PUBLIC CONSULTATION ON THE EUROPEAN INVESTMENT BANK’S (EIB) ENERGY SECTOR LENDING POLICY.

Particularly in the current economic climate, is there a trade-off between promoting competitive and secure energy supply and one which is environmentally sustainable? Where should the balance lie and what implications does this have for the energy sector investments?

We don’t see that this trade-off exists, especially for mature RES technologies, such as wind energy, which are every day closer to competitiveness and where they make a solid contribution to EU energy security.

Many EU countries (Germany, UK, Poland, Romania…) are in urgent need of new energy investments to replace ageing capacity and meet internal demand; in all of them renewable energy sources —within them, wind energy is privileged— have a significant role to play. Such ambitious plans should be supported by the EIB new lending policy, putting more efforts in sub-sectors that have a more difficult access to commercial funding, like it is the case of wind farms (onshore and offshore).

How does investment in the energy sector contribute to growth and employment? Are investments in all energy sub-sectors equally valuable? And how does investment in the energy sector rank relative to other investments in the economy which support growth and employment?

An EU policy to support growth and employment should focus on those sectors which are competitive worldwide, which have a strong added value, which operate in sectors with good future prospects taking into account not only internal supply but also exports outside EU.

That is precisely the case of wind energy, with wind energy manufacturers being world leaders, with strong export capacity. This means that their contribution to EU employment is much larger than what the job/M€ of investment may suggest at first sight.

What impact do you consider the current economic crisis will have on the energy sector (demand, policies, supply)?

Economic crisis has meant a decrease of energy demand in most countries, although appetite for new energy and need to replace ageing capacity remains a challenge in most regions.

Energy policy is also on the change; Government austerity plans are having an impact on their willingness to support sectors which require high initial investments, as it is the case of wind energy, even if their economic benefits outweighs costs. The crisis has also entailed the very dangerous practice of applying retroactive cuts on previously-agreed
support mechanisms and policies, thus making the life of renewable energy investors particularly difficult.

Most EU countries are now modifying their support schemes to renewable energies; the legislative process can take several years (see Poland, UK, Spain, Portugal); during that period commercial financial institutions are reluctant to fund new projects, even if these will not be affected by the Law under discussion.

**What evidence is there that the cost of emerging technologies is falling?**

Onshore wind energy costs have dropped dramatically in the last 20 years; the prospect is that they will reach competitiveness within the current decade, although this will depend to a certain extent on the specific feature of the national markets as well as on new policy developments (CO2 markets, configuration of electricity wholesale and retail markets). In any case it is clear that the deployment of wind energy has entailed an improvement of technology performance and costs, for the benefit of all EU citizens.

The following chart shows evolution of wind turbine generator price, which is approx 70% of total investment cost of a wind energy project. Note that the best indicator of cost evolution is not the cost of the wind turbine (although informative on the efforts put by manufacturers), but the cost per MWh: a more expensive wind turbine can entail a significant increase of energy production and thus decrease the cost of energy, which is the relevant measure for the consumer/policy-maker.

**Figure 1: WTPI mean price by date of delivery H1 2008 to H1 2014 (EURm/MW)**

The case of offshore wind energy is somewhat different. A simplistic look at aggregated figures could make people think that its cost per MWh is on the rise.
The reality is that given the novelty of offshore wind turbines, first installations were prototypes or small size pilot projects located very close to the coastline; in the past couple of years projects located further from the coast and of larger size have been built. Also some of them are technically challenging. Those factors, coupled with harder financial conditions explain a certain increase of costs in 2011 and 2012.

But the offshore wind industry has committed to achieving substantial cost reductions in the short/medium term. Pathways Study on Offshore Wind Cost Reduction, funded by the Crown State of the United Kingdom reveals future trends of this technology, pointing where main savings will come from. Overall, a cost reduction of approx 35% can be expected in the current decade.
Finally, it is important to look, not only at the cost/MWh of wind energy, but how this compares against other, competing Technologies. BNEF shows a useful chart with up-to-date figures: onshore wind energy is almost on competitive terms with natural gas power plants and coal plants (new investments).
What level of investment in RES do you expect in the short and medium term?

