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# Coal in the Romanian NECP

*Will 2GW be retired this year and a new unit built at the same time?*

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## Executive summary

National Energy and Climate Plans (NECP) are tools created under the revised governance of Energy Union rules which support European Union member states to plan their climate and energy sectors. They are made for a period of ten years, replacing a series of plans made regularly, and need to be finalised by the end of the year.

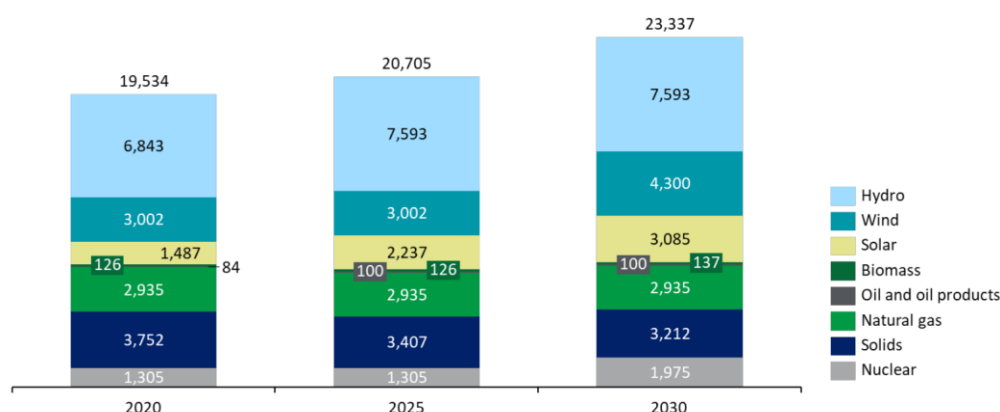
Romania was among the countries which managed to submit its draft NECP before the deadline at the end of 2018. This came at a cost – a very limited period for consultations (only ten days), a fact which was signalled by most interested stakeholders. The document raised a series of concerns, the central one being the very unambitious target for renewable energy in final energy consumption of only 27.9%.

Ambiguity is one of the main problems of the Romanian NECP. A striking example of this is that it already anticipates that the installed coal capacity in 2020 will be 3.7GW, which is 2.2 GW less than what is currently available in the system. This decrease is not explained anywhere in the plan, nor did the Ministry for Energy or any operator announce any unit retirements by the end of the year. Furthermore, it is expected that until 2030 only an additional 540MW of coal capacity will disappear.

This slow decrease of coal capacity is inexplicable, given that the average coal unit in Romania is 42 years old, thus most can no longer operate economically. A possible

explanation is the fact that calculations for the NECP are based on the National Energy Strategy, which prioritizes building a new 600MW unit on the site of the existing Rovinari power plant. In the final part of this briefing, co-authored by Zoltán Szabó and Csaba Vaszkó, we show that if this unit were built, it would hardly (if ever) be economic. Fuel, CO2 and limestone costs will eat up 82% of the total revenue, leaving little room to cover the other costs – salaries, operation etc. – not to mention making a profit.

## Outlook of coal capacity in the NECP



*Indicative trajectory of installed capacity, by sources, MW. NECP, p. 65*

The low renewables target is not the only surprising element of the NECP. The evolution of coal capacity is also surprising. According to a graph on page 65, installed capacity will decrease from 3752 MW in 2020 to 3212 MW in 2030. This is unexpected for two reasons:

- *A sudden decrease should take place in 2019.* According to Transelectrica, the Romanian electricity transport system operator, the total installed coal capacity available in Romania on 01.02.2019 is 5915 MW, over 2 GW more than what is estimated in the NECP for 2020 – 3752 MW. Although there are some units which have not functioned for the past years, their combined power is under 1.3 GW, which means that some units will have to be retired. However, *the Ministry for Energy, Transelectrica or power plant operators did not announce any retirements scheduled for 2019 (or at any time in the future).* In this chapter, we analyse the status of coal units in Romania, in order to see which units are most likely to be shut down this year. Otherwise, the document submitted by the Romanian Ministry for Energy to the European Commission does not have a factual basis.
- *Only 540 MW will be retired for a decade after 2020.* The coal-fired installed capacity falls only slightly until 2030, as the graph below shows. This is a questionable assessment, for a series of reasons:
  1. *Age.* The average coal unit in Romania is today 42 years old, their age varying between 32 and 52 years. This means that the average age will reach 53 years in 2030, way past the estimated economic viability of coal power plants, which is approximately 40 years. Retiring such a small number of units during the next decade would only be possible with major investments in modernization – yet most companies can barely cover operation costs.

