



# Energy Security in Slovak Republic

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Michal Hudec, [energia.sk](http://energia.sk)



**energia**  
komplexne a vecne

# Introduction

## For the beginning:

- 🔄 a brief introduction,
- 🔄 a question: **What does energy security mean:**
  - for country like Slovakia (importing country)?
  - for country like Russian Federation (exporting country)?

*It is not enough to look at energy security from importer's point of view, but at the same time, looking at it from exporter's point of view helps with understanding the issue in a broader and more complex way...*

# Structure of lecture

**The main aim** of this lecture is to discuss:

- ↻ evolution of energy security in Slovakia,
- ↻ „framework“ for energy security in Slovakia,
- ↻ basic facts and numbers,
- ↻ role of Russia in energy security of Slovakia,
- ↻ projects currently under development,
- ↻ the main issues (challenges) linked to energy security of Slovakia.

# Evolution of energy security in Slovakia

## Key determinants for energy security:

- ↻ governments 1993 – 2009: more words, less acts,
- ↻ timing of privatization of strategic energy companies,
- ↻ feeling of highly important transit country for Russian natural gas and oil,
- ↻ ignoring the importance + impact of new infrastructure projects in abroad (eg. Nord + South Stream, Nabucco, North – South Gas Interconnection etc.),
- ↻ **before 2009, no serious negative experience with energy supplies disruption.**

# Legal framework of energy security in Slovakia

## Basic primary and secondary legislative acts:

- ☞ **Act no. 656 / 2004 (energy bill)**
- ☞ Act no. 309 / 2009 (renewable energy sources and combined heat and power)
- ☞ Act no. 276 / 2001 (regulation of networked industries)
- ☞ **National Energy Security Strategy (2008)**
- ☞ National Action Plan for Renewable energy sources (2010)

**Two basic bills to be novelized (energy bill, regulation bill) in 2012, the others should be updated in a short term (energy security strategy, RES bill, CHP...)**

# High dependence on primary energy sources import

According to International Energy Agency (Report from 2012; data 2009/10):

↻ Total primary supply (TPES): 17,3 Mtoe:

↻ Natural Gas	30 %	(99 % imported from Russia)
↻ Nuclear Energy	22 %	(100 % imported from Russia)
↻ Oil	21 %	(98 % imported from Russia)
↻ Coal (hard + brown)	20 %	(hard coal: 100 % imported; CZ, RU, PL, US)
↻ Renewables (RES)	7 %	

↻ Inland energy production: 6,1 Mtoe (36 %)

↻ Total final consumption (TFC): 10,8 Mtoe

# Basic figures – Slovakia

## Key data (2010 estimates)

Population: 5.4 Million

GDP: 94.7 billion USD (2000 prices and PPPs), +59.7% since 2000

GDP per capita: 17 500 USD (OECD average: 26 900)

TPES: 17.3 Mtoe (gas 30%, nuclear 22%, oil 21%, coal 20%, renewables 7%)  
-0.2% on average per year since 2000

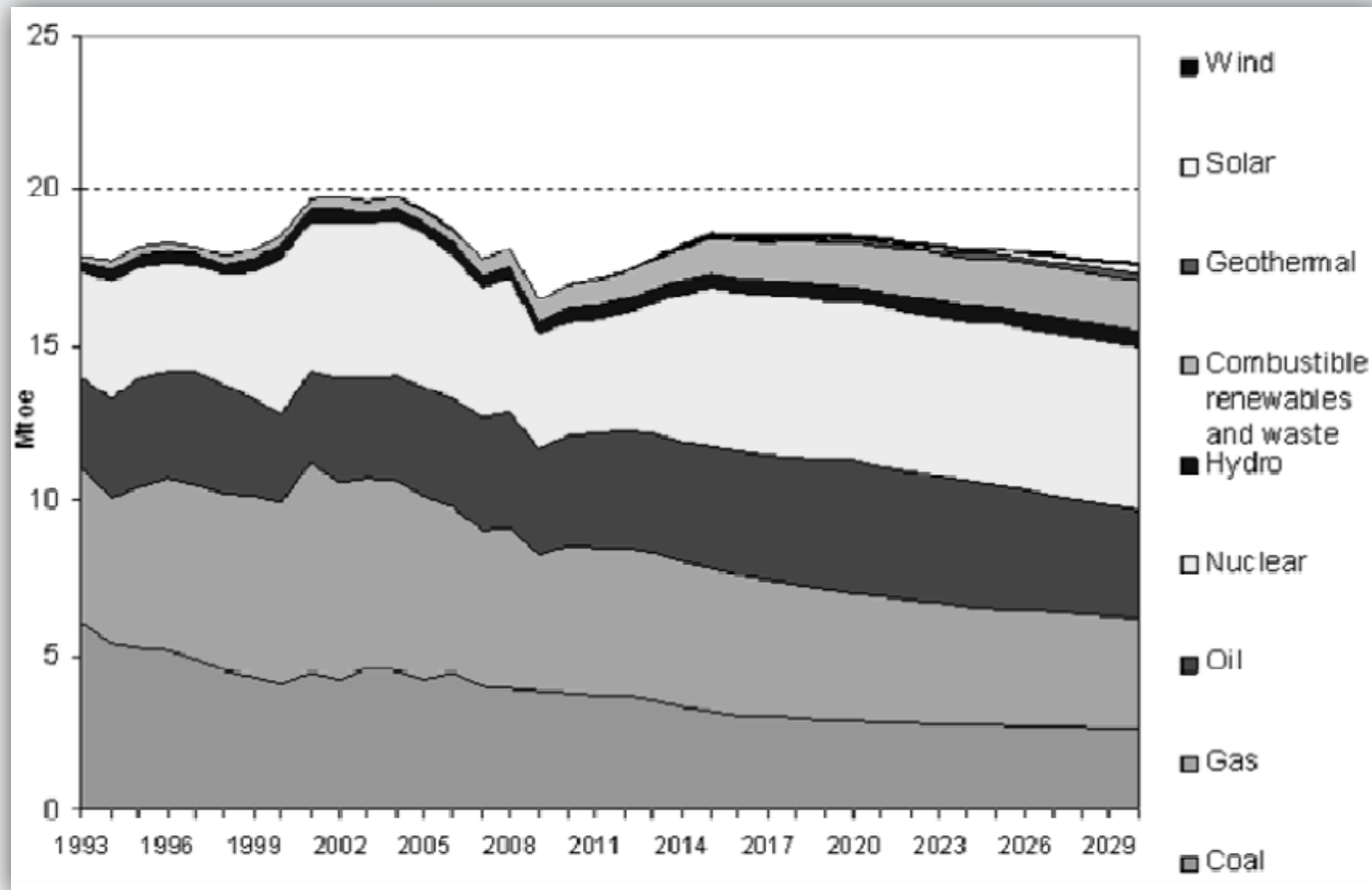
TFC: 10.8 Mtoe in 2009 (industry 40%, transport 21%, residential 20%, other 19%)  
-0.5% on average per year since 2000

Electricity generation: 27.3 TWh (nuclear 53%, hydro 20%, coal 15%, gas 7%, oil 2%,  
biofuels 2%)

