# 2009

# BALTIC REGIONAL GROUP ANNUAL REPORT

# CONTENT

# FOREWORD

The changes that are taking place in rfc energy sector all over Europe give us an opportunity to take part in all encompassing significant alterations. However, it is very important to follow the main jointly set course – the establishment of the single market of the Baltic States ensuring a high level of reliability and quality of management of the power system and its integration into Western European power systems.

The most significant event that haq recently taken place in the operation of our power system is the closure of the Ignalina nuclear power plant (NPP) which has facilitated and accelerated the development of power exchange in the Baltic States.

The closure of the Ignalina NPP on the last day of the year 2009 was a substantial technological alteration for the system that had used to work in a different mode. The Ignalina NPP that had been a significant power generating source which had generated 35 per cent of all power demand in the Baltic States was disconnected from the system.

The directions of power flows have dramatically changed recently – an exporting power system of Lithuania has become an importer as a power system of Latvia used to be, where import also prevailed and electrical capacity excess was mainly during the spring flood through the operation of a hydro power plant on the river Daugava.

The liberalized power markets require special attention of electricity transmission system operators (TSOs) in order to use all possible capacities of cross-border electricity transmission lines efficiently.

No doubt that harmonious work of all TSOs is one of the most important factors to pursue common goals of the power sector. All earlier mentioned changes for us – as a TSO – are like the turning from a smooth and straight road on to a mountain road that is a lot narrower due to the closure of the Ignalina NPP and twisting, as it is built upon the needs of the power market participants to liberalize power markets. There is no time to look around; we have to drive ahead at steady "speed" of 50 Hz and continually improve skills of cooperation between TSOs.

Dear Colleagues, thank you very much for your constructive cooperation.

On 1 April, 2010 we transferred the coordination of the operation of ENTSO-E Baltic Regional Group to the Estonian TSO – Elering OÜ. Good luck!

Daivis Virbickas
Convener of Baltic Regional Group ENTSO-E
System Operation Committee

Chief Technical Officer (CTO) of LITGRID

# Baltic Regional Group Activities

Baltic Regional Group (BRG) represents Lithuanian, Latvian and Estonian Transmission System Operators (TSO's). The Convener of BRG is Daivis Virbickas (LITGRID UAB, Lithuania). Convener changes every year according to agreed rotation principal Lithuania in 2009, Estonia in 2010 and Latvia in 2011.

In August 2009 System Operation Committee approved Terms of Reference (ToR) BRG. ToR includes the following tasks:

- Monitor, analyze and report on power-system quality-level, changes, important network operation events on a regular basis;
- Organize evaluation of integration in to the Baltic Power systems pan-European operational standards;
- Ensure the implementation of common development tools, used in the Baltic TSO's operational environment;
- Ensure that Electricity Market development in Baltic region is in compliance with security and reliability standards;
- Approve solutions that improve the reliability, security and efficiency of synchronous operation of transmission systems.

The main works for BRG in 2009 were:

- An updated Regulation for isolated operation of Baltic TSO's and Kaliningrad region from IPS/UPS and Instruction for dispatchers "Isolated operation Baltic TSO's and Kaliningrad region from IPS/UPS" was approved;
- An updated Baltic TSO's operational planning procedures were approved.

## Operation and Control of The Baltic TSO's

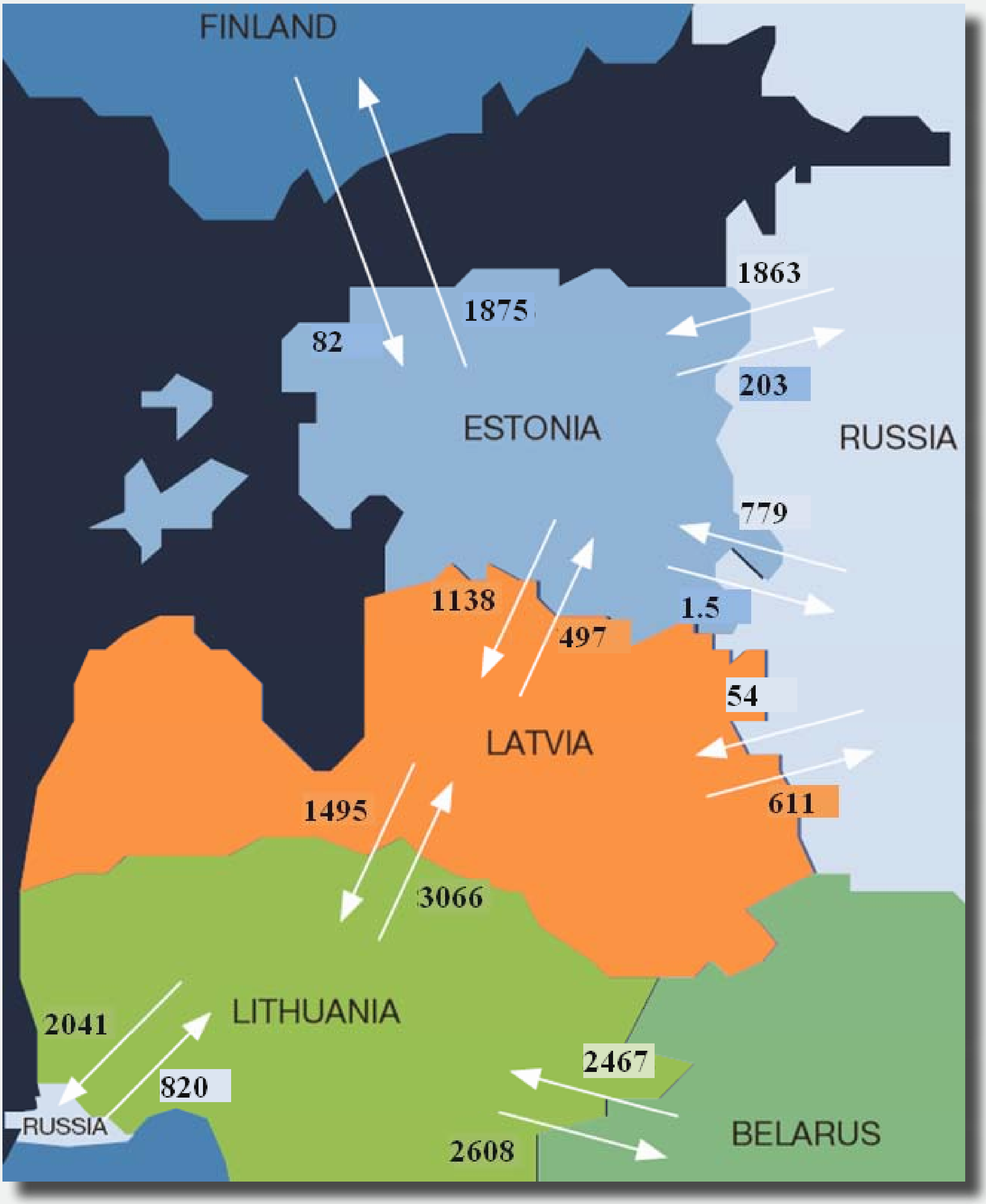
During 2009, dispatch control of the transmission grids in the Baltic States was carried out from three dispatch centres run by the following TSO's:

- Pohivork OÜ (Estonia). Elering OÜ from 19.06.2009;
- Augstsprieguma tīkls AS (Latvia);
- Lietuvos Energija AB (Lithuania). LITGRID UAB from 01.01.2010.

The transmission system operators perform:

- real time power system monitoring;
- the readiness to perform power system restoration after widespread disturbances;
- interchange security assessment of the BRELL (Belarus, Russia, Estonia, Latvia, Lithuania) transmission system network for the following day or month;
- power system cross - border balance settlements;
- calculations and reporting on wheeling energy through the power systems networks;
- calculations of the common disturbance generation reserves and reports on their activities.

# Exchanges of Electricity in 2009, GWh



# Security of Supply in the Baltic Interconnected Transmission Grid

Ensuring safe and quality electricity supply is the primary operational goal of the interconnected transmission grid. The Baltic States operate synchronously with the power systems of Russia and Belarus. The large scale of the nuclear units (with the productive capacity of 1000 and 1300 MW) necessitates tremendous responsibility for providing a reliable and efficient transmission system.

Consequently, the operators utilize different emergency automatic devices. First, the automatic start-up of selected reserve hydro power units or automatic thermal power plants load reduction is designed to prevent the operation of the load shedding devices.

This means that the power system's security criterion N–1 (in cases of particularly severe disturbances) is provided by special emergency protection systems, which are comprised of devices in several power systems e. g. starting up the hydro generators of Daugava Cascade and Kruonis pumped storage plant (PSP) from outage signals of Ignalina nuclear power plant or 330 kV overhead lines.