2. *Climate goals.* The latest IPCC report<sup>1</sup> shows once again that climate action is now more urgent than ever. Limiting global warming to 1.5°C will be possible only if energy systems are radically transformed in order to reach zero emissions by 2050. Romania seems to take no concrete steps towards this goal by maintaining its reliance on coal for electricity almost unchanged.
3. *New BATs.* The new Best Available Techniques (BAT) Conclusions, adopted in July 2017 and coming into effect four years later<sup>2</sup>, impose stricter limits on large combustion plants for emissions of several substances – among them SO<sub>2</sub>, NO<sub>x</sub> and dust. As we will show below, many units in Romania are not able to meet the existing limits, despite benefitting from several derogations. As mentioned before, this is in large part because their operators cannot afford the necessary investments<sup>3</sup>. As a result, Romania finds itself in breach of European legislation. In 2017, the European Commission sent the country a letter of formal notice because four plants were functioning without a permit<sup>4</sup>. In fact, permitting these units was not possible, since they were lacking the pollution abatement technologies. In 2018, another letter was sent to Romania because sulphur dioxide and dust emissions from Govora 2 and Deva 2 coal units “have pushed Romania's emissions significantly over the national ceilings”<sup>5</sup>. No power plants in Romania applied for a derogation from the new IED limits yet.

The most likely explanation for this insignificant decrease in installed coal capacity comes from the fact that estimations in the NECP are based on the National Energy Strategy, which was published in 2018 by the Ministry for Energy. The document identifies 4 priority projects – among them, a 600 MW lignite-fired unit on the site of the existing Rovinari power plant. In an analysis on its economic feasibility in the next chapter, we show that given its high operation costs, building this unit doesn't make sense.

## Future of coal units in Romania

The table below is based on data from Transelectrica, the Romanian electricity transport system operator. As the last column shows, many units in Romania still benefit until 2020 from derogations from emission limits for different substances under the Transitional National Plan. This allows units to follow the emission limit values which were applicable to them on 31.12.2015 – higher than those in the Industrial Emission Directive – as long as the total national emissions decrease from one year to another, under a certain ceiling (e.g. from 9496t in 2016 to 3960t in 2019 for SO<sub>2</sub>). Some units benefitted from other derogations as well – e.g. through Romania's Accession Treaty or by opting out from the Large Combustion Plant Directive – but those have expired.

Almost all coal power plants in Romania are state-owned, with the exception of Bacau (operated by Thermoenergy) and Iasi (Veolia). Govora is owned by Vâlcea County and the rest are companies where the majority stakeholder is the Ministry for Energy: Drobeta was operated by RAAN; Craiova, Işalniţa, Turceni and Rovinari are managed by Oltenia Energy Complex; and Minitia (Deva) and Paroşeni by Hunedoara Energy Complex. The last two companies also operate lignite and hard coal mines, respectively.

1 <https://www.ipcc.ch/sr15/>

2 [http://ec.europa.eu/environment/pdf/31\\_07\\_2017\\_news\\_en.pdf](http://ec.europa.eu/environment/pdf/31_07_2017_news_en.pdf)

3 Oltenia Energy Complex, the main operator of four lignite power plants, claims to have spent EUR 1 billion on pollution reduction measures alone since 2010: <https://www.focus-energetic.ro/cheltuielile-de-mediu-la-ce-oltenia-au-depasit-15-miliarde-de-euro-56259.html>

4 [http://europa.eu/rapid/press-release\\_MEMO-17-1936\\_en.htm](http://europa.eu/rapid/press-release_MEMO-17-1936_en.htm)

5 [http://europa.eu/rapid/press-release\\_MEMO-18-4486\\_en.htm](http://europa.eu/rapid/press-release_MEMO-18-4486_en.htm)