Inland energy production: 6.1 Mtoe, 36% of TPES

Source: IEA

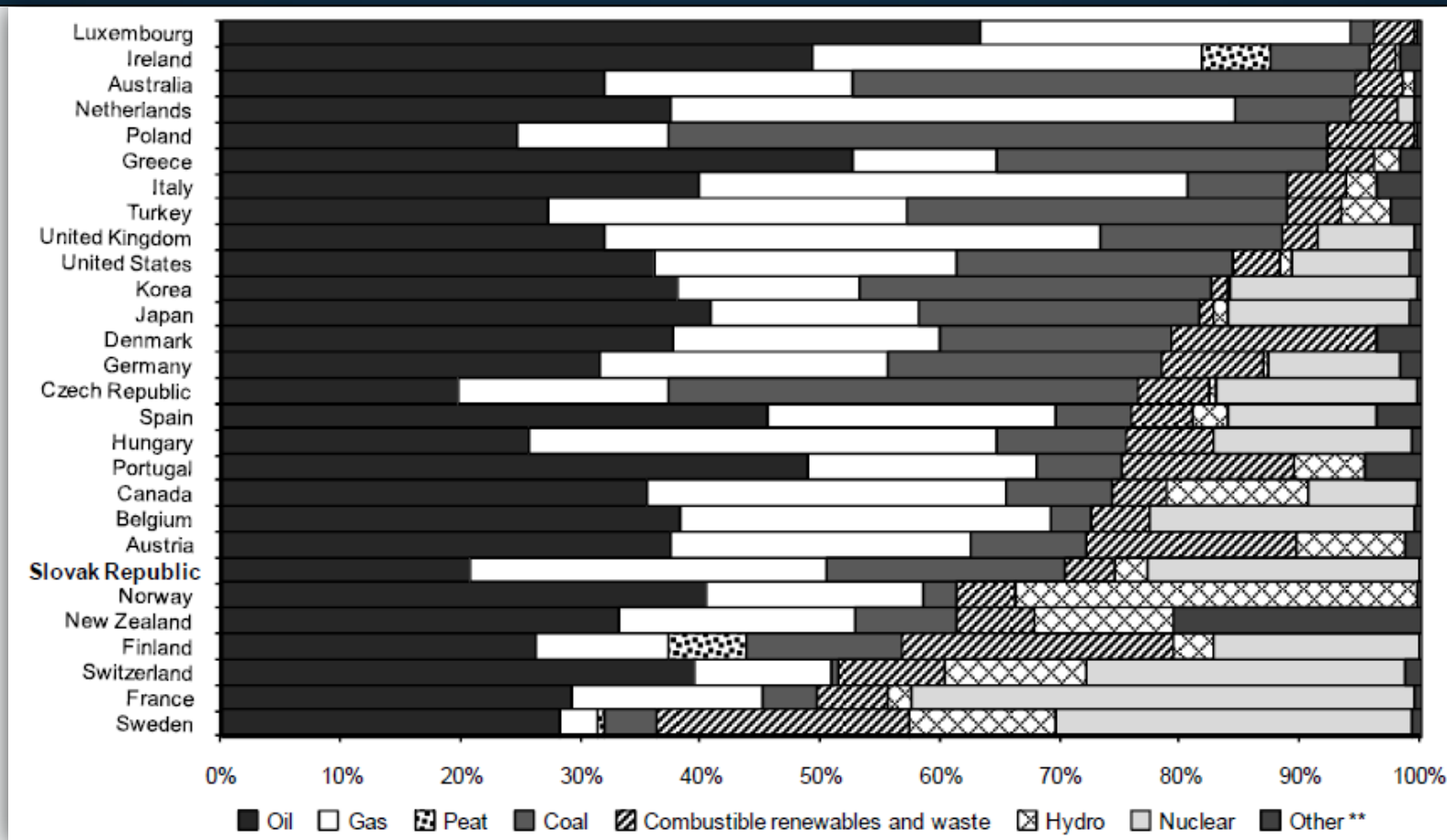
# Basic figures – history and future forecast (TPES)



