GABE A.S.B.L.
GROUPEMENT DES AUTOPRODUCTEURS
BELGES D'ELECTRICITE.

GABE V.Z.W.
GROEPERING VAN AUTOPRODUCENTEN
VAN ELEKTRICITEIT IN BELGIE.

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Subject : **GABE ANSWERS TO ERGEG CONSULTATION ON :**

INTEGRATION OF WIND GENERATION.

1. INTRODUCTION :

GABE is a Belgian association of industries, large electricity consumers but whose the sites are also equipped with local generation units (cogeneration) providing a part of their energy needs.

As large consumers, its members are directly concerned by the consultation issues.

2. GENERAL COMMENTS : WIND GENERATION INCENTIVES :

Mainly two types of incentive mechanisms exist

- some member states define, for each renewable energy source, the power they wish, use "call for offers" procedure to select the optimum projects to be built and purchase their generated energy for the inciting offered prices.
- other member states allocate green certificates to renewable electrical energy besides the energy prices that generators obtain from the market; they impose consumers purchase a quota of renewable energy with green certificates, organize a green certificate market but also impose TSOs to purchase these green certificates for a minimum warranted price.

Depending on the member state, renewable source generators may receive additional advantages related to their grid connection costs, imbalances, …

While the first mechanism promotes renewable energy sources optimizing the costs, the second one may lead into very too high benefits for renewable energy generators.

In fine, consumers must pay all the costs of these advantages, which may be a high surcharge.

Hereafter, our purposes about wind integration in the market aim the second incentive mechanism.

Therefore, GABE recommends the promotion of electricity from renewable sources to be done

- via only one incentive mechanism, encouraging project optimization, spread over the whole expected life of the installation
- imposing renewable electricity generators to pay all other costs (connection, unbalances, …) so as classic generators.

GABE / President : J-P Bécret. c/o Solvay. Rue de Ransbeek, 310. 1120 Bruxelles. Belgium.
Mail: jean-pierre.becret@solvay.com Tel.: +32.22.64.26.76.
GABE / General Secretary: P. Zadora. c/o Umicore. A. Greinerstraat, 14. 2660 Hoboken. Belgium.
Mail: Peter.Zadora@eu.umicore.com Tel.: +32.38.21.72.06.

3. ANSWERS TO ERGEG QUESTIONS :

3.1. Q 1 : WIND GENERATION IMPACTS ON MARKETS :

Wind generation is characterized by high fixed cost (subsidized via the incentive mechanism) and low variable cost. Will the consumer benefit from the low energy price ?

3.1.1. Back-up: increasing prices:

Because wind generation is very variable and intermittent, with a ratio in the range 0.2 – 0.3 between average and installed powers, wind turbine generation requires classic quick-acting power plants supplying the complementary power. These ones must be amortized on 80 – 70 % of their capacities, increasing their energy prices.

3.1.2. Base-Load :

Large industrials want to negotiate long-term contracts to supply their base-load plants with constant power. Typically, high powers may only be furnished by large generators, frequently one historical generator by member state. To put these generators into competition and to be able to conclude contracts with foreign generators, multi-yearly cross-border capacities are crucial.

With both, the actual and the "target" models of markets, increasing wind energy injections and consequently the loop-flows will reduce the long-term cross-border capacities for the market, because of increased security margins imposed by TSOs.

Without changing cross-border mechanisms, the increasing wind energy will block the base-load long-term market that large consumers need.

3.1.3. Day-ahead Market:

When selling wind energy to day-ahead power exchange, the offered price should be low. But,

- only during few hours with both strong wind and low demand, the fixing may be based on wind offer with low price
- during the other hours, the fixing will be based on a classic power plant or, worse, on the higher price of a reserve power plant, providing wind energy with a significant additional benefit !

The risk that a wind generator overestimates its offered volumes to increase its benefit must be fought against, via high imbalance penalties.

Globally, it is not sure the average day-ahead price will decrease thanks to wind energy.

3.1.4. Intraday Market:

The intraday market will permit wind generators to optimize their positions facing unforeseen wind variation, without benefit for the consumers which mainly need long-term contracts (for their base consumption) and day-ahead markets (for their ripples and opportunity transactions).

So an optimization transaction may only be authorized if it does not worsen any congestion (including in neighboring countries via loop-flow), thus if it does not increase TSO de-congestion costs.