The most significant bottleneck in the region is in fact outside the Baltic States, namely at the border between Russia and Belarus. In case of an emergency in this area, extremely negative consequences are possible: the instability of the system operation, a long-term shortage of electricity, failure of electrical equipment and a low level (frequency, voltage) of available power. The most significant loading of this section, crucial for operation, is the closure of the Ignalina NPP in 2010.

In order to prevent asynchronous operation in different parts of the interconnected power systems in the case of an emergency, protective devices, called ALAR (Automatic Liquidation of Asynchronous Regime), have been installed to detect asynchronous operation over selected lines and to separate network parts.

In the case of significant frequency or voltage deviation, immediate emergency disconnection of the selected load is performed by respective load-shedding automatic devices that are intended to maintain a frequency level (49.2-49.8 Hz) in the power systems.

In the Baltic power systems, the total amount of the load connected to these devices is approximately 50 % of the peak load. However, emergency disconnection of the load is performed in stages with different frequency and time settings for each stage.

In order to stabilize the frequency, a hydro generator start-up and stopping systems are used in addition to the load shedding automatic devices.

In a number of cases, the emergency automatic devices are considered to be the last chance to avoid a power system blackout, and its activation should not occur under normal operation or rated N–1 outages (except the loss of a generator or unit in Ignalina NPP).

However, with the constant load growth and predicted generation deficit in the Baltic region, the importance of emergency automatic devices should not be understated.

Operation in a synchronously interconnected network allows the generators of the Baltic power system to operate under a primary control using a dead band of 0.1–0.25 Hz and droop of 4-6 %, while centralized frequency control is performed by a central controller by the UPS of EES Russia.

# Cooperation within BRELL

The organizations Belenergo (Belarus), ОАО ФСК ЕЭС and ОАО СО ЕЭС (Russia), Elering AS (Estonia), Augstsprieguma tīkls AS (Latvia) and Lietuvos Energija AB (Lithuania), concluded in 2001 an Agreement on Parallel Operations of Power Systems and established BRELL. This is a body for cooperation between transmission system operators.

The BRELL organization shall maintain conditions necessary for the reliable operation and interconnection of the power systems of Belarus, Russia, Estonia, Latvia and Lithuania and deal with:

- coordination in the area of Operational Standards;
- coordination in the area of development of the BRELL transmission system's long-term planning of the 220–330–750 kV network;
- modelling of the BRELL`s 220–330–750 kV network;
- O&C (incl. short-term planning of maintenance and performing switches of cross-border lines, information exchange and coordination between control centres in normal and emergency situations etc.);
- developing and maintaining conditions regarding Inter-TSO Compensation within BRELL.

# THE MAIN EVENTS

## Estonia

*Control-room of Elering OÜ*

## Current Situation of Transmission Grid

The transmission system operator of the Estonian power system owns network containing 110, 220 and 330 kV lines and substations and most of the 110 kV power transformers. However, according to the new Grid Code, new grid connections with Elering OÜ can be done only on the voltage of 110 or 330 kV. With neighbouring countries the Estonian power system is interconnected with five 330 kV transmission lines. With Latvia, Estonia has two 330 kV lines – one from Tartu, another from Tsirguliina substation. With Russia, Estonia has three 330 kV interconnection lines – one from Balti SS, second from Eesti PP and third from Tartu SS. From year 2006 the Estonian network is connected to Finland network via 350 MW DC submarine cable (Estlink).

4 April 2009 Elering OÜ has performed test of the separation of the Estonian Power System (EPS) from synchronously connected UPS/IPS grid. The main purposes of the test was an investigation of the capability of frequency regulation in isolated Estonian Power System during the fast and slow changing in demand with and without utilization of AFC (automatic frequency control) function of Estlink. Test was divided into the five stages:

1. Estonian Power System separation from synchronously connected UPS/IPS grid with surplus in demand.
a) Frequency regulation in isolated EPS due to a sudden change in demand decrease without utilization of AFC (automatic frequency control) function of EstLink;
b) Frequency regulation in isolated EPS with utilization of AFC functions of EstLink.
2. Frequency regulation in isolated EPS during the slow changing of generation with utilization of AFC function of EstLink.

3. Frequency regulation in isolated EPS during the fast changing of generation with utilization of AFC function of EstLink.
4. Frequency regulation in isolated EPS due to a sudden change in demand increase without utilization of AFC function of EstLink.

5. Reconnection of EPS with UPS/IPS.

EPS operates in island operation mode successfully 1 hour 40 min.

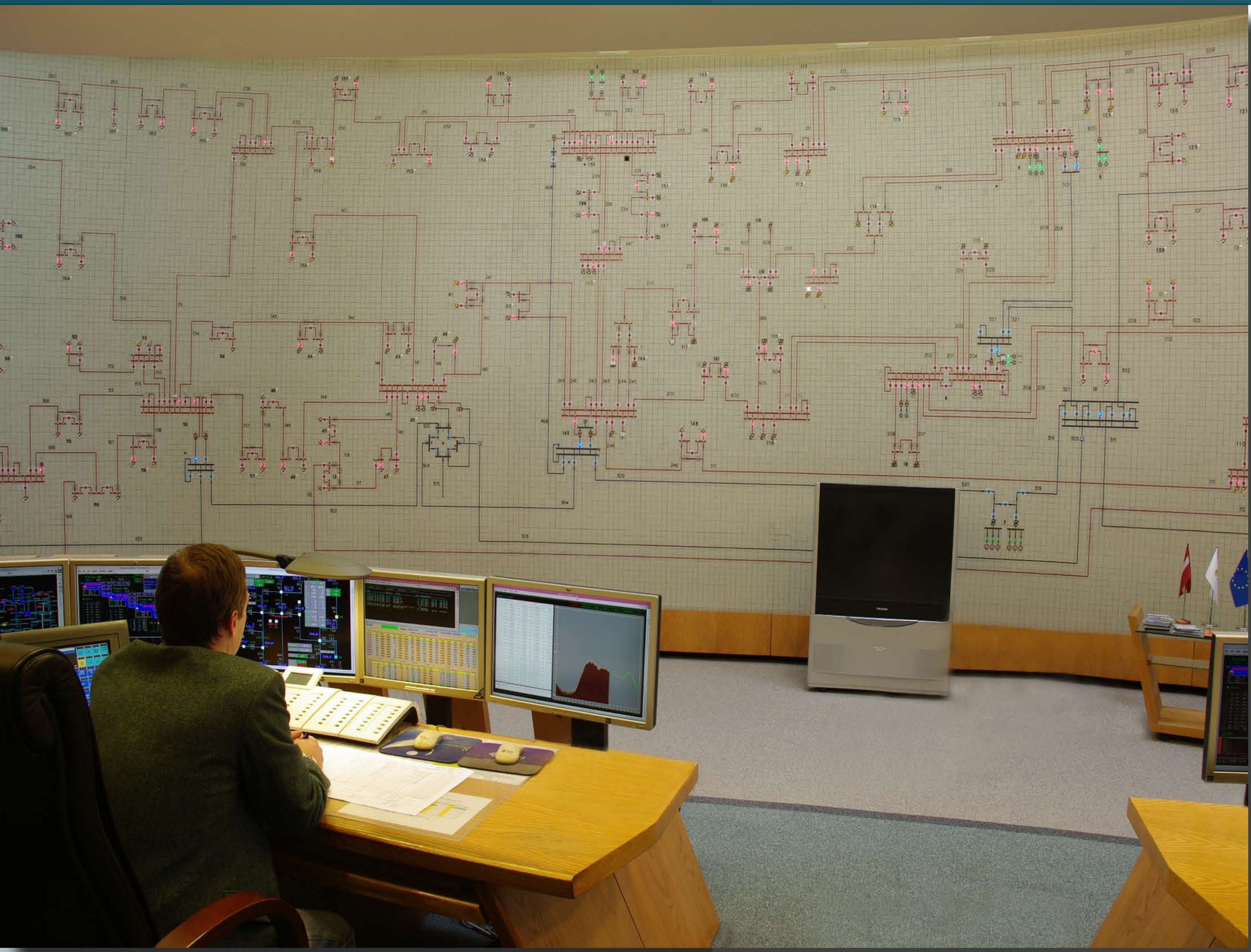
In 2009 the reconstruction of these substations was completed:
- Six 110 kV transformer substation (TS) with a total transformer capacity of 362 MVA;
- 110 kV Virtsu TS for a 16 MVA wind park connection;
- Expansion of the 110 kV Rõuste 110 kV TS for a 25 MVA wind park connection;
- 110 kV part of Püssi TS for a 150 MVA wind park connection.


