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ETSO comments on ERGEG's Public Consultation Paper
Treatment of Losses by Network Operators

ETSO welcomes the opportunity to comment on ERGEG's consultation paper on 'Treatment of Losses by Network Operators.' This consultation was announced by the 2008 European Energy Regulators' Work Program "within the scope of the Energy Efficiency Directive 2006/32/EC". Of course, ETSO supports any improvement in energy efficiency that would contribute to greater sustainable development of the European Union.

Before answering to the different questions of the consultation paper, ETSO would like to make some general comments[1]:

1. **Losses are specific to each TSO and therefore not comparable,**
   The rate of losses varies considerably from one transmission network to another and it depends on many features that are very different between two TSOs. Therefore the setting at European level of a fixed maximum rate for losses is not appropriate because it would impede development of appropriate regional or national solutions.

2. **Because of exogenous dependencies, losses are hardy controllable by TSOs on the short term,**
   Losses on electrical networks are a physical phenomenon and, with the present available transmission technologies and in the respect of the safety and the security rules, TSO are able to monitor the volume of losses. Nevertheless, it is very difficult for them to significantly reduce it because, especially, in real time operation, losses are first of all dependent on generation plans and on exchanges.

3. **Long-term measures can have higher priority than short-term measures**
   Most comments and answers included here relate specifically to the short term. Notwithstanding this, ETSO underlines that planning actions can have an effect on losses reduction on the long term and that TSOs require from suppliers equipments that consume less electricity.

4. **Innovative market mechanisms are essential for significant loss reduction**
   Reductions in the volume of losses on the transmission system can also be achieved through price signals to the users of the networks, that is to say, by setting higher prices for the use of the transmission network when and where the volume of transmission losses induced by those users is higher. This important incentive directly applied to users of the network should be developed in any future regulation.

[1] As TSOs operate transmission (EHV and HV) networks, ETSO comments are only relative to transmission networks and not to distribution networks

5. **Any losses regulation must hedge TSOs against high market price variations**
   Any incentive mechanisms for reduction of losses or the way in which the losses are purchased must involve opportunities as well as risks for TSOs and the aims of the regulation must be achievable. When TSOs buy losses, the regulation should hedge TSOs against unexpected electricity market prices, it may mean, for instance, that the level of the transmission tariffs should be linked to the losses purchase price.

In response to the specific questions set out in the consultation paper:

1. *What is considered an acceptable definition of losses?*
   On transmission networks, all entry and exit points are equipped with precise metering systems. The simplest way to define losses is therefore to evaluate the difference between the measured injected energy and the measured supplied energy. There is no energy theft in transmission network, therefore the difference between energy measured as injection and off take for transmission network is considered as technical losses. [2]
   It should be noted that at the substations different technical solutions may exist as regards energy consumed for in-house consumption (such as lighting and consumptions in the buildings of the transmission system substations) or the energy consumed directly by the substation equipment (transformers fans, communications, control and metering equipment…). The amount of energy consumed may come from e.g. tertiary windings of transmission transformers (then is included in the volume of losses) or may be supplied from distribution networks (then is included in operational cost). The different technical solutions exist at substations even for the same TSO and may result in slightly different volume of technical losses between TSOs.

2. *Should power losses refer only to technical losses or is it acceptable to include also non - technical losses?*
   In the transmission systems there are no non-technical losses.

3. *Which are the key components for defining losses?*
   In the transmission networks the key components of losses are:
   a) In transmission lines and substation bus bars, losses are basically Joule effect losses and losses due to the corona effect,
   b) In transmission transformers there are Joule effect losses in the conductors of the windings and also losses in the magnetic cores due to the hysteresis phenomenon and to Foucault currents.

4. *What ways exist to improve the evaluation of losses in distribution networks?*
   Since ETSO has no experience in the evaluation of distribution losses, it does not express an opinion on this question.

5. *What should be a reasonable and acceptable level of power losses at the distribution level and the transmission level?*

[2] The only exception could be represented by cases of countries where meters are not located at the exact connection point, and then the measure at the connection point is calculated with the application of a specific algorithm which take into account the potential losses between the point where the meter is located in the distribution network and the connection point itself. In these cases non-technical losses can also occur on the transmission network.

The idea of a single reasonable and acceptable level of losses on transmission systems is meaningless because the volume of losses depends on a large number of parameters that vary between countries, including:

- ✓ The number of voltage levels operated by a TSO,
- ✓ Whether or not losses on transformers to distribution levels are included,
- ✓ The voltage level itself (e.g. there are more losses in 150 kV than in 225 kV for an identical flow),
- ✓ Average electrical distances between generation and demand,
- ✓ Demand density or distribution and evolution,
- ✓ Real demand versus forecasted demand,
- ✓ Generation patterns, exchanges between countries, off-shore in-feeds,
- ✓ Load factors of the lines (e.g. a congested network will have higher losses),
- ✓ Operation network topologies,
- ✓ Network technologies (overhead lines or cables, DC/AC converters, FACTS),
- ✓ Corona losses in winter conditions,
- ✓ Amount of transit flows in the integrated electricity markets.

It is therefore not surprising that the transmission losses tabled in the table of page 13 of the consultation paper vary between TSOs.

Indeed, harmonization of the volume of losses is not appropriate for different transmission networks. Only an examination on a case-by-case basis would be adequate to judge the appropriateness of the level of the losses.

