vertical axis. As noted earlier, in the energy

market, there are three types of consumers. One group uses PVMP to generate their own solar PV electricity, consumes part of it and feeds the surplus into the grid. The second group uses PVMP to generate their own solar electricity and consume all of it, meeting any shortage by drawing on power from the grid. The third group simply consumes electricity directly from the grid and is not affected by the various forms on intervention in the PV solar electricity market. In this example, we are referring to the first group which supplies surplus electricity into the grid. Hence, the supply curve SS in figure 4 refers to that first group. The demand curve DD in figure 4 refers to those large companies that provide the facilities for households to connect to the grid network and feed in any surplus solar PV energy into the grid. These companies have a downward sloping demand curve for surplus solar PV energy into the grid. In this analysis we assume away for the moment any monopsony or monopoly power of the electricity companies which might otherwise cause distrotions. We recall however that they will pay a lower feed-in rate for solar electricity and resell it to consumers drawing from the grid at a higher price. Hence, reduction in the rate that they have to pay for solar electricity will increase the quantity they demand of it. For illustrative purposes in figure 4 we show initial equilibrium prevailing at a price P^E of RMB 1.15/ kilowatt hour for solar electricity, clearing the local market at quantity Q^E of 5 million watts. At this price of 1.15, the suppliers of PV solar electricity find it profitable to purchase PVMP to produce their own solar electricity and feed the surplus into the grid. Government intervention in the market however then forces the price down to P^S of RMB 1/ kilowatt hour. At this lower feed-in tariff rate, the suppliers of PV electricity cut back on supply to Q^S = 3 million watts as shown in figure 4. This is then the amount of solar electricity produced and sold in the market. This creates a shortage of PV solar electricity in the market as shown by the distance Q^S and Q^D. The reduction in price and of output in the solar electricity market to $P^{S \text{ and}}$ Q^S respectively, other things equal,will cause a flow on distortion upstream in the PVMP market. It will lead to a reduction in the demand for PVMP products which we turn to discuss next.