Source: IEA

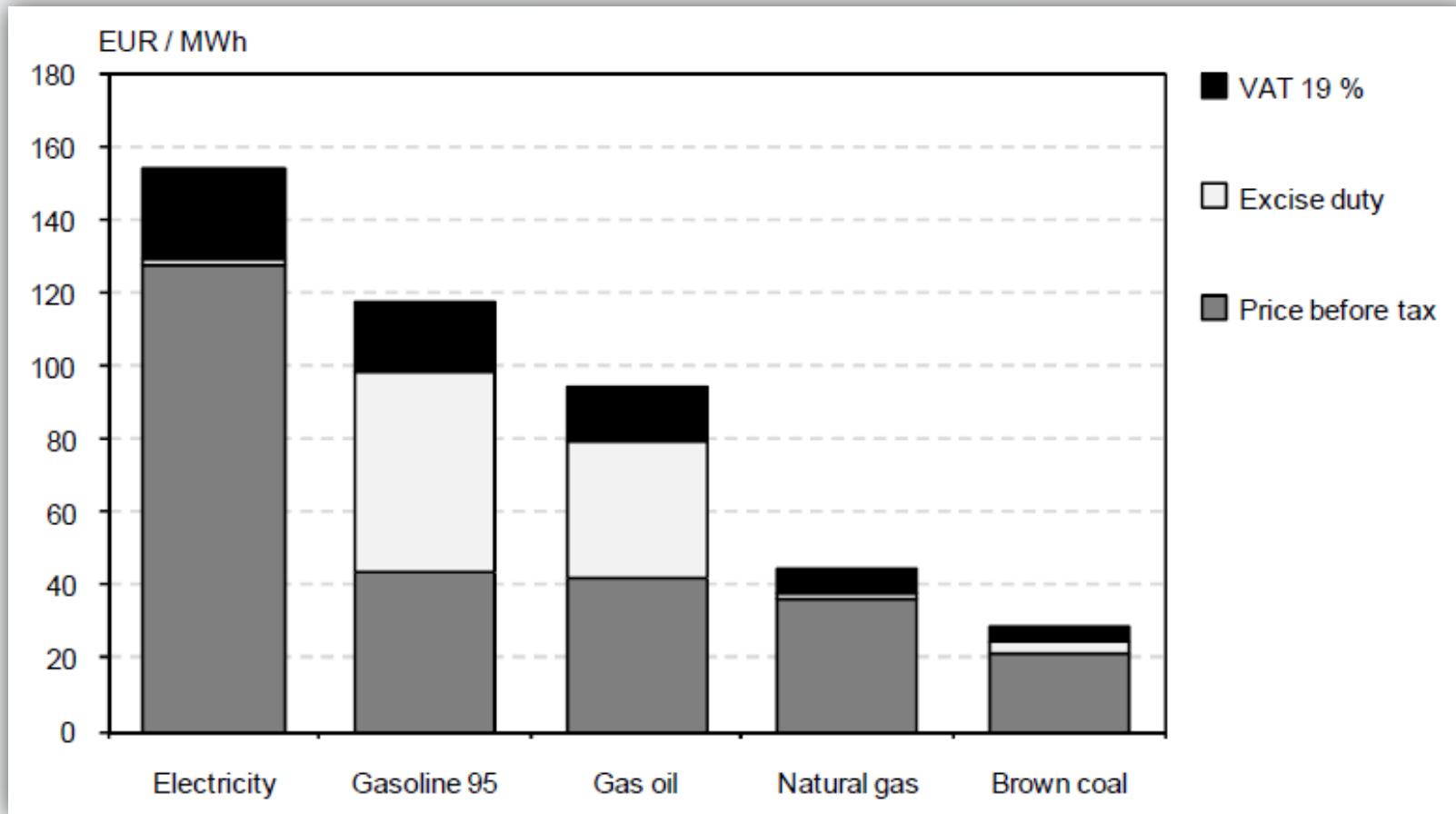


# Energy mix – TPES (comparison with OECD countries)



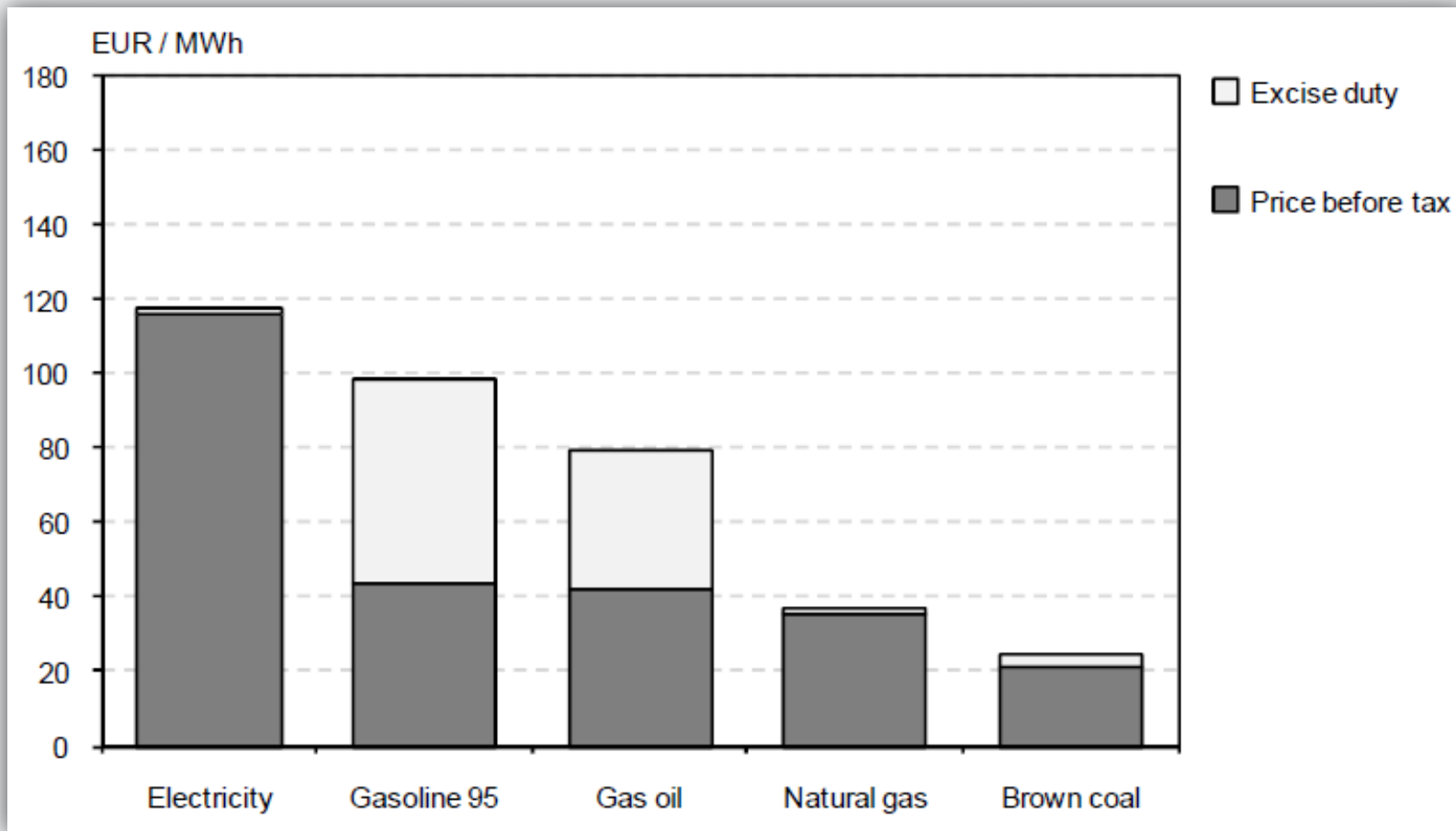
Source: IEA

# Average energy prices in household sector (2010)



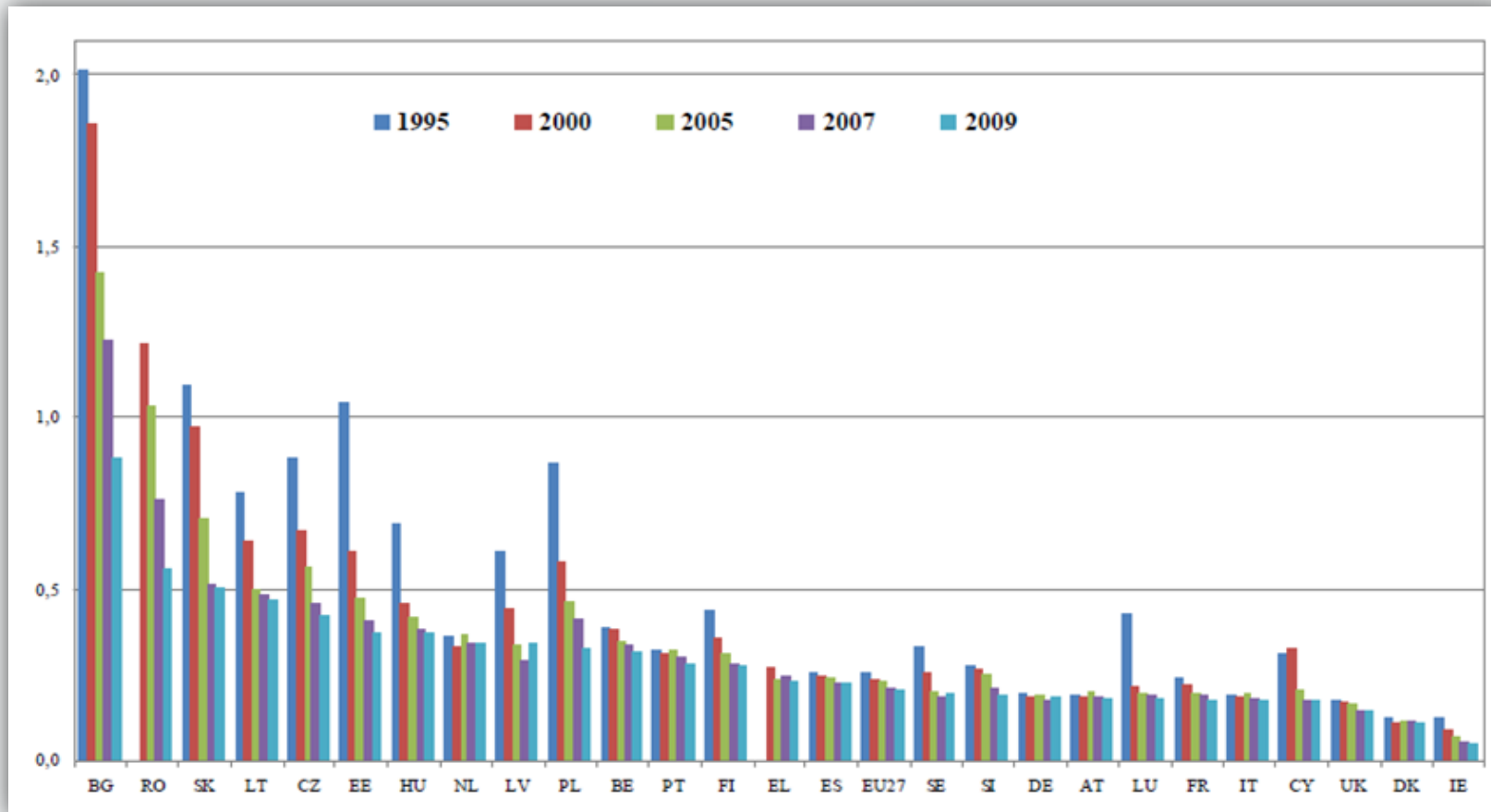
Source: IEA

# Average energy prices in the industry sector (2010)



Source: IEA

# Energy intensity in the industry and energy sector



Source: DG Energy (European Commission)

# Energy intensity in general (IEA)

## According to International Energy Agency (Report from 2012; data 2009/10):

- ⌚ energy use per capita: 3,1 toe per capita (OECD average: 4,3 toe per capita)
- ⌚ energy intensity: 0,18 toe per 1.000 USD PPP (OECD: 0,16 USD PPP)

## Since 2000, noticeable improvement has been reached::

- ⌚ energy use per capita decreased by 6 percent
- ⌚ **energy intensity decreased by 39 percent (!!)**

# Natural Gas

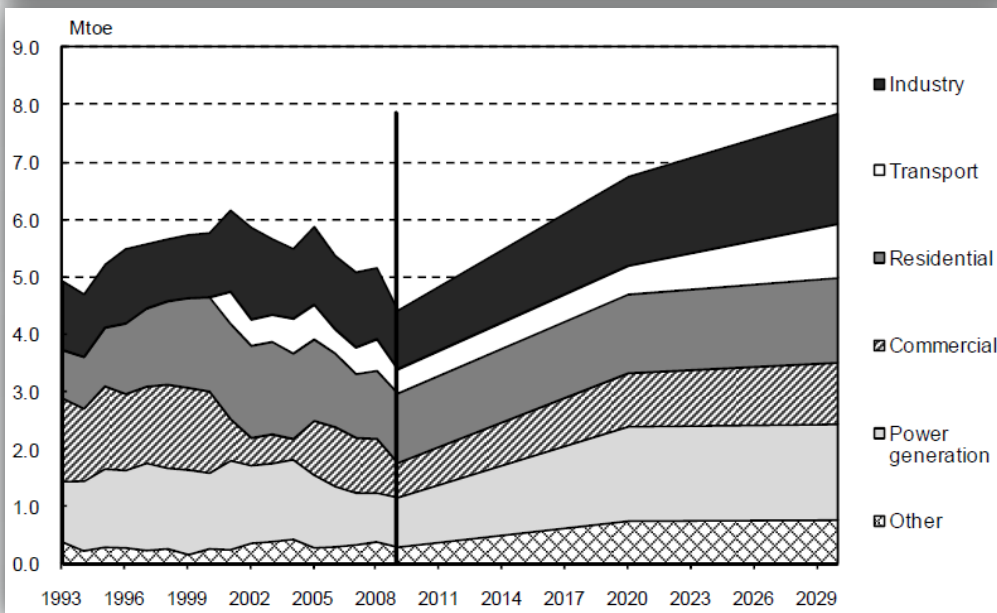
## Key Data (2010 estimates)

