

E.ON's statement to ERGEG Public Consultation Paper on Smart Grids (E09-EQS-30-04)

Introductory Remarks from E.ON

As international debate on Smart Grids intensifies, E.ON welcomes this consultation paper from ERGEG and in particular, the supportive stance that it takes. We understand the pivotal role that regulators will have to play in creating the necessary tools and environment to facilitate the widespread adoption of Smart Grids. We support ERGEG's statement that *"Regulators act as key facilitators in this process, by identifying and removing possible barriers and by finding solutions that provide an appropriate balance between all the stakeholders' positions (p.7)."* We, however, want to add that Smart Grids are not a standalone development.

We believe that the fundamental drivers supporting a move towards Smart Grids are as follows:

- The anticipated increase in intermittent renewable generation which will inherently increase the complexity of the electrical system. First single experiences with photovoltaic systems show that network operators will face two peak situations per day: one positive peak for the demand and one negative (reverse flow of energy from low voltage into medium voltage) due to the generation of distributed energy resources. To manage this change, grid operators will need new tools to analyse more complex power flows, thus ensuring that high levels of service quality are maintained for a reasonable cost to the end users.
- Our projections show that without intervention, demand, particularly at peak times, could be significantly higher as a consequence of the decarbonisation of heating and transport. We believe smart grids will enable more efficient and cost effective management of this change in the demand profile.
- Smart grids can facilitate the low carbon transition and allow customers to embrace new technologies without causing problems for the system. Customers will be able to actively contribute to the efficiency of the electrical system and participate effectively on the energy market by managing their demand patterns, either independently or through a service provider.

- Finally, smart grids could also bring benefits in terms of improving the efficiency of the existing system as well as providing new forms of asset and operational data leading to better investment prioritisation processes.

Additionally, we would like to stress that in the further development of the regulatory framework a clear distinction between regulated (grid) and competitive (generation, wholesale, supply) business must be maintained. In addition, the roles and responsibilities of DSOs and TSOs will need to be clearly defined to avoid any potential overlap or confusion, as each will want to optimise its own assets and systems. Please note that our comments in this response are focussed on the distribution grid unless otherwise stated.

Section 1 – Introduction

1. "Do you consider that networks, transmission and distribution, are facing new challenges that will require significant innovation in the near future?"

Yes, we completely agree with ERGEG. The European climate objectives will have a deep impact on the generation mix. To arrive at the required performance improvements in system optimization and energy efficiency along the entire value chain, modern and intelligent distribution grids are indispensable.

Modern grids will present a neutral platform for competition and system optimization. Renewables have to be integrated into an efficient and capable grid for reasonable cost and without undue delay. Network operators are already facing these new challenges today and these challenges will increase significantly over the coming years. In Northern Germany, for example, E.ON is experiencing reverse load flows from the medium voltage to the high voltage grid due to the strong increase in wind-power. In Southern Germany similar problems are occurring but at different grid levels (reverse of load flows from low voltage to the medium voltage level), due to the strong increase in photovoltaic (PV) installations. Additionally, the increase of fluctuating PV generation in Southern Germany is necessitating more active voltage management to maintain voltage stability in the network.

The increasing number of decentralised generation units feeding into the grid will lead to technical problems if the current network structure and technical standards do not change. Most of the decentralised in-feed will be connected to the low and medium voltage grid. On the other hand, we also see a change in demand. The UK government, for example, has created a number of incentives which are designed to accelerate the adoption of electric vehicles and heat pumps. Given the average lifetime of vehicles and boilers is ten years, rapid widespread adoption will cause

problems for DSOs with historically asset investment cycles of 40 years or more. Both of these technologies draw significant amounts of power from the grid and are likely to put a significant strain on the electrical network.

Therefore, the distribution network will have to be upgraded with I&C technologies to ensure quality of supply and allow for demand side management, new customer services and the integration of new electricity consumers like E-vehicles.

*2. Do you agree with the ERGEG's understanding of smart grid?
If not, please specify why not.*

In principal, we agree with ERGEG's understanding of Smart Grids. E.ON's more narrow definition of Smart Grids is *"a (distribution) network upgraded with additional communication and information technology to steer the more complex supply and load patterns, provide intelligent load management and to enable all costumers and decentralized generators connected to the grid to participate in the energy market."* Smart homes and smart appliances are not included in our definition.