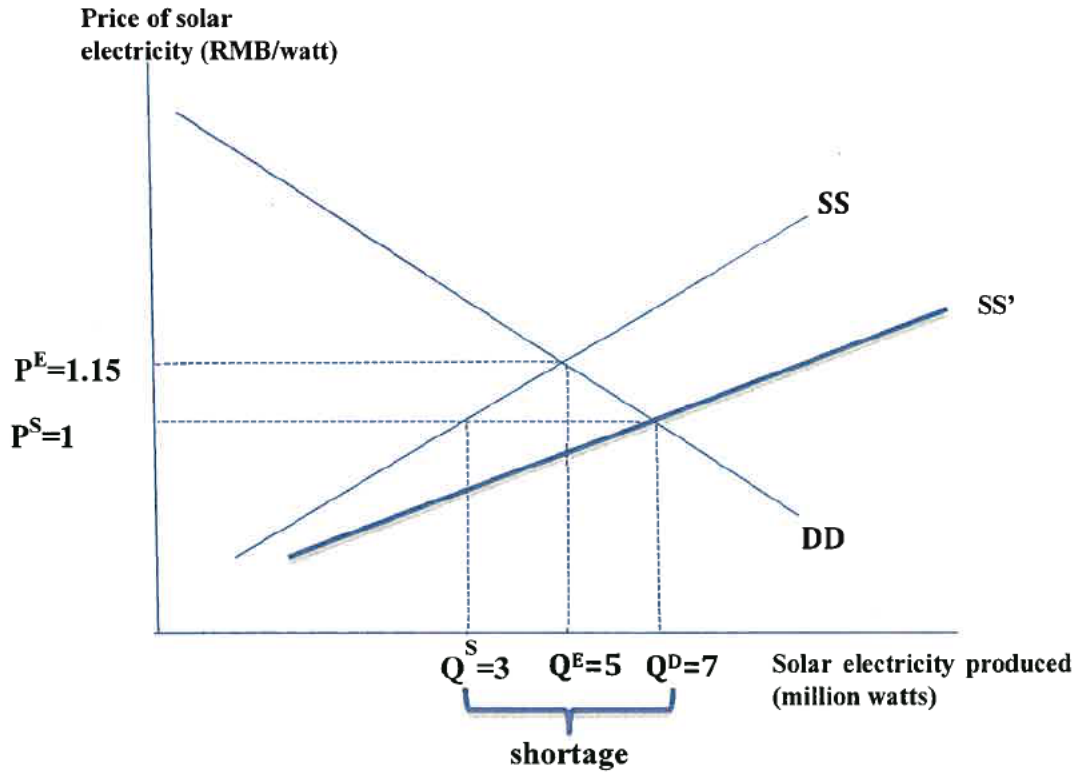

Figure 4: Impact of Price Reduction in Solar Electricity on Market for Solar Electricity

The above figure 4 shows how National Development and Reform Commission (NDRC) decision to reduce the benchmark price uniformly fixed for solar PV electricity by about 13 %, could have a significant distortionary effect on *the market for solar energy*. The point is that this distortion however will have a flow on effect upstream on the PVMP market. The outcome which we turn to now is that prices in the upstream PVMP market will also be distorted, they too will not reflect competitive market outcomes or normal values.

The distortionary effect on the PVMP product market, of the government's policy to reduce solar PV electricity price by 13% (from RMB 1.15 per kilowatt hour to RMB 1 per kilowatt hour) is ilustrated in figure 5 below. In figure 5 the quantity of PVMP suplied and demand is measured on the horizontal axis, and the price of PVMP on the vertical. Initially we show the competitive market, without distortion, with the demand curve DD which refers to the demand for PVMP, while the supply curve SS refers to the supply of PVMP. The key point is that the demand curves position depends on the price of solar electricity downstream. As noted the profit from selling PV generated electricity helps to pay for the purchase of PVMP. A 13% fall in prices for PV electricity could thus wipe out any profit, and significantly depress demand for PVMP.

The effect of the price ceiling downstream in the solar electricity market then is to distort the PVMP market by changing the position of the PVMP demand curve in the upstream PVMP market shown in figure 5 below. As shown for illustrative purposes

the initial feed-in tariff of RMB 1.15/watt supports the demand curve DD, and the PVMP market clears at an equilibrium price of RMB 1200 for PVMP and a quantity of 4 million units of PVMP sold. Government intervention in the downstream market for solar electricity however, forcing prices for solar electricity down by 13%, renders the purchase of PVMP products less profitable at a price of RMB 1200. PVMP users cut back on demand, with the demand curve moving leftwards to DD'. To restore equilibrium, PVMP prices have to also fall down, to RMB 1100, at a new equilibrium quantity of 3 million units sold as shown in figure 5.

