The E15 Initiative

STRENGTHENING THE MULTILATERAL TRADING SYSTEM

Winds of Change and Rays of Hope:

How Can the Multilateral Trading System Facilitate Trade in Clean Energy Technologies and Services?

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ABSTRACT

Efforts to combat climate change need to be supported by a broad-based 'policy-toolkit', including trade policy tools. Trade governance, as embodied in the multilateral trading system represented by the WTO, will thusneeds to provide a supportive framework. One way in which it can do this is by facilitating trade in clean energy goods and services essential for the rapid scaleup of clean energy, aiding in efforts to decarbonize the global economy. This paper examines how the WTO can play this role. It finds that this will involve addressing a number of substantive and process-related issues with regard to improving markets for clean energy goods and services, enabling greater transparency in clean energy measures and policies that could restrict trade, improving clarity with respect to existing trade rules and possibly developing new ones. Interim measures could also be explored as a short-term solution to provide greater certainty to the private sector and policymakers and reduce the likelihood of trade disputes involving domestic clean energy policies.

EXECUTIVE SUMMARY

The world today confronts an urgent need to address climate change and the serious consequences that a global temperature rise of more than 2 degrees Celsius threatens to bring with it. At the same time, itis imperativefor increasing global energy supplies to meet the needs of economic activity and continued growth in both developed and developing countries as well as to provide energy access to the 1.3 billion people that lack such access. The reality is that fossil-fuel use —the primary cause of human-induced global warming — is dominant in the global energy mix and is expected to remain sofor several decades to come. Efforts to keep global temperature rise within the 2 degrees Celsius mark will require both a rapid scaleup of clean energy sources (solar, wind, hydro, and biomass) and greater efficiency in the use of energy. This is critical not only for countries in the Organisation for Economic Co-operation and Development (OECD) that already contribute a significant level of carbon dioxide (CO2) emissions, but also countries in the developing world, where most of the future growth of emissions is expected.

The transition to a low-carbon future will require an effective 'enabling environment', shaped by a 'toolkit' of domestic and international regulatory policies and frameworks that will influence price signals as well as public and private resource allocation and consumption decisions, encouraging the deployment and diffusion of new clean energy and energy-efficiency technologies and discouraging the use of fossilfuels. Trade-policies and regulatory frameworks will be an important set of tools in that context. While energy itself is 'tradable' like other goods and services, it is also different and more fundamental in that it is also an 'enabler' of economic activity, including manufacturing and trade.

For the purposes of this paper, clean energy has been taken to include only clean-electricity generation technologies related to wind, solar, hydro, and biomass and in certain cases cleaner fuels, such as ethanol in addition to clean energy services. While nuclear fuel and generation technologies produce no carbon emissions during generation, the associated environmental and safety risks lead to its being excluded from the scope of the paper, although there is no doubt that it will play an important role in climatechange mitigation efforts. Also excluded from the paper isconsideration of a broad set of measures,such as carbon taxes and fossil-fuel subsidy reform, as well as measures, such as carbon labelling and border tax adjustments, all of which may indirectly promote clean energy by discouraging or removing incentives related to the use of fossilfuels.

Despite the gloomy investment climate resulting from the global economic recession, investment in renewable power and fuels increased by 17 percent to a new record of USD 257 billion in 2011, with 35 percent of investment flows going to developing economies. It is encouraging that some of the biggest greenhouse gas emitters, such as the United States (US), the European Union (EU), China, and India witnessed the largest volumes of clean energy investments or represent some of the fastest growing clean energy markets. Another noticeable trend has been a significant jump in investment inflows in solar helped by rapid

costdeclines in solar photovoltaic (PV) modules. Long-term forecasts by Bloomberg New Energy Finance (BNEF) predict a bright future for renewables, and in one scenario renewables account for between 69 percent and 74 percent of all new power capacity added between now and 2030, owing to increasing costcompetitiveness. Large hydro is expected to remain the dominant form of renewable energy generation under all scenarios.According to the projections of the International Energy Agency(IEA's) *2012 World Energy Outlook*, by 2035, renewables would comprise 31 percent of electricity generation in 2035, up from 10 percent in 2010.Falling costs and natural demand is also expected to take over from policy support as the main driver for renewables according to BNEF,which alsoforesees a need for public support at least until 2020.

Trade in clean energy goods has been growing rapidly and the growth in exports and imports of solar PV modules has been particularly impressive. Chinese solar PV exports, for instance, grew spectacularly from USD 644 million in 2004 to USD 27.94 billion in 2011. An interesting aspect is that the key traders in clean energy products, like solar panels and wind turbines, are often also the major greenhouse gas emitting countries. Thus, the 'critical-mass',if it were to be defined as such,for both climate mitigation as well as trade in clean energy products comprises a handful of countries and often the same ones —China, the US, and the EU being fundamentally important in both spheres. The emerging economies among developing countries have been steadily increasing their share of exports of clean energy products, and their rates of growth have been much larger than OECD countries. Another interesting aspect is the concentration of the major players in solar PV and wind turbines (and clean energy technologies more broadly) in the Asia-Pacific region. This has implications, particularly in the context of voluntary initiatives on liberalizing trade in clean energy goods and services (and environmental goods and services more broadly) under the aegis of Asia-Pacific Economic Cooperation (APEC).

From a World Trade Organization (WTO) perspective, there are ways in which the multilateral trading system could play a more supportive role to facilitate greater deployment of clean energy goods and services. These are:

(i) Addressing measures that restrict trade in clean energy goods and services while being mindful of legitimate concerns with respect to the policyspace that WTO members, particularly developing countries may have.

(ii) Enabling greater transparency with regard to clean energy measures and policies that could restrict trade and

(iii) Improving clarity with regard to existing trade rules that may affect deployment of clean energy and exploring the need for reformulating rules and new provisions through fresh negotiations among WTO members with a view to ensuring greater predictability for policymakers as well as the private sector and reducing the likelihood of future trade disputes.

From this perspective, the paper examines five key issues at the interface of trade and clean energy policy, namely: (i) tariffs; (ii) clean energy incentives, subsidies and local-content measures; (iii) services; (iv) government procurement policies; and (v) standards and certification. A review of these issues, including examination of the findings of ICTSD, reveal that tariffs may be relatively less problematic to address compared with non-tariff measures. At the same time, tariff liberalization has faced its own set of challenges, as reflected in the contentious debates over defining and identifying 'environmental' goods in the WTO Doha Round of negotiations. Such issues of classification and identification may also play an important role in addressing market access related barriers on services. From a rules-clarification perspective as well as when examining the need for new rules, the issue areas that emerge as significant appear to be clean energy subsidies and localcontent measures, standards, and certification and government procurement policies. Services also appear to be an important area for further developing and clarifying rules, particularly on subsidies and domestic regulatory aspects. From a rules perspective of all the issues, clean energy incentives and localcontent measures could arguably deserve priority attention from the WTO, particularly keeping in mind the nature of disputes arising at the WTO. Addressing trade remedies may also be important from a market-access perspective, and it has taken centrestage in disputes between the US, the EU and China. Countervailing duties, to the extent they are applied in the future, will no doubt also be shaped by any clarification or development of subsidy rules that may take place within the WTO.

In addition to these five sectoral issues, the paper also examines WTO process-related issues and systemic questions. It contends that the WTO is at a crossroads. Given the lack of progress in the Doha Round of negotiations, activity is increasingly shifting to regional forums. At the same time, the WTO remains the only multilateral institution with binding rules and a robust dispute settlement system. It is also the only trade institution that brings all major greenhouse gas emitters — developed as well as developing — under a single set of trade-related rules and obligations. Hence trade-related decisions taken under the WTO would be politically and economically significant. Given that the WTO operates within the 'single-undertaking' framework, decision-making agreements may not be easy to reach. Progress may need to come incrementally, and the focus may have to be first on easily attainable reforms and issues. In other words, 'fine-tuning the WTO's engine' will be easier than aiming for a rapid overhaul or transformation. The paper highlights three process-related problems within the WTO: (i) fragmentation of relevant rules across a number of WTO agreements; (ii) challenges with regard to negotiating market access for clean energy goods and services, including fragmentation of negotiating forums; and (iii) lack of clarity and coherence in rules. The paper raises a number of questions for these process-related issues once again under the perspective of (i) improving transparency, (ii) increasing market access, and (iii) clarifying existing rules and developing new ones if necessary.

In addition, the paper raises the issue of whether any interim measures may be necessary to reduce the likelihood of trade disputes related to clean energy policies until meaningful progress may be made on the other pillars — market access, transparency, and rules.

The paper will not attempt to address the WTO's coherence with the United Nations Framework Convention on Climate Change (UNFCCC) system and climate-relevant measures,such astreatment of fossilfuels, carbon taxes, labelling, and border carbon adjustments on carbon-intensive goods. Important as they are in determining market opportunities for the scale up of clean energy, any meaningful discussion of their range and complexity and relevant gaps in the multilateral trading system that will need to be addressed will require a separate paper. The current paper,therefore, focuses only on trade barriers, transparency measures, and rules that directly affect clean energy technologies and services.

1.CONTEXT

The danger posed by climatechange is one of the greatest threats mankind has faced. The dangers of global warming triggered by rising atmospheric levels of greenhouse gases are well understood and documented —rising sea-levels, changes in weather and rainfall patterns, and increased frequency of extreme weather — impacting human habitats and livelihoods,biodiversity, and species loss among other things. In May 2013, carbondioxide (CO2) concentration levels in the atmosphere exceeded 400 parts per million (ppm) for the first time in three to five million years.[1] This puts further pressure on global efforts to rein in the rise in climate temperature to a maximum of 2 degrees Celcius (C) (36 degrees Fahrenheit), which is needed to avoid some of the worst effects of global warming.

The challenge of climate change mitigation is daunting, owing to the already high levels of percapita fossil-fuel energy use in much of the developed world;rapidlygrowingglobal demand for energy fuelled by economic growth, particularly in newly emerging developing countries like China and India; and the imperative to provide energy access to 1.3 billion in the developing world, particularly in Africa and Southern Asia to meet basic survival needs, such as cooking and lighting. Addressing these needs in a manner that does not harm the climate will require a shift away from fossil fuels toward clean energy sources. Because fossilfuels are expected to be dominant in the energy mix for the next several decades, climate change mitigation efforts and the transition to a sustainable energy future will require not only renewables, but also much greater efficiency in the use of fossilfuels themselves.Currently fossil-fuel combustion accounts for 90 percent of total CO2 emissions (excluding forest fires and the use of wood fuel).[2] In 2011, global energy demand grew by about 2.5 percent, in line with the average for the past decade. Consumption of important fossil fuels, such as oil, coal, and natural gas have continued to increase with oil consumption growing at 2.9 percent, coal at 5.4 percent,and natural gas at 2.2 percent. Coal consumption alone accounted for 30.3 percent of global energy consumption, which represents the highest share since 1969.[3] While investments in renewables have been growing rapidly (see Section II) they still account for a small portion of the overall power generationmix and will likely account for less than half of the mix even by 2030 (See Figures 2 and 6).

To stay within a 'likely' chance (66percent) of meeting the target of limiting the rise in global temperatures to 2 degrees Celsius, emissions have to peak before 2020 and have emission levels around 44 GtCO2e (giga-tonnes of CO2 equivalent) in the same year. In addition, there would need to be an average decline of emissions of 2.6percenta year

[1] BBC News, *Carbon dioxide Passes Symbolic Mark*,18 May 2013 accessible at http://www.bbc.co.uk/news/science-environment-22486153

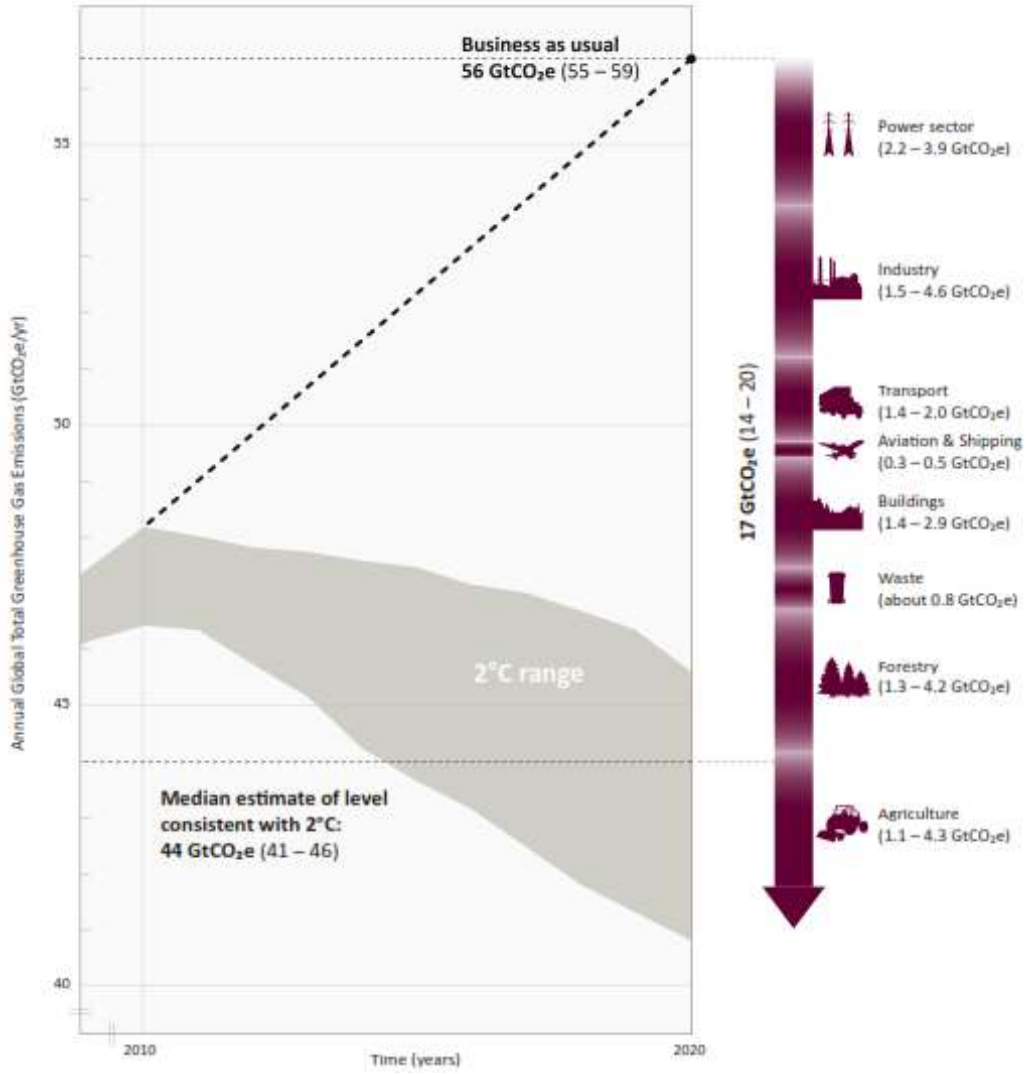
[2] Jos G.J. Olivier, Greet Janssens-Maenhout and Jeroen A.H.W. Peters, Trends in Global CO2 Emissions 2012 Report, PBL Netherlands Environmental Assessment Agency, The Hague/Bilthoven, 2012.

[3] Ibid.

following 2020. At present, there is a significant 'gap' of 5 GtCO2e between this ideal target and the most ambitious reduction pledges (which would keep emissions at around 49 GtCO2e). *The Emissions Gap Report* by the United Nations Environment Programme UNEP (2010) estimates a 'gap' of about 5-9 GtCO2e, and *Bridging the Emissions Gap* by the UNEP estimates the gap to be about 12 GtCO2e. Figure 1below illustrates the potential for bridging this gap through emissions reductions in various sectors. The power, building, and transport sectors (where most of the renewable energy and energy-efficiency technologies can be deployed) account for a huge share of potential reduction sectors. Energyefficiency (and by implication technologies and services that deliver it) will have an important role to play. Based on the International Energy Agency's (IEA)*World Energy Outlook 2012*, implementing economically viable energy efficiency measures could reduce by half the growth in global energy demand, the amount of oil saved would be equivalent to the current combined production of Norway and the Russian Federation, with similarly impressive savings for coal and gas. Energy efficiency gains would also cut by significant amounts emissions of local pollutants and carbon dioxide,resulting in a five-year postponement (until 2022) of the datewhen the world would become locked in by the existing energy infrastructure to an average temperature increase of at least 2 degrees C.[4]

[4]World Economic Forum (WEF) 2013, *Enabling an Effective Energy Transition amid a Shifting Landscape*, WEF Energy Advisory Board Background Document accessible at http://www3.weforum.org/docs/IP/2013/EN/WEF_AM13_EN_AdvisoryBoardBackgrounddocument.pdf based on IEA's World Energy Outlook 2012 and International Energy Agency (IEA), *World Energy Outlook*,2012

Figure 1: SectoralPotential in Bridging the 'Emissions Gap.'