Name	Capacity (MW)	Comments	Derogation / pollutant / valid until
BACAU	60	In conservation	
IASI	60		SO <sub>2</sub> , NO <sub>x</sub> - 30.06.2020
CRAIOVA 1	150		NO <sub>x</sub> - 30.06.2020
CRAIOVA 2	150		NO <sub>x</sub> - 30.06.2020
ISALNITA 7	315		NO <sub>x</sub> - 30.06.2020
ISALNITA 8	315		NO <sub>x</sub> - 30.06.2020
ROVINARI 3	330		NO <sub>x</sub> - 30.06.2020
ROVINARI 4	330		NO <sub>x</sub> - 30.06.2020
ROVINARI 5	330	In modernization	
ROVINARI 6	330		
TURCENI 1	330		
TURCENI 3	330		NO <sub>x</sub> - 30.06.2020
TURCENI 4	330		NO <sub>x</sub> - 30.06.2020
TURCENI 5	330		
TURCENI 6	330		
TURCENI 7	330		
GOVORA 3	50	No IED Permit	SO <sub>2</sub> , NO <sub>x</sub> , PM - 30.06.2020
GOVORA 4	50	No IED Permit	SO <sub>2</sub> , NO <sub>x</sub> , PM - 30.06.2020
DROBETA 1	60	Bankrupt	
DROBETA 4	60	Bankrupt	
DROBETA 5	60	Bankrupt	
DROBETA 6	60	Bankrupt	
PAROSANI	150	No IED Permit	
MINTIA 2	210	No IED Permit	
MINTIA 3	235	No IED Permit	SO <sub>2</sub> , NO <sub>x</sub> , PM - 30.06.2020
MINTIA 4	210	No IED Permit	SO <sub>2</sub> , NO <sub>x</sub> , PM - 30.06.2020
MINTIA 5	210	No IED Permit	SO <sub>2</sub> , NO <sub>x</sub> , PM - 30.06.2020
MINTIA 6	210	No IED Permit	SO <sub>2</sub> , NO <sub>x</sub> , PM - 30.06.2020
TOTAL			

*Installed coal capacity, 01.02.2019. Source: Transelectrica <sup>6</sup>*

The colour of the columns is based on their chances to function after 2021: the units in red have not been in operation for the past years, the ones in yellow are operational today, but in order to meet current or 2021 BATs they require modernizations which they might not afford, and the units in green are likely to meet 2021 requirements. Below, we assess each unit individually.

<sup>6</sup> <http://transelectrica.ro/web/tel/productie>

## Not in operation

**Bacău.** The lignite unit in Bacău has been used in the past for district heating – today, the city of Bacău relies on a gas unit for that purpose. Despite the fact that the coal unit has been in conservation for years, the company does not plan to dismantle it “until a local/national strategy to clarify its situation will be published”, according to a communication from 2017.

**Turceni 1 & 6.** Unlike the other units functioning on the site, Turceni units 1 and 6 were not modernized during the past two decades. A wet flue gas desulphurization unit was built for unit 6, but since the installation required even more costly investments in order to be efficient, the company decided to instead connect unit 7 to the desulphurization and dismantle unit 6 in 2016<sup>7</sup>. Turceni’s operator has been announcing since 2016 that it will dismantle unit 1 as well – repeating the announcement in 2018<sup>8</sup> – but this did not happen yet.

**Drobeta.** The company operating the power plant has been bankrupt since 2015. Since 2016, the municipality rents two boilers every year for district heating<sup>9</sup>, and plans to build a gas unit as a long term solution. Electricity is no longer produced.

## Uncertain

**Işalnița.** Although Oltenia Energy Complex (OEC) invested in both Işalnița units in order to meet emission requirements, their future is uncertain as they are the oldest functioning lignite units in Romania, functioning for over 300 000 hours each since 1967. Furthermore, in order to meet the 2021 BATs, OEC prioritizes investments in other power plants it operates – particularly Rovinari and Turceni. In 2016 the company announced that unit 8 will be closed by 2019<sup>10</sup>, but in 2017 and 2018 this was changed to “the power plant will especially use unit 7”.

**Craiova.** These are OEC’s newest units, operational since 1987 and 1989 respectively. As a consequence, there were no investments made for rehabilitation. Modernizations will become necessary as the units have over 150 000 hours of functioning and 30 years of age. Additional measures to reduce emissions will also be needed to meet the new BATs, which would increase total costs. As in the case of Işalnița, based on this OEC might choose to instead focus on Rovinari and Turceni, which are more efficient. A potential advantage for this power plant is the fact that it provides district heating for Craiova, one of Romania’s biggest cities and an important industrial centres, which makes us anticipate that at least one unit here will remain open, or at least converted to natural gas if necessary.

**Rovinari 5.** The unit was shut down in February 2015 for rehabilitation, in order to increase efficiency and meet emission requirements. The modernization was supposed to be finished in 24-30 months, but it incurred several delays. As of February 2019, the project was 45% completed and delayed once more<sup>11</sup>. Given the fact that OEC was heavily affected by the price increase of ETS certificates in 2018 and that it needs to upgrade several other units by 2021, it remains uncertain whether this investment will ever be concluded.