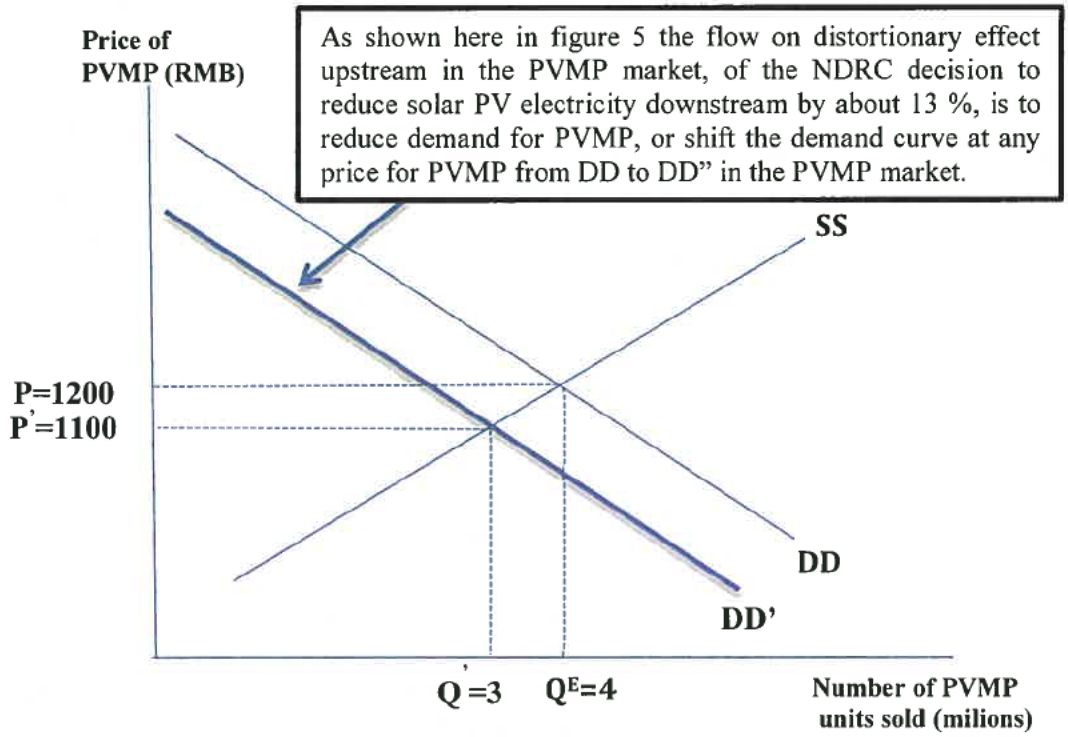

Figure 5: Impact of Price Reduction in Solar Electricity on PVMP Market Price

In conclusion then the National Development and Reform Commission's (NDRC) decision to reduce the benchmark price uniformly fixed for solar PV electricity by about 13 %, would have a significant and direct distortionary effect on *the market for solar energy* as shown in fugure 4. The reduction in output of PV Electricity as a result and the fall in its price shown in figure 4 is a distortion however that will have a flow on effect upstream, and also distort the PVMP market. As shown in figure 5 the impact on the PVMP market is to reduce demand, and prices in the upstream PVMP market, which means it too will also be distorted. PVMP prices will as a result therefore not reflect competitive market outcomes or normal values, but be distorted and below competitive market prices

4.3 State-owned Enterprises (SOEs)

The report has already noted the substantial monopsony and monopoly power of downstream electricity companies, which is likely to have further depressed feed-in

tarrifs for solar power, and as a result depressed PVMP prices upstream. There is moreover extensive state ownership of these dominant electricity companies in China, which long predates, and continues throughout the investigation period.[80] State Owned Enterprises (SOE) are generally known to enjoy privileges and immunities that are not available to their privately-owned competitors, giving them even greater competitive edge over their rivals, preventing market entry, enhancing their incumbent market power and further distorting competitive outcomes in the market. There are a number of relevant advantages that SOEs have over private-owned enterprises as listed below. Where these apply in the Chinese context, they are likely to have contributed to the distortion of downstream electricity prices, and have led to flow on distortions to PVMP market prices:

Outright subsidisation. SOEs tend to receive direct subsidies from their government or benefit from other public forms of financial assistance to sustain their commercial operations. For example, SOEs are known to enjoy favourable tax regimes or exemptions from certain taxes, which can be interpreted as selective government subsidies. Another form of subsidisation is in the form of in-kind benefits, for instance where state-owned operators in the network industries receive benefits such as land usage and rights of way at a price significantly below what private competitors would have had to pay in like circumstances. Such exemptions artificially lower the SOEs's costs and enable them to price more efficiently than competitors subject to a full tax regime.

Concessionary financing and guarantees. SOEs may enjoy credits directly from governments, or provided via state-controlled financial institutions, at below-market interest rates. For example, explicit or implicit state guarantees for SOEs can reduce their cost of borrowing and provide a competitive edge over their privately-owned rivals. This "anti-competitive" effect may not always be intentional – commercial lenders can lend to SOEs at favorable rates given their state-backing status.

