

# Session 4

## Centralised *versus* decentralised

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Session 4 – **Centralised versus decentralised**: workshop by the World Energy Council

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**Philip Lowe, World Energy Council, United Kingdom**

In this session, the World Energy Council is looking forward to feedback for the preparation of this year's Trilemma Report and Trilemma Index, the major theme of which is centralisation *versus* decentralisation. Is this simply a question of centralised supply *versus* decentralised generation? Does it mean central planning rather than decentralised planning? Does it consider the demand side of energy at all?

In the earlier sessions, we saw that there is a renewed focus on consumers, and on energy services as well as energy. The transformation occurring across energy systems is therefore not only about the technological shift from thermal and nuclear to renewables; we are talking about centralised or decentralised systems. That means that we are not simply talking about the *technicalities* of energy but also about the *politics* of energy. We also need to ask whether the market for energy is a wholesale or retail market. How do the different changes on the generation and system sides impact on systems as a whole? What models and systems should we be moving to in order to meet the objectives of the trilemma: sustainable, affordable and secure energy systems?

**THE PERSPECTIVE OF A FRENCH DISTRIBUTOR**



**Jean-Baptiste Galland, Enedis, France**

Enedis is France's largest distributor, distributing electricity to 95% of the French population. We have to consider the question of centralised *versus* decentralised in an evolving context marked by two main characteristics. First, people are now very much aware of global warming, particularly in the

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post-COP21 context. Second, it is now possible to share information very rapidly and very efficiently thanks to the digital revolution.

France has been undergoing a significant change on the distribution side. It now has 20 GW of renewable energy connected to the distribution network, and that will be more than doubled by 2020-2025. We have therefore made a great deal of progress in this area. In the past, the system was based on adapting supply to demand.

The advent of electric vehicles is also having an impact on the system. There was a 50% increase in the number of electric vehicles in France in the past year alone (103.000 EV by the end of 2016). France has 100,000 charging points today, with 7 million expected by 2030. France has already decarbonised its energy sector, and now needs to decarbonise its transport sector. The use of electric vehicles is an important means to that end as transport is the second greatest generator of greenhouse gases after energy.

Going forward, it is demand that will be adjusted. That's the reason why the energy transition is also concerned with an increase in flexibility, from 2 GW in flexibility today to 6 GW. This requires the deployment of 35 million smart meters by 2021, and the reduction of energy consumption by 12.3% in 2023 compared to 2012. Smart meters should make it possible for consumers to make informed decisions and better manage their consumption.

Is energy transition an economic, technical or political question? As a national distributor, we have always been concerned by the political dimension of these questions. Going forward, we will have to address two new factors: the technical-economic challenge of an increasingly flexible network, and the challenge of organising coordination between the different components and different levels of the system. All of this goes much further than the challenges we faced in the past.

In terms of pure distribution, we have a very clear transformation plan. First, the network must be managed in an active and not a passive manner. Second, we have to provide information to all players related to our business and not only to consumers. Third, we need to facilitate the operation of energy markets. This is particularly important for France, which is a very market-oriented country. Finally, we have to ensure that the system is safe and secure. In the past, managing distribution networks was relatively simple: it was an "invest and forget" matter. However, we now need to ensure the safety and security of the system at the local level. That is part of what we call the distribution system operator (DSO) model.

Another important aspect is to ensure a good relationship with the regulator. The fact that we are undergoing rapid changes means that there are many tensions in the system. We therefore need to try out new ideas and resolve any problems that are encountered. Finally, the question of investments is also important, especially in a system that includes regulated stakeholders and competitive players. In that context, we need clear and efficient economic signals that address the free rider issue in particular.

I will close with a quotation from Elon Musk who stated that, "energy providers have only one solution: to act like new entrants and to re-think business from end user needs, ignoring burdens associated with the existing construction (technological, regulatory or otherwise) that as to evolve or is to do so".

### **Philip Lowe, World Energy Council, United Kingdom**

You noted the interaction between competitive frameworks and regulatory frameworks. Is it not necessary to ensure that the distributor is not the only actor with access to user data?

### **Jean-Baptiste Galland, Enedis, France**

Data, which is necessary for innovation, has to be made available to all players.

