The Role of Lignite-fired Power Plants for Energy Security in Bulgaria

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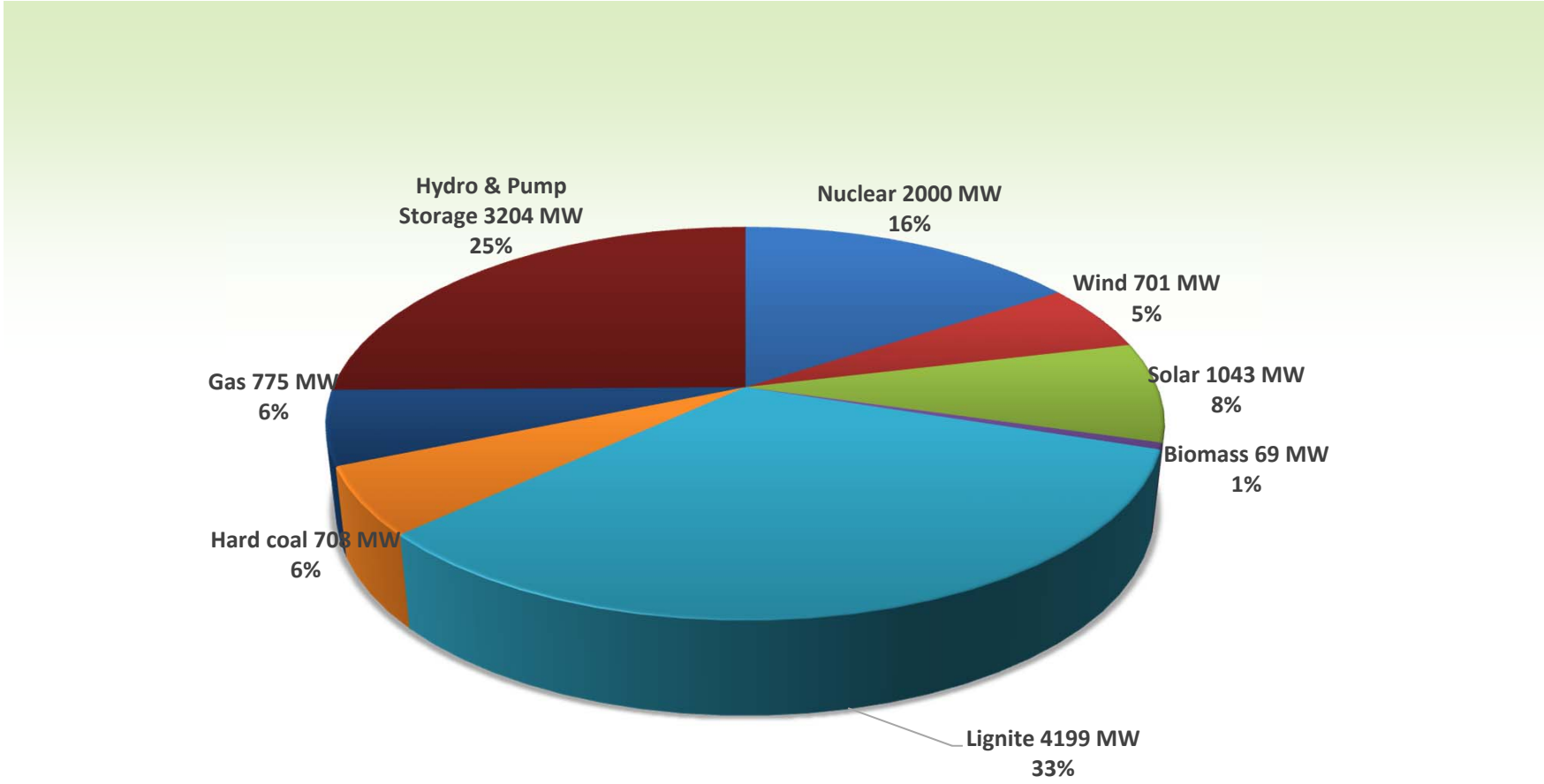