**Govora 3.** There are currently three large combustion installations (LCI) functioning on the site of the Govora power plant. One of them was converted to natural gas, one of them was modernised to continue functioning on coal (see below), and the last one – Govora 3<sup>12</sup> - was not upgraded in recent history and has record emissions. In fact, together with Mintia 2, it managed to break the TNP ceiling for SO<sub>2</sub> and dust, emitting more than all installations included

7 <http://ceoltenia.ro/documente/AGEA/Sedinta%20AGEA%2011.07.2016/Anexa%206%20la%20AGEA%2011.07.2016.pdf>

8 <http://ceoltenia.ro/documente/AGEA/Sedinta%20AGEA%2015.03.2018/Anexa%204.pdf>

9 <https://www.mediafax.ro/social/reportaj-frig-in-casele-scolile-si-spitalele-din-drobeta-turmu-severin-autoritatile-se-contrazic-pe-tema-furnizarii-caldurii-15822546>

10 <http://ceoltenia.ro/documente/AGEA/Sedinta%20AGEA%2011.07.2016/Anexa%206%20la%20AGEA%2011.07.2016.pdf>

11 [https://www.pandurul.ro/articol/modernizarea-grupului-5-rovinari-intarziata\\_111286.html](https://www.pandurul.ro/articol/modernizarea-grupului-5-rovinari-intarziata_111286.html)

12 The names for Govora units might be confusing: Transelectrica refers to the coal units as 3 and 4, based on the number of the smoke stacks. This corresponds to what the Commission mentions as LCIs 2 and 3. LCI 1 is the unit converted to natural gas.

in the plan. As there are no plans to modernise Govora 3 and its operator can rely on two other units to continue production, this will almost certainly be the first installation at this power plant to be retired.

*Mintia.* Unit 2 is the only installation of this power plant which is not benefitting from derogations from IED limits through the Transitional National Plan. This is because it opted out from the Large Combustion Plant Directive – with the condition to function maximum 20 000 hours until 31.12.2015. This, however, did not happen. According to its latest Annual Environment Report, this unit functioned 1 270 hours in 2017 alone, in clear breach of the directive<sup>13</sup>. No reasonable explanation is provided for this – further down the report, it is mentioned that “for unit 2, Hunedoara Energy Complex did not make a decision regarding its final withdrawal from exploitation before the insolvency procedure was initiated (...) unit 2 was started in July 2017 for tests”.

The other Mintia units have not been modernised. The National Energy Strategy, too, mentions that with the exception of unit 3, the rest will be retired<sup>14</sup>. The national natural gas company Romgaz also announced the intention to build a gas unit on the site of the Mintia power plant in the near future<sup>15</sup>.

*Paroşeni.* Along with the other Hunedoara Energy Complex-operated power plant, Mintia, Paroşeni too is functioning illegally at the moment, as it lacks an IED permit. The company is in a very poor economic situation, also administering four unprofitable hard coal mines. After many delays, things started to look up for Paroşeni last year, when an EUR 65 million investment to reduce SO<sub>2</sub> emissions was concluded<sup>16</sup>. It is not clear whether the other BAT 2021 emission limit values will be met – the unit does not have SNCR.

## Safe in 2020

*Iaşi.* The relatively small power plant in Iaşi is operated by Veolia, the French utilities transnational company. The unit is quite old and the company might decide to begin using natural gas instead. However, unlike the other power plants previously mentioned, the fact that Iaşi has a valid IED permit and was modernized to reduce pollution constitutes an advantage. The power plant also delivers heating for Iaşi, Romania’s fourth most populous city, and as a result receives a cogeneration bonus which totaled RON 27 million (approx. EUR 6 million) in 2017 alone<sup>17</sup>.

*Rovinari units 3, 4 & 6.* This power plant is the most efficient one, among those operated by Oltenia Energy Complex, as it is built between lignite mines, and the fuel is delivered on transport belts directly to the plant – thus transport costs are greatly reduced. However, all OEC mines need to be expanded in order to continue production, and mining machinery is in dire need of modernization – so costs are expected to increase. The company intends to invest in these units in order to meet the new BATs, and its environment permit, which expired on 31.12.2017, was renewed on 25.05.2018, therefore it functioned illegally for almost 10 months last year.

*Turceni units 3, 4, 5 & 7.* Unit 7 at Turceni power plant opted out from the Large Combustion Plant Directive – with the condition to function maximum 20 000 hours until 31.12.2015. This, however, did not happen. Instead, the unit was operated illegally for almost three years, until 23.11.2018, when the power plant permit was revised to include it. Since the unit benefitted from the opt out, it now needs to meet the strictest pollution limits from the BATs. According to the latest permit, it will – both units 5 and 7 were upgraded to include selective non-catalytic reduction of NO<sub>x</sub> emissions. The same is planned for the other two functioning units.

