ENERGIJA

# SLOVENIA:

# SUSTAINABLE ENERGY SUPPLY IN THE REGION

11th March 2008

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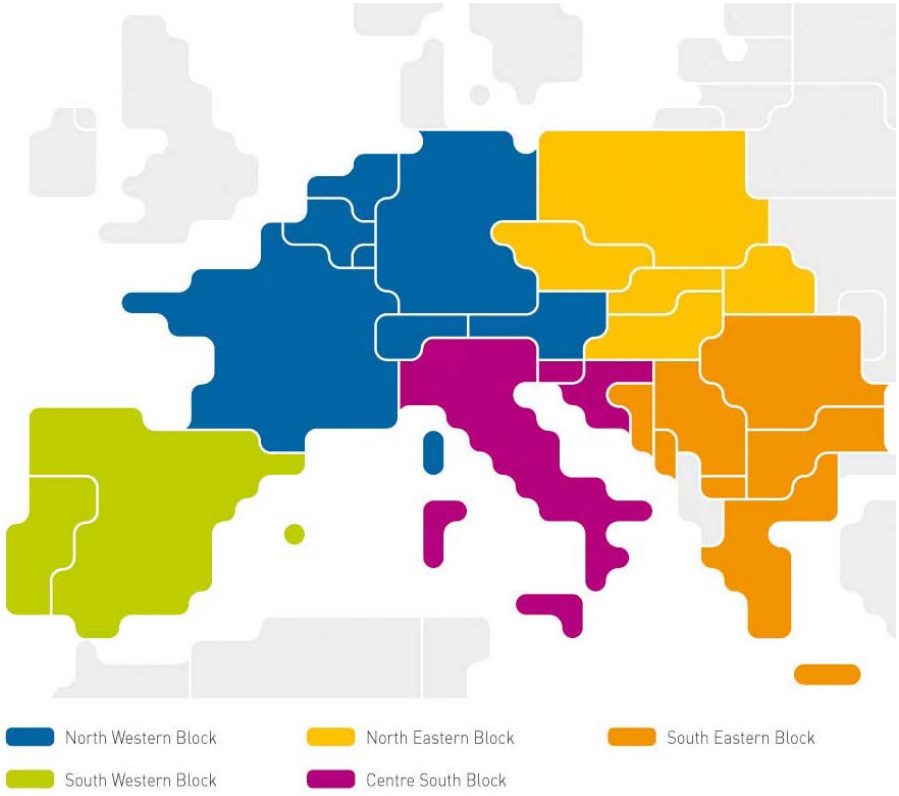
# 1. STRONG INCREASE IN DEMAND IN SLO, CRO, ITA

- Region overview
- BDP/electricity demand
- SLO,CRO,ITA (UCTE Centre South block)



