REGULATION ASPECTS OF RES ON DISTRIBUTION SYTEMS OPERATORS: AUSTRIAN CASE

DI Wolfgang MANDL
BEWAG Nezt GmbH – Austria
wolfgang.mandl@bewagnetz.at

DI Franz WERNER
BEWAG Nezt GmbH – Austria
franz.werner@bewagnetz.at

DI Pilar BARRERA-GONZALEZ
BEWAG Nezt GmbH – Austria
pilar.barreragonzalez@bewagnetz.a

ABSTRACT

As a result of the implementation of the Green Electricity Act-2012 with its improved conditions for renewable energy generators, there is currently a massive increase in the requests for grid access to all distribution system operators in Austria. This "boom" has und will have an enormous effect at all voltage levels on the distribution grids. This paper will focus on the influence of the recently new wind park projects development and the regulatory framework regarding the connection of RES installation in Austria.

INTRODUCTION

The announcement of the Green Electricity Act-2012 on the 29th July 2011, with its improved conditions for RES generators, has caused a second "boom" on the renewable supplier side in Austria, with an increased number of new clean generation requests at all voltage levels on the distribution grids. The distribution operator faces different challenges based on its geographic location. Several DSOs, especially in east Austria, are currently confronting massive wind power park projects. As an example, Burgenland is shown in Figure 1.

DSOs technical aspects regarding numerous amount of distributed centralized, small- or big-scaled renewable generation are challengeable but they are definitive achievable. However the affected DSOs have to face additional economic risks due to a necessary enhancement of the power grid, driven by the present tariff structures and future regulation in Austria.

BIG SCALE POWER GRID CENTRALISED CONNECTIONS

In a future regulation system it is necessary to ponder in the one hand an increased participation of the generator side on the grid costs as well as stronger power-orientated grid tariffs. On the other hand it shall be considered an additional safeguarding of investments and innovation expenditure of the grid operator as well as ensuring a sufficient return on investments.

The massive construction of RES had and has so far an enormous impact on the power grid. Naturally the effects are dependant on the primary energy source (Solar, Biomass, Wind, etc…) and they differ on the different grid levels. In particular in Burgenland, at the very east of Austria, wind parks have the strongest influence.

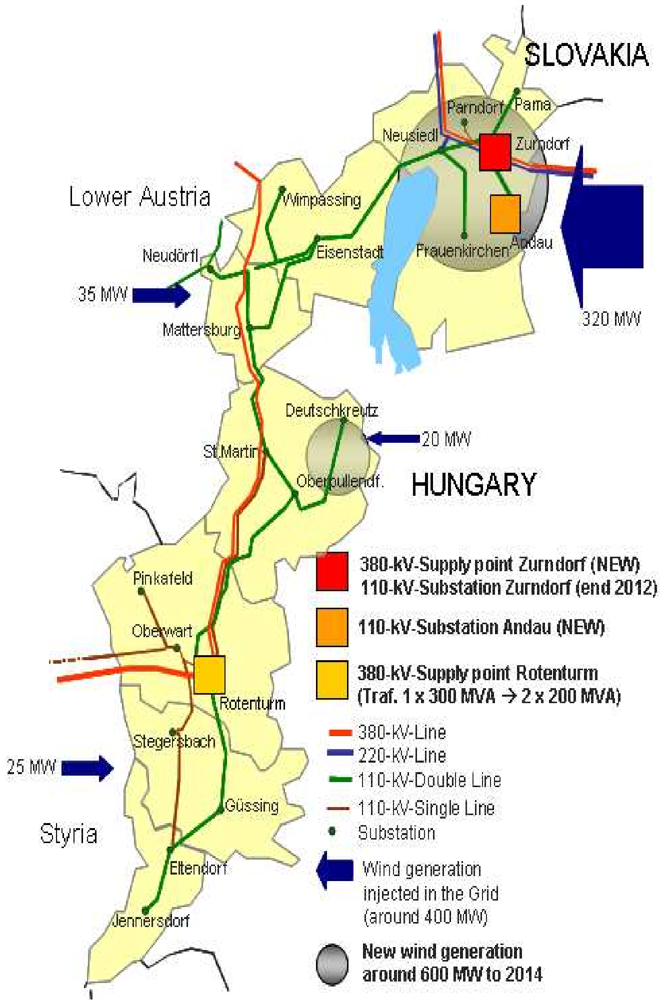

Figure 1 Geographical Location Burgenland

With a maximal peak demand of round 340 MW and a wind power installed capacity of 1000 MW peak until 2014 (see development of power and energy in figure 2 and 3), the grid operator has to face extreme requirements that derive in additional costs due to the necessary maintenance and also result in unavoidable conflicts with the Power Generation Facility Owner. As a consequence of the new connected generation it has also to be taken into account the necessity to implement network stability requirements for certain voltage levels. During the first construction phase, between 2003 and 2006, the currently network was able to allow this additional capacity (round 400 MW) without any considerable enhancement of the power grid. However the second and third phase of the projects needs an enormous grid construction investment.

