Position Paper on Smart Grids - An ERGEG Public Consultation Paper
Ref. E09-EQS-30-04, 10 December 2009
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RWE welcomes the opportunity to comment in the framework of an ERGEG Public Consultation. We do so from the perspective of one of the largest operators of electricity and gas distribution grids in Germany. This implies that we will not refer to issues that affect only transmission system operators (TSO) as these face fundamentally different challenges. In fact we consider smart grids to affect mostly distribution system operators (DSO). While both TSO and DSO face challenges different from the past, only the DSO will have new means at their disposal which result from new technology becoming available. In fact, one can reasonably state that the electricity transmission system already is smart and has been smart for decades. In fact, one can reasonably state that the electricity transmission system has been evolving into smart grids for decades

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?

Both electricity transmission and distribution grids will certainly face significant new challenges within the next 20 years with an initial first significant increase much sooner. The distribution grids in particular will have to cope with a massive expansion of distributed generation that in many cases will be powered by energies from RES requiring base load back-up power in form of natural gas, coal or nuclear energy. In addition, distribution grids will face new large loads like e-mobility or heat pumps. These loads tend to be much more synchronous than today as they will to a large extent be linked to the availability of electricity generated by (central and distributed) renewables. This in turn implies that load flows will not only be much higher than today and they might also be reversed. In addition they will have a much higher volatility in comparison with today. The distribution grids have to master these challenges.

Taking all these mainly technical developments into account the regulatory bodies (BNetzA and legislation) will take their time to implement wholly new mechanisms to set their goals how the market should develop. On the commercial side the market participants have to introduce new products to the end-users which will help to transfer the electricity market from the conventional status quo into the innovative smart grids. When introducing innovative products (e.g. interruptible transports) the accounting and balancing has to be adjusted.

Furthermore the end-users have to be made aware of the benefits of smart grids: for the environment and for themselves, without the understanding and acceptance of the individuals the success of smart grids will be limited.

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

The aspects that our response focuses on are the capability of the distribution grids to manage higher, partially reversed and volatile load flows that result in an increase of distributed generation and new loads like e-mobility or local storages. Other aspects like home automation ("smart home"), increased capabilities of metering ("smart meters") and the synchronisa-

tion of electricity from renewable sources and corresponding loads will not be regarded in depth.

Prevailing aspects in the definition for smart grids are the higher flexibility of distribution systems and a new approach to the understanding of networks. The higher flexibility will utilise the potential of the existing and future networks to a higher extent. The grid will be restructured and built on the new understanding that due to limiting costs for electricity the existing networks have to be better utilized by incentivising consumption at less costly times. Consumption has to be incentivised not only to when there are high supply peaks, but also to when there is available capacity in the transmission and distribution grid in order to avoid costly grid extensions. Thereby the interaction of consumer and DSO will change it will be become much closer.

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?

As far distribution grid operators are concerned, the main challenge they face will be to accommodate loads. As energy itself will be of less significance, grid pricing systems will have to provide incentives to reduce simultaneous loads, which will lead to grid pricing systems that are more geared towards load pricing instead of energy pricing. This tendency is a prerequisite for the accommodation of distributed generation and new loads while limiting the increase in grid costs. For these reasons we strongly advocate a decoupling of grid operators revenues and profits from energy transported and recommend a more load-focussed system instead.

Section 2 – Drivers for smart grids

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.

The consultation paper identifies the main drivers for the substantial transformation of distribution grids required to meet new demands. In general we expect that we are on the brink of a new electric era, which will meet the energy demand mostly through the use of electricity.

However we also consider increased demand for electricity in new applications to change the requirements on the distribution grids of the future. One example of this is the tendency to substitute gas-powered heating by heat pumps, which are usually electricity-powered. We explicitly agree with the statement that electric mobility will not significantly increase the demand for electricity. Still, we would like to point out that the major challenge does not result from increased power to be distributed, but from specific load peaks that will put strains on the distribution grids that can only be solved through the introduction of smart solutions and concepts.