## The Major Projects of Estonian Transmission Grid

The major projects are:

- *Underwater route study for Power Link to Finland (EstLink 2);*
- *Harku 330 kV substation expansion;*
- *Kiisa 330 kV substation renovation;*
- *Tartu-Sindi 330 kV overhead line construction;*
- *Renovation of the 330 kV line between Eesti PP and Püssi SS;*
- *Making data communication of substations IP-based.*

# Latvia



*Control-room of Augstsprieguma tīkls AS*

## Current Situation of Transmission Grid

Existing transmission network in Latvia consists from 110 and 330 kV lines and substations. 330 kV transmission network includes 23 lines with total length of 1258 km and 15 330 kV substations. Total installed capacity of transformers is 3200 MVA. 110 kV transmission network includes power lines with total length of 4072 km and 119 substations with 110 kV transformers 4698 MVA installed capacity.

Latvian transmission network have two interconnections with Estonia, one with Russia and four with Lithuania. The capacity of transmission network is sufficient to ensure safe operation of the power system in present time.

Valmiera 330 kV substation reconstruction and modernization is finished at the end of 2009. After Ignalina NPP closure Valmiera 330 kV substation will be important transit substation in the interconnected Baltic transmission system. Valmiera 110 kV substation switchyard reconstruction will be finished at the end of 2010.

New 110 kV substations constructed in 2009: "Matiss" and "Zolitude" in Riga and "Liepajas Metalurgs" in Liepaja. 110 kV "Matiss" substation is modern indoor substation, which is located in Riga city center. 110 kV substation "Liepajas metalurgs" is constructed prior to metal melting factory in Liepaja town with two new cable lines from Grobina substation.

The main need for Riga CHP1–Imanta 330 kV cable line construction is Riga 330 kV to close transmission ring around the Riga city and to provide reliable connection point for Kurzeme Ring project. Planned Riga CHP1–Imanta 330 kV cable commissioning date is 2012.


## The Major Projects of Latvian Transmission Grid

The major projects are:

- *Construction of new gas-steam 442 MW unit in Riga CHP2;*
- *The second 400 MW unit in Riga CHP–2 has to be constructed;*
- *Construction of Riga CHP1-Imanta 330 kV cable line in Riga;*
- *Latvia Western Region 330 kV transmission network (Kurzeme Ring) construction;*
- *Third Latvia-Estonia interconnection;*
- *110 kV Milgravis–Bolderaja transmission line.*

# Lithuania

*Control-room of LITGRID UAB*

## Current Situation of Transmission Grid

Transmission grid in Lithuania consists of 110 and 330 kV transformer substations and lines. Lietuvos Energija AB owns 229 transformer substations and switchyards, more than 6670 kilometres of 330 kV and 110 kV electric lines, the Kaunas Hydro Power Plant and the Kruonis Pumped Storage Plant. Both power plants are the main tools for ensuring capacity balances and regulation of regimes.

Lithuanian transmission system is interconnected by four 11. iT lines with Latvia, five with Belarus and three with Russia (the Kaliningrad Region). One of the main objectives of Lietuvos Energija AB is the integration of Lithuania's power system into the Western European electricity market along with the development of regional co-operation. By utilising the common capabilities of the power systems of the Baltic States, establishment of the Common Baltic Electricity Market needed for successful integration of the Baltic States into the electricity markets of Western Europe and the Nordic countries is projected.

Lietuvos Energija AB is one of the constituent parts in the parallely operating power systems of the Baltic States, Russia and Belarus, and manages energy flows vitally important to both industry and households.

In 2009, the construction of these substations was completed:

- Construction of 110 kV Sūdėnų wind farm switchyard;
- 110/10 kV Šventininkai TS.

The substations were reconstructed in 2009:

- 330 kV Vilnius TS;
- For 110/35/10 kV transformer substations Noreikiškės TS.

About 131 km of 110 kV electric lines were resconstructed.

In 2009 a new hydroturbine (No. 4) regulatory system was installed in Kruonis HPSPP. Thermocontrol system modernization was made in all power plants' hydrounits. In Kruonis HPSPP new drivers were installed and the monitoring software was updated.

Presently, the total installed capacity of power plants operating in the Lithuanian power system equals 5110 MW. Taking into consideration that a part of this capacity is used for own needs of power plants, the maximum available capacity equals approx. 4684 MW.


## The Major Projects of Lithuanian Transmission Grid

The major projects are:

- *Construction of new generatig units in power plants (Visaginas NPP, Lietuvos PP, Kruonis PSPP and etc.);*
- *Integration of new renewable energy sources;*
- *Construction of new interconnections (Lithuania-Poland and Lithuania-Sweden);*
- *330 kV Alytus substation reconstruction;*
- *Network preparation for synchronous connection with TESIS (new internal transmission lines, new PP and etc.).*

## Forty-five year's experience as a dispatcher

The closure of the Ignalina nuclear power plant was definitely a historical event, however, the biggest changes in our operation occurred after having regained the Independence, when the dispatch services were unbundled from the former Soviet Union jurisdiction. Just at the time as the operation of electricity transmission system of the three Baltic States was being adjusted we faced the largest number of new challenges.

The main goal currently set for power energy is the connection with the West. Having built the power bridges connecting Lithuania with Poland and Sweden, the work of a dispatcher will become even more complicated: a level of responsibility will increase and the communication with neighbouring power systems will be established in several foreign languages.

In my opinion, pursuing the earlier mentioned strategic goals and working day after day, we have to further aim at preserving unity, which is the most important. The cooperation between electricity transmission system operators of the Baltic States secures two main factors: mutual assistance and safety.

Arūnas Konradas Vasilis Vasiliauskas
LITGRID UAB

# STATISTICS

## Key Operational Indicators of Baltic TSO's in 2009

| | MEASURE | ESTONIA | LATVIA | LITHUANIA | BALTIC IPS |
|---|---|---|---|---|---|
| Installed capacity 2009 (net) | MW | 2440 | 2523 | 4684 | 9647 |
| Share of Baltic IPS | % | 25 | 26 | 49 | 100 |
| Peak load | MWh | 1462 | 1340 | 1713 | 4515 |
| Net consumption in 2009 | GWh | 7506 | 7029 | 7360 | 22.75 |
| Net consumption in 2008 | GWh | 8036 | 7573 | 1.32. | 24/27 |
| Change compared to 2008 | % | -7.1 | -7.7 | -/..0 | -8.3 |
| Total net generation in 2009 | GWh | 7504 | 5376 | 13500 | 26380 |
| Nuclear PP | GWh | | | 10025 | 10025 |
| Thermal PP | GWh | 7055 | 1902 | 2190 | 11145 |
| Hydro PP | GWh | | 3425 | 345 | 3770 |
| HPSPP (gen) | | | | 715 | 715 |
| Wind PP | GWh | 176 | 49 | 141 | 366 |
| OtherPP | GWh | 273 | | 83 | 356 |
| Total net generation in 2008 | GWh | 9103 | 5053 | 101/5 | 24251 |
| Change compared to 2008 | % | -21.4 | 6.0 | 6.6 | -..33 |
| Population | thousand | 1340 | 2250 | 3330 | 6920 |
| Consumption per capita | iWh | 5602 | 3124 | 0670 | 3260 |
| Export of electric power | GWh | 3216* | 2603** | 7715(( | |
| Import of electric power | GWh | 3221* | 4257** | 4783(( | |
| System saldo | GWh | -2 | -1654 | 2932 | |
| Output to grid | GWh | 10723 | 9631 | 16261 | |
| Losses in main grid 2009 | GWh | 332 | 281 | 1/2 | 905 |
| | % of output | 3.10 | 2.92 | /.50 | |
| Losses in main grid 2008 | GWh | 385 | 288 | 330 | 1003 |
| Change compared to 2008 | % | -16 | -2.5 | -12.0 | -10.4/ |

** Include ESTLINK*
*** Physical*

## Length of Overhead and Cable Power Transmission Lines in the Baltic Interconnected States

| | ESTONIA | LATVIA | LITHUANIA | BALTIC IPS |
|---|---|---|---|---|
| Length of 330 kV OHL, km | 1541 | 1249 | 1670 | 4460 |
| Length of 220 kV OHL, km | 184.3 | | | 184.3 |
| Length of 110 kV OHL, km | 3434 | 3910 | 4972 | 12316 |
| Length of 110 kV CL, km | 41.35 | 65.34 | 39 | 145.69 |
| Number of 330 kV transformers | 16 | 21 | 22 | 37 |
| Capacity of 330 kV transformers | 2680 | 3200 | 3750 | 7430 |

## Installed Capacity of Different Types of Plants in the Baltic Interconnected States

| | ESTONIA | LATVIA | LITHUANIA | BALTIC IPS |
|---|---|---|---|---|
| TOTAL | 2440 | 2523 | 4684 | 9647 |
| Conventional thermal PP* | 2303 | 937 | 2576 | 5816 |
| Hydro PP | 4 | 1558 | 76 | 1638 |
| Hydro pump storage PP | | | 760 | 760 |
| Nuclear PP | | | 1183 | 1183 |
| Wind PP | 133 | 28 | 89 | 250 |