Other preferential treatment by government. Another perceived operating cost advantage to SOEs arises in cases when SOEs are not subject to the same costly regulatory regimes as private firms. There are a number of examples of such exemptions according to the national context, e.g. exemptions of compliance with disclosure requirements, exemptions from antitrust enforcement, building permit regulations or from zoning regulations. Moreover, in countries where public procurement rules are relatively less stringent, some SOEs may in practice continue to benefit from preference in public procurement. This does not necessarily imply onerous practices at the level of general government. These can merely arise if the SOEs have accumulated competitive or informational advantages which allow them to tailor their offers more closely to government requirements. SOEs may also be in a unique position to benefit from having access to government information or data not available (or available in a limited extent) to their private companies.

[80] The five major Chinese electricity companies are all state owned enterprises, directly administered by the State-owned Supervision and Administration Commission of the State Council (SASAC). See: http://www.sasac.gov.cn/n1180/n1226/n2425/index.html for list of companies under control of the State Council. These companies own listed subsidiaries, but see recent story "China SOE's restructuring leaves state ownership intact" http://www.ft.com/cms/s/0/902826f4-c878-11e4-8617-00144feab7de.html#axzz3fkLv7Tg8 https://en.wikipedia.org/wiki/Electricity_sector_in_China#Companies

Monopolies and advantages of incumbency. Often, governments entrust SOEs with exclusive or monopoly rights over some of the activities that they are mandated to pursue. This is visible in many areas, such as in state ownership of electricity companies in China, and other services that the state has decided to pursue through state-controlled entities. Where SOEs operate as vertically integrated structures with legal monopolies in parts of their value chains, this can distort competitiveness, and it may also allow the SOEs to influence entry conditions of would-be competitors across a number of commercial activities.

Captive equity. Control of a SOE cannot be transferred as easily as in privately-owned firms. This inability to transfer ownership rights gives SOEs a number of advantages, such as: (i) being absolved from paying dividends or indeed any expected return to shareholders; (ii) an inclination to engage in anti-competitive behaviour; and (iii) being sheltered from the threat of takeovers or the disciplining effects of capital markets which would otherwise force SOEs' management to operate the enterprise more efficiently.

Exemption from bankruptcy rules and information advantages. SOEs often enjoy exemptions from bankruptcy rules. Because equity capital is locked, SOEs can generate losses for a long period of time without fear of going bankrupt. In addition, SOEs may also benefit from information assymetries in the form of access to data and information not available to their private competitors or only available to a limited extent.

4.4 Conclusion

The GOC's various forms of intervention in the upstream and downstream market are likely to have significantly affected prices and output. Our analysis suggests that fiscal support in the photovoltaic cell market would have had the effect of lowering price and increasing output of PV cells. As a key component in the production of PV modules or panels, intervention in the upstream PV cells market that lowers its price will likely have flowed on to lower prices for PVMPs. In the downstream market for solar electricity, price control in the form of a 13% reduction on price would cause a fall in demand for PVMP products, lowering their prices.

5.0 Methodologies for Identifying Market Values

The extent and nature of the interventions reviewed above indicates significant distortions of competitive market conditions in relation to the subject goods such that domestic sales are likely to be significantly distorted from normal competitive market value. Indeed to use the GOC's own words, there is susbstantial evidence that the PV market was in a *"dire situation of excess capacity or excess supply, due to over-expansion"*, which inevitably would have depressed prices, during the investigation period.

The wide range and material nature of the GOC measures which have had significant influence directly on the market for photovoltaic modules and panels, and indirectly through upstream PV cells, and polysilicon markets and the downstream electricity

markets, suggests there is sufficient reason to believe that domestic prices in China in all these markets are not substantially the same as they would be in a competitive market. Indeed as a result it appears likely that normal values could not be determined on the basis of

i) domestic selling prices of PVMP in China or on
ii) the domestic full cost of making and selling PVMP plus profit.

On the second point the problem is that GOC interventions in the upstream markets, which includes photovoltaic cells and polysilicon markets, mean the costs to make and sell using recorded domestic costs in China would not reflect a competitive market cost.