Smart Grids also need to deliver a means to facilitate a demand side management process that can accommodate both wholesale price signals and distribution network constraints.

What is also important for us to mention is that DSOs may have different needs to invest into smart grids as the intelligence necessary will vary by region and voltage level. Generally, investments into smart grids can be differentiated into smart network assets (including smart meters), ICT and system integration.

3. Do you agree that objectives of reducing energy consumption impose the need for decoupling regulated companies' profit from the volume of energy supplied? How can this be implemented?

We are not sure how this question should be understood: Does it either relate to regulated network operators' profit or to regulated end-consumer prices where they exist in specific countries.

a) The revenues of grid operators should be volume adjusted, as is already the case in some EU countries with revenue regulation. The revenues for DSOs are fixed and volumes deviations are balanced at the end of the regulatory period. If one of the targets is energy efficiency then the total annual volume in a benchmarking process should be re-considered.

b) In the case of regulated retail prices, E.ON shares the view of the COM that regulated retail prices negatively affecting wholesale markets and retail competition should be abolished.

4. Do you agree with the drivers that have been identified in the consultation document? If not, please offer your comments on the drivers including additional ones.

As stated above, the primary drivers we see are the integration of renewables, end-user participation on the energy market and the management of changing demand profiles as a result of the decarbonisation of the energy and transport sectors. Smart grids, together with smart meters, are necessary for further market integration, and will, if complemented by intelligent market arrangements, let households and national markets respectively benefit on a large scale. They enable active demand side management as well as the integration of storage (electricity storage, e-vehicle batteries) to respond to the increasing intermittency of wind power.

For further market integration and the interoperability of the grid, ERGEG should aim to set a common/ compatible European regulatory framework and engage the supplier industry and network operators in the development and implementation of fully compatible standards. It is crucial to keep standards between countries compatible, especially regarding data formats and functions of IT devices. In this respect the rollout of smart meters in Europe might be a negative example for the Single European Market as countries are choosing very different models for their rollout.

Finally, we believe that the advantages of more active demand side participation could be increased by the introduction of a central implicit intra-day platform to allow continuous wholesale power trading across Europe. This would enable markets to make best use of the most effective demand side response to the intermittency of wind power and PV. The most sensible demand side response could also be balanced against any other supply side reaction in a market based way.

5. Do you agree that a user-centric approach should be adopted when considering the deployment of smart grids?

Yes, we agree. Smart Grids are not an end in themselves and they should enable the customer who is no longer simply a consumer but also a generator, to actively take part in the energy market. However, there are many different types of customer, with different needs and different characteristics, and it may not be straightforward to develop a solution tailored to all requirements. Consultation will therefore be a key part of the development of smart solutions, to ensure that the needs of the all

stakeholders are considered. Additionally, Smart Grids are also required for smart load management which allows the network operator to balance increased decentralised in-feeding and wind intermittency without investing in enormously enhanced grid capacity which ultimately the consumer has to pay for.

6. How should energy suppliers and energy service companies act in the process of deploying smart grids solution?

There is no one-size-fits-all-solution. There is a need for an attractive and supportive framework for suppliers, consumers, networks businesses and others. Innovation is needed and there is an increasing willingness from the network side to lead the process. However, within the actual regulatory framework of most countries high barriers to investment remain.

By offering appropriate tariff products to end consumers, energy suppliers and energy service companies enable the end consumer to participate via active demand side management on the energy market and at the same time mitigate the fluctuations of wind intermittency. Optimised network utilization by intelligent load management can prevent the large network extension that would be required to manage the fluctuations of an increasing number of renewables.

In those markets where energy suppliers or service companies are critical to the roll out of smart meters there must be a requirement for them to integrate the wider smart grid benefits that may be achieved during the process. This creates a need for detailed consultation with distribution and transmission businesses.

