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# Can Slovakia Secure Reliable Electricity Supply Without Nuclear?


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**Hotel Fórum**

**Bratislava , May 2004**

# Subject :

## Introduction of Slovenské elektrárne, a.s.

## Present and Forecast Balance in Electricity Demand and Supply

## Feasibility of Providing Reliable Electricity Supply

## Economic Impact of Various Resources Development Scenarios

## SE, a.s. Main Objectives in the Nuclear Power Plants Domain

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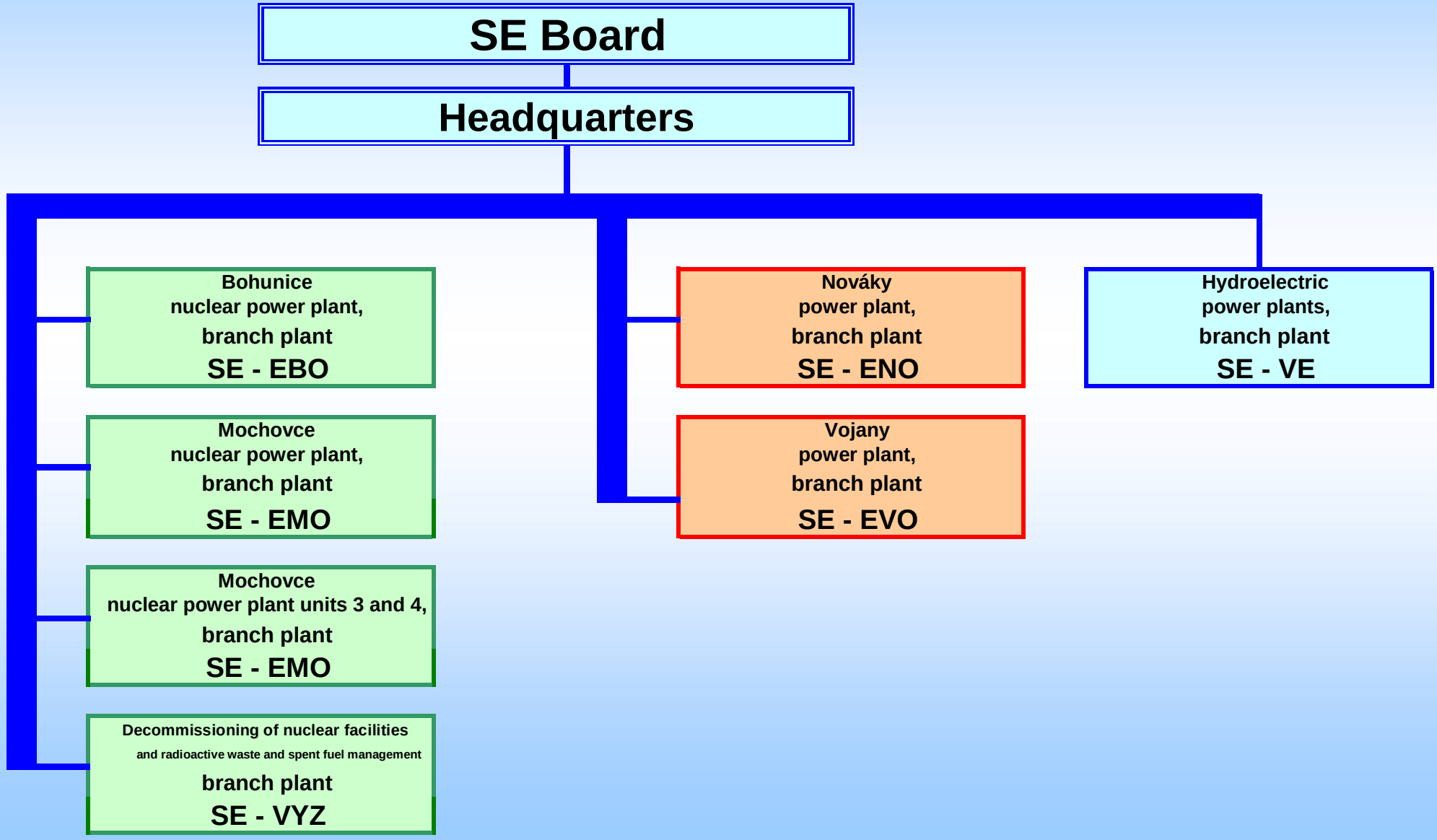
# Present Organizational Structure of SE, a.s.



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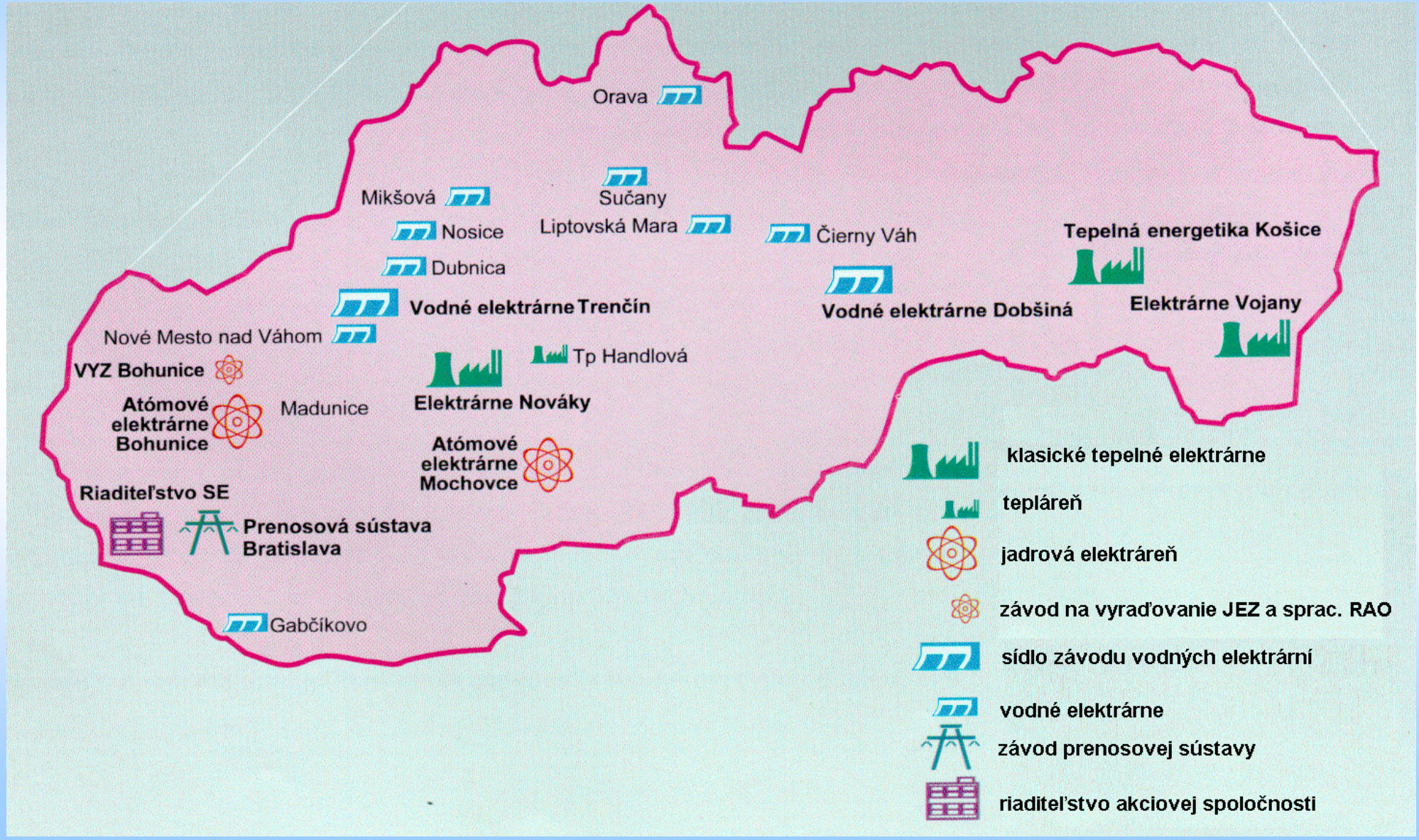
# Electricity Generation Structure of SE, a.s.