Source:*UNEP 2011. Bridging the Emissions Gap. UNEP*

While industrialized countries formerly accounted for the majority of CO2 emissions, future growth will come from the developing world. As Table 1 below shows, emission levels in a number of OECD countries have been declining while they have been growing in the developing world. China already accounts for the largest share of absolute emissions,although,for India and other developing countries,emission levels are still low in per capita terms .

Table 1: CO2 emissions in 2011(million tonnes CO2) and CO2 per capita emissions, 1990-2011 (tonne CO2 per person)

Country	Emissions 2011	Per capita emissions				Change 1990–2011	Change 1990–2011 in %	Change in CO_2 1990–2011 in %	Change in population 1990-2011, in %
		1990	2000	2010	2011				
Annex I*									
United States	5420	19.7	20.8	17.8	17.3	-2.4	-12%	9%	19%
EU27	3790	9.2	8.4	7.8	7.5	-1.7	-18%	-12%	6%
Germany	810	12.9	10.5	10.2	9.9	-3	-23%	-21%	4%
United Kingdom	470	10.3	9.3	8.1	7.5	-2.8	-27%	-20%	8%
Italy	410	7.5	8.1	6.9	6.7	-0.8	-11%	-4%	7%
France	360	6.9	6.9	6.1	5.7	-1.2	-17%	-9%	10%
Poland	350	8.2	7.5	8.8	9.1	0.9	11%	11%	1%
Spain	300	5.9	7.6	6.3	6.4	0.5	8%	29%	16%
Netherlands	160	10.8	10.9	10.5	9.8	-1	-9%	2%	11%
Russian Federation	1830	16.5	11.3	12.4	12.8	-3.7	-22%	-25%	-4%
Japan	1240	9.5	10.1	10	9.8	0.3	3%	7%	3%
Canada	560	16.2	17.9	16	16.2	0	0%	24%	19%
Australia	430	16.0	18.6	17.9	19.0	3	19%	57%	24%
Ukraine	320	14.9	7.2	6.7	7.1	-7.8	-52%	-58%	-14%
Non Annex I									
China	9700	2.2	2.8	6.6	7.2	5	227%	287%	15%
India	1970	0.8	1.0	1.5	1.6	0.8	100%	198%	30%
South Korea	610	5.9	9.7	12.2	12.4	6.5	110%	141%	11%
Indonesia	490	0.9	1.4	2	2.0	1.1	122%	210%	24%
Saudi Arabia	460	10.2	13.0	15.8	16.5	6.3	62%	181%	43%
Brazil	450	1.5	2.0	2.2	2.3	0.8	53%	106%	24%
Mexico	450	3.7	3.8	3.9	3.9	0.2	5%	45%	27%
Iran	410	3.7	5.2	5.4	5.5	1.8	49%	100%	27%
South Africa	360	7.3	6.9	7.1	7.2	-0.1	-1%	35%	27%
Taiwan	270	6.2	10.5	11.7	11.8	5.6	90%	119%	13%
Thailand	230	1.6	2.7	3.3	3.3	1.7	106%	155%	18%

Source of population data: UNPD, 2010 (WPP Rev. 2010)
* Annex I countries: industrialised countries with annual reporting obligations under the UN Framework Convention on Climate Change (UNFCCC) and emission targets under the Kyoto Protocol. The United States has signed but not ratified the protocol, and thus the US emission target in the protocol has no legal status.

Source: *Jos G.J. Olivier, Greet Janssens-Maenhout and Jeroen A.H.W. Peters, Trends in Global CO2 Emissions 2012 Report, PBL Netherlands Environmental Assessment Agency, The Hague/Bilthoven, 2012.*

A transition to a low-carbon future will require an effective 'enabling' environment shaped by a 'toolkit' of domestic and international regulatory policies and frameworks that will influence price signals as well as public and private resource allocation and consumption decisionsthereby encouraging the deployment and diffusion of new cleanenergy and energy-efficiency technologies and discouraging the use of fossilfuels to the extent possible.A meaningful 'toolkit' will involve for instance the reform of fossil-fuel subsidies — huge budgetary outlays that artificially lower the price of fossilfuels,like coal, and create an uneven playing field for cleaner energy sources, such as solar and wind.

Tradepolicies and regulatory frameworks will be an important set of tools in such a climate mitigation toolkit.Energy has a special significance. While it is tradable, like other goods and services, it more broadly is fundamental to the provision of agricultural and industrial goods

and services. Energy prices can alter choices of manufacturing locations and patterns of trade. Recent trends in new investments and the relocation of certain energy-intensive industries to the United States (US) is one example.[5]Another example is the recent rise in coal-fired generation in Europedriven by coalimports from the US, as coal becomes increasingly displaced in the US power generation sector by shale gas.[6]Trade policies shape the nature of barriers and impediments that cleanenergy technologies and services face as they cross national boundaries. Cleanenergy goods and services, like other goods and services, are increasingly being driven by globalvalue chains and networks involving trade in rawmaterials, intermediate components and services, and finished goods and services. Addressing barriers to trade ranging from tariffs to non-tariff measures and restrictions on services can enable firms to more cost-effectively optimize their global value chains and facilitate the scaling up of clean energy.

Well-crafted and transparent traderules, particularly multilateral ones embodied in World Trade Organization (WTO) agreements, will also give a greater degree of predictability to private actors in the cleanenergy space, encouraging greater levels of investment. This is critical, as it is widely acknowledged that the majority of the resources and investments needed to facilitate a transition to a clean energy future will have to come from the private sector. Clearer trade rules will also enable governments to ascertain their 'policy-space' boundaries, i.e. the extent to which they can deploy domestic policies in their toolkit to foster the scale up of clean energy. Such policies may be introduced with the intention of not only responding to climate change, but also a host of other domestic economic objectives, such as ensuring economic growth, competitiveness, employment, and energysecurity. Such objectives could often compete with the requirement to provide non-discriminatory market access for cleanenergy goods and services to a country's trade partners. A lack of clarity ontraderules could conversely result in tensions between a country's domestic cleanenergy policies and trade-related obligations. It could also lead to trade disputes among countries regarding these policies as is increasingly being seen for instance in cases brought to the WTO's dispute settlement body, such as the Ontario Feed-in Tariffs case (Canada vs. Japan and the EU), China's complaint against solar photovoltaic (PV) local-content measures, and related incentives in the European Union (EU) and the US complaint against India's local-content measures in the solar PV sector. Trade friction has also led to domestic anti-dumping and countervailing measures being initiated or considered for instance by the US and EU against Chinese solar panels and China on poly-silicon imports from the EU. Annex Table A.1 provides an overview of the main trade disputes involving the cleanenergy sector todate.

[5] Enabling an Effective Energy Transition Amid a Shifting Landscape, WEF Energy Advisory Board Background Document accessible at
http://www3.weforum.org/docs/IP/2013/EN/WEF_AM13_EN_AdvisoryBoardBackgrounddocument.pdf
[6] The Wall Street Journal,*Shale Boom Is a Bust for Europe's Gas Plants*, 8 May 2013 accessible at
http://online.wsj.com/article/SB10001424127887323744604578470841012284404.html

This paper will attempt to examine how the WTO can play an important role in climate mitigation efforts by facilitating both market access for clean energy goods and services as well as increasing transparency and clarity with regard to domestic clean energy policies and trade rules It will begin with an overview of the landscape and trends in cleanenergy marketsand trade and identifya number of priority issues at the heart of the trade and clean energy interface. It will conclude by discussingimportant process-related considerations and raising questions to enable a better understanding of how the WTO could play a more meaningful role in addressing clean energy governance. This will be centredonthree overarching themes,namely:transparency;addressing market access issues and barriers for clean energy goods and services; and clarifying traderules. It will also briefly raise the issue of whether there is a need for the WTO to consider 'interim' or 'stop-gap' measures that would temporarily reduce or eliminate the risk of further tradedisputes pending future clarification of rules, thereby reducing the lack of predictability or certainty for both governments andprivatesector actors.

From a climate perspective it is also important that WTO rules are cognizant and supportive of the multilateral framework on climate change as embodied in the UNFCCC[7]. There may be trade implications for instance of response measures that members of the UNFCCC undertake in pursuit of climate mitigation.In addition to coherence with the UNFCCC framework, there are a number of other important issues relevant to how the WTO system can be supportive of clean energy scale-up for instance in the manner in which measures on fossil-fuels such as carbon taxes and fossil-fuel subsides are addressed, as well as measures such as carbon labelling and border tax adjustments. The WTO can play an important role in all of these issues by ensuring (i) good governance through sharpening and reforming *trade rules (ii) Greatertransparency* and (iii) avoiding *protectionism***.**

This paper however will not attempt to address the WTO's coherence with the UNFCCC system and climate relevant measures such treatment of fossil-fuels , carbon taxes, labelling and border carbon adjustments on carbon-intensive goods. Important as they are in determining market opportunities for clean energy scale-up, , any meaningful discussion of their range and complexity and relevant gaps in the multilateral trading system that will need to be addressed will require a separate paper in itself. The current paper will therefore focus only on trade barriers, transparency measures and rules that directly affect clean energy technologies and services.

[7] United Nations Framework Convetion on Climate Change

2. TRENDS IN THE CLEAN ENERGY LANDSCAPE AND TENSIONS BETWEEN DOMESTIC CLEAN ENERGY AND TRADE POLICY

2.1. What Is Clean Energy? Definitional Complexity and The Trade Context

Before examining the growth of clean energy markets and its implications for the multilateral trading system it may be worthwhileto define what we mean by 'clean energy.' This is no simple matter, as energy is 'clean' in most cases only in a relative sense. Even supposedly carbon-free sources of energy, such as solar and wind, may involve carbon emissions during the production of solar panels and wind turbines or require additional fossil-fuel sources to ensure continuous operation. Hydro-projects may have upstream environmental impacts and production of ethanol could result in carbon emissions associated with land-use change.

From a trade perspective, 'clean energy' goods and services could comprise the following categories, each of which may have different trade implications.

(i) **Fuels:** that may be used for power generation, industrial processes, transport, or all of three. Good examples are fossil fuels, such as coal, natural gas, and petroleum;synthesized fuels, such as ethanol, biodiesel, and hydrogen; and nuclear fuels, such as uranium or thorium. Each of these fuels may have its own carbon footprint during consumption as well as production (depending on processes and methods used). **'**Clean' or 'cleaner' fuels may include those that have zero or lower carbon emissions associated with electricity generation or transport compared with fossilfuels. For instance,natural gas though not *clean* is *cleaner*than coal.The emissions associated with hydrogen, ethanol, and biodiesel may vary, depending on how they are produced. Nuclear fuels produce carbon-free electricity (although emissions may be involved in the construction of power plants), but are radioactive and thus have other associated environmental and health risks.Fuels are classified under specific customs codes for international trade and are usually classified as industrial products. However, ethanol is also an agricultural product.

(ii) **Electricity-generation technologies:** that may be used to produce electricity from all of the sources mentioned above i.e. fossilfuels, synthesized fuels, and nuclear fuels. In addition, electricity-generation technologies can harness naturally available sources of energy, such as the sun (through solar panels); wind (using wind turbines); and running water (hydro-electric dams and turbines). Certain technologies, such as steamturbines or alternating current (AC) generators, can be used to generate electricity from steam produced by burning fossil fuels or from heat generated from the sun (concentrated solar thermal). For the

purposes of international trade, electricity-generation technologies are manufactured or 'industrial' goods.

(iii) **Electricity:**can be produced from diverse sources using diverse technologies. The implications for CO2 emissions may be very different, but for international trade purposes, any electricity if traded across borders, is indistinguishable and has one single harmonized system (HS) customs code-271600.

(iv) **Energy-efficiency technologies:** could include a wide variety of consumer goods that may be energyefficient in a relative sense, but physically indistinguishable from their counterparts — for instance, a more fuel-efficient car or airconditioner — or distinguishable — a light-emitting diode (LED) or compact fluorescent lamp (CFL) compared with an incandescent one — or could increase energyefficiency when applied within an energy system ('smart-grid' technologies).

(v) **Clean energy 'services':** include a wide variety of services that may be involved in the provision of clean energy, such asconsulting, engineering, and construction and installation services. They may also include services designed to increase energyefficiencies of buildings and homes, like energy audits and energy management services provided by energy services companies (ESCOs).

Another category that could arguably be included would be policy measures that discourage 'dirty' or 'fossil-fuel' energy and thereby indirectly promote the scale up of clean energy. These may range from carbontaxes to elimination of fossil-fuel subsidies to border tax adjustments all of which have implications for trade policy and the multilateral trading system, but will require an extensive and detailed analysis exclusively devoted to these issues. They are therefore outside the scope of this paper.

For the purposes of this paper, a reference to clean energy in the context of the WTO will include only 'clean electricity' generation technologies related to wind, solar, hydro, and biomass as well as in certain cases cleaner fuels, such as ethanol and clean energy services. While nuclear fuel and associated generation technologies produce no carbon emissions, the associated environmental and safety risks, lead them to being excluded from the scope of this paper, although it is clear they will play an important role in climatechange mitigation efforts.

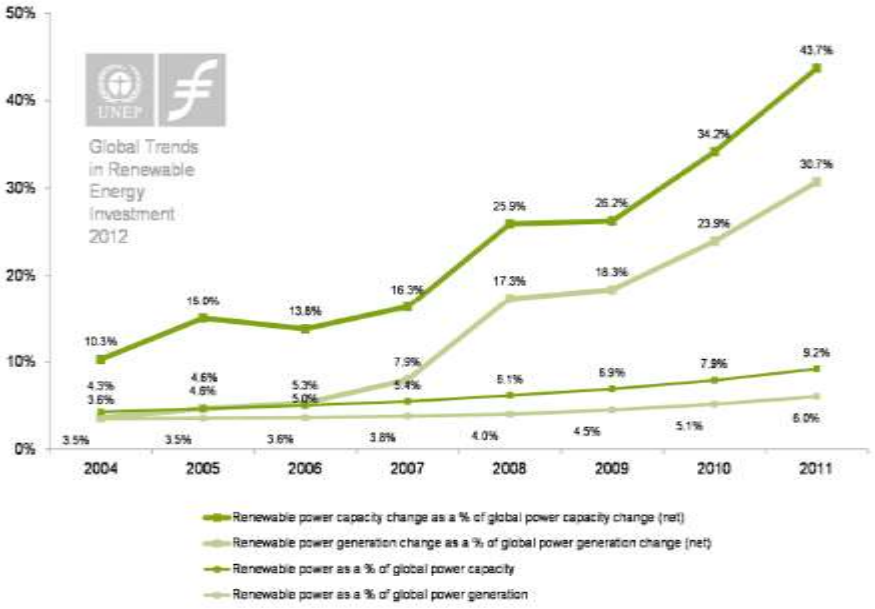
2.2. Recent Trends in Clean Energy Investment

The share of renewables in the global energy mix (excluding large-hydro) rose from 5.1 percent in 2010 to 6 percent in 2011. Despite the gloomy investment climate resulting from the global economic recession, investment in renewable power and fuels increased by 17 percent to a new record of USD 257 billion in 2011 with 35 percent of investment flows going to developing economies.Renewables accounted for 44 percent of newly installedpower capacity worldwide in 2011 an increase from 34 percent in 2010 and 10.3 percent in 2004.The US overtook China to be the lead investor with USD 51 billion, a 57 percent rise over 2010, while India showed the fastest growth of any large market with investments in renewables rising 62 percent to USD 12 billion. The market has also witnessed unprecedented declines in technology costs, particularly solar PV where costs dropped by close to 50 percent, and onshore wind turbine prices fell by between 5 and 10 percent. Wind,usually the biggest sector in terms of attracting investment, was overtaken by solar in 2011. Solar attracted an investment of USD 147 billion in 2011 (an increase of 53 percent over the previous year), almost twice as much as wind(USD 84 billion) for which investments declined by 12 percent from 2010.The jump in solar investment may be attributed to increased rooftop installations in Germany and Italy helped by a dramatic fall in panel prices and a rapid rise in investments in the solar thermal sector in Spain and the US . The fall in wind energy investments was a result of the lower turbine prices, policy uncertainty in Europe, and a slowdown in China's previously hectic growth in wind installations.[8]

Despite the increase in investment, the financial climate for renewables has become more difficult in recent years with banks increasingly unwilling to lend to the renewable energy sector, given the recession and uncertain policy support for renewables in a number of countries. This has resulted in a focus on alternative sources of investment, such as pension funds and long-term institutional investors.