Production: 0.1 Bcm

Share of natural gas: 30% of TPES and 7% of electricity generation

Net imports: 6 Bcm (Russia 99%, other 0.7%)

Inland consumption: 6.3 Bcm (residential 27%, power and heat generation 20%, industry 23%, commercial and agriculture 14%)



Source: IEA

# Infrastructure for Natural Gas

## Slovakia has been the biggest single transport country within the EU:

- ↻ annual capacity of „eustream“ company: more than 90 bcm
- ↻ annual consumption of Slovakia: up to 5,5 bcm
- ↻ annual utilization of „eustream“ capacities: more than 76 bmc (2008)
- ↻ annual capacity of future SK-HU interconnection: up to 5 bmc (2014)

## Infrastructure projects avoiding Slovakia:

- ↻ Nord Stream I: annual capacity: 27,5 bcm (in operation)
- ↻ Nord Stream II: annual capacity: 27,5 bcm (2012/13)
- ↻ South Stream: annual capacity: 63 bcm (2015)
- ↻ Nabucco (theoretically): annual capacity: 31 bcm (2017)

# „Gas Crisis“ 2009

## On 1st January 2009 natural gas deliveries were stopped:

- ☞ 21 days without the deliveries of natural gas from Gazprom
  - ☞ reverse flow from Czech republic enabled and activated
  - ☞ significant shortage of gas deliveries for industry
  - ☞ households, schools, heating companies etc. without a gas shortage
  - ☞ significant economic impact – total lost: 1 billion EUR per period, in terms of GDP it represents its decreasing by 1 – 1,5 % (!!)
- (according to Slovak Academy of Science, but on the other hand, some companies decided not to reveal quantifications of their loss -> **real impact unknown**)



# Natural Gas sector after „Gas Crisis“

**In 2009, Slovakia faced the disruption of natural gas supplies for 21 days...**

After „gas crisis“ several measures had been adopted:

- ↻ technical solution for permanent reverse flow in „eustream“ pipes
- ↻ technical solution for reverse flow from Czech republic (already operated)
- ↻ technical solution for reverse flow from Austria (Baumgarten hub)
- ↻ the obligation of natural gas suppliers to have enough reserves in order to fully supply all customers at least for 60 days:
  - ↻ underground storage capacities (total capacities: 2,7 bcm)
  - ↻ diversification contracts with the another gas producers
  - ↻ combination of storage and contracts

# Crude Oil

## Key Data (2010 estimates)

Crude oil production: 5.1 kb/d

Net crude oil imports: 78.1 kb/d, -3.4% compared to 2009

Oil products: refinery output 6.1 Mt (130kb/d), net exports: 71kb/d

Share of oil: 20.7% of TPES and 2.2% of electricity generation

Inland consumption: 83.2kb/d (transport 50%, industry 31%, transformation sector 16%, , residential, commercial and agriculture sectors 4%)

Consumption per capita: 0.6 t per capita (OECD average: 1.6)

Source: IEA

## Other issues:

- ↻ not fully exploited capacity (20 Mt per year) of „Transpetrol“ pipe ( > 50%)
- ↻ the future of Bratislava-Schwechat Pipeline project (environment?)

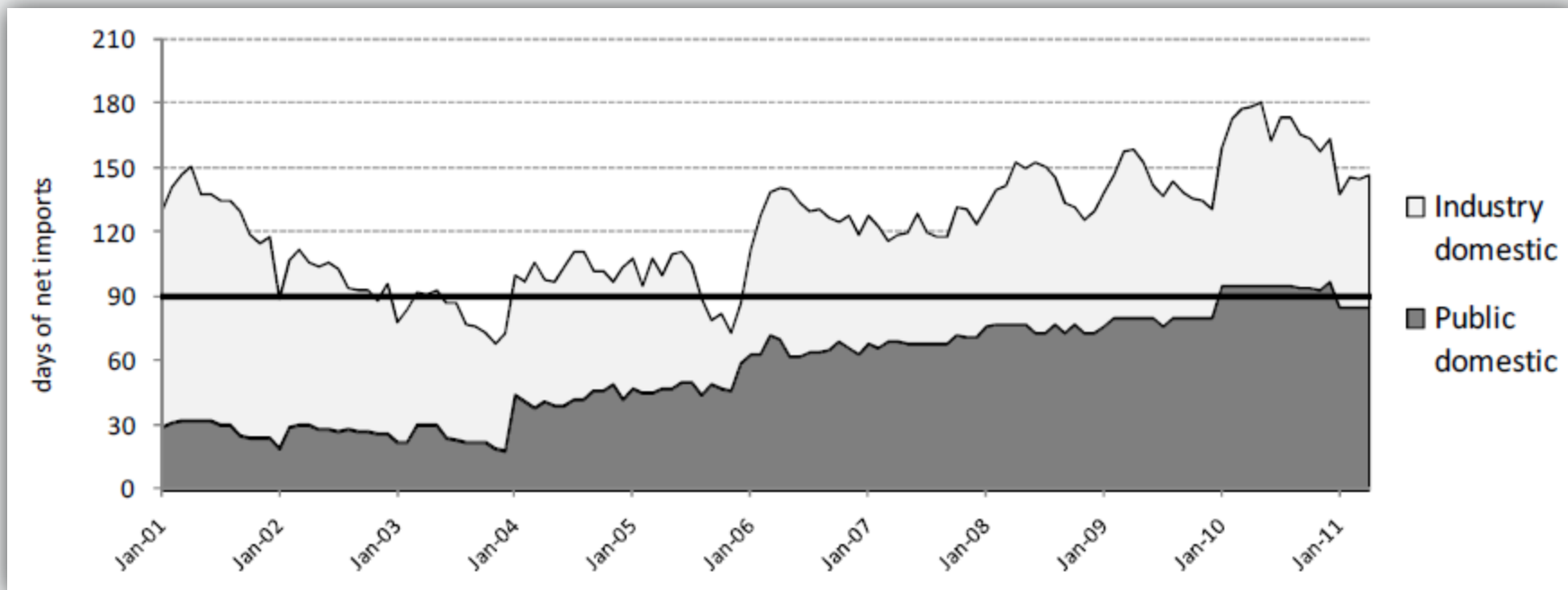
# Reserves of Crude Oil

## Slovakia meets minimum stockholding obligations as EU and IEA member:

- ☉ total storage capacities: more than 9 million barrels,
- ☉ Total used capacities in 2010: 5,4 mb (reserve for , which are owned by state-owned Transpetrol (4,2 mb) and MOL-owned Slovnaft (1 mb) companies:
  - ☉ 3,3 mb of final oil products
  - ☉ 2,1 mb of crude oil

**Responsibility for emergency response had Administration of State Material Reserves (Štátne hmotné rezervy).**

# Compliance with stockholding obligations



Source: IEA

# Coal

## Key Data (2010 estimates)

Production: 2.4 Mt of brown coal<sup>20</sup>

Net imports: 0.6 Mt of brown coal (Czech Republic 83%), 3.4 Mt of hard coal (Czech Republic 48%, Russia 27%, Poland 16%, USA 7%)