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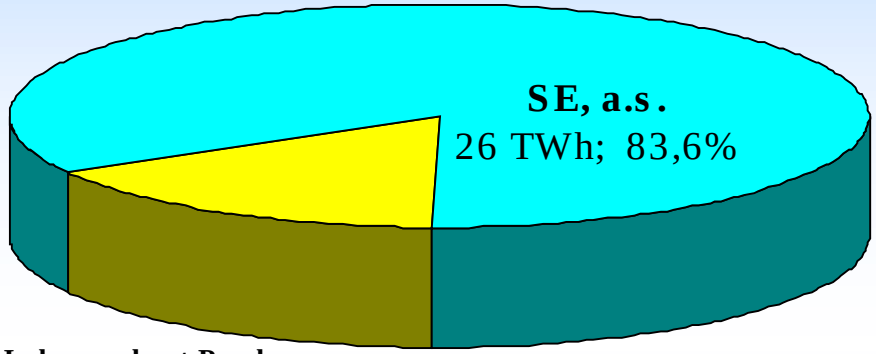
# Present Energy Mix in Slovak Republic

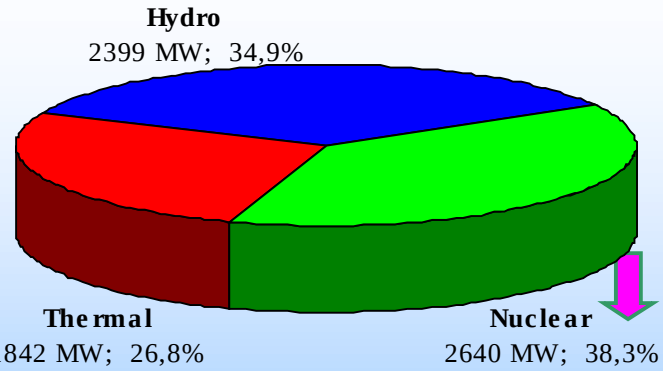
## Electricity Generation Structure in Slovakia in the Year 2003

### The Share of SE, a.s. in Electricity Generation in Slovakia

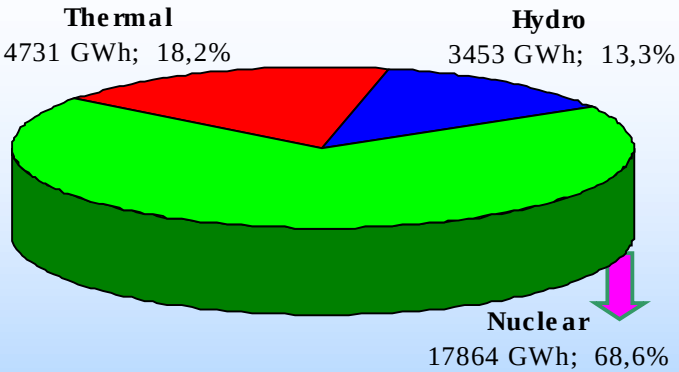



### The Share of Particular Resources of SE,a.s.

*Installed Capacity 6882 MW*




*Generation 26 TWh*




- *Total electricity generation in Slovakia amounted to 31,1 TWh*
- *The share of Nuclear Power Plants amounted to 57,4 percent*
- *The SE, a.s. electricity generation attained 26 TWh*

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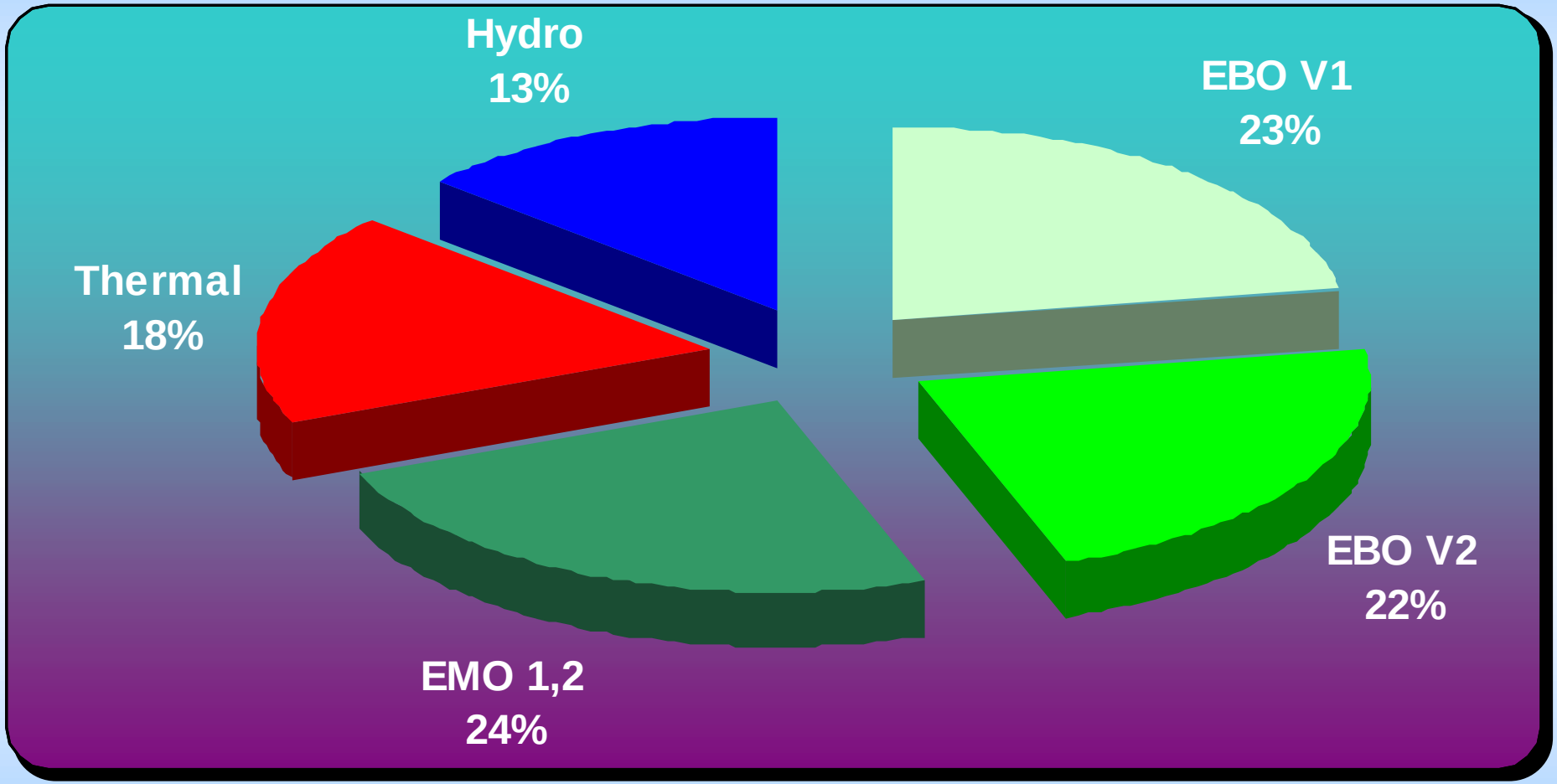
# Electricity Generation Structure of SE, a.s. in 2003




*The Nuclear Power Plants generation in 2003 amounted to 17,9 TWh, i.e. 69 percent of SE,a.s. total generation*

