

Climate Change, trade and  
production of energy supply  
goods: The need for levelling the  
playing field  
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# Introduction

- Economic crisis implies that expenditures on climate change mitigation and adaptation must also make economic sense.
- The mood on trade is also increasingly protectionist.
- But the economic crisis is also an opportunity to create a green economy as is shown by the emphasis in fiscal stimulus packages.
- How is the Green Economy initiative linked to production and trade of environmental goods in the energy supply sector?

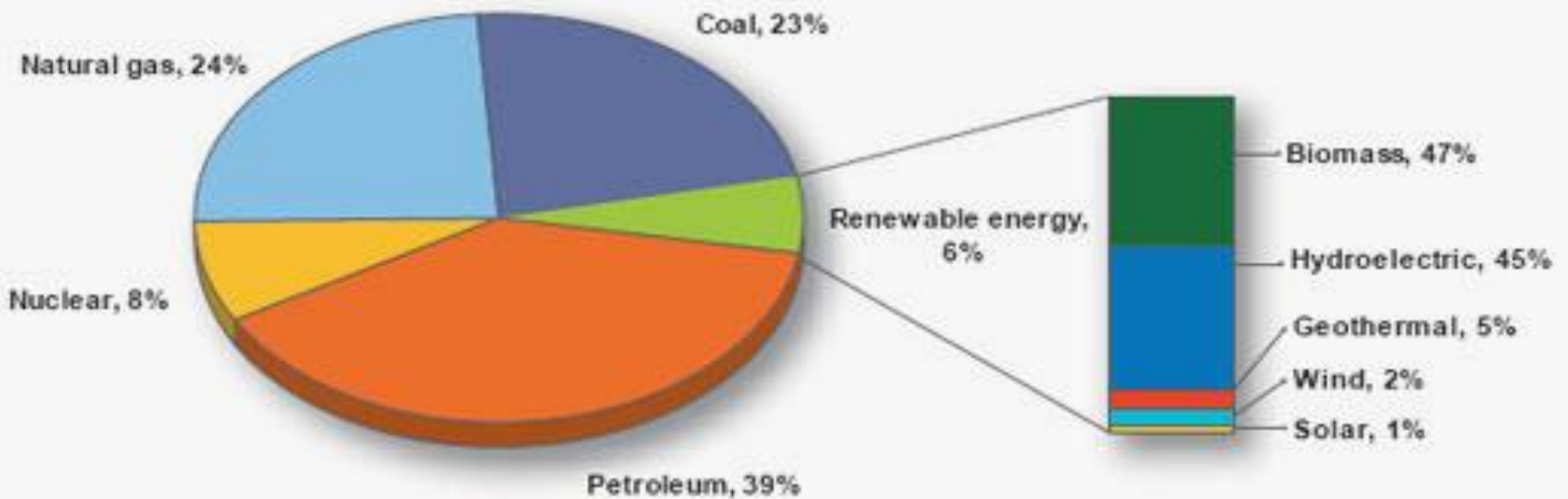
## Potential benefits from EGS liberalisation

- Both IPCC and Stern Review have highlighted the potential gains from trade-liberalisation in clean technologies.
- Renewable energy products liberalisation =>expansion of markets for climate friendly technologies and services=>incentive for innovation.
- Diffusion of and access to renewable energy goods =>Puts economy on low-carbon trajectory.
- But the important issue is will reduction of tariff and non-tariff barriers actually increase trade in renewables and the deployment of renewable energy technologies?

# Methodology used

- Products in Renewable Energy Supply Sector identified on the basis of the ICTSD mapping study (supported by UNEP) and undertaken by the Energy Research Centre of the Netherlands (ECN).
- Trends of trade, tariffs and production analysed.
- Market drivers identified on the basis of a regression analysis.
- Implications for trade negotiations on the basis of policy variables identified.