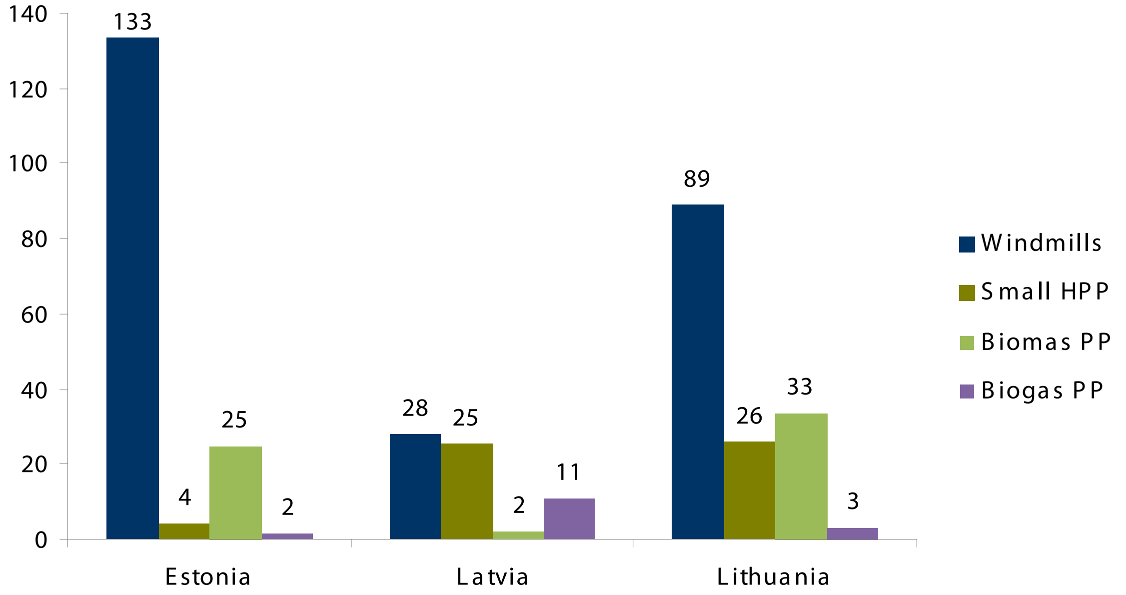
* *Thermal power plants plus combined heat and power (CHP) plants*

# Installed Capacity of Power Plants, MW

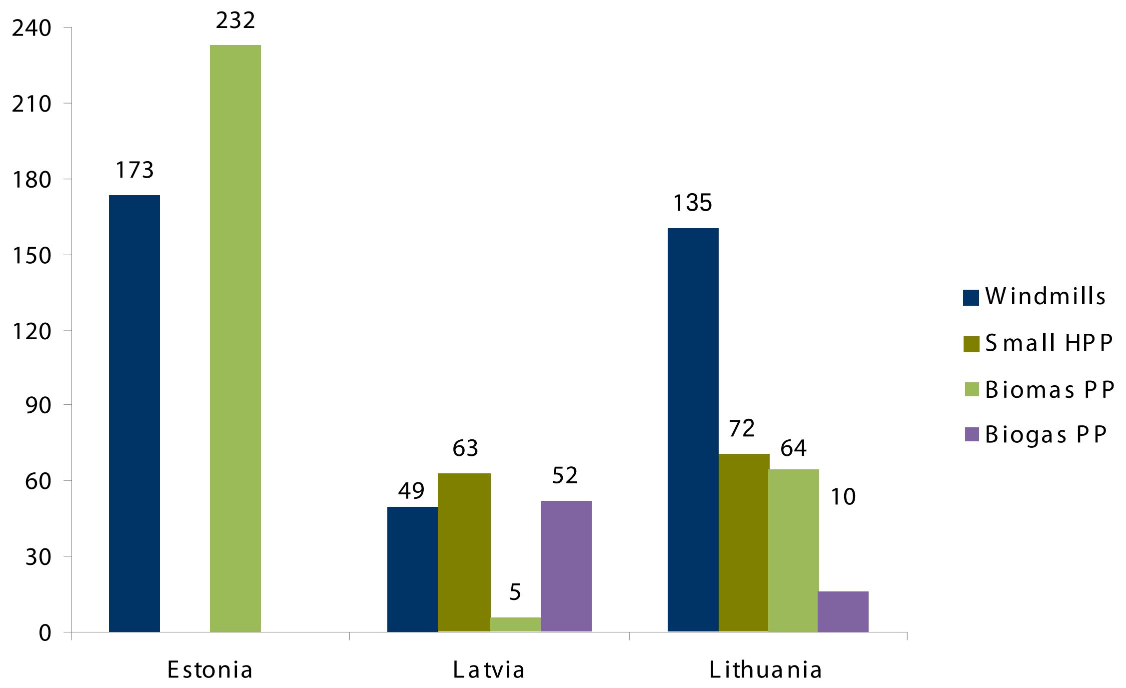
| | INSTALLED CAPACITY (GROSS) | | INSTALLED CAPACITY (NET) | |
|---|---|---|---|---|
| | 2008 | 2009 | 2008 | 2009 |
| ESTONIA | 2736 | 2840 | 2330 | 2440 |
| Balti PP | 765 | 765 | 654 | 654 |
| Eesti PP | 1615 | 1615 | 1346 | 1346 |
| IRU CHP | 176 | 176 | 176 | 156 |
| Windmill | 65 | 133 | 65 | 133 |
| Small PP | 112 | 147 | 86 | 147 |
| Hydro PP | 3 | 4 | 3 | 4 |
| LATVIA | 2566 | 2612 | 2476 | 2523 |
| Piavinas HPP | 869 | 884 | 860 | 875 |
| Kegums HPP | 264 | 264 | 261 | 261 |
| Rigas HPP | 402 | 402 | 397 | 397 |
| RCHP-1 | 144 | 144 | 139 | 139 |
| RCHP-2 | 662 | 662 | 597 | 597 |
| Imanta CHP | 45 | 45 | 42 | 42 |
| Windmill | 25 | 28 | 25 | 28 |
| Small PP | 155 | 184 | 155 | 184 |
| LITHUANIA | 507 . | 511 / | 4626 | 4684 |
| Ignalina NPP | 1300 | 1300 | 1183 | 1183 |
| Lietuvos PP | 1800 | 1800 | 1732 | 1732 |
| Vilnius CHP | 372 | 360 | 355 | 342 |
| Mažeikiai CHP | 160 | 160 | 148 | 148 |
| Kaunas TPP | 170 | 170 | 161 | 161 |
| Kaunas HPP | 101 | 101 | 50* | 50* |
| Kruonis PSP | 900 | 900 | 760 | 760 |
| Petrašiūnai TPP | 8 | 8 | 7 | 7 |
| Klaipėda CHP | 11 | 11 | 9 | 9 |
| Panevėžio CHP | 35 | 35 | 33 | 33 |
| Small hydro PP | 26 | 27 | 26 | 26 |
| Windmill | 68 | 91 | 68 | 89 |
| Biomass | 21 | 38 | 20 | 37 |
| Auto producers | 98 | 110 | 96 | 107 |