On a brief review of the options available in the time available, it appears that, if one cannot use domestic prices of PVMP, and instead turned to constructed cost, using the records of costs in the accounting books of the exporter, and found that these cannot be relied on either (as appears to be the case here), there is a provision in the regulations it appears (which should be confirmed by further work) allowing departure from this. It is s 43(2) of the Customs (International Obligations) Regulations 2015 - https://www.comlaw.gov.au/Details/F2015L00373/Download. This is Select legislative instrument 32 of 2015 that replaces regulation 180 of the old 1926 regulations.

The ultimate constraint is from WTO ADA art 2.4 that there has to be a *reasonable comparison* between export price and normal value. From an economic point of view other methodologies for identifying *reasonable* or competitive market values include

1. Comparable actual market sales (CAMS) of the same product, made in less distorted competitive international markets between unrelated parties who are acting at arms length. Adjustments may be required where directly comparable data cannot be found, which is likely. Reasonable adjustments to prices in comparable transactions in competitive international markets between unrelated parties who are acting at arms length is a reasonable approach to adopt.
2. Another standard economic methodology is the Resale Price Minus (RPM) methodology where one takes re-sale prices in Australia, or other competitive markets of like goods imported from a third country. Having found resale prices one deducts (minus) comparable competitive market resale margins from the resale price to find the relevant comparable product price. Adjustments may be required where directly comparable data cannot be found, which is likely. This still a reasonable approach to adopt.
3. A third economic methodology is the cost plus methodology (CPM) where one estimates cost of production, a reasonable amount for administrative, selling and all other costs, and a reasonable amount for profits, using comparable market data of costs and margins. Again adjustments may be required where directly comparable data cannot be found, which is likely and still a reasonable approach to adopt.

It is proposed two methodologies and two data sets be used to estimate market prices:

iii. RPM methodology starting with price from the PV-Exchange Europe for relevant products and *Bloomberg New Energy Finance* reports for the investigation period. The *Bloomberg New Energy Finance* reports contain the current prevailing price data and cost components of photovoltaic modules and panels from major suppliers and customers in the industry.

iv. Cost plus methodology - although we do not have information regarding the competitive cost of production, administrative, selling and all other costs, or an amount for profit from producers in China, we have access to published information which represents the international average of these items, based on information provided in *Bloomberg New Energy Finance* reports for the investigation period. These reports contain the current prevailing price data and cost components of photovoltaic modules and panels from major suppliers and customers in the industry. It is then possible to use the monthly cost build-up information, including an amount for profits, for the purposes of determining the normal values of the subject goods for each respective month of the investigation period.

References

See Footnotes for References.

Others drawn on include:

The Australian industry's application for a dumping duty notice; http://www.adcommission.gov.au/cases/Documents/001-Application-Australianindustry-TindoManufacturingPtyLtd.pdf

Anti-Dumping Notice (ADN) Number 2014/38; and; http://www.adcommission.gov.au/cases/Documents/031-ADN-201438-Initiationofaninvestigationintoalleggeddumping.pdf

The Statement of Essential Facts no. 239 that contains the Commissions preliminary findings: http://www.adcommission.gov.au/cases/Documents/112-SEF.pdf

IEA (2014) "Technology Roadmap: Solar Photovoltaic Energy" https://www.iea.org/publications/freepublications/publication/TechnologyRoadmapSolarPhotovoltaicEnergy_2014edition.pdf. Retrieved 15 June 2015

Canadian Border Security Agency (CBSA) Statement of Reasons Concerning the initiation of investigations into the dumping and subsidizing of CERTAIN PHOTOVOLTAIC MODULES AND LAMINATES ORIGINATING IN OR EXPORTED FROM THE PEOPLE'S REPUBLIC OF CHINA http://www.cbsa-asfc.gc.ca/sima-lmsi/i-e/ad1405/ad1405-i14-de-eng.html. . Retrieved 28 June 2015