

Nuclear Power Plants and Industry of Slovakia Perspectives, Trends, Potential of Development

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Challenges Effecting Power Engineering

- climate changes and its consequences
- high energetic demand of the economics
- high dependency on the import of primary energy sources and the need to ensure reliability of supplies
- impact on the competitiveness of the economics
- ➢ gas crisis
- economic and financial crisis
- events in the Nuclear Power Plant Fukushima



Objectives of Energy Policy

- to establish conditions for self-sufficiency and pro-export ability in electricity production
- optimal and balanced energetic mix with the emphasis on low-carbon technologies and increase of energy efficiency
- ➢ to increase energy efficiency
- Iong-lasting sustainable energy development
- to develop trans- European energy infrastructure within the Visegrad Four in gas, oil and electricity sphere
- to support rational use of domestic energy sources in order to reduce dependence on their import
- to accelerate a preoperational work for the erection of a new Nuclear Power source in Jaslovské Bohunice area and to use all opportunities for performing more effective completion of 3. and 4. Unit of NPP Mochovce
- to achieve a high level of security for all nuclear facilities



Current Energetic Mix



In the energetic mix, the Slovak Republic has got balanced proportion of nuclear and fossil fuel in gross consumption of primary energy sources.



Slovak Energetic Upcoming Diversification Projects

- Slovak Hungarian and Slovak Polish gas interconnection.... as a part of North– South gas interconnection linking terminals in Croatia and in Poland
- > pipeline link of Družba system with Schwechat refinery (Project BSP)
- > pipeline reconstruction Adria (SR Hungary)
- two cross- boarder conduction 400 kV with Hungary



The Slovak Republic Transmission System





Energetic Mix at Production of Electricity



Power 2011	MW	%
Nuclear	1 940	24
Conventional	2 708	33
Hydro	2 478	30
Renewable + small	1 026	13
Gross power	8 152	100



Power 2011	GWh	%
Nuclear	15 411	53
Conventional	5 726	20
Hydro	4 006	14
Renewable + small	2 992	10
Import	727	3
Consumption	28 862	100

vůje Balance of Consumption and Production of Electricity

GWh	Total consumption	Production	Balance	
2005	28 572	31 294	-2 722	
2006	29 624	31 227	-1 603	
2007	29 632	27 907	1 725	
2008	29 830	29 309	521	
2009	27 386	26 074	1 312	
2010	28 761	27 720	1 041	
2011	28 862	28 136	727	



Zdroj: SEPS,, a.s.

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Electricity Consumption Forecast



0	3Wh	2010	2011	2015	2020	2025	2030
Low				29 470	30 770	31 810	32 650
Reference	e	28 761	28 862	30 710	33 290	35 660	37 700
High				31 570	35 470	39 110	42 400

Zdroj: SEPS,, a.s.

Vuje Forecast for Consumption and Production of Electricity



It is expected in the near future that annual production will reach the electricity consumption of about 29TWh per year and Slovakia will have re-balanced, resp. positive balance of electricity consumption and production. Fossil fuel resources which do not meet new emission standards after 2015 might

be shut down.

Power Engineering export capability will be increased.



Development of the Production Basis

based on the principle of balanced fuel mix

Nuclear Power Plants

- will form the basis in the power system balance as an important element in ensuring the security of electricity supply and sustainable development
- > completion of 3. and 4. Unit of NPP Mochovce
- > construction of the new nuclear source in Jaslovské Bohunice area

Conventional Power Plants

- > the main importance is its use for power system regulation
- future development will be influenced mainly by fuel availability and its price trend
- its use is especially recommended in areas with the potential for combined production of electricity and heat



Development of the Production Basis

Renewable electricity sources

- > to be considered as additional sources
- reduce dependency on primary fuels import
- development is possible if the support of legislative and economic measures is ensured by the State
- biomass has the greatest potential



Nuclear Power

Nuclear power represents an important element in the SR energetic safety and will remain the main element in the process of transition to competitive low-carbon economics regarding production of electricity.

Nuclear Power Plants in Slovakia ensured 55 % electricity in 2011 and covered 53 % of electricity consumption in the Slovak Republic.

Due to nuclear sources, there will be produced up to 80 % of electricity without CO2 emissions in 2020 in Slovakia.

Position of nuclear energetics in SR

- > high acceptance of this energetic source in public
- clearly declared support of the SR Government
- experienced NPP operating staff and companies involved in technical support, maintenance, modernization and erection of NPP
- high professional credit of SR Nuclear regulatory



NPP Mochovce





Completion of NPP Mochovce

- > NPP Mochovce erection was interrupted in 1992
- Units 1 and 2 were put into operation in 1998 and 1999
- > in 2006 the preparatory stage for completion of 3. and 4. Unit was launched
- in 2009, SE, a.s. signed contracts with the major suppliers regarding Completion of 3. and 4. Unit
- > expected commissioning of both Units is in 2015
- after verification of the stable operation of both units, gradual increase of their output to 112 % Nnom is planned. It means the unit will supply 500MWe to distribution network



NPP Bohunice





NJZ Bohunice Construction

29. May 2009 – JAVYS, a.s. and ČEZ, a.s. company representatives signed a shareholder agreement that will allow to establish a common company for the construction of NJZ in Jaslovské Bohunice area.

1. January 2010 – establishment of the common company by JAVYS, a.s. (51%) and ČEZ Bohunice, a.s. (49%)EZ- Nuclear Power Company Slovakia, a.s. (JESS, a.s.)

Activities performed after incorporation of the company

- > preparation of entry and input data for the Feasibility study
- tender for the Feasibility study
- elaboration of the Feasibility study (11/2011 up to 07/2012)

Current main company activities

- evaluation of the Feasibility study and related studies- technical, economic, temporal, spatial parameters
- > preparation of decision regarding organizational and financial security of the project
- > preparation of preparatory phase NJZ Bohunice project (January 2013)



A technology demonstration as a first gas-cooled fast reactor



A technology demonstration as a first gas-cooled fast reactor



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vůje



Joint preparatory work started in 2010 with support of CEA

Signature of MoU by AEKI Budapest Hung UJV Rez Czec VUJE Slov in May 2010.

Hungary Czech Rep. Slovak Rep.

NCBJ (Poland) will officially join the consortium in 2012.





The ultimate objectives of ALLEGRO

1. Demonstration of the GFR gen-4 concept,

(alternative technology to the reactor cooled by molten sodium)

- demonstration of the technological feasibility, helium cooling and high temperature core,
- demonstration of the breeding capacity,
- demonstration of the ability of transmutation of actinides.

2. Demonstration of heat production at industrial and economic conditions.

Compared to other reactors, this one has an ability to produce heat of about 850 ℃, this enables chemical production of hydrogen.

High temperature heat could be used also for other technological purposes.



Gas cooled fast reactors (GFR) represent one of the three European candidate fast reactor types.

Allegro	Gas Fast Reactor (GFR) Potential Sites: Jaslovské Bohunice, Slovakia Dukovany Czech Republic Paks - Hungary
Astrid	Advanced Sodium Technical Reactor for Industrial Demonstration Sodium Fast Reacto (SFR) Site: Marcool France
Alfred	Advanced Lead Fast Reactor European Demonstrator

red Advanced Lead Fast Reactor European Demonstrator Led Fast Reactor (LFR) Potential Sites: Cerna Voda, Romania