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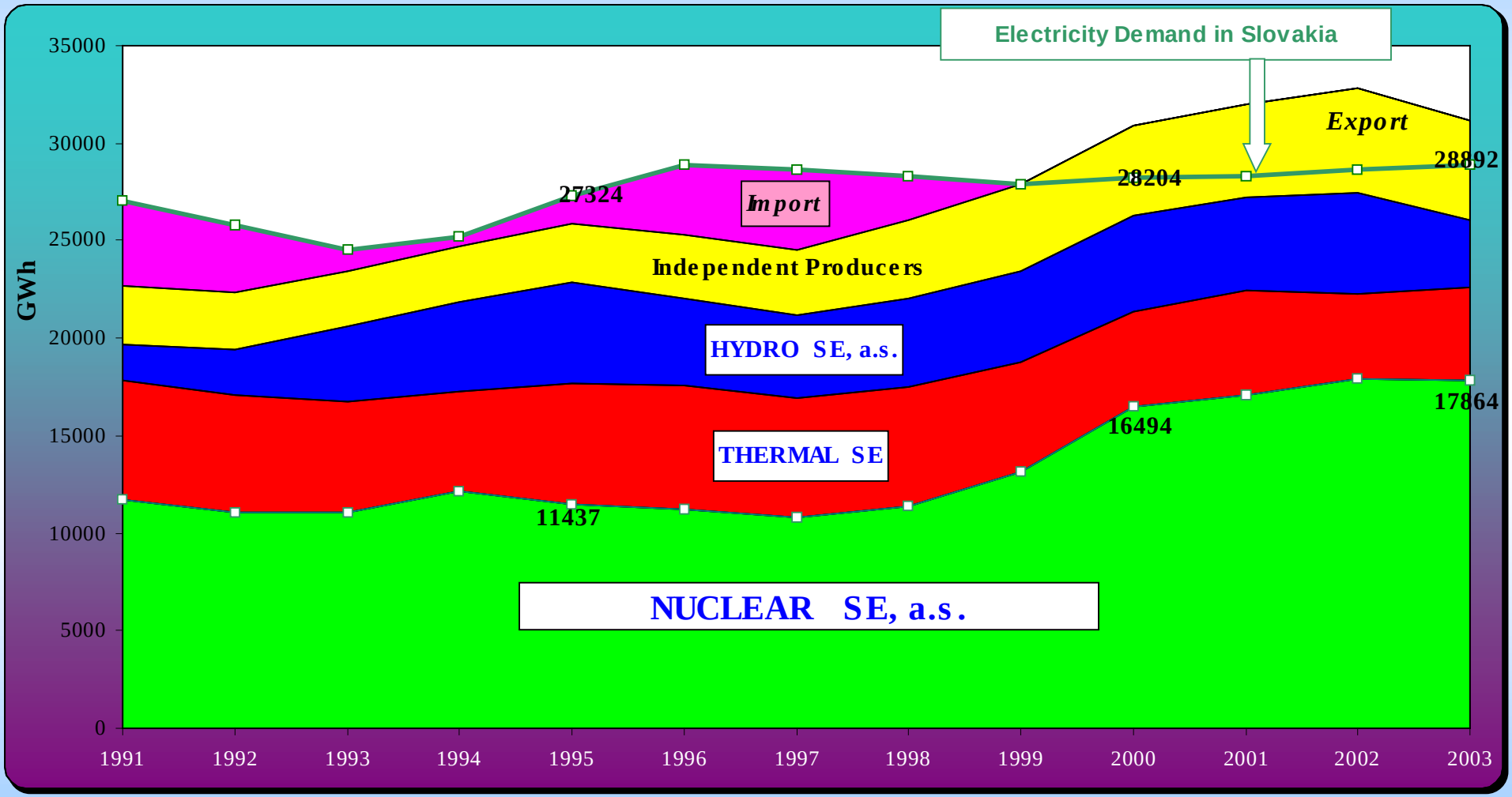
# Electricity Generation Structure in Slovakia




- *After EMO 1,2 completion Slovakia became for the first time in history self-sufficient in electricity supply*
- *Presently Slovakia dispose of reasonable surplus of power plant capacity*

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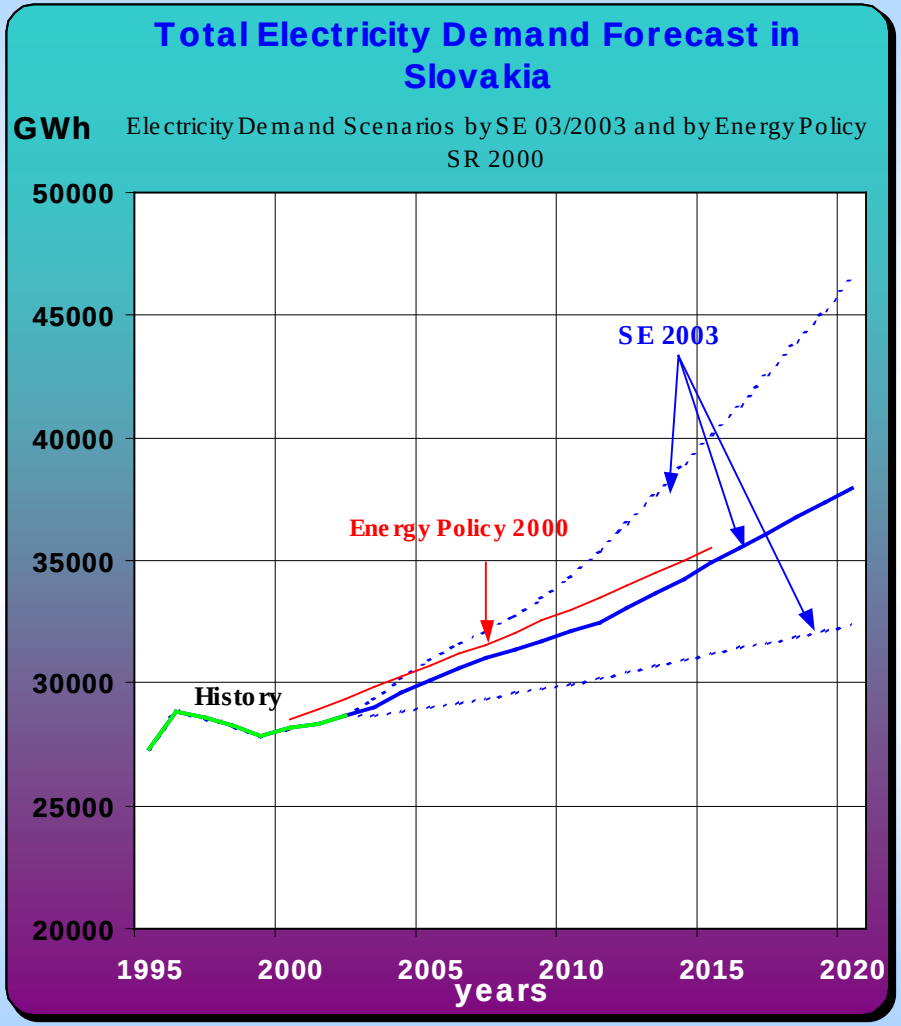
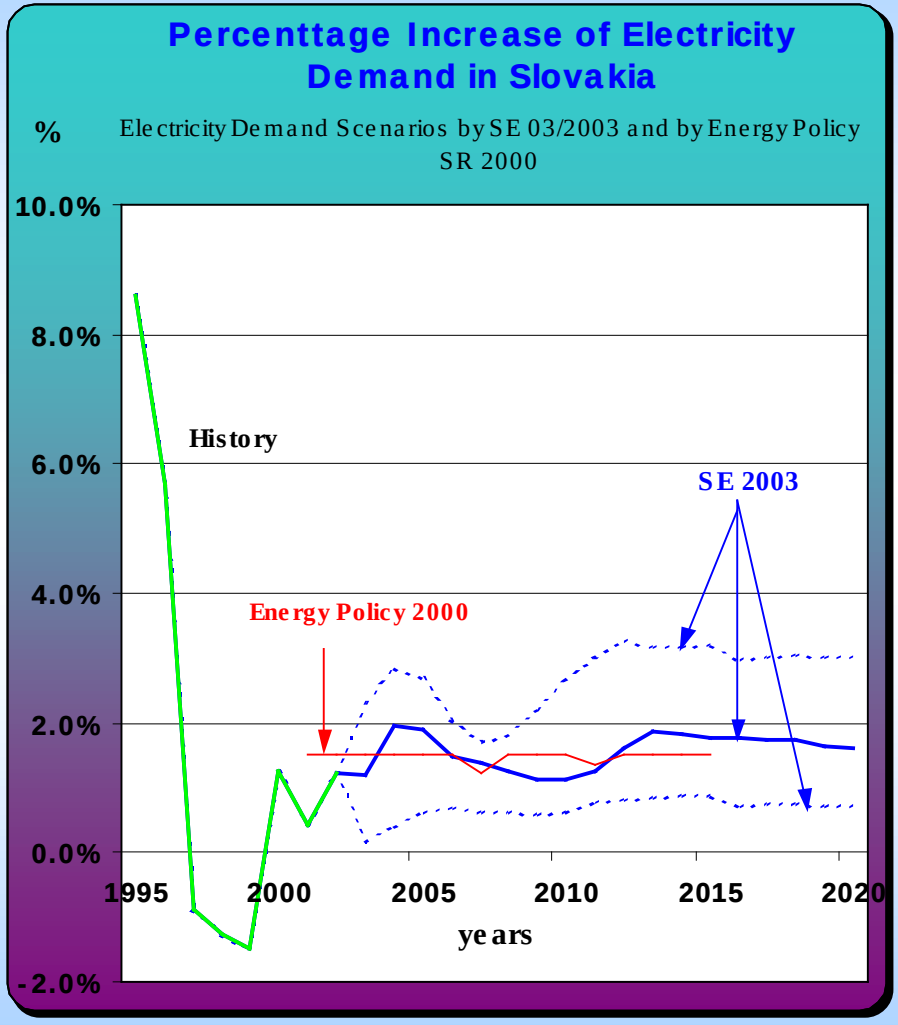
# Electricity Demand Forecast in Slovakia