Figure 2: Renewable Power Generation and Capacity as a Proportion of Global Power (2004-2011) in percentage.

[8] *UNEP and Bloomberg New Energy Finance, Global Trends in Renewable Energy Investment, 2012*

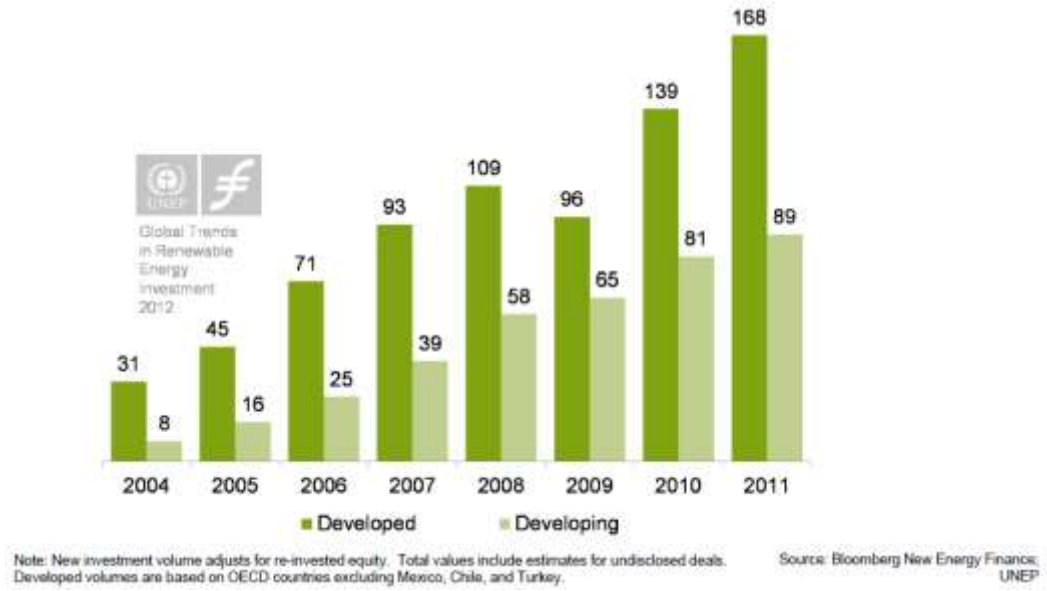


Note: Renewable power excludes large hydro. Renewable capacity figures based on Bloomberg New Energy Finance global totals.

Source: Bloomberg New Energy Finance, EIA, IEA, UNEP

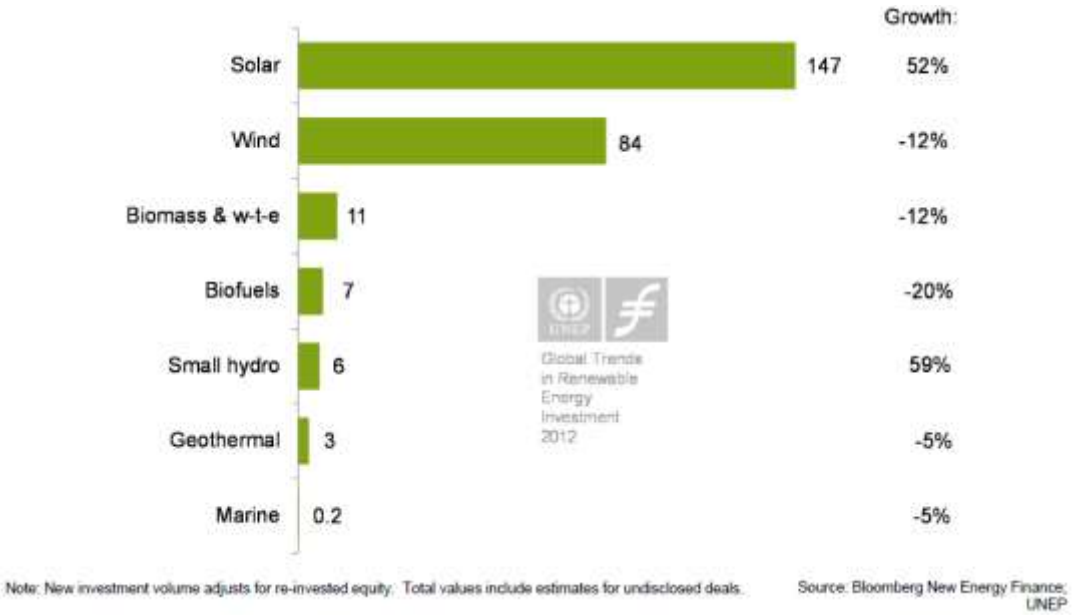
Source: UNEP and Bloomberg New Energy Finance, Global Trends in Renewable Energy Investment, 2012

Figure 3: Global New Investment in Renewable Energy Developed vs. Developing (2004-11)



Source: UNEP and Bloomberg New Energy Finance, Global Trends in Renewable Energy Investment, 2012

Figure 4: Global New Investment in Renewable Energy by Sector, 2011 and Growth compared to 2010 (in USD Billion)



Source: UNEP and Bloomberg New Energy Finance, Global Trends in Renewable Energy Investment, 2012

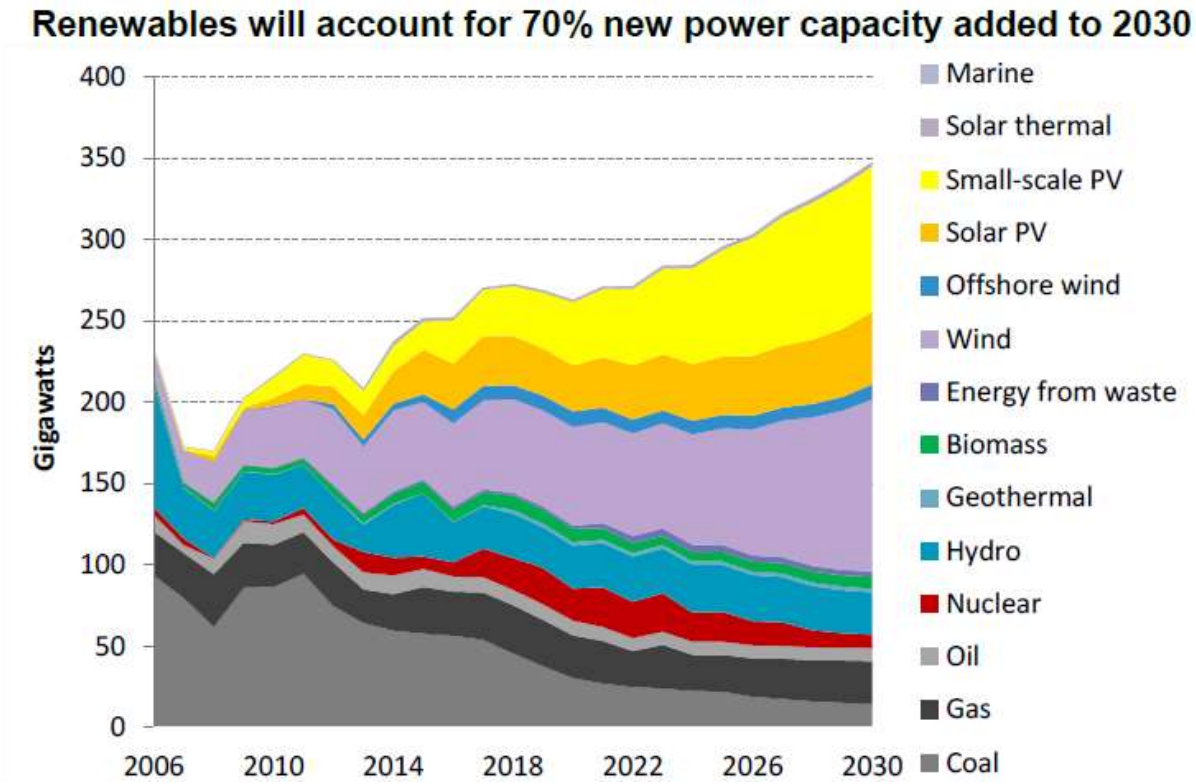
The future for renewables looks bright. Bloomberg New Energy Finance's (BNEF) latest forecast, known as GREMO (Global Renewable Energy Market Outlook) projects that renewables (including large-hydro) could account for between 69percent and 74percent of all new power capacity added between now and 2030, owing to increasing

costcompetitiveness(See Figure 5 below)This compares with an estimate of 57 percent by the International Energy Agency (including large-hydro). Of this, wind and solar is expected to take up 30 percent and 24 percent of new power capacity added in terms of gigawatts (GW)between 2012 and 2030. This capacity addition involves a jump in investment by 230 percent from 2012 to USD 630 billion a year by 2030. These projections are based on the 'new normal' scenario, considered most likely among three scenarios making up BNEF's predictions for world energy markets until 2030. The more optimistic 'barrier-busting' scenario would require investments reaching USD 880 billion a year by 2030 (USD 9.3 trillion cumulative from 2013 onwards) as well as an additional USD 2 trillion (22 percent increase) in supporting infrastructure, such as long-distance transmission systems, smartgrids and demand response. Under the more pessimistic 'traditional territory' scenario, investment requirements would be USD 470 billion by 2030(USD 6.1 trillion cumulative from 2013 onwards).[9] Large-hydro will remain the dominant form of renewable energy generation until 2030 under all three scenarios.(See Figure 6 below).The International Energy Agency (IEA's) *World Energy Outlook 2012*, projects that by 2035, renewables would comprise 31 percent of electricity generation in 2035 up from 10 percent in 2010.[10]which is similar to the 'traditional territory' projections in the BNEF's 2013 Global Renewable Energy Outlook (See Figure 6).

[9] Bloomberg New Energy Finance, Global Renewable Energy Outlook,2013. Press Release and Fact Pack accessible at: http://about.bnef.com/gremo/. The three scenarios come from BNEF's Global Energy and Emissions Model, which integrates all of the main determinants of the energy future, including economic prosperity, global and regional demand growth, the evolution of technology costs, likely developments in policies to combat climate change, and trends in fossil-fuel markets.

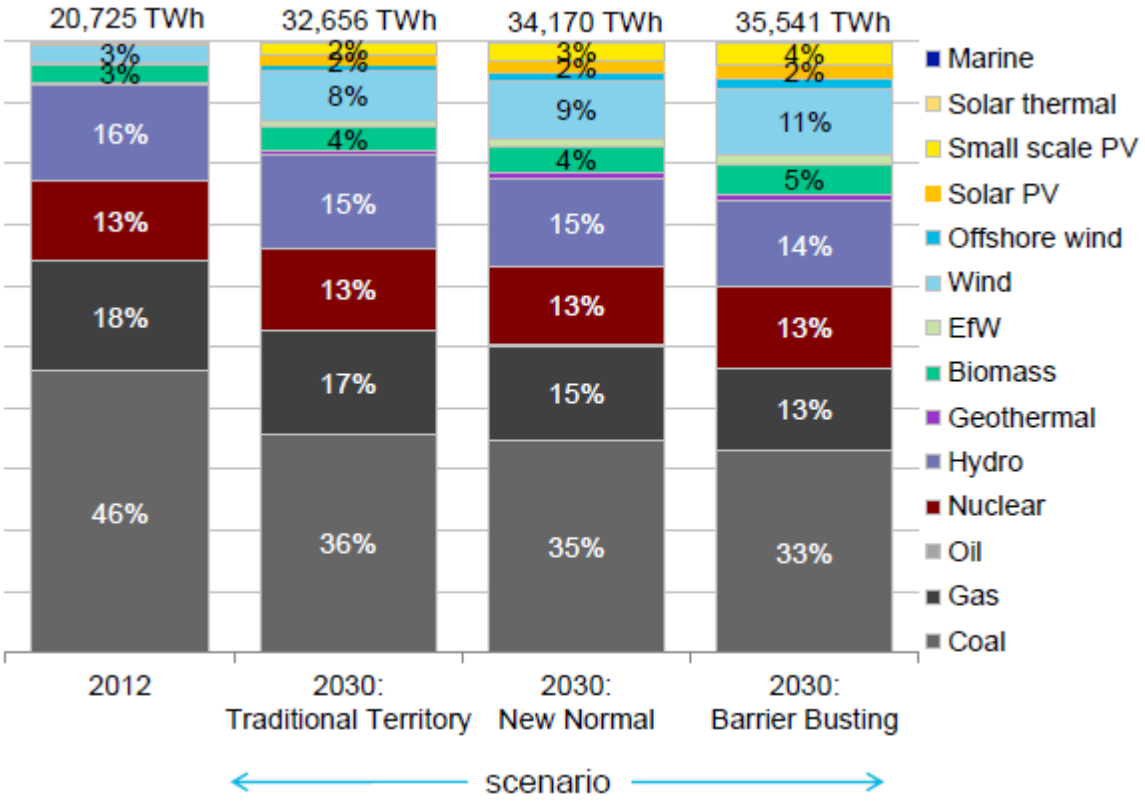
[10] International Energy Agency (IEA), World Energy Outlook 2012 Factsheet, accessible at http://www.worldenergyoutlook.org/media/weowebsite/2012/factsheets.pdf

Figure 5: Additions to Power Generation Capacity-2013- to 2030 Under 'New Normal' Scenario



Source: Bloomberg New Energy Finance, *Global Renewable Energy Outlook*,2013. Press Release and Fact Pack accessible at: http://about.bnef.com/gremo/

Figure 6: Forecasted Evolution of the Power Generation Output Mix under Different Scenarios(2013-30)



Source: Bloomberg New Energy Finance, *Global Renewable Energy Outlook*,2013. Fact Pack accessible at: http://about.bnef.com/fact-packs/global-renewable-energy-market-outlook-2013-fact-pack/

According to BNEF, the main driver for future growth of the renewable sector over this timeframe (2013-30) is a shift from policy support to falling costs and natural demand. The falling costs of renewable energy and of all the technologies required to integrate it into our energy system suggest that "we are beyond the tipping point towards a cleaner energy future."[11] However, some level of support for renewables will continue to be required at least until 2020 according to BNEF under all three scenarios. TheIEA's *2012 World Energy Outlook* however adopts a more cautious outlook stating that support for renewables would reach USD 240 billion a year in 2035 up from USD 11 billion in 2011.[12]

This naturally leads us to a discussion on the role of an enabling policy environment for renewables.

2.3. Role of an 'Enabling' Policy Environment

The investment climate for clean energy in general depends on a mix of factors, notably policy and financial support for renewables;the price of competing fossilfuels (which in turn are determined by a mix of market forces and subsidies for fossilfuels); and technology prices. Policy support through various types of incentives, such as feed-in tariffs (FITs), investment tax-credits, and renewable portfolio obligations have played a critical role in the development of the cleanenergy sector, and the cutting back of these incentives in 2011 has fuelled fears that the sector is coming under threat despite a fall in technology costs and the scenario of several renewable energy sources being competitive with fossilfuels in a couple of years. The discovery of shale gas in the US and new technology, such as hydraulic fracturing, has also depressed gas prices, further adding to a challenging future environment for investment in clean energy.

Policy and financial support for clean energy is therefore important, given the challenges facing clean energy, although as with other subsidies it will cost taxpayers money and will need to be phased out over the longer term. Policy and financial support for clean energy has been an important driver for trade in clean energy goods. For instance, the production and export of solar PV panels in China has largely been driven by FITs for solar energy in Europe. It is also being deployed domestically in greater numbers following China's introduction of its own FITs for solar PV in 2011.[13] Similarly, higher electricity and energy prices would in general stimulate manufacturing and trade in energy-efficient products.However, as will be explained later, certain domestic clean energy policies, depending on their design and manner of application could distort trade and create frictions among countries that produce and trade clean energy goods and services.

[11] BNEF Press Release, *Strong Growth for Renewables Expected Through to 2030,* 22 April 2013 accessible at http://about.bnef.com/files/2013/04/BNEF_PR_2013-04-22_global_renewable_energy_market_outlook.pdf

[12] International Energy Agency (IEA), World Energy Outlook 2012 Factsheet, accessible at http://www.worldenergyoutlook.org/media/weowebsite/2012/factsheets.pdf

[13] http://www.businessgreen.com/bg/news/2098838/china-heats-solar-market-feed-tariff

Table 2 below lists some of the commonly used clean energy policies and incentives in power generation. These can be oriented either toward producers or consumers.

