



MINISTERUL ENERGIEI



ROMANIA'S POWER STRATEGY – ROLE OF COAL

The development of the power sector in terms of sustainability must be seen as an important part of Romania's development process.

The power sector is divided into two components - energy resources and power units.

Energy resources

In 2017, primary energy resources of 34.291,4 thousand toe, out of which 21.303,5 thousand toe from domestic production and 12.987,9 thousand toe from import, have the following structure:

- Coal: 5.164,7 thousand toe (4.654,6 domestic production and 510,1 import) - 15% of the mix
- Crude oil: 11.175,9 thousand toe (3.421,7 domestic production and 7.754,2 import) – 32,6% of the mix
- Natural gas: 9.282,1 thousand toe (8.337,7 domestic production and 944,4 import) - 27% of the mix
- Hydro-, nuclear-, solar-, wind-, other sources: 5,203,8 thousand toe (4.889,5 domestic production and 314,3 import) - 15.2% of the mix
- Petroleum products: 2.985,8 thousand toe, import - 8.7% of the mix.

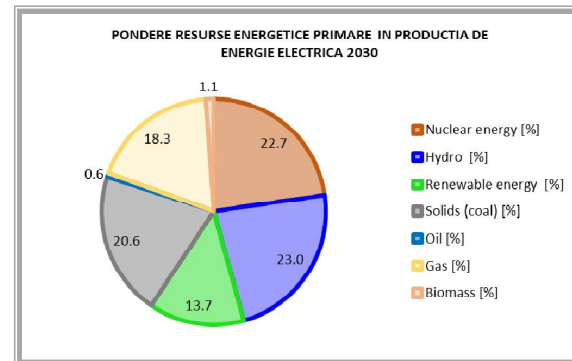
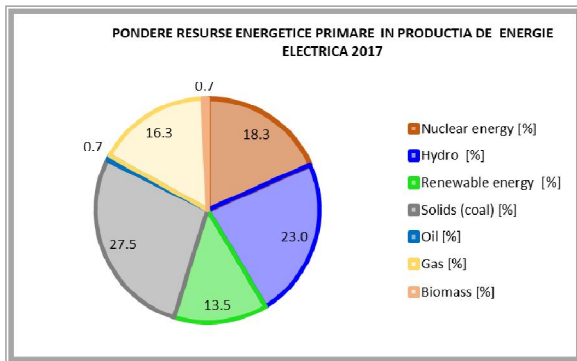
Coal is the primary energy resource in the energy mix, being a strategic fuel in supporting national and regional power security. In extreme weather conditions, coal is the basis for the resilience of the power supply and of the proper operation of the National Power Grid (NPG), covering one third of the electricity demand.

Lignite: Lignite resources in Romania, mainly located in Oltenia mining area, are estimated at 690 million tons (124 million toe), out of which 290 million tons (52 million toe) are exploitable in the concession perimeters. At an average resource consumption of 4.5 million toe / year, the lignite resource will be provided for the next 28 years, if consumption will remain constant over the next 25 years, and no other deposits will be exploited. The average calorific value of the lignite exploited in Romania is 1800 kcal / kg.

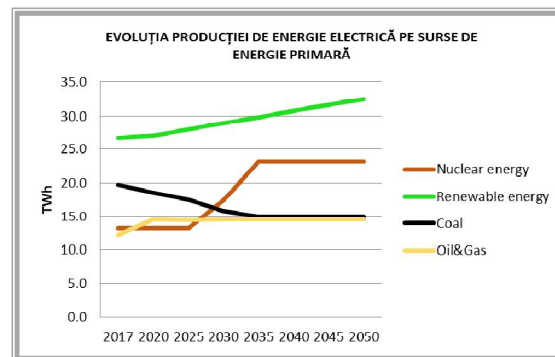
Hard coal: Romania's hard coal resources exploited in the Jiu Valley area are of 232 million tons (85 million toe), of which 83 million tons (30 million toe) exploitable in the concession perimeters. At an average consumption of 0,3 million toe / year, the hard coal will be provided over the next 104 years, but the exploitation of this primary energy resource is subject to exploitation feasibility. The average calorific value of the Romanian hard coal is 3650 kcal / kg.