** By 2010 only two units of Kaunas HPP will be in operation*

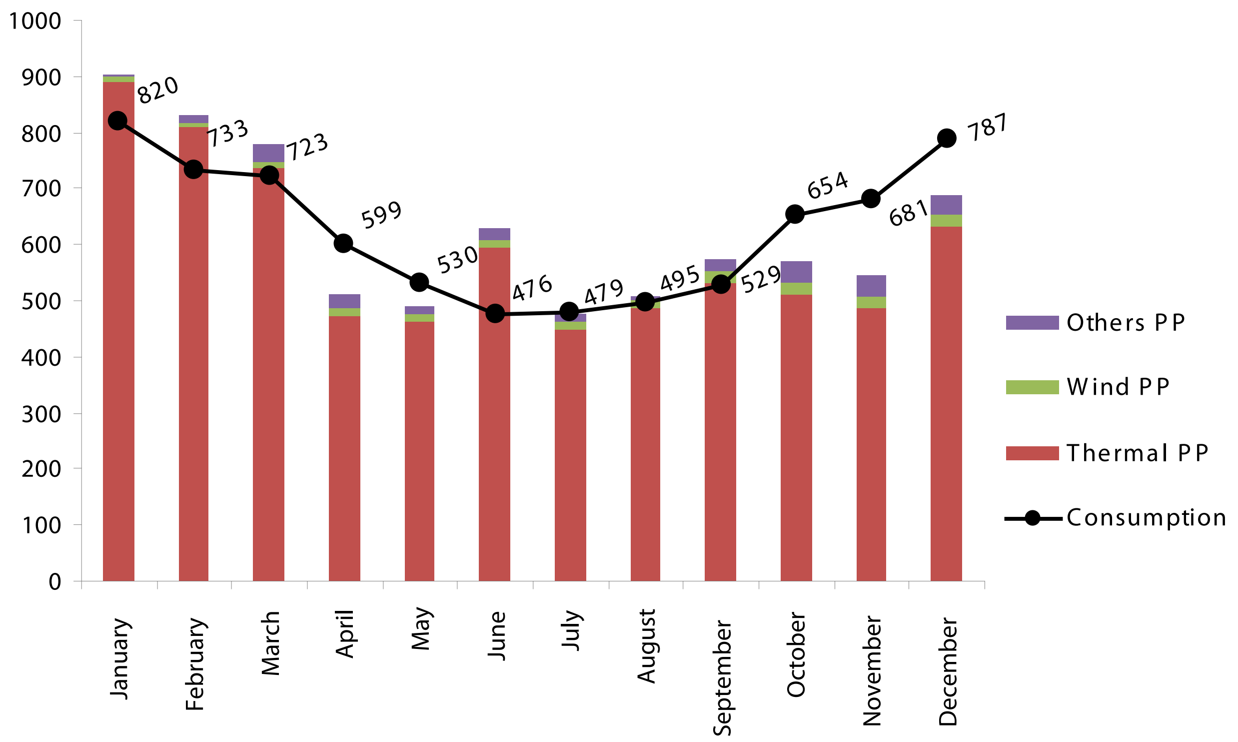
## Subsidized Energy Installed Capacity in the Baltic Interconnected States, MW




## Subsidized Energy Production in the Baltic Interconnected States, GWh

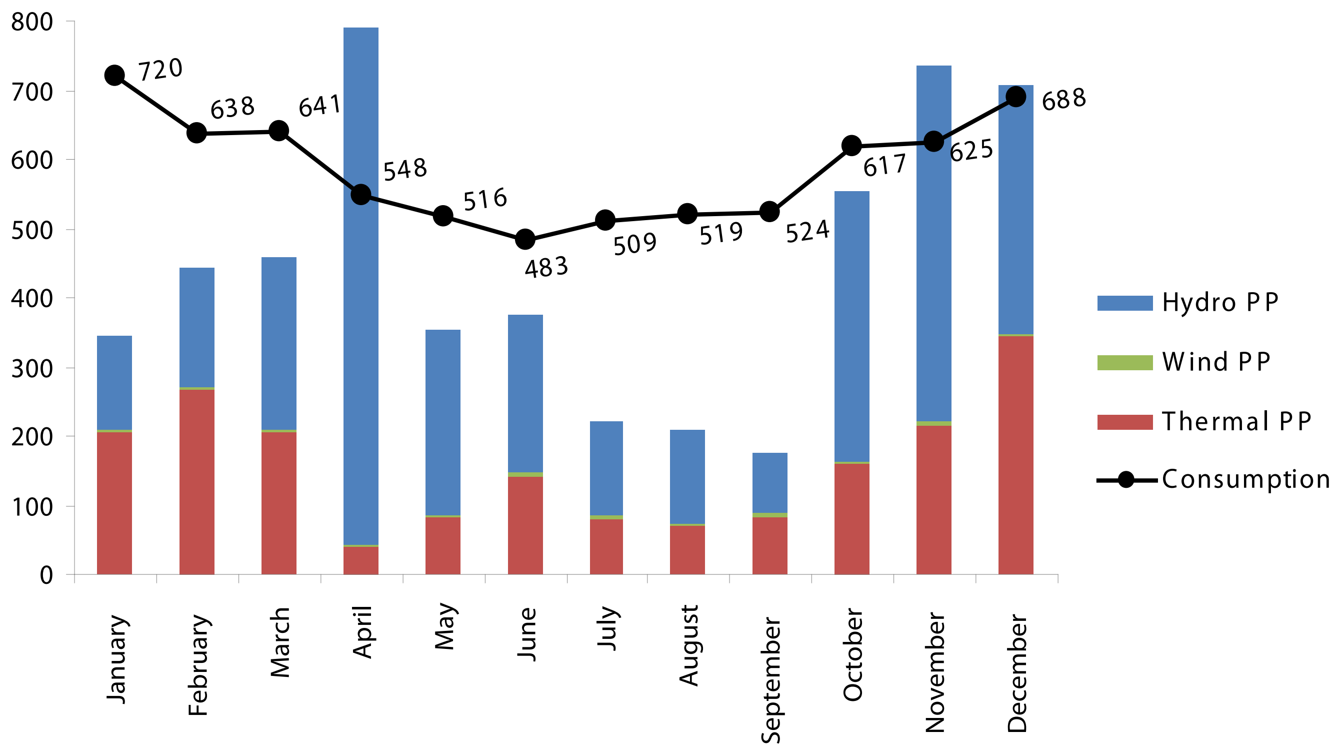


# Net Consumption and Production by Month in Estonia, GWh



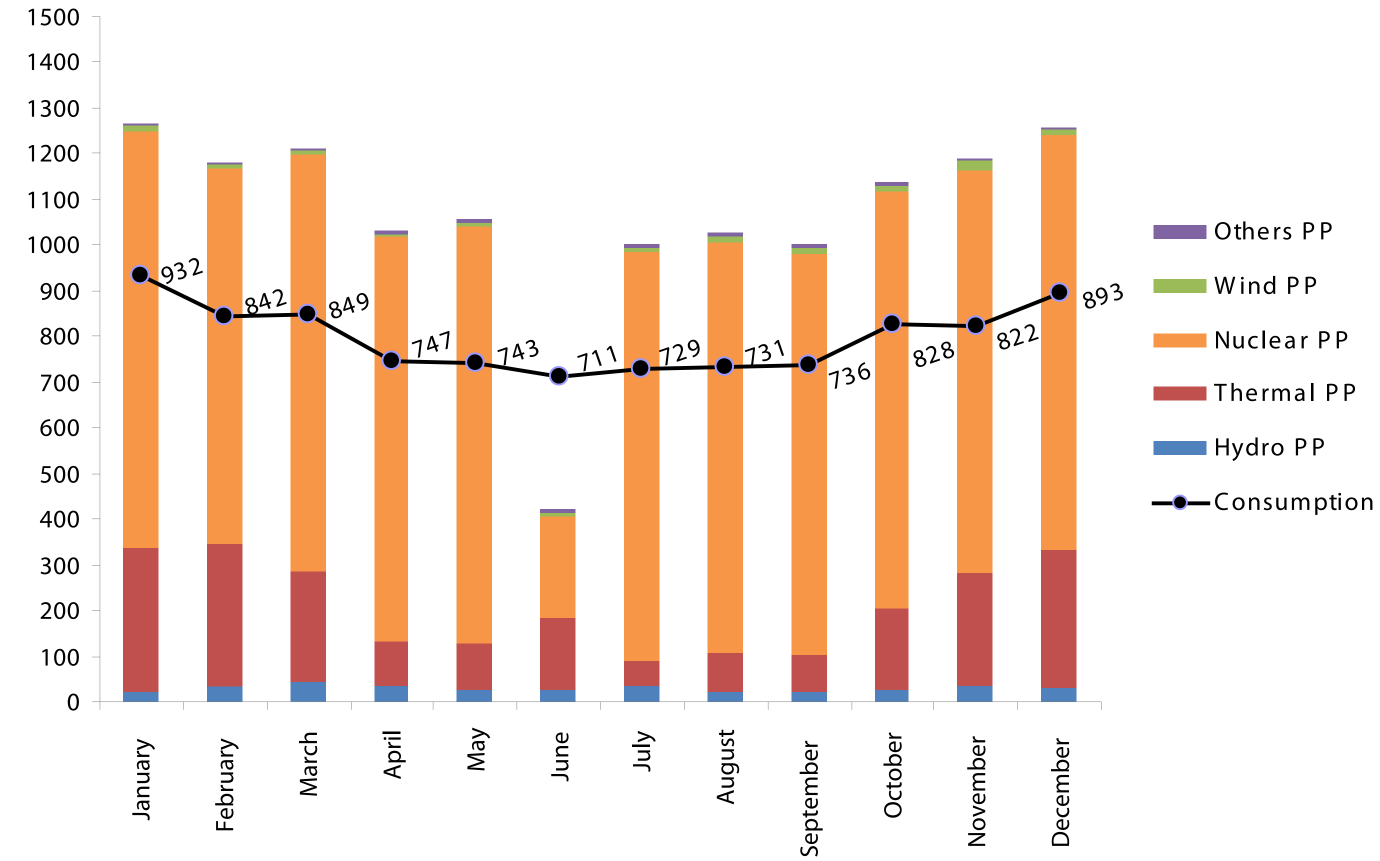

| Month | Consumption | Thermal PP | Wind PP | Others PP | Import | Export | Total |
|---|---|---|---|---|---|---|---|
| January | 820 | 889 | 10 | 5 | 319 | 403 | 904 |
| February | 733 | 808 | 8 | 15 | 245 | 343 | 831 |
| March | 723 | 738 | 9 | 32 | 275 | 331 | 779 |
| April | 599 | 473 | 11 | 25 | 372 | 282 | 509 |
| May | 530 | 460 | 14 | 17 | 264 | 225 | 491 |
| June | 476 | 594 | 15 | 21 | 137 | 291 | 630 |
| July | 479 | 450 | 12 | 15 | 171 | 169 | 477 |
| August | 495 | 486 | 12 | 8 | 141 | 152 | 506 |
| September | 529 | 531 | 21 | 22 | 194 | 239 | 574 |
| October | 654 | 509 | 22 | 39 | 317 | 233 | 570 |
| November | 681 | 485 | 21 | 39 | 410 | 274 | 545 |
| December | 787 | 632 | 21 | 35 | 376 | 277 | 688 |
| Total | 7506 | 7055 | 176 | 273 | 3221 | 3219 | 7504 |