13 <http://www.anpm.ro/documents/21661/40975642/Ceh+Mintia+2017.pdf/26a8c027-c785-4f61-a4ce-4aaa50446fef>

14 [http://energie.gov.ro/wp-content/uploads/2018/11/Strategia\\_Energetica\\_FINAL\\_02\\_nov\\_2018.docx](http://energie.gov.ro/wp-content/uploads/2018/11/Strategia_Energetica_FINAL_02_nov_2018.docx), p. 44

15 <http://www.replicahd.ro/centrala-pe-gaz-la-mintia/>

16 [https://www.economica.net/termocentrala-paroseni-prima-instalatie-a-ce-hunedoara-conforma-legislatiei-europene-de-mediu-dupa-o-investitie-de-65-3-mil-euro\\_157600.html#n](https://www.economica.net/termocentrala-paroseni-prima-instalatie-a-ce-hunedoara-conforma-legislatiei-europene-de-mediu-dupa-o-investitie-de-65-3-mil-euro_157600.html#n)

17 <https://www.anre.ro/download.php?f=haeAhg%3D%3D&t=vdeyut7dlcecrLbbvby%3D>

*Govora 4.* The power plant is functioning illegally as it lacks an IED permit – but based on its request for permitting, theoretically this unit could function legally<sup>18</sup>. The document shows that several investments were made to make the unit conform to existing environment legislation – among them, a desulphurisation installation and selective non-catalytic reduction of NOx emissions.

## Analysis of the planned Rovinari 600MW unit

Romania announced in 2012 that it plans to build one coal fired unit on the site of the existing Rovinari power plant. We have, based on available information, analysed the planned 600 MW supercritical coal-fired unit's project economics based on its preliminary feasibility study data, available energy market details and strategic energy related documents.

The planned supercritical coal fired unit would have several issues that needs to be properly addressed prior to any further decision.

Based on the current short term energy market outlook, there are two fundamental issues regarding the operations of the new Rovinari unit:

- *Economics:* The project would likely have difficulties in meeting the project's debt service requirements as the organic cash flow generation would be limited and be not sufficient under current energy market prices.
- *Environmental concerns:* The environmental licensing would also face challenges as the licensing under the current European Union' legal framework would make the licensing process of a coal fired unit more complicated. Directive 2014/52/EU of the European Parliament and of the Council<sup>19</sup> has amended Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. The amended Directive aims to strenghten the quality of the environmental impact assessment procedure and to align that procedure with the principles of smart regulation and enhance coherence and synergies with other Union legislation and policies, as well as strategies and policies developed by Member States in areas of national competence. The amended Directive mentions the impact of the project on climate and the vulnerability of the project to climate change as aspects to explicite consider in the environmental impact assessment.

It is important to note that the planned Rovinari unit is already included in the country's energy strategy<sup>20</sup>, so it may receive additional support from the government. According to the national energy strategy, this project would create significant employment in its region, however the strategy does not explain the details of job creation.

In this brief analysis, we focus on the economic concerns and vulnerabilities of the planned 600MW capacity lignite-fired unit in Rovinari.

## Policy

*Romania committed to clean energy, but the local coal fired units are still supported on Country Policy level.*

Romania developed its energy strategy for the period of 2016 – 2030 with an outlook to 2050 in 2017. This strategy paper identifies several objectives, one of them being clean energy. It also discusses that the investment decision on Rovinari project, a 600 MW supercritical coal fired unit, is already made or will be made in the near future. There is a strong commitment from European countries, including United Kingdom, Netherlands, Spain, Finland, Italy,

<sup>18</sup> [http://www.anpm.ro/web/apm-valcea/documentatii-procedura-autorizare/-/asset\\_publisher/OGmk21PNWBvp/content/documentatii-procedura-autorizare](http://www.anpm.ro/web/apm-valcea/documentatii-procedura-autorizare/-/asset_publisher/OGmk21PNWBvp/content/documentatii-procedura-autorizare)

<sup>19</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN>

<sup>20</sup> <http://energie.gov.ro/transparenta-decisionala/strategia-energetica-a-romaniei-2019-2030-cu-perspectiva-anului-2050/>

Austria or Germany to reduce the use of coal as primary fuel reducing the green-house-gas emission from coal fired units. Romania operates several old stations that are significant sources of CO<sub>2</sub>. However, the country has large brown coal reserves identified as an important primary fuel of the country, therefore it remains a key subject whether the country should stop promoting coal as an efficient local primary fuel.

Officially Romania does not have a capacity mechanism notified to or approved by the European Commission. However, in 2013, before the adoption of the new Environmental and Energy State Aid Guidelines (EEAG) – which came in effect on July 1, 2014, the Romanian Government adopted Government Decree 138 which was advocated as a Capacity Mechanism and it functioned as a Capacity Mechanism but was in effect a masked state aid to coal power plants granted without public consultation and an adequacy assessment, in short – a support scheme which managed to stay under the radar of the European Commission. This government decree was later replaced by Government Decision 941/2014, and currently the Emergency Ordinance 26/2018 is in place regarding the capacity mechanism provisions in the country.