Having such energy resources, Romania has created a balanced and diversified mix of primary energy resources for electricity generation.

In 2017, the share of primary energy resources in electricity generation had the following structure: coal-based electricity (lignite and hard coal) 27,5% (17,3 TWh); electricity generated in hydropower plants 23% (14,4 TWh); electricity generated in nuclear power plants 18,3% (11,5 TWh); electricity generated from hydrocarbons (oil and gas) 17% (10,7TWh); electricity generated from wind and photovoltaic installations 13,5% (8,5 TWh), electricity produced from biomass 0.7% (0.4 TWh). Summing up renewable energy sources, their share in the structure of electricity generation in 2017 was 37,2% (23.4 TWh) followed by coal - 27.5% (17.3 TWh).



Structure of primary energy mix in 2017 and 2030

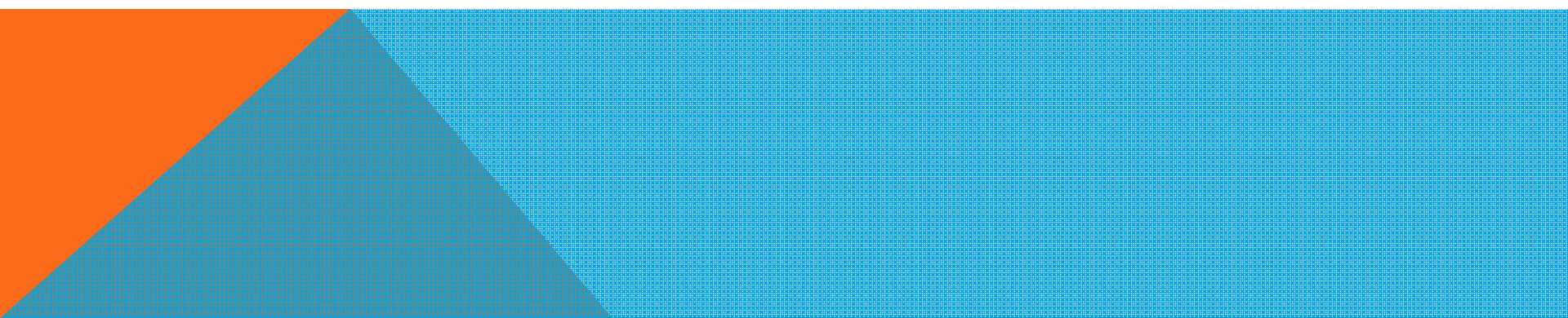


For 2030, in the context of assuming climate change obligations, the modeling results show an increase in the share of energy from nuclear sources to 23,2 TWh; an increase to 29 TWh will be recorded for total renewable sources, accounting for a 37,9% share of the total primary energy sources that will form the energy mix in 2030. Coal-based electricity will decrease slightly to 15,8 TWh and will have a share of 20,6% while electricity generation based on hydrocarbons will increase to approx. 14,5 TWh year (1,9% share).

Thus, coal, lignite and hard coal production in Romania depends directly on the national demand for primary energy resources in the electricity sector, and on the resources / reserves available in Romania. The role of coal in the electricity mix will depend on the competitiveness of the raw material price with direct influence on the price of energy generated from this primary energy resource.