## Total Electricity Demand Forecast in Slovakia




## Percenttage Increase of Electricity Demand in Slovakia




*By reference scenario the average annual electricity increase in Slovak Republic in the period 2003 to 2015 is supposed as high as 1,6 percent*

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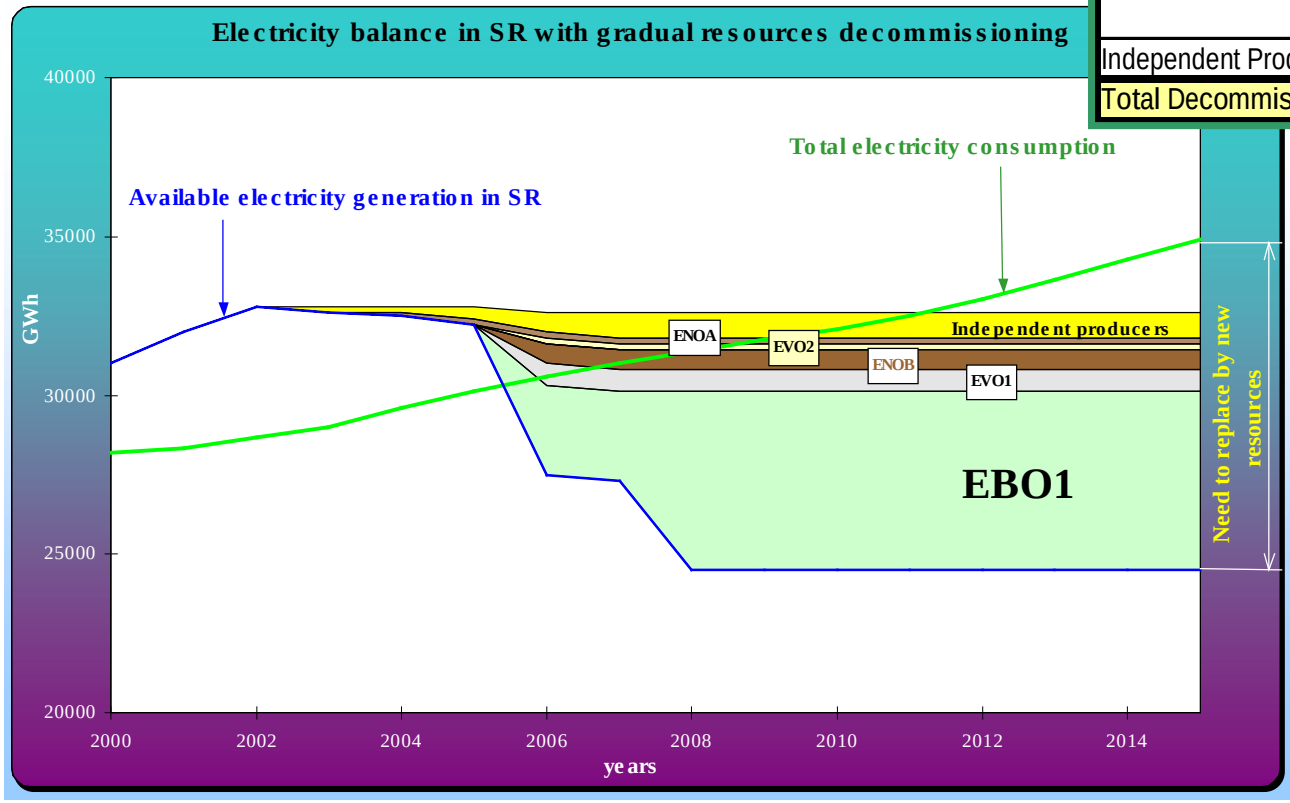
# Electricity Supply Forecast in Slovakia

## Decommissioning of Power Plant Capacity in Slovakia

| Power Plant | Installation | Output in MW | Generation in MWh | Year of decommissioning |
|---|---|---|---|---|
| Thermal Power Plant Nováky A | TG 2 a TG 3 | 54 | 190 000 | 2005 |
| Thermal Power Plant Nováky B | 3. a 4. blok | 220 | 600 000 | 2006 |
| Thermal Power Plant Vojany 1 | 3. a 4. blok | 220 | 700 000 | 2006 |
| Thermal Power Plant Vojany 2 | 25. a 26. blok | 220 | 100 000 | 2006 |
| Nuclear Power Plant Bohunice | V1 - 1. blok | 440 | 2 800 000 | 2006 |
| | 2. blok | 440 | 2 800 000 | 2008 |
| Independent Producers | | 200 | 900 000 | 2003-2010 |
| Total Decommissioning | | 1794 | 8 090 000 | 2003-2010 |




*Up to 2010 it is supposed the decrease of installed capacity in SR by 1794 MW*

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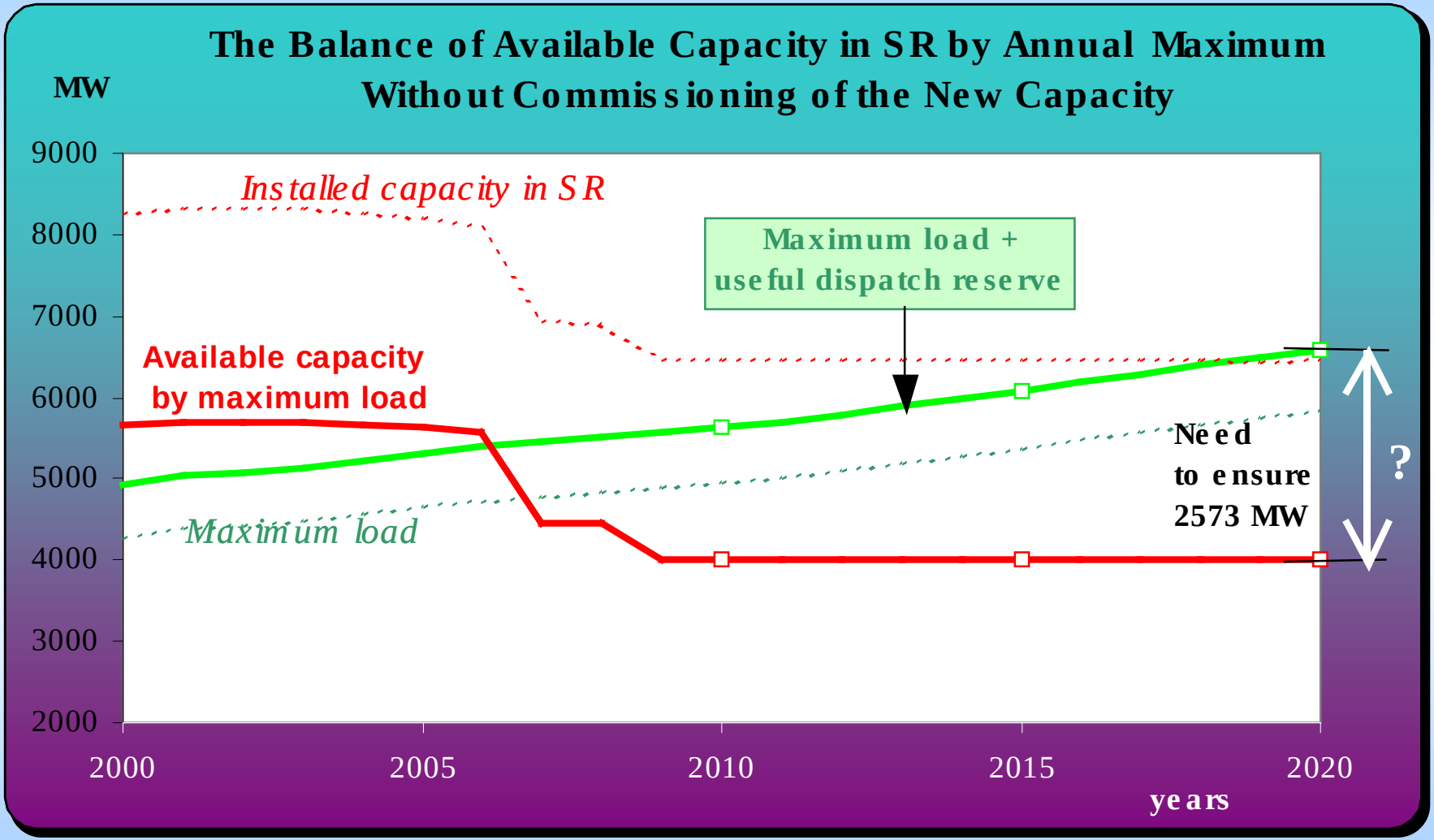
# Electricity Supply Forecast in Slovakia




