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Research and Development of Main Trends of Enhancing of Energy Security: Experience of Belarus

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DEFINITION

Energy security implies the availability of energy, in its different forms and at all times, to users in sufficient quantities and at reasonable prices during normal period as well as in required quantities during accidents.

Additionally involves prevention of serious accidents in energy system itself.

It should be considered at many levels: global, regional (EC, CIS, etc.), national and local.

Main threats to energy security

Internal

- **shortage of domestic fuel and power resources;**
- **high energy intensity of economy;**
- **lack of adequate country (or regional) strategic reserves to cater for any transient interruption, shortage or unpredictable high demand;**
- **ageing of energy equipment and systems;**
- **in appropriable energy prices;**
- **non-payment for energy delivery;**
- **Not adequately dealing with environmental challenges.**

Main threats to energy security

External

- **notability to draw on foreign energy resources that can freely imported through port, other transport means and cross-boundary energy grids (pipelines and electricity networks);**
- **low diversification of energy export:**
- **- by countries;**
- **- by types of fuel;**
- **interruptions of energy trade and supply;**
- **shortcoming and gaps in energy treaties, charters and trade agreements;**
- **lack of foreign investments.**

Methodology of energy security

Methodology of assessment of energy security is based on so-called "***indicative analysis***" that guessed the forming the system of *Energy Security Indicators* (ESI).

Depending on its magnitude each ESI can be found in normal, subcritical or critical zone.

A country implementing the ESIs may choose to use an alternative definition for particular indicators as well as the boundaries between zones that better correspond to country's specific circumstances.

Situation in the Republic of Belarus

Energy sector parameters in Belarus	Magnitude 2009
Primary energy consumption, Mtoe	24,1
Production of electricity, TWh	30,1
Consumption of electricity, TWh	34,6
Installed electricity capacity, GW	8067
Peak electricity demand, GW	6017
Heat supply, PJ	142,4
Oil production, Mt	1,72
Natural gas import, bill. m^3	17,6
Share of domestic fuel and power resources, %	20,1
Consumption of peat, Mtoe	0,64
Consumption of firewood, Mtoe	0,95

Situation in the Republic of Belarus

Key energy problems in Belarus:

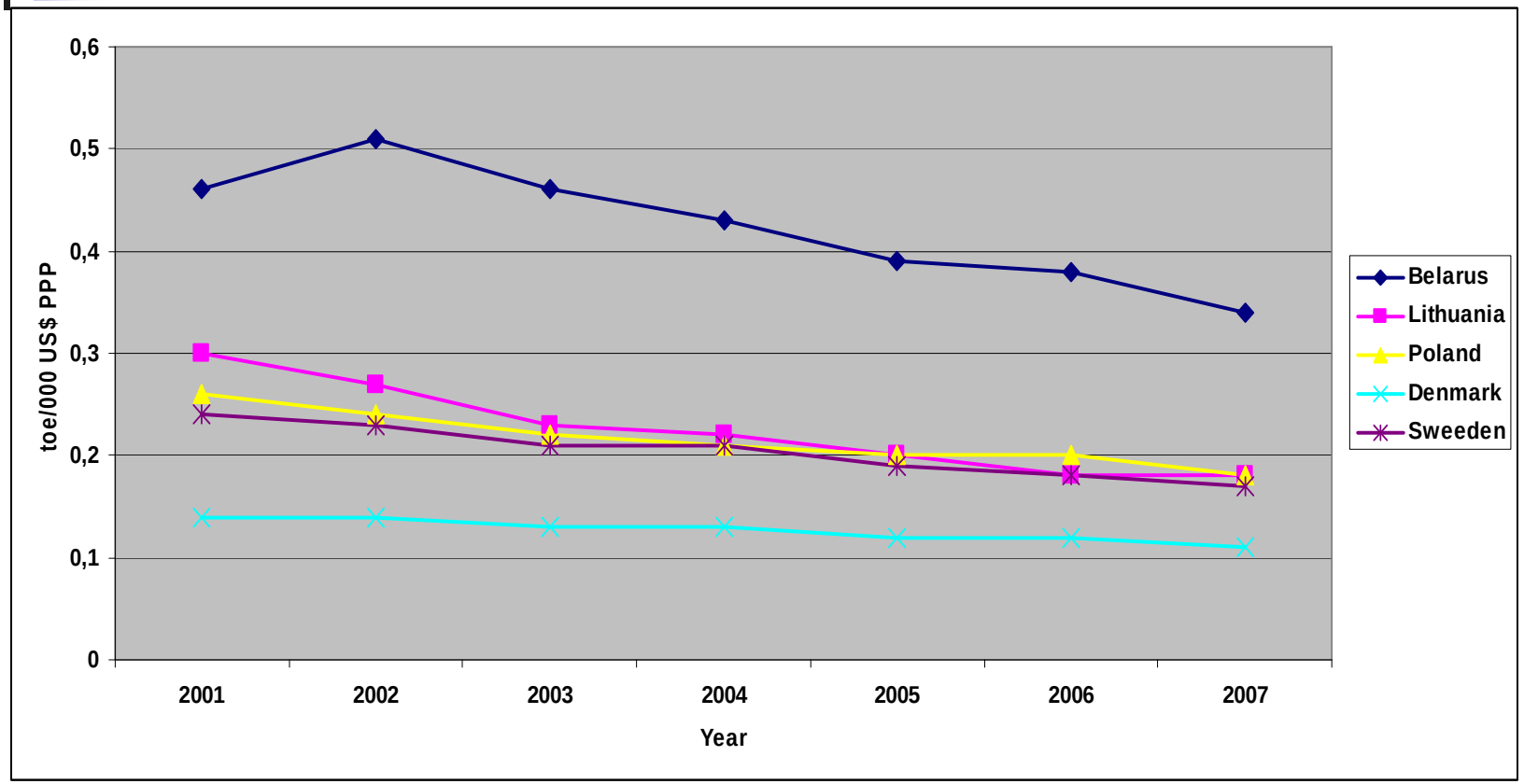
- limited indigenous fuel and power resources;
- high dependence on imported energy;
- very heavy dependence on Russia as a supplier of primary energy;
- ageing of energy sector infrastructure;
- limited oil and gas storage capacity;
- a weak legislative and regulatory frame work;
- limited commercial focus.