Share of coal: 19.9% of TPES and 15.2% of electricity generation

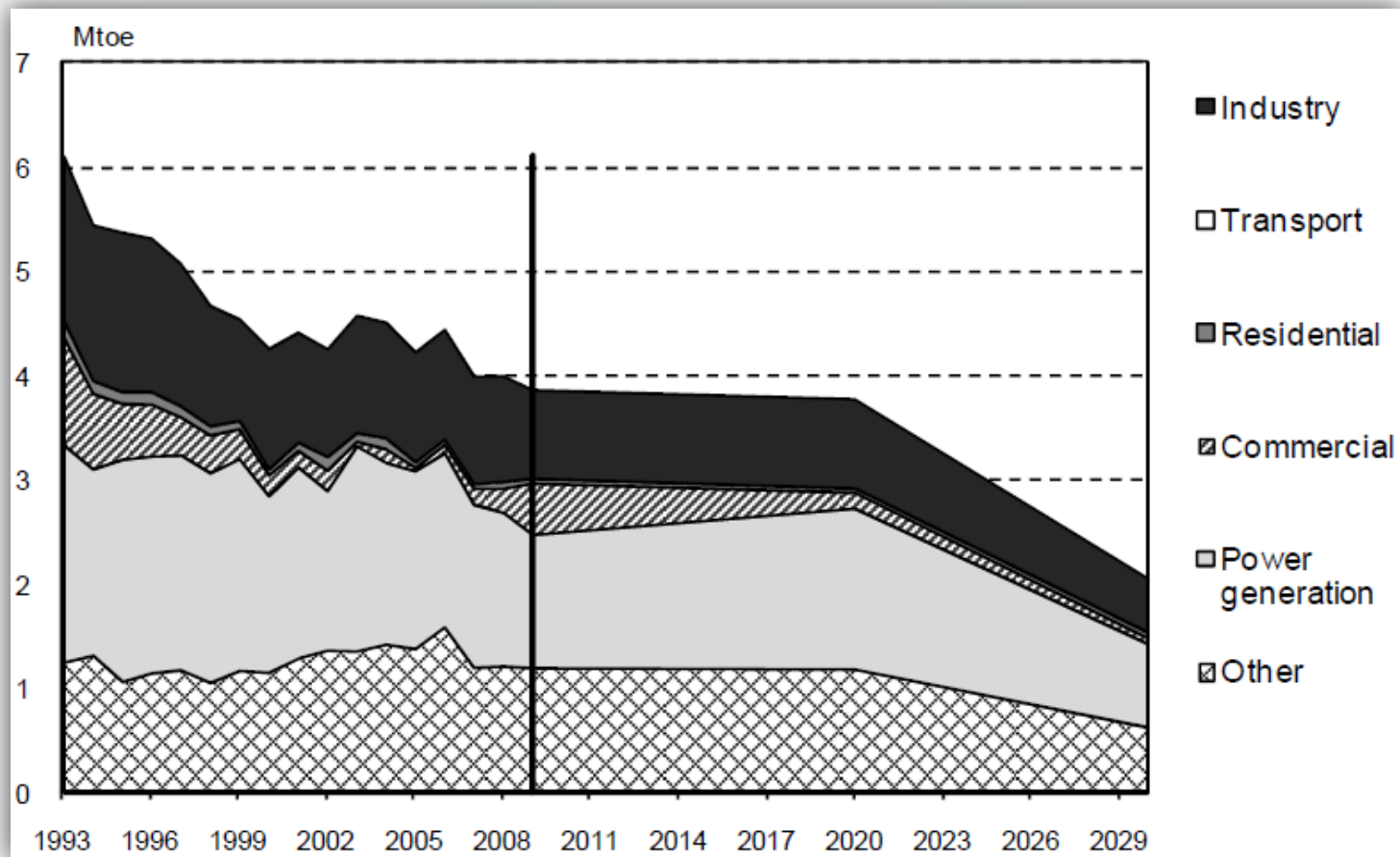
Inland consumption: Power and heat generation 33%, other transformation and energy sector 31%, industry sector 22%, commercial and residential 13%

## Other issues:

- ↻ after 2012: 3rd phase of carbon trading (ETS scheme)
- ↻ price impact („TPS“ tariff) + state of the art of new technologies (gasification)

Table source: IEA

# Future Coal Exploitation



Source: IEA

# Renewables (2010)

## Key Data (2010 estimates)

Share of renewables: 6.9% of TPES and 22.2% of electricity generation (IEA average: 7.7% and 17.7%), compared to 4.6% and 15.1% in 2000

Hydro power: 2.7% of TPES and 20.1% of total electricity generation

Biofuels and waste: 4.1% of TPES and 2% of total electricity generation

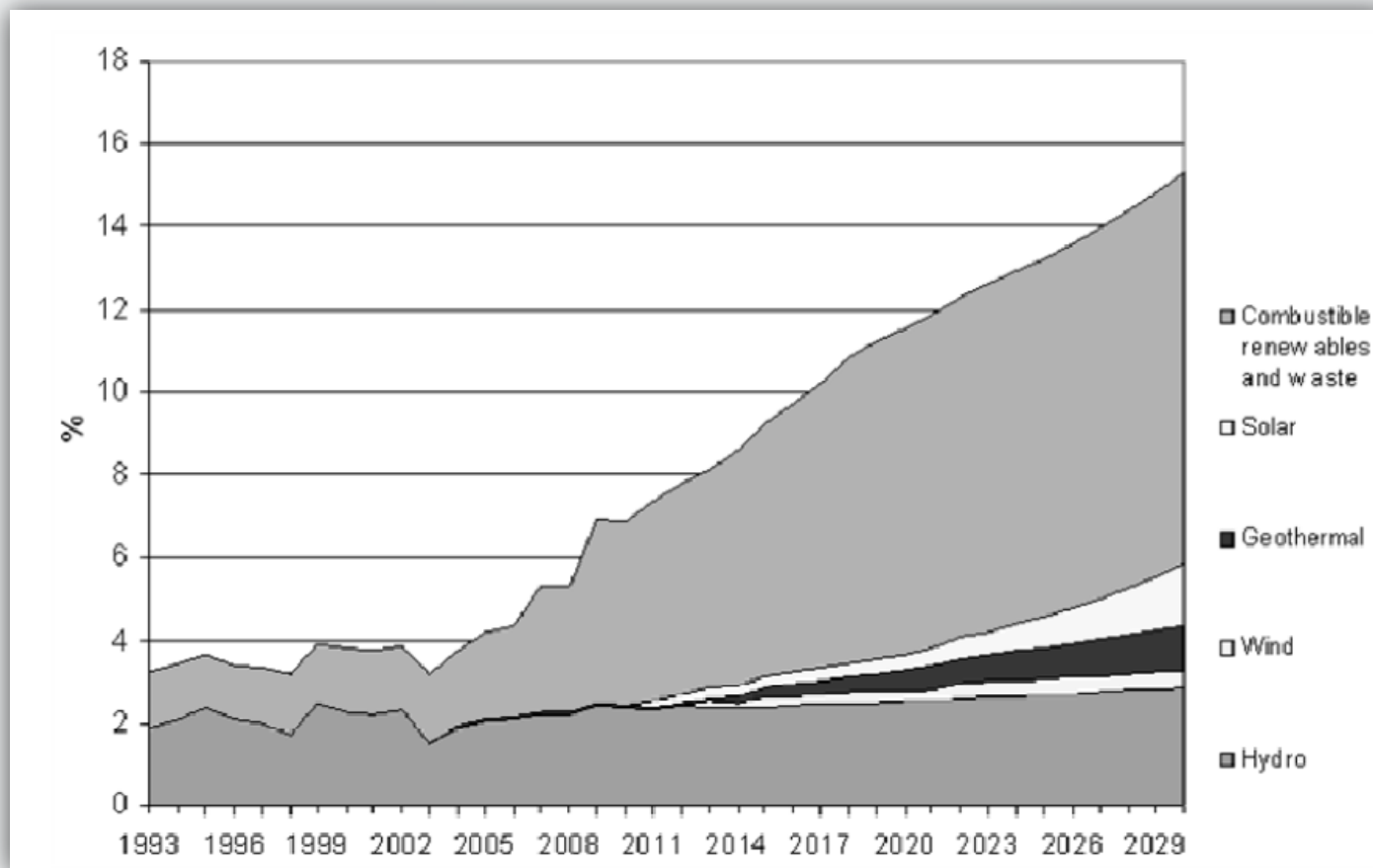
Other renewables: 0.1% of TPES and 0.2% of total electricity generation

## Update:

- ⌚ PV 2010/2011 „boom“ - currently almost 500 MW of installed capacity
- ⌚ „no bright future“ for wind energy + current „stop status“ for RES
- ⌚ SEPS warning against „biogas boom“ (feed-in tariffs 145 EUR/MWh)

