CHAIRMAN'S SUMMARY

Renewable Energy: a Route to Decarbonisation in Peril?

29th Round Table on Sustainable Development
4-5 June 2013
OECD Headquarters, Paris

Renewable Energy: a Route to Decarbonisation in Peril?

The following is a summary of the discussion on 4-5 July 2013[1], issued under the Chairman's authority. Please note that, in keeping with Round Table procedures, this summary in no way represents an agreed outcome.

Renewables in trouble, or blip in the chart?

Global spending on renewables (wind and solar installations in particular) has declined over the past year. Interpretations of this fact varied between two camps: the optimists and the pessimists.

The optimistic camp either operates in high electricity demand growth regions, or looks at the market from a global perspective with an eye on the capacities of existing wind and solar facilities. The point was made that investment figures can be misleading: although there has been a drop, it has been less pronounced than the decrease in unit costs of renewable technologies and the reduction in deployment incentives. On a global scale, electricity generation from renewables other than hydro has grown quite rapidly in recent years.

The more pessimistic camp (mainly from Europe and the US) sees challenges ahead, related to:

- the affordability and perception of affordability of renewable electricity;
- competitiveness, with challenges to renewables coming from cheaper fossil energy costs in some regions (e.g. the US, with its abundant unconventional gas);
- rapidly changing incentive measures reflecting falling equipment costs;
- a general lack of investment in supporting infrastructure (e.g. transmission to exploit broader supply and demand pools), as well as investment in energy efficiency, which would eventually lower the actual cost of energy (i.e. household energy bills versus the price of a kilowatt-hour);
- opposition from incumbents to the rapid deployment of renewable energy (a theme that was mentioned repeatedly);
- low priority given to the fight against climate change by public opinion, and the fact that current RE trends, even globally, are not enough to put us on track to meet decarbonisation requirements;
- the design and incentive structures of current electricity markets.

The point was also made that the ups and downs of the renewable energy industry are, in a sense, a sign of industrial maturity, with business cycles in Europe and North America affecting supply and demand and forcing reassessment of market expectations. An end to economic recession in some OECD countries could quickly turn the market around, all the more so as equipment costs

[1] *in partnership with the World Business Council for Sustainable Development*

continue to decline. However, the lack of infrastructure investment today represents a missed opportunity, given historically-low interest rates.

Policy instruments: different horses for different courses

There is an ongoing debate on the choice of policy instruments, i.e. price supports such as feed-in tariffs (FITs) versus market-based green certificates or renewable energy mandates. RE developers seek stability to lower the cost of capital and secure investment in their facilities. Beyond that, a long-term political commitment is also seen as essential; stop-and-go policies are a deterrent for the financial sector. The regulatory hurdles to long-term supply contracts that exist in some regions are also seen as a significant impediment to the competitive deployment of capital-intensive renewable technologies. At the moment, FITs provide these long-term contracts, with tariff certainty for up to two decades. The emphasis on seeking short-term economic efficiency with spot wholesale electricity markets at the expense of long-term visibility will need re-assessing in light of long-term security of supply and of climate policy goals demanded from the electricity system.

The broader question around 'subsidies' is whether their cost can be borne economically and politically, notwithstanding the fact that fossil fuels enjoy far larger subsidies on the global scale. The framework of energy supply and demand could be re-examined to facilitate the transition to, and minimise the cost of, a low-carbon energy system. Consumers could be guided to lower their electricity use, and may be given the choice for certain types of energy. The supply side should be working to secure supply but also to minimise price volatility. Several participants stressed that, notwithstanding their physical supply variability, renewable energy technologies such as solar photovoltaic and wind turbines operate at a very stable cost, whereas 'cheaper', fossil-based technologies are exposed to the price volatility associated with commodity prices. The cost stability of solar and wind technologies could be a critical advantage at times when volatile fossil fuel prices in most regions are either high or rising. The point was also made that subsidies to fossil fuels are much higher than those supporting renewable energy technologies.

The question was raised whether, without a sense of urgency about the climate change threat and in the absence of full competitiveness, significant deployment of RE could be boosted by emphasis on employment benefits and the prospect of industrial development – i.e. an industrial policy justification. This was strongly rejected by some on grounds of economic efficiency and of the trade tensions this approach may create.

The role of the carbon market and a carbon price was acknowledged as important, but not considered to be a sufficient policy response by itself. It was pointed out that if this were the single policy instrument to drive all low-carbon investment, carbon price volatility would increase the capital cost and negatively impact RE investments, which are typically more capital-intensive electricity sources. From another perspective, under a future climate regime, international crediting of greenhouse gas reductions could encourage further investment in renewable energy projects in developing countries.

An important notion in the discussion of instruments is that of a long-term price signal to reflect our collective need for low-carbon technologies which cannot be brought to market under today's carbon pricing mechanisms. Nonetheless, some questioned debating the appropriateness of 'support measures' while policy barriers to the penetration of these technologies could still be removed. Others felt that the discussion on adequate measures should be complemented by one on how to gain agreement among stakeholders on the decarbonisation of the electricity system. The political aspects should not be separated from the technical ones.

It was also stated that technology suppliers have information about technology costs that is not accessible to governments. The auctioning of long-term contracts has proven to be effective in fixing this asymmetry of information, and in adjusting to changes in technology costs. In Brazil, the auction of power purchase agreements has allowed wind generators to trump fossil-based technologies that face more volatile input prices. This element was mentioned again in the context of market reform (see below).