Coal fired power plants using locally produced lignite have survived the decline in energy demand due to a combination of relying on a cheap primary fuel and continued state support. Lignite is considered to be low-cost primary fuel because external costs (e.g. health) are not included in the price of lignite. As Romania became a full member of the European Union, several factors impacting the operation of these coal fired power plants changed. The evolution of European Energy markets, the introduction of the EU ETS led to a gradual erosion of the market leading positions of these power plants.

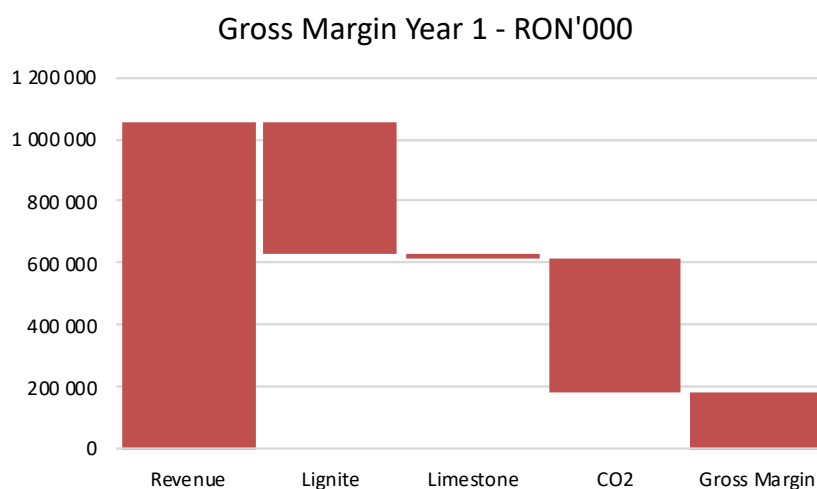
## Economics

*The economic value of the planned coal fired unit would be defined by the current and future energy market prices.*

The economic value generation potential of a power plant is determined by its revenue generation capability and the cost(s) associated with the energy generation.

In case of a coal fired unit, there are three key elements of the energy generation cost:

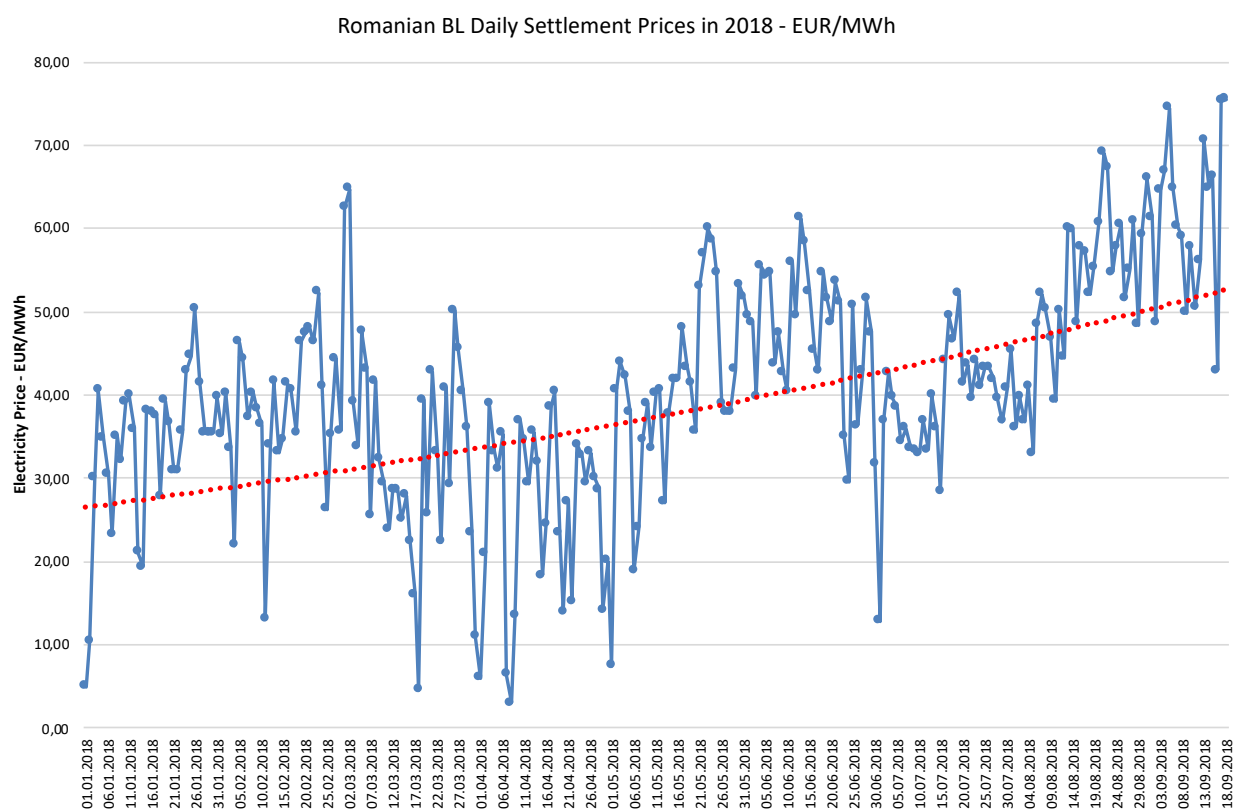
1. Cost of fuel, in this case the lignite
2. Cost of CO<sub>2</sub> associated with the energy generation
3. Cost of limestone added in order to reduce SO<sub>x</sub> emissions