Key data source: IEA

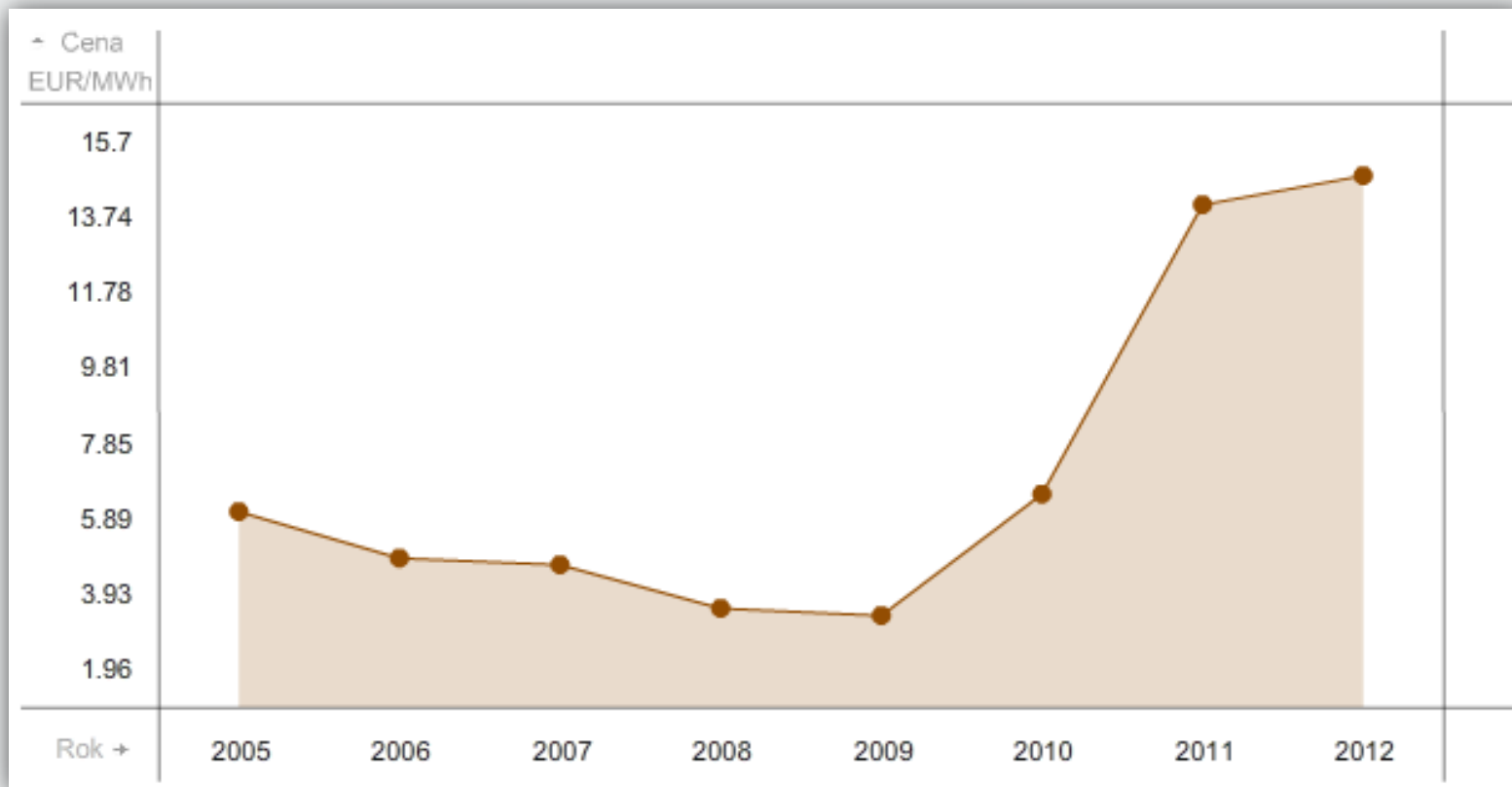
# Renewables – IEA prediction (TPES)



Source: IEA



# Coal & Renewables – price impact („TPS“ tariff)



Source: energia.sk (cenaenergie.sk)

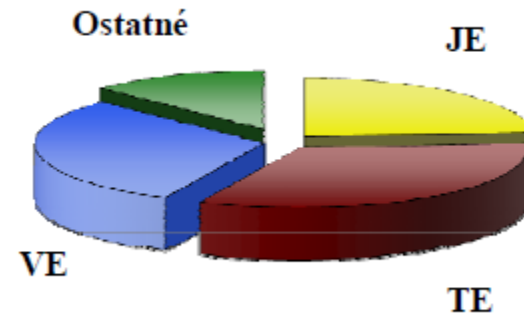
# Electricity generation

Technology:

Nuclear  
Thermal (Coal)  
Hydro  
Others (gas, PV...)

<b>Elektrárň</b>	<b>MW</b>	<b>%</b>	<b>Type</b>
JE	1 940	23,8	Nuclear
TE	2 708	33,2	Thermal
VE	2 478	30,4	Hydro
Ostatné	1 026	12,6	Others
<b>Suma</b>	<b>8 152</b>		<b>Total</b>

Ostatné: závodné el. a obnoviteľné zdroje  
Others: industrial PP and renewable energy sources

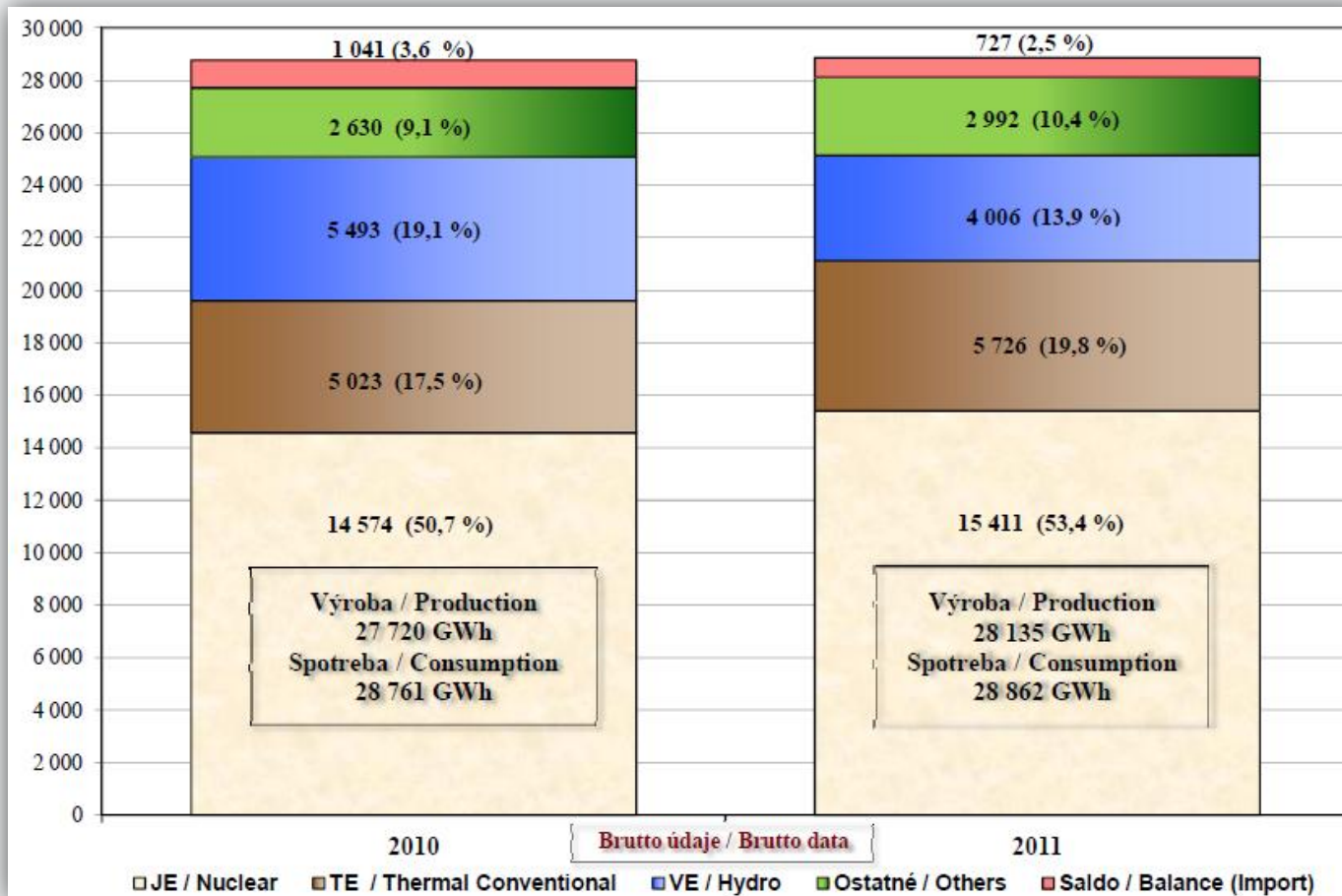


Data source: Slovak electro energy dispatching, SEPS (2011)

