ENTSO-E response to the ERGEG public consultation on the position on 'Smart Grids'

Brussels, 1 March 2010

1 GENERAL COMMENTS

ENTSO-E considers the ERGEG Position Paper on Smart Grids a fine and most welcome initiative towards the foreseen implementation of increasingly more complex data communication and intelligence in the European power systems.

ENTSO-E would like to emphasise that the System Security issue is the core around which the other three main elements, the integration of RES, European market development and energy efficiency.

The future challenges will be different from the historical ones as a result of the 20-20-20 goals defined by the European Union. To achieve the 20-20-20 goals, transmission grid reinforcement is a precondition but it is not sufficient. Smart Grids applications offer the transmission grid access to extra ancillary services from the sub grid that is needed to balance and regulate the transmission grid. Therefore, it is important to use all appropriate tools, mechanisms available including increase of the flexibility of electricity system also with smart meters and smart homes, i.e. flexing in generation to meet demand and flexing in demand to meet generation. The Smart Grid players are the generators, prosumers, consumers and Balance Responsible Parties (BRP), whose incentive to participate in the initial investment is the operational and market advantages they will achieve, and TSOs and DNOs (Distribution Network Operators) that must answer new system requirements. Especially TSOs must state their requirements based on secure and efficient grid operation incorporating new technologies. To support a timely deployment of Smart Grids technology we believe that new regulatory frameworks, supporting incentives and controlling deployment schemes should be developed by the European Regulators allowing for the initial up-front investments be done by the transmission and distribution system operators as well as generators and consumers.

ENTSO-E is of the opinion that this may very well be achieved by adopting the proposed Regulator user-centric approach as long as it is recognized by the European society that smart grid technology becomes a technical necessity to fully exploit all assets and safely operate the resulting active power systems. User-centric approach should involve all relevant market actors, regulated and non-regulated. Retailers and aggregators are essential partners and players for the Smart Grid.

Additionally we would like to state the difference between "Smart Grid", which is a process "*to transform the functionality of the present electricity transmission and distribution grids so that they are able to provide a more user-oriented service, enabling the achievement of the 20/20/20 targets and guaranteeing, in a competitive market environment, high security, quality and economic efficiency of electricity supply"*, and the "Supergrid challenge", which is the long term vision of a "Pan-European" of grid able to deal with the 2050 power system challenges.

Questions for public consultation:

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

Yes. The 2007 EC ”Integrated Energy and climate change package ” has led all the EU Member States to share a first set of ambitious targets by 2020, the 20/20/20. In parallel, the Third Energy Package pushes the Member States, the Regulators and Transmission & Distribution operators to launch innovation programs, much beyond 2020.

These ambitious targets induce new challenges for the network operators to strengthen the backbone of the transmission system and to keep system security and quality of supply. Hence, Transmission System Operators in EU-27 are becoming “proactive” in order to provide the transmission and system operation services demanded by the decarbonised European electricity system, and the works already done in countries like Germany, Denmark or Spain are good examples of this fact.

The integration of renewables, “Vehicle to Grid” concept and a vast amount of distributed generation will foster network operators to build up a pervasive reliable communication infrastructure to manage new challenges and market players.

The combined integration of DER and large scale renewables into the grid has to be designed to ensure the overall security and robustness of the network, avoiding that local network failure would lead to catastrophic outages. In particular, while TSO’s are on the critical path to transmit electric power from the centralized electricity generation units to the regional distributors and to large consumers, ageing of the transmission system (planned and realized mostly about 50 years ago) requires new technologies, control techniques, metering and billing functions, but also techno-economic variables (such as congestion management using financial tools, market coupling with limited transmission capacity, etc.).

Regulators should support the new developments needed by ensuring the TSOs the funds for RD&D and for realising pilot projects to test the new technologies that might be part of the transmission backbone in the future.

The ability of “Smart Grids” to limit the increase of peak loads is also an important mean to optimize the reinforcement of local grids in the future. Nevertheless, it has to be highlighted, that “Smart Grids” is a complement but not a substitute of new necessary overhead lines. The main benefit of “Smart Grids” has to be seen in terms of maintaining system security despite of high share of RES and DG in the generation profile.

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

ENTSO-E agrees with the ERGEG’s understanding of “Smart Grids”. The ”Smart Grids” concept does not only mean the deployment of new technologies but also the optimal design and operation of electrical grids including new generation means, new HV facilities to enhance grid flexibility, active demand and new usage of electricity in line with the European and National energy policies. From the TSO point of view, the integration of new components and interoperability are the key challenges. All choices must be consistent to ensure a global security of supply, quality of electricity, minimal cost for the society, etc. Power systems are complex and become more and more complex. Some traditional solutions applied in transmission systems could be adopted in distribution systems as well.