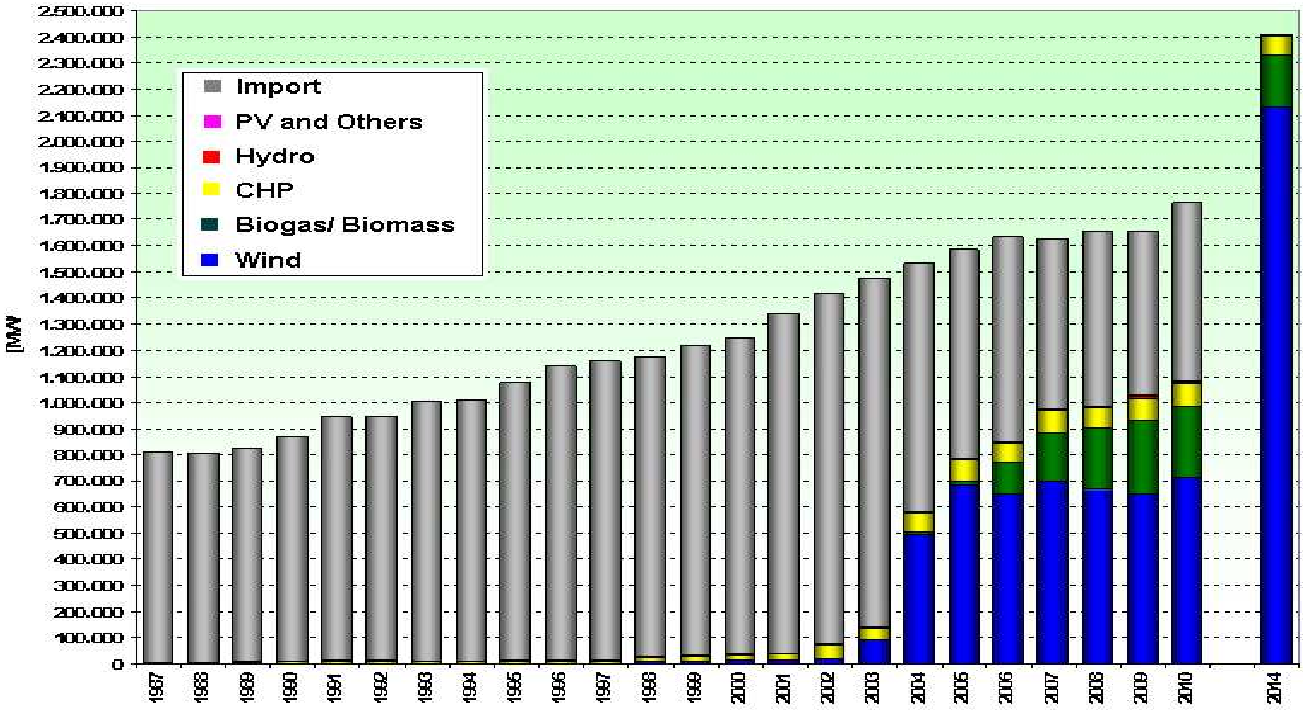

Figure 2: Development of electricity supply and production in Burgenland from 1998 to 2014

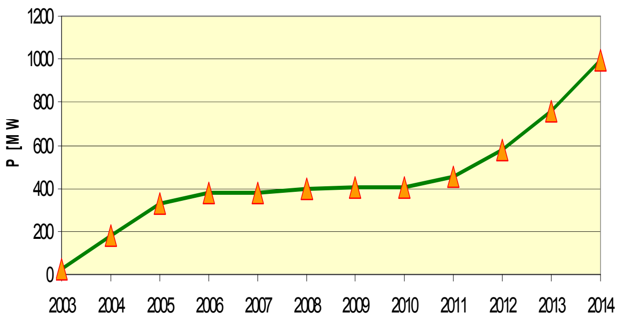

Figure 3 Development of wind power in Burgenland from 2003 to 2014

With a maximal peak demand of round 340 MW and a wind power installed capacity of 1000 MW peak until 2014 (see development of power and energy in figure 2 and 3), the grid operator has to face extreme requirements that derive in additional costs due to the necessary maintenance and also result in unavoidable conflicts with the Power Generation Facility Owner.

For instance, for an additional power generation of 600 MW, BEWAG Netz GmbH shall invest around 71 million Euro. The requirements include additional 110-kV-cables and new substations for the connection of the new wind projects, with a direct connection to the 380-kV-transmission network of APG (Austrian TSO).