Table 2: Typology of Clean Energy Policies

Producer-Oriented Policies and Incentives. (Incentivising supply of clean energy)			**Consumer -Oriented Regulatory Policies and Incentives** (Creating demand for clean energy)
Investment-related	*Production-related*	*Other regulatory policies and Incentives*	
Investment Subsidies/Grants	***Preferential Tariffs and Premiums (including Feed-in Tariffs)***	***Renewable Energy Targets***	***Carbon and Energy Taxes***
Investment-tax credits. Eg: Accelerated depreciation	***Production Tax-credits/ Generation-based Incentives***	***Binding Commitments to Reduce Greenhouse Gases***	***Removal/Reform of Fossil-fuel based Subsidies***
Preferential Finance or soft loans	***Power Purchase Agreements (providing stable guaranteed returns for 'X' number of years)***	***Carbon and Energy Taxes***	***Renewable Purchase Obligations***
VAT and Sales Tax Reductions and Exemptions on Equipment		***Removal/Reform of Fossil-fuel based Subsidies***	***Renewable Energy Certificates (RECs)***
Income Tax holidays		***Government Assistance for Business Development***	***Government Procurement (including through competitive bidding)***
Customs-duty exemptions and reduction		***Renewable Portfolio Standards***	***VAT and Sales Tax Reductions and Exemptions on Equipment (for instance: solar water heaters or rooftop solar panels)***
		Subsidies/ Grants for R&D	***Financial incentives and soft loans to purchase RE equipment***
			Net Metering

Source: ICTSD Analysis Based on REN 21: Renewables 2012 Global Status Report

According to a background document prepared by the WEF's Energy Advisory Board, support schemes for renewables must be carefully designed to ensure their success. They should be based on predictable and transparent frameworks,focusing on a portfolio of technologies best suited to meet short- and long-term objectives. These should be backed up by ambitious yet credible targets,and support should be differentiated according to the maturity of each technology. Further, as cost reductions for renewable technologies are achieved, the level of support provided for new installations needs to decline to avoid excessive and unnecessary increases in the cost of energy services.[14]

2.4. Trends in Trade Flows

Trade flows in clean energy goods, such as wind-powered generating sets and solar panels, have grown rapidly over the period 2004-11. In terms of trade intensity, solar panels seem to be particularly important as seen below in Table 3. It is, therefore, hardly surprising that solar panels as well as local content measures affecting solar have assumed prominence in recent cleanenergy trade disputes and application of trade remedies (anti-dumping and countervailing duties). The tables below show the top ten exporters and importers of solar PV cells and modules as well as windturbines as of 2010 (in shaded column) as well as their export and import volumes over the period 2004-11.

Table 3: Exports of PV cells and modules (HS 854140), USD millions, 2004-2011 and List of Top Ten Exporters in 2010

(In descending order of 2010 values)

	2004	2005	2006	2007	2008	2009	2010	2011
All countries 1/	**10331.4**	**11751.0**	**14696.1**	**19410.8**	**30485.7**	**27898.4**	**54005.3**	**57622.9**
China	644.2	1257.5	2459.7	5252.3	11745.4	10721.2	25178.6	27946.2
Taiwan	1175.3	1403.2	1689.1	2580.0	4002.3	3871.8	7424.9	6951.2
Japan	4628.9	4796.2	5198.8	5472.2	6189.8	4673.4	6397.3	6604.1
Rep of Korea	317.3	315.2	422.1	563.2	805.1	1307.3	3807.2	3884.3
United States	1193.2	1297.6	1298.1	1582.2	1976.1	2017.6	2706.1	2427.0

[14] Enabling an Effective Energy Transition Amid a Shifting Landscape, WEF Energy Advisory Board Background Document accessible at http://www3.weforum.org/docs/IP/2013/EN/WEF_AM13_EN_AdvisoryBoardBackgrounddocument.pdf

Malaysia	792.7	843.8	1004.3	942.4	744.6	835.5	2598.7	2725.6
EU27 1/	688.6	764.0	1072.8	1260.3	2024.9	1748.4	1835.4	2100.1
Singapore	328.7	317.1	444.6	500.3	737.2	673.7	1253.4	2080.7
Mexico	81.6	140.8	218.5	200.6	397.6	560.1	711.0	931.9
India	87.2	93.7	133.9	212.8	528.8	437.3	585.7	327.5
Developing countries including emerging economies	**3613.4**	**4628.9**	**6790.3**	**10681.9**	**19455.3**	**18864.2**	**42418.0**	**46131.1**
Intra-EU27	1512.1	2592.9	4052	5986.4	10556.2	8621.9	15623.3	12660.2
EU272/	2200.7	3356.9	5124.8	7246.7	12581.2	10370.4	17458.6	12769.7
World 2/	11843.5	14343.9	18748.1	25397.2	41042.0	36520.4	69628.6	70283.1

Source; COMTRADE, using WITS (October 2012)

1/ Excluding Intra-EU trade

2/ Including Intra-EU trade

Table 4: Imports of PV cells and modules (HS 854140), USD millions, 2004-2011 and List of Top Ten Importers in 2010

(In descending order of 2010 values)

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
All Countries	**11358.6**	**13566.4**	**16644**	**21217.1**	**33182.3**	**30876.5**	**56747.7**	**59076.8**
EU27 1/	2948.7	4093.8	5513.7	8411.0	17102.2	15160.0	30646.4	26536.6
China	1930.5	2362.4	2680.8	3288.6	3743.9	3606.5	6144.7	6719.7
USA	1251.3	1390.8	1848.1	2155.7	2760.2	2591.7	4411.5	7193.1
Hong Kong	1204.8	1334.8	1715.4	1817.5	1983.8	2109.1	3204.7	3637.0
Rep of Korea	858.4	865.1	978.9	1276.8	2143.8	1996.0	2793.8	2822.8
Japan	1001.7	1135.9	1207.1	1131.3	1412.3	1212.1	2189.2	2305.9

Taiwan	472.6	462.1	524.6	544.4	660.2	696.8	1285.9	1153.1
Australia	55.4	55.4	52.5	59.2	171.1	400.0	1047.4	1509.8
Mexico	282.6	356.9	414.3	442.5	487.9	541.2	876.3	1107.1
Singapore	339.1	328.2	432.1	503.6	559.1	478.2	814.4	904.8
Canada	165.1	215.7	215	202.4	266.9	269	700.7	987.1
Malaysia	251.3	256.3	225.1	305.6	353.8	299.0	498.0	685.5
India	49.8	53.8	104.8	168.9	420	405.4	298.9	1332.8
Developingcountries	**6734.7**	**6484.6**	**7611.1**	**8988.8**	**11080.2**	**10783.6**	**17151.6**	**19765.4**
Intra-EU	1121.4	1991.0	2790.3	4216.7	7762.0	6472.7	12721.5	11062.9
EU27 2/	4070.1	6084.8	8304	12627.7	24864.2	21632.6	43367.9	37599.5
World 2/	12480.0	15557.4	19434.3	25433.8	40944.3	37349.2	69469.2	70139.7

Source: COMTRADE using WITS (October 2012)

1/ Excluding intra-EU trade

2/ Including intra-EU trade

Table 5: **Exports of wind-powered generating sets (HS 850231), USD millions, 2004-2011**

(in descending order of 2010 values) and List of Top 10 Exporters in 2010

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
All countries 1/	**561.1**	**1104.3**	**2467.1**	**2802.9**	**3337.6**	**2503.4**	**2487.8**	**2509.4**
EU27 1/	534.0	993.1	1886.8	1870.7	1812.9	1260.6	2035.5	1934.0
USA	4.4	3.6	83.3	14.2	22.1	117.0	142.1	126.0
India	1.2	23.8	199.0	335.8	651.1	335.6	122.9	41.1
China	0.2	0.4	3.2	78.0	210.9	151.1	56.6	351.1
Viet Nam	n/a	13.5	37.6	108.6	126.4	116.9	67.4	n/a
Developing countries	20.1	66.4	285.4	524.8	1010.4	624.9	294.7	413.0
Intra-EU	517.1	811.8	629.2	1062.4	2062.3	1646.8	1973.3	1898.4
EU27 2/	1051.1	1804.9	2516	2933.1	3875.2	2907.4	4008.8	3832.4

World 2/	1078.2	1916.1	3096.3	3865.3	5399.9	4150.1	4461.1	4407.8

Source; COMTRADE, using WITS (October 2012)

1/ Excluding intra-EU trade

2/ Including intra-EU trade

Table 5: Imports of wind-powered generating sets (HS 850231), USD millions, 2004-2011

(in descending order of 2010 values) and List of Top 10 Importers in 2010

	2004	2005	2006	2007	2008	2009	2010	2011
World 1/	**588.2**	**1064.0**	**2426.8**	**3578.5**	**4751.3**	**4641.0**	**3431.0**	**3853.1**
United States	64.1	503.8	1280.0	2365.1	2679.1	2300.6	1197.5	1289.9
Canada	93.7	41.3	183.3	108.6	545.2	435.7	895.0	546.2
Turkey	5.9	0.1	54.3	92.4	285.0	506.2	405.2	353.6
Mexico	0.1	0.2	85.3	17.1	85.4	195.3	295.3	341.4
Brazil	3.9	5.6	61.7	42.3	121.7	221.1	273.9	456.3
Japan	112.6	43.8	232.9	62.5	173.7	55.5	40.0	30.9
EU27 1/	3.3	12.5	6.8	98.2	153.3	165.6	74.7	64.5
Taiwan	2.3	67.9	49.3	123.9	90.9	124.6	36.5	45.7
Selected other reporters								
Australia	66.9	130.4	47.8	158.2	220.7	204.6	21.7	154.6
China	93.3	211.5	257.1	372.0	189.3	26.4	11.5	11.7
India	2.1	6.0	4.9	0.6	2.3	1.4	3.9	9.5
Rep of Korea	31.5	22.9	59.2	33.6	102.2	37.5	2.1	2.8
Developing countries	**168.3**	**324.4**	**627.4**	**761.1**	**947.5**	**1418.0**	**1108.0**	**1390.5**
Intra-EU	632.1	1128.3	1592.3	1766.2	2157.9	2160.5	2507.1	3314.1

EU 2/	635.4	1140.9	1599.0	1864.4	2263.9	2313.8	2581.8	3378.6
World 2/	1220.3	2192.3	4019.1	5344.7	6909.4	6801.5	5938.2	7167.2

Source; COMTRADE, using WITS (October 2012)

1/ Excluding intra-EU trade

2/ Including intra-EU trade

Based on these trade figures, it is possible to make a number of observations that have implications for the nature of discussion on the WTO's role in cleanenergy governance. Some important aspects are:

- The top fivegreenhouse gas producers (China, the US, the EU, India, and Japan) are also among the top traders of solar PV panels and wind turbines. With a few variations, previous research by the International Centre for Trade and Sustainable Development (ICTSD) has revealed a similar trend in a number of other climate-friendly goods relevant to clean energy.[15]

- Emerging economies have been steadily increasing their share of exports of cleanenergy products, and their rates of growth have been much larger than OECD countries, such as the US, the EU (excluding intra-EU trade), and Japan. One country, China, is already the top exporter of solar panels, and Malaysia and Korea have steadily increased their exports, overtaking the US in 2010.In 2011, the emerging economies alone accounted for nearly 80 percent of solar PV exports and 33 percent of imports. However, for wind-powered generating sets the US and the EU remain dominant exporters, with countries like India and Vietnam registering a presence among the top five exporters. The share of developing countries (including emerging economies) for exports of wind-powered generating sets have been much lower, accounting for about 16 percent of total global exports and 26 percent of total global imports in 2011.

- China's rise in terms of solar PV exports has been dramatic; its 2011 export value was 43 times that of the value in 2004. Gains of all the other major exporters have been much more modest over the same period, rising by about double to about tenfold. China started becoming a major importer of solar panels only from 2010 onwards, after the government also initiated bids for solar power projects and launched a series of subsidies under the 'Golden Sun' programme in 2009.[16]

[15] ICTSD Global Platform on Climate Change, Trade and Sustainable Energy-Research and Analysis accessible at http://ictsd.org/programmes/climate-change/research-analysis/

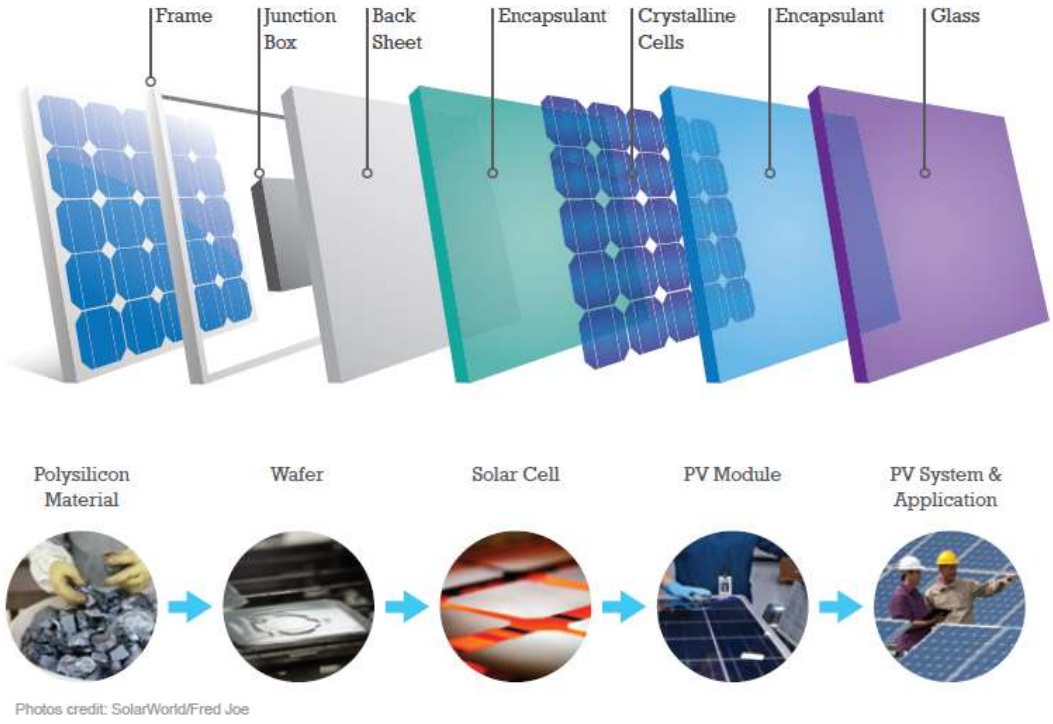
[16] Gary S. Wigmore , Shepard Liu , Yaxun Wang, and Jeffrey Rector *China Policy: Shedding Light On The Recently Enacted Solar Feed-In-Tariff*, Milbank, Tweed, Hadley and McCloy LLP, 4 Jan 2012 accessible at http://www.mondaq.com/x/159390/Renewables/China+Policy+Shedding+Light+On+The+Recently+Enacted+Solar+FeedInTariff

- Most of the top traders, in solar PV and wind turbines, but also more broadly for other clean energy goods are centred in the Asia-Pacific region. Hence, trade liberalization initiatives as well as other cleanenergy and trade-related rules, guidelines, and principles developed as part of Asia-Pacific Economic Cooperation (APEC) processes will have implications for any initiatives or discussions within the WTO.

2.5. The Relevance of Trade Policy andthe Interface between Domestic Clean Energy Policies and Trade

International trade today is largely driven by global supply chains. Companies benefit from the cost-optimization advantages of dispersing production locations for goods and services that enter at different points along the valuechain in the manufacture of a final product. This is also true for cleanenergy products, and from a climate change mitigation perspective is significant, as it enables deployment of these goods at the lowest cost possible. Every advantage that these products enjoy in terms of cost reduction helps to tilt an already uneven playing field, even if slightly, in favour of renewables relative to fossilfuels. To the extent that trade policy can contribute to lowering the deployment costs of renewables, trade policy is also contributing to climate mitigation efforts.Figure 7 below shows the value chain for the production of solar PV modules.

Figure 7: Solar Modules Components and Assembly



Source: Pew Charitable Trusts (2013), Advantage America: The US-China Clean Energy Technology Trade Relationship in 2011.