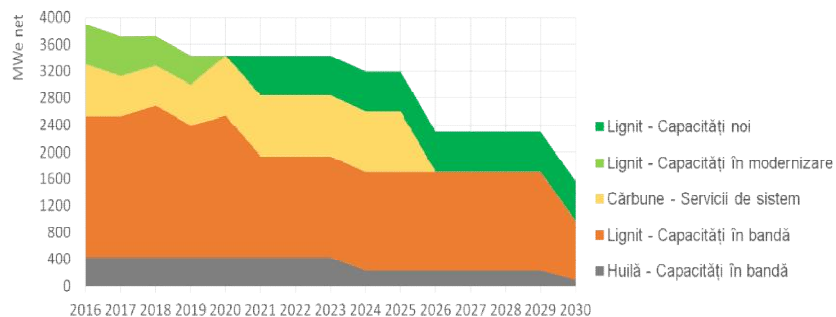
Exploitation of lignite used in power industry is mainly carried out in Oltenia mining area, in 15 mining perimeters. With the existing installed production capacities, it can be achieved a flexible lignite production between 20 and 30 million tons / year. Annual lignite production dropped from 31,6 million tons in 2012 to 22,1 million t in 2015, respectively 22,5 mil.t in 2017.

The quantity of hard coal necessary for electricity generation is partly provided from the 4 mines and from import, until the transfer of the non-feasible capacities operating on coal to another more efficient primary energy resource. Coal mines are economically uncompetitive. Hard coal production in 2017 was of 756,894 thousand tons, dropping from 1,29 million t in 2015 and from 1,87 mil t in 2012.



Coal-based power units

Currently, Romania has 3300 MW of net capacity installed and available in thermal power plants operating on coal, lignite and hard coal. Many of these power units are being rehabilitated while some of them will be withdrawn from the power grid.



Evolution of available coal –fired power units

All coal-based power units were commissioned during 1970-1990, and the oldest approach the end of their lifetime, requiring either modernization or replacement with new units. The competitiveness of coal in the electricity mix depends on: (1) the performance of each power unit; (2) the cost of coal; (3) the price of EU ETS emission allowances.

Following an extensive process of restructuring the power sector, currently, Romania has two major coal-based electricity producers, Oltenia Energy Complex - the lignite-based integrated energy company and Hunedoara Energy Complex – a hard coal-based integrated company.

In order to keep its place in the electricity mix, Oltenia Energy Complex mainly tracks the lignite cost, the super-critical parameters, high efficiency, operating flexibility and specific lowered GHG emissions in its power capacities

Price projections for electricity and ETS allowances indicate that lignite's competitiveness in the electricity mix will remain at a level similar to the current one, at least until 2030. After 2030, lignite competitiveness is difficult to assess for old power units, depending on the materialization of new projects. The role of lignite is important in providing the adequacy of NPG in stressful situations such as extended periods of drought or severe frost - aspects discussed in the stress test analysis.

In the long term, the role of lignite in the energy mix can be kept by developing new capacities, provided with CO2 capture, transport and geological storage (CCS) technology.

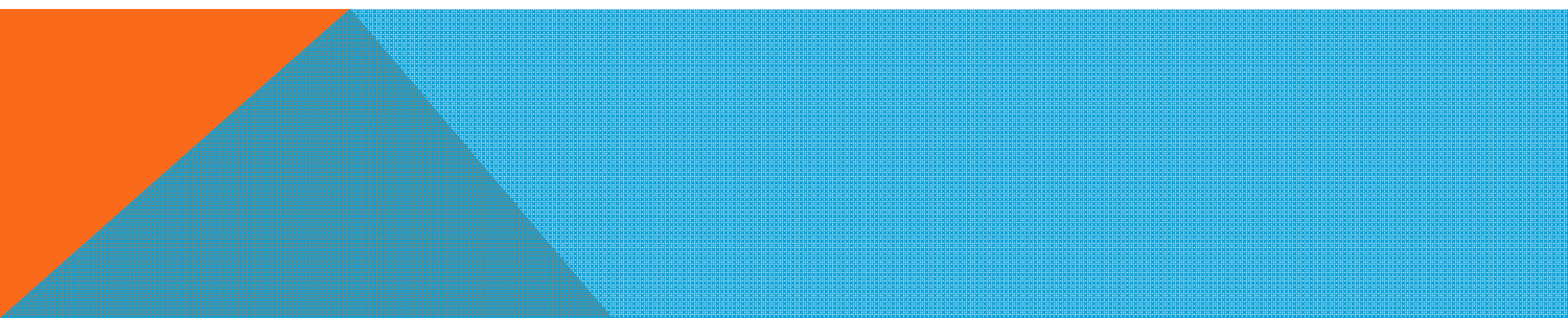
Within Hunedoara Energy Complex, only two recently modernized units are in operation. An impediment is also the fact that the exploitation of hard coal resources in Romania is not feasible, which makes it impossible to build new units instead of those withdrawn as there are no justified investments that would use imported coal. Even the lifetime of existing units will depend on the extent to which they manage to stay competitive in the electricity mix and to meet the environmental obligations.