A slow-down of the wind energy market can be expected in the next two-three years as a consequence of financial constraints, as well as some changes in policy (expiry of PTC in the US, of Accelerated Depreciation Formula in India; freezing of subsidies in some European countries; grid connection problems in China). Yet, medium term prospects remain bright. Below some forecasts prepared by a number of experts, as well as Gamesa internal forecasts:

<table>
<thead>
<tr>
<th>MW (annual installations)</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNEF Onshore</td>
<td>44.835</td>
<td>39.328</td>
<td>47.341</td>
<td>44.679</td>
</tr>
<tr>
<td>BNEF Offshore</td>
<td>1.428</td>
<td>2.522</td>
<td>3.317</td>
<td>4.662</td>
</tr>
<tr>
<td>BTM Onshore</td>
<td>41.466</td>
<td>43.654</td>
<td>47.553</td>
<td>51.831</td>
</tr>
<tr>
<td>BTM Offshore</td>
<td>1.724</td>
<td>3.903</td>
<td>5.149</td>
<td>6.456</td>
</tr>
<tr>
<td>Make Onshore</td>
<td>45.693</td>
<td>41.537</td>
<td>46.821</td>
<td>47.846</td>
</tr>
<tr>
<td>Make Offshore</td>
<td>1.416</td>
<td>3.000</td>
<td>3.623</td>
<td>4.635</td>
</tr>
</tbody>
</table>

Forecast on-shore (Internal May’12)

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>42.465</td>
<td>35.051</td>
<td>43.001</td>
<td>39.542</td>
</tr>
</tbody>
</table>

Long term forecasts prepared by the International Energy Agency show a great growth for both onshore and offshore wind energy:

<table>
<thead>
<tr>
<th>GW (cumulative)</th>
<th>2015</th>
<th>2020</th>
<th>2030</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Scenario</td>
<td>n/a</td>
<td>521</td>
<td>749</td>
<td>852</td>
</tr>
<tr>
<td>Central Scenario</td>
<td>397</td>
<td>582</td>
<td>921</td>
<td>1.102</td>
</tr>
<tr>
<td>High Scenario</td>
<td>n/a</td>
<td>661</td>
<td>1.349</td>
<td>1.685</td>
</tr>
</tbody>
</table>

What are the barriers to investment in renewable energy outside Europe? How might these be overcome?

Different markets have different barriers; it is difficult to give a single answer. However, some common patterns are the following:

- Policy uncertainty -unexpected regulatory changes, downwards price reductions- are taking place in some countries. Uncertainty in these times is particularly negative given the low risk appetite of market agents.
- Local funding is impossible or very expensive in many low-income and certain emerging markets. In some countries the participation of an international financial institution (EIB-type) is the only way to mobilise investment from third parties or to carry out the projects.
- European investors must compete with investors from other countries, which bring along a State bank supporting their activity with favourable conditions. This
partly explains the success of Chinese manufacturing in entering key Latin American and Asian renewable energy markets.

- Many countries have introduced “local content” requirements for the awarding of renewable energy projects. This reduces the ability of European investors to enter those markets; specially taking into account that the European Union does not apply similar regulations.

The EIB can play an important role in overcoming such barriers, by mobilising resources towards international projects where local funding is not feasible, or by backing up investors which compete under unfavourable terms.

**Is the traditional model for electricity and distribution changing? What implications does this have for future investments in electricity networks?**

It is difficult to foresee what will be the model for electricity and distribution. We could expect some changes, but difficult to predict in which extent they will be implemented:

- More active participation of consumers in taking real time decisions for electricity consuming depending of price of electricity.
- That means a new era of smart counters and development of telecommunication with energy information. Even more if the consumers enter in self-generation with small wind or solar panels.
- New demand patterns : electric vehicle, energy storage, …
- Difficult development of new transmission and distribution grids due to local opposition and NIMBY effect.
- This means development of Distributed Generation, energy storage and development of renewable generation technologies in a smaller scale : KW, not MW.
- Development of self-consumption and achievement of grid parity for mature technologies : wind, solar, …
- Integration of renewable will need more intensive development, research and investment in energy storage.

**What is the future role of smart grids, offshore grids and energy storage solutions?**

See previous answer

**Which are the key innovative energy technologies under development?**

**KEY INNOVATIVE ENERGY TECHNOLOGIES:**

In a first approach, and by obvious reasons, we will focus on renewable energy resources. Renewable energy technologies: They are getting cheaper, through technological change and through the benefits of mass production and market competition. A 2011 IEA report said: "A portfolio of renewable energy technologies is becoming cost-competitive in an increasingly broad range of circumstances, in some cases providing investment opportunities without the need for specific economic support," and added that "cost reductions in critical technologies, such as wind and solar, are set to continue." As of 2011, this has been confirmed.
In conclusion, the levelised cost of electricity (LCOE) are declining for wind -onshore and offshore-, solar (PV, CSP and others as Stirling) and some biomass technologies, while hydropower produced at good sites is still the cheapest way to generate electricity. These technologies, excluding hydropower, have high learning rates. This means that capital costs decline by a fixed, average percentage for every doubling of installed capacity. On the other hand Biomass technologies are CO2-cycle dependant energies, which are still under question. So that’s why we consider that Solar and Wind -onshore and offshore- are the most promising and innovative energy technologies under development.