The example of the production valuechain of a solar PV module (which is at the heart of a number of trade disputes) is a good illustration of the way global value chains operate in clean energy. According to a report by Pew Charitable Trusts, *the US- China Clean Energy Technology Trade Relationship in 2011*, China and the US traded more than USD 6.5 billion in solar products. Of these, 95 percent of China's exports to the US comprised finished solar modules, and China exported USD 151 million of solar cells to the US. Both these categories

represent China's strength in massassembly and high-volume manufacturing. The US, on the other hand, enjoyed a competitive advantage in producing high-value inputs (polysilicon and wafers for making PV cells) as well as the machinery and equipment required for solar factories. Consequently, contrary to popular perception, the US actually enjoyed a trade surplus of USD 913 million in 2011 in the solar sector. Figure 8 below provides of good illustration of the breakdown of this trade.

Figure 8: US-China Solar Energy Trade Flows, 2011 (millions of US dollars).

Source: Pew Charitable Trusts (2013), *Advantage America: The US-China Clean Energy Technology Trade Relationship in 2011.*

Despite the prominent role of global value chains in clean energy goods, tensions between domestic clean energy policies and trade have often arisen. The main reason for this is that governments design cleanenergy policies in a manner that is aimed at achieving a number of other domestic policy objectives, not simply the deployment of clean energy alone. Such objectives include the creation of domestic jobs and the development of a 'green' manufacturing sector for economic strength in a strategic and fast-growing sector. These objectives often imply policies that restrict imports and often require a trade-off with acquiring and deploying cleanenergy goods and services at the lowest cost possible. Domestic cleanenergy policies may have either dejure or defacto trade effects, the former obviously intended to restrict trade and the latter restricting trade due to the manner in which a policy may be designed or applied. For instance, raising tariffs on imported cleanenergy goods or requiring a certain proportion of domestic goods and services to be used for cleanenergy projects in order to benefit from renewable energy incentives — local content requirements (LCRs) — are obviously traderestrictive. The trade impact of others are not immediately obvious, but their restrictive effects can occur due to their design or the way they are applied —for instance designing standards for clean energy products in a

manner that benefits local producers and keeps out imports. Countries may also require products to be certified by national test laboratories creating an additional burden for importers. Certain policies, such as 'hidden' subsidies provided by a country to manufacturers of clean energy goods, can also distort trade in third-country markets by providing an undue advantage for the country's exporters.

The presence of global valuechains, however, amply demonstrates why restricting trade in cleanenergy products could backfire in unexpected ways. The production of a certain good in Country A might create jobs in components or capital equipment in country B. Furthermore, the import of that good from country A could also create downstream jobs in the services sector in country B. In September 2012, the EU launched its biggest ever antidumping investigation on the import of Chinese solar panels, and in May 2013, EU Trade Commissioner Karel De Gucht urged the imposition of provisional duties of upto 47 percent on Chinese imports for 'dumping' or selling products below production cost in Europe. However, the proposed measure has drawn protests from numerous solar panel installers who argue that by making solar panels more expensive in a price-sensitive market the duty would actually destroy jobs in installation. In addition, it could also provoke Chinese countermeasures on polysilicon imports from Europe which are needed to manufacture these panels (an investigation by China is already underway). According to one estimate, European companies capture 70 percent of the value of Chinese panels sold in Europe when one accounts for European polysilicon suppliers to China and downstream installers in Europe. According to a study carried out by the German consultancy Prognos and flagged by the Alliance for Affordable Solar Energy, a coalition of mainly European companies, a 60 percent duty on Chinese solar panels could cost 240,000 European jobs over 3 years. However, the findings of this study have been contested APricewaterhouseCoopers (PwC) study on the Prognos report. PwC contends that in the US solar jobs and installations increased even after it had imposed countervailing and anti-dumping duties on Chinese solar panels in 2012.[17] Those duties had been triggered by investigations subsequent to complaints by US solar panel producers regarding unfair subsidies enjoyed by Chinese manufacturers. In response, China announced its own investigation into US subsidies in the solar, wind, and hydro-electric sectors, and Chinese manufacturers also called for anti-dumping duties on polysilicon imports from the US worth more than USD 800 million annually. Within the US, firms dependent on imports of Chinese PV modules have formed a Coalition for Affordable Solar Energy to oppose US duties on China.[18]

[17] 'Solar Flares' Analysis in the Financial Times, 10 May 2013.

[18] Ghosh, A. and Gangania, H. (2012).Governing Clean Energy Subsidies: What, Why, and How Legal?'ICTSD Global Platform on Climate Change, Trade and Sustainable Energy; International Centre for Trade and Sustainable Development, Geneva, Switzerland accessible at: http://ictsd.org/i/publications/143945/

Table 6 below shows a range of domestic sustainable energy as well as trade policies that could have direct or indirect trade impacts.

Table 6: Trade Impact of Domestic Sustainable Energy and Trade Policies

Policies with a Direct Trade Impact
Tariffs: Customs-duty Concessions and Exemptions
Export Restrictions and Export-Taxes
Market Access for Sustainable Energy Service Providers
Measures Affecting National Treatment for Sustainable Energy Service Providers
Trade-Facilitation and Transit Measures
Local-content Requirements (LCRs)
Possible Trade Impact Based on 'Design'/ Implementation/Price Signals
Renewable Energy Targets
Binding Commitments to Reduce Greenhouse Gases
Carbon and Energy Taxes
Removal/Reform of Fossil-Fuel based Subsidies
Renewable Portfolio Standards
Investment Subsidies/Grants
Investment-tax Credits. Eg: Accelerated Depreciation
Preferential Finance or Soft Loans
Income Tax Holidays
Preferential Tariffs and Premiums (including Feed-in Tariffs)
Production Tax-credits/ Generation-based Incentives
Renewable Purchase Obligations
Renewable Energy Certificates (RECs)
Government Procurement (including through competitive bidding) for SEGS
VAT and Sales Tax Reductions and Exemptions on Equipment (for instance: solar water heaters or rooftop solar panels)
Financial Incentives and Soft Loans to Purchase RE Equipment
Technical Standards/Regulations for Sustainable Energy Goods
Domestic Regulatory Measures affecting SEGS providers
No Forseeable Trade Impact
Government Assistance for Business Development
Subsidies/Grants for R&D
Power Purchase Agreements (providing stable guaranteed returns for 'X' number of years)
Net Metering

Source: ICTSD Analysis based on literature survey

As can be seen, for most policies it may not be possible to immediately discern a trade impact if there is one. It is noteworthy that local content measures and subsidies have been at the heart of recent trade disputes involving cleanenergy measures. The table in Annex 1 provides an overview of some of the major disputes to date.

In addition to the various measures listed in Table 6, a number of other measures that could have impacts on cleanenergy trade include the operation of cartels, monopolies over electricity transmission, distribution grids that favour incumbent operators, other anti-competitive practices that may affect cleanenergy goods and services exporters, investment-related restrictions and discriminatory practices favouring domestic cleanenergy goods and services, and domestic intellectual property regimes that could encourage or discourage cleanenergy technology dissemination.

From a WTO perspective, there are ways in which the multilateral trading system could play a more supportive role to facilitate greater deployment of cleanenergy goods and services. These are:

(i) *Addressing measures that restrict trade in cleanenergy goods and services* while being mindful of legitimate concerns about thepolicyspace that WTO members, particularly developing countries, may have.

(ii) *Enabling greater transparency* with regard to cleanenergy measures and policies that could restrict trade.

(iii) *Improving clarity* with regard to existing trade rulesthat may affect deployment of clean energy andexploring the need for reformulating rules and new provisions through fresh negotiations among WTO memberswith a view to ensuring greater predictability for policymakers as well as the private sector and reducing the likelihood of future trade disputes.

(iv) *Interim measures:* that the WTO could consider to reduce the immediate likelihood of tradedisputes related to clean energy policies.

3. KEY ISSUES AND IMPORTANT CONSIDERATIONS IN TRADE POLICY

While the issues at the interface of trade and clean energy policy are diverse, thissection will focus on only four issue areas in clean energy. It will highlight areas where there may be a greater priority or urgency to address trade barriers, improve transparency regarding measures that have a potential impact on trade, and facilitate better governance through greater clarity in WTO rules. It will also highlight some previous research findings on these issues by ICTSD.[19] In the end it will pose questions for further discussion on how the WTO may address these issues.

3.1. Tariffs

Tariffs on cleanenergy goods are one of the most visible barriers that can be addressed. The Doha Round of WTO negotiations included a specific mandate to 'reduce or as appropriate eliminate tariffs and non-tariff measures on environmental goods and services. However, such reduction has not been easy. This often has to do with the way that many cleanenergy

[19] Research carried out under ICTSD's Sustainable Energy Trade Initiative (SETI).

goods are classified under the HS, which may group these goods at the six-digit level (the level at which all WTO members use common HS nomenclatures) with other goods that may not have renewable energy or even environmental applications. It may be possible to locate these products in some cases by digging deeper into national tariff lines, but WTO members will then need to come to a common agreement on product nomenclatures and descriptions, as otherwise there may be uncertainty as to what good is actually being liberalized. In other cases, the same good could have both clean energy as well as other environmental applications. For instance, ballbearings and pipes could be used in wind energy projects and solar-thermal power projects as well as in other industrial applications. While some countries (Argentina and India) have proposed applying lower customs duties on ballbearings or pipes (and in fact on all goods) as long as it can be certified that they are being used in specific environmental projects, other WTO members consider such an approach as imposing administrative costs and not providing the certainty that 'bound' tariff liberalization could provide.[20] The easiest solution may be for WTO members to reduce tariffs at the six-digit level whether or not such a reduction would also apply to 'non-environmental' goods. But, many developing countries have been reluctant to apply such a 'broad-based' liberalization and argue that such liberalization should be pursued within the Non-Agricultural Market Access (NAMA) Group within the WTO rather than being initiated as part of environmental goods liberalization being discussed within special sessions of the WTO's Committee on Trade and Environment (CTE-SS). One solution could also be to start with a smaller list of clearly identifiable clean energy goods that are solely or predominantly used for environmental applications. Such a list has been identified by ICTSD based on a mapping exercise of clean energy goods in the energy supply, buildings and transport sectors.[21]

A study of tariffprofiles for a number of cleanenergy products reveals that most countries in the Organisation for Economic Co-operation and Development (OECD), including the EU and the US apply very low tariffs (5percent or below) to a large number of cleanenergy goods. Emerging developing countries, such as Brazil, China, and India apply tariffs ranging from 5 to 20 percent for a large number of cleanenergygoods and even zero (in the case of solar PV modules). Not surprisingly the highest tariffs are usually applied by lower-income countries mainly in Africa, and this could also be due to customs revenue concerns and protection of domestic industries. It may be arguable whether these tariffs make sense for such countries and how long they should be retained particularly given the need in many of these countries to provide energy access to the poor and reduce reliance on fossil-fuel imports.

[20] A reference is frequently made to 'bound' and 'applied' tariffs. Bound tariffs are the maximum 'ceiling' levels that are legally permissible under the WTO. WTO members may actually 'apply' tariffs to any extent as long as it does not exceed the permitted 'bound' levels. Such tariffs, actually in place at a given time are known as applied tariffs.

[21] See Vossenaar,R. (2010).*Climate-related Single-use Environmental Goods*, ICTSD Issue Paper No.13, International Centre for Trade and Sustainable Development, Geneva accessible at http://ictsd.org/i/publications/84489/

Previous studies indicate that tariffs do not represent the greatest obstacle to the diffusion of cleanenergy goods (Hufbauer and Kim, 2011)[22] and may be less important as a driver of international trade in these goods than other variables, such as domestic environmental regulation. However,among various environmental goods categories that cover lists of goods submitted by WTO members during the course of environmental goods negotiations, two categories of products relevant to climatechange mitigation, namely renewable energyand heat and energy management imports, showed a higher sensitivity to tariff reduction than other categories of products(Jha,V.2008).[23] Tariffs may also be the easiest barrier to address first in any trade negotiations, and for products where countries already apply very low tariffs this may not be too difficult to achieve even within the WTO.Success is,however, conditional on progress in other trade issues being negotiated as part of the Doha negotiating mandate, as under the WTO's single undertaking approach 'nothing is agreed, unless everything is agreed.' This has in fact been a big obstacle to progress on reducing tariffs in cleanenergy goods in the WTO context. However, in forums outside the WTO, such asbilateral free trade agreements, clean energy goods have been liberalised as part of broad-based liberalisation for all manufactured products., Recently as part of APEC's Vladivostok Declaration , there has been agreement to lower tariffs, albeit voluntarily and on a limited set of 54 tariff lines that does include a number of cleanenergy goods.[24]Although it is a 'drop in the ocean' in terms of measures to address climate change, tariffreduction could be a 'low-hanging fruit' and an 'easy deliverable' that the WTO could make as a contribution. In trade terms too there will certainly be gains. The World Bank estimates that a removal of tariffs alone in four categories of products — wind-power generation, solar power technology, clean coal technology, and efficient lighting — would increase trade volumes by 7.2 percent, while removing tariffs and a select set of non-tariff barriers (based on advalorem equivalents of selected measures, such as quotas and technical regulations) would increase trade volumes by 13.5 percent.[25]

A number of questions could be raised on the role of the WTO in promoting transparency and clarity to facilitate tariff reform as well as in addressing tariff barriers on cleanenergy goods in a more efficient manner given the negotiating challenges in the WTO.These include:

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[22] See Hufbauer, Gary; Jisun Kim; (2012);*Issues and Considerations for Negotiating a Sustainable Energy Trade Agreement*;ICTSD Global Platform on Climate Change, Trade and Sustainable Energy; International Centre for Trade and Sustainable Development, Geneva, Switzerland accessible at: http://ictsd.org/i/publications/133314/

[23]Jha, Veena. (2008) Environmental Priorities and Trade Policy for Environmental Goods: A Reality Check, ICTSD Trade and Environment Series Issue Paper No.7. International Centre for Trade and Sustainable Development, Geneva, Switzerland accessible at: http://ictsd.org/i/publications/32519/

[24]Sugathan,M. and Brewer,T.L. *APEC's Environmental Goods Initiative: How Climate-friendly is it?* Bridges Trade BioRes Review • Volume 6 • Number 4 • November 2012. accessible at http://ictsd.org/i/news/bioresreview/150577/

[25] World Bank, 2008; *International Trade and Climate Change: Economic, Legal and Institutional Perspectives,*World Bank Economic and Sector Work (Environment Department, Sustainable Development Network). Washington, DC.

Transparency

How can the WTO address difficulties with regard to tariff liberalization for cleanenergy products with environmental and non-environmental uses? Should it promote greater discussion among members in further refining products that can be isolated at the national tariff-lines (i.e. beyond the six-digit level) and agreeing to common product descriptions in order to facilitate liberalization?

Market Access

Could an 'early' tariff harvest on certain cleanenergy products be envisaged as a 'deliverable' in the fight against climate change? What products should be emphasized? Should already lowtariffs on certain products be reduced to zero or at least bound permanently?

3.2. Clean Energy Incentives, Subsidies and Local Content Measures

Financial incentives for clean energy are among the most important tools used by governments worldwide to support the deployment of clean energy. Such incentives can take the form of grants, capital subsidies, soft loans, and tax-credits. Subsidies for clean energy production, particularly FITs have played a major role in the rapid scaleup of grid-connected solar PV in recent years in countries like Germany and Spain, even when equipment costs remained high. While equipment costs have been declining, clean energy is, with the recent exception of solarenergy in certain locations ,still not competitive with fossilfuel based energy sources for reasons discussed earlier in Section 1. As a result, some form of support for clean energy may be required until it attains 'grid-parity' or price competitiveness with fossilfuel based electricity generation. The conflict with trade may arise if subsidies provided by one country constrain trade opportunities for another. This may happen automatically under WTO rules on subsidies if they are conditional on exports or need to be proven based on 'adverse trade impacts' and 'injury' suffered by a trading partner. Subsidies provided only to manufacturers of cleanenergy goods could very likely be traderestrictive. However, more commonly a source of trade disputes in clean energy have been subsidies and incentives linked to 'local-content' measures that mandate the use of locallymade components or technologies in cleanenergy projects so as to induce a certain degree of investment in local manufacturing. A list of LCRs in selected countries is shown in Table 7 below.