*Up to 2020 it is needed to ensure about 2500 MW of capacity to match the demand - supply electricity balance in Slovakia*

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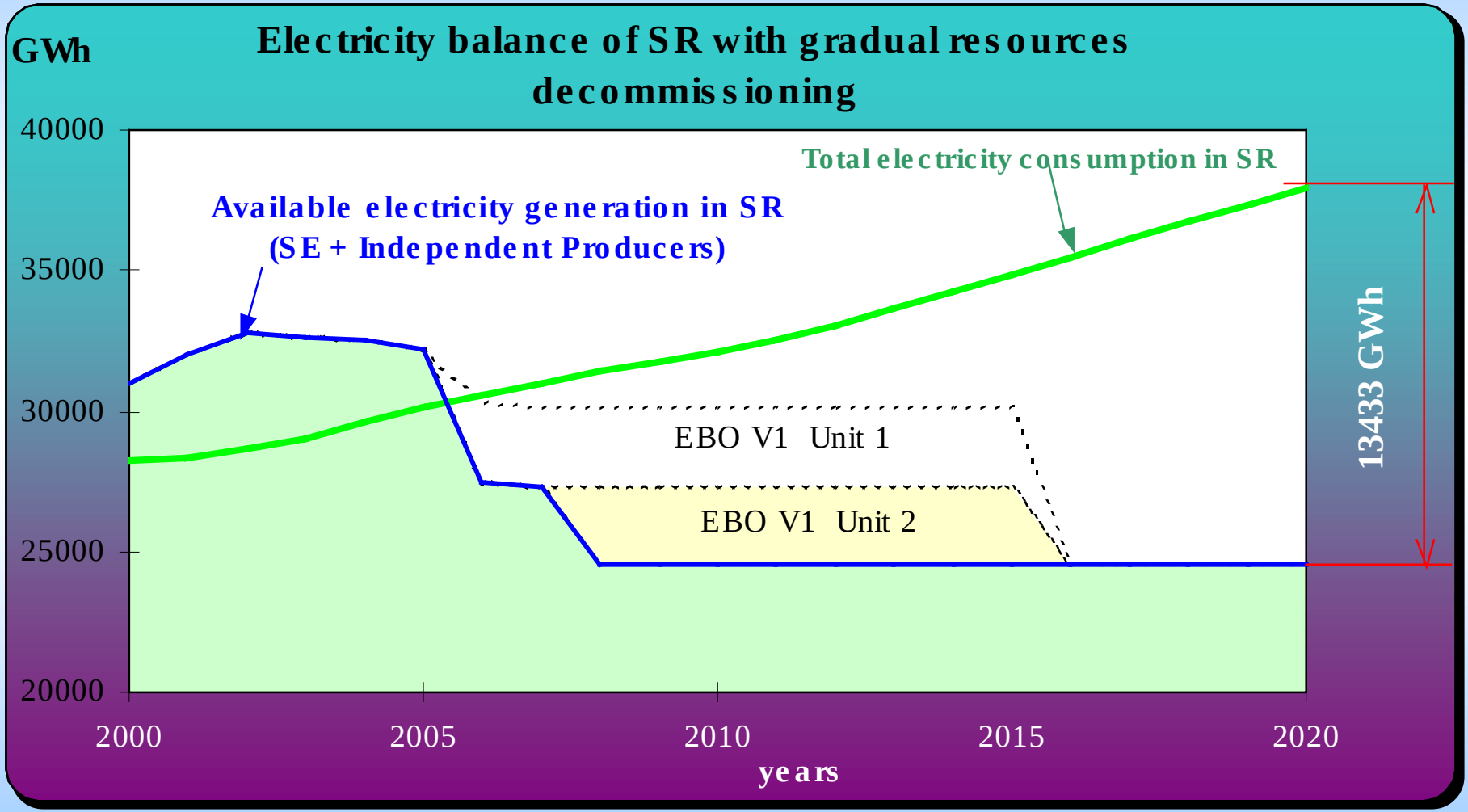
# Electricity Supply Forecast in Slovakia




*In the year 2020 it is necessary to ensure electricity generation as high as 13 TWh*

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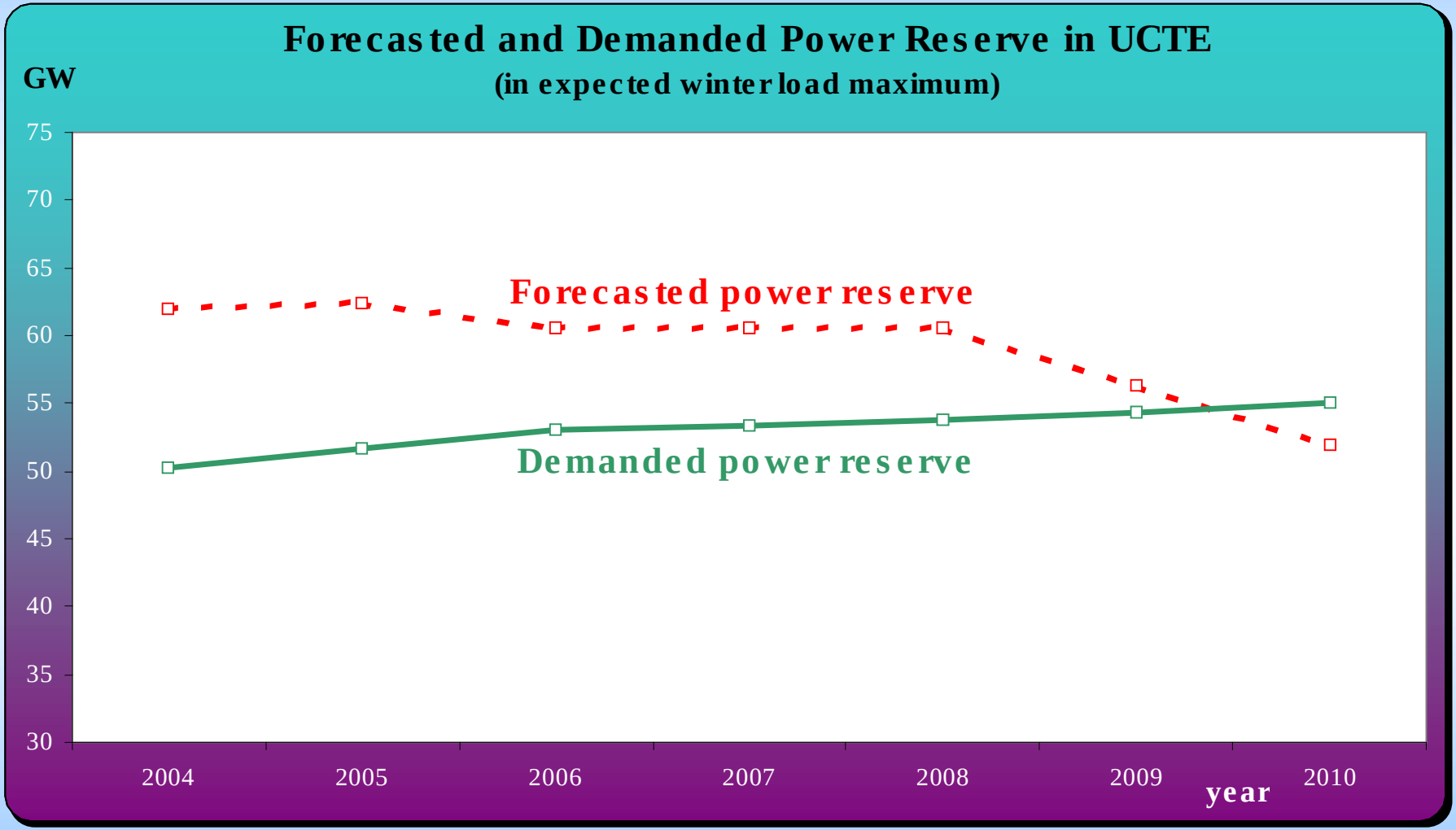
# Forecast of Power Reserve in the UCTE Countries




