Treatment of Losses by Network Operators an ERGEG Position Paper for public consultation

Comments from:

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General comments

“Treatment of losses by network operators - an ERGEG position paper”, this document has been long awaited. In EU Green Paper on Energy Efficiency, the CEER and ERGEG action addressing reduction of T&D losses was promised. Hence the expectations that additional regulations will be introduced to set up new incentives facilitating investments in T&D losses reduction and helping to remove existing disincentives.

Incentives promoting renewables are easily visible in many European regulatory practices. European Energy Policy has ambitious targets 3 x 20% until 2020. One of them is energy efficiency. It has been addressed mainly in end use area and this is clear that the target will hardly be met without reaching for energy savings in power generation and T&D areas. So similarly to renewables regulatory incentives, reduction of T&D losses are expecting equivalent treatment.

Leonardo ENERGY http://www.leonardo-energy.org/drupal/ has been helping the discussion on network losses for a long time.

We appreciate this opportunity to raise several questions in ERGEG Consultation process to address future changes in European regulation with respect to most adequate treatment of network losses.

The document is mapping existing situation in selected EU countries but concrete "position", expected from Position Paper seems to be messing. A more specific proposal of regulatory changes leading to better incentives for network efficiency improvements would be very welcome by many stakeholders including us.

General questions based on Leonardo ENERGY notes on T&D losses

Importance of T&D losses. Improvement potential

Losses in transmission and distribution networks represent the single biggest use in any electricity system. In Europe, they consume between 4 and 15% of electricity generated. Such a large span suggests large improvement potential, also in respect of EU climate policy, but also shows that some countries can effectively keep losses discipline while other do not address this issue appropriately. Therefore the key element should be to agree on **specific actions and good practices of cross-European relevance**.

Definition of losses

It is fundamental to clearly identify and separate technical from non-technical losses. The nature of each incentive is radically different.

- Technical losses relate to investment in equipments (lines, transformers) and long term signals (compromise between investment costs and operational expenditure). They also relate to efficient planning and design of distribution networks. The incentives are similar for any country, this is a general issue that can be treated globally.
- Non technical losses basically refer to metering issues. They are to be treated on case by case basis. Their evaluation is based on particular situations depending on the country, region, specificities of public lighting and the, theft rate.

1. **Is definition of T&D losses commonly agreed?**
2. **Should the position of EU regulators be defined for technical losses only or should non-technical losses be included as well? Are there advantages in setting separate mechanisms for technical and non-technical losses?**
3. **What (other) categorisation (or subcategorisation) should be created for defining losses?**
4. **How to improve the evaluation of losses in distribution networks?**
5. **Is it reasonable to define acceptable level of losses separately for the distribution and the transmission level? Are there advantages in setting separate mechanisms for transmission and distribution losses?**

Benchmarking losses - externally and within EU

The world average loss in the electric network system is 8.8%. However, this figure includes countries like India and Brazil, where the losses are high due to rather social problem oriented issue of non-technical losses – electricity which could not be invoiced and is mainly lost via illegal network connections. In Europe and North America, average network losses are around 7%. The differences between European countries are very high, ranging in extremes (under specific assumptions) from 1% for Luxembourg to 16% for Estonia. Though it may happen that these figures do not give an accurate impression of the situation, since the formula to calculate losses favors countries with a lot of transit power, like Luxembourg. Transit power only passes through high voltage transmission lines, while about 75% of the losses are situated within the distribution network. Network losses in the EU-15 countries didn't decrease much over the past decade. In many new EU Member States (Eastern European countries) on the contrary, network losses have lowered significantly during the latest years. When comparing network losses with the size or population density of countries, correlation is weak. This means that technical network losses mainly depend on other factors such as network design, operation, and maintenance.

6. **Which countries are setting a good example? What is the role of regulation and policies with respect to this issue?**
7. **Current tariff systems in most European countries do not really favour network efficiency, do they?**

Basic rules to minimise network technical and non technical losses.

Technical losses could be reduced if the appropriate incentives are set: long term signals allowing electricity distribution companies to plan their investments and operational expenses over at least 20 years (even more, as transformers technical life is sometimes 40 years or more). If long term signal fails, investment decisions will be taken on the basis of the lowest investment cost, and not on the basis of the lowest lifecycle cost.