3.1.5. Balancing:

It is easier and cheaper to decrease reserve power plant production and, even, to stop it, because of a wind excess, as to increase reserve power plant production or to start it, to palliate a lack of power.

Thus, for any hour, the total sold power, via all the markets, of a wind generator should be the minimum of the uncertainty range of the power forecast for this hour.

Otherwise, balancing prices may become too high.

3.2. Q 2 : MARKET RULES :

3.2.1. Base-Load :

The long-term market integration principles and the cross-border capacity management must be changed to provide the long-term market with high multi-yearly cross-border capacities. (See Q4).

3.2.2. Day-ahead Market:

Power exchange is the typical market place for short-term transactions, so as wind energy, with effects on prices for consumers.

Wind generator should be obliged to offer its unsold power on this market, but limited to the minimum power of the wind forecast uncertainty range.

3.2.3. Intraday Market:

A market rule must exclude any transaction which either creates or worsens a congestion, including in neighboring countries via loop-flow. Otherwise, wind generator may optimize its position at the expense of the TSO.

3.2.4. Balancing:

Wind generators should pay the full unbalance costs, so as any other actor, to encourage the finest wind forecast and to avoid gaming.
However, it should be authorized and promoted that several spread wind generators, inside the balancing zone, cumulate their injections in a common equilibrium portfolio to reduce their global ripple amplitude and improve their power forecasts.

3.3. Q 3 : MOVING GATE CLOSURE CLOSER TO REAL-TIME ? :

3.3.1. Day-ahead Market:

We recommend to move the power exchange gate closure as near as possible to the real time.

Why the power exchange gate ? Because it is the last market benefitting to all consumers and generating price references.

Limit: TSOs need a delay to study the interconnected grid security and to define palliative actions.

3.3.2. Intraday Market:

The intraday market gate closure should by as near as possible to real time, with, as limit, the delay the TSOs need to study interconnected grid security and to prepare palliative actions, so as imposing the start of a power plant.

3.4. Q 4 : TARGET MODELS :

To accept increasing renewable source injections of intermittent and variable powers without blocking long term markets from integration, the cross-border management principles must be changed.

Instead of managing congestions, TSOs should solve congestions, so as they do in their national grids.

Today, TSOs estimate the worse realistic conditions of topology, injections, national power flows and congestions, loop-flows, … and calculate the cross-border capacities remaining available for the market that they allocate as PTR or FTR. Inevitably, the yearly capacities are very low and will worsen with wind generation growth and multi-year capacity allocation.

We recommend TSOs solve, together, congestions via international generation redispatching and, if needed, interconnection reinforcement. The best solution is to progressively merge national markets of countries, the generation park of which have similar costs, because their generators are able to mutually compete.

Concerning wind injections, the here-up solution is particularly required.

The minimum is that monthly and (multi-)yearly capacity calculation should consider, for each wind generator injection, only the minimum power from the wind uncertainty range. In real time, if a higher power injection creates a congestion, this one has to be solved by international generation redispatching.

Let's analyze an example: Strong injections of wind power in the North of Germany generate large North-South power flow in Germany and a loop-flow via The Netherlands, Belgium, France.

Today:

- TSOs limit the cross-border capacity Belgium-France because this loop-flow may occur and must have its own capacity channel to flow
- a French consumer wishing to purchase electricity from a Belgian generator has problem: a high price for few capacity, reducing the competitiveness of the Belgian offer.

With our solution:

- cross-border capacity Belgium-France is very higher (not reduced because of large potential loop-flow) and a power plant of the Belgian generator runs to supply the French consumer
- if, unexpectedly, wind turbines in the North of Germany increase their injections creating the loop-flow and interconnector congestion, the TSOs
  - receive this excess of wind energy as positive imbalance with low price, they pay
  - ask the Belgian generator to decrease its power injection and receive from this generator a price, normally a little lower as the variable generation cost
  - globally, receive from the Belgian generator a price higher as they pay to the wind turbines, thus obtain a benefit.
- NB: for transactions in the reverse direction, the netting between transaction flow and loop-flow reduces the constraint.

With regard to the previous principles, <u>no additional cross-border capacity may be reserved for intraday market integration.</u>

3.5. Q 5 : BALANCING OBLIGATIONS:

<u>The normal unbalance tariff must apply, for wind generators so as for other ones</u>, so as explained in § 3.2.4.