It should be highlighted that:

- "Smart Grids" are not specified by a certain amount and location of distributed generation, rather the ability of an intelligent management and integration of that energy sources into the power system.
- "Smart Grids" describes a power system which sustains energy supply, while using all available resources in such a way that societal benefit can be maximized. Hence, it might be the case that minimization of transmission losses will not be the top priority.
- in the transmission grid the term self-healing technologies should be taken with some caution. It must be understood as "increased use of intelligent autonomous subsystems" so as to deliver a high reliability to consumers

All in all "Smart Grids" is much more than the specification of technology features. In fact, it is an approach how a power system is designed, built and operated for maximizing the overall societal benefit and sustain assure security of supply.

Question 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?

The reduction of primary energy consumption does not necessary mean a reduction of electrical energy consumption. In a low carbon economy, the amount of electrical energy consumed will increase. Electric Vehicles (EV) and Heat Pumps (HP) must contribute significantly for the 20/20/20 targets to be achieved. At the same time they are likely to increase significantly the volume of energy transported and/or distributed by the grid. In ENTSO-E's opinion the income for grid operation should be focus on incentivising an adequate and secure grid operation and development, but not to regulate energy consumption. "Smart Grids" is even more important to be able to couple EV and HP to achieve the 20/20/20 goals and to maintain security of supply and give access to markets.

In any case the critical factor for electrical systems is not the energy but the power not only in the balance between electrical power consumption and generation but also for the actual distribution of power flows.

Network operators should be remunerated in a way that they can support the change in the energy infrastructure. The way this can be implemented is through an Asset (and availability) base remuneration system instead of a Use base one. The remuneration system should remain attractive on financial market, given the importance of investments or equity requirements.
It should also include effective incentives to promote the efficiency of the Network Operator, both in its internal operations and in the operation of the power system.

Question 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.

ENTSO-E agrees with the identified drivers. It is important to point out the relationship between, and the impact of, each of the Drivers. Although each Driver can contribute to the same end result (integration of renewables, and system security and flexibility) or reinforce this end result, each Driver can have different impacts on the operation of the power system. Regulatory and legislative decisions regarding the implementation of Smart Grids must understand and take account of the impact of these operational aspects. The operational requirements of the power system with large-scale renewables on the transmission system

and integration of distributed forms of generation[1] on the distribution system must be fully understood along with the dynamics of developing a system that enables End-user participation.

The full exploitation and integration into the power system of every kind of micro units (heat pumps, electrical vehicles, fuel cells, PV systems, CHP, house hold appliances, etc.) can only be achieved by the development and implementation of a set of fully automated tools.

In order to be able to handle larger power fluctuations, due to large amount of intermittent RES the performance and controllability of the power system need to be improved. The reliability of ICT will be an essential component in maintaining current standards of system security.

We would like to point out the outstanding role of "operational security" as catalyst factor for the all other drivers. Smart Grids is the positive approach for integrating large amount of RES and giving the consumers access to new services, acting as "prosumers" when investing in their own RES units, allowing network operators to keep "operational security" at this actual level at a reasonable cost with a minimal environmental impact.

One final comment regarding the sustainability and network losses minimisation concepts: In general, large RES integration, coming from locations far from the consumption areas, is going to result in larger transmission losses in absolute figures, in distribution networks the situation could be similar or not, but in any case this fact should be taken into consideration when assessing the network companies performance.

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

Yes as long as it is recognized by the European society that smart grid technology becomes a technical necessity in order to integrate and fully exploit all assets of more and more RES and safely operate the resulting active power systems. In an unbundled power sector with large amounts of DER, more assets and stakeholders have to collaborate with the TSO in ensuring the common grid stability, maintaining frequency and voltage (ancillary services) – a task that was traditionally handled by the central players in the power system – by mean of technically feasible solutions.

We do believe the proposed user-centric approach must emphasize on the main service demanded by all network-users (generators and "prosumers", customers 'as usual', retail suppliers and ESCOs and network operators itself), that is the whole System Security. In our opinion Smart Grids are going to be the tools that will allow the network operators to maintain the current system security standards, under the new conditions needed for the achievement of the 20/20/20 targets, at a reasonable cost.