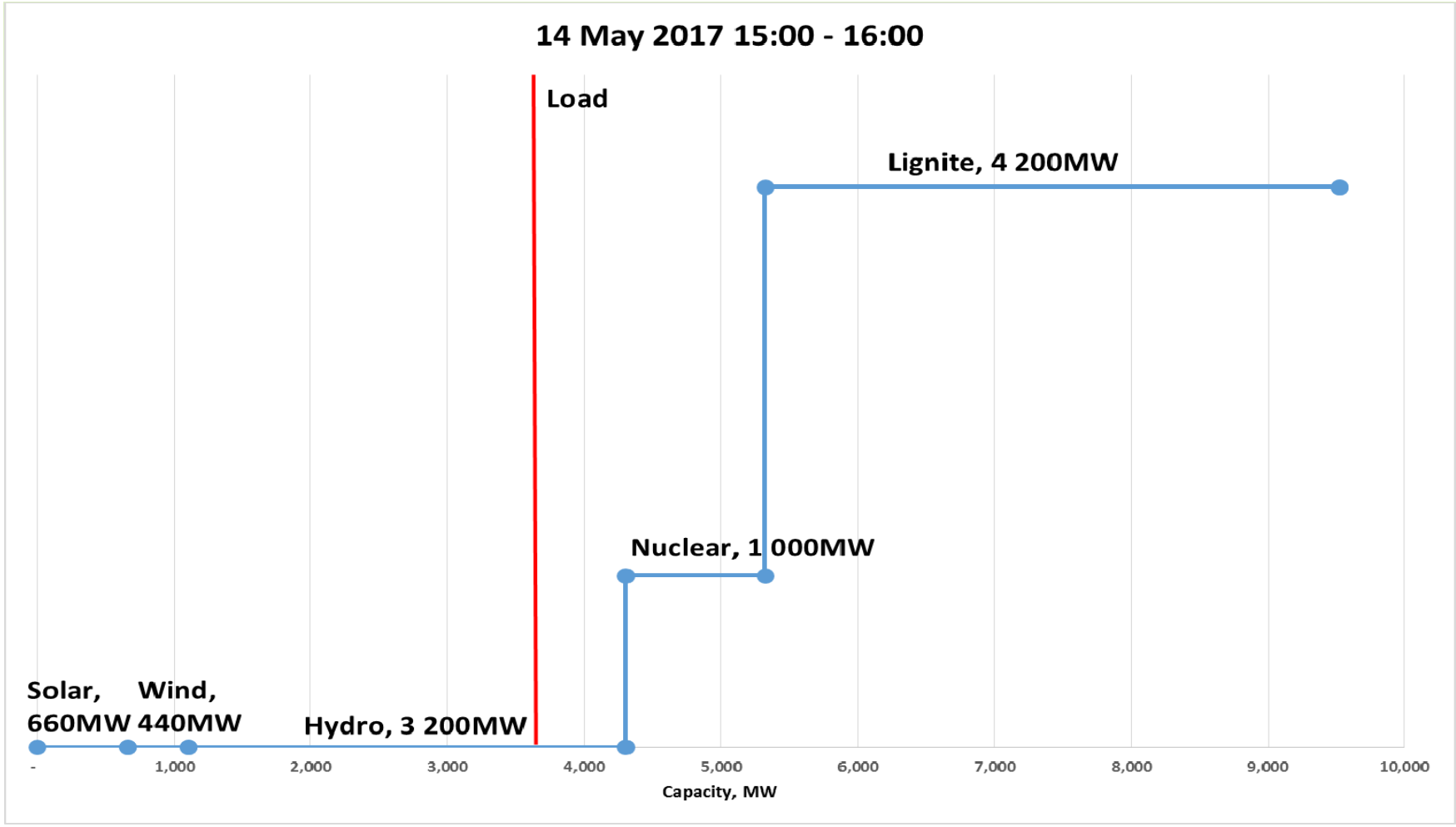
Lignite Thermal Power Plants represent 33% of total installed capacity in Bulgaria

