



Transelectrica SA

Romanian Power Grid Company

We lead the power

**NECESSARY STEPS FOR
RENEWABLES INTEGRATION IN
THE ROMANIAN ENERGY
POLICIES**

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Vulnerabilities

Romania at ENTSO-E border
Incomplete 400kV ring

Opportunities

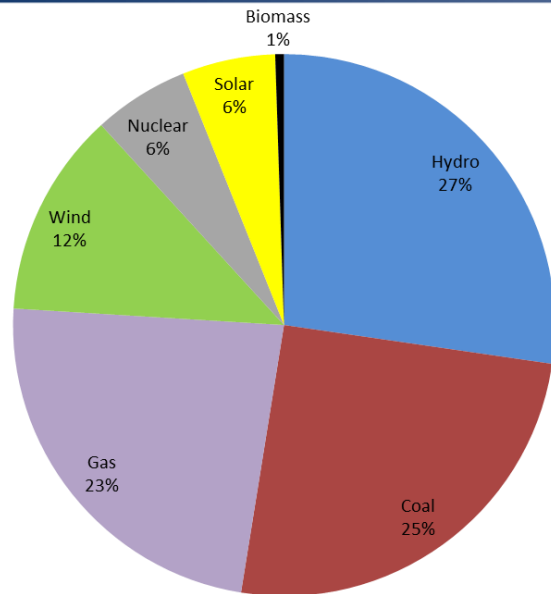
Romania acts in two regions: Central Europe and South East Europe

➤ Romanian TSO- responsibilities:

- ✓ To maintain the safe operation of the national power system;
- ✓ To maintain the energy quality parameters for all market participants;
- ✓ To ensure the efficient market operation;
- ✓ To restore the operation after a blackout;
- ✓ To estimate and to ensure the power reserves

➤ Power reserves:

- Secondary regulation (a/FRR, m/FRR):
 - ✓ 600 MW available band (peak hours – working days);
 - ✓ 400 MW available band (peak hours – weekend, holidays);
 - ✓ 300 MW available band (off peak hours).
- Fast tertiary reserve (RR):
 - ✓ 900 MW - 1000 MW
- Slow tertiary reserve:
 - ✓ 700 MW