For sure active end-user participation is one of the main drivers for the deployment of smart grid solutions, nevertheless we consider there are basically three complementary view points (or three different perspectives) to be taken into account, i.e.:

- a demand pull from electricity generation companies or electrical distribution operators as managers of DER outputs
- the policy push issues, in order to make the whole electricity system more efficient in Europe and fulfil the EC targets.
- the technology push from both system manufacturers and the research laboratories

[1] As many of the decentrilized units depend on CO2 emitting primary energy sources (e.g. gas) we might envisage a scenario that is not so much dependent on CO2 emitting generation in the distribution grid as well.

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

The role of energy suppliers and the aggregator is to make small consumers valuable actors in the market. Both of them are destined to kick-off the smart grid deployment by pushing forward the roll-out of smart-meters. Also it will become imperative for a successful deployment that all parties involved fully accepts operating with open international standards for data communication and control structures as opposed to a wilderness of different propriety "standards". This will represent the first step of end-user sensitization and participation in the energy supply process. Nevertheless all involved players have to coordinate the development to sustain compatibility of smart grid applications and technology driven by the different energy suppliers, grid operators, etc. In order to have a real global benefit, the System Operators must participate to the definition of the corresponding services with special focus on observability and ability to keep the system under control. The objectives are global security of supply with costs under control.

New services to the consumer should be in the benefit of the consumer giving more comfort and a lower electricity bill, but also should be designed to contribute to the achievement of sustainability, security of supply and competitiveness objectives. When the consumer and his Smart House appliances are utilized through “Smart Grids” and aggregators - the consumer could be a valuable supplier of some ancillary services optimizing the value of his flexible performance. The benefit of the system security is that ancillary services are provided from several additional and distributed sources.

Grid Operators are standing in the front line of implementing intelligent solutions to the grid. The companies have to combine the interest of the customers – both consumers and decentralised producers with their own interests to improve the security of supply, economic transmission and distribution. The ’smart’ solutions should be implemented over the years since main elements at high voltage level e.g. energy storage, controllable transmission links, etc. are developed or must be implemented in due time.

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

Conditionally yes because, although the document identifies most of the power system actors’ needs, it does not mention explicitly the system security which is in fact the main service provided by TSO to the rest of network-users.

ENTSO-E emphasizes that the system security issue is the cornerstone that supports the provision of all other services covering the current and future needs of network users. Additionally, Regulatory Authorities should have in mind that network development can have a broader impact on society and the economy depending on the grid functionalities that have been considered during the design for the further operation.

In general terms a fair and transparent regulatory framework is a precondition for allowing generators, consumer or prosumer, and any other relevant stakeholder to participate in and actually efficient electricity market; and suitable grid information have to be provided to the decentralised power producers to get them together into an efficient virtual power plant, to final customers for choosing their level of green energy, controlled load (heating, cooling), etc.

Question 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.

Yes, the most important aspects are considered. In sub chapter 3.5.4 Network solutions for generators, another solution "The virtual Power plant" (combination of some decentralised small power plant to one big virtual power plant) should be added.

Giving the 20-20-20 goals numerous power plants in Europe – fuelled by coal, oil and gas – will be decommissioned in the coming years. When the major part of new production capacity is no longer provided for by thermal power plants but by RES depending on the sun, the wind or the rain, then all TSO are facing a substantial need for flexibility on the demand side matching the fluctuation on the production side. The integration of more and more renewable energy sources far away from load centres goes ahead and TSOs are facing the risk of having to manage the future's generation system with yesterday's transmission grid.

Challenges for TSOs are still higher as result of the difficulty to build additional transmission facilities (NIMBY issues). More generally, beyond customers, the citizens require a minimal environmental impact from electric infrastructures. This trend is the main driver for the usage of new technologies in transmission business (FACTS, HVDC, long underground cables, etc.). However, in our opinion the different Administrations should support the building of new infrastructure (e.g. overhead power lines) as they will be a key issue to support the expected goals contemplated by the energy and climate policies.

We would like to draw attention to the need to consider aspects such as network losses from the point of view the system as a whole and not in isolation for each activity. E.g. some specific applications for power flow control (PST and FACTS) would have a direct impact on transmission losses but would be the way for keeping connected to the grid some RES sources and avoiding their curtailment and substitution for another generation based on fossil fuels. In this case the system losses will be larger but the CO2 emissions are still lower. Then we would like to suggest avoiding statements like "Losses in networks represent by far their most significant carbon impact" because, seen from a power system perspective the sentence is false.

