Comparison of transmission and distribution systems in the Czech Republic and Spain

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1. Brief introduction

Electric power transmission, a process in the delivery of electricity to consumers, is the bulk transfer of electrical power. Typically, power transmission occurs between the power plant and a substation near a populated area. Electricity is then distributed from the substation to the consumers.
Due to the large amount of power involved, transmission normally takes place at high voltage (1150 kV, 750kV, 420 kV, 220 kV and 110 kV). Electricity is usually transmitted over long distances through overhead power transmission lines.
This paper will discuss Czech and Spanish electrical energy systems. The transmission networks of both countries are explained in the full version this paper. Here are mainly introducing Czech electrical model, his topology, energy composition. At the end are discuses the stability problem and structure energy sources.

Key words:

Transmission network, distribution network, UCTE, delivery company

2. The Transmission company

The CEPS s.o. (Czech Transmission company state organization) transmission system is part of the Czech power supply system, which links major entities operating within the power supply system. The majority of cross-border exchanges are carried out across this system. The CEPS transmission system comprises 38 substations of 420 kV and 245 kV located at 30 transformer stations, along with 2 900 km of 400 kV lines and 1 440 km of 220 kV lines. Two 123 kV substations and 105 route kilometers of 110 kV lines are also included in the transmission system.
The CEPS is responsible for electricity transfer, transmission system operation, maintenance and development, and real-time dispatch in the Czech power supply system. As a system service it further develops and tests a Defense Plan (to prevent failure spreading) and a Restoration Plan (to restore the power supply after major system failures). It provides technical management of system services such as power-frequency control and voltage and reactive power control, and is responsible for availability and efficient use of power reserves.

Tab. 1 Technical information CEPS

CEPS s.o.	Unit	Year 2006
Maximum download	MW	18 626
Longitude on VHVL	km	12 500
Transformers station	Piece	170

Tab. 2 Technical information Red Eletrical

Red Eletrical Inc.	Unit	Year 2006
Maximum download	MW	55 400
Longitude on VHVL	km	33 000
Transformers station	Piece	2 905

3. The distribution company

The CEZ distribution Inc., holds a license for distribution electricity and operator distributive system for nine territories. They are shown on fig. 1.
The competing company CEZ Distribution Inc. repairs fiduciary assets (technology and related arrangement distributive system) and achievement proprietary law above those assets, including reservation care of consumer from look distribution on all suspense levels of and drive system in real-time.
The E.ON Distribution Inc., is another company involved in distribution networks. This company is located in the southern part of the Czech Republic.
The PRE Distribution Inc. is the final company that handles distribution networks. This company is responsible for only the city of Prague (Praha) is not smallest company.

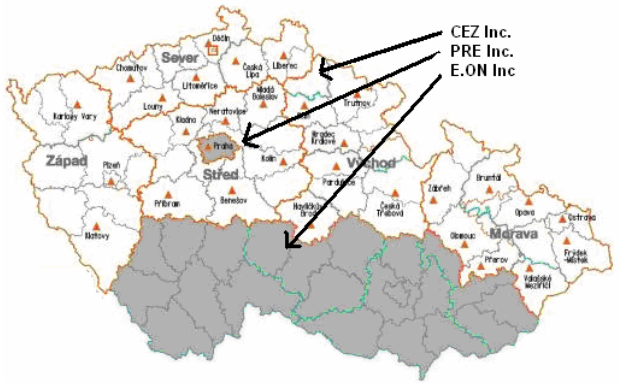

Fig. 1 Czech distribution company- operating area

ENDESA is the main company in the Spanish electricity system. ENDESA's electricity transport and distribution lines at the end of the fiscal year 2004 totaled 295,654 Km., of which 23% corresponded to underground lines.
The UNION FENOSA, S.A. was set up by a public document on 10 February 1912, under the name Unión Eléctrica Madrileña, S.A. On 16 October 2001, it changed its name to UNION FENOSA, S.A., and is a registered office of the Company.
The main aims of the *IBERDROLA Generation Area*, one of Europe's leading electricity companies and the largest Spanish company in terms of installed power, are to develop, operate and maintain all types of electrical energy generation installations.