By utilizing the grid to a higher extent – for example due to taking in energy from large wind farms – the grid's capability will be much more stressed thereby the grid's probability of failure will be higher. This would relativise ERGEG's statement that operational security would be improved in the way that due to grid's lower failure tolerances parts of the grid could fail. This is mainly due to the higher percentage of more erratic production of electricity from RES: at times there will be very high supplies of wind-energy at other times nearly nil. This would require a high flexibility of the grid; quick adjustments of the grid and the way the grids are occupied will be necessary.

Section 3 – Smart grid opportunities and regulatory challenges

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

Grid operators are open to the ideas behind smart grids, from grid operators' point of view prerequisite for any investment in smart grid technology will be a reliable framework given by the national regulatory body

We agree with the statement that the sole purpose of the DSO is to facilitate the actions of the parties that require their services. In this respect, the development of smart grids must be judged from the benefits it brings for grid users. However it should be noted that both suppliers and consumers of energy will not always reveal their true needs. In certain cases it might thus be advisable that the regulating authorities implement mechanisms that provide incentives to install certain elements of smart grids as market-based demand might fail to materialise.

Yet there are serious doubts whether there are sufficient foreseeable benefits to the grid operators that will automatically result in their commitment to smart grids and their active participation in the development. Most of these benefits are rather small if compared to the investment at risk. Especially small DSO will most probably tend to conventional solutions when faced with new challenges. Even larger DSO will not implement innovative concepts without sufficient incentives provided by the regulators.

Market participants will see that different layers of activities arise, every individual DSO has to define its place for the individual future, whereby the role of ICT (Information & Communication Technology) will be of outstanding importance for the DSO in order to fulfil their duties for the reliability of the network.

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

Not in the focus of distribution system operators. In general, in order to develop effectively functioning smart grid solutions all players should work closely together.

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

In general the list serves the purpose to identify the needs of grid users well.

We would like to point out however that grid users should be prepared to face a lower standard of quality of supply than they have in the past. There are two main reasons for this tendency. First, the more widespread employment of remote electronic components will almost certainly make distribution grids more prone to interruption than they have been in the past. This effect can be limited by deploying back-up systems and the most reliable technology, but cannot be ignored altogether. Next, the challenges facing the distribution grids will partially be addressed by employing available security reserves. This will in general put more strain on the distribution grids compared to today.

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.

We consent to the list ERGEG has presented concerning the future challenges and their possible solutions. Over and above, the list it should be noted that the new technology is costing money.

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.

In order to fulfil the requirements of more volatile supplies from energies from RES and incentivising customers offtake we anticipate potential increases of costs: either costs for extending the existing (conventional) grid or costs for refining the grid with innovative smart grids; basically either way will cause higher costs for end users. In general we have good reasons to believe that the costs for refining the existing grid with innovative technology will be less expensive than spending monies on extending the conventional grid, only the specific deployment of smart grids' innovative technology will reduce relevant costs.

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

The regulatory challenges as describes cover the main challenges. Indeed it is crucial to provide adequate incentives for network companies to be able to focus on innovation. At the same time it is important that the regulatory regime is stable and maintains its focus on regulated infrastructure business.

Section 4 – Priorities for Regulation

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)?

In general this certainly is a good idea as focussing on inputs would inevitably require micromanagement by the regulating authorities. This is an approach that given the amount of data required will not yield optimal results. Even more importantly, micromanagement would quench any initiative on the part of the grid operators, which would have to be replaced by regulatory decree. An input-focussed method would thus be neither effective nor compatible with contemporary regulatory concepts.

12.

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

In view of the necessity to incentivise the development of smart grids by the grid operators, the performance indicators seem to be rather remote from what the grid operators can indeed influence and be held responsible for (cf. Q 13). As much as an approach focussing on

input micromanagement will result in inefficiencies (cf. Q 11), one has to be careful not to select output indicators that are too wide to really be influenced by the grid operators.