# Renewable energy goods, a Growing Market with New Players



Source: EIA, 2004a & b

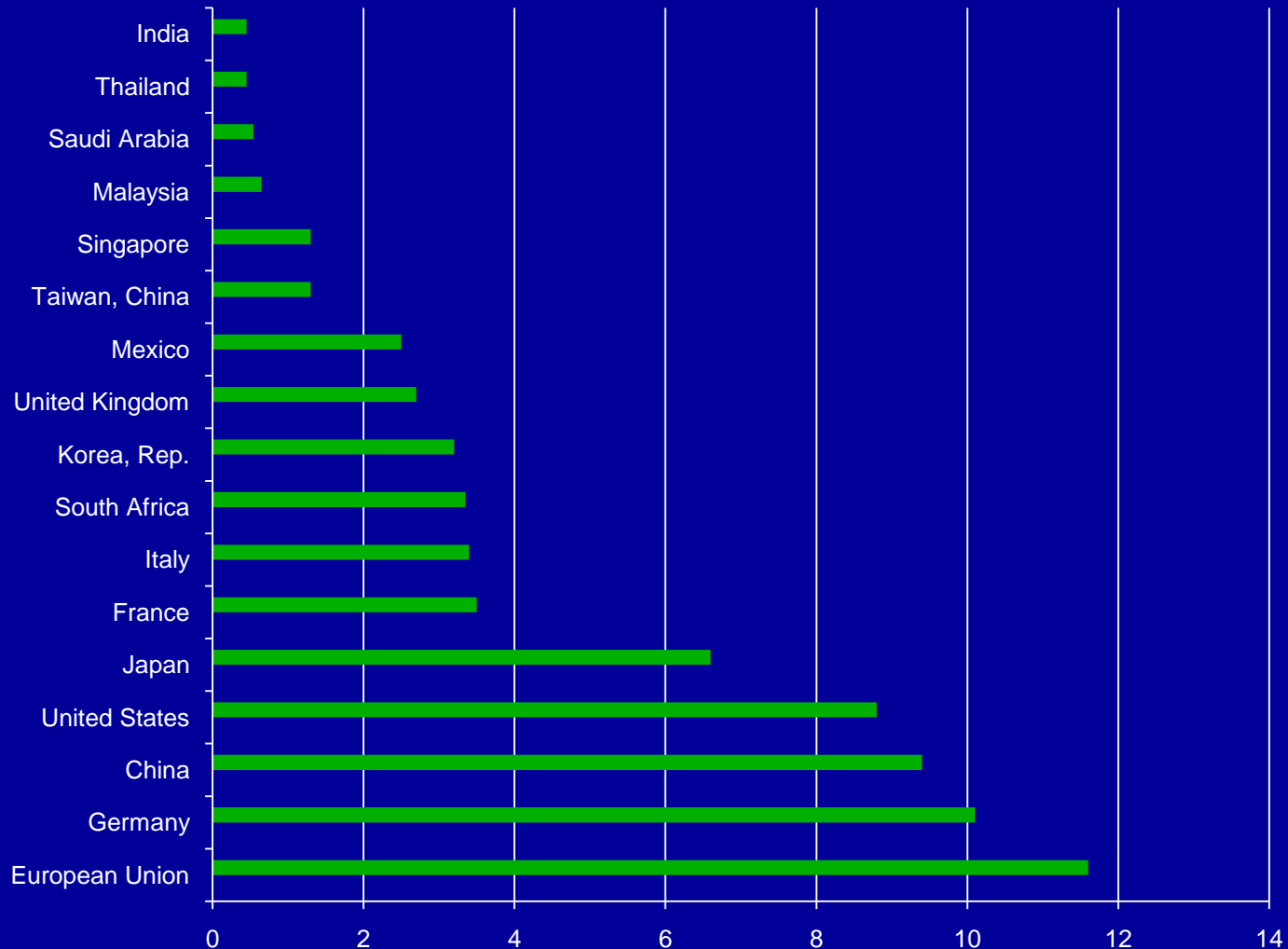
Figure 2: Summary of biomass resource consumption



# Who are the major players?

- 18 of the top twenty firms are from developed countries, with a majority from Europe.
- The industry developed by power utilities.
- The Spanish utility Iberdrola and FPL Energy, a subsidiary of the U.S. utility FPL Group, were leading generators of renewable energy in 2007.
- Exports of renewables is largely dominated by the European players as they have sprung with massive government subsidies from existing power utilities.