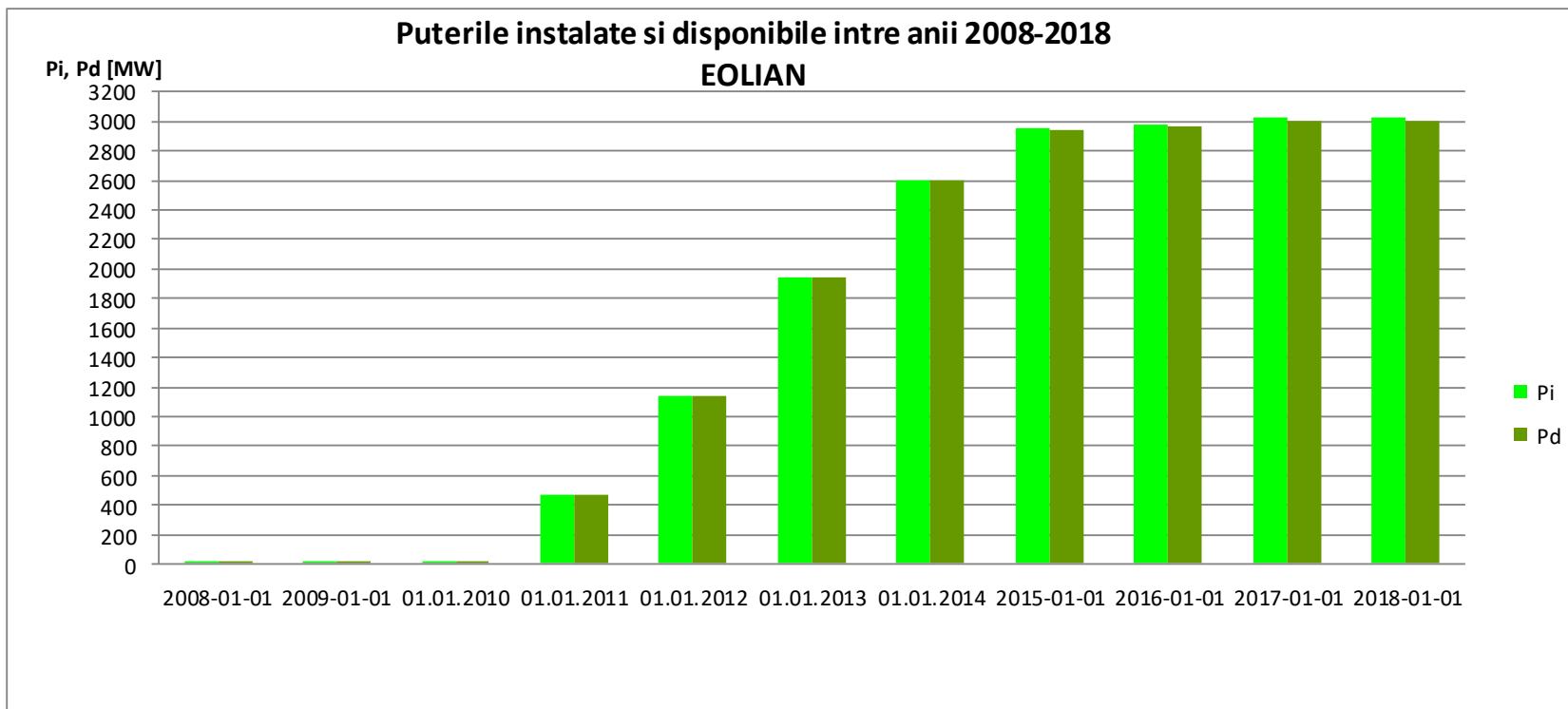


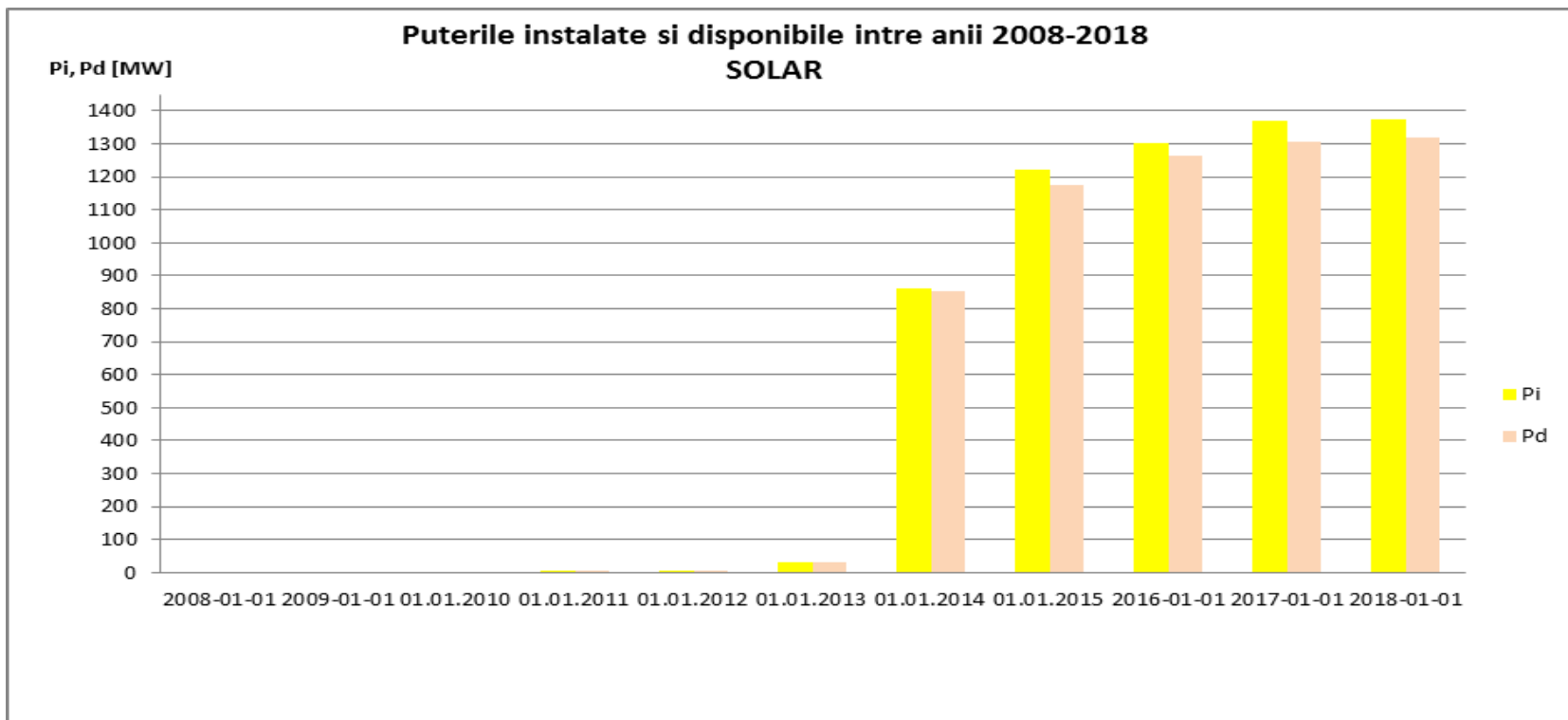
January 1st , 2018

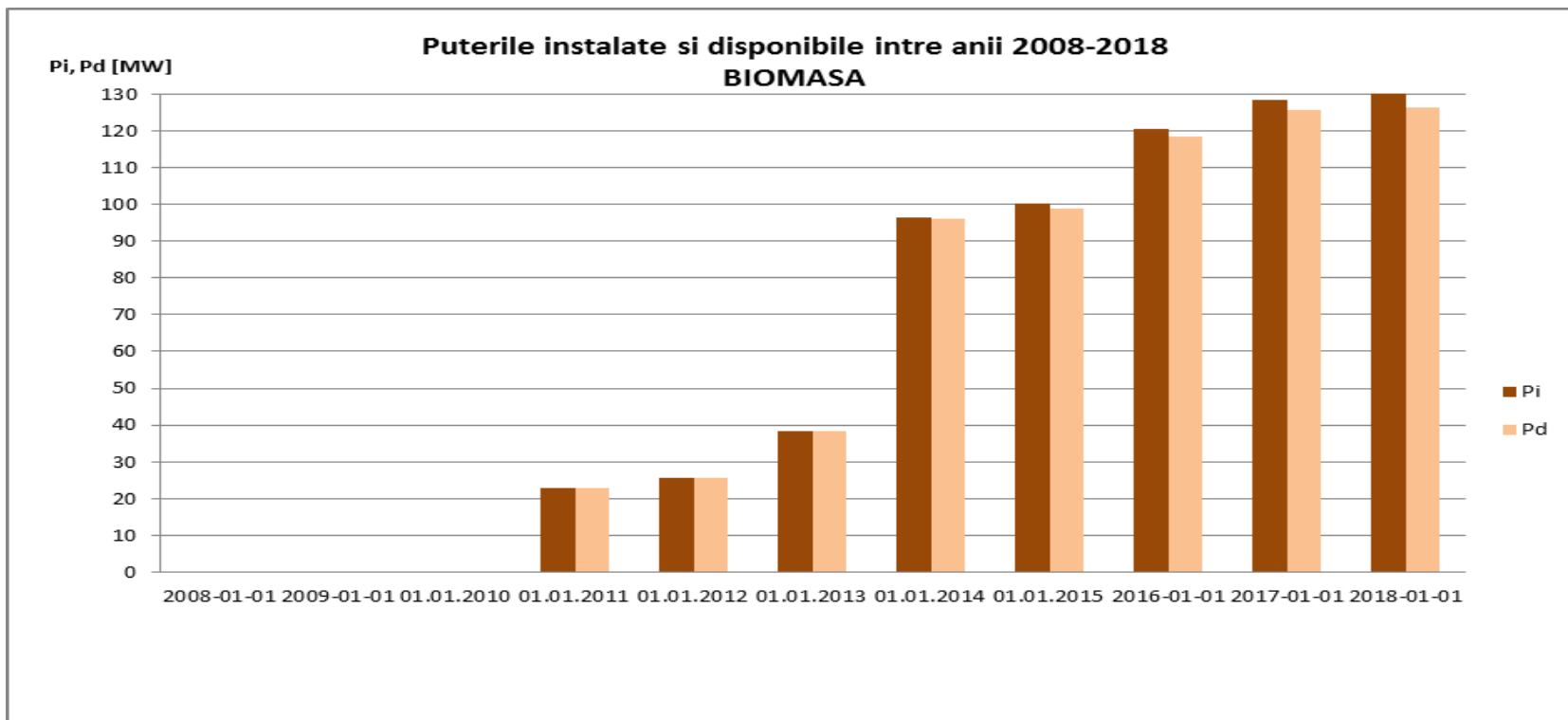
Source of energy	Pi [MW]	%
Hydro	6761	27
Coal	6240	25
Gas	5789	23
Wind	3030	12
Nuclear	1413	6
Solar	1375	6
Biomass	130	1
Total	24738	100