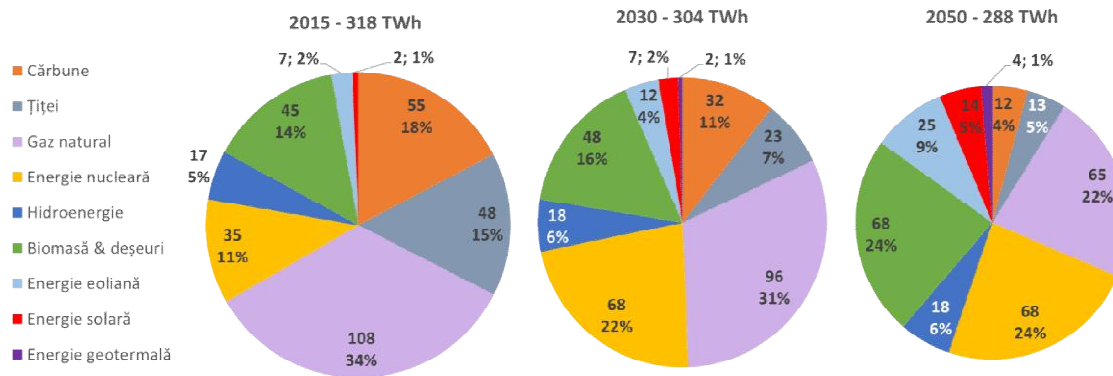
Romania has as a strategic objective the maintenance of a balanced and diversified electricity mix, in which all types of primary energy sources available in Romania can be found at competitive costs. For reasons of power security, the strategy defines the place of traditional fuels in the mix - hydro-energy, nuclear energy, coal and natural gas.

Consequently, the relative role of coal in the electricity mix after 2025 will depend on the price of ETS emission allowances. Current projections show a sustained increase in the cost of emissions to 40 € / ton of CO₂ equivalent, in 2030, to facilitate achieving the decarbonisation targets. At this ETS price, natural gas becomes competitive in the mix compared to the lignite, at a price level of 19 € / MWh. If the ETS price remains lower than currently estimated, it is possible to maintain the lignite in the electricity mix, as it is unlikely that the long-term natural gas price will remain below 15 € / MWh.

The evolution of the Romanian energy sector in the horizon of 2050: Development trends go for: the increase the sustainable role of biomass in the energy mix, increasing the share of renewable energies in the electricity mix and using CCS technologies.

Between 2030 and 2050, coal demand is estimated to decrease by about 28 TWh. In 2050, coal could cover only 4% of primary energy demand, down from 10% in 2030.





The evolution of primary energy generation in Romania divided on energy source

In the context of the Platform's objectives, Romania is pursuing a distinct approach for the two coal regions. Thus, for Jiu Valley region, we want mainly economic development alternatives in the area, given that the exploitation of the coal resources has been in a major decline for more than 20 years.. The decline of the mining activity in Jiu Valley during 1997-2017, may be quantified by:

- ❖ reduction of mining perimeters in operation: from 16 mining perimeters of 163,35 km² to 4 mining perimeters of 22,3 km².
- ❖ Decrease in coal production from 5,76 million t to 0,75 million t.
- ❖ Decrease of employees number from 46915 to 4058.

On the other hand, given the long tradition of the area as well as human capital, we want to implement a project that meets the requirements of the future: methane capture.

For Oltenia region, we want to implement projects to achieve the decarbonisation targets of this power sector, and possibilities of higher exploitation of lignite resources.

THANK YOU!

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