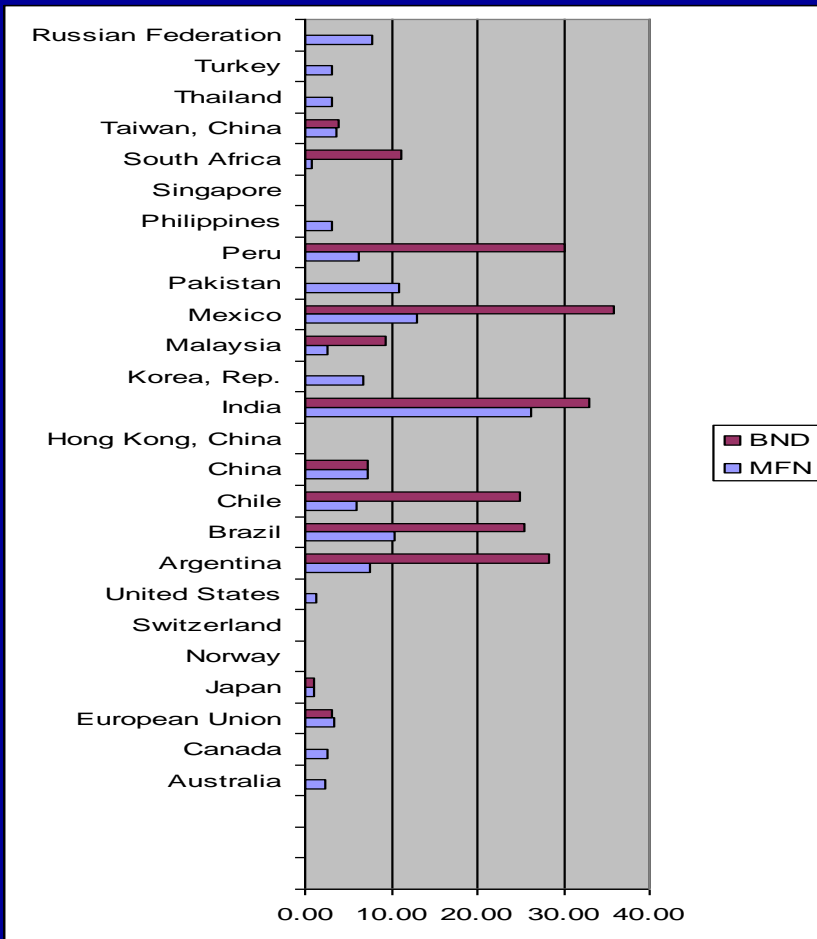
# Top Exporters of Renewables in billions of US dollars (2008)



# Emerging players

- **China a major exporter in almost all forms of renewable energy sources but especially in solar energy,**
- **India (wind energy) Mexico, Hong Kong, Republic of Korea, Malaysia, Colombia, South Africa or Brazil (biofuel).**
- **But, as a whole, the developing countries have little capacity to trade these goods.**
- **Thus only a handful of players which has implications for trade negotiations.**
- **Major exporters also exporters of industrial products.**

# Tariffs on renewables



- Tariffs in the top trading nations are generally below 10%.
- However, the emerging economies apart from China have higher tariffs and some tariff water between bound and applied tariffs.
- Bound tariffs are generally higher than applied tariffs.

# Exports of solar energy products in billions of US dollars (2008)

<b>EU</b>	<b>60.4</b>	<b>China</b>	<b>45.3</b>
<b>US</b>	<b>47.2</b>	<b>Korea, Rep of</b>	<b>23.3</b>
<b>China</b>	<b>45.3</b>	<b>Taiwan, China</b>	<b>13.3</b>
<b>Japan</b>	<b>32.3</b>	<b>Hong Kong</b>	<b>10.6</b>
<b>Ger</b>	<b>29.5</b>	<b>Mexico</b>	<b>2.8</b>
<b>Korea, Rep of</b>	<b>23.3</b>	<b>Thai</b>	<b>2.4</b>
<b>Taiwan, China</b>	<b>13.3</b>	<b>Malay</b>	<b>1.2</b>
<b>Italy</b>	<b>11.8</b>	<b>Brazil</b>	<b>1.1</b>
<b>Hong Kong</b>	<b>10.6</b>	<b>Philippines</b>	<b>0.8</b>
<b>Netherlands</b>	<b>9.1</b>	<b>Turkey</b>	<b>0.5</b>