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### **Philip Lowe, World Energy Council, United Kingdom**

There will be more and more actors in the system at the retail and wholesale levels. Should we mutualise or socialise all the imbalances in the system or should this be the role of the market?

### **Jean-Baptiste Galland, Enedis, France**

The problem in Europe is that the market is not working as it should, due the introduction of subsidies. The more rapidly we can return to appropriate price signals, the more rapidly we can achieve a more balanced market.

### **Philip Lowe, World Energy Council United Kingdom**

Portugal has always complained that the European market was not sufficiently integrated.

## THE PERSPECTIVE OF A PORTUGUESE DISTRIBUTOR



### **Ricardo Prata, EDP Distribuição, Portugal**

We are integrated into an Iberian wholesale energy market that is an open market. However, due to distortions in the market, we face issues with respect to resource allocation. We also face an issue with the remuneration of thermal power plants that guarantee the security of the system. We have very significant renewable production that has zero marginal costs, resulting in merit-order effects that leads to a reduced utilisation of gas-fired power plants. In the long-term, there is no incentive to invest in dispatchable power plants that will guarantee the security of supply. How can we design a market to provide that incentive? That is a question that has not been fully answered to date.

The Portuguese energy sector was traditionally based on hydro power plants. Together with pump storage capabilities, we are able to manage the intermittency of renewables.

### **Philip Lowe, World Energy Council, United Kingdom**

How do you see the Iberian electricity system evolving in the period toward 2025-2030? Will it also shift toward a high percentage of renewables, including hydro? Who should be responsible for providing back-up services: companies or governments? Do we need to subsidise decentralised generation for it to be reliable and affordable?

### **Ricardo Prata, EDP Distribuição, Portugal**

That is probably not necessary in Portugal. We began our renewable energy production by building hydro power plants. In the late 1980s, we encouraged the emergence of distributed generation, mainly in the form of co-generation power plants. In the early 2000s, we introduced strong incentives for wind energy production. Today, both wind and hydro account for 40% of total consumption. In addition, 40% of demand is met by distributed generation connected to the distribution grids.

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Demand has now levelised after declining, and incentives for new renewable power plants have been reduced. As a result, we have not added much in the way of new renewables since 2012. Nevertheless, solar production is starting to become competitive in Portugal even without incentives, and we expect that self-production will start to take off in the coming years. Of course this poses challenges both for the regulator and for the distributor. We also have to encourage innovation in order to keep connection costs as low as possible. We have to build system-wide initiatives to accommodate the use of renewables, namely the building of dams with pump storage capability to address variability.

**Philip Lowe, World Energy Council, United Kingdom**

If the Iberian market is integrated, that capacity could also be provided by Spanish CCGT stations in the future.

**Ricardo Prata, EDP Distribuição, Portugal**

That is correct. We can indeed look at the system from an Iberian perspective.

**Philip Lowe, World Energy Council, United Kingdom**

How does ENGIE see the future to 2025-2030?

## THE PERSPECTIVE OF A FRENCH MULTINATIONAL



**Grzegorz Gorski, ENGIE, France**

ENGIE's strategy is to be the leader of the energy transition. We consider the future lies in a fully 3-D world: fully decentralised, fully digitalised, and fully decarbonised. With the appointment of our new CEO in 2016, our strategy has accelerated even further. ENGIE is also very well positioned in services, with over 100,000 people working in this sector. ENGIE is a global Group, with operations in over 100 countries.

I firmly believe that good regulation should promote the energy trilemma: security, affordability and sustainability. In Europe, unfortunately, we have done the opposite: our systems have become less secure, less affordable and less environmentally friendly. At the same time, carbon emissions have increased in Europe overall. Therefore, despite the policy focus on climate and the claims for European leadership in the battle against climate change, none of the objectives have been achieved.

## PANEL DISCUSSION

**Philip Lowe, World Energy Council, United Kingdom**

Decentralisation provides consumers with the autonomy to understand how they consume, to create security for themselves, and to find the cheapest tariffs. However, if everyone sub-optimises,

the entire system will eventually collapse. Does that mean that we cannot have a wholly decentralised system and that we need some form of centralised decision-making?

### **Jean-Baptiste Galland, Enedis, France**

Decentralised does not mean autonomous. There has to be some coordination, and the way we organise that coordination is very important. Enedis therefore does not see autonomous consumers becoming the norm. In addition, electricity is about the quality of current, and isolated consumers cannot be sure of the quality of their current.