## Net Consumption and Production by Month in Latvia, GWh




| Month | Consumption | Thermal PP | Hydro PP | Wind PP | Import | Export | Total |
|---|---|---|---|---|---|---|---|
| January | 720 | 205 | 134 | 5 | 494 | 118 | 345 |
| February | 638 | 269 | 171 | 3 | 339 | 144 | 442 |
| March | 641 | 206 | 249 | 3 | 347 | 165 | 459 |
| April | 548 | 40 | 748 | 3 | 170 | 413 | 791 |
| May | 516 | 83 | 268 | 4 | 392 | 231 | 355 |
| June | 483 | 143 | 229 | 4 | 297 | 189 | 376 |
| July | 509 | 81 | 138 | 3 | 414 | 127 | 223 |
| August | 519 | 72 | 135 | 4 | 437 | 129 | 210 |
| September | 524 | 82 | 88 | 6 | 420 | 72 | 176 |
| October | 618 | 159 | 391 | 5 | 341 | 278 | 555 |
| November | 625 | 217 | 514 | 6 | 273 | 385 | 737 |
| December | 688 | 344 | 361 | 4 | 333 | 353 | 708 |
| Total | 7029 | 1902 | 3425 | 49 | 4257 | 2603 | 5376 |

# Net Consumption and Production by Month in Lithuania, GWh




| Month | Consumption | Thermal PP | Hydro PP | Nuclear PP | Hydro pumped-storage PP | Wind PP | Others PP | Import | Export | Total | Hydro pumped-storage PP pumping |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 932 | 315 | 21 | 913 | 64 | 11 | 4 | 403 | 701 | 1328 | 98 |
| February | 842 | 311 | 34 | 824 | 56 | 7 | 4 | 315 | 635 | 1237 | 76 |
| March | 849 | 246 | 42 | 909 | 54 | 8 | 7 | 317 | 655 | 1265 | 78 |
| April | 747 | 99 | 34 | 885 | 52 | 7 | 8 | 494 | 763 | 1084 | 69 |
| May | 743 | 104 | 26 | 910 | 43 | 10 | 9 | 432 | 724 | 1101 | 65 |
| June | 711 | 158 | 26 | 219 | 59 | 10 | 9 | 546 | 237 | 481 | 79 |
| July | 729 | 57 | 33 | 894 | 56 | 9 | 9 | 396 | 651 | 1058 | 75 |
| August | 731 | 87 | 21 | 898 | 68 | 11 | 9 | 354 | 618 | 1094 | 100 |
| September | 736 | 85 | 20 | 874 | 57 | 17 | 8 | 340 | 586 | 1059 | 78 |
| October | 828 | 181 | 25 | 909 | 66 | 16 | 7 | 437 | 723 | 1205 | 90 |
| November | 822 | 246 | 33 | 883 | 67 | 21 | 6 | 346 | 685 | 1257 | 96 |
| December | 893 | 301 | 31 | 907 | 74 | 14 | 4 | 403 | 737 | 1331 | 103 |
| Total | 9562 | 2190 | 345 | 10025 | 715 | 141 | 83 | 4783 | 7715 | 13500 | 1006 |

## Peak Load in the Baltic Interconnected States

| TSO | Peak load, MWh | Date | Time, h | Temperature at the time of max, C | Generation, MW | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermal PP | Nuclear PP | Kruonio HPSPP | Hydro PP | ESTLINK | Windmills | Small PP |
| Estonia (net) | 1462 | 2009.12.18 | 17:00 | -14 | 1340 | | | | | 24 | 21 |
| Latvia (gross) | 1340 | 2009.01.05 | 18:00 | -12 | 243 | | | 438 | | 3 | 34 |
| Lithuania (net) | 1713 | 2009.01.05 | 18:00 | -15 | 334 | 1223 | 355 | 20 | | 6 | 31 |
| Baltic IPS | 4515 | | | | 1917 | 1223 | 355 | 458 | | 33 | 86 |

## Minimum Load in the Baltic Interconnected States

| TSO | Peak load, MWh | Date | Time, h | Temperature at the time of max, $^{0}C$ | Generation, MW | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Thermal PP | Nuclear PP | Kruonio HPSPP | Hydro PP | ESTLINK | Windmills | Small PP |
| Estonia (net) | 403 | 2009.06.24 | 05:00 | 9 | 601 | | | | | 25 | 20 |
| Latvia (gross) | 371 | 2009.06.26 | 06:00 | 20 | 247 | | | 214 | | 11 | 29 |
| Lithuania (net) | 628 | 2009.07.06 | 06:00 | 8 | 61 | 1204 | -439 | 35 | | 1 | 30 |
| Baltic IPS | 1402 | | | | 909 | 1204 | -439 | 249 | | 37 | 79 |

## Peak Load and Average Temperatures in the Baltic Interconnected States by Month

| | January | February | March | April | May | June | July | August | September | October | November | December | Average of year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Estonian peak load (net), MWh | 1404 | 1369 | 1246 | 1090 | 933 | 906 | 831 | 890 | 953 | 1210 | 1229 | 1462 | 1127 |
| Average ambient temperature | -1.9 | -4.3 | -0.7 | 5.4 | 10.8 | 13.5 | 16.9 | 16.1 | 13.6 | 5 | 2.8 | -3.9 | 6.1 |
| Normal temperature | -5.5 | -5.7 | -2.1 | 3.4 | 9.8 | 14.5 | 16.4 | 15.5 | 11.1 | 6.5 | 1.4 | -2.8 | 5.2 |
| Latvian peak load (gross), MWh | 1340 | 1238 | 1112 | 1030 | 957 | 885 | 849 | 865 | 928 | 1058 | 1122 | 1264 | 1054 |
| Average ambient temperature | -1.6 | -2.8 | 0.9 | 8.4 | 12.9 | 15.3 | 18.8 | 17.4 | 14.8 | 5.9 | 4.3 | -2 | 7.7 |
| Normal temperature | -5.3 | -4.9 | -1.3 | 4.5 | 10.9 | 14.9 | 16.4 | 15.7 | 11.4 | 6.8 | 1.6 | -2.7 | 5.7 |
| Lithuanian peak load (net), MWh | 1713 | 1627 | 1500 | 1391 | 1292 | 1273 | 1274 | 1278 | 1312 | 1466 | 1526 | 1665 | 1445 |
| Average ambient temperature | -1.9 | -2.5 | 1.4 | 8.3 | 13.3 | 15.5 | 19.7 | 17.8 | 14.7 | 5.6 | 4.1 | -2.1 | 7.8 |
| Normal temperature | -5.1 | -4.6 | -0.7 | 5.4 | 11.9 | 15.4 | 16.7 | 16.2 | 11.9 | 7.2 | 2.0 | -2.0 | 6.2 |