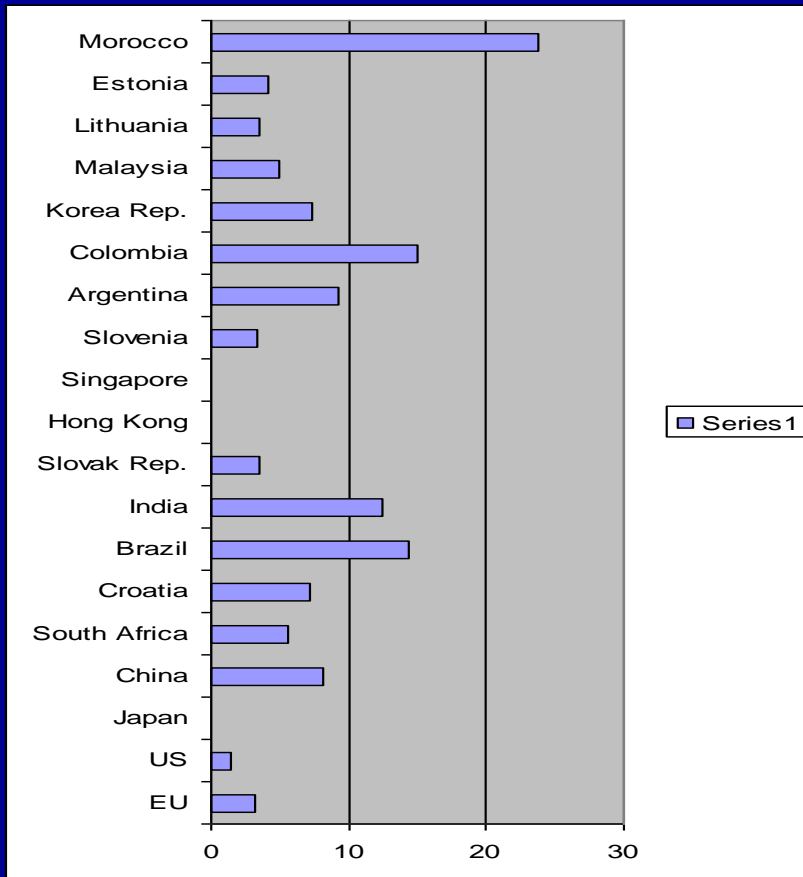
# Analysis of exports of solar

- The global photovoltaic (PV) industry faces an oversupply situation leading to falling prices along the supply chain by at least 20-40% in 2009.
- Further, the global PV market in 2009 is likely to decrease by around 10% in value terms over 2008. (SolarPlaza, Nov 2008)
- China is emerging as the largest player in PV with a substantial share of global trade as well. China's high share in trade in PV (shown below) is also indicative of the fact that several components of solar technology have now become tradable.

# Top ten importers of solar energy (2008) in billions of USD

China	67.2	China	67.2
European Union	41.3	Hong Kong, China	11.8
Japan	30.3	Mexico	10.75
United States	28.5	Korea, Rep of	8.42
Germany	27.3	Taiwan, China	6.4
Hong Kong, China	11.8	Thailand	3.5
Mexico	10.75	Singapore	3.1
Italy	10.3	Malaysia	2.1
Netherlands	9.1	Brazil	2.1
Korea, Rep of	8.42	Slovak Republic	1.1

# Tariffs on solar technology products



- The applied tariffs are in generally below 15%.
- Major importers have low or zero tariffs.
- Only Morocco which is not a major trader has high tariffs.
- When prices are falling, tariffs unlikely to be an important market driver.