Regarding the first wind turbines connections that are finalized in 2011 and with the new physical limit capacity of 1000 MW until around 2014, this sets a challenge to the engineers that need to plan in an strategically and efficient manner the enlargement of the power grid.

Another fact to be considered is that the construction of more than 200 wind turbines, with an estimated height that in many cases overpass the 200 meters, has not presented any environmental or nature problematic until date. However, the construction of 110-kV overheads, with a maximal height of 30 meter, has raised numerous environmental concerns among the same region. As a consequence of these concerns, a total length of 70 km cable of 110 kV has to be deployed instead, with its extreme increased cost compared to an average overhead connection.

Indeed the settlement of these costs, including the related interest rate, constitutes at the moment the major problem for distribution system operators as well as for investors. While on one hand the generators conditions are regulated under the Green Electricity Act-2012, on the other hand the investment cost executed by the DSO and its return time on grid investment is unclear.

REGULATORY FRAMEWORK

The Green Electricity Act-2012 regulates in conjunction with the minimal feed-in tariffs the conditions for the development of the Austrian renewable generation. The costs for the subsidiaries of the green energy are in principle socialized among all Austrian grid customers. Therefore the DSOs acquire the role of charging the mentioned subsidies through a “green electricity fee”, designated to cover the expected RES connections usage costs. The required power grid development has to be financed through a different way.

More than ten years ago the majority of the efforts were redirected towards the development of the electricity market and no one saw this green electricity “boom” coming. As a consequence of this liberalization process, the structure of the national grid tariffs is defined in the EIWOG 2010 (Austria Federal Act providing new rules on the organization of the electricity sector since 1998) and in the SNE-VO 2012 (Order of the E-Control commission on the calculation of charges for use of the grid). However these norms do not consider the participation of the generator side on the grids costs with the exception of the direct costs for the grid connection.

When in a grid area the generated power exceeds the demand and thus derivate into determined costs in the grid elements, it is necessary to examine further the implication on the present tariff systematic. The consumer in a grid area with a higher amount of RES installed faces an extra expense due to an increased charge for network usage, compared to customer in an area with fewer RES installed.

An additional aspect to consider is that the grid operator cannot usually freely decide to allocate the additional costs on the cost basis for the grid tariffs. As natural monopolist the DSO is subjected to the tariff regulation and during a defined regulation period this tariff will be determined in accordance with a yearly “Regulation formula” provided by the regulator (Energy Control Austria). The regulation formula is calculated using complex mathematical algorithms for a defined regulation period (at the moment four years). This formula establishes the permitted costs to be incurred by each system operator in the following year, in relation with the costs carried out in the previous year. This leads to a two-years-delayed regulated system. Therefore the system operators must self finance in advance, at least during these two years. When these additional RES grid costs are not considered in the algorithms, this costs need to be carried out by the affected DSO in the whole regulation period. The grid operator has two possibilities. One is to reduce other costs. However, these cost reduction will lead in a mid-time period to a detriment of the power quality supply. The other possibility is to obtain a negative result regarding the regulation period. These negative results will derivate in a mid- and/or long period in unavoidable bankrupt.

INVESTMENT FACTOR

The present regulation system in Austria considers certainly an investment factor, which is adequate to cover at least the CAPEX of the grid installation investment within the actual regulation period. Since the current regulation period is applicable until the end of 2013 and hence this investment factor is two years delayed, as mentioned in the previous section, this regulation period of time is too short timed for the fort coming requirements. Currently a further regulation system is under negotiation; however this regulation has not been to date agreed.

In the current regulation regime, Benchmarking is playing the main role, comparing the different DSOs and evaluating which grid operator performs its electricity supply business with the minimal specific costs. A grid operator with a large amount of RES integration has additional costs, in comparison with those that have less renewable integration in its grid. If this additional RES integration costs are not fully considered in the benchmarking model, as a result, this grid operator with a large RES integration appears to be less efficient that those without green energy integration, being punished with a lower efficient factor.

CONCLUSIONS

As it is shown in this paper, the financial part of the integration of renewable energy, related to the real effect of the massive RES construction on the power grid, is still a complicated question:

Multiple systems must be taken into consideration in this global energy analysis. In this paper has been presented how several methods, that would promote the investment in green energy in certain sectors, have at the same time unexpected negative effects in other sectors. The unequal distributed effects of this Green Electricity-Act 2012 mentioned in this paper are just a few of the numerous possible detriment effects in certain industries sector. These effects need to be further discussed and analyzed, in a regional, national and political level, in order to carry out an adequate and efficient renewable energy development in the future.