All the mentioned technologies are energy resources itself but it is important not to forget that there are other energy-smart-demand technologies such as smart grids (as a vector), electric vehicles, all new energy storage technologies (batteries, pumping plants, pressurized gas concepts, etc.) must be taken into account, because they will play an important role in the future helping renewable energy sources to solve one of their major problems, their optimal matching with the demand.

The development of which key innovative low-carbon energy technologies should receive the most financial support?

As we mentioned in the previous question, renewables, should be prioritized. And namely, solar (mostly PV but not only) and Wind are for us the best option for development.

The question is what is going to return more wealth to Europe.

Looking at the economic aspects, in the next picture, we have the structure of our renewable energy sector represented by its production.
Most of the PV production is focused in Asian countries: China, Korea and Japan, so most of the value chain will go there. Europe maintains some collateral technologies, such as power inverters, trackers...and little more!

It’s easy to see that Wind energy is approximately 50% of the total production, which means that there is a big economical structure behind it. Moreover, most of all Wind companies export to the rest of the world (in case of GAMESA, it represents more than half of our sales), where the share of wind is even bigger. So, if we are interested in short term returns of our investments, Wind -onshore and offshore- will be the best option.

Thinking about the feasibility of providing Europe with only renewable energy, we have to be sure that we are using the best option. Renewable energies like Solar and Wind are very dependant to their siting. It’s very easy to notice that the southernmost counties have better solar resource (Global horizontal irradiation), and the northernmost countries in Europe are the ones with more wind resource (averaged wind speed). So in Europe’s case, solar and wind seems to be naturally complementary. The EEA on its technical report “Europe's onshore and offshore wind energy potential”, calculates in a very approximate way the quantity of resource of power that could be generated by current WTG models (wind turbine generator) covering all possible placements of wind farms. This amount is 45.000TWh of annual energy production. This is equivalent to 2.21 times the total Europe’s energy consumption (including transport, and industry). So in this case and selecting the best energy technology for each particular case, the power supply to Europe by only renewable energies (including biomass, or hydro) is technically a fact, in terms of resource availability.
Global horizontal irradiation is the most important parameter for evaluation of solar energy potential of a particular region and the most basic value for PV simulations. Source: Solar gis ©.

In case we are thinking about the “best return for EIB’s investment”, it is not easy to decide between one technology and the other. Both technologies have been advancing a lot, and
lowering their Cost of Energy (CoE) really fast. In the next set of pictures, we can see the estimations of the expected improvements till 2030, and both of them seem to have more or less the same behaviour. It is important to highlight that Solar PV is getting closer to Wind but still in its best scenario, is more expensive than Wind.


From the sustainability point of view, we would like to study the Energy Pay Back (EPB) of both technologies. This EPB is the time a wind turbine or a solar cell, takes to produce the amount of energy that it was necessary to manufacture it to all its life cycle (including maintenance and operation).
In the NREL publication “The National Renewable Energy Laboratory, a DOE national laboratory, produced PV FAQs” appears that a common EPB for a current technology of multi layer cell (the ones of the lowest CoE) is 3.5 years. That means that during its life span, a solar cell returns to the world 8.5 times the energy necessary to create and operate it.

For a current technology WTG a common EPB is considered 8 months. That means that during all its life span it returns to the world 30 times the energy needed to create and operate it.

Again, and from sustainability point of view this time, Wind is the best option for the use of our energy resources.

**Should financial support be spread across a large number of small research projects or be selective and concentrated on a few promising large research projects?**

Regarding wind, the development of new Wind Turbines, specially those for offshore, in unitary power ranges above 5 MW, require significant investments above 100 Million euros. In current times of financial scarcity, this creates a unsurpassable stress in the Capex on wind turbine manufacturers, mainly those who are not part of industrial conglomerates, such as Gamesa, Vestas, Nordex and Enercon. So, they future is at stake.

There are two possible ways to solve this situation: Either to undertake these developments jointly with other company with whom there is no need to share markets. Therefore, the natural partners for European companies are Asian.

Examples are the conversations between Vestas and Mitsubishi. But those with Chines or Korean should follow.

Another is to obtain large research support for European only projects. But being the EIB support credits, they do not help to reduce the Capex of WTG manufacturers, unless an specific mechanism is designed for these difficult times.

**In a developing market context, where should the balance lie between meeting local energy needs at least cost and reducting global greenhouse gas emissions –the tradeoff between affordable energy for all and sustainable energy for all?**

Renewable energy technologies, both offgrid and ongrid applications, are a competitive solution in developing markets, which allows reaching both targets at the same time. The EIB.

**Where can sources of low cost finance be more effectively used by the private sector to develop energy projects?**

Please refer to answer given above about “barriers to investment in renewable energy outside Europe”.

**What are the main barriers to developing sustainable energy sources in developing markets?**

Please refer to answer given above about “barriers to investment in renewable energy outside Europe”.