Total installed capacity in Bulgaria 12 701 MW



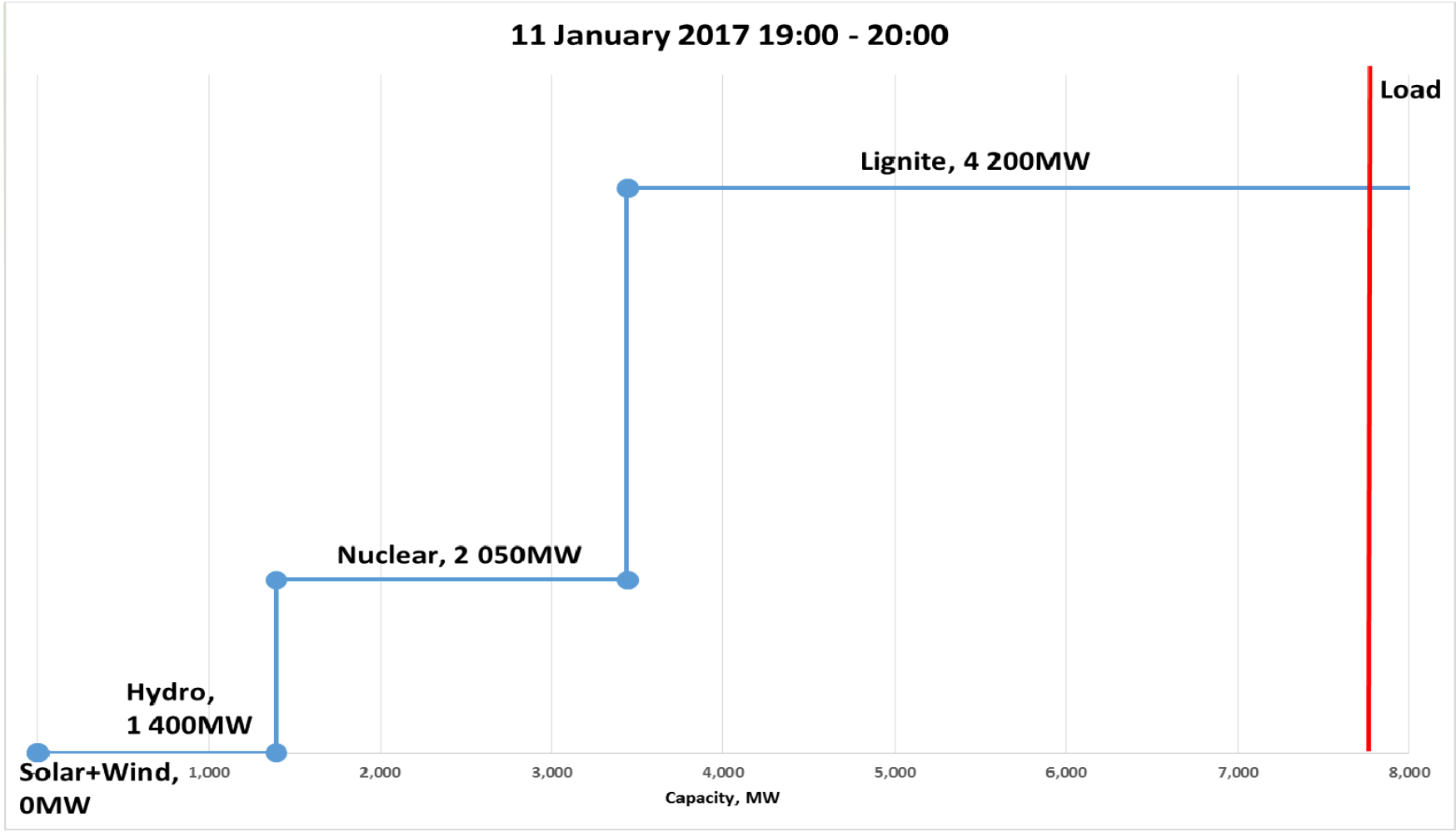
Source: Annual Report to EU 2016, EWRC

During a sunny spring day, demand is met by renewables only…



Source: www.transparency.entsoe.eu

… However thermal plants are strongly needed in winter day



Source: www.transparency.entsoe.eu

Thermal plants were essential to meet high demand in January 2017

- Extreme low temperature values for Bulgaria.
  - Average temperature for January -6°;
- Reaching electricity consumption and generation peak levels.
- 13 January 2017 the export of electricity was stopped with order issued by the Energy minister.
  - The ban lasted for 27 days until 9 February 2017

Енергийният министър спря износа на ток от България

11.01.2017 г., 18:48

Енергийният министър в оставка Теменужка Петкова издаде заповед за ограничаване на износа на електроенергия, произвеждана в България, съобщиха от пресцентъра на министерството на енергетиката. Заповедта на енергийния министър предвижда „Електроенергийния системен оператор" ЕАД да прекрати достъпа до електропреносната мрежа на износителите на електрическа енергия, произведена в страната.