Network operators as well as retailers have a critical role in terms of engaging with consumers and informing them of the potential benefits of smart grids. Demand side management may require energy suppliers to develop different energy supply contract solutions to ensure that the smart grid can function and deliver its true benefits. It is also important that the specification of the meter and the communication network meets smart grid requirements otherwise stranded assets, unnecessary cost and customer disruption will result.

7. Do you think that the current and future needs of network users have been properly identified in Section 3.3?

In principle we agree with this description of the different needs of customers, generators, suppliers and energy service companies (ESCo). We however want to express our doubts that the "decarbonisation of electricity supply will cause reduction in quality and reliability". It is our key remit as a network operator to

maintain under all circumstances the high quality of supply our customers have benefited from over the last decades. In order to reach the European climate objectives, large investments in infrastructure are necessary and will not be realized if the necessary return is not guaranteed in the compensation scheme. **Up to now, there have been strong incentive systems to increase the share of renewable energy but almost no incentive to integrate these renewables into the grid.** This has to change in the future if the European goals for climate protection are to be reached. The challenge for law makers in Europe will be to find the appropriate balance between necessary investment and the cost to end consumers. The allocation of costs for these investments should be shown transparently to end consumers. It might be even helpful if a EU-wide framework, that combines the promotion of renewable energy, also includes rules about sharing the cost for the necessary enforcement of the grids.

8. Do you think that the main future network challenges and possible solutions have been identified in Section 3.4 and 3.5 respectively? If not, please provide details of additional challenges/solutions

Intelligence will be needed to improve the utilization and functionality of the networks. This is necessary to reduce future investments into the enforcement of grids (where approvals are often hard to obtain) and thus may contribute to more efficient networks and lower network fees. It should however be clear, that smart grids are a tool and a platform for the services described in chapter 3.5.4. These services have to be offered in a competitive environment.

From the customer perspective, we do not wholly agree that "higher electricity prices and stronger time-dependency of prices will make that customers will require more details about their consumption pattern than today". It may be true that lower carbon intensity in generation will lead to higher electricity prices and certainly the price signal is the most effective factor for customers to change their behaviour. However, we think that the primary driver for customers to understand more about their consumption patterns is that they know that modern technologies can provide them with this information - customers want to know more about their consumption patterns or the specific consumption of their appliances because they want to contribute to a more energy efficient world. If network operators and suppliers will in the future introduce more and more time-dependant prices allowing customers to save money if they shift their consumption the need to get more information will rise.

9. Do you expect smarter grid solutions to be essential and/or lower cost than conventional solutions in the next few years? Do you have any evidence that they already are? If so, please provide details.

One reason to invest in Smart Grids is to improve asset utilisation, which in the long run will lead to a reduction in future investment. This is, however, a major challenge for regulators as smart grids may mean higher expenditure today (due to a need to invest in information and communication technology) to postpone or even avoid the need for investment in more conventional grid assets in the future. On the one hand investment in Smart Grids should give returns in terms of improved output measures, such as load index improvements, fewer and shorter customer interruptions and less carbon intensive networks.

On the other hand, by becoming smarter, we suspect that the end solution will be cheaper, although network operators may be taking on a higher risk network, and this would need to be accounted for in the regulatory mechanisms.

Another important aspect with regard to investment into more smartness should be economies of scale. With a large number of devices, the average unit cost would decrease. As investing into smart grids is a topic for all European electricity (and also gas) markets, there is the opportunity to realize these economies of scale on a pan-European scale. Open asset standards and non-proprietary data formats will be needed to realize these scale economies, as well as a parallel action of European regulators to improve incentives for investments into smart grids.

Currently, we do not yet see that regulators support these increased investments into smart grids as typical benchmarking or incentive regulation always compares with the network operator who is most efficient today and not most efficient in the future. Without a more forward looking regulation we think that smart grids might not be implemented on a broad scale.

We believe that there are ways of solving this problem, such as:

- including a term in the benchmarking to recognise the benefits of smart grids such as the avoided network investment although we recognize that it might be difficult to achieve;
- by ensuring that other incentives reward those companies investing in smart grids to a greater degree than they are penalised in the benchmarking.
- encouraging the widespread adoption of Smart Grid technology by offering higher returns on these types of investments and perhaps a separate 'Smart Regulated Asset Base'. A higher risk premium for smart grids may be

appropriate, based on developing standards and technology, the lack of experiences in implementation, maintenance and appropriate asset life times of the new technology. Accelerated depreciation periods for new technologies may also reduce the risks for investors on technology uncertainties.