## Projects currently under construction / planning:

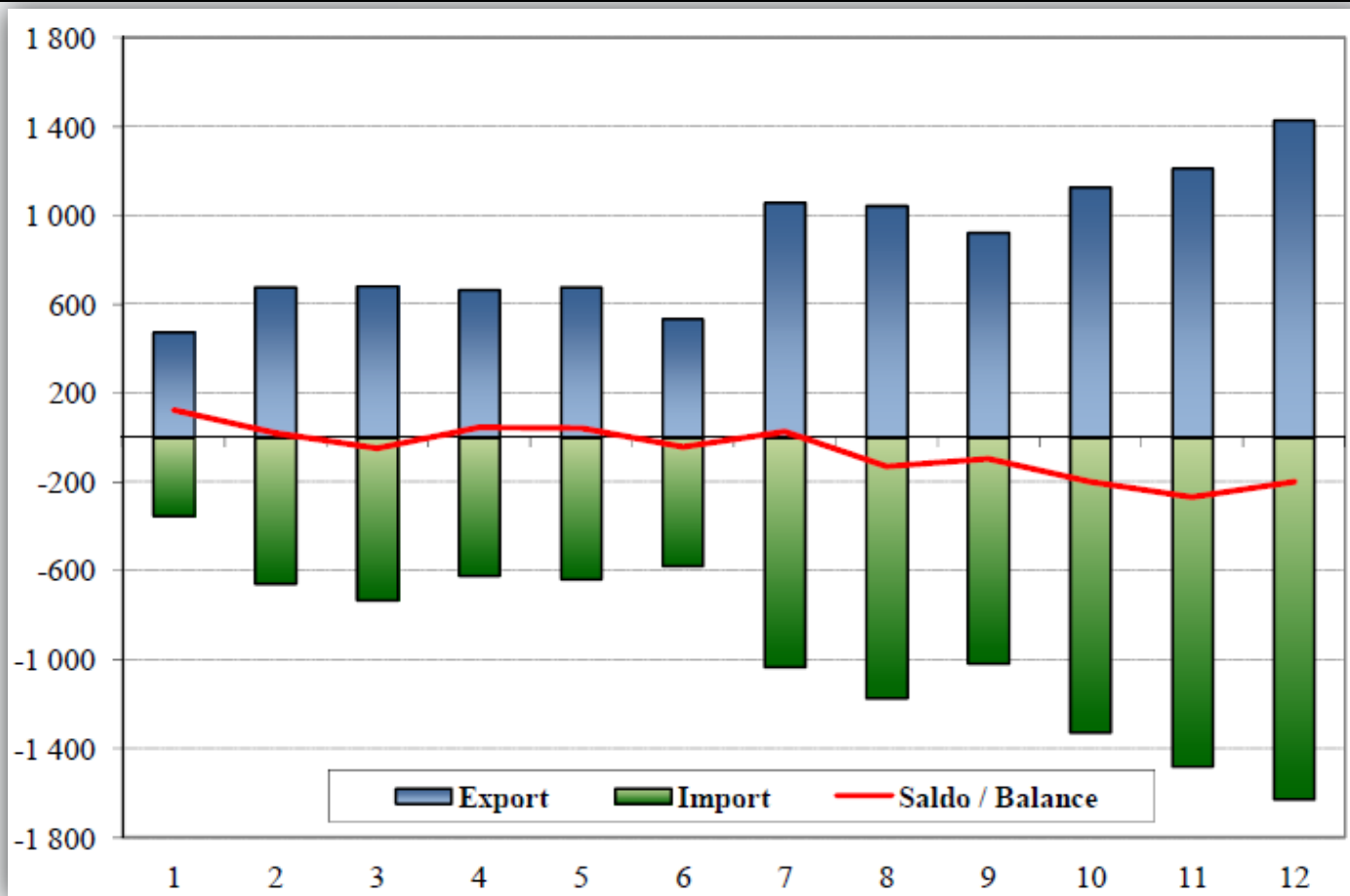
- ⌚ Mochovce NPP 3, 4 (additional 1 GW) – operational in 2013 (+ 9 months)
- ⌚ feasibility study of new nuclear source in Jaslovske Bohunice
- ⌚ various small biogas (CHP) project, new natural gas CHP projects
- ⌚ small hydro: 2015 target: 0,45 TWh

# Electricity generation



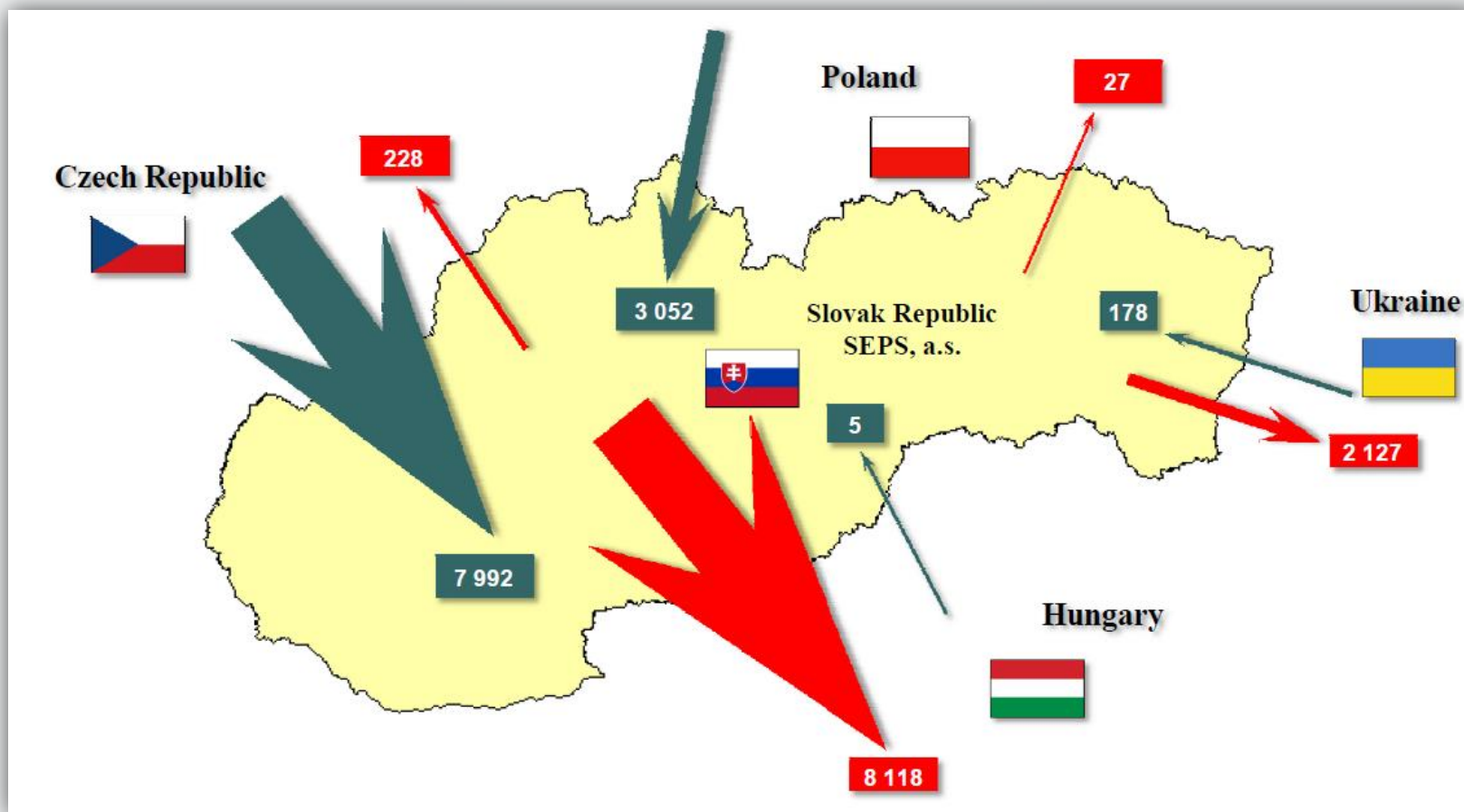
Source: Slovak electro energy dispatching, SEPS