In Europe, therefore, some form of network services will be the cheapest in order to coordinate customers-producers and ensure system stability. That may not be the case in Africa, for example, where large networks do not exist in the first place.

### **Ricardo Prata, EDP Distribuição, Portugal**

I would agree. Self-production will take off, particularly in Southern Europe. Nevertheless, despite the taxes and subsidies that are levied on network access, the network provides comfort and security at a very reasonable price. To reach that same level of comfort and security at an independent consumption point would require a very substantial investment. It is therefore necessary to have some regulatory authority and centralised coordination.

There is, however, a challenge for regulatory authorities. The regulatory framework varies greatly in Europe. In Portugal, for example, the brunt of the costs associated with feed-in tariffs are met by energy tariffs. That provides an incentive for users to install PV systems in order to benefit from cross-subsidies across end users. However, if people are made to pay for net consumption (including the cost of security costs), that will make it even more difficult for them to dis-connect from the network.

### **Grzegorz Gorski, ENGIE, France**

I take a slightly different view. If everyone engages in local optimisation, the result will clearly not be optimal. Technological progress means that PV will continue to be cheaper and cheaper. Storage will change everything, and it will also come down in cost. Finally, the flexibility of demand will increase. What will people do with their excess power? They will trade it, through peer-to-peer trading or blockchain systems. Energy utilities should not ignore these trends. Rather, they should position themselves in the forefront by proposing these offers themselves. If they do not do that, someone else will.

Going forward, there will be much more technology (both hardware and software) in our systems.

### **Philip Lowe, World Energy Council, United Kingdom**

This would suggest that we cannot have totally decentralised solutions in order to meet the objectives of the trilemma. Nevertheless, there is much room for innovation in an uncertain world.

You all mentioned the fact that conventional sources of generation now have to compete with renewables at zero marginal cost. Is there not a market-oriented response to that issue? Could we not have electricity contracts that include the necessity for providers to look after the services? Why should this be socialised onto grid operators?

### **Grzegorz Gorski, ENGIE, France**

In many countries today, renewable resources already have to pay the costs of intermittency. That is therefore not the real issue here. Of course we can ask what will happen in the future when conventional generation plants disappear, but that will not occur for the next 20 years at least. When it comes to intermittency, we now also have offshore wind which has a good fit with PV and no feed-in premiums.

**Ricardo Prata, EDP Distribuição, Portugal**

I believe that new technologies will facilitate these developments. I agree that the markets already address some of these issues quite well but I believe that networks will always play a very important role. When it comes to storage and security of supply, storage systems can also benefit from the economies of scale involved in networks.

**Jean-Baptiste Galland, Enedis, France**

Today, we are seeing competition between a mass production effect and a return to scale effect. Globalisation brings a mass production effect that makes renewables very competitive: we can buy the same turbines and PV panels everywhere in the world.

We also have to distinguish between costing and pricing. The fact that something has a zero cost does not mean that it should have a zero price: distribution, for example, generally has zero marginal costs on the network. It is therefore necessary to re-build prices according to this new reality.

**Philip Lowe, World Energy Council, United Kingdom**

We have not yet mentioned scale effects. Is there a difference here between gas and electricity?

**Grzegorz Gorski, ENGIE, France**

This is not only a question of gas but also of thermal energy. Two-thirds of our needs are thermal needs, and one-third only is electricity. What makes gas different is that it can be seen as a transition technology to a fully decarbonised world. Existing gas infrastructures and assets could be used in the future with “green” gas. They therefore do not represent sunk costs. That is a more distant future but is nevertheless a possible scenario.

**Philip Lowe, World Energy Council, United Kingdom**

The investments in gas infrastructure pay off more quickly than some of the very expensive transmission lines and distribution networks we need.

**Grzegorz Gorski, ENGIE, France**

That is not correct. The main parameter here is the cost of capital.

**Philip Lowe, World Energy Council, United Kingdom**

Let us now turn to consumers. We have seen that we need active retail markets. However, we also know that consumers do not make rational choices even when presented with the relevant information. Do you share that view or do you believe that smart meters will inevitably lead consumers to make rational choices?