New capacities (projects) in Romanian power system

Fuel Type	Connection Contracts [MW]
Wind	2307
Solar	805







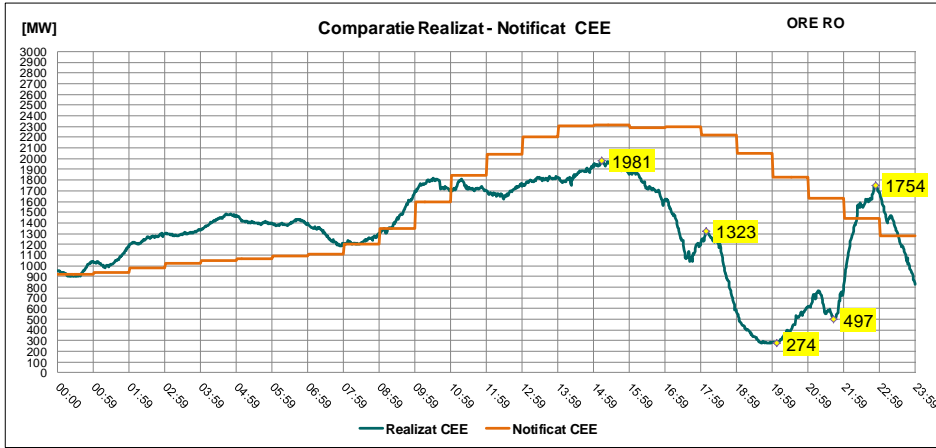
- RES generation is variable and non-programmable;
- RES units are typically installed geographically distant from load centers;
- RES units are typically small units and installed in the LV/MV grid;
- RES are typically converter – base units
 - Most of the wind units and all PV units are inverter connected to the grid. By replacing conventional power plants the system inertia is reduced. The system inertia determines the sensitivity of the frequency to imbalances. With small inertia the system is sensitive to temporary power imbalances. Additionally, inverter-based units have a low short circuit current. The lack of short circuit power makes the grid more sensitive to faults and voltage dips.

- Power reserves are projected to cover in 15 minutes the accidental stop of the biggest generator and/or to cover the sudden 1000 MW variation in WPP production, utilizing the fast tertiary reserve; the next biggest generator is covered by the slow tertiary reserve.
- After the WPP integration, difficulties appeared because:
 - ✓ Notifications sent in Balancing Market are smaller than the realized production;
 - ✓ WPP production's sudden variations
- *Network Code on Electricity Balancing* – was finalized at ENTSO-E and it will be approved and published this year. Its aim is to ensure an efficient Balancing Market in Europe. The reserves will be diversified and dispatchable consumers will be involved.

