



To **ERGEG**

e-mail to: [smartgrids@ergereg.org](mailto:smartgrids@ergereg.org).

**Subject: Views on ERGEG position paper on smart-grids**

Ref: E09-EQS-30-04, 10 December 2009

**Joint reply** from KTH – Royal Institute of Technology, Stockholm, Sweden and the Power Circle, Stockholm, Sweden.

We consider the ERGEG Position Paper on Smart Grids a most welcome initiative. It has come forward at a time when the foreseen implementation of increasingly more complex data communication and intelligence in the European power systems is a necessity.

The aim of the ERGEG paper is “to explore the drivers and opportunities for ‘smarter’ networks from the users’ perspective”, which we interpret as much more than a limited customer perspective. The descriptions of the paper of today’s power system and the challenges of tomorrow seem to describe, treat and weight the interest of different stakeholder in a balanced and knowable way and include different perspectives.

This said we, however, wishes to make two general remarks before replying to the specific questions raised.

The first refer to the described layouts of the future networks as “*not being substantially different in the physical ‘architecture’ of today’s electricity networks (i.e. “hardware”)*”. In its extreme hardware analogy this might be right as the wires, the poles, the insulation, etc will still be made of copper, aluminum, iron, porcelain, plastic and so on, but in its physical layout the new European electricity network will actually gradually grow significantly different from today.

The electricity networks of tomorrow will have to adapt to new important drivers. An example is the need of new transmission capacity in order to bring large wind resources from off-shore locations to in-land consumption areas. Another is the need to make it possible for regulative power to balance shortage of wind sometimes far away from the plants. Likewise will the pressure from increased trading lead to more interconnectors and thus new line investments although the given examples, will not be independent of each other. Our main observation is, however, that Europe gradually will move from a rather radial system

approach towards a more meshed network. The marginal costs to establish this new system structure might well - for a relatively long period of time - drive costs upwards.

The second relates to smart-grid as such. The increasing complexity of tomorrow's system makes it necessary to collect, process, and actively use information from many more sources and in greater and more frequent numbers than before, like producing units, energy consumers, or simply "important points" in the network, in order to control stability and guarantee network quality. Smarter network is a necessity to cope with the wished integration of renewables and other 20/20/20 driven initiatives.

The most promising part of the optional smart grid concept is, however, its possibility to become a cost-reducing-tool of tomorrow's network costs. By developing new algorithms, steering devices, and system approaches and process collected information of the status of the systems, it will become possible to utilize the networks harder without jeopardizing security and stability. This is the real area for R&D, pilot tests and the reason for the EU commission to act now.

Smart grids can from this perspective be seen as a rationalization tool. By investing in smart grid the networks can be better used and thus reduce their costs. This is different from promising lower costs through smart-grids. The low cost promise is linked to the reservation "than it should have otherwise developed to".

The scope today is however to find R&D volunteers and pilot tests that are willing to launch smart grid actions earlier than necessary and learn from these experiments. Such pilots are likely not to come without economical support, which may be a combination of common sources, customer financed charges, as well as other stakeholder contributions.

Our answer to the specific questions are given in the attached annex.

Stockholm 2010-02-26



Stig Goethe  
Power Circle  
Chairman of the Board



Lars Nordström  
KTH

Letter attachment to: **Views on ERGEG position paper on smart-grids.**

Reply from KTH and the Power Circle, Stockholm, Sweden.

## **Comments to the questions raised**

### **Question Section 1**

1. Yes

2. Basically yes, but...

...we do it with the specific comment that there are many drivers that will influence the cost level of our future electricity nets and it will not be easy to distinguish between them. From some aspects smart-grid will become a cost, from other perspectives it will rationalise system performance. Thus, what should be included in the smart-grid or not will probably never become a precise business.

3. Yes – in principle, but ...

The business of networks is a threefold matter. The first part is related to administration, like billing, keeping up reserves, administration of people and resources. The second is determined by capacity demands and will include investments and most of the operational costs. The third part is related to the energy transferred in the sense that network losses will become a cost, but in relation to the others this part is small. Thus, it might be right that network monopolies could be decoupled from the energy business. The incentives should anyhow be more directed towards ensuring quality and the transport capacity, e.g. flexibility in power transmission given distributed generation and local requirements on quality and reliability, an on the energy transferred.

However, incentives for establishing appropriate flexibility in the transport capacity must consider cases such as balancing power being transmitted from far away to cover for – from time to time - unavailable customer generated power and a large amount of new loads like heat pumps and electrical vehicles and this could create energy losses which should not be neglected. A second point to note, incentives that drive the design of grids, purely from a transmission capacity (power) perspective has the risk of leading to increased network.

The conclusion is that a move towards total decoupling from energy therefore seems premature.

### **Questions section 2**

4. We agree with the identified drives.

Letter attachment to: **Views on ERGEG position paper on smart-grids.**

Reply from KTH and the Power Circle, Stockholm, Sweden.

It should, however, be observed that in reality a lot of new units and behaviors will be finally determine and create new market conditions. What kind of new drivers that will come from the introduction of all the now debated alternatives are difficult to state and imagine.