4. Comparison of the network

The transmission networks in both countries are similar. Both networks consist of the same voltage level, 400 kV to 110 kV, the same frequency, 50 Hz, similar network topology, and similar connections with neighboring countries. Additionally, the transmission networks utilize identical power sources, similar transmission line towers, the same materials for overhead lines and cables, and both countries are connected to the UCTE grid.
The Czech energy system is momentarily experiencing overuse of its transmission grid, but the grid is expected to achieve sufficient capacity within a few years. The Czech transmission grid has good topology, as the grid consists of two circuit network which are connected at two points.
The Spanish energetic system needs something like Dlouhé Stráně in Czech Republic for better regulation energy.
The Dlouhé Stráně Hydroelectric Power Station is situated in Moravia in the Czech Republic. It prides itself on three superlatives: it has the largest reversing water turbine in Europe, at 325 MW; it has the largest head of all power stations in the Czech Republic, at 510.7 m; and it has the largest installed capacity in the Czech Republic, at 2 x 325 MW. The administration building and the control room are situated on the surface, along with the outgoing lines with a 400 kV encased switching station, workshops and warehouses, garages, a sewage treatment station and a water treatment station.

5. Conclusions

In a few years, both countries can expect problems maintaining stable energetic systems because the use of wind energy has rapidly increased. The energy system is likely to have problems with excess energy during periods of high winds and low energy periods of less wind. To prevent system disintegration at this time, scientists must develop new technology to connect wind and solar energy to the energetic grid. At this time, only three options exist for preventing this situation. The first is reversing turbine for fast regulation. The second option is to use capacitors or batteries to store energy at wind power station fields. Finally, the third option is to create special semiconductor technology for use in controlling network stability.
As following Figure illustrates, coal is the main source of power in the Czech Republic.

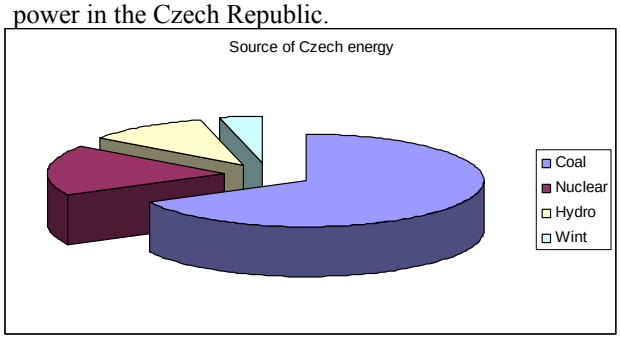

Fig. 2 Source of Czech energy
In Spain fig. are coal, nuclear, and hydroelectric power are the major sources of power and contribute the same percentage of energy.

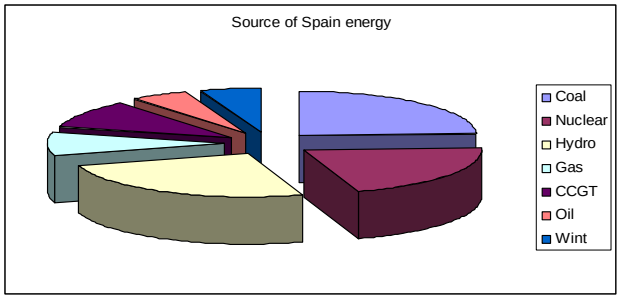

Fig. 3 Source of Spain energy
Though the Spanish system is (reason why it's better- more diversified, more sustainable), this energetic system should consider incorporating more hydropower plants with reversing turbines for saving energy for use during peak times in the daily-load curve. Spain contains many hills and water supplies that would allow for the construction of these power stations.

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