In case of the Rovinari project, only the three above mentioned item would eat up 82% of the total revenue. According to our analysis, the project, even in the first year of operation would only generate RON 187M gross margin which would be, most probably, not sufficient for covering the fixed costs – salaries, operation and maintenance costs, etc. – the depreciation and the interest expenses of the project. We would like to emphasize that our analysis was based on pure market conditions, so the project would sell electricity to the liberalized market, and there will be no other sales, such as biomass based renewable sales, and would not receive any additional compensations in the form of capacity mechanism or other form.

The energy market prices in Romania are based on the Day-Ahead-Market (“DAM”) and Future prices on the OPCOM, the Romanian Power Exchange<sup>21</sup>. The evaluation of the projected financial performance of the planned units therefore shall be based on the available power sales prices. The DAM base load price levels on the OPCOM in 2018 traded below 50 EUR/MWh for most of the year.

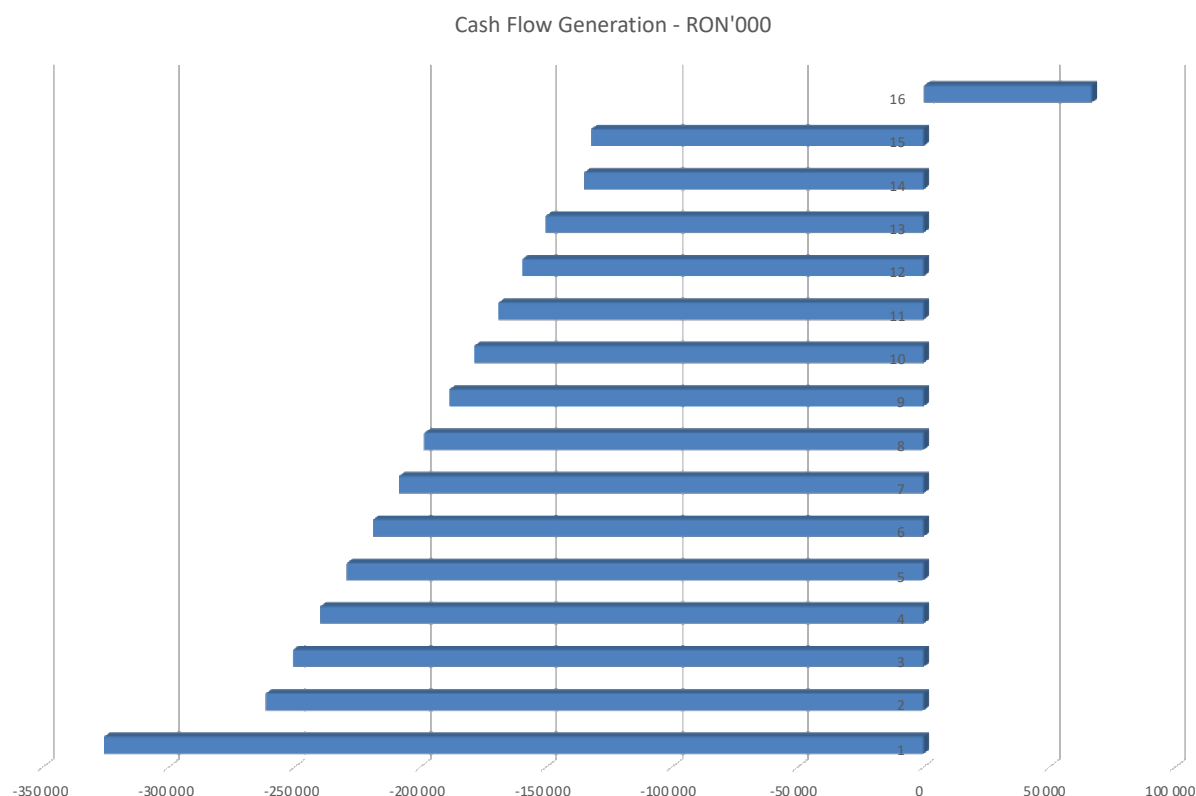
The future prices – available for 2019 and 2020 – are below 50 EUR/MWh. These market conditions provide rather challenging environment for the project. We have not calculated with any additional sales opportunity – biomass co-firing, system services, etc. – which may provide some upside in sales revenue.