*From 2010 there is expected insufficient power reserve in UCTE*

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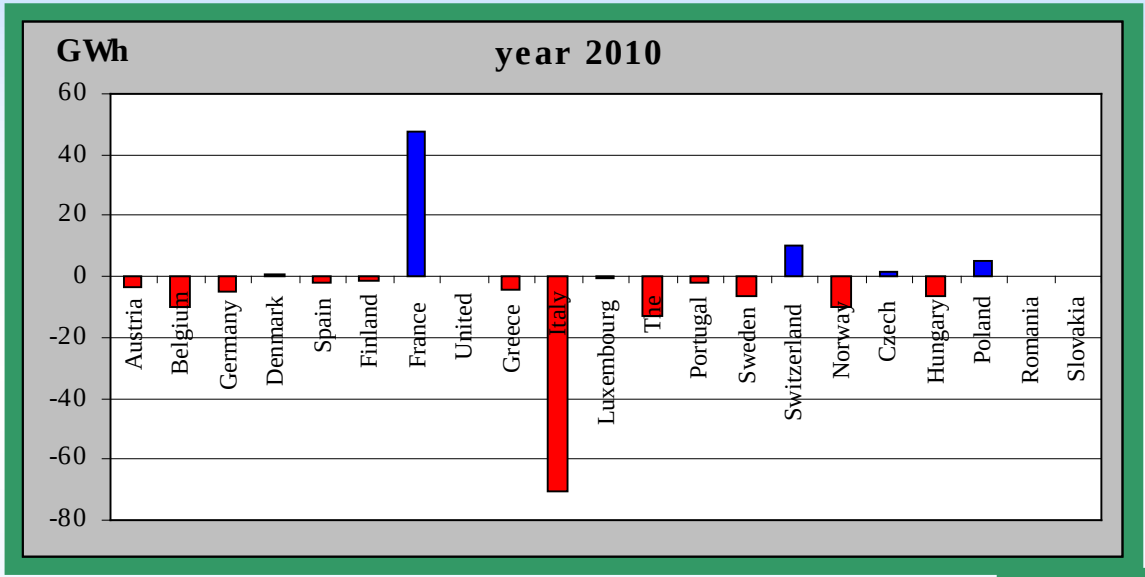
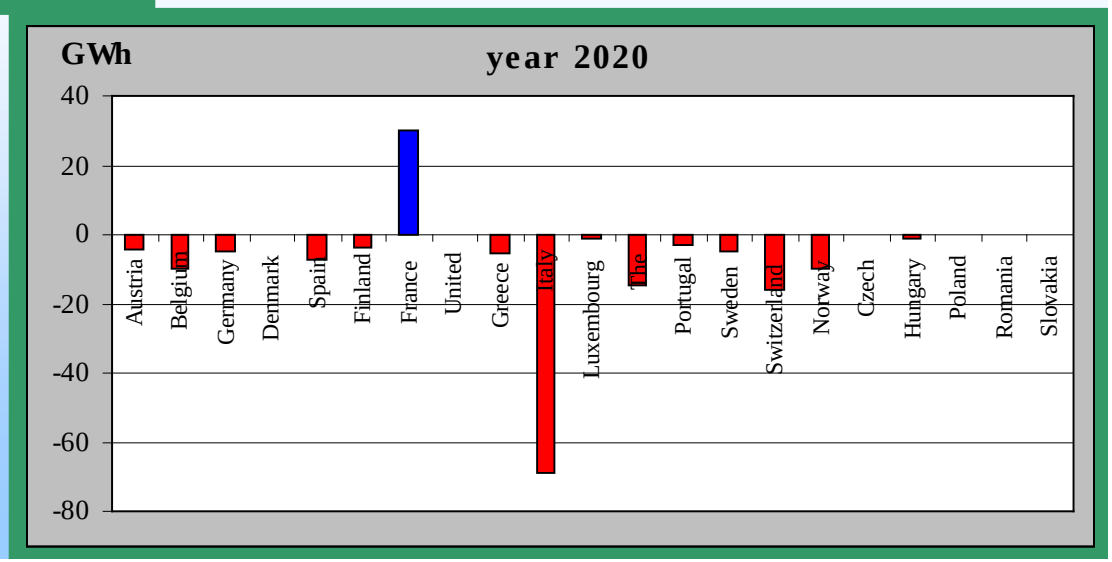
# Forecast of Electricity Balance (export-import) in the European Countries in 2010 and 2020




*In accordance with „Statistics and prospects for the European electricity sector“, Eurelectric, september 2002 there is anticipation, that in 2020 only France is the exporter of electricity, the other countries are then importers, or at most well balanced*



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# Prospect of Reliable Safeguard of Electricity Supply

**To safeguard balance of electricity generation and demand in Slovakia is needed to construct about 2 500 MW of new capacity up to the year 2020**

To safeguard sufficient power output can contribute:

| | |
|---|---|
| • MO 3,4 completion | 880 MW |
| • Operation of JE EBO V1 up to building new alternate capacity | |
| • Reconstruction of ENO | 125 MW |
| • Power and generation upgrading in EBO V2 and EMO 1,2 | 130 MW |
| • Promotion for renewables and cogeneration development | 150 MW |
| • Commissioning of new thermal capacity (Reconstruction EVO, CCGT Malženice , etc.) | 720 MW |

***Estimated investment cost: 70 to 85 mld. Sk***

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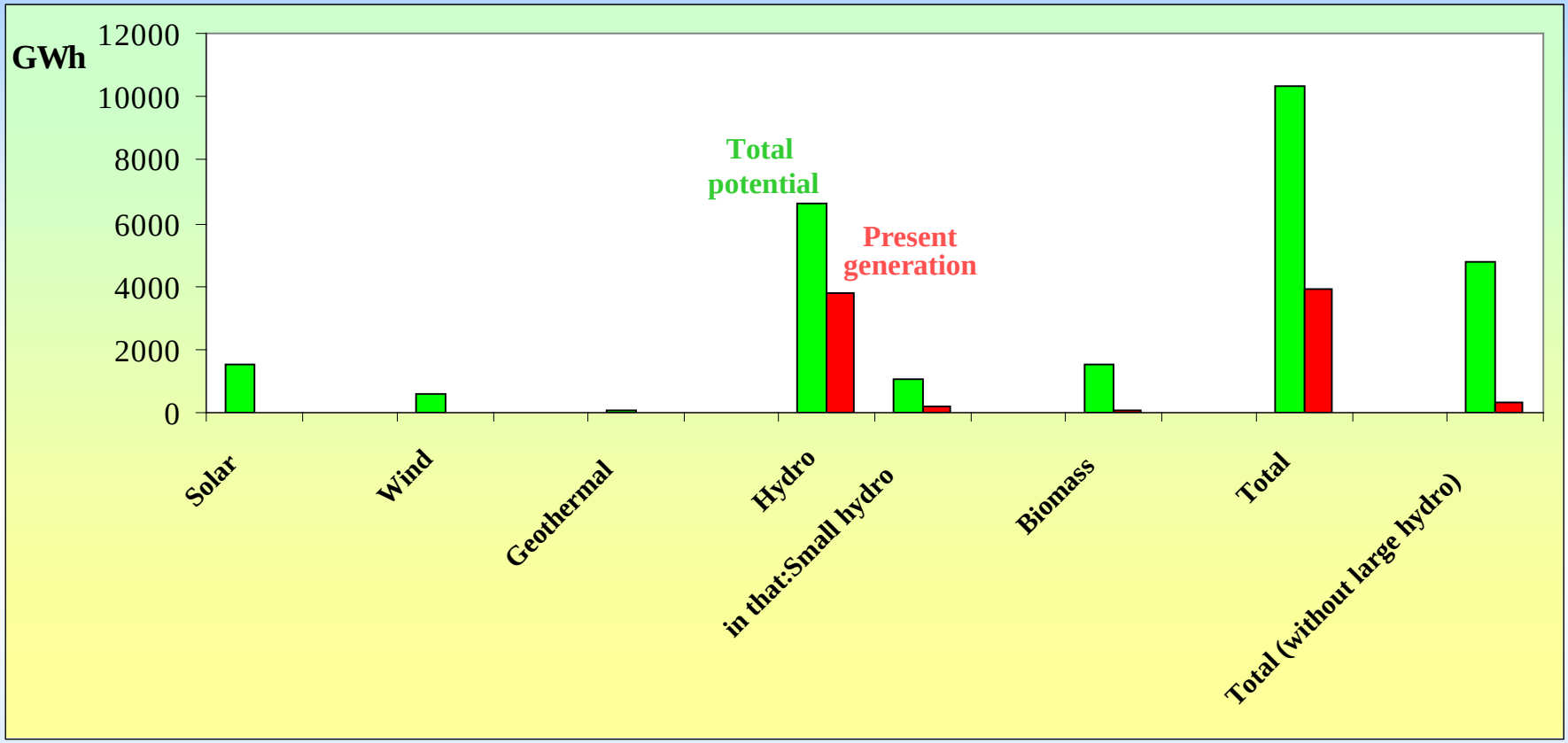
# Available Renawable Potential for Electricity Generation