Question 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 terms of security of supply, which is essential for the network users, some "Smart Grids" solutions will become a necessary prerequisite for maintaining security of supply in power systems with a high penetration of RES:

- developing new market designs to utilise the fluctuating generation from RES.
- utilising DG to support voltage control in those windy periods the bulk power generation moves to remotely placed offshore Wind Power Plants and centrally placed Thermal Power Plants are shut down.

In terms of cost, considering the overall cost of the complete chain of supply and in comparison with the cost of implementing "traditional" measures that could permit the system to provide similar performance, we can point out the example of the implementation of fault ride through capabilities in the wind farms as well as real time communication with the TSO and associated control facilities. The cost of implementation, including resources previously devoted to RD&D efforts, has a relatively small impact on the investments that have similar impact on the cost of MWh delivered to the system. However, reaching similar levels of integration and production of wind power without these features it would demand

larger investment in transmission facilities as well as larger amounts of spinning reserves (with associated emissions) in order to maintain the security standards. We do not have the figures for a specific power system but we are sure the 'ex-post' CBA is clearly in favour of the 'Smart Grid' solution.

However, this does not mean that, when considering the different activities in the chain of supply individually, all of them are going to be cheaper than before. For network activities implementing "Smart Grids" solutions will most probably be more costly than the "fix and forget" strategy applied for decades, but at the end of the day the benefits in controllability, efficiency, quality and security of supply will redress the higher investment costs.

Smart grid solutions will not have an essential impact on reduction of the need to build new transmission lines in the next few years.

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

The TSO's remuneration in many EU countries does not foresee any component dedicated to recover costs incurred by the TSO for developing innovative activities. This point is crucial to have effective deployment of "Smart Grid" solutions.

An adequate regulatory scheme should be defined for "Smart Grids" solutions;which should allow a relevant sharing of costs and benefits between stakeholders.
Harmonisation of regulatory rules (including support of RD&D) at the European level is an essential condition for an optimal design and operation of the future pan-European grid.

Equally important is going to be the capacity of the regulators for reacting to changes in the environment in a timely and uniform manner.

Regulatory Authorities should support the new developments needed by giving the TSOs the funds for RD&D and for realising pilot projects to test the new technologies that might be part of the transmission backbone in the future. In that respect the regulatory scheme should be based on depreciation values which recognize the differences between High Voltage assets and IT assets.

Question 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. The smooth operation of the power system is intrinsically linked to the benefits "Smart Grids" can provide. In this regard, the technical aspects of how an integrated European power system might function in the future needs a clear regulatory understanding and examination

Question 12	Which effects and benefits of smartness could be added to the list (1) - (7) presented in Section 4.1, Table 1? Which effects in this list are more significant to achieving EU targets? How can medium and long-term benefits (e.g. generation diversification and sustainability) be taken into account and measured in a future regulation?

We understand that basically all the relevant benefits coming from 'Smart Grids' are listed in the table. In benefit (6) we think the actual benefit should be "Effective support of transnational electricity markets", independent of the way the network operator contributes to this goal.

Regarding effects (and potential KPI)

- (1) should be extended towards a minimisation of environmental impact and not only CO2 or GHG.
- (6) Potential performance indicators could be the convergence of market prices at the European level through the harmonisation of regulatory rules and generalisation of flow-based market coupling.

A point on coordinated grid rules for operation is also missing in the table.

Most of the proposed KPI are strongly affected also by 'traditional' grid development (new facilities) or other externalities. We are aware that the key (and probably most difficult point) is to establish goals and measure results of specific 'Smart Grids' solutions.

The more significant contribution for achieving 20/20/20 targets is coming from 'benefits' (1) and (2) for sustainability, (4) and (5) for security of supply and (6) for competitiveness. Talking about "Smart Grids", probably the most representative KPI could be DER hosting capacity in distribution and large RES hosting capacity in transmission for sustainability, duration and frequency of interruptions for security of supply and, for competitiveness, interconnection capacity vs electricity demand ratio and congestion rents.

In any case it is necessary to highlight that the amount of RD&D needed and the growing speed of development of such R&D calls for stronger cooperation among network operators focusing on a common strategy to reduce the overall RD&D costs and accelerate the introduction of new solutions to the System

Question 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?

Incentive regulation is a general topic not only associated with "Smart Grids". We do not believe that new incentive rules must be defined to promote "Smart Grids". Some of current incentives should be refocused from "cutting costs" to an efficient grid operation and development in the future. A change in this sense is needed in some countries.

