



# THE VIEW OF THE TRANSMISSION SYSTEM OPERATOR TO DEVELOPMENT OF DISTRIBUTED GENERATION

**Dr. Dalius Šulga**  
*Director of Energy Development Department*  
*Lietuvos Energija AB*

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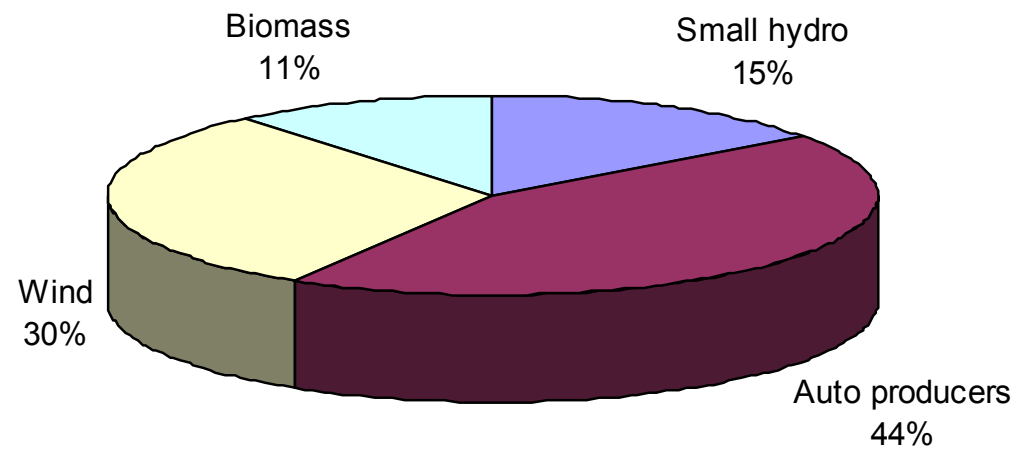
## INSTALLED CAPACITIES BY 2008-01-01

<b>Lithuanian PP</b>	<b>1800</b>
<b>Total CHP</b>	<b>756</b>
	26
<b>Auto producers</b>	<b>75</b>
<b>Wind</b>	<b>52</b>
<b>Biomass</b>	<b>19</b>
<b>Total</b>	<b>5029</b>