# Top ten exporters of wind powered turbines (2008)

European Union	1,902,068.667
Denmark	1,718,601.575
Germany	969,479.000
Japan	354,009.471
India	335,817.506
Spain	197,977.299
China	78,019.421
Italy	44,382.913
Australia	36,859.894
Netherlands	15,758.659

# Analysis of wind energy exports

- A third of the world's wind capacity is now under the aegis of the top 20 wind farm owners.
- Two Chinese manufacturers (Goldwind & Sinovel) and one from India (Suzlon) in total now represent 18 % of the global supply.
- Apart from wind turbines, the top twenty exporters of components of wind energy supply goods are however not exactly the same as the top twenty producers of wind energy.
- This shows the limitations of the mapping exercise where a number of components for wind energy may actually be dual use products.
- Large producers such as India may also be producing for the local market, but where assembly is in third countries they may be importing components.
- Tariffs in this case is also at about the same levels as solar energy.

# Top 20 Exporters of Undenatured Bio-ethanol (HS 2207 10) in 2007 (in USD'000)

Reporter Name	Exports'000
Brazil	1,439,175.318
El Salvador	142,148.699
South Africa	85,401.737
European Union	70,889.879
Jamaica	60,143.786
China	53,415.032
United States	50,516.835
Canada	42,055.836
Argentina	38,278.422
Guatemala	38,001.383
Costa Rica	29,438.829
Bolivia	28,168.575
Trinidad and Tobago	27,812.468
Pakistan	23,171.072
Thailand	20,340.420
Ecuador	13,199.887
Turkey	12,496.496
Peru	9,035.767
Kenya	7,366.704
India	7,229.792