There are also some general rules applied in network design e.g.:

- Design the network system in such a way that power lines to large consumers are as direct as possible.

- Reduce the number of transformation steps, since transformers account for almost half of network losses.

The objective of losses reduction has to be considered together with such technical aspects as system short circuit calculation and reliability. It is a trade off between capital and operational cost.

As far as non technical losses are concerned, the investment in metering systems strongly depends on a local case. For instance, if theft rate is high in a particular zone, the investment in additional meters will be quickly recovered thanks to theft tracking. Similarly substantial savings can be made in public lighting.

8. **How does perfect regulation work in this respect?**
9. **What can be done to optimise the electricity system and reduce these losses?**
10. **Where is the biggest potential for reduction of T&D losses?**

Controllability of losses - calculating or measuring losses

Not all losses are controllable and not every loss reduction is justifiable. In absence of measurement what kind of calculated benchmarks should be in applied. Simulation and modeling in supporting network configurations has been a popular research subject for long.

11. **Is the term of non controllable losses only an excuse for lack of concrete action?**
12. **Are there practices or software to follow?**

Loading

The higher the load on a power line, the higher its variable losses. This means that a trade-off should be made between load and losses. Investments in new capacity could in some cases be justified by the reduced cost of losses. The appropriate tool for such an investment decision is Life Cycle Costing (LCC). It has been suggested that the optimal average utilisation rate of distribution network cables should be as low as 30% if the cost of losses is taken into account. A similar reasoning accounts for the cross-section of lines and cables: the higher the cross-section, the lower the losses. An optimum balance between investment cost and network losses should be aimed for.

13. **To what extent is this optimum achievable in practice?**

Power Quality

Network efficiency is related to Power Quality by the fact that harmonic currents increase losses. Though certainly not negligible, losses due to harmonics are part of the overall network losses. Some calculations present that harmonics in European networks are responsible for rather small figure of about 3% of the network losses (a loss of 0,2% of the load). Loss-optimised network design also lowers network impedance, and hence has a positive impact on supply quality.

14. **So how do network measures to improve Power Quality influence the efficiency, and vice versa?**
15. **Are Power Quality and Energy efficiency measures synergetic, or rather counter-productive?**

Improving regulation is key

A discrepancy can be observed between the way EU policies are treating generation and end-use efficiency on one hand, and network efficiency on the other. The current tariff systems in most countries are not favoring network efficiency improvements. In several European countries (France, Poland, Spain, Germany, there is a price cap on the network tariff, in which the term for network losses is not included. This means that the cost of network losses can be entirely charged through to the customer. This tariff system produces a strong disincentive for investing in network efficiency. The price cap prevents network operators from accumulating sufficient cash for efficiency investments, while the lack of a price cap on network losses makes such investments completely useless – the network operator does not have to pay for the losses anyway.

In other European countries, maximum values are set for the amount of network losses that can be charged through. This forces network operators to prevent losses from increasing, but it does not yet stimulate them to reduce losses.

The only real regulatory efforts to reduce network losses so far have been carried out by Estonia and the UK. In Estonia, the maximum network loss that can be charged through is reduced every year by 1% of the total load. In the UK, the losses that exceed a certain target rate are penalised to the distribution network operator by £48/MWh.

The EU is increasingly conscious of the fact that there are too few incentives to improve network efficiency and it will be critical to make things happen as soon as possible. There is an opportunity to make significant changes at the moment, since large investments in the network system are to be made in the forthcoming decade.

The SEEDT study has estimated the distribution transformer losses in the EU-27 at about 33 TWh/year. This figure does not include reactive power and harmonic losses which, at a conservative estimate may add a a further 5TWh/year. This would bring total losses of distribution transformers to about 38 TWh/year. These represent a considerable part of the network losses. Again, regulation does not provide incentives for investment in more efficient transformers. The main market actors purchasing distribution transformers are electricity distribution companies, which do not have a benefit from investing in efficiency and simply burden the consumers with the cost of the losses.