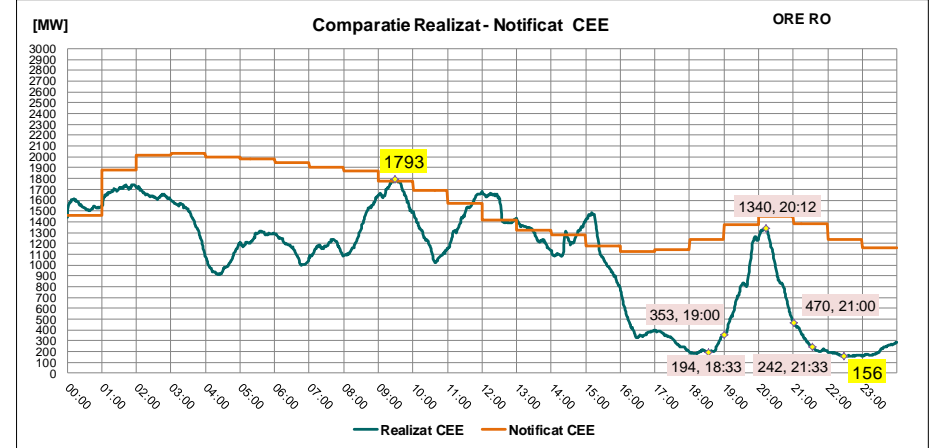
In Romania the maximum power possible to be installed in WPP taking into account available reserves has already been reached (3000 MW).

Impact of the RES integration

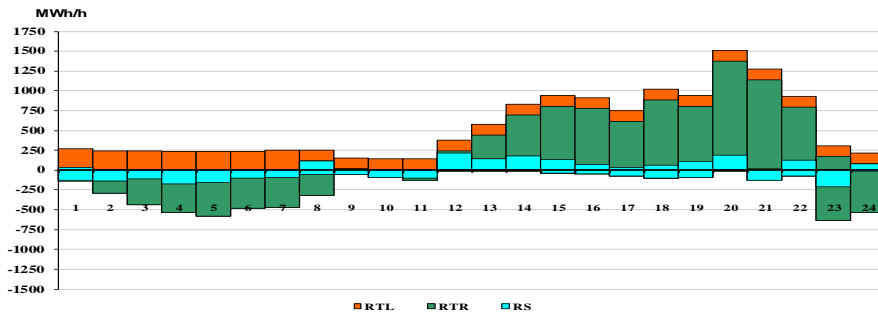
Realizat maxim CEE 1981 MW Realizat minim CEE 274 MW marți 25.07.2017



Realizat maxim CEE 1793 MW Realizat minim CEE 156 MW duminică 19.03.2017

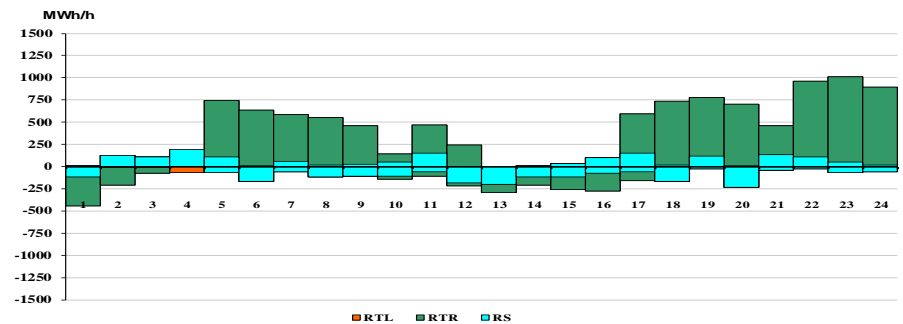


Energii de echilibrare acceptate - 25.07.2017



Tertiar rapid scadere	3285 MWh
Tertiar rapid crestere	7454 MWh
Tertiar lent scadere	0 MWh
Tertiar lent crestere	3947 MWh
Secundar scadere	2010 MWh
Secundar crestere	1575 MWh
Energie rezultata pe PE:	18271 MWh
Procent din total energie:	11,12 %