# UCTE Energy Consumption Forecast

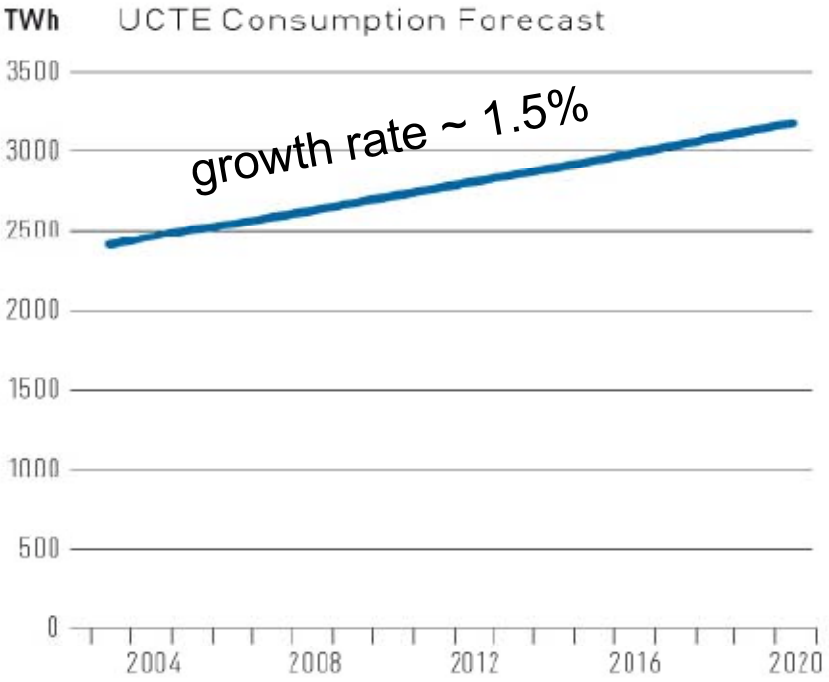
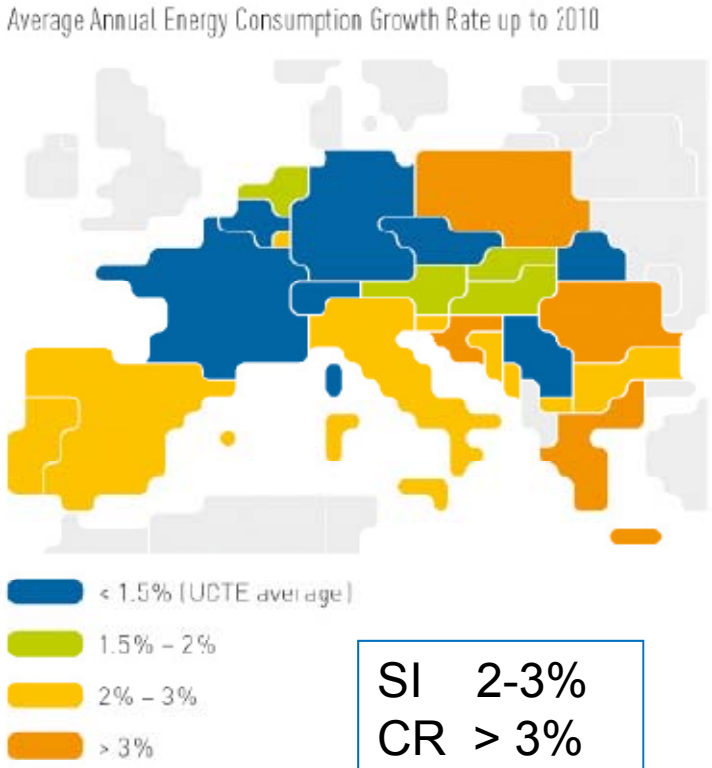