An example of an additional irrational driver is the customers that wish to engage energy service providers from outside the electricity business perhaps from the telecom industry, estate companies, etc. New market entrants will appear, effect the behaviour and demand market changes. To predict the changes will not be easy but as the entrants are used to other market rules than those reigning the electricity market it is necessary to assume that changes might be necessary.

### **Question Section 3**

5. Yes, a network user approach is necessary, the “network user” term includes producers, consumers, retailers and service providers .

However, care should be taken not to include technologies, which go “beyond the meter”. The future development of this “unregulated market” will not necessarily follow the infrastructure focused Energy market, and the deployment of technologies will happen under other market rules.

6. By accepting each other’s roles.

Generally speaking the electricity companies and service providers are acting on competitive terms whilst the network monopolies serve under regulated market conditions often given a determined return. It will be necessary to agree on common standards and the exchange of data. This information might well be shared with third party companies, but the terms of such sharing is probably not always easy to agree on. Specifically regarding the relation between energy suppliers and energy service it should not be defined since both parties act on an open market.

7. Yes,

although section 3.3.3 would benefit from separating the services offered by network companies and those offered by retail suppliers and ESCOs.

The services offered by network companies should be focused on quality of network , transmission capacity and access services. These services are all under a regulatory regime. The services offered by the retail suppliers and ESCOs are developed on an open market. The final paragraph in section 3.3.3 is of vital importance for the new user services to develop.

Letter attachment to: **Views on ERGEG position paper on smart-grids.**

Reply from KTH and the Power Circle, Stockholm, Sweden.

A crucial issue is to set up a regime that encourages a dialogue between the “free market actors” and the monopoly net works. The latter shall not become a hinder for new initiatives although investments on the infrastructure might have to come first. Negotiations and terms for financing will become important. Probably new market impacts and technical discoveries will have to develop under a continues dialogue between several stakeholders.

8. Mostly yes,

But the issue of quality and security is not highlighted. It should also be noted that the new structure of generation will need to observe the need short circuit situations. In short, the value of rotating mass should in the longer term be valued among other ancillary services. In addition problems around VAR balance can often be solved either by local new generation or network actions. How these two types of questions should be treated in planning of networks and later the costs should be shared is a not neglectable issue.

In 3.4.1 no mention is given of the importance of interoperable communication facilities, this should be added in the same manner is the case for section 3.4.2. In section 3.5.4, it is of vital importance that “beyond the meter technologies” are not bundled with metering infrastructure.

9. This question risks becoming misleading in relation to smart-grid development.

Firstly, introduction of renewables impose a new dimension of less predictable and variable production. The nets need to collect and process a lot more online information in order to cope with stability control. More exchange and handling of data is a prerequisite to the introduction of large and small scale renewables. Consequently new investments to cope with this new pressure is a must.

Secondly, the introduction of intermittent and variable production also drives securing solutions to replace less available renewables with other resources when it is not blowing. This drives extra investment in either new line capacity, new reserve capacity (like storage) or acceptance of higher running margins and sometimes both. This also implies that solutions will involve both the network monopoly and the competitive market.

Thirdly, also new intermittent load like heat pumps and electrical vehicles will also need new technical approaches.

Smart-Grid technique is a way to turn the up-warding cost trend downwards again. If this force in the long run will fully eliminate the upward pressure is still an open question. Certainly smart-grid solutions will hold down the cost but if it will turn it below today’s marginal cost per kWh transmitted or not we simply do not know. The important matter is

Letter attachment to: **Views on ERGEG position paper on smart-grids.**

Reply from KTH and the Power Circle, Stockholm, Sweden.

perhaps that the development of the new (R&D and pilot projects) to show the credibility of smart-grid performance need support now. Demo projects will otherwise wait, which is not in line with EU wishes.

#### 10. Two comments

In consideration of the long lead times to plan and build networks, the regulation and supporting incentives should have mechanisms to allow investments to be done before new generators or relevant consumer equipment pose a risk of leading to shortage of network capacity.

It is stated that Network Companies should be incentivised to be more innovative. Such initiatives should be contained to the area of responsibility of Network Operators, (Quality of network & access as well as openly available information (measurements)). Any involvement in areas typically outside the area of responsibility such as beyond the meter technologies shall of course not be allowed.

#### **Question setcion 4**

#### 11. Yes in principle.

However, the incentive schemes used to regulate the quality of network and access as well as information flow may require a technical perspective on the regulation. ( certain technical constraints must be fulfilled.)

#### 12. Two additional ideas for consideration and some words about prioritising

(8) Empowered network users possibly measured as the number of network customers in an area that have changed supplier the last year. Number of small scale customers producing electricity.

(9) Increased electrical safety through following the development of selected network quality criteria.

The most important general EU-target to follow and prioritise for network business would be related to keeping the power on line with the defined quality. Disturbances are failures. Thus the following “electrical items” are the most important. (4); (2); and (5).

Letter attachment to: **Views on ERGEG position paper on smart-grids.**

Reply from KTH and the Power Circle, Stockholm, Sweden.

13. N/A

14. Yes, there must be incentive schemes.

15. Yes, there is still not a stable set of standards for information exchange between distribution companies and energy providers regarding usage data. Many good developments exist, but no uniform standard has yet appeared.

16. N/A

17. No

18. Incentivising network expansion to host large scale renewable sources.