## Estonian Net Consumption and Production on Day of Peak Load (Net), MWh/h (18 December 2009)

| Hour | CONSUMPTION | GENERATION | BATLI PP | EESTI PP | IRU CHP | WINDMILL | SMALL PP | ESTLINK |
|---|---|---|---|---|---|---|---|---|
| 1 | 1054 | 1069 | 144 | 860 | 0 | 27 | 38 | 380 |
| 2 | 1014 | 1030 | 144 | 818 | 0 | 30 | 38 | 380 |
| 3 | 997 | 1009 | 144 | 793 | 0 | 33 | 38 | 380 |
| 4 | 994 | 1003 | 145 | 788 | 0 | 33 | 38 | 380 |
| 5 | 999 | 1111 | 144 | 897 | 0 | 33 | 37 | 380 |
| 6 | 1034 | 1138 | 145 | 948 | 0 | 26 | 20 | 380 |
| 7 | 1143 | 1213 | 144 | 1028 | 0 | 26 | 15 | 380 |
| 8 | 1292 | 1374 | 142 | 1190 | 0 | 27 | 15 | 379 |
| 9 | 1403 | 1362 | 141 | 1181 | 0 | 25 | 15 | 379 |
| 10 | 1419 | 1355 | 140 | 1188 | 0 | 19 | 8 | 379 |
| 11 | 1419 | 1348 | 141 | 1186 | 0 | 19 | 3 | 362 |
| 12 | 1409 | 1349 | 143 | 1186 | 0 | 19 | 1 | 382 |
| 13 | 1387 | 1349 | 142 | 1186 | 0 | 18 | 3 | 383 |
| 14 | 1385 | 1361 | 142 | 1187 | 0 | 19 | 12 | 383 |
| 15 | 1372 | 1371 | 144 | 1193 | 0 | 17 | 17 | 383 |
| 16 | 1397 | 1376 | 144 | 1193 | 0 | 18 | 22 | 383 |
| 17 | 1462 | 1385 | 145 | 1194 | 0 | 24 | 21 | 383 |
| 18 | 1450 | 1392 | 145 | 1195 | 0 | 30 | 23 | 383 |
| 19 | 1414 | 1408 | 144 | 1197 | 0 | 34 | 34 | 383 |
| 20 | 1373 | 1415 | 144 | 1196 | 0 | 41 | 34 | 383 |
| 21 | 1329 | 1413 | 144 | 1195 | 0 | 44 | 29 | 383 |
| 22 | 1279 | 1346 | 143 | 1128 | 0 | 45 | 30 | 383 |
| 23 | 1208 | 1254 | 145 | 1034 | 0 | 44 | 30 | 383 |
| 24 | 1141 | 1140 | 145 | 924 | 0 | 42 | 29 | 381 |

# Estonian Net Consumption and Production on Day of Minimum Load (Net), MWh/h (24 June 2009)

| HOUR | CONSUMPTION | GENERATION | BATLI PP | EESTI PP | IRU CHP | WINDMILL | SMALL PP | ESTLINK |
|---|---|---|---|---|---|---|---|---|
| 1 | 503 | 821 | 0 | 776 | 0 | 24 | 21 | -68 |
| 2 | 485 | 792 | 0 | 755 | 0 | 16 | 21 | -65 |
| 3 | 463 | 787 | 0 | 748 | 0 | 18 | 20 | -65 |
| 4 | 428 | 668 | 0 | 629 | 0 | 20 | 19 | -168 |
| 5 | 403 | 647 | 0 | 601 | 0 | 25 | 20 | -174 |
| 6 | 405 | 644 | 0 | 597 | 0 | 26 | 21 | -176 |
| 7 | 418 | 682 | 0 | 641 | 0 | 20 | 21 | -167 |
| 8 | 447 | 768 | 0 | 739 | 0 | 9 | 21 | -70 |
| 9 | 491 | 826 | 0 | 800 | 0 | 5 | 20 | -52 |
| 10 | 531 | 855 | 0 | 828 | 0 | 7 | 20 | -65 |
| 11 | 558 | 888 | 0 | 858 | 0 | 10 | 21 | -65 |
| 12 | 574 | 895 | 0 | 861 | 0 | 12 | 21 | -65 |
| 13 | 576 | 917 | 0 | 878 | 0 | 18 | 21 | -65 |
| 14 | 573 | 917 | 0 | 870 | 0 | 25 | 21 | -65 |
| 15 | 571 | 920 | 0 | 871 | 0 | 27 | 21 | -65 |
| 16 | 564 | 905 | 0 | 855 | 0 | 29 | 21 | -65 |
| 17 | 567 | 902 | 0 | 855 | 0 | 25 | 21 | -65 |
| 18 | 574 | 900 | 0 | 856 | 0 | 23 | 21 | -65 |
| 19 | 578 | 909 | 0 | 866 | 0 | 21 | 22 | -65 |
| 20 | 580 | 917 | 0 | 877 | 0 | 17 | 23 | -65 |
| 21 | 582 | 931 | 0 | 889 | 0 | 19 | 23 | -65 |
| 22 | 576 | 908 | 0 | 863 | 0 | 20 | 25 | -65 |
| 23 | 562 | 905 | 0 | 855 | 0 | 25 | 25 | -65 |
| 24 | 546 | 902 | 0 | 841 | 0 | 38 | 23 | -65 |

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GENERATING OPPORTUNITIES

# Latvian Net Consumption and Production on Day of Peak Load (Gross), MWh/h (5 January 2009)

| HOUR | CONSUMPTION | GENERATION | PLAVINAS HPP | KEGUMS HPP | RIGAS HPP | RCHP-1 | RCHP-2 | IMANTA CHP | WINDMILL | SMALL PP |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 825 | 276 | 0 | 0 | 0 | 135 | 65 | 41 | 1 | 34 |
| 2 | 770 | 275 | 0 | 0 | 0 | 134 | 65 | 41 | 1 | 34 |
| 3 | 747 | 277 | 0 | 0 | 0 | 134 | 65 | 42 | 2 | 34 |
| 4 | 740 | 276 | 0 | 0 | 0 | 134 | 64 | 41 | 3 | 34 |
| 5 | 751 | 275 | 0 | 0 | 0 | 133 | 63 | 42 | 3 | 34 |
| 6 | 800 | 273 | 0 | 0 | 0 | 133 | 63 | 42 | 1 | 34 |
| 7 | 941 | 273 | 0 | 0 | 0 | 133 | 63 | 41 | 2 | 34 |
| 8 | 1129 | 450 | 178 | 0 | 0 | 133 | 64 | 41 | 0 | 34 |
| 9 | 1247 | 486 | 179 | 35 | 0 | 132 | 64 | 41 | 1 | 34 |
| 10 | 1278 | 540 | 181 | 35 | 51 | 132 | 63 | 41 | 3 | 34 |
| 11 | 1289 | 605 | 181 | 55 | 101 | 135 | 64 | 33 | 2 | 34 |
| 12 | 1277 | 611 | 181 | 55 | 101 | 136 | 64 | 38 | 2 | 34 |
| 13 | 1231 | 522 | 90 | 55 | 101 | 137 | 63 | 40 | 2 | 34 |
| 14 | 1232 | 520 | 90 | 55 | 100 | 136 | 63 | 41 | 1 | 34 |
| 15 | 1227 | 522 | 90 | 55 | 100 | 137 | 64 | 41 | 1 | 34 |
| 16 | 1230 | 612 | 180 | 55 | 101 | 137 | 63 | 41 | 1 | 34 |
| 17 | 1305 | 564 | 181 | 55 | 51 | 137 | 65 | 41 | 0 | 34 |
| 18 | 1340 | 718 | 270 | 117 | 51 | 137 | 65 | 41 | 3 | 34 |
| 19 | 1329 | 714 | 271 | 117 | 51 | 137 | 63 | 41 | 0 | 34 |
| 20 | 1293 | 674 | 180 | 116 | 101 | 137 | 65 | 41 | 0 | 34 |
| 21 | 1254 | 610 | 180 | 54 | 101 | 136 | 64 | 41 | 0 | 34 |
| 22 | 1194 | 566 | 181 | 54 | 51 | 137 | 65 | 41 | 3 | 34 |
| 23 | 1080 | 385 | 89 | 18 | 0 | 137 | 64 | 42 | 1 | 34 |
| 24 | 958 | 277 | 0 | 0 | 0 | 137 | 64 | 41 | 1 | 34 |