# Electricity import / export in 2011



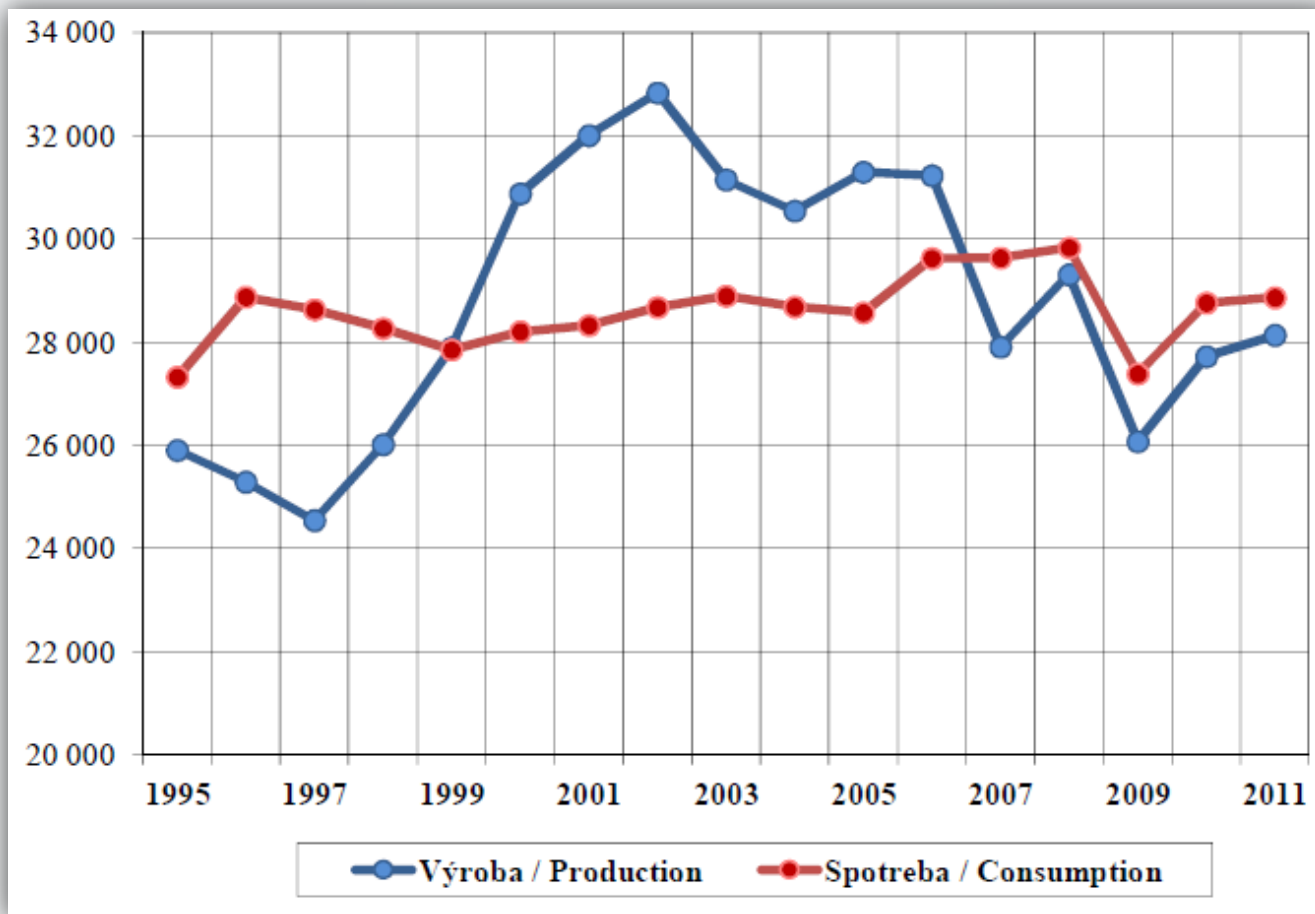
Source: Slovak electro energy dispatching, SEPS

# Electricity import / export in 2011 [GWh]



Source: Slovak electro energy dispatching, SEPS

# Electricity import and export 2005 - 2011



Source: Slovak electro energy dispatching, SEPS

# Heat

## Key Data (2009)

Share of heat in final consumption: 50 % (OECD average 36%)

Heating mix: gas 47%, coal 25%, commercial heat 14%, biomass 9%, oil 4%

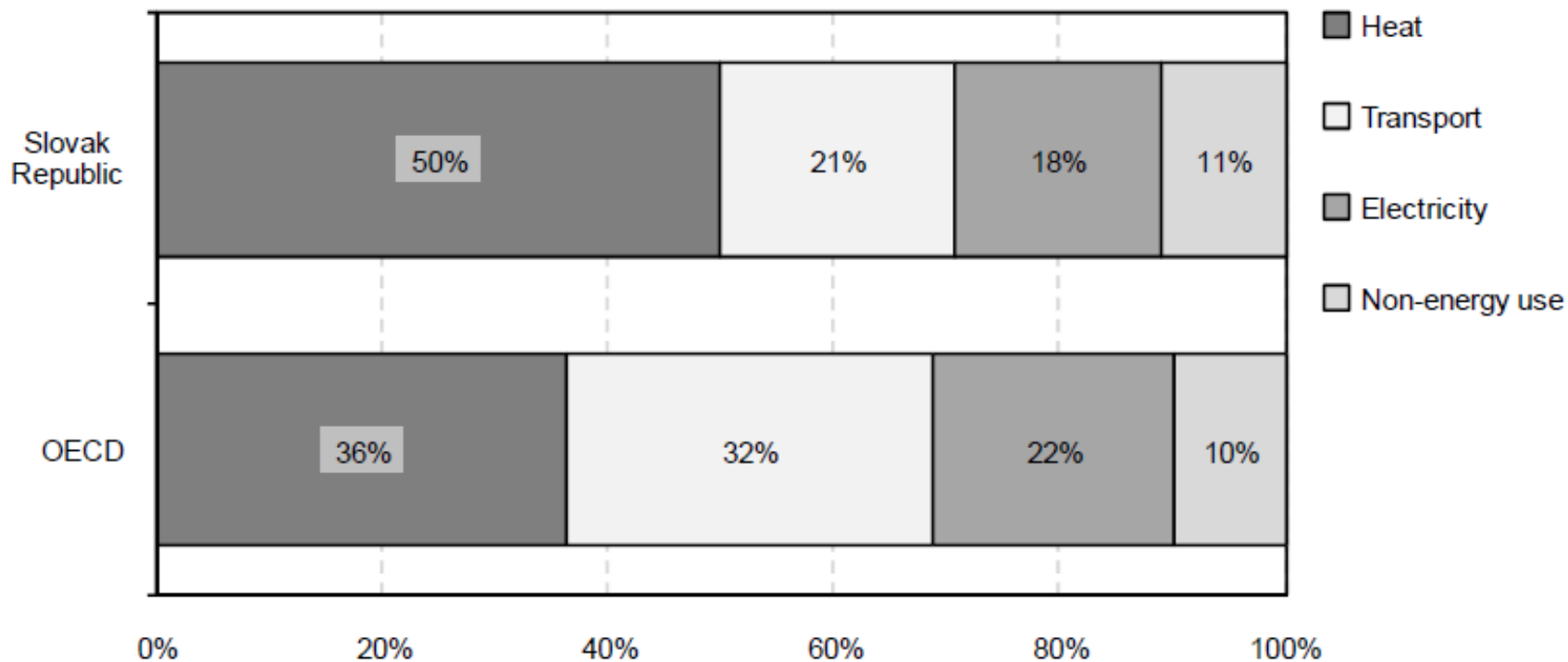
Share of CHP: 60% of total commercial heat production (OECD average 80%)

## Existing potential for improvement:

- ↻ combined heat and power generation
- ↻ broader exploitation of existing district heating distribution networks
- ↻ low level of implementation (enforcement) of existing bills
- ↻ currently almost lowest level of RES exploitation in heat generation

Data source: IEA

# Final energy use (2009)



Source: IEA



# Conclusions and questions...

## Conclusions:

- ↻ energy security has to be viewed in perspective of:
  - ↻ traditional role of important gas transit country
  - ↻ timing of privatization of strategic energy companies
- ↻ energy security has been issue only since 2009 crisis
- ↻ energy sector in Slovakia works well, but it is highly dependent on energy imports, mainly from Russia
- ↻ Slovakia is not a secure country in terms of energy security

**Place for observations, comments, questions, discussion...**

**Thank you for your attention!**

**Michal Hudec, [energia.sk](http://energia.sk)**

**[hudec@energia.sk](mailto:hudec@energia.sk)**