Fig. 13 UCTE Consumption Forecast




SI 2-3%
CR > 3%
IT 2-3%

Map 7 Average Annual Consumption Growth Rate up to 2010

# UCTE Load Forecast/Load Growth Rate up

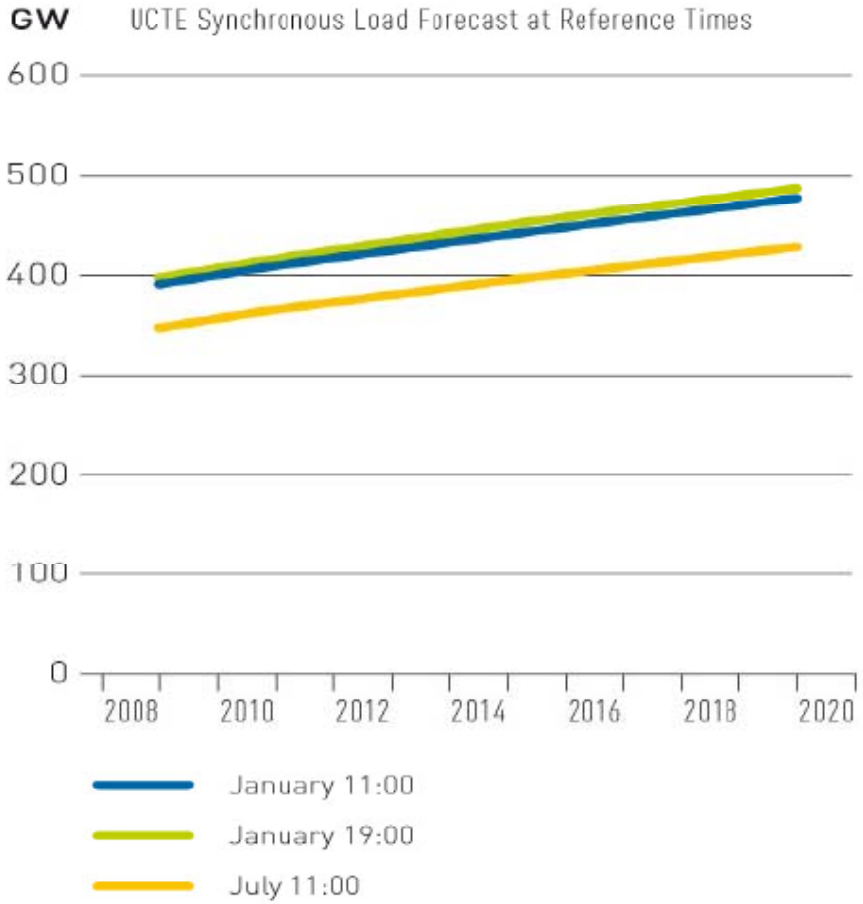
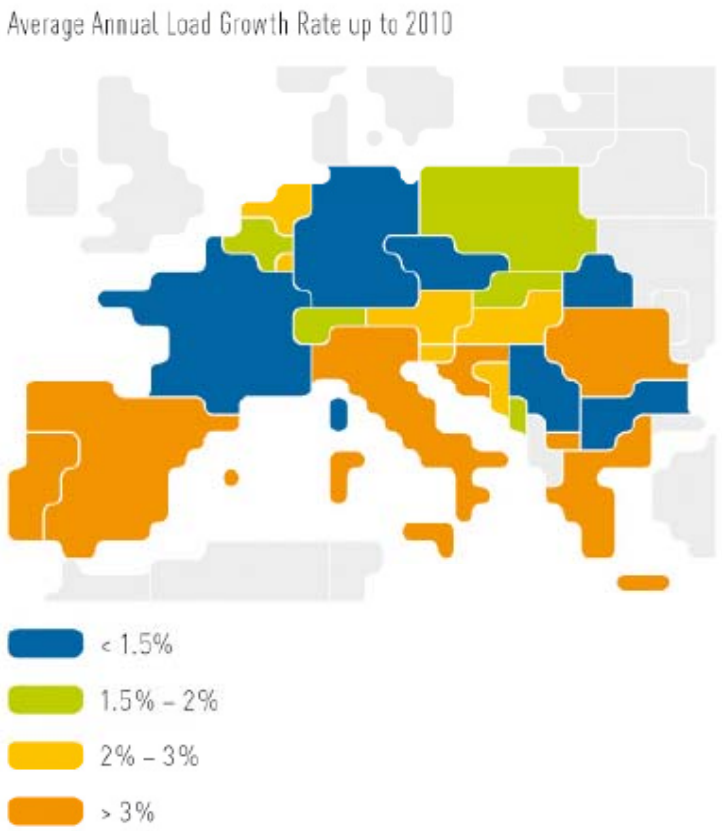
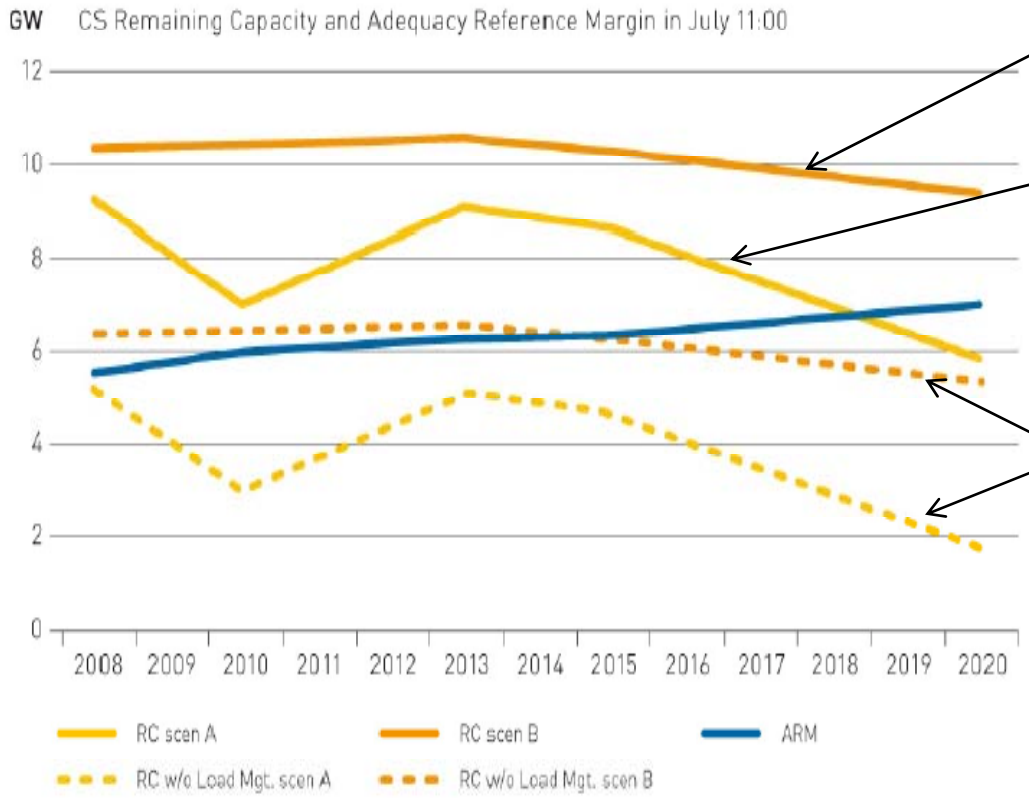