Integrating variable renewable energy in systems and in markets

Challenges and solutions to the physical integration of variable renewables

The flexibility of electricity systems is at the heart of integrating variable renewable electricity (VRE). Grids must be able to accommodate the ramping up and down of variable plants, but also withstand periods with abundant or very little electricity generated. There has been progress on these fronts as VRE is being deployed. For instance, wind power generators have greatly improved predictability of their output, which facilitates balancing of the grid by system operators. There was a general sense that more capacity cannot be the only answer to the penetration of VRE. Other options include increased transmission and inter-connection, an active management of the demand side, and electricity storage.

Broader transmission infrastructure would allow: a) taking advantage of the different wind and insulation conditions of various resources across regions; b) accessing more capacity in flexible plants to manage the ramping up and down of VRE installations; and c) accessing a broader, more diversified electricity demand (VRE installations could sell their power to a neighbouring country or region and avoid being curtailed when local demand is limited). Overall, improved transmission infrastructure including international connections could cost-effectively avoid the need for new generation capacity. Efforts are underway to increase transmission but barriers remain (e.g., NIMBY-ism and the need for common grid codes), in spite of clear business cases.

More locally, VRE integration will benefit from smart management of demand, including the possibility of remotely controlling certain end-use appliances, again to facilitate the ramping up and down of VRE or to absorb excess supply (e.g. with boilers, including in district heating systems). Storage options (other than hydro reservoirs), remain limited at present but are being considered either in centralised (compressed air electricity storage, or concentrated solar plants) or decentralised (PV panels combined with batteries) settings. While costs remain high, they should be compared to alternatives such as plants that may only function a few hours per year.

Integration in electricity markets

New VRE installations are now equipped to provide services to the electricity system (e.g. modulation, frequency control), but are so far rarely allowed to access these services' market – a barrier to their commercial viability. Hybrid plants offering both renewable energy and fossil fuels can also ensure a more stable contribution from renewables. At the end of the chain, end-users could be empowered to control their demand in reaction to price changes; information technologies in smart grids could be used to facilitate end-users' contribution to a more stable, less costly grid.

Mechanisms are being established in some jurisdictions to secure power generation capacity in times of peak demand. This development was criticised by some of the participants, who viewed these mechanisms as adding a yet another market distortion on top of existing ones. Indeed, the point was strongly made by some that governments should be wary of the need for stand-by generation capacity when huge technical improvements in managing variability are currently being made. From the renewable industry perspective, uncritically accepting security of supply arguments for capacity mechanisms will only strengthen incumbent fossil fuel generators.

Participants called for a vision whereby all options that can contribute to a secure, low-carbon electricity supply, at least overall cost, can be integrated. For some regions, a growing contribution from variable renewable electricity must be further researched on the technical and regulatory side, even if regional testing could provide the needed proof-of-concept.

Regulatory barriers to entering long-term contracts were identified as another important barrier to the cost-effective deployment of renewable electricity. In general, the focus of existing electricity markets on short-term economic efficiency was seen as conflicting with longer-term societal goals such as climate mitigation: a re-examination of market organisation was seen by some as necessary for the effective decarbonisation of power generation. The centralised electricity system is also being challenged by emerging decentralised supply, but remains strong. The evolution of end-users into being both end-users *and* producers of electricity was presented as a potentially powerful source of change going forward.

Unconventional gas: imminent, helpful, or damaging to renewables and decarbonisation?

The boom in unconventional (shale and other) gas in the United States has helped reduce the country's CO_2 emissions in recent years, even if it is not the only factor. The shale gas boom is not considered likely to deliver deep emissions reductions, however; policies will be required. In the US, unconventional gas extraction is also often associated with the extraction of cheap oil, which may trigger higher use. It has also improved the competitiveness of coal in power generation in Europe, at the expense of natural gas, with higher emissions as a result. On the other hand, natural gas is now making inroads in US transport, which should help to lower that sector's CO_2 emissions. In power generation, it could also facilitate more variable renewable electricity generation, with the provision of flexible, dispatchable plants.

The development of shale gas in North America is influencing energy and climate policy discussions in the rest of the world. Coal-reliant countries look at shale gas as a positive contribution toward the achievement of their CO_2 pledges. Some European stakeholders see it as a panacea to the combined problems of high energy prices and the low-carbon energy transition. Others point to the risks of enhanced energy price volatility – gas prices have hardly been stable – and more lock-in of carbon infrastructure. The environmental impacts of shale gas including associated methane emissions are a major concern in Europe, probably more so than the siting of wind farms. The topic is still being investigated in the US. In summary, the North American shale gas developments were not viewed as replicable in Europe in the near future, one of the key differences between the two regions being ownership of the underground.

The US shale gas boom and its knock-on effects on energy choices elsewhere were seen as having two potentially negative effects:

- It occupies the energy policy space and as such slows down policy decisions on the new energy infrastructure and market reform needed to align climate and energy objectives.

- It has split the energy security community from the climate policy community. A high shale-gas use scenario is consistent with a 4°C world, not with the 2°C objective agreed on by the climate policy community.

The effects of additional unconventional gas supply on the competitiveness of renewable electricity sources were considered in different contexts:

- A higher penetration of gas in US power generation, i.e. in base-load generation, would considerably lower electricity prices and affect the competitive position of renewables. Renewable support measures are already challenged on the ground of their high costs, while impacts on electricity bills are not significant.

- The rest of the world is unlikely to see the very low gas prices experienced in the US over the past year. Unconventional gas could provide a short-term answer to energy security, with renewables and their predictable costs providing the effort required for decarbonisation. Furthermore, wind and solar technologies are also undergoing a revolution, with rapidly declining prices that should change the equation on future energy choices.