Table 7: LCRs in Clean Energy in Selected Countries

Country	Technology	LCR % (start year)	LCR % (2012)	Notes and Remarks
Brazil	Wind	60% (2002)	60% (2012)	
China	Wind	20% (1997)	70% (2009)	The LCR requirement was formally abolished in 2009
France	Solar	(2012)	60% (2012)	10% bonus on EDF repurchasing price
India	Solar	30% (2011)	30% (2011)	Feed-in tariff conditionality
Italy	Solar	Variable (2011)		5 to 10% bonus if local content used
Ontario (Canada)	Wind	25% (2009)	50% (2012)	Feed-in tariff conditionality
Ontario (Canada)	Solar	50% (2009)	60% (2012)	Feed-in tariff conditionality
Québec (Canada)	Wind	40% (2003)	60% (2012)[1]	
South Africa	Wind	35% (2011)	>35% (2012)	
Spain	Wind	70% (2012)[2]		
Turkey	Wind	Variable (2011)		Additional feed-in tariff if local content used
Turkey	Solar	Variable (2011)		Additional feed-in tariff if local content used

Source: ICTSD Research

Subsidies that are contingent, whether solely or as one of several other conditions, on the use of domestic over imported goods are clearly prohibited by Article 3.1 (b) of the WTO Agreement on Subsidies and Countervailing Measures (SCM). LCRs are themselves also prohibited by the WTO's Agreement on Trade-related Investment Measures (TRIMS). The recent decision by the WTO Panel and Appellate Body in the Ontario FITs case (Canada vs. Japan and EU) clearly ruled against the use of LCRs. The WTO dispute settlement body, however, did not rule on the legality of FITs per se. While it could be presumed that FITs by themselves do not distort trade, this is not a foregone conclusion, and much may depend on the design of the FIT scheme. In a future context where renewable electricity will be increasingly traded across international borders, FITs themselves could have trade effects if they favour domestic clean electricity providers.

An ICTSDGeneral Equilibrium) modelling study undertaken by VeenaJha shows that LCRs by themselves may have little effect on trade in cleanenergy goods unless there is a viable clean electricity sector, which means they usually have to be linked to an incentive scheme for clean electricity generation. Hence, it makes sense to examine LCRs in the cleanenergy sector in the context of cleanenergy subsidy schemes.[26]

It is clear, however, that LCRS raise costs of cleanenergy goods for domestic power producers and hinders immediate and cost-effective generation of clean electricity.

Given the increasing use of LCRs in the renewable energy sector by a number of countries, it may be asked whether there is a need to provide some sort of temporary exemption, particularly for developing countries. Often the promise of local manufacturing jobs is a way of securing local 'buy-in' for other renewable energy promotion measures that could involve higher taxes (such as carbon taxes) or higher electricity prices. At the same time, opening up the TRIMs or the SCM could be a potential 'slippery slope', altering a carefully put together balance of rights and obligations under the WTO. Further research on LCRs indicates that there is no real empirical evidence to back up claims that LCRs would have positive spillover effects, such as the establishment of a viable domestic manufacturing industry or increasing medium to long-term competitiveness and innovation, all of which could depend on a complex set of country and technology-specific factors.[27]

What could be discussed or debated may be some form of time-limited,non-renewable waiver for certain countries for LCRs and perhaps regional or plurilateral variants of LCRs set at a low local content percentage as suggested by Sherry Stephenson to dilute its protective impacts.In addition, a moratorium or standstill on future LCRS could be an option. However, as Stephenson herself has argued — in the interests both of the global economy and efficient renewable energy production by developing as well as developed countries — less distorting options and alternatives for dealing with LCRs should be considered. It mustalso be borne in mind that once LCRs become a mainstay and expectation of local businesses, the withdrawal of government support will often be met with fierce resistance, and the LCRs themselves may do little to increase competitiveness of domestic firms or create jobs in services segments of the value chain, such as installation and maintenance.[28]

Identifying potentially trade-distorting subsidies can be a challenge. Another challenge would be ensuring they are captured by the definition of a 'subsidy' under the SCM. For instance, a grant of 'free' land to cleanenergy equipment manufacturers could confer a 'benefit' as required by the SCM, but it does not likely fall within the parameters of a

[26]Jha,V. (2013, Forthcoming), Removing Trade Barriers on Selected Renewable Energy Products in the Context of Energy Sector Reforms: Modelling the Environmental and Economic Impacts in a General Equilibrium Framework, International Centre for Trade and Sustainable Development, Geneva, Switzerland.
[27]Kuntze, J.C. and Moerenhout, T. (2013, Forthcoming) Local Content Requirements and the Renewable Energy Industry – A Good Match?International Centre for Trade and Sustainable Development, Geneva, Switzerland.
[28]Stephenson,S.(2013, Forthcoming),Addressing Local Content Requirements in a Sustainable Energy Trade Agreement, International Centre for Trade and Sustainable Development, Geneva, Switzerland.

'financial contribution' as laid out by the SCM. While the SCM also lays down a notification process under Part VII, information on subsidies is often incomplete or non-existent. This represents a serious lacuna in WTO practice in an important policy area.[29]

In a recent ICTSD paper on cleanenergy subsidies[30], ArunabhaGhosh and HimaniGangania highlight a number of sources of policy tensions surrounding cleanenergy subsidies (See Box 1 below). They point out that individual country policies, emerging disputes, and lack of clarity on exceptions to WTO rules underscore the tension between maintaining non-discriminatory trade practices while also promoting greater and faster adoption of clean energy. There is thus a need for greater legal and policy clarity and perhaps the need for a re-examination of the SCM. For instance, Article 8 included a list of non-actionable subsidies, such as for research and development (R&D) and for environmental protection, but this provision lapsed in 2000.[31]It is not clear whether the exceptions under Article IXXofthe General Agreement on Tariffs and Trade (GATT) for environmental or health protection for instance could apply to the SCM.In any case, it may be worthwhile for the WTO members to consider the design and nuancesof various clean energy support schemes.

Box 1: Policy Tensions Surrounding Clean Energy Subsidies

1. **The Environmental Imperative**: the support needed to cover the incremental costs to enable cleanenergy sources to reach 'grid-parity' or cost comparability with fossil-fuel energy sources. The tensions arise from the question of how the incremental costs will be covered, and whether the financial support will be sustained over a period sufficient to scale up deployment of new and emerging clean energy technologies. Many countries will also desire flexibility in terms of pathways to pursue a 'green' and 'low-carbon' economy and this will determine how cleanenergy subsidies are governed. However, different types of subsidies may also have differential impact on consumers, project developers, and equipment manufacturers at home and abroad.

2. **The Technology Imperative:** Technological initiatives including research, development and deployment through for example joint-venture partnerships will require some form of support. The question is how partner countries can or should support these joint ventures, such as through direct financial transfers or by contributions in kind — and how the fruits of such labour are to be shared.

3. **The Economic Imperative**: Countries may resort to subsidies to ensure economic viability and attractiveness of the renewable energy sector for investors, particularly during times of recession. However, periods of recession could also see subsidies that assume mercantilist purpose, especially if domestic industrial development, manufacturing capacity and employment generation come at the expense of other countries. Governments, and firms, are interested not only in the collective good of cleaner, low-carbon energy, but also in industrial and economic competitiveness

4. **The Trade Imperative:** Mercantilist policies discriminate between foreign and domestic firms within a country. They can also discriminate between imported clean energy products and local manufactures. Subsidies could be granted to promote clean energy exports, making domestic firms more competitive in the international market. The impacts of such policies are already being felt today leading to high-profile trade disputes between countries such as Canada vs. EU & Japan and China vs. the US &EU.

[29] WTO, *World Trade Report 2006*, accessible at http://www.wto.org/english/res_e/booksp_e/anrep_e/wtr06-2f_e.pdf

[30]Ghosh, A. and Gangania, H. (2012).Governing Clean Energy Subsidies: What, Why, and How Legal?'ICTSD Global Platform on Climate Change, Trade and Sustainable Energy; International Centre for Trade and Sustainable Development, Geneva, Switzerland accessible at: http://ictsd.org/i/publications/143945/

[31] WTO, *World Trade Report 2006*, accessible at http://www.wto.org/english/res_e/booksp_e/anrep_e/wtr06-2f_e.pdf

Source: *Ghosh, A. and Gangania, H. (2012). Governing Clean Energy Subsidies: What, Why, and How Legal?' ICTSD Global Platform on Climate Change, Trade and Sustainable Energy; International Centre for Trade and Sustainable Development, Geneva, Switzerland*

Following the issues that have arisen in recent cleanenergy disputes and based on the findings of the paper by Ghosh and Gangania, it may be worthwhile to raise the following questions that the WTO could consider:

Transparency

- Is there a need to consider improved or enhanced notification processes for cleanenergy subsidies?
- Should,and if so how could, relevant WTO committees debate the nature, purpose, scale, and impact of different types of cleanenergy subsidies so as to help clarify individual country measures (for instance at WTO Trade Policy Reviews)?

Clarity in Existing Subsidy Rules/Development of New Rules

- Should there be a review of the definition of a 'subsidy' under the SCM so as to better capture certain types of clean energy subsidies that could have a potential impact on trade? Could this be linked to the debate on clean energy subsidies by WTO committees as highlighted above?
- Should there be a clear window of exemption for certain types of subsidies for instance under a revived 'non-actionable' category of subsidies?
- Should a time-limited exemption be granted to certain types of local-content measures in clean energy, for instance for developing countries, given the increasing frequency of use with the phase-out being strictly monitored by the WTO?
- Should discussions on rules take into account the different natures and coststructures of various clean energy technologies, i.e. should there be differentiation in rules to respond to differentiation in technologies, or should the same rules apply (keeping in mind the objective is cost-effective attainment of climate change goals and related environmental, social, and economic benefits)?

3.2.1. Services

Trade in services plays a critical role in the deployment of clean energy and comprises a major input into clean energy projects. A number of projects are actually built by engineering, procurement, and construction (EPC) contractors to whom these projects are outsourced by power producers. After the project is commissioned there is still a need for maintenance and often monitoring. Producers may also rely on external sources for data, such as on windspeeds and solar radiation levels. Trade in services also spills over into the realm of foreign direct investment if it involves the commercial presence of a foreign services provider (also known as Mode 3). Other modes of trading services are through cross-border delivery, for instance of consulting or monitoring services over the Internet (Mode 1); the movement of consumers abroad to consume a service, such as in tourism or

technicians travelling abroad to obtain training at a foreign institute (Mode 2); or the temporary movement of service personnel abroad to deliver the service, such as for example Spanish technicians moving temporarily to India to carry out repair work at a solar thermal power plant (Mode 4).

A mandate for the liberalization of environmental services is also contained in Paragraph 31 (iii) of the Doha mandate. The pace of liberalization has progressed very slowly at the WTO. As of August 2008, only 48 WTO members had made commitments in environmental services as compared to 100 members on financial services. Commitments in environmental services have been selective and do not cover all sub-sectors. For instance, most commitments have been on environmental sanitation and sewage treatment. Further liberalization may be boosted through ongoing discussions on a plurilateral International Services Agreement within the WTO. (see below)

An important consideration for liberalizing clean energy services within the WTO would be to re-examine approaches for classification of such services under the General Agreement on Trade in Services (GATS). The classification issue is closely linked with the type of barriers that will be relevant to address for clean energy services trade. Given that classification of environmental services is based on the Central Product Classification (CPC) categories, most of the environmental services listed (except possibly 'Other Environmental Services) may not adequately capture a number of clean energy services particularly in critical areas such as design and installation, and construction and maintenance,etc. for renewable energy projects. It is likely that a number of horizontal policies, such as procurement and visa restrictions and even restrictions on the use of electronic payment methods, such as credit cards, for foreign transactions could have a restrictive effect on not only environmental services, but also sustainable energy services.

A number of papers including those commissioned by ICTSD have highlighted various perspectives on the need for a clearer classification.[32] One is that the absence of an appropriate classificationmust not and should not prevent WTO members from negotiating on climate change-related services. What is more important is to ensure that each schedule is internally coherent by avoiding overlap among sectors and defining the scope of the commitments clearly and precisely. [33] The WTO Secretariat in a recent note to WTO members, suggested several ways in which clean energy services can be classified. The Secretariat started by confirming the lack of explicit reference to services related to

[32]For instance, see Kim, Joy A. (2011*) Facilitating Trade in Services Complementary to Climate-friendly Technologies*; Environmental Goods and Services Series; Issue Paper 16, International Centre for Trade and Sustainable Development, Geneva, Switzerland and Monkelbaan,J. (2013, Forthcoming) Sustainable Energy Services in a SETA:Sustainable Development Aspects of Trade in Services Related to Renewable Energy Supply, International Centre for Trade and Sustainable Development, Geneva, Switzerland

[33]One issue that is important in relation to the classification of environmental services is how to classify "new" activities, particularly in the sector undergoing significant technological development. The field of carbon capture and storage may be a case in point (Cossy, 2011).

renewable energy or energy efficiency in both the Sectoral Classification List (W/120) and the CPC and the neutrality of classification of energy-related services i.e. it is neutral with respect to the energy source (clean energy services cannot be distinguished from services related to fossil fuels). The only explicit reference made to renewable energy is found in "engineering services for power projects" (CPC2 83324). Whatever the approach used it will be important to give consideration to new and emerging technologies, such as carbon capture and storage and 'smart-grid' related services. Smartgrid for instance would cut across several W/120 sectors, including telecommunication and computer services as well as others that are perhaps incidental to energy distribution.According to the paper, engineering services together with construction services are keywithin the category of 'other professional, technical and business services' in delivering effective public services and electricity generation and transmission. Engineering services, which predominantly entail advisory, design, consulting, and project management functions, complement construction services. Therefore, many firms provide integrated packages of engineering and construction services. While developed countries have historically dominated the markets in many sustainable energy services, existing data reveal that countries like Brazil, India, the Russian Federation, and Singaporeare exporters of 'other professional, business and technical services.'

This raises another issue. While clean energy services and goods are often provided in an integrated manner, negotiations on liberalizing these two are being carried out separately within the WTO—the former in the CTE-SS and the latter in the Council for Trade in Services (special session). It may be appropriate to ensure some level of coordination between the two negotiations so as to ensure a coherent outcome on clean energy services.

Presently in terms of negotiating modalities for services liberalization, a significant development within the WTO has been the agreement on 5 May 2012 by a group of WTO Members-'the Really Good Friends of Services' to start negotiations towards a plurilateral 'International Services Agreement' (ISA). These members include key countries that make up a strong majority of services traders—the US, Canada, the EU, Norway, Switzerland, Australia, New Zealand, Hong Kong, South Korea, Japan, Singapore, Taiwan, Mexico, Chile, Colombia, Peru, Costa Rica, Israel, Pakistan, Turkey and Iceland. Negotiations commenced in March 2013 and the options are to negotiate it within the WTO as a plurilateral agreement similar to the Government Procurement Agreement (GPA) or an agreement outside the WTO as permitted by GATS Article 5. The agreement would supposedly provide a new platform where the parties could work to build stronger international consensus on new and improved rules to address emerging issues. It will remain to be seen whether this will provide a boost to liberalization of clean energy services and whether major countries like Brazil, China, and India that have been critical of a plurilateral agreement could accede at a

later stage.[34] Given the limited liberalization commitments in major clean energy service sectors, such as construction and engineering (see Tables 8 and 9 below-autonomously they may have liberalized to a much greater extent) any progress made in this regard by an International Services Agreement (ISA) would be commendable.

Table 8: Sectoral commitments on other professional, technical and business services[35]

Major Exporters/ Importers	Architectural services	Engineering services	Integrated engineering services	Other business services;			
				c. Management consulting services	e. Technical testing and analysis services	j. Services incidental to energy distribution	m. Related scientific and technical consulting services
Australia (E/I)*	/	/	/	/	/	/	/
Brazil (E/I)	0	0	X	/	X	X	X
Canada (E/I)	0	0	0	0	/	X	0
EU ** (E/I)	0	0	0	0	0	X [0]	X
India (E/I)	X	0	X	X	0	X	X
Korea, Rep. (E/I)	0	/	/	/	0	X	/
Norway (E/I)	/	/	/	/	/	X	/
Singapore (E/I)	/	0	X	/	X	X	X
United States (E/I)	0	0	0	/	X	/	/

[34]Library of the European Parliament, *International Services Agreement: Towards a new plurilateral trade Agreement*, 1 March 2013 accessible at http://libraryeuroparl.wordpress.com/2013/03/01/international-services-agreement-towards-a-new-plurilateral-trade-agreemeent/

[35]The classification of sub-sectors in all the tables is based on W/120.

Source: Derived from the WTO Services Data base on Members' Commitments Schedule and Initial Offers as well as Revised Offers (TN/S/O and TN/S/O rev.1).

Note: √ =Unrestricted commitment, x=No commitment, O=Limited commitment

[ ] = A new commitment included in the EU's 'revised offer' during the Doha Round.