Fig. 14 UCTE Load Forecast




Map 8 Average Annual Load Growth Rate up to 2010 in January 11:00

# Remaining capacity in Centre-South block




**Best Estimate Scenario B**:
scenario A as well as future power plants whose commissioning can be considered as reasonably credible.

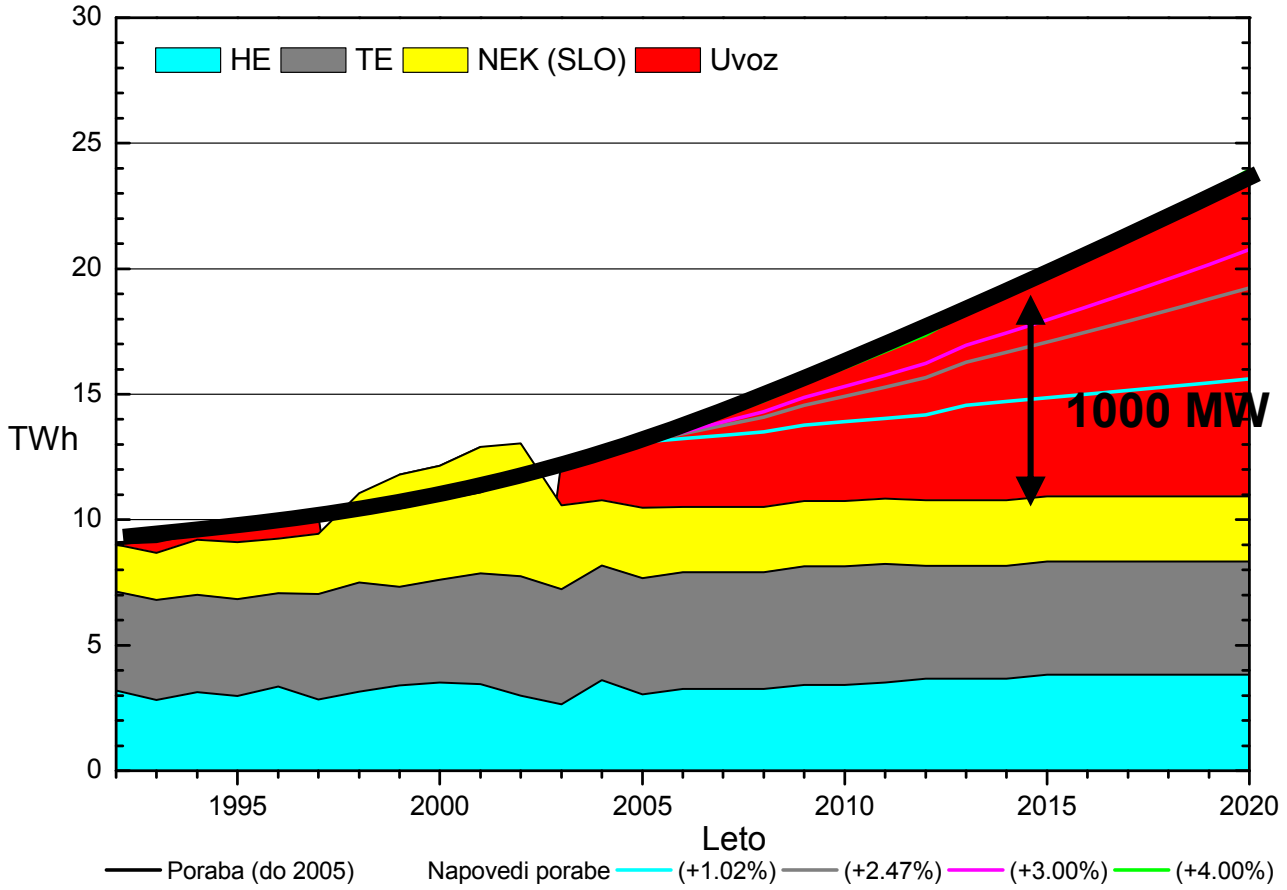
**Conservative Scenario A**:
commissioning of new power plants considered as sure and the shutdown of power plants expected during the study period.

