



Baltic Power System Control Centre Ltd.

Congestion management and capacity allocation methods used in the Baltic region

Arnis Staltmanis

Manager of Power System Reliability Department

Baltic Power System Control Centre Ltd.





Electrical Ring of the BRELL network 330-750kV





Criteria for boundary transfer capacity determination

As basis n-1 principle is used e.g failure and trip of one network element.

- Current limits depending from the ambient temperature

Depends from type of wiring and line dimensions

- Static stability

Overload of the lines and voltage collapse

- Dynamic (transient) stability

Basically the possible asynchronous run among power systems is considered

Non compliance with n-1 is accepted by use of emergency protection schemes in such cases: for boundaries Central Russia – St.Petersburg, Smolensk (Russia) – Belarus and loss of the Ignalina NPP reactor.



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Transfer capacities of the BRELL Electrical Ring for normal conditions (MW)

<i>Central Russia – St.Petersburg</i>	<i>1800 < > 1500</i>
<i>St.Petersburg - Estonia</i>	<i>1000 < > 1000</i>
<i>Estonia – Pskov (Russia) - Latvia</i>	<i>1200 < > 1500 – (0,4 P_{INPP} – 300)</i>
<i>Latvia - Lithuania</i>	<i>Max current < > 1000</i>
<i>Lithuania – Kaliningrad (Russia)</i>	<i>> 700</i>
<i>Lithuania - Belarus</i>	<i>1400 < > 2200</i>
<i>Belarus – Smolensk (Russia)</i>	<i>1300 < > 1000</i>

Legend:
- 110kV, 150kV, 220kV, 330kV, 500kV, 750kV Lines
- High voltage direct current (HVDC) lines
- High voltage direct current (HVDC) cables
- Nuclear power plants



Emergency protection schemes

Central Russia – St.Petersburg

Overload in direction of St.Petersburg: trip of the load in St.Petersburg area, in the worst case scenario trip of DC link between Russia and Finland

Overload in direction of Central Russia: de-loading of Leningrad's NPP

Russia-Belarus

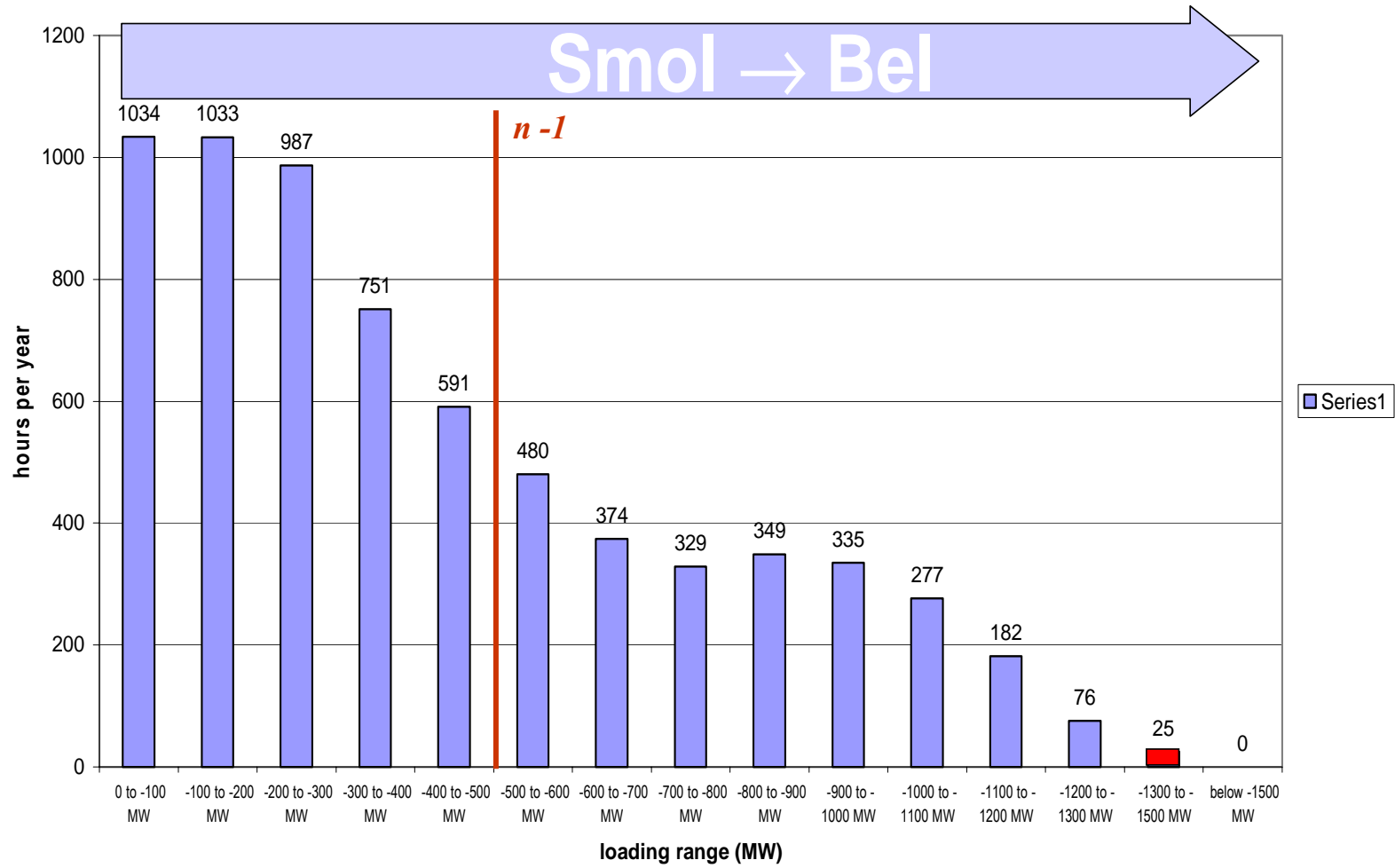
Overload in direction of Belarus: start-up of the hydro units on Daugava river HPP (Latvia); trip of the pumps (if available) and start-up of generators on Kruonio PSPP; disconnection of the load in Belarus