The free cash flow generation potential is the key indicator in evaluating the financial viability of a power plant project. Pure market sales, or short term, market based electricity sales agreements would be the way for selling electricity from the project. Long term Power Purchase Agreement, which would provide the envisioned financial stability required by any potential financing bank is not allowed in the European Union.

<sup>21</sup> Source: Hungarian Power Exchange database, 2018, [www.hupx.h](http://www.hupx.h)

Under these circumstances the power plant would be facing very difficult financial situations from Year 1. Under a conservative operational cost structure scenario, the project would not be able to generate the required cash in order to meet its debt service obligations, and implicitly no return generation to its shareholders. It is important to emphasize that this project is already in the country's energy strategy, therefore additional supporting schemes – biomass co-firing, additional revenue stream, etc. – may be provided.



The evolution of CO<sub>2</sub> prices will be key for the viability of the project<sup>22</sup>. Coal fired units – without any CO<sub>2</sub> mitigation technology – usually are the single largest CO<sub>2</sub> emitters in any given country. This is no different in this case as well, but the old coal units, that are still operated in the country are even bigger polluters in terms greenhouse gases, particularly NO<sub>x</sub>, SO<sub>x</sub> and CO<sub>2</sub> as well as particulate.

Under the current cap-and-trade EU ETS, one of the key issue is the future cost level of EUA's on European Exchanges. We have seen a strong increase in prices over the last 15 months which would significantly reduce the financial viability of coal fired units as these operate with high CO<sub>2</sub> intensity.

<sup>22</sup> Source: TheICE, 2018, [www.theice.com](http://www.theice.com)



The current price level of EUA's corresponds to 21 EUR/MWh, which is almost 50% of the sales price the project can achieve.

## Investment cost

The power plant's construction cost corresponds to European industry standards. The planned coal fired unit would be a supercritical unit, which would operate at higher pressure and temperature values as compared to the CFB's or other conventional steam plants. It is important to note that based on the project's preliminary feasibility study, two staged flue gas cleaning system is designed in order to comply with the LCPD's required limits. There is going to be an FGD plant and as a second stage, an SNCR system would mitigate the NOx emission of the planned unit. However, there is going to be no CO<sub>2</sub> mitigating system planned for the project, which will have significant implications on its financial viability as discussed in the previous section.

The total investment cost is slightly below of 1.000 MEUR including the cost of the plant, project development expenses and contingency as per the relevant industry standards.

One of the important features of the planned investment is the efficiency of the power plant. Using coal in conventional units and adding on flue gas desulphurisation and de-NOx equipment, the overall efficiency would be reduced.

The LCPD BREF defines minimum efficiency for all newly permitted power plants. Taking into consideration the additional flue gas cleaning system, and no reference to additional efficiency improvement methods, meeting the required efficiency limits would be challenging. It could also be important from the Capacity Mechanism perspective as in many European Member States, one of the eligibility criteria for participation in such markets is a minimum efficiency criterion.

## Methodology

*Detailed list of assumptions of our Analysis*

ITEM	VALUE	SOURCE OF INFORMATION
Electricity Sales Price	55 EUR/MWh	Actual OPCOM Base Load prices for 2018 from the Hungarian Power Exchange – HUPX –

		database. It provides base load price database for HU, RO and SK and future price indications for these countries' base load price.
Lignite price	90 RON/t	Primary source of information is the information from Rovinari's Extraordinary Meeting of Shareholders of OEC, unit cost calculation. The price assumption is also supported by the CIF ARA European Coal price index, which is currently 75 USD/t which corresponds to 12,5 RON/GJ level.
EUA price	21 EUR/t	The actual prices and forward price indications are taken from the International Exchange's- <a href="http://www.theice.com">www.theice.com</a> – web site.
Lignite consumption	No specific assumption used.	The actual lignite consumption is derived from the unit's efficiency value, which was assumed to be the minimum as per the LDPD BREF, in our case it is 41,72% efficiency.



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