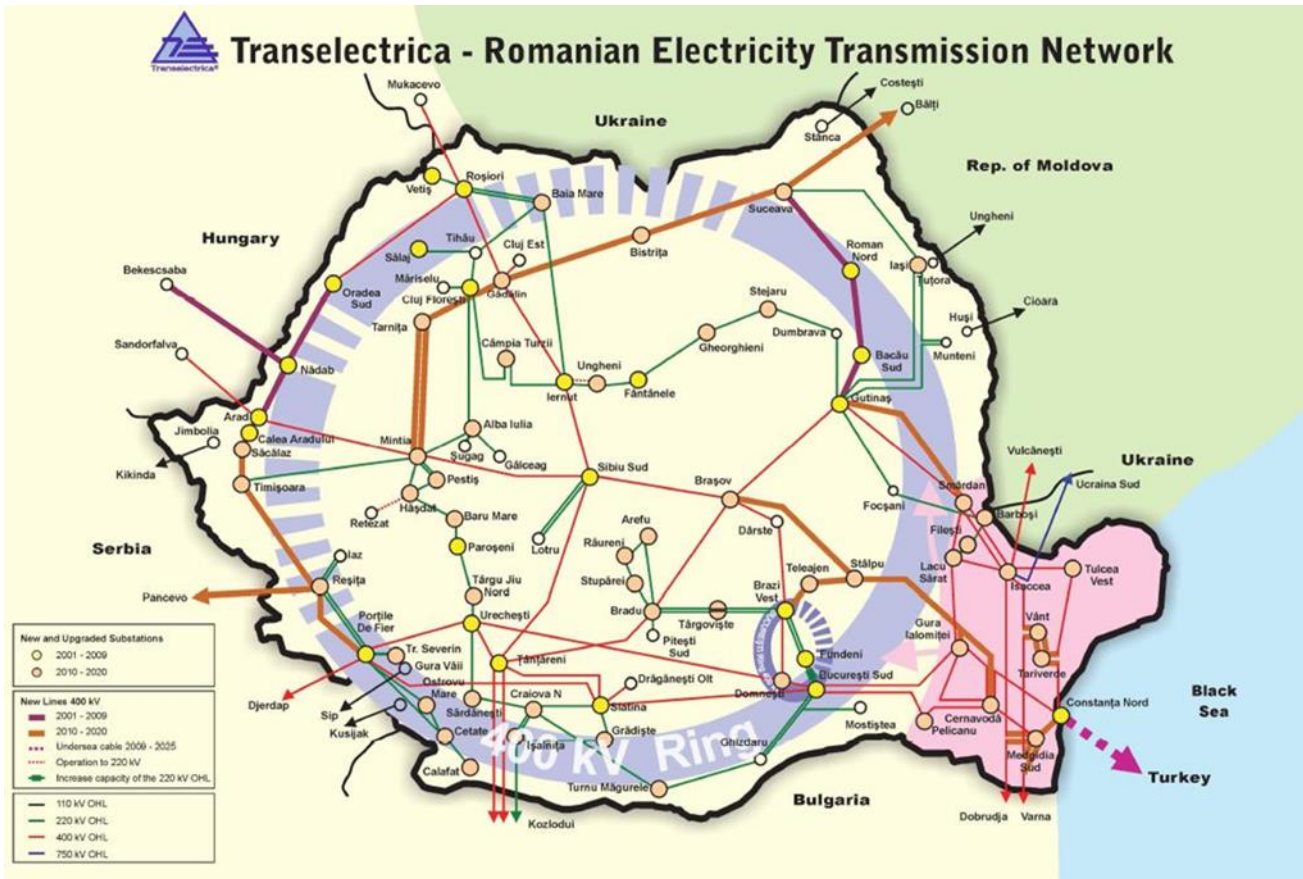
Energii de echilibrare acceptate - 19.03.2017



Tertiar rapid scadere	1337 MWh
Tertiar rapid crestere	8964 MWh
Tertiar lent scadere	0 MWh
Tertiar lent crestere	68 MWh
Secundar scadere	2190 MWh
Secundar crestere	1551 MWh
Energie rezultata pe PE:	14109 MWh
Procent din total energie:	9,55 %

Impact of the RES integration - recommendations

- **To increase the power reserves by installing classic power plants; to respect the European Network Code Requirements for Generators;**
- **To install Storage systems; 100MW storage is needed for each additional 300MW installed in WPP;**
- **Flexible consumers, Demand Side Management implementation;**
- **To stimulate installation of generators with rapid starting to compensate the RES variations;**
- **To integrate the European Balancing Markets and create common platforms;**
- **To increase the market on short term liquidity (to allow the transactions close to real time)**



European “Ten-Years Network Development Plan (TYNDP) 2016” and the National Development Plan contain the following project for RES integration and increased capacity on RO-BG border:

Project 138 „Black Sea Corridor”

- OHL 400 kV d.c. Smârdan – Gutinaș (commissioning 2022);
- OHL 400 kV d.c. Cernavodă - Stâlpu, one circuit in-out in Gura Ialomiței substation (commissioning 2021);
- OHL 400 kV s.c. Gadalin – Suceava (commissioning 2027).