*** E/I=Major exporters as well as major importers**

**** Among the EC member states, Cyprus and Malta have not made any commitment on "other professional, technical and business services" group.**

Table 9: Sectoral Commitments on Construction services

Major exporters/ importers	General construction work for buildings	General construction work for civil engineering	Installation and assembly work	Other: site investigation work
China (E/I)	O	O	O	O
EU** (E/I)	O	O	O	O
Egypt, Arab Rep. (E)	X	O	O	O
India (E/I)	X	O	X	X
Japan (E/I)	O	O	O	O
Malaysia (E/I)	O	O	O	O
Singapore (E)	O	O	O	O
Turkey (E)	O	O	O	X
United States (E/I)	O	O	O	O

Source: Derived from the WTO Services Data base on Members' Commitments Schedule and Initial Offers as well as Revised Offers (TN/S/O and TN/S/O rev.1).

Note: X=No commitment, O=Limited commitment

E/I=Major exporter as well as importer

*** Among the new EU member states, Cyprus, Hungary, and Malta have not submitted their commitments schedules on the construction services sector. Finland has made a partial commitment on this sector.**

The Doha mandate also provides for the development of new disciplines in safeguards procurement and subsidies in services pursuant to Articles V, X and XIII of the GATS, although little to no progress has been made. However, any future disciplines could have positive implications for the trading climate in renewable energy services by offering greater predictability and clarity.

A few (non-process related) questions on clean energy services trade that the WTO could consider could be:

Transparency

- Should the WTO try to enable a better classification of clean energy services and promote a uniform approach in this regard to facilitate negotiations? (Presently members can use whatever classification approaches they wish as long as the sectors are mutually exclusive)

Market Access

- Will the ongoingplurilateral services negotiations for an ISA facilitate addressing market barriers? Should there be a 'critical-mass' of countries that should participate including from a climate change perspective?

Clarification of existing-rules/Development of new rules

- What rules need to be clarified as far as trade in clean energy services is concerned? What new rules need to be developed? Is this a realistic possibility in the short to medium term?

3.2.2. Government procurement policies

Government procurement for sustainable energy and related equipment and services can play an important role as a driver of demand for clean energy goods. Energy-efficient government procurement was also identified by the Intergovernmental Panel on Climate Change (IPCC) as a possible policy tool to address climate change,[36]and many governments prefer to use procurement policies as a tool for promoting domestic clean energy capacities and industry. At the same time, procurement policies can also discriminate against foreign suppliers by favouring domestic suppliers in a dejure or defacto manner. This could result in restricted opportunities for trading partners. Greater transparency in clean energy procurement policies would enable foreign goods and services providers to clearly understand the criteria and requirements.

Because of their effect on trade, these discriminatory practices have been addressed in WTO law and more particularly in the GPA. The United Nations Commission on International Law (UNCITRAL)Model Law on Procurement of Goods, Construction and Services, the APEC non-binding guidelines on government procurement, and other regional non-binding instruments are an attempt to regulate public procurement as well. Also many free-trade agreements (FTAs) include "WTO-plus" obligations to regulate public procurement.

While transparency in government procurement was one of the issues included under the Doha Ministerial declaration, it was eventually dropped from the Doha agenda in the aftermath of a failure to reach an explicit consensus in Cancun. The GPA, which came into

[36]Cottier,T.,Malumfashi,G.,Matteoti-Berkutova,S.,Nartova,O. , De Sepibus,J., and Bigdeli,S. (2010).*Energy in WTO Law and Policy* accessible at: http://www.wto.org/english/res_e/publications_e/wtr10_7may10_e.pdf

effect on January 1, 1996, also provides a framework for procurement issues. The GPA was initially intended to apply to all WTO members, but this proved impossible. Consequently, the GPA constitutes one of the few plurilateral agreements within the WTO legal framework, creating obligations and rights only for WTO members that have signed it. In December 2011, parties meeting at the ministerial level in Geneva formally approved a revised version of the GPA, which also significantly improved market access in procurement as WTO members committed to extend coverage to new sectors as well as government entities.The cardinal rule in the GPA is that standards and/or technical regulations 'shall not be prepared, adopted or applied with a view to, or with the effect of, creating unnecessary obstacles to international trade.Similarly, any technical specifications inserted in the tender 'shall be in terms of performance rather than design or descriptive characteristics.'[37]

From the perspective of promoting trade in sustainable energy goods and services, it may be useful to examine specific issues of concern as highlighted in an ICTSD paper by Alan Herve and David Luff. A major lack of clarity in the GPA as it exists, according to the authors, is the extent to which provisions of non-discrimination as contained in the GPA would permit the use of procurement policies that explicitly favour clean energy goods and services against non-sustainable ones if they have the effect of favouring particular regional suppliers. One example could be a requirement to use energy-efficient methods in the delivery of a service. Unlike the Agreement on Technical Barriers to Trade (TBT), Article IV of the revised GPA does not contain any reference to 'likeness', as public procurement provisions are mostly addressed to suppliers and procuring entities of countries. However, while a possible justification could exist under the general exceptions provisions of the GPA that mirrors Article XX although any preference based on process and production methods (PPMs) cannot be presumed.Cottier. et.al have raised the issue that GPA Article XXIII does not contain the equivalent of the words 'relating to conservation of natural resources,' as found in GATT Article XX (g).[38]

The revised version of the GPA contains two new provisions suggesting that requirements can be included in standards or labels. This would be particularly useful, for instance, when a standard or a label specifies that a good or a service must be produced through energy-saving methods.

Luff and Herve contend that it would be helpful if such ambiguity could be clarified and provisions expressly allow for promotion of clean energy goods and services by public purchases. The recently revised GPA specifies that sustainable procurement should be one of the subjects for future GPA negotiations.[39] It will be interesting to examine the implications of these negotiations on future trade in clean energy goods and services from both a market access anda rule-creation perspective.

[37] Ibid.
[38] Ibid.
[39] Herve, Alan and David Luff (2012); Trade Law Implications of Procurement Practices in Sustainable Energy Goods and Services; International Centre for Trade and Sustainable Development, Geneva, Switzerland

A number of issues the WTO could address with respect to procurement of clean energy goods and services would be:

Transparency

- How can transparency be improved with respect to procurement measures in clean energy goods and services?

Market Access

- Can future negotiations on sustainable procurement as mandated in the revised GPA contribute to addressing procurement-related market access for clean energy goods and services?

Clarification of existing rules/development of new rules?

- How can rules be clarified or developed further under a future GPA that provides greater certainty and predictability or perhaps an explicit exception allowing governments to use green-procurement measures without running afoul of WTO rules prohibiting discrimination against 'like' products?

3.2.3. Clean energy equipment standards and certification

Standards depending on how they are designed and applied may be among the most important non-tariff measures to affect trade in clean energy goods. Under WTO law, standards that are mandatory are known as technical regulations. Technical standards and regulations have an important role in ensuring safe and reliable performance of clean energy equipment. They are also relevant for clean energy services. For instance, installation of solar equipment can be done effectively only by properly trained and certified installers. Technical standards are important in conveying confidence and trust between manufacturers, operators, owners, financial institutions, and government authorities. Standards can either be based on 'design' or 'performance'. Greater harmonization of standards enables easier and quicker deployment of equipment across projects and countries supporting the development of economies of scale. Minimum performance standards for equipment are also necessary for clean energy producers to obtain project-specific financing from commercial banks, in other words to enable projects to be 'bankable.' Standards are also important in enabling trade in energy-efficient goods. Given that many energy-efficient products are physically indistinguishable from their less energy-efficient counterparts, labelling based on energy-efficiency standards will be an important way of differentiating such products.

Ensuring compliance with different foreign technical regulations and standards as well as getting them tested and certified involves costs for foreign producers. There are also general costs, such as translation of foreign regulations, hiring of technical experts to explain foreign regulations, and adjustments to production facilities to comply with

regulations. It is possible that countries might design and apply standards in a manner that protects their domestic producers of clean energy goods.

The TBT contains provisions intended to prevent this from happening. Article 2.2 of the TBT requires that 'technical regulations are not prepared, adopted or applied with a view to, or with the effect of, creating unnecessary obstacles to international trade. The TBT also encourages members to base national regulations or parts of them on international standards. Such standards are presumed "...not to create an unnecessary obstacle to international trade."

In reality, however, national technical regulations even if based on internationally accepted standards still throw up a number of issues. An interesting case in point is that of solar PV modules that are intensively traded.International Electrotechnical Commission (IEC) standards with local variations make up the majority of the global market and form the basis of technical regulations effectively 'required' for import of solar PV modules. The only market- significant global region that does not follow a variation of the IEC standards is North America where Underwriter Laboratories (UL) standards are currently the standards recognized by government agencies. A forthcoming ICTSD study on solar-PV equipment standards by Sunny Rai and TetyanaPayasova[40] identified the following issues that have a trade impact:

(i) Diversity of testing procedures and requirements specific to countries. For instance, in China mandatory testing requirements are to be conducted in national laboratories, which imposes additional costs for exporters.
(ii) Diversity of product requirements due to varying local conditions such as climate and electrical gridcodes. While some of these may be legitimate, it may be worthwhile to harmonize others, such as national electrical grid codes, when feasible.
(iii) Enabling standard-setting to keep pace with and not discourage new and innovative clean energy products.

Some of these issues may be outside of the WTO's regulatory reach, but in certain areas the WTO could contribute. These areas are raised below as questions for further consideration:

Transparency

- Could the TBT notification process of diverse standards for various types of clean energy equipment and services be further streamlined and made coherent? If so, how?

[40]Rai, S. and Payasova, T. (2013, Forthcoming).*Selling the Sun Safely and Effectively: Solar Photovoltaic (PV) Standards, Certification Testing and Implication for Trade Policy,*International Centre for Trade and Sustainable Development, Geneva, Switzerland.

- Should a special information system for clean energy standards be created based on the proposed WTO/InternationalOrganization for Standardization (ISO) Standards Information System and the ISO/IEC Information Centre

Clarification of existing rules/development of new rules

- Certification requirements appear to be more burdensome than the actual standards per se. What can the WTO do to further discipline unnecessary and costly certification requirements?

- The GATS does not contain detailed rules for technical requirements for services, such as installation of clean energy equipment. These may include qualifications, licensing requirements etc. and are classified under domestic regulation addressed under Article VI of the GATS. The Working Party on Domestic Regulation has been established to develop coherent horizontal disciplines on domestic regulation for services, but so far it has developed only special rules for the accountancy services sector. Should new rules be similarly developed for the clean energy services sector?

- The effect of technical regulations that are not adopted by central governments still may have a crucial negative impact on trade in PV products. Should Article 2.1 and 2.2 of the TBT also explicitly discipline such regulations?

- Similarly, current TBT disciplines do not sufficiently address standardization activities of local governments and non-governmental bodies. What can be done in this regard?

4. WTO PROCESS-RELATED ISSUES AND SYSTEMIC QUESTIONS

While the previous section dealt with specific issues of substance and some key areas of intersection of clean energy and trade policies, this section will briefly raise a number of process-related issues and questions under the three thematic headings followed in the previous sections, namely (i) improving transparency (ii) enhancing market access and (iii) clarifying existing rules and developing new ones. While disputesettlement is another obvious area that has been under the spotlight, this section will not address dispute settlement. Rather, it will argue that proactive steps taken by the WTO to improve transparency, enhance market access, and clarify and develop rules could lessen the need for WTO dispute settlement. Indeed, the increasing number of renewable energy dispute cases in the WTO underscores this. The WTO is at a crossroads. The Doha Round has not reached a successful conclusion even after a decade of negotiations, and trade negotiations are increasingly shifting to regional forums. Despite this, the WTO remains the only multilateral trade institution with binding rules and an effective dispute settlement system. It is also the only trade institution that brings all major greenhouse gas emitters — developed as well as developing — under a single set of trade-related rules and obligations. Thus, any contribution it makes toward advancing climate goals will be significant, politically as well as economically. However, because the WTO operates under a 'single undertaking' framework and by consensus, it will not find it easy to speedily advance in negotiations or quickly take innovative decisions required to facilitate the global scaleup of clean energy. Progress may need to come incrementally, and the focus may have to be first on easily attainable reforms and issues. In other words 'fine-tuning the WTO's engine' will be easier than aiming at a rapid overhaul or transformation. Yet, in the process of doing so, the WTO could take lessons from developments in other forums that deal with clean energy and trade issues, notably APEC, as well as innovative bilateral and regional trade agreements that address clean energy issues and agreements, such as the Energy Charter Treaty which hasdeveloped comprehensive rules on energy transit.

Some major process-related problems under the WTO are:

Fragmentation: Issues of clean energy fall under the scope of a number of WTO Agreements-GATT, GATS, the SCM, the TRIMs, the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPs) and the GPA. Rules on anti-dumping and countervailing measures and steps taken pursuant to those rules could also affect market access opportunities for clean energy goods. While the diversity of rules and applicable agreements is understandable, it also leads to a fragmented approach in viewing trade issues for clean energy goods and services. For instance, there are notification requirements under various agreements, but a lack of systematic collection or compilation of measures affecting the clean energy sector. Similarly, negotiations on environmental goods and services are fragmented, each taking place in their respective committees despite the fact that these goods (including clean energy goods and services) are traded together. Ways need to be explored by the WTO to reduce fragmentation in terms of notification processes as well as

negotiations. Some experts are of the opinion that fragmentation in terms of rules on energy can be addressed only through a Framework Agreement on Energy. (For instance see Thomas Cottier, et.al.)[41]

Negotiating market-access challenges in clean energy goods and services: The challenges that have faced WTO negotiators in negotiating market access for clean energy goods and services are well-known and well-documented. (For instance, see Claro, Lucas and Sugathan, 2007).[42] At the same time, talks on opening up markets have made faster progress in forums, such as APEC, where members agreed to liberalize tariffs on a set of 54 product categories to 5 percent or less by 2015. While it could be argued that APEC members were able to achieve such progress because they were unconstrained by a 'single-undertaking" and that initiatives are voluntary and the outcome is non-binding, perhaps the WTO could also examine the ways and processes followed in APEC to see whether something could be borrowed that could help catalyse progress within the WTO context —such as, for instance, involvement of private sector associations in working groups and peerreviews of voluntary liberalization initiatives in services. Similarly, the WTO could explore ways in which the results of the APEC agreement on environmental goods could be built upon.Plurilateral initiatives concluded within or outside the WTO could also hold lessons for addressing market challenges in clean energy goods and services. For instance, the WTO's Informational Technology Agreement (ITA) is a successful example of an agreement triggered by the participation of a 'critical mass' of interested countries with a certain percentage of world trade extending benefits to all members (even non-participating ones) on a most-favoured nation (MFN) basis. On the other hand, the government procurement agreement (GPA) and the proposed ISA are based on a 'closed' model with benefits being enjoyed only by signatories. Such agreements could be one way of making progress by 'like-minded' countries in addressing market access barriers on clean energy goods and services. However,the procedural steps, legality,and pros and cons of such agreements within or even outside of the WTO will need to be carefully evaluated, particularly if they go beyond market access and enter the 'rules' arena. An ICTSD paper by Matthew Kennedy provides a detailed assessment of various legal aspects that may need to be considered in pursuing various plurilateral options for a sustainable energy trade agreement.[43]

Lack of clarity and coherence in rules: This is also a major area of concern for clean energy goods and services. Effectively fulfilling the Doha mandate could address some aspects of

[41]Cottier,T.,Malumfashi,G.,Matteoti-Berkutova,S.,Nartova,O. , De Sepibus,J., and Bigdeli,S. (2010).*Energy in WTO Law and Policy* accessible at: http://www.wto.org/english/res_e/publications_e/wtr10_7may10_e.pdf

[42] Claro, E., Lucas, N., Sugathan, M., Marconini, M. and Lendo, E. (2007).*Trade in Environmental Goods and Services and Sustainable Development: Domestic Considerations and Strategies for WTO Negotiations*.ICTSD Environmental Goods and Services Series, Policy Discussion Paper, International Centre for Trade and Sustainable Development, Geneva, Switzerland accessible at http://ictsd.org/i/publications/12517/

[43] Kennedy, Matthew (2012);Legal Options for a Sustainable Energy Trade Agreement;International Centre for Trade and Sustainable Development, Geneva, Switzerland, www.ictsd.org accessible at http://ictsd.org/i/publications/138050/

this, such as through the development of subsidies and procurement rules in services. The lack of a formal negotiating mandate may make it difficult to draft new rules or re-open existing ones. Nevertheless, discussion among WTO members on where such rules should most usefully be developed or clarified would be worth having in the WTO. Some examples of issues where rules may need to be clarified or new rules need to be developed have been provided in the previous section. It is also likely that new innovative or technological developments in the clean energy sector will raise the need for new rules even though there is no formal negotiating mandate. Perhaps such discussions on a regular basis could also be given an outlet in some form without the fear of upsetting the balance of rights and obligations of WTO members.