**Load management**:
Potential load reduction available at peak load to balance the system and ensure reliability

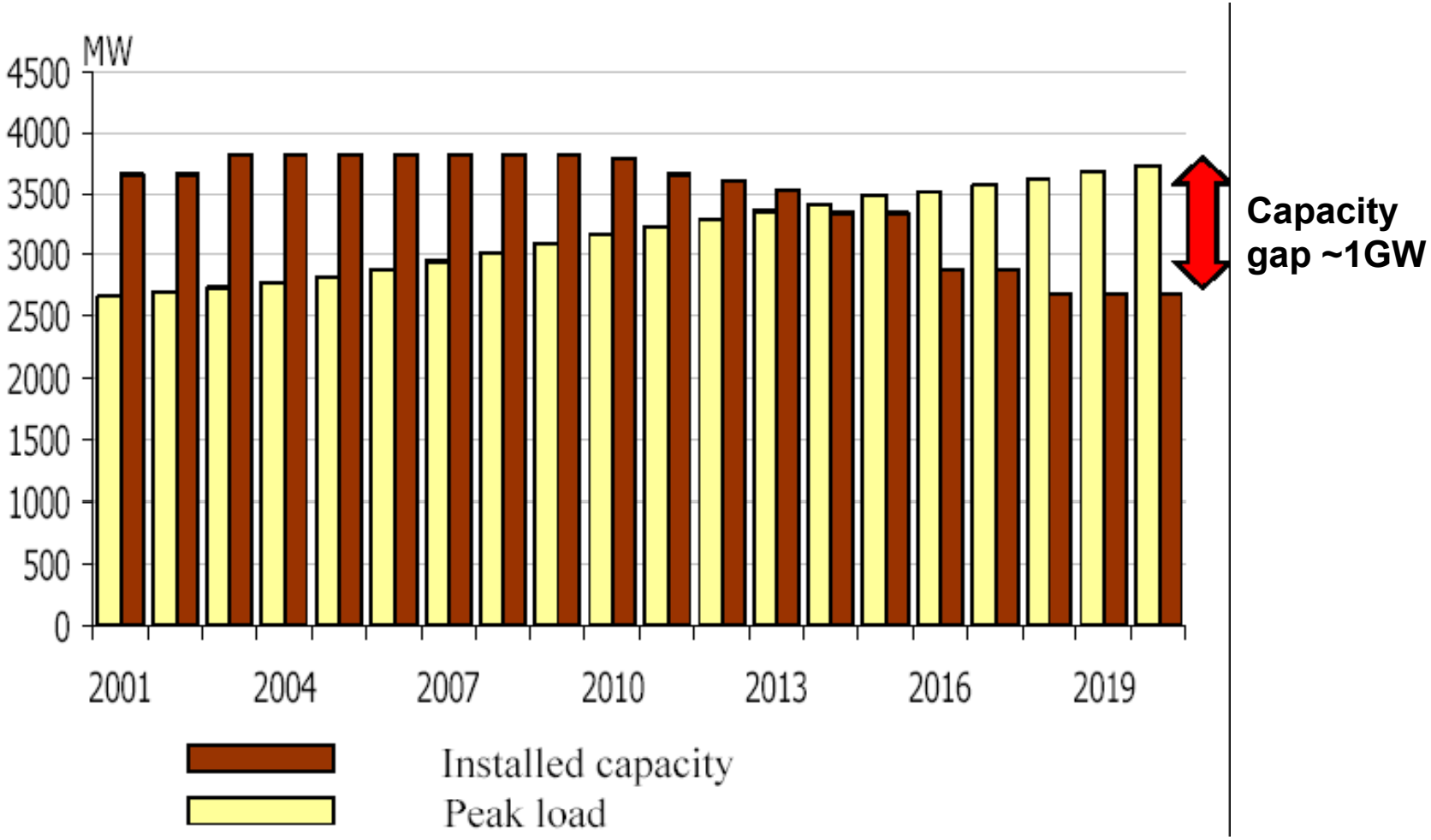
- Adequacy should be achieved in the mid-term with a minimum in 2010.
- < 10 GW of additional capacity must be confirmed to maintain adequacy in 2020 at the same level as in 2008 (considering Conservative scenario A).

source: UCTE_SAR 2008 - 2020

# Electricity generation and consumption in Slovenia (four different consumption growth scenarios)



# Installed capacity and peak load plus forecast in Croatia




Source:Nikola Čavlina, 2004