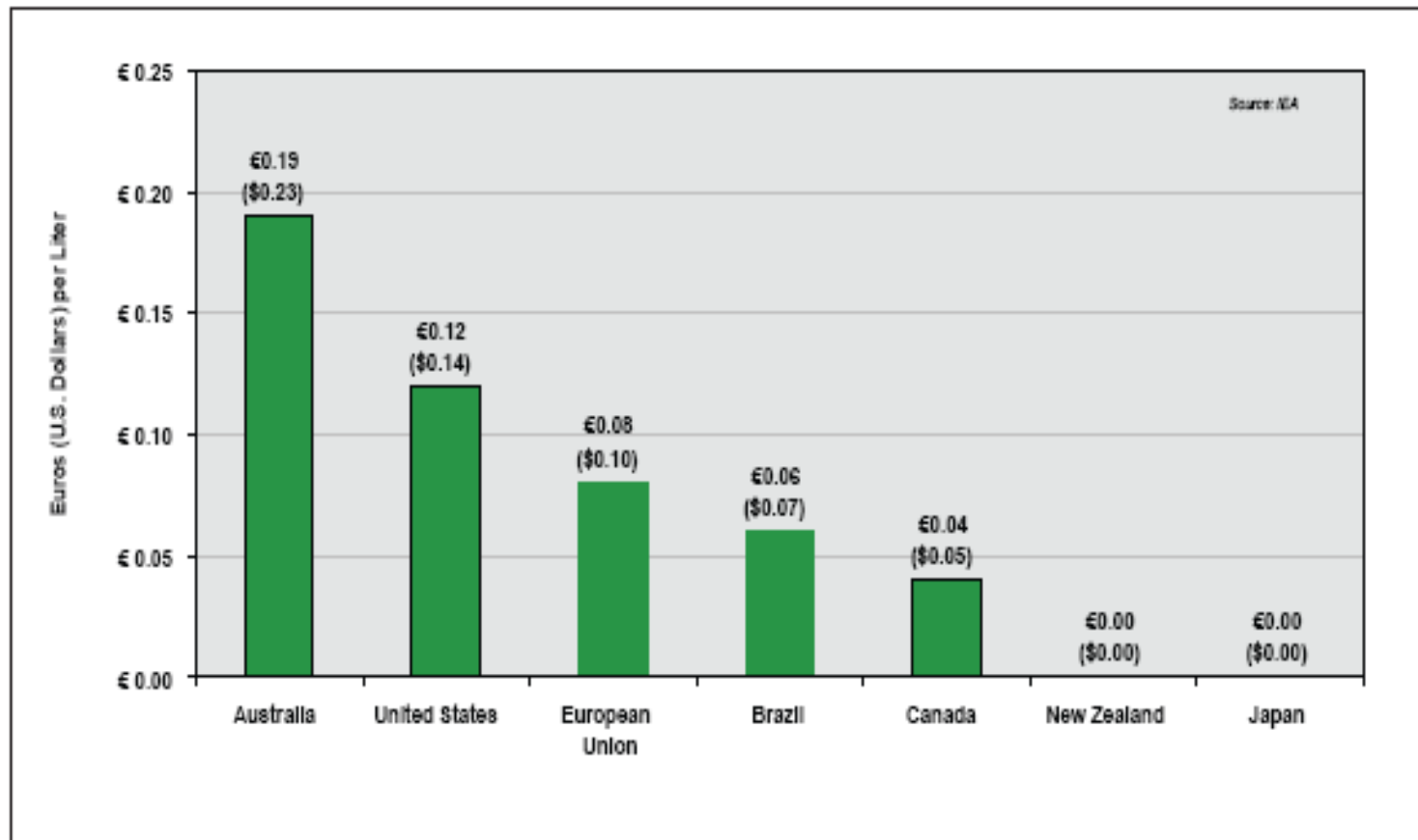
Source: WITS

# Top 20 Importers of Undenatured Bio-ethanol (HS 2207 10) in 2007 (in USD'000)

Reporter Name	Imports ( in USD' 000)
United States	960,808.940
European Union	634,102.276
Japan	262,712.229
El-Salvador	135,251.022
Trinidad and Tobago	71,480.432
Korea, Rep	69,394.405
Singapore	35,082.728
Jamaica	33,488.924
Slovak Republic	29,968.185
Colombia	29,746.644
Mexico	29,343.627
Switzerland	24,739.723
Ghana	22,117.860
Chile	20,002.186
Canada	18,392.505
Taiwan, China	17,804.339
Israel	11,318.000
Norway	10,192.270
Uganda	8,147.152

Source: WITS

# Ethanol Import Duties in Select Countries-2004



Source: Fulton and IEA (2004).

# Summing up trends in trade and deployment of renewable energy

- Only a handful of players in this industry-
- Major traders of components may not necessarily be those that are deploying renewable energy technologies.
- This exposes the limitations of the six digit mapping exercise which inevitably results in several multiple use products-
- Trade in components plays a relatively minor role in the deployment of a number of technologies such as geothermal, ocean and hydroelectricity.
- Trade in components, especially turbines of wind and solar is important.

# Testing correlations

- Cross country panel data used-34 countries. top exporters and importers
- Dependent variable was trade in renewable energy generation (exports and imports).
- Explanatory variables relevant to explaining trade were various types of subsidies including those for component manufacturers and other investment-related subsidies (Eg:Soft Loans, tax-breaks] as well as subsidies for RE generation (feed-in tariffs) (ii) supply of renewables as a % of total electricity supply (IEA), (iii) % of patents registered by a country for renewables and (iv) Tariffs on components of renewable energy (witS).

## Regression results: Dependent variable: Log Trade in components of renewable electricity generation

- Invention as denoted by patents  
 $2.03^{***}(0.448)$
- Log (tariff)  $-0.177(0.157)$
- Composite index  $0.530^{***}(0.187)$
- R-sq 0.56
- F (3,30)  $12.7^{***}$
- No of observation 34
- Note:  $^{***}$  denotes significance at 1% level

# Market drivers estimated through regression analysis

- The composite variable is composed of subsidies and shares of renewables in the energy supply sector of the countries concerned.
- There is a significant amount of collinearity between these two variables.
- Hence using eigen vectors this composite variable was composed.
- The three stars show that this correlation is significant at the 1% level.

# Testing correlations between market drivers and trade

- Tariff reduction may make trade easier, but it is unlikely to be sufficient to generate markets. Tariffs were shown to have an insignificant correlation to exports. High tariffs likely to decrease imports.
- The higher the share of renewables in the grid the higher would be exports.
- Subsidies would increase exports.
- Patents may be major market drivers. The number of patents registered in a country is also likely to increase exports.