**Ricardo Prata, EDP Distribuição, Portugal**

Our experience regarding customer behaviour is consistent with your impression, particularly when we consider domestic users. We launched a smart grid pilot some years. This showed that there was an initial improvement in consumer behaviour in order to make savings. However, that might not be sustained over time. In contrast, small business tends to make more sustainable improvements to its behaviour.

**Philip Lowe, World Energy Council, United Kingdom**

Are French consumers as dynamic as Estonian ones?

**Jean-Baptiste Galland, Enedis, France**

While living in England, I had at home a smart meter providing information on electricity and consumption as well as CO<sub>2</sub> emissions. Initially, my children were very interested in their consumption

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(shutting down lights when leaving bedrooms) but lost interest after only one month. They were, however, very much interested in the CO<sub>2</sub> emissions, comparing them with our car suggesting to replace first the car. This anecdote highlights the fact that consumers (either English or French) will find unexpected solutions that will be probably good for the system as a whole if we provide them with the right information.

### **Grzegorz Gorski, ENGIE, France**

Consumers are passive for three reasons. First, generally speaking, it is difficult to change. Second, they do not really understand the system. Third, the savings they could make are relatively insignificant. Going forward, this can be expected to change with a new generation of consumers coming through, and with the development of increasingly easy processes. Today, it is estimated that people spend approximately 5 minutes thinking about energy per year. With the new technologies available, it may become a sexier topic in the future.

### **Philip Lowe, World Energy Council, United Kingdom**

There are more energy service companies in the United States who promise to reduce consumers' bills. That type of service does not appear to be available in Europe.

### **Grzegorz Gorski, ENGIE, France**

I would have thought the United States was less advanced than Europe in these matters.

### **Philip Lowe, World Energy Council, United Kingdom**

The potential for more autonomous decision-making must be increased by the introduction of aggregators, and by the availability of other business models such as car sharing.

## QUESTIONS & ANSWERS

### **Jedrzej Makowski, Sciences Po, France**

Do you consider that Europe has had a sufficient focus on the affordability of electricity? Retail prices for electricity have continued to grow in many countries, but that is perhaps a good thing in terms of consumer behaviour.

### **Jean-Baptiste Galland, Enedis, France**

Wholesale energy prices is cheaper today than it was in the early 2000s. What is missing now is the price of CO<sub>2</sub>. That is, if we do not add the cost of pollution, there is no incentive to save energy or to decarbonise. Without this, we will always have a free rider problem.

### **Philip Lowe, World Energy Council, United Kingdom**

The price of energy has risen so far as to become painful, but not so far as to stop people paying. There are non-price elements in people's attitudes to energy. At the same time, now that consumption can be monitored more intelligently, electricity is becoming less of a commodity. Nevertheless, it is true to say that attitudes to energy are not entirely concerned with cost.

### **Grzegorz Gorski, ENGIE, France**

From a macro perspective, energy is not more expensive than in the past. Progress in technology is always inclusive: both the total invested capital and the base of consumption is growing. The best example of this is today's Africa, where off-grid energy solutions (home solar systems) are booming today.



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### **Philip Lowe, World Energy Council, United Kingdom**

I am not sure that we can categorically say that consumers will move toward distributed generation in order to contain the costs of energy. It will depend on the circumstances in each country or region.

### **Ricardo Prata, EDP Distribuição, Portugal**

The market has to accommodate the externalities of the climate impact of the energy consumed. Policy makers in Europe have tried to internalise those costs within the system, thereby promoting the emergence of new technologies such as solar and wind.

### **Philip Lowe, World Energy Council, United Kingdom**

Some years ago during a vote on the energy mix, the United Kingdom House of Commons voted in favour of nuclear by 600 to 8. The margin for manoeuvre of a government like that is quite low: there is an important non-price factor at work here from a political and social point of view.

We have not found any major answers to the centralisation-decentralisation dilemma in the trilemma. We need to define the terms very carefully, on both the demand and supply sides. We also need to look at this from a political point of view. We recognise that there are scale effects and network effects that have costs and benefits, and that influence the final price of electricity.

We will have to reflect these different strands of thinking in the report, which aims to provide a framework of recommendations to governments and regional authorities. There is clearly no silver bullet or one size fits all solution to these issues, and I would like to thank our panel for their valuable insights to this debate.