10. Would you add to or change the regulatory challenges set out in Section 3.6?

In principle, we agree with this statement as well. Encouraging innovation is certainly a very important challenge for regulators. Most regulation in European member states where E.ON is active does not support R&D investments – the British regulation being a rather positive exception. Nevertheless, whilst the UK is commended for providing funding for R&D, the underlying regulation has not been amended to support innovation or to encourage smart grids as a business as usual investment. As the implementation of smart grids still needs a lot of research to be done, this low focus of regulators on R&D is a big disadvantage. As a consequence, investment into smart grids will either be too late or too low.

Another important aspect in our view is the integration of positive externalities into the regulation. In other words, more investment into the grid will be more than compensated by increased functionalities and benefits for the competitive parts of the value chain such as generation/ wholesale and retail. Smart meters might be a good example of this. Smart meters have higher cost than conventional meters but they provide information to customers to help them better manage consumption, enable new carbon saving products and services and are a prerequisite for smart grids.

11. Do you agree that regulators should focus on outputs (i.e. the benefits of smart grids) rather than inputs (i.e. the technical details)?

Yes, we agree, regulators should focus on output and leave the decision on the best input to the network operators. The output parameters listed by ERGEG may interfere with other national parameters, e.g. quality regulation. Output parameters also tend to reduce costs. To encourage the investment in new technology and pilot projects financial incentives might also be an appropriate instrument. That could be e.g. special funds like in the UK, a special return on equity as in Italy, or accelerated depreciation periods of smart grid investments. For the mid-term the investment conditions given in each EU country have to be sufficient to encourage network operators to invest in smart grids on a large-scale.

Parallel to the output parameters some technical details should also be considered by regulators to compare the capability of smart grids with each other. Intelligent load management becomes a crucial factor by transporting high volumes of renewables e.g. from off-shore generation in the North of Germany, a large number of photovoltaic in the South, or decentralized biogas in-feeding to consumers. The end consumer as well as the generators of decentralized units only profits indirectly by lower grid tariffs than by enhanced grid capacities required otherwise to enable this in-feeding. Therefore, regulators shall also take the capability of smart grids, e.g. amount of transported load, into account to incentive cost effective solutions.

With regard to smart metering in competitive, supplier led models like in the UK or Germany it may be necessary to impose constraints and standards e.g. on meter and communications specifications to enable smart grid delivery. Other countries such as Sweden already have smart meters in place and thus already are well positioned to go on with the development of smart grids and active customer participation and new energy services.

The focus on output parameters should not lead into nonobservance of environmental and structural conditions the System Operators are faced with, especially those outside their influence.

12.

12a. Which effects and benefits of smartness could be added to the list (1) - (7) presented in Section 4.1, Table 1?

We think that this list is already fairly complete and may already contain too many performance indicators because every additional indicator leads to more complexity for network operators and regulators. Additionally, it is absolutely necessary that indicators which are used to measure the performance of grid companies are limited to those which can be directly influenced, e.g. some of the mentioned performance indicators might depend on the development of products by suppliers in a competitive environment which cannot be influenced by grid operators.

12b. Which effects in this list are more significant to achieving EU targets?

We think that increased sustainability, adequate capacity and enhanced efficiency are the most important benefits of smartness to achieve the EU targets. They should be the first priority for increased investments into smartness. Other benefits such as "Coordinated grid development" can also be reached with out smartness.

12c. How can medium and long-term benefits (e.g. generation diversification and sustainability) be taken into account and measured in a future regulation?

As we said earlier, this is the most crucial aspect of the regulation because it has to be more forward looking. The benefits of smart grids will be harvested in the future and if regulation does not take this into consideration, many investments into smartness will be deferred or postponed altogether.

13. Which output measures should be in place to incentivise the performance of network companies? Which performance indicators can easily be assessed and cleansed of grid external effects? Which are suitable for European-level benchmarking and which others could suffer significant differences due to peculiar features of national/regional networks?