Keeping this in mind, we would suggest that regular performance indicators that are used in the benchmarking of DSO are also considered when evaluating the performance of the grid operators that are faced with new challenges. In Germany these are maximum load on different voltage levels the number of stations and customer connections line length on the different voltage levels both for cables and overhead lines the area supplied and generation installed. Some of these parameters will change significantly in the future and should in any case be continued when analysing the output of a particular DSO. Others of these parameters have to be re-evaluated as innovative solutions are in many cases designed to limit either line length or the maximum load and replace these by the application of innovative concepts.

In this respect, "smartness" serves to limit the costs of adapting to new demands that can in most cases be evaluated by the application of traditional benchmarking parameters. However, in some cases new parameters – like the number of e-mobility charging points – have to be added while traditional parameters – like maximum load and line length – should be reconsidered.

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

The task of a DSO and the parameters to measure the output of a DSO should not directly be linked to achieving EU targets. Energy policy should decide on the most suitable methods to achieve these targets. Regulation must then ensure that the DSO accommodates the new elements in the grid in a cost-effective way. This will include the use of innovative concepts and smart solutions, which in many cases are more efficient than conventional solutions.

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

Once again, regulation should focus on a cost-efficient way to master the challenges at hand, which will include distributed generation and more flexible loads which will result in higher and more volatile load flows than today. However, regulation should not replace energy policy by defining objectives and incentivising the grid operators directly to realise these objectives. Politics have to address what benefits will be prevailing, legislation will design the regulatory framework and DSO will react appropriately to achieve the benefits.

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 mentioned above, grid operators can in our view be sufficiently incentivised through the application of performance indicators that are already used today. Still, new parameters must be added as the task of operating the distribution grid in a certain area will change significantly.

A European-level benchmarking is no valid method. In view of the vastly different conditions for grid operation in different Member States, any attempt to compare the efficiency of distri-

bution grid operators on an international level would be fundamentally flawed. In view of the German situation, there is also no real need for an international benchmarking of DSO as more than 600 different grid operators provide a sufficient base to determine efficiency.

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?

In general innovative solutions should be used if and where they prove to be more cost-effective than conventional concepts. Given a benchmarking that uses sufficient parameters to determine efficiency, grid operators will be properly incentivised to implement innovative solution wherever this is cost-effective.

However, this fails to recognise that new technologies introduced quickly on a large scale bear both technological and regulatory risks. These risks may prevent the use of innovative solutions unless they are compensated for. Any investment needs to yield sufficient returns as required by the capital markets. those investments with a potentially greater risk require a risk premium for larger-than-average risks. The implementation of smart grids might thus not become reality unless regulators recognise the risks associated with innovative technologies and solutions and grant sufficient compensation for these risks.

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

Lack of standards certainly is a problem. As much as innovation is a competitive process, regulated grid operators will only reluctantly embark on this journey if certain standards are not determined by the regulators. A compelling example is the installation of smart meters which in Germany is mandatory. However, in this context the exact specification of which meter fulfils the legal requirements is delayed, which in turn delays the introduction of smart meters. Wherever the legal or regulatory framework demands certain actions, the respective standards must be clearly defined. Wherever innovation is left to market forces, regulation should be left to a minimum.

On the other hand it would be detrimental if the regulatory bodies try to incentivise the market by half baked standards and without input of relevant market-participants. Would this be executed in such a manner and the results would not support the goal intended than it would take time and resources to readjust the standards.

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

Nil.

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

Distribution system operators with smart grids will not supply energy themselves, but – as today – provide a platform for other market actors to operate on. Insofar the critical question when designing the regulatory framework for smart grids is not preventing cross-subsidies,

although the different market roles have to be clearly defined One of the main objectives of smart grids will be to harmonize volatile production with corresponding consumption i.e. off-take by customer in order to prevent costly extension measures. Such measures could be conducted with the knowledge what the other party plans to do, but there is no room for cross subsidies nor is there any need to do so.

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

There are numerous regulatory challenges. Among these are allowing sufficient revenues, implementing just benchmarking procedures, devising new price systems, installing balancing regimes, allocating the various roles and taking account of the developments in the design of quality incentives. However smart grids will only become a reality if the necessary investment can yield sufficient returns given the technological and regulatory risk associated with the introduction of new technologies on a large scale.