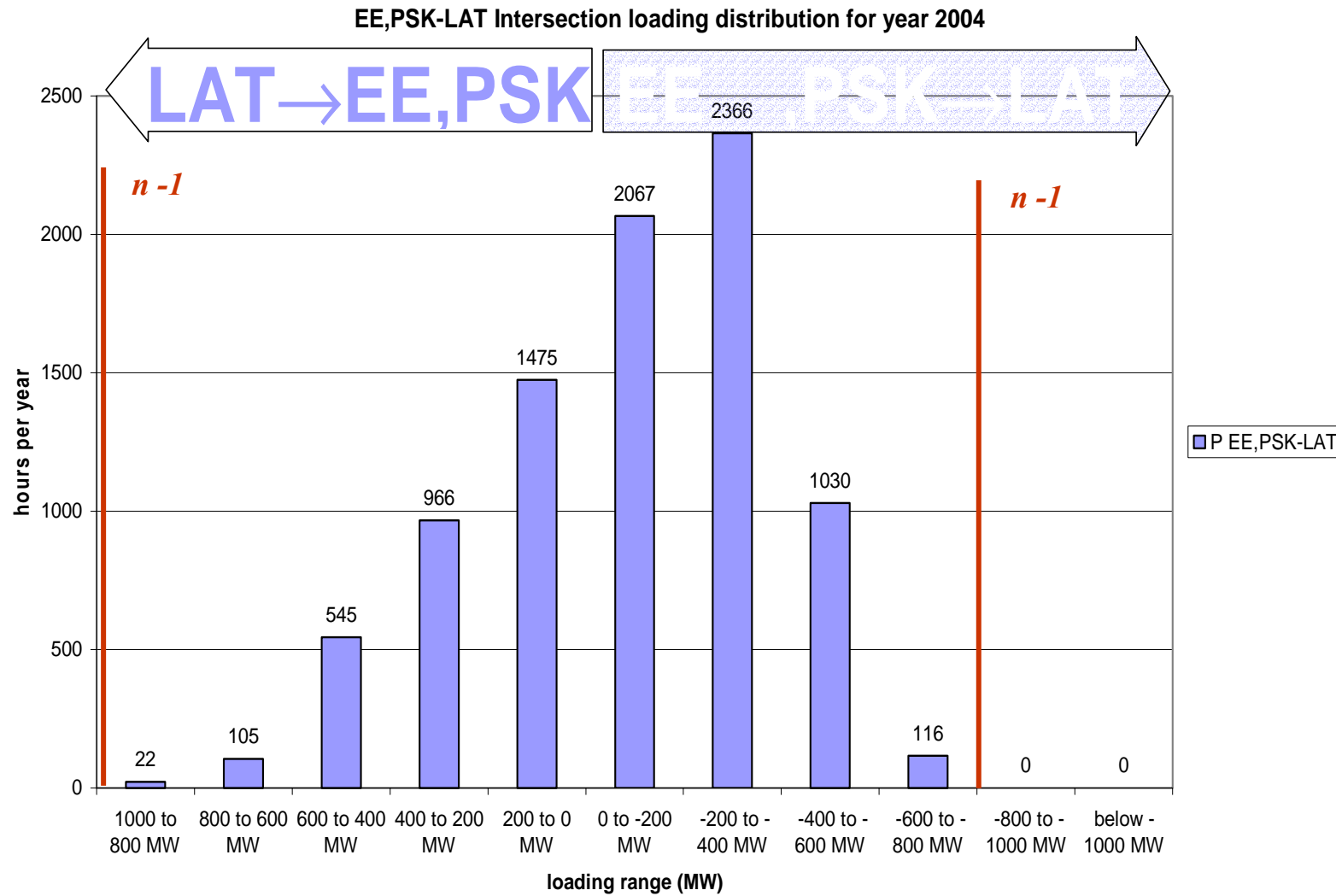
Ignalina NPP

Trip of the reactor (1300MW) or one generator (750MW): start-up of the hydro units on Daugava river HPP (Latvia); trip of the pumps (if available) and start-up of generators on Kruonio PSPP; disconnection of the load in Latvia, Lithuania and Belarus.



Smol -> Bel Intersection loading distribution for year 2004







Transfer capacity allocation methods at present

- *No transfer capacity allocation methods exist*
- *The power exchanges are based on bilateral monthly contracts*
- *No power reserve market – only mutually agreed emergency power reserves are kept for Baltic IPS, Russia UPS and Belarus IPS with no clear principles of use*
- *The power exchanges are allocated to transmission capacities on the basis “first come – first served” and “friendly iteration” principles*



BRELL Committee

BRELL stands for Belarus, Russia, Estonia, Latvia and Lithuania

The aims of the committee are:

- *To discuss all actual problems related to operation in the Electrical Ring*
- *To develop operational documents regarding control and real time planning for power systems*
- *To develop technical documents about security analysis methodology and emergency protection schemes related to operation in the Electrical Ring*
- *To develop commercial principles for trade, emergency power exchange and system services*



Baltic Power System Control Centre functions

Operational control of the Baltic IPS 330kV transmission network and coordination within the framework of BRELL Electrical Ring

Baltic IPS 330kV transmission network power flow planning, scheduling and coordination within the framework of BRELL Electrical Ring

Technical coordination of the Baltic IPS 330kV transmission network within the framework of BRELL Electrical Ring, including:

- ***coordination and calculation of relay and emergency protection settings***
- ***calculation of max allowed transmission capacities***
- ***issuing overhead line maintenance (monthly and annual) schedule taking into account limitations set by expected power exchanges and system stability requirements***

Consultancy services for the transmission systems



Problems with congestion management

- 1. Ignalina NPP decommissioning:
scheduled maintenance or emergency shutdown of second reactor;
full decommissioning in 2009*
- 2. Lack of power plants with competitive production costs*
- 3. Uncertainties in development of Russia electricity market operation principles*
- 4. Lack of transfer capacity allocation mechanisms within the electrical ring of the BRELL*
- 5. Incapability of Baltic power systems to solve market and congestion problems on their own*



Conclusions - Future actions

Development of:

The Baltic IPS power reserve market

Transfer capacity allocation principles in the BRELL Electrical Ring

Counter trade principles in the BRELL Electrical Ring

Incentive schemes for new competitive power plant installation