In January 2018 CNTEE Transelectrica SA obtained European funds through CEF mechanism for the PCI - OHL Cernavodă-Gura Ialomiței –Stâlpu.

Other projects necessary for RES (wind) integration in Romania:

- Rewiring (increase capacity) of OHL 220 kV Stejaru – Gheorghieni – Fantanele (commissioning 2022);
- Upgrade to 400kV of the 220kV corridor Brazi Vest - Teleajen-Stalpu (commissioning 2023);
- OHL 400kV Contanta Nord - Medgidia Sud (commissioning 2024);
- OHL 400kV Stalpu-Brasov (commissioning 2027).

The National Development Plan was build using consumption and generation forecast for 2022 and 2017 (winter peak, summer peak and summer low load) .

Reference scenario for winter peak 2027 :

- Consumption in Romania: 9333 MW
- Generation in Romania: 10890 MW
- Losses in Romania: 357 MW
- Export: 1200 MW

Installed power in RES for 2027 reference scenario:

- Wind power: 3600 MW
- Photovoltaic: 1600 MW
- Biomass: 300 MW

4 units in place for NPP Cernavoda: 2630 MW installed.

National target for RES integration:

According to National Plan for RES integration

Energy produced from RES to be 38% of consumption for 2020 (HPP with more than 10MW installed power are taken into account).

Green certificates (GC) to stimulate the RES integration:

- According to Law no. 220/2008 for RES promotion
 - For Wind Power Plants commissioned by 2014: 2 GC/MWh by 2015 and 1GC/MWh from 2016
 - For Solar PV systems commissioned by 2014: 4 GC/MWh
 - For Biomass Power Plants commissioned by 2014: 3 GC/MWh
 - The system applies for 15 years for new equipment and for 5 years for WPP second hand equipment.

This system applies for 16,8% of total generation in 2020 (16,8 % RES in 2020 in Romania)

- According to Law no. 220/2008 for RES promotion **modified in 2010**
 - For Wind Power Plants commissioned by 2016: 2 GC/MWh by 2017 and 1GC/MWh from 2018
 - For Solar PV systems commissioned by 2016: 6 GC/MWh
 - For Biomass Power Plants commissioned by 2016: 3 GC/MWh

The system applies for 15 years for new equipment and for 7 years for second hand equipment.

This system applies for 20% of total generation in 2020 (20% RES in 2020 in Romania)

Due to this stimulating system a huge number of projects appeared.

After 2010 many updates were made to the Law no. 220/2008 and the number and value of GC was reduced and the transaction of a certain number was postponed.

Participation of RES producers to necessary network development:

According to the methodology imposed by NRA for the connection tariff (Ord.11/2014, ord. 141/2014) the investor has to participate to the network development proportionally with the power installed.

This decreased the number of projects, actually no project was realized in this conditions.

Situation of WPP projects with connection to RET

- 12 WPP projects summarizing 1330 MW obtained connection technical permits and connection contracts were signed between 2007-2012 and the WPP were commissioned by 2014;
- 15 WPP projects summarizing 1245 MW obtained connection technical permits in 2009 - 2012 and connection and execution contracts were signed in 2010-2012 and the WPP were not built even if for 7 of them the connection equipment was made ; only 3 of them still have a valid connection contract;
- 68 WPP projects summarizing 8600 MW obtained connection technical permits in 2009 - 2012 and connection contracts were signed in 2011-2012 but the execution contracts were not signed, these projects are not valid any more (the connection contracts were cancelled);
- 110 WPP projects summarizing 10700 MW obtained connection technical permits in 2010 – 2013 but connection contracts have never been signed;
- 9 WPP projects has obtained connection technical permits since 2013 and only for 4 of them the connection contract was signed; all of them were finally cancelled.

Recommendations to launch again the WPP projects:

- **Predictable legislation** in needed for the investors
- **Long term national strategy for RES integration is needed to meet the European targets**
- **The legislation for important and strategic national projects should be modified to facilitate the network development**



THANK YOU!