16. **The EU unbundling plans are not likely to be addressing this situation, so will we be again at the dead end on the network efficiency road?**

Tariffs – how to tackle losses

As for the general tariffs, they are transparent and cost reflective, but whether there is special tariff for losses, or not, doesn't seem a key issue. The important issues are:

- To reduce the amount of energy losses
- To optimise the energy procurement
- To protect end consumer

Finally, several regulatory incentives have been implemented in both absolute and relative terms. For instance, in Norway costs related to network losses are treated like any other cost within the regulatory model used, whereas in Austria and the Czech Republic there is a maximum percentage value for losses. For distribution losses, the Czech Republic employs an annual loss efficiency factor mechanism, and in Portugal the DSO is rewarded (or charged) if registered losses are below (or above) a pre-set reference value.

17. **What is the fair proportion between electricity supplier and user in paying for losses? Do such mechanisms incorporate free market idea?**
18. **Should the costs of losses be covered by a special tariff?**

More observations about existing models, their advantages and disadvantages:

- Norway model : this model provides the right incentives as long as the CAPEX/OPEX balance comes up correctly and making assumptions on long term basis; so as time horizon provided for yardstick competition is long enough. One disadvantage : there is no differentiation between technical and non technical losses, which ,in our view, is something to be avoided.
- Austrian model : maximum level of losses should be assessed and should evolve continuously to lower values. Again, it lacks the differentiation between technical and non technical losses.
- Portuguese model : seems to provide a strong incentive but needs a roadmap for losses reduction on a long term basis, so as to provide the right investment signals.

19. So which key elements should be considered when assessing different regulatory incentive mechanisms?

In our view:

- Saving energy: reduction of energy losses due to inefficient network equipment and operation. Incentives should be provided to obtain the right balance between investment and operational costs, including cost of energy, CO_2 emissions and energy saving targets provided by the European Commission.
- Protecting end user: losses procurement (DSO vs Energy Supplier), transparency of costs and a cost reflective tariff.
- Minimizing procurement cost: providing the right signal to procure energy of losses in the most economical way
- Treatment of non technical losses: investments are justified by subsequent savings. Customised treatment.

Distributed generation and network losses

It is often believed that distributed generation (DG) systems in any case reduce network losses. Detailed studies prove that the reality is not so simple. As a general rule, one could say that distributed generation systems only reduce network losses if their energy is consumed locally. As a result, in urban or densely

populated areas, where energy consumption is high, DG units do indeed reduce network losses. In rural areas, however, the electricity consumption close to the point of generation is small. Consequently, network losses are reduced in cases of small penetration of DG systems, but increase again with rising DG penetration. In the last case, the generated power has to be transported to the closest centre of consumption, bringing along network losses again. The application of intelligent control systems for DG units may also help to reduce losses. Such control systems could take the energy losses of the involved network cable into account. If those losses would be too high because of excessive load, the control system could switch the DG unit off the grid. Such a system would be particularly interesting if the DG unit were to be combined with local energy storage. In such a case, the DG unit could continue generating power when it went off grid and then inject this power into the grid at later time.

20. **What about the influence of the increasingly distributed generation on future network losses?**
21. **Should the relation between network losses and distributed generation be treated by regulation?**

Specific questions

Page #5 of the ERGEG position document

"After studying national practices throughout Europe, a selection of case studies was identified. Austria, Czech Republic, Finland, France, Norway, Portugal and Sweden were highlighted as being representative of the different regulatory models currently available." and consequently 6.4, 6.5, 6.6

Question: What are the criteria for selecting these countries as representatives of different regulatory models? Why such major electricity consuming countries like:

Germany - seemingly lacking regulation based incentives but representing high efficiency level,

Italy, where specific incentives are provided to purchase energy efficient network equipment

UK – where probably the most concrete measure was introduced to penalise excessive losses

were not selected

#6.3 "Values" of the ERGEG position document

Question: What is the reason for Austria and 4 other countries to be marked grey in table 2?

Question: Can the differences between Romania and Sweden and some other extremes be explained by 4 bullet points only?

Is the role of technical losses to be ignored in these cases?

Page 21 – Case Austria of the ERGEG position document

“A dedicated tariff for losses is defined. The price is based on a special formula, which includes the peak and the base prices. For 2007, it was 55,38 Euro/MWh.”

Question:

A large table follows this statement presumably trying to support this number but it hardly does. This section requires explanation (of the formula) otherwise the table seems not meaningful.