Because prices for lack of power are typically higher as for power excess, this mechanism is needed to incent wind generators to announce the power injection equal to the minimum of the uncertainty range. This minimum nomination is better to solve congestions (see §3.4) and limits the risk of the gaming explained at §3.1.3.

3.6. Q 6 : R & D :

TSO should engage in <u>R&D to optimize the European grid</u> evolution. This one will have to accept local injections of significant wind turbine power. But wind integration is not the only issue of R&D.

3.7. Q 7 : GRID COSTS :

<u>Wind generation projects should pay the same types of network charges as other generators, based on the same methodology.</u>

<u>That applies also to their grid connection costs</u>, to encourage the project optimization.

<u>TSO should define the nearest grid substation on which the connection is possible, but</u>

- <u>without creating problems in the national grid</u>
- <u>without generating high loop-flows into the grids of neighboring countries</u>.

These constraints may impose a longer connection, up to a more appropriate substation, nearer consumption areas.

3.8. Q 8 : NEW NETWORK INFRASTRUCTURE :

At both European and national levels, TSOs should study a 10 year development plan for their grids, including extensions, reinforcements and equipment replacements, able to satisfy the evolution forecast of demand and generation and to secure the harmonious development of Europe and its member states. The concerned Regulatory Authorities should approve these plans.

The resulting costs may be financed by the respective transmission tariffs.

The plans should be published, showing the power reserves foreseen for loads and power plants.

On the other hand, individual connections of new projects to the common grid are paid by these projects.

The same rules should apply to wind generation:
- TSOs know the forecast of wind power to be connected to their grid, to adapt their 10 year plans
- each project pays its connection to the common grid.

3.9. Q 9 : SUPERGRID :

A European SuperGrid is not a grid for renewable energy sources !

The SuperGrid must be studied, at European level, to optimize the electricity transmission in Europe, with regards to both grid efficiency and commercial transactions.

It has two targets:
- to assume coherence between TSO investments in their networks
- to study the general optimum development of an European grid, providing answers to questions, so as
  - does Europe need a higher voltage network through Europe or is 400kV enough ?
  - does Europe need a DC network from East to West with vertical links to North and South, mainly assigned to large commercial power flows ? Redundant ?

The SuperGrid should provide the zonal projects with connection, but does not depend on these projects.

On the other hand, each large zonal project, so as North Sea Grid, Mediterranean Ring, … should be studied and optimized. If a project is efficient, it may be realized.

3.10. Q 10 : OFF-SHORE GRID OWNERSHIP :

If the creation of an off-shore grid is more advantageous for wind generators as individual connection to the on-shore grid, because of either cheaper or better energy valorization (lower ripple, better predictability, …), this off-shore grid is a good solution.

Then, the off-shore grid may be erected, owned and operated by a specific company, which may be
- either a subsidiary of the wind generators, acting as an ISO
- or a subsidiary of the concerned TSO (then wind generators pay connection costs to the TSOs which create the off-shore grid), acting as a TSO.

3.11. Q 11 : R.I. :

Logically, the North Sea Grid and the countries, it is connected to the grids of which, should be a Region. But theses countries already are part of several Regions. Finally, this problem becomes a real European issue.

3.12. Q 12 : OTHER ISSUES :

Considering the extent of wind generation in several countries, the wind generation power may be a high percentage of the total generated power during hours with strong wind.

Let's imagine a country with an objective of 15 % of wind energy and a ratio 0.3 between average and installed powers; when the wind is maximum, 0.15/0.3 = 50 % of electricity is generated by wind turbines.

Therefore, the two hereafter issues become critical.

3.12.1. Wind Generation must resist to grid incidents:

Regulation should impose that any new wind turbine must

- remain connected to the grid even during any close short-circuit, despite the very deep voltage drop, supplying the possible power to the grid
- inject its normal power very quickly after the fault clearing.

Because the electrical system may not accept that a single fault in the 400 kV grid might imply the shut-down of wind turbines and a so high lack of generation power after the fault.

3.12.2. Ancillary Services:

Regulation should impose any new wind turbine must be able to provide the TSO with ancillary services, so as frequency control and voltage control, perhaps secondary reserve.