*The share of renewables in electricity balance in Slovakia is 16 percent ( 1 percent without large scale hydro )*
*Technically available potential has been estimated to about 10 TWh/rok, the realistic potential is about - 3 TWh*
*The present use of technical potential is 40%*

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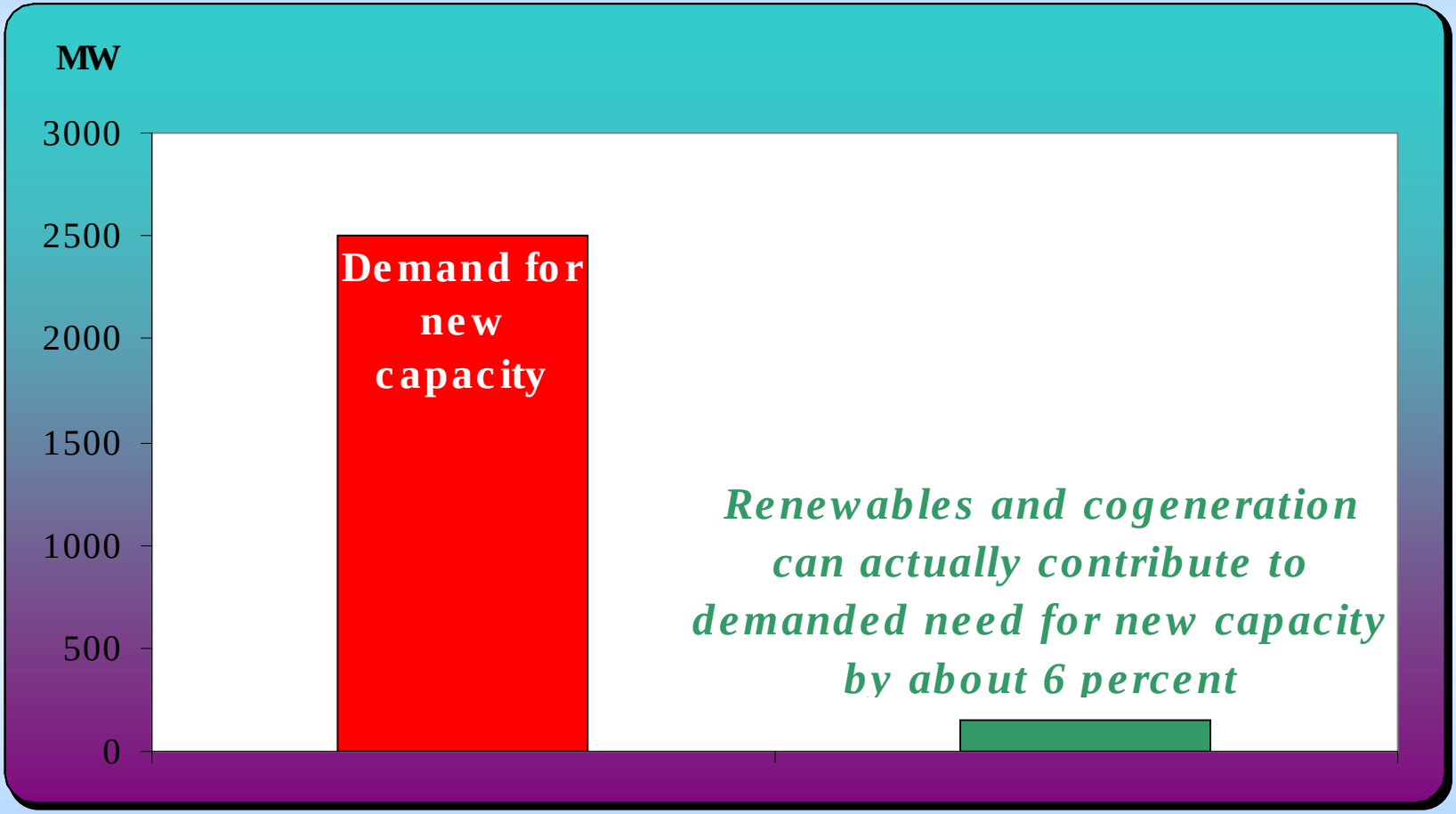
# The Participation of Renewables to Match the Useful Capacity Increase in SR




*The renewables are not able to replace the shortage in total capacity and generation in Slovakia*

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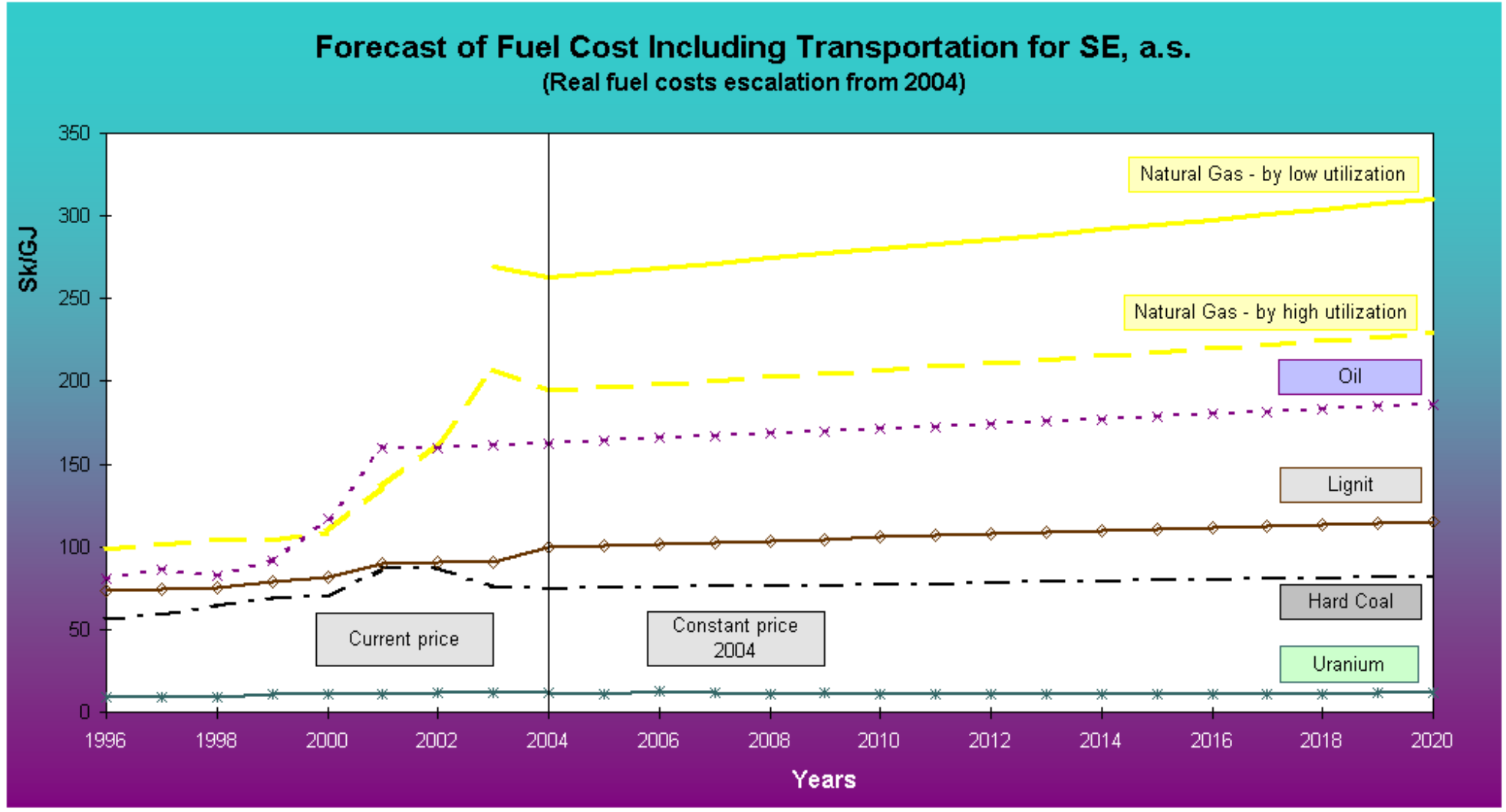
# Forecast of Fuel Costs