As stated at question 11, output measures are important for the design of regulation. However, technical details have to be considered to compare the capability of networks with each other and incentivise cost effective solutions. Additionally, the coverage rate of grids with I&C technology and the coverage rate of households with smart meters, number of renewable units feeding-in along certain categories and decentralized micro-generation, installed capacities of renewables feeding-in along certain categories and decentralized micro-generation might, inter alia, be suitable measures for European level benchmarking.

14. Do you think that network companies need to be incentivised to pursue innovative solutions? How and what output measures could be set to ensure that the network companies pursue innovative solutions/technologies?

Innovations bear a higher risk for the investor as the outcome is unknown. If the current or expected regulation does not set incentives to companies taking this increased risk why should an investor take it? Therefore it is most likely that innovations in the network industry will be extremely low without appropriate incentives, such as higher rate of return or a direct compensation for R&D effort.

Some countries already respond to this higher risk by a higher return on equity for smart grids like e.g. Italy or by special funds for smart grid projects as in the UK ('Low carbon Network Fund'). A higher risk premium may be adequate based on developing standards and technology that might lead to stranded investments, the lack of experience in implementation, maintenance and appropriate asset life times of the new technology. Accelerated depreciation periods for new technologies may also reduce the risks for investors on technology uncertainties.

15. Do you consider that existing standards or lack of standards represent a barrier to the deployment of smart grids?

Yes, the lack of standards is a significant barrier to investment and smart metering is a good example of it. At present, if a network operator invests in smart metering they can choose between different standards for communication, interoperability and meter functionality. If a specific standard is established in the future, the current investment of the grid operator might turn out to be stranded. As network operators are aware of this problem they will be very reluctant to invest into smart metering unless the regulator agrees to take this risk upfront.

It is also important to note, that there are well established institutions already responsible for standardization. Standards should in the future be set voluntarily by industry and its norming bodies but the regulators should provide governance over the pre-cursors to these conversations and working groups to ensure open standards do indeed result.

16. Do you think that other barriers to deployment than those mentioned in this paper can be already identified?

On one hand, we think that this consultation provides already gives a very good overview. On the other we must say that with regard to smart grids a lot of R&D still has to be undertaken, alongside the timely preparation of suitable regulatory frameworks to encourage both this, and wider scale adoption. We currently know that more intelligence will lead to more efficient networks but we still have to analyse which solutions are most promising with regard to operations, performance and cost and E.ON will therefore test certain aspects of smartness in a variety of pilot projects. The overall process will take some time but we hope that regulators both on European and on national level will fully support this requirement. This consultation certainly is a positive sign for the support that we expect from regulators.

17. Do you believe new smart grid technologies could create cross subsidies between DSO and TSO network activities and other non-network activities?

We believe that a clear definition of the roles and responsibilities of DSOs and TSOs will help avoid any potential overlap or confusion, as each will want to optimise its own assets and systems. In addition, clarity on the borders and functions between the regulated business in the grid and the services on this platform undertaken in a competitive environment will also contribute to avoiding confusion and the potential for accidental cross subsidy.

This however does not mean, that positive externalities of smart grids to other non-regulated players shall be avoided. As we said investing into smartness will have positive externalities, in other words, more investment into the grid will be more than compensated by increased functionalities and benefits for the competitive parts of the value chain. These externalities might be positive for TSOs, prosumers or other service providers. These effects are intended as they form the platform for new appliances for consumers and generators. These effects are however not so much a question of cross-subsidies. They are more a question whether politicians or regulators believe that these positive externalities exist and therefore try to support such an optimization of the electricity system and the European economy as a whole.

18. What do you consider to be the regulatory priorities for electricity networks in relation to meeting the 2020 targets?

Meeting the 2020 targets requires suitable and in many countries better investment conditions to be able to enhance the capacities for new generators and international market integration and good R&D conditions to encourage innovation, demonstration and ultimately deployment across the whole network. The current regulatory framework from our perspective is much more focussed on cost cutting with fairly weak incentives to invest. A higher and additional rate of return for investments into R&D not only but especially focussed on smart grids and the integration of renewables will strongly support investments and thus make the 2020 targets easier to reach.