For a TSO, the output measures must assess its performance in fulfilling its mission: satisfaction of grid users needs, support of energy policies (Sustainability, Security of supply, Competitiveness), etc. The detailed performance indicators valid for any European TSO are not easy to define. Harmonization of rules is a prerequisite: differences are too important today: for example about system balancing, loss compensation, etc.

However specific recognition that innovation has become a relevant activity for the network company and, consequently, financial compensation for the additional cost coming from this activity (in accordance with the regular remuneration system or through a new scheme due to the particularity of this activity) is a must, but today not available in most of the countries..

We do believe performance indicators are not suitable for EU-level benchmarking without a significant effort of homogenisation. Even after harmonization of rules, big differences will continue to exist. The existing infrastructure in each region depends on the regional context (density of population, large cities, mountains, weather conditions, etc.) and on past energy policies. It isn't very easy to find an agreement on methods which fairly take into account these differences in the benchmarking of TSO's performance. A standardization of these methods and evaluation of pros and cons at the European level could be a first step.

Question 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?

The EU Power Sector reforms in the last decade have moved to a business model where TSOs (no matter if they are public or private companies) are strongly conditioned in their plans by the existence of suitable remuneration schemes.

Network operators are fully aware of the relevance of innovation for the achievement of the 20/20/20 targets but until now, in many countries, RD&D carried out by the TSOs is not considered a necessity, and the methodology applied to calculate the company remuneration does not take it into account. What actually is needed, is a fair compensation for the services provided to the system, including innovation. As mentioned in question 14, it is necessary to implement a suitable financial compensation for the RD&D by regulatory frameworks (tariffs, national and European research funding).

It is very important that TSOs are conducting research, development and large size demonstration projects. The involvement should include specification of R&D topics, analysis, validation of results and full scale demonstrations. TSOs need to engage in R&D to understand the short and long term consequences of developing power systems with a significant proportion of asynchronous intermittent generation. In order to help the integration of wind energy, innovative solutions are necessary.

The measures to promote the TSO's commitment to technological innovation, beyond the necessary recognition of the cost associated with the activity, should be:

- the establishment of a reference road-map based on the knowledge and expectancies of relevant stakeholders, including high-level CBA,
- the promotion of specific projects with precise goals and measurable (KPI) return results, from a much more detailed CBA, to quantify their contribution to the objectives of the framework and overall energy policy of the European Union.
- the assessment of projects' achievements and the network operators performance during project development.

ENTSO-e intends to play a key role in this process with the release of the R&D plan and by making proposals for the governance of this plan.

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

TSO are fully aware of the relevance of standards both for equipments and ICT devices and for criteria and operation procedures. Standards are necessary in order to efficiently use new functionalities offered by "Smart Grids". Many of the standards already exist. Especially the IEC has for years been preparing standards that are suitable for smart grid development. Part of this standardisation work is still ongoing.

A lack of standards may prevent an efficient integration of Smart grid solution enabling efficient information exchange and the overall operation. Consequently, only open data communication standards should be encouraged to be used in the framework of "Smart Grids".

TSOs will not be in charge of the deployment of smart meters (hardware and associated services). In order to ensure optimally their missions, TSOs should be able to use the aggregated services provided by smart meters.

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

Yes, besides the lack of standards the availability of secure and reliable ICT hardware and infrastructure is presently a major barrier, especially having in mind the large amount of data transfer involved and the need to guarantee that confidentiality is properly addressed.

Other relevant issues are the need to design suitable economic incentives, contracts etc that ensured the customer participation in “Smart Grids”.

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

All grid operators are obliged to respect the unbundling requirements from the EU legislation. Any cross subsidies against these legal requirements would be illegal.

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

Special attention to the development of a regulatory framework should be paid to cater both for the operational needs of the power system and investments needs over the short and longer term. Improvements in traditional network operators’ demands like timely permitting and administrative authorisation processes, with minimum constraints, must be also achieved.

The development of harmonised regulation is also a requirement moving forward. Europe needs to continue to use cooperative ventures such as the Florence Forum to ensure regulatory and operational harmony and that standards are uniform

It is very important all the relevant actors are aware on the need to anticipate the increasing complexity of the European power system. R&D activities are essential to reach the 2020 targets. TSOs intends to be involved in these activities and the regulatory framework should setup the funding mechanism to support this involvement.

2 CONCLUSION

ENTSO-E is at the regulators disposal for further discussions.

Yours Faithfully,

European Network of TSOs for Electricity, Brussels