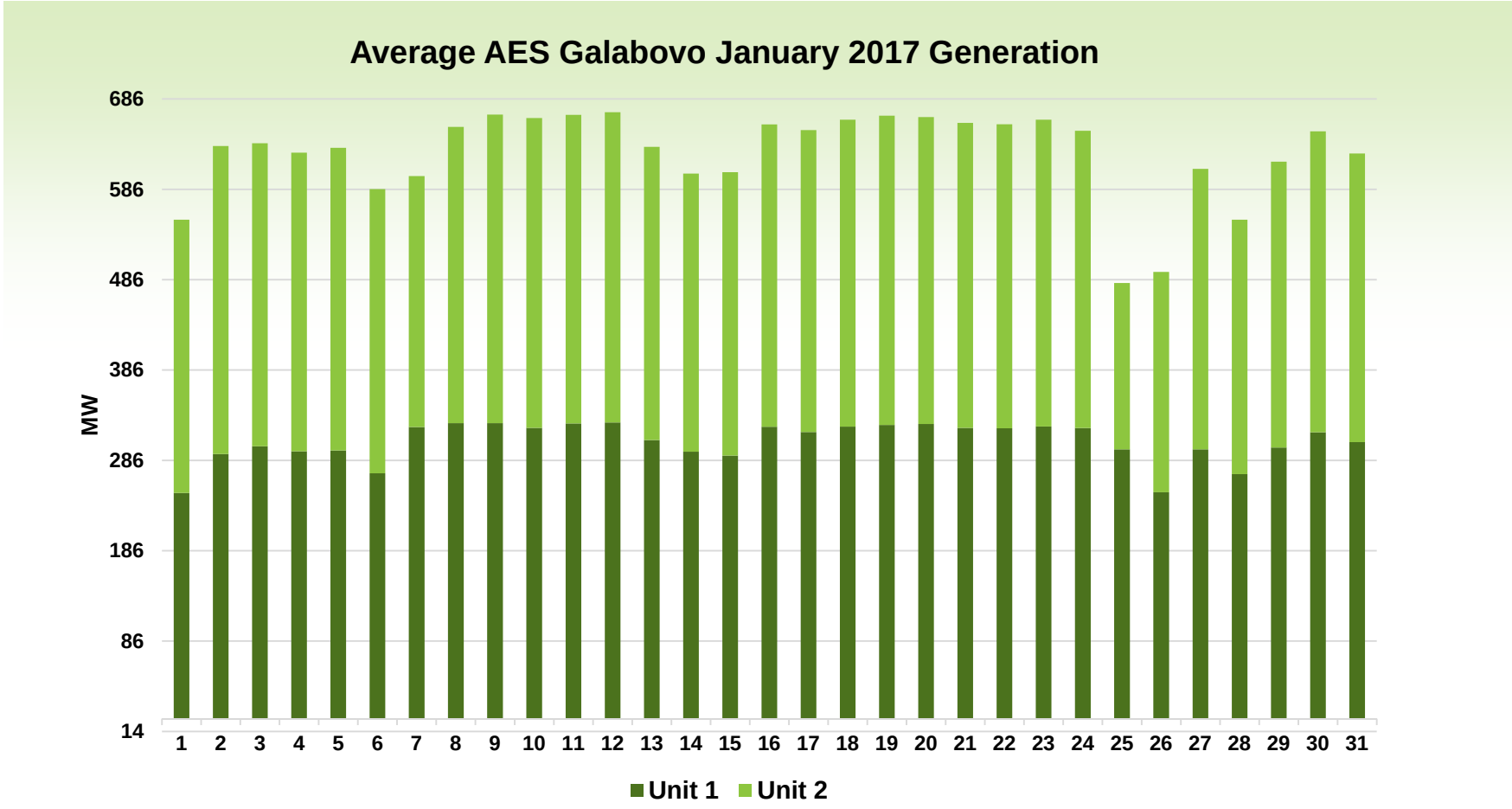
The system experienced unexpected additional challenges

- Lack of import opportunities due to electricity generation constraints in neighbouring countries;
  - Greece also had banned exports for the period of 11-12 January 2017
  - Romania turns down emergency power supply request despite the clear rules, established at European level with the active role of ENTSO-E.
- Reduced volumes in the respective dams- hydro-power production limited, wind and photovoltaic installations difficult to use;
- Triggering cold reserve failure- several of the plants failed to connect to the system immediately after orders.

How the crisis was solved

- The electricity system managed to withstand to the reached historic peak load of 7690 MW on 10 January 2017 thanks to the active position of the companies along the whole energy chain – ESO, NPP, TPPs, EDCs.
  - Energy companies reduced their planned outages to a minimum;
  - Base plants increased generation by about 8%, reaching a production of just over 7.4 million megawatt hours of electricity;
- The Maritsa basin lignite power plants were the spine of the system with more than 3 000 MW installed capacity managed to operate on full load despite the severe weather problems.
- The two units of “AES Galabovo” TPP generated 465 482 MWh or 10.35% of the electricity.

TPP AES Galabovo generated at maximum capacity during the entire month of January 2017



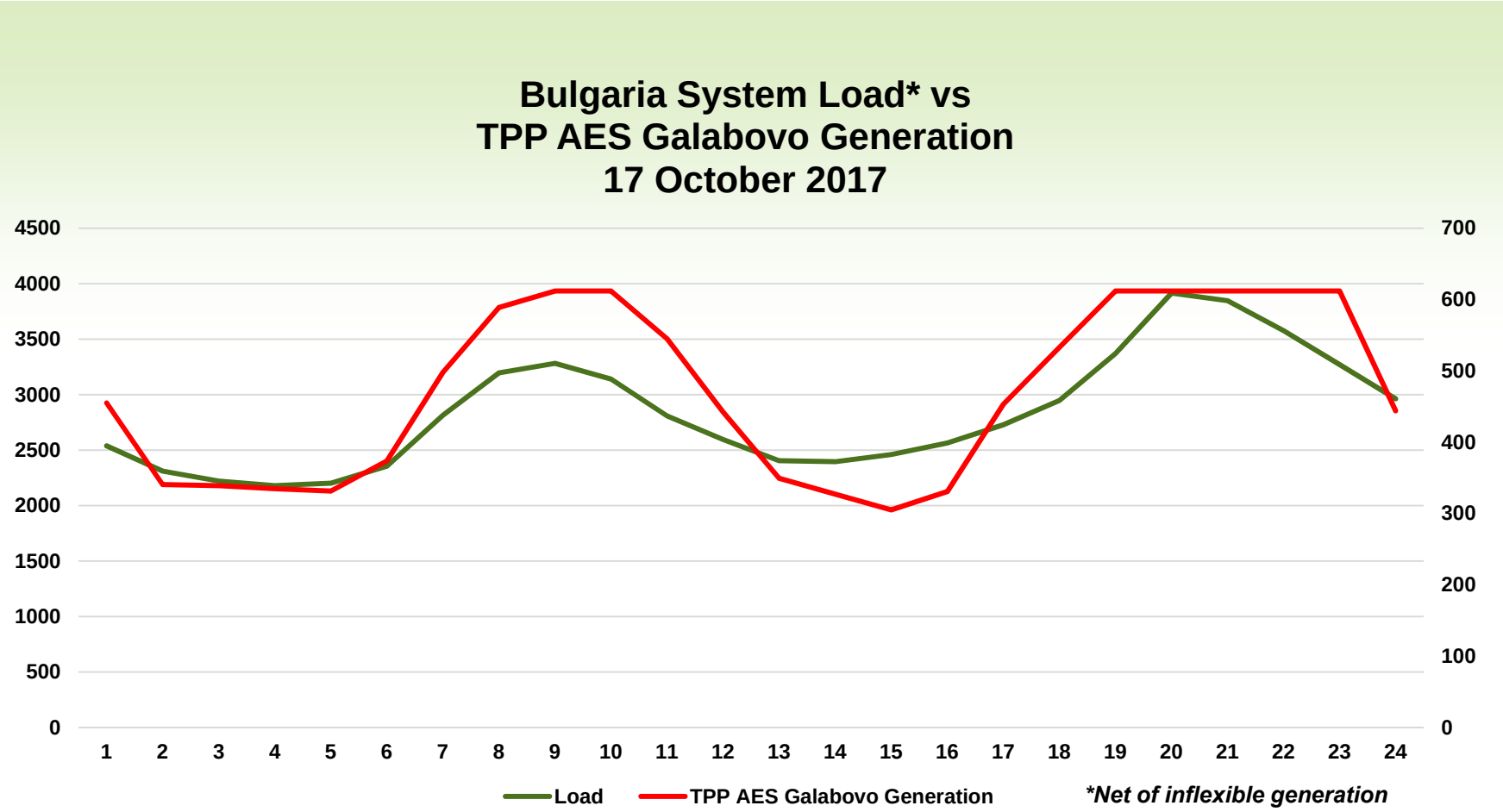
Source: www.tso.bg

TPP AES Galabovo is also valuable for system regulation

TPP AES GALABOVO main technical advantages:

- It can very quickly change the amount of electricity produced. The rate of change is 6 MW/min while the other Units in the region reach a speed up to 3 MW/min.
- The range of secondary control adjustment is up to 60% (from 120 to 300 MW), while the other Units have adjustment range up to 30% of the installed capacity.
- The primary control adjustment range is 30 MW (± 15 MW), with other Units - 20 MW (±10 MW).

TPP AES Galabovo current dispatch profile shows its flexibility



Source: www.tso.bg; www.transparency.entsoe.eu

New EU Environmental Regulations – LCP BREF

- In August 2017 the EC Implementing Decision 2017/1442 establishing the BAT Conclusions under Directive 2010/75/EU for large combustion plants was published on the Official Journal.
- 4 years after the publication (August 2021) power plants have to either comply, be granted a derogation (for extended time for compliance or less strict requirements) or retire.
  - Large combustion plants have 6 months after the publication to confirm compliance with BAT Conclusions or to apply for derogation where an assessment shows that achievement of BAT AEL would lead to disproportionate costs compared to environmental benefits based on cost-benefit analyses provided by each plant.
  - Implementation stage at Member state level will be crucial with a significant room for interpretation from the competent authorities

Emissions	BAT-AELs Yearly average ✶ (mg/Nm3)
Mercury	<0,007
NOx	<175
SO2	>97 % FGD eff. with a maximum of 320
Dust	<8

✶BAT-AELs applicable for combustion plants with total rated thermal input of ≥ 300 MWth with lignite-fired pulverized coal boilers, put into operation no later than 7 January 2014 and specifically designed to fire indigenous lignite fuels

New EU Environmental Regulations – LCP BREF

Next Steps

- Evaluation of technics for insuring compliance with BAT-ELVs and their impacts on the plants operation and the associated costs;
- Combined efforts of the Maritsa basin based lignite power plants- TPP2, ContourGlobal TPP, AES Galabovo TPP and Brikel TPP supported by the Ministry of Energy;
- Using EU experienced third party for Estimation of costs related to environmental benefits related to the achievement of the emission levels specified in the BAT Conclusions;
- Filing application for derogation in EEA within the regulatory required timeframe where needed.

Mid-term Adequacy Forecast (MAF) 2017 for Consultation

- The MAF 2017 base scenario identifies severe risk of resource scarcity in Bulgaria in 2020: (threshold Loss of Load Expectation (LOLE) ≥ 10 hours/year), one of the highest across EU countries;
- This scenario is based on same lignite installed capacity as of the moment;
- Therefore the lignite thermal power plants are essential part of energy security for Bulgaria.

Adequacy in the 2020 base case scenario

Source: ENTSOE, Mid-term Adequacy Forecast (MAF) 2017

Thank you.

Olivier Marquette