# Dependent variable : Log exports of solar energy components

- Invention  $2.57^{**}(1.17)$
- Log (tariff)  $0.311(0.412)$
- Composite index  $1.18^{**}(0.49)$
- R-sq  $0.43$
- F (3,30)  $7.63$
- No of observation  $34$
- $**$  denotes significance at 5% level

# Dependent variable: Log exports of wind energy components

- Invention  $2.57^{**}(1.17)$
- Log (tariff)  $0.311(0.412)$
- Composite index  $1.18^{**}(0.49)$
- R-sq 0.43
- F (3,30)7.63
- No of observation 34
- $**$  denotes significance at 5%

# Market drivers for imports

- Turning to imports, patents registered in a country and the composite variable (subsidies plus share of renewables in grid) affect imports of renewables positively (possibly intra-firm trade of company registering patents) as well as components of wind and solar energy.
- This analysis points to the fact that tariff reduction by itself may not generate trade in renewables. Other support policies, particularly consumption subsidies may be more important in determining import flows.

# Dependent variable: Log Imports of solar energy components

- Invention  $3.46^{***}(1.18)$
- Log (tariff)  $0.126(0.415)$
- Composite index  $1.05^{**}(0.49)$
- R-sq 0.43
- F (3,30)  $7.77^{***}$
- No of observation 34
- $^{***}$  denotes significance at 1%

# Dependent variable: Log import of wind energy components

- Dummy invention  $3.23^{***}(1.08)$
- Log (tariff)  $-0.112(0.378)$
- Composite index  $1.19^{***}(0.45)$
- R-sq 0.45
- F (3,30)  $8.27^{***}$
- No of observations 34
- \*\*\* denotes 1% level of significance

# Role of Patents

- Studies suggest that patents may not be a barrier to the dissemination of renewable technologies.
- Registering patents increases exports, perhaps showing specialisation.
- Over two thirds of the patents in developing countries are owned by non-residents.

# Contd

- The fact that non-residents such as multinationals feel the need to register patents prior to exports from developing countries suggests that the technologies may be copiable or it may be embedded in the parts that they are exporting. Thus patents and the associated specialization has an important role to play in the exports of the components of renewables.

# Levelling the playing field

- **From a trade point of view subsidy would distort the level playing field and go against free and perhaps fair trade.**
- **However from an environmental point of view, subsidies have played a crucial role in generating markets for renewable energy and hence on climate change.**

# Levelling the playing field

- **As the industry becomes competitive and costs come down, subsidies and tariffs can be phased out.**
- **Thus a level playing field in renewables would demand the simultaneous dismantling of subsidies by the developed countries and tariffs by developing countries.**

# Policy Implications and proposals

- **Liberalizing tariffs however may not guarantee a diffusion of these technologies or the creation of markets for products used in these technologies in developing countries.**
- **Markets in developed countries have grown exponentially during the last few years in response to the subsidies provided for renewable energy consumption and generation, and the huge volume of venture capital investment.**
- **Given the grip of the economic and the financial crisis it is unlikely that such venture capital will come to developing countries.**

# Policy Implications and proposals

- **Only a handful of players important in trade in renewables. Any negotiating proposal for liberalising trade will need to take account of this.**
- **No matter how careful the mapping exercise, translating renewables to six digit tariff lines has serious limitations. In most cases it would include multiple use products.**
- **Emerging economies important players, though their share of trade is less than half that of developed countries.**

# Implications for negotiations

- It is also likely that subsidies or incentives to the green economy in the developed countries will increase through the stimulus packages.
- This would be a double whammy for developing countries that have the capacity to develop renewables on their own.
- In a way, parity should be established between the two pillars of the RET industry—the overall level of support for the RET industry and the tariffs in RET industry.

# Actions needed

- Clear policy frameworks aimed at fostering innovation, scale up and roll out of low carbon technologies
- Globally coordinated investment frameworks, linked to economic recovery, with the emphasis on 'green growth';
- Technology sharing and financial support, through mechanisms such as globally supported feed-in-tariffs for renewable energy.

***Thank you very much***

***Please send comments to  
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