*The costs of natural gas are 17 to 23 times higher than the costs of nuclear fuel*

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# Appreciation of Economic Intensity of Nuclear Energy Development Scenarios in Slovakia

*Designed scenarios of NPP Development*

| Scenario | Decommissioning of V1 | Alternative | MO 34 | V2, EMO 1,2 |
|---|---|---|---|---|
| 1 | Unit 1 2006<br>Unit 2 2008 | a | not completed | V2 until 2025,<br>EMO 1,2 until 2039 |
| | | b | completed 2009 and 2010, operation until 2050 | |
| 2 | Unit 1 2006<br>Unit 2 2015 | a | not completed | |
| | | b | completed 2009 and 2010, operation until 2050 | |
| 3 | Unit 1 and 2 2015 | a | not completed | |
| | | b | completed 2009 and 2010, operation until 2050 | |

***The scenarios represent combination of operation extension of EBO V1 and completion versus not completion of MO 3,4 construction***

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# Economic Intensity of Nuclear Energy Development Scenarios in Slovakia

| Scenario | V1 - Decommissioning Unit 1<br>V1 - Decommissioning Unit 2 | 2006<br>2008 | | 2006<br>2015 | | 2015<br>2015 | |
|---|---|---|---|---|---|---|---|
| | MO 34 | not completed | completed | not completed | completed | not completed | completed |
| Difference of operational cost present value against the most intensive economic scenario bil.Sk | | 0 | -120 | -40 | -134 | -80 | -158 |
| Difference of operational cost present value, health and environmental damages against the most intensive economic scenario bil.Sk | | 0 | -167 | -54 | -193 | -113 | -232 |
| The order of least costs | | 6 | 3 | 5 | 2 | 4 | 1 |

***The higher is NPP electricity supply, the lower cost is attained for safeguard of electricity demand***

***The shift of EBO V1 decommissioning and MO 3,4 completion can contribute to reduction of operational cost up to 158 bil. Sk and with involvement the environmental impact (external costs) up to 232 bil. Sk***

# Intensity of MO 3,4 Incompletion

| *The Cost of MO 34 incompletion* | |
|---|---|
| *Cost* | *bil. Sk* |
| Up to November 30, 2003 have been overequipped for Units 3 and 4 financial expenses including credit interest, without convertion to price level in 2003 as high as | 19,84 |
| Pay out of credit interest to November 30, 2003 without influence of course differences | 3,9 |
| Reminder of cost for conservation works and coherent activities by term of implementation up to 2004 | 0,09 |
| The cost for property settling represent lower limit without main operational unit liquidation and the upper limit in case of its liquidation | 6,3 until 13,3 |
| The income estimation from sale of inapplicable delivery and equipment, metals and recycling stoneware | - 0,6 until - 1,2 |
| *Total stranded cost by MO 3,4 incompletion* | *29,5 až 35,9* |

- ***The stranded cost by uncompletion of MO 3,4 represent 29,5 to 35,9 bil. Sk***
- ***By completion of MO 3,4 would be reduced risk from capacity and energy shortage***

# Result of Nuclear Studies from Abroad
# FINLAND

*The Study compared the nuclear fuel cycle with coal, peat and CCGT. The Study claims that nuclear power plant has the least operational cost by any annual utilization over 5 600 hours, that reply to 64 percent utilization of installed capacity*

| EUR / MWh | Nuclear | Gas | Coal | Peat |
|---|---|---|---|---|
| **Capital cost** | 11.88 | 4.82 | 6.86 | 9.27 |
| **Fixed cost O&M** | 3.30 | 1.07 | 2.04 | 3.01 |
| **Fuel cost** | 2.86 | 19.88 | 10.26 | 15.49 |
| **Variable cost O&M** | 3.41 | 0.31 | 4.92 | 3.10 |
| **Total** | **21.45** | **26.08** | **24.08** | **30.87** |

Operational cost by 8000 hours/year

(NucNetBackgroud No. 18/2000)

# The Enviromental Impact of NPP

- The utilization of nuclear energy prevented from emission of carbon dioxide to the atmosphere in EU in the annual volume of 300 mil tons, in OECD Countries 1200 mil tons (NEA 2002, WEF Davos 2000)

- In Slovakia the utilization of nuclear energy facilitates to reduce the release of carbon dioxide to the atmosphere about 16 mil. tons/year

- The withdrawal of nuclear energy prevents the implementation of Kyoto aims - the increase of energy generation from fossil fuel could raise CO2 emissions up to 8 % in EU scope (WEF Davos 2000)

**The Nuclear Power Plants with their safe, reliable and economic effective operation play very important role by greenhouse gas reduction**

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# The Main Objectives of SE, a.s. in the NPP Domain

- *Make an effort*
  - *about maximum utilization of generation capacity, above all the nuclear power plants at inland market as well as through the mediation of external sale*
  - *for solution of project financing of MO3,4 and to obtain also promotion of Slovak Government*
- *Continue*
  - *in modernization of EBO V2 units with the goal to enhance the safety and reliability together with lifetime extension and increase of capacity and generation*
  - *in increase of capacity in EMO 1,2*
  - *in decommissioning of NPP A1*
  - *in solution of final repository of nuclear fuel*
- *Find out*
  - *the acceptable political, economic and technical solutions facilitating operation of V1 units at least until the adequate compensation*
- *Minimize*
  - *the negative impact of V1 units decommissioning and MO 3,4 uncompletion for the company economy*

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# Anticipated Development of Nuclear Energy in the World

## *The position of selected countries towards nuclear energy:*

**France** – Promotes operation of existing NPP, licence extension, completion of NPP under construction and building of new NPP

**Finland** – Promotes construction of new NPP with 1600 MW capacity and its operation from 2009

**United Kingdom** – The utilities convince the Government hesitating about acceptance of the projects aimed to reduction of dependence on imported gas and to replacement the elder NPP by new ones

**Swiss** – The citizens refused in referendum the proposal for earlier decommissioning of NPP Muhleberg, Swiss Government does not accept the earlier NPP decommissioning from political or ideological reasons

**USA** - New Energy Policy of the USA approved by US Senate has clear pronuclear character with accented role of nuclear energy for safeguard of energy demand in 21 century

**Germany** - The Government decided to keep the NPP in operation up to their originally designed lifetime

**Spain** – It has been approved the lifetime extension by 10 years for 6 units

**European Commission** - The document "Green Paper" accents the obligation of adaptation the measures for outstanding reduction in energy demand and the parallel retain of nuclear alternative

# The withdrawal of nuclear energy from electricity generation in Slovakia would mean extremely high economic burden for the company and society and expressive deterioration in the quality of environment

# Thank you for your attention