# Latvian Net Consumption and Production on Day of Minimum Load (Gross), MWh/h (26 June 2009)

| HOUR | CONSUMPTION | GENERATION | PLAVINAS HPP | KEGUMS HPP | RIGAS HPP | RCHP-1 | RCHP-2 | IMANTA CHP | WINDMILL | SMALL PP |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 494 | 535 | 180 | 71 | 0 | 0 | 221 | 26 | 8 | 29 |
| 2 | 463 | 441 | 89 | 71 | 0 | 0 | 222 | 22 | 8 | 29 |
| 3 | 435 | 437 | 89 | 71 | 0 | 0 | 221 | 22 | 5 | 29 |
| 4 | 410 | 403 | 89 | 35 | 0 | 0 | 221 | 22 | 7 | 29 |
| 5 | 375 | 408 | 90 | 35 | 0 | 0 | 222 | 22 | 10 | 29 |
| 6 | 371 | 501 | 179 | 35 | 0 | 0 | 223 | 24 | 11 | 29 |
| 7 | 389 | 504 | 179 | 35 | 0 | 0 | 221 | 32 | 8 | 29 |
| 8 | 410 | 591 | 179 | 71 | 51 | 0 | 221 | 32 | 8 | 29 |
| 9 | 453 | 591 | 179 | 71 | 50 | 0 | 222 | 32 | 8 | 29 |
| 10 | 493 | 416 | 89 | 36 | 0 | 0 | 221 | 32 | 9 | 29 |
| 11 | 528 | 466 | 90 | 36 | 50 | 0 | 220 | 32 | 9 | 29 |
| 12 | 547 | 508 | 89 | 71 | 51 | 0 | 222 | 32 | 14 | 29 |
| 13 | 553 | 508 | 90 | 70 | 50 | 0 | 221 | 33 | 15 | 29 |
| 14 | 558 | 508 | 89 | 70 | 50 | 0 | 222 | 32 | 16 | 29 |
| 15 | 553 | 523 | 90 | 34 | 100 | 0 | 222 | 33 | 15 | 29 |
| 16 | 548 | 503 | 89 | 18 | 101 | 0 | 221 | 33 | 12 | 29 |
| 17 | 548 | 505 | 89 | 18 | 100 | 0 | 221 | 33 | 15 | 29 |
| 18 | 560 | 507 | 89 | 18 | 102 | 0 | 221 | 33 | 15 | 29 |
| 19 | 572 | 597 | 179 | 70 | 50 | 0 | 221 | 33 | 15 | 29 |
| 20 | 579 | 502 | 89 | 70 | 50 | 0 | 220 | 33 | 11 | 29 |
| 21 | 589 | 596 | 180 | 70 | 51 | 0 | 222 | 33 | 11 | 29 |
| 22 | 591 | 556 | 179 | 36 | 50 | 0 | 220 | 33 | 9 | 29 |
| 23 | 582 | 555 | 179 | 36 | 51 | 0 | 220 | 33 | 7 | 29 |
| 24 | 556 | 559 | 179 | 36 | 51 | 0 | 221 | 33 | 10 | 29 |

# Lithuanian Net Consumption and Production on Day of Peak Load (Net), MWh/h (5 January 2009)

| HOUR | CONSUMPTION | GENERATION | IGNALINA NPP | LIETUVOS PP | VILNIUS CHP 3 | KAUNAS CHP | MAZEIKAI CHP | KAUNAS HPP | KRUONIO HPSPP | WIND-MILL | SMALL PP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1013 | 1604 | 1221 | 72 | 120 | 140 | 0 | 24 | -218 | 3 | 27 |
| 2 | 957 | 1604 | 1222 | 72 | 120 | 140 | 0 | 24 | -218 | 3 | 26 |
| 3 | 930 | 1603 | 1220 | 72 | 121 | 140 | 0 | 24 | -217 | 4 | 26 |
| 4 | 924 | 1610 | 1224 | 73 | 121 | 139 | 0 | 24 | -289 | 5 | 29 |
| 5 | 937 | 1608 | 1221 | 71 | 121 | 139 | 0 | 24 | -297 | 7 | 32 |
| 6 | 1002 | 1610 | 1224 | 71 | 120 | 140 | 0 | 24 | -217 | 7 | 31 |
| 7 | 1223 | 1605 | 1222 | 71 | 120 | 140 | 0 | 24 | -76 | 4 | 28 |
| 8 | 1441 | 1745 | 1222 | 72 | 120 | 140 | 0 | 24 | 141 | 3 | 26 |
| 9 | 1570 | 1812 | 1216 | 72 | 121 | 140 | 0 | 21 | 218 | 3 | 24 |
| 10 | 1603 | 1817 | 1216 | 73 | 121 | 140 | 0 | 21 | 217 | 4 | 29 |
| 11 | 1621 | 1824 | 1228 | 73 | 121 | 140 | 0 | 21 | 213 | 4 | 28 |
| 12 | 1621 | 1814 | 1222 | 73 | 121 | 140 | 0 | 21 | 209 | 5 | 28 |
| 13 | 1580 | 1810 | 1219 | 72 | 121 | 140 | 0 | 21 | 208 | 7 | 29 |
| 14 | 1566 | 1816 | 1222 | 73 | 121 | 140 | 0 | 21 | 211 | 5 | 28 |
| 15 | 1549 | 1813 | 1220 | 73 | 121 | 140 | 0 | 20 | 210 | 6 | 29 |
| 16 | 1550 | 1816 | 1223 | 72 | 121 | 140 | 0 | 20 | 209 | 5 | 31 |
| 17 | 1623 | 1873 | 1222 | 72 | 121 | 140 | 0 | 20 | 265 | 7 | 33 |
| 18 | 1713 | 1963 | 1223 | 72 | 121 | 141 | 0 | 20 | 355 | 6 | 31 |
| 19 | 1693 | 1957 | 1225 | 72 | 121 | 140 | 0 | 20 | 350 | 4 | 29 |
| 20 | 1654 | 1943 | 1223 | 72 | 120 | 140 | 0 | 21 | 339 | 4 | 28 |
| 21 | 1603 | 1924 | 1221 | 72 | 120 | 140 | 0 | 21 | 319 | 6 | 31 |
| 22 | 1498 | 1785 | 1223 | 72 | 121 | 140 | 0 | 21 | 181 | 4 | 27 |
| 23 | 1326 | 1684 | 1221 | 73 | 121 | 139 | 0 | 19 | 84 | 2 | 27 |
| 24 | 1180 | 1599 | 1222 | 72 | 121 | 140 | 0 | 20 | -118 | 1 | 24 |

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# Lithuanian Net Consumption and Production on Day of Minimum Load (Net), MWh/h (6 July 2009)

| HOUR | CONSUMPTION | GENERATION | IGNALINA NPP | LIETUVOS PP | VILNIUS CHP 3 | KAUNAS CHP | MAZEIKAI CHP | KAUNAS HPP | KRUONIO HPSPP | WIND-MILL | SMALL PP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 779 | 1335 | 1198 | 61 | 0 | 0 | 0 | 30 | -218 | 17 | 29 |
| 2 | 712 | 1331 | 1201 | 61 | 0 | 0 | 0 | 30 | -218 | 13 | 26 |
| 3 | 682 | 1322 | 1200 | 61 | 0 | 0 | 0 | 30 | -241 | 6 | 25 |
| 4 | 658 | 1319 | 1201 | 62 | 0 | 0 | 0 | 30 | -440 | 4 | 22 |
| 5 | 636 | 1317 | 1200 | 61 | 0 | 0 | 0 | 30 | -439 | 1 | 25 |
| 6 | 628 | 1331 | 1204 | 61 | 0 | 0 | 0 | 35 | -439 | 1 | 30 |
| 7 | 665 | 1340 | 1202 | 61 | 0 | 0 | 0 | 49 | -355 | 1 | 27 |
| 8 | 730 | 1335 | 1202 | 61 | 0 | 0 | 0 | 44 | -216 | 1 | 27 |
| 9 | 811 | 1325 | 1198 | 61 | 0 | 0 | 0 | 40 | -27 | 0 | 26 |
| 10 | 885 | 1428 | 1197 | 61 | 0 | 0 | 0 | 49 | 98 | 0 | 23 |
| 11 | 937 | 1493 | 1196 | 61 | 0 | 0 | 0 | 50 | 162 | 0 | 24 |
| 12 | 957 | 1543 | 1196 | 61 | 0 | 0 | 0 | 50 | 211 | 1 | 24 |
| 13 | 963 | 1557 | 1195 | 61 | 0 | 0 | 0 | 50 | 225 | 1 | 25 |
| 14 | 956 | 1559 | 1195 | 61 | 0 | 0 | 0 | 50 | 224 | 2 | 27 |
| 15 | 951 | 1564 | 1198 | 61 | 0 | 0 | 0 | 50 | 223 | 4 | 28 |
| 16 | 936 | 1561 | 1196 | 61 | 0 | 0 | 0 | 50 | 223 | 5 | 26 |
| 17 | 929 | 1558 | 1195 | 61 | 0 | 0 | 0 | 50 | 222 | 3 | 27 |
| 18 | 930 | 1560 | 1197 | 61 | 0 | 0 | 0 | 50 | 221 | 4 | 27 |
| 19 | 931 | 1562 | 1200 | 61 | 0 | 0 | 0 | 50 | 220 | 3 | 28 |
| 20 | 936 | 1547 | 1201 | 62 | 0 | 0 | 0 | 50 | 204 | 3 | 27 |
| 21 | 945 | 1379 | 1200 | 60 | 0 | 0 | 0 | 50 | 34 | 3 | 32 |
| 22 | 951 | 1405 | 1199 | 61 | 0 | 0 | 0 | 50 | 66 | 5 | 24 |
| 23 | 950 | 1423 | 1201 | 61 | 0 | 0 | 0 | 50 | 77 | 6 | 28 |
| 24 | 870 | 1339 | 1198 | 61 | 0 | 0 | 0 | 50 | -75 | 6 | 24 |

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