## INSTALLED DISTRIBUTED CAPACITIES BY 2008-01-01

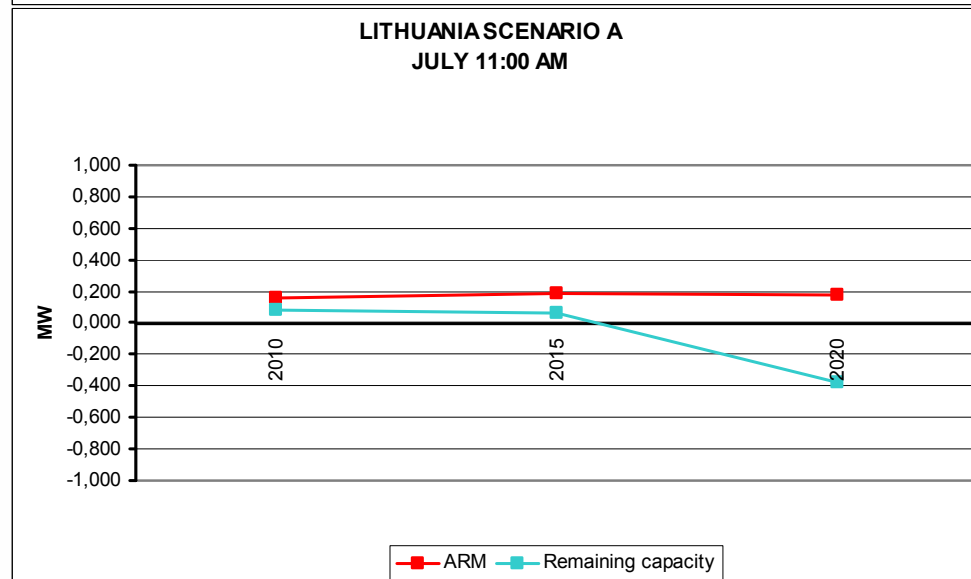
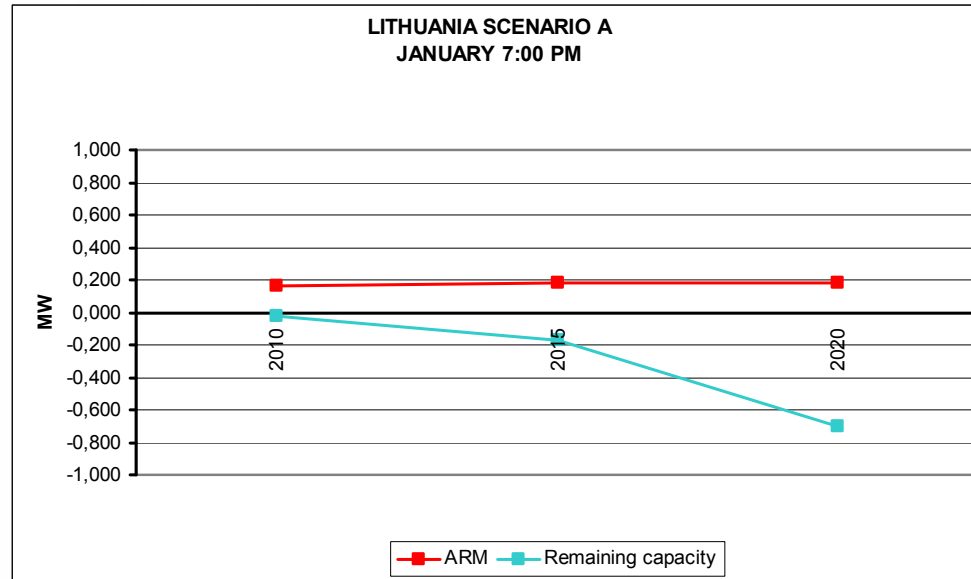
	<b>Installed MW (Gross)</b>
<b>Small hydro</b>	<b>26</b>
<b>Auto producers</b>	<b>75</b>
<b>Wind</b>	<b>52</b>
<b>Biomass</b>	<b>19</b>
<b>Total</b>	<b>172</b>

## INSTALLED DISTRIBUTED GENERATION CAPACITIES BY 2008-01-01

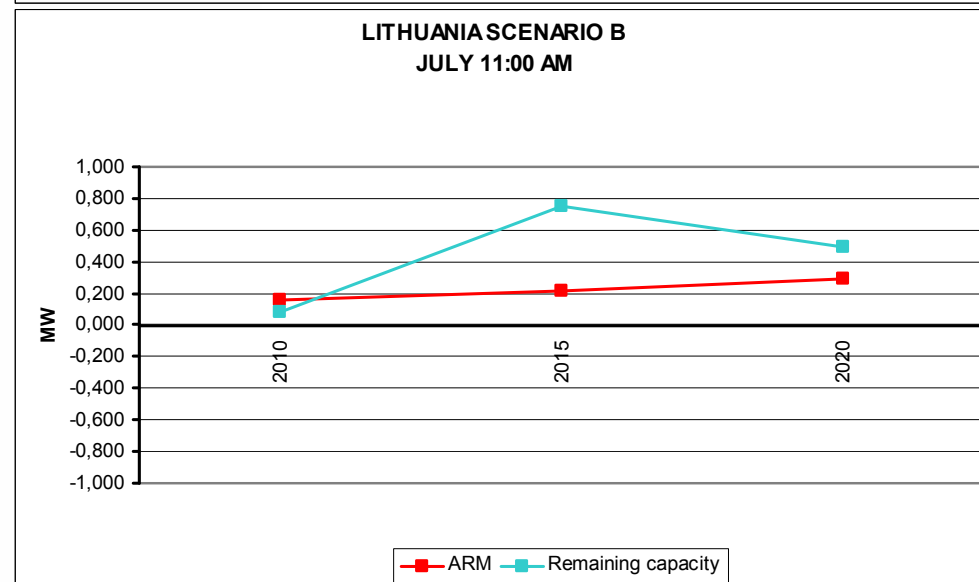
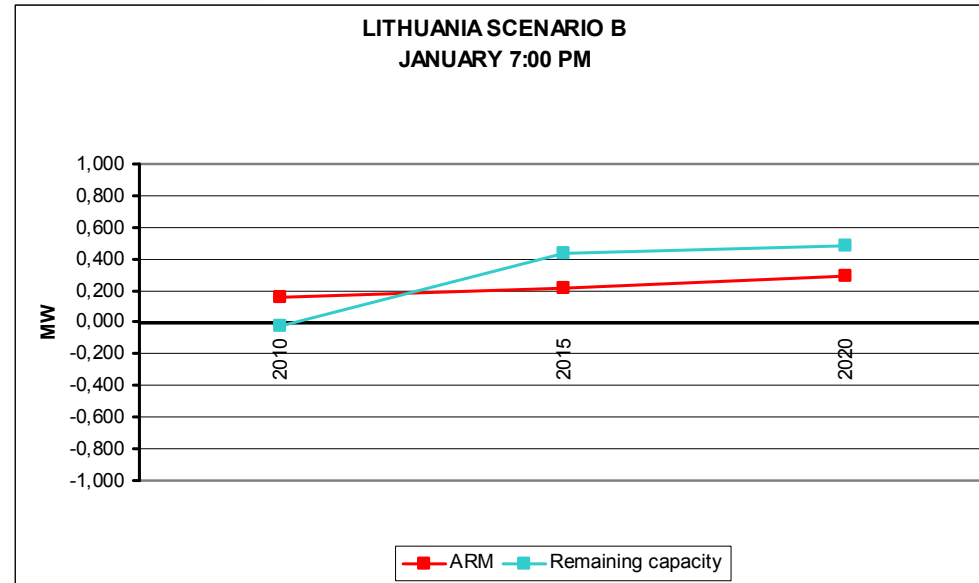