Situation in the Republic of Belarus

Additional factors:

- high share of natural gas as a fuel in production of electricity and centralized heat (94-98 %);
- permanent growth of the GDP allotment expendable on import of energy resources (24 % in 2009);
- high share of co-generation technologies in electricity generation system (about 50 %);
- very energy intensive economy.

Situation in the Republic of Belarus



Primary energy-GDP intensity of Belarus and other countries

Concept of the Energy Security of the Republic of Belarus

The Concept of the Energy Security of the Republic of Belarus was developed by National Academy of Sciences of Belarus, Ministry of Energy, Ministry of Economic, Department of Energy Efficiency etc.

It was approved by President of the Republic of Belarus in August 2005 and then the adjusted version in September 2007.

Concept of the Energy Security of the Republic of Belarus

For estimation of the energy security statue of the Republic of Belarus 12 indicators were chosen:

1 Energy intensity of Gross Domestic Product;
2 Share of domestic resources in fossil fuel consumption, %;
3 Share of domestic generation in total electricity supply, %;
4 Share of consumed fuel in transport produced from domestic crud oil, %;
5 Share of dominant fuel (natural gas) in electricity generation, %;
6 Share of dominant fuel in total fossil fuel consumption, %;
7 Share of dominant supply source (state), %;
8 Share of power plants that can use two or more kinds of fuel, %;
9 Ageing of infrastructure of fuel and power sector;
10 Capacities of oil and gas storages, days;
11 Capacity to meet peak demand for electric power, %;
12 Ratio of investments to value of producing capacities in fuel and power sector, %.

Concept of the Energy Security of the Republic of Belarus

Positions of Energy Security Indicators

ZONE	2005	2020
Critical	1	-
Subcritical	2,4,5,6,7, 9, 10,12,	4,6
Normal	3,8,11	1,2,3,5,7,8,9, 10,11,12

Concept of the Energy Security of the Republic of Belarus

- **TR1 - improving of energy independency;**
- **TR2 - alternatives for fuel supply (diversification);**
- **TR3 - upgrading of reliability of energy system;**
- **TR4 - improving of energy efficiency (energy saving).**

Concept of the Energy Security of the Republic of Belarus

According to the Concept in direction TR1 it is planning to increase the share of domestic fuel and power resources from 16 % in 2005 to 25 % in 2020 including the following grows:

- **consumption of wood biomass as a fuel from 1 to 2.2 Mtoe;**
- **consumption of peat as a fuel from 0.4 to 0.8 Mtoe;**
- **construction of new Hydro PP - 200 MW;**
- **construction of new CHP with use wood chips - 260 MW.**

Concept of the Energy Security of the Republic of Belarus

In TR2 direction the main goal is to decrease the share of natural gas as a fuel in electricity production from 96 % to 73 %. It will be achieved by construction of Nuclear PP with capacity of 2000 MW and Coal PP with capacity of 700 MW up to 2020 year.

In direction TR3 it is planning the modernization of existing CHP on the basic of the combined cycle technology, reconstruction of electricity grids, substations, *etc.*

It was estimated the total energy saving potential in TR4 direction up to 2020. It is of 6700 Mtoe, *i.e.* about 30 % of present annual primary energy consumption.

Concept of the Energy Security of the Republic of Belarus

It is planning to reduce energy intensity of GDP up to:

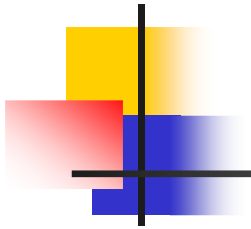
- **2010 by 31 %**
- **2015 by 50 %**
- **2020 by 60 %**

in comparison with 2005

Concept of the Energy Security of the Republic of Belarus

Apart from mentioned above there are other effective measures of enhancing of energy security:

- **international co-operation;**
- **liberalization of energy market;**
- **promotion of investments *etc*.**



Thank you very much for your attention!