Following an identification of these main problems, a number of questions that could be raised for further discussion are provided below:

Increasing Transparency

- What can the WTO do to increase transparency on cleanenergy measures that could have a trade impact? Is this something that could be 'worked into' existing mechanisms (such as the Trade Policy Review Mechanism and various notification procedures) or is there a need to create completely new mechanisms?

- Should there be strict penalties for non-notification of measures that have a potential trade impact?

- How can various notification processes be 'clustered' in a coherent manner so as to obtain an easy overview of measures prevailing in the clean energy sector? For instance, should subsidies andstandards affecting the solar PV sector be 'gathered' together? Which WTO body should be responsible?

Enhancing Market Access

- How can fragmentation in negotiations on clean energy goods and services be avoided? Should some kind of formal mechanism within the WTO ensure this?

- How can the WTO discuss and draw lessons from positive developments in market access negotiations on clean energy goods in other forums, such as the APEC and RTAs? Where should such discussions take place?

- Should discussions on plurilateral initiatives within the WTO be considered for clean energy goods? Are there systemic risks involved?

Clarifying Existing Rules and Developing New Rules

- Should already agreed upon WTO rules be re-opened for discussion and new rules be created? Or, is constructive ambiguity better despite the burden it places on the Dispute Settlement Understanding (DSU)? If it is decided that new rules are necessary, should such rules be part of a separate framework agreement or developed within the various individual agreements?

- Given that in most instances, there is no negotiating mandate, how can discussions on rule clarification or development proceed within the WTO setting? Should the focus be on what can be done within the existing mandates and negotiatingorworking groups? Should new forumsorworking groups be created?

- Annex Table A2 provides an overview of some of the main questions that could be raised on clean energy and trade in terms of both substance as well as process.

In addition to these points, it may be worth considering other interim, stop-gap measures the WTO could take to reduce the likelihood of trade disputes related to clean energy policies until meaningful progress may be made on the other pillars — market access, transparency, and rules.

Annex Table A: 1: An Overview of Some Prominent Clean Energy Trade Disputes

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
1.China-Measures Concerning Wind Equipment	Dec 2010 (DS 419)	China	United States	Grants, funds, or awards to enterprises on condition of manufacturing wind power equipment (including the overall unit, and parts thereof) in China	(i)GATT 1994: Art. XVI:1 (ii)Subsidies and Countervailing Measures: Art. 3, 25.1, 25.2, 25.3, 25.4 (iii)Protocol of Accession: Part I, para. 1.2	Measure unilaterally revoked by China in Feb 2011
2.Canada-FiT programme	Sep 2011 (DS 412 and 426)	Canada	EU and Japan	Local content requirements (LCRs) in Ontario's Feed in Tariff programme for wind and	(i)GATT 1994: Art. III:4 (ii)Subsidies and Countervailing Measures: Art. 1.1, 3.1(b), 3.2	Resolved-2013. (Appellate Body Report DS 426).

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
				solar PV	(iii)Trade-Related Investment Measures (TRIMs): Art. 2.1	Appellate Body rules Canada's measure inconsistent with GATT Article III and TRIMS Article 2
3. US Trade Remedies Application on Solar Panel Imports from China	Oct 2011	China	US (on basis of complaints by domestic solar panel manufacturers to US Commerce Department)	Alleged Chinese subsidisation of its solar panel manufacturers		(i)Countervailing duties imposed by US on March 2012 after finding of 'injury' (ii) Higher anti-dumping duties imposed by US on May 2012 after determination of 'dumping' by Chinese

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
						panel manufacturers.
4. US Trade Remedies Application on Wind Tower Imports from China and Vietnam	Dec 2011	China and Vietnam	US	Alleged Chinese subsidisation of wind tower manufacturers and dumping by Chinese and Vietnamese exporters		Preliminary CVduties (on Chinese imports) and AD duties (on Chinese and Vietnamese imports) announced by US Department of Commerce in May and July 2012. Final duties announced in Dec 2012
5.Chinese AD and CVD investigation on polysilicon	Nov 2012	US, EU and Korea	China	Alleged subsidisation and dumping of solar grade polysilicon by US, EU and		Investigation ongoing

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
imports from EU, US and Korea				Korea		
6.US-Countervailing duty measures on certain products from China	May 2012 (DS 437)	US	China	Various aspects of certain identified countervailing duty investigations by the US, including their opening, conduct and the preliminary and final determinationsleading to the imposition of CVDs. China also challenges the "rebuttable presumption" allegedly established and applied by the US Department of	(i)Article VI of the GATT 1994; (ii)Articles 1.1, 2, 11.1, 11.2, 11.3, 12.7 and 14(d) of the SCM Agreement; and (iii)Article 15 of the Protocol of Accession of China.	Panel composed on 26 Nov 2012

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
				Commerce that majority government ownership is sufficient to treat an enterprise as a "public body".		
7. EU Trade Remedies on Solar Panel Imports from China	Sep 2012 (Anti-dumping investigation launched) Nov 2012 (Investigation of subsidisation launched)	China	EU (on basis of complaint by the EU Pro Sun coalition, a group of 25 European solar panel manufacturers headed by the German-based SolarWorld.)	Alleged dumping and subsidisation by China of solar panels and cells and wafers used in production of solar panels		EU's planned anti-dumping duties expected to be approved by June 2013. Reports of potentially negotiated settlement of cases involving the US, EU and China. Investigation into subsidies

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
						ongoing.Results expected by Aug 2013.
8.EU-Certain Measures Affecting the Renewable Energy Generation Sector	5 Nov 2012 (DS 452)	EU	China	Domestic content restrictions affecting the renewable energy generation sector relating to the feed‑in tariff programs of EU member States, including but not limited to Italy and Greece.	(i)GATT 1994: Art. I, III:1, III:4, III:5 (ii) Subsidies and Countervailing Measures: Art. 1.1, 3.1(b), 3.2 (iii)Trade-Related Investment Measures (TRIMs): Art. 2.1, 2.2	In consultations

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
9.EU Trade Remedies on Solar Glass from China	15 January 2013	China	EU (on basis of complaint filed by ProSun Glass an adhoc group representing EuropeanSolar Glass manufacturers.	Alleged dumping by China of solar glass-used primarily though not exclusively in the production of solar panels and accounting for four percent of panel costs.		Investigation ongoing. Provisional findings expected by Dec 2013.
10. India-Certain Measures Relating to Solar Cells and Solar Modules	6 February 2013 (DS 456)	India	US	Domestic content requirements under India's Jawaharlal Nehru National Solar Mission ("NSM") for solar cells and solar modules.	(i)GATT 1994: Art. III:4 (ii)Trade-Related Investment Measures (TRIMs): Art. 2.1	In consultations

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
					(iii)Subsidies and Countervailing Measures: Art. 3.1(b), 3.2, 5(c), 6.3(a), 6.3(c), 25	
11. EU-Certain Measures on the Importation and Marketing of Biodiesel and Measures Supporting the Biodiesel Industry	15 May (DS 549)	EU	Argentina	Two types of measures adopted by the EU and certain member States: (a) measures to promote the use of energy from renewable sources and to introduce a mechanism to control and reduce greenhouse emissions; and (b) measures to establish support schemes for the biodiesel	(i) GATT-1994: Articles I:1, III:1, III:2, III:4 and III:5 (ii) SCM Agreement: Articles 1.1, 2.3, 3.1(b), 3.2,5(b), 5(c) and 6.3(a) (iii) TRIMS Agreement: Articles 2.1 and 2.2 (iv) TBT Agreement: Articles 2.1, 2.2, 5.1, 5.2 (v) WTO Agreement: Article XVI:4	In Consultations

Dispute Name	Year of Dispute Initiation/ WTO Case No: (1.For WTO cases-date of request for consultations 2. In Trade Remedy cases date of filing of complaint by private sector or launch of investigation)	Defending/ Targeted Country (ies)	Complainant (s)	Measure	WTO Relevant Articles raised in complained	Dispute status and year of resolution (if applicable)
				sector.		

Sources: World Trade Organization, *Chronological List of Dispute Cases accessible at www.wto.org and ICTSD Bridges Weekly Trade News Digests accessible at www.ictsd.org*

Annex

Table A: 2:

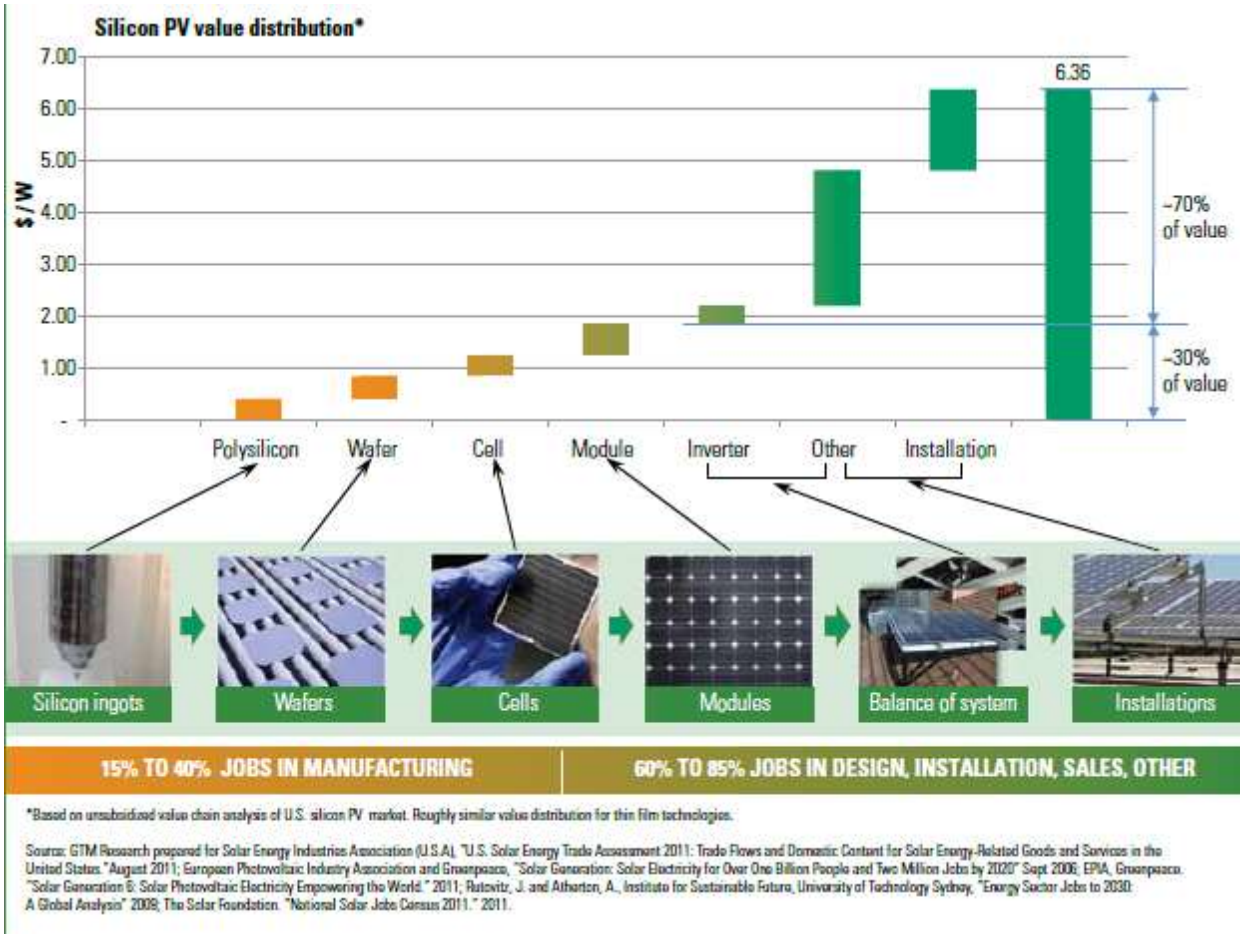
Supporting Clean Energy Scale-up by Facilitating Trade in Clean Energy Goods and Services: Key Issues and Considerations for the WTO

Key Issue Areas	Questions and Considerations for the WTO		
	Enabling Greater Transparency	***Market Access- Addressing Trade Restrictive Measures***	***Clarifying Existing Rules and Developing New Ones***
Tariffs	• How can customs classifications be better refined to more clearly identify clean energy products?	• Could an 'early harvest' for clean energy products be identified? What products make good candidates?	
Clean Energy Subsidies and Incentive Measures	• Is there a need to consider improved or enhanced notification processes for clean energy subsidies? • Should and if so, *how could*, relevant WTO Committees debate the nature, purpose, scale and impact of different clean energy subsidies so as to help clarify individual country measures? (for instance at WTO Trade Policy Reviews).		• Should there be a 'review' of the definition of a subsidy under the SCM so as to better discipline clean energy subsidies with an adverse trade impact on clean energy goods and services? Can this be linked to the debate on subsidies in relevant committees? • Should there be a clear window of exemption for certain types of subsidies for instance under a revived 'non-actionable' category of subsidies? • Should there be a time-limited exemption granted to certain types of local-content measures in clean energy (for eg: developing countries) given the increasing frequency of use?
Government Procurement Policies	• How can transparency be improved with regard to procurement measures in clean energy goods and services?	• Can future negotiations on sustainable procurement as mandated in the revised GPA contribute to	• How can rules be clarified or developed further under a future GPA that provides greater certainty and predictability for governments to use green-procurement

		addressing procurement related market access for clean energy goods and services?	measures without running afoul of WTO rules prohibiting discrimination against 'like' products?
Clean Energy Equipment Standards and Certification	• Could the TBT notification process of diverse standards for various types of clean energy equipment and services be further streamlined and made coherent? If so, how? • Should a special information system for clean energy standards be created based on the proposed WTO/ISO Standards Information System and the ISO/IEC information centre?	•	• What can the WTO to do further discipline unnecessary and costly certification requirements that are often more burdensome than the actual standards *per se*? • Should new rules be developed to address domestic regulation disciplines in the clean energy services sector? Such regulation may be required for instance to address qualification and licensing requirements for installers of clean energy equipment. • The effect of technical regulations which are not adopted by central governments may still have a crucial negative impact on trade in PV products. Should Article 2.1 and 2.2 of the TBT Agreement explicitly discipline such regulations? • Current WTO TBT disciplines do not sufficiently address standardization activities of local governments and non-governmental bodies. What can be done in this regard?
Services	• Should the WTO try and enable a better classification of clean energy services and promote a uniform approach in this regard to facilitate	• Will the ongoingplurilateral negotiations for an ISA facilitate addressing of market barriers? Should there be a 'critical	• What rules need to be clarified as far as Trade in Clean Energy Services is concerned? What new rules need to be developed? Is this arealistic possibility in the

	negotiations?	mass' of countries that should participate including from a climate perspective?	short to medium term?
WTO Process-related Issues and Systemic Questions	• What can the WTO do to generally increase transparency on clean-energy measures that could have a trade impact? Can it be 'worked into' existing mechanisms (such as the Trade Policy Review Mechanism and various notification procedures) or is there a need to create completely new mechanisms? • Should there be strict penalties for non-notification of measures that have a potential trade impact? • How can various notification processes be 'clustered' in a coherent manner so as to obtain an easy overview of clean energy measures? For instance, should subsidies and standards affecting the solar PV sector be 'gathered' together? Which WTO body should be responsible?	• How can fragmentation in negotiations on clean energy goods and services be avoided? Should some kind of formal mechanism within WTO ensure this? • How can the WTO discuss and draw lessons from positive developments in market access negotiations in other forums such as the APEC and RTAs? Where should such discussions happen? • Should discussions on plurilateral initiatives within the WTO be considered for clean energy goods? Are there systemic risks involved?	• Should already agreed upon WTO rules be re-opened for discussion and new rules be created? Or is constructive ambiguity better despite the burden it places on the DSU? If it is decided that new rules are necessary, should such rules part of a separate Framework Agreement or developed within the various individual agreements? • Given that in most instances, there exists no negotiating mandate how can discussions on rule clarification or development proceed within a WTO setting? Should the focus be on what can be done within the existing mandates and negotiating/working groups? Should new forums/working groups be created?

Annex Figure A: 1. The Relevance of Downstream Jobs in the Solar PV Sector:More than half the jobs and value generated lie downstream of modules



Source: Natural Resources Defense Council; Council on Energy, Environment and Water,*Laying the Foundation for a Bright Future*

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