6. *Which types of losses could be most easily reduced?*

a) In the short run, i.e. without addition of new transmission assets, TSOs have some means to keep at a minimum the volume of losses, even if, first of all, other factors will determine the rate of losses

- ✓ Optimization of the operation network topologies,
- ✓ Operation at higher voltage level,
- ✓ By adapted choices for the period of maintenance of transmission assets,
- ✓ Taking account of losses in re-dispatch decisions.

TSOs perform these actions in the respect first of all of the safety and security rules

b) In the long run, the reduction of the cost of losses intervene in investment decisions,

- ✓ With the addition of new transmission assets, under specific conditions, losses can be reduced. However transmission network planning involves other considerations like investment costs, congestion management, system adequacy, security of supply, safety rules, environmental restrictions, market factors etc… These factors may take precedence in planning and investment decisions.
  - o In some cases, the TSO has to invest in installations that might increase the losses on the network (high temperature conductors, phase shifters…)
  - o The overall evaluation between costs and benefits for these parameters will be decisive.
- ✓ In the long-run, loss-optimized equipment should get higher priority, even if the effective reduction of losses will depend on the real use of the network.
- ✓ The use of zonal tariffs or locational signals can be a mean to reduce losses but due to the impact on the market this should be a national Regulator decision.
- ✓ As power plant locations have a significant influence on transmission losses, specific incentives should be investigated,
- ✓ Rational use of energy (flattening the load curve, for example) and energy saving measures can reduce losses.

7. *Who should be responsible for procuring electric energy to cover losses?*

In order to purchase grid losses efficiently the losses procurement process should be transparent, neutral to market actors and competitive according to the principles of EU public procurement directive. To that end, TSOs, who should publish their practices of procurement, are the natural actors to buy the losses:

- ✓ The fact that the volume of losses can be monitored in daily operation explain why TSOs should be preferentially responsible for procuring losses.
- ✓ Market transactions are also simplified by this situation because the transmission service is complete: when 1 MW is injected on the network, 1 MW can be sold without any complicated hourly variations based on a percentage of losses to be compensated.

In the long run, harmonization of the loss procurement process would be preferable as the market integration proceeds. The rationale is as follows: it is not possible to determine exactly which grid users have caused losses in each operational situation. This applies particularly to losses caused by transit flows. Therefore, the model where supplier is responsible for purchasing losses,

- ✓ does not treat players fairly, which has a detrimental impact on competition and market integration,
- ✓ is complicated and lacks of transparency because it means that users need to know in advance which quantity of electricity they have to purchase over their own consumption,

Moreover, as in daily operation losses are defined by generation, demand and exchange patterns, a compensation in kind by users of the network will never give the quantity of energy equal to the volume of losses: TSO will have, anyway, to compensate the unbalance.

8. *How should electric energy to cover losses be procured in a market-oriented way? Which solution is the most efficient?*

Due to several reasons (the energy markets in different countries are not standardised, national or regional energy market exist, often there are limited interconnection capacity…) for different countries different market based methods of purchasing losses may result in different costs and further on efficiencies of the purchases. According to country specific conditions, the same market based method may in different countries result in different costs. Therefore, there is no European wide most efficient model and for each country the best-suited marked based method should be found and agreed between network companies and respective regulatory authorities. That said, there are common principles in existing regulations particularly to hedge the risk that could be applied, such as transparent non discriminatory mechanisms

9. *Should the costs of losses be covered by a special tariff?*

Today, there is large variety in how TSOs cover the cost of losses from the grid users. Some countries use a marginal loss tariff while other countries just cover the cost of losses in the same way than any other cost.

A more important question is whether the costs of losses should or should not be allocated to customers by time period or according to the location of the connection point. The impact of a time or of a spatial differentiation based on losses should be studied as way to create a price signal addressed to users of the network. This signal could be used to give an incentive to their demand (injection or off-take) and then could contribute to reduce the volume of losses on the network.

Nevertheless one has to remember that tariff must remain simple and understandable by users before being implemented and adapted to the national market conditions.

10. *What are the advantages and disadvantages of the aforementioned incentive mechanisms?*

Any mechanism based on capped volumes should take into account the factors influencing the volume of losses (see answer to question 5) in order to adapt it to the real way in which losses are created in the transmission networks. It means that it is highly difficult, not to say impossible, to fix any simple rate of losses. Any realised rate of losses must be analysed in regards of the operating conditions.

11. *Which key elements should be considered when assessing different regulatory incentive mechanisms?*

As many external factors influence the volume of transmission losses, any regulation aiming at controlling volume of losses should take them into account to be adapted to the effective operating conditions.

Nevertheless, one key element has to be considered when designing any regulation on losses, especially for TSOs that buy losses. Purchasing losses means buying losses on the market: even if TSOs can develop hedging policies to minimize the cost of losses, TSOs are finally depending on market prices. That is why hedging purchase policies on the markets must be completed by hedging regulations that helps TSOs to support high market price variations. It means that transmission tariffs should be easily adaptable to the quick variations of market prices.

12. *Are there advantages in setting separate mechanisms for technical and non-technical losses?*

As previously stated there are no non-technical losses in the transmission network.

13. *Are there advantages in setting separate mechanisms for transmission and distribution losses?*

As transmission and distribution systems have very different characteristics that affect losses, any incentive mechanism for transmission losses should be specifically designed for the transmission system concerned.