■ Small hydro ■ Auto producers ■ Wind ■ Biomass

# ADEQUACY OF LITHUANIAN POWER SYSTEM SCENARIO A



# ADEQUACY OF LITHUANIAN POWER SYSTEM SCENARIO B



# INFLUENCING FACTORS

- National Energy Strategy: to exploit, to a maximum extent, development possibilities and positive features of distributed (decentralised) energy generation;
- Strategic goal – synchronous operation with UCTE. Applying UCTE principles for power system operation;
- Ensuring sufficient amount of reserves for power frequency control;
- Sufficient reserves for secondary and tertiary control;
- Participation of power plants in providing additional services for TSO. Capability of TSO to provide system services;
- Directive 2003/54/EC, Article 9 c: Tasks of TSOs – managing energy flows on the system, taking into account exchanges with other interconnected systems. To that end, the TSO shall be responsible for ensuring a secure, reliable and efficient electricity system and, in that context, for ensuring the availability of all necessary ancillary services insofar as this availability is independent from any other transmission system with its system is interconnected.

## DIFFICULTIES FOR POWER SYSTEM CONTROL

- Further development of wind power plants in Lithuania will require additional power reserves;
- Wind power plants not participate in power frequency control, in providing reserves;
- Often “invisible” for the system operator;
- Supported production reduce market share, lower competition;
- Small amount of frequency control reserves;
- Industry intents to build power plants and connect it to power system without technical requirements of TSO;
- Very difficult to make actual power system energy balance. Missing or incorrect big number of data;
- Extremely difficult to receive data about power plants for dynamic power system model;
- How long time will take power system restoration?



## ADVANTAGES OF DISTRIBUTED GENERATION

- Bigger number of generators;
- Often it is renewable generation;
- Theoretically it is possible to have bigger amount of power frequency reserve;
- Local usage of electricity generated i.e. decrease of power transfer via transmission and distribution grids, so decreasing losses in the grids;
- Smaller disturbances.

## TSO REKOMENDATIONS

- The share of generation, which could not participate in the power frequency control must be limited to a certain amount;
- The limitation of installed capacity of wind power plants must be based on power system generation pattern and the capacity of fast reserves, or additional fast reserve capacities should be installed;
- Automatic control of distributed generation must be used;
- All small generators must participate in providing additional services (for system services).

# Thank You

**Dr. Dalius Sulga**

Director of Energy Development Department

Lietuvos Energija AB  
Zveju str. 14, LT -09310, Vilnius  
Lithuania

[www.le.lt](http://www.le.lt)

[dalius.sulga@lpc.lt](mailto:dalius.sulga@lpc.lt)