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Parallel Workshop 1: Energy and Environment

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Ladies and gentlemen, we thank IFRI for inviting us all here and providing this forum. I completely agree with the previous speaker that there is a technology solution and we need a lot more R&D and I would like to walk you through some of the issues surrounding solar technology and the evolution of technology in the energy field. Last year when I made a presentation here the title was 'Why Renewable?' I think we have gone a lot further down the road and I think there is a consensus that at least there is a case for policy intervention, there is a climate change issue and that we need to include renewables in the energy mix somehow, but the big question is how we do that.

If we look at how we have done it to date you really wonder what the policymakers were thinking, especially in Germany. Just plugging PVs into the electricity system does not solve the energy issue or de-carbonise the grid in any shape or form. You might be saving a little bit of fuel, but you are still keeping your fossil fuel plants up and running on hot standby. In a way the whole exercise has been pointless and a huge waste of money and it has been extremely destructive to the grid and how we manage the grid. For example, if you look at electricity prices on one sunny day in June in Germany they go negative because there is too much power on the grid, and if it is windy you have got some real technical issues. This is not at all a satisfactory situation. I think the environmental lobby and the green lobby have been very misleading in talking about grid parity and stating that PV has become so cheap it can replace fossil fuels. That is not at all true because it is not a replacement. We are not comparing apples to apples. This is an apples to oranges comparison. PV stops producing electricity when the sun goes down. Windmills stop producing electricity when the wind stops blowing. We are therefore talking about very, very different animals.

What does that mean? One thing that it does mean is that PV obviously cannot bring the energy revolution that we need to solve climate change, certainly not in the way that policymakers are implementing it today. What is the solution? The solution is to link it up with batteries. It is obvious. You can do that with wind. You can do that with PV. However, if you look at the cost of batteries all of a sudden the decline in PV costs does not really mean anything because the cost of batteries is about six times the cost of the PV, so you have got a situation where PV is actually far from competitive from a systems level. If you analyse things as a whole as to how PV fits into the grid it is very, very rarely competitive. If you are in a remote village where you have to truck in diesel over several hundred kilometres on very poor roads then this system might be competitive, but in general PV is far from competitive.

There are, however, other solar technologies and these are at the beginning of the learning curve. They are beginning to be deployed. We have seen a lot being deployed in Spain and in the US and it is a solar technology which is based on thermal rather than the photoelectric effect. Because it is based on thermal you can store the heat and that means you can produce electricity once the sun

goes down, and in fact we have a CSP tower system in Spain which can function 24 hours a day. They were producing electricity non-stop over the summer for 36 consecutive days. It was only dimensioned for 10 hours of storage, so you could actually dimension it so it would produce energy continuously all year round. It is just a question of how many mirrors you put out and how much storage you put in.

What we are seeing with CSP, which is really at the beginning of its lifecycle, is a decline in prices. In Morocco there has been a very large international tender at Ouarzazate and the Moroccans were actually surprised at how low the prices were. It still has to be subsidised, as their fossil fuel is subsidised by the way, but it is one-third of the subsidy they were expecting, so they can do a lot more solar with their budget and they are seeing a continuous downward pressure on price.

Our company is developing a CSP plant on the island of Crete and we are starting to get bids in on that and one thing that is happening which is quite extraordinary and a major development in this industry is that the Chinese are entering the CSP market and they are doing the same thing to the prices as they did in the PV market. We are getting prices close to half of what we are getting from Spanish and US suppliers. We are waiting for a revolution and there is a possibility that this will be a real revolution in the energy system. A lot of people understand this and a lot of policymakers, especially in multilateral institutions such as the World Bank, the African Development Bank, the development banks in Germany and France, are supporting the CSP projects because they know it is a long-term energy solution for the planet.

There are limitations and one of the biggest limitations is geography. Use of this technology really makes sense in the area known as the sunbelt. The solar intensity in these areas is sufficient to run a CSP plant. It is a marginal technology for Europe and even for the United States. You cannot get the kind of economic performance there that you can get in the Sahara Desert or some of the deserts of South Africa or Australia. Who is going to develop this technology then? It is not a natural technology for the Europeans, or even the US, to jump on. It is marginal. However, the potential is there. The resource is there in these geographic areas. However, it is very similar to where the fossil fuels are distributed. They are in areas where there is not necessarily the technology to exploit them and it has required international cooperation to go in there and extract these resources. The same will be true for renewable resources.

Desertec produced a famous slide showing a blue square in the middle of the Sahara which is enough to power the entire planet. The potential is there, but the question is how to access it. We think that one way of accessing it is high-voltage DC transmission lines. If we can build gas pipelines under the Mediterranean and under the Baltic Sea we can certainly lay high-voltage DC cables under the Mediterranean. This is not a technological miracle. We have done the engineering and the pre-feasibility studies. This works and it is economical. We are talking to our first clients in Europe and I can tell you that our biggest challenge is not technical. It is political and regulatory. The regulations are just not set up to transport electricity over long distances. In fact, European policy is going in the opposite direction with market coupling. We are trying to reserve long-term capacity and the regulators are saying, 'No, you cannot. This is a day-ahead market.' There are therefore huge issues that need to be addressed by Brussels and the national regulators.

The other challenge is political and getting the Tunisian government to understand that they cannot cut the same deal that they have with our friends in fossil fuels. We do not have the margins available to give them 50% of the revenues. We just do not have it. It has taken a lot of education, but we now have a comprehensive export law which has been put before Parliament, so if Parliament actually means anything in Tunisia we will one day have a law.

There is another application of this technology. What we are seeing, especially with the new market entrance in China, is that they have managed to scale down this technology as opposed to scaling it up. The tendency with suppliers in Spain and the US has been to go for bigger and bigger power plants to get efficiencies, but the problem is that that excludes so much of the market. You need huge amounts of land and you need huge investments in transmission infrastructure. Some Chinese companies have looked to see if they could scale this down so they could deploy this without having to do the investments in the grid infrastructure. A Turkish company is doing likewise. Being able to go and put in a one-, two- or three-megawatt system with storage, without having to do grid upgrades, on the edge of a town or city in a very hot area is extremely attractive. You could probably plug right into the distribution network. This is an extremely interesting market opportunity and we are writing a business plan right now to try to role this technology out in sub-Saharan Africa.

This is how we can implement the energy revolution: to use CSP solar with storage and export projects from areas where there is high sun to the areas of high demand using extremely well proven high-voltage DC cable technology and to scale this technology down and implement distributed generation, which could take off much like mobile telephony in Africa where you basically skipped having to cable millions of miles. We were able to completely skip putting up millions of miles of copper cable in developing countries. We can skip the same kind of cabling in national grid deployment using distributed generation using small CSP systems with storage. That is my short presentation, which I think wraps up a lot of the elements that we touched on in the discussion today. Thank you very much.