“Electricity System Operator” EAD

Bulgarian Ten-Year Network Development Plan

WE GUARANTEE THE LIGHT FOR YOU!

Bulgarian TYNDP

Bulgarian TYNDP contents basic infrastructure for transmission of electricity, including new constructions, extension, reconstruction and modernization, as well as assessment of required investments for its realization. It is developed in line with requirements of as follow:

- Bulgarian Energy Act;
- Bulgarian Grid-code;
- Directive 2009/72/EC;
- ENTSO-E.

Bulgarian TYNDP

TYNDP is based on the following general preconditions:

- Electricity demand analysis and forecasting development of electricity loads till 2022;
- Generation capacities analysis and development, including RES;
- Analysis on power flows and the voltage levels in transmission grid, based on forecasted power balances.

Electricity demand analysis

The following indicators, which have influence on electricity demand are taken into account:

- GDP;
- Structure of demand;
- Energy efficiency and its tendency;
- Population/households;
- Price of electricity.

Electricity demand forecast

The forecast is based on statistics, macroeconomic forecast of Ministry of economy and energy and forecasts of energy public suppliers. Two basic variants for development are accepted:

Minimum and Maximum

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gross Demand Variant Minimum, GWh	38795	39260	39717	39963	40198	40417	40621	40805	40970
Gross Demand Variant Maximum, GWh	39558	40329	40886	41325	41945	42440	43109	43749	44159

Generation Capacities development forecast

Two scenarios are defined:

- **Optimistic**, with building up all declared conventional generation capacities, including RES and sulfur reduction installation for units 4, 5 and 6 in TPP “Varna”;
- **Pessimistic**, with building up only declared RES.

The following general preconditions are taken into account for both scenarios:

- Extension exploitation of NPP “Kozloduy”;
- Realization of the hydro cascade project „Gorna Arda”;
- Modernization of existing capacities in TPP “Maritsa Iztok 2”;
- Building up contracted RES capacities and declared co-generation.

Forecasted energy and power balances

The transmission grid development perspective depends on forecasted energy and power balances based on maximum variant of electricity demand and load development.

Forecasted energy and power balances:

Optimistic generation scenario

Problems with electricity supply are not expected till 2022, because of enough generation capacities. It is expected surplus from 14 till 18 TWh annually, which is more than 25% of available capacities. This is basically due to RES contribution. Therefore, high electricity export is expected only in case of perfect hourly forecasts of RES production and application of expert trading strategies for domestic producers on the regional power market. In the opposite, in case of more competitive imports, the power system operation will go to severe trials. In addition, this will lead to financial problems to domestic conventional generation capacities, because of unrealized availability for production.

Forecasted energy and power balances:

Pessimistic generation scenario

Again, problems with electricity supply are not expected till 2022, because of enough generation capacities. It is expected gradually decreasing surplus from 15 till 6 TWh annually, which is more than 15% of available capacities. This is in contrast with winter power balance, where export is impossible, but the statistical duration of extreme winter loads is only 20 days. For the rest days of the year, especially during the spring, available capacities are in surplus. However, in this scenario the financial pressure on domestic conventional generation capacities is mitigated.

National RES indicative goal

For the both generation capacity scenarios RES electricity production reaches 25% of electricity demand and in case of met forecasted minimum demand variant – 27%. Practically, the application of energy efficiency measures will support realization of national RES indicative goal. In other words, instead investments in building up more and more RES, the final goal can be achieved by investments in decreasing energy intensity, which will reflect in growing up competitive power of Bulgarian economy.

Transmission grid development preconditions

400kV grid development:

- Decommissioning of units 3 and 4 of NPP “Kozloduy” and their production replaced by lignite thermal units in Maritsa Iztok basin;
- Commissioning of new TPP „AES Galabovo”;
- Synchronization of Turkish Power System to ENTSO-E;
- Increasing transmission capacity in direction north-south;
- Improvement of transmission security in south region of Black Sea coast;
- Utilization of Wind power production in northeast part of Bulgaria;
- Improvement of transmission security in Blagoevgrad region;
- Increasing of transmission capacities with Turkey.

Transmission grid development preconditions

220kV grid development:

- Accepted conception is to stop development of 220kV transmission grid.

110kV grid development:

- Integration of RES and conventional power plants with capacity till 200 MW;
- Improvement of transmission security in local regions where planned maintenance and frequently restoration in 400kV and 220kV is required;
- Improvement electricity exchanges with distribution grid.

Transmission grid development: Optimistic Scenario

- Maximum load forecast variant with 8100 MW extreme load and 1400MW export for 2022 year;
- TPP “Varna” produce electricity with three units, TPP “Bobov dol” – two units;
- Based on general policies development of transmission grid, in TYNDP are outlined necessary new equipment (lines and substations) and required rehabilitation of existing ones.
- Security criteria is examined and specific features and regional problems are outlined.

Transmission grid development: Pessimistic Scenario

- Maximum load forecast variant with 8100 MW extreme load and only 50MW export for 2022 year;
- New conventional power plants are not expected, only RES penetration is taken into account;
- The basic policy for transmission grid development are the same as optimistic scenario. Concerning necessary new equipment, there are differences only for integration of new conventional power plants examined in optimistic scenario.

Basic directions for development of transmission grid

- Increasing transmission capacity in northeast Bulgaria to utilize high Wind power penetration;
- Improvement of security supply in south part of Black Sea coast;
- Increasing 110kV transmission grid capacity in capital Sofia, because of high concentration of load and its tendency for growing up during the last years;
- Finalization reconstruction of substations “Dobrudza” and “Varna”;
- New 400kV OHL in direction “Plovdiv-Maritsa Iztok 3” in parallel with existing ones;
- Building up new interconnection 400kV with Turkey;
- New interconnection 400kV with Greece;
- Construction of new 400kV OHL between substations “Galabovo” and “Burgas”;
- Building up new 400kV OHL between substations “Burgas” and “Dobrudza”;
- Construction of new 400kV OHL between substations “Vetren” and “Blagoevgrad”;
- New 400kV OHL between substations “Tzarevetz” and “Plovdiv”;
- Improvement of security supply in Ruse;
- Improvement of security supply in Gorna Oriahovitza.

Financial assessments of investments necessary to realize TYNDP

- Forecasted costs of necessary investments for TYNDP realization to face only security criteria for the period till 2022 are estimated at 580 million euro, including 50 million euro granted European finances.

- All forecasted costs for building up, extension, renewing and modernization of transmission grid for the period till 2022 are estimated at 880 million euro.

Projects on common interest declared in initiative “North-South”

I. Projects group №51 „Development of transmission grid in Corridor 8“:

1. New interconnection 400kV with Greece;
2. New parallel OHL 400kV between substations “Maritsa Iztok” and “Plovdiv”;
3. New parallel OHL 400kV between substations “Maritsa Iztok” and “Maritsa Iztok 3”;
4. New OHL 400kV between substations “Maritsa Iztok” and Burgas”.

II. Projects group №95 „Green Dobrudza“:

5. New OHL 400kV between substations “Dobrudza” and Burgas”;
6. Two new substations 400/110kV;
7. New double OHL 400kV, splitting OHL 400kV “Druzba” and connected the above mentioned two substations with power system.

III. Projects group incorporated in Cluster E-126 „North-South“:

8. New OHL 400kV between substations “Vetren” and “Blagoevgrad”;
9. New OHL 400kV between substations “Tzarevetz” and “Plovdiv”.


BULGARIA
Drobeta
Turceni
Tântăreni
Slatina
Domnești
Mostistea
Tr. Severin
Sip
Gogosu
Porțile de Fier 2
Ostrovu Mare
Cetate
Zajecar
Vidin
Kula
Calafat
Kozloduy
Grădiște
Drăgănești Olt
Olt I
Craiova Nord
Ișalnița
Bucureşti Vest
Progresu
Ghizdaru
Tr.Măgurele
Obraztsov Chiflik
Varna
Dobrudzha
Madara
Varna
Pleven
Tsarevets
Boychinovtsi
Mizia
Gorna Oryahovitsa
Balkan
Tvarditsa
Karnobat
Burgas
Pirot
Sofia Zapad
Metalurgichna
Kremikovtsi
Zlatitsa
Stolnik
Kazichene
Sofia
Sofia-Yug
Sestrimo
Belmeken
Aleko
Chudomir
Stara Zagora
Maritsa Iztok 2
Maritsa Iztok 3
Maritsa Iztok 1
Leskovac
Breznik
Vrla
Stomana
Ch. Mogila
Vlasina
Vetren
Plovdiv
Bobov dol
Chaira
Peshtera
Orfey
Devin
Teshel
Blagoevgrad
Skakavitsa
K. Palanka
Uzundzhovo
Maritsa Iztok
Alarko Altek
Sedko DGKÇ
Verbena
Hamitabat
Babaeski
Zorlu En.
Z.Enj.
Unimar
Stip
Negotino
Petrich
Dubrovo
Tikves
Susica
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WF-2
Platanovrisi
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Substations remote operation

ESO EAD started process of change the way of operation in its substations. Traditional 24-hour staff shifts will be changed. During the period of 20 years all substations 110kV/middle voltage (near 200 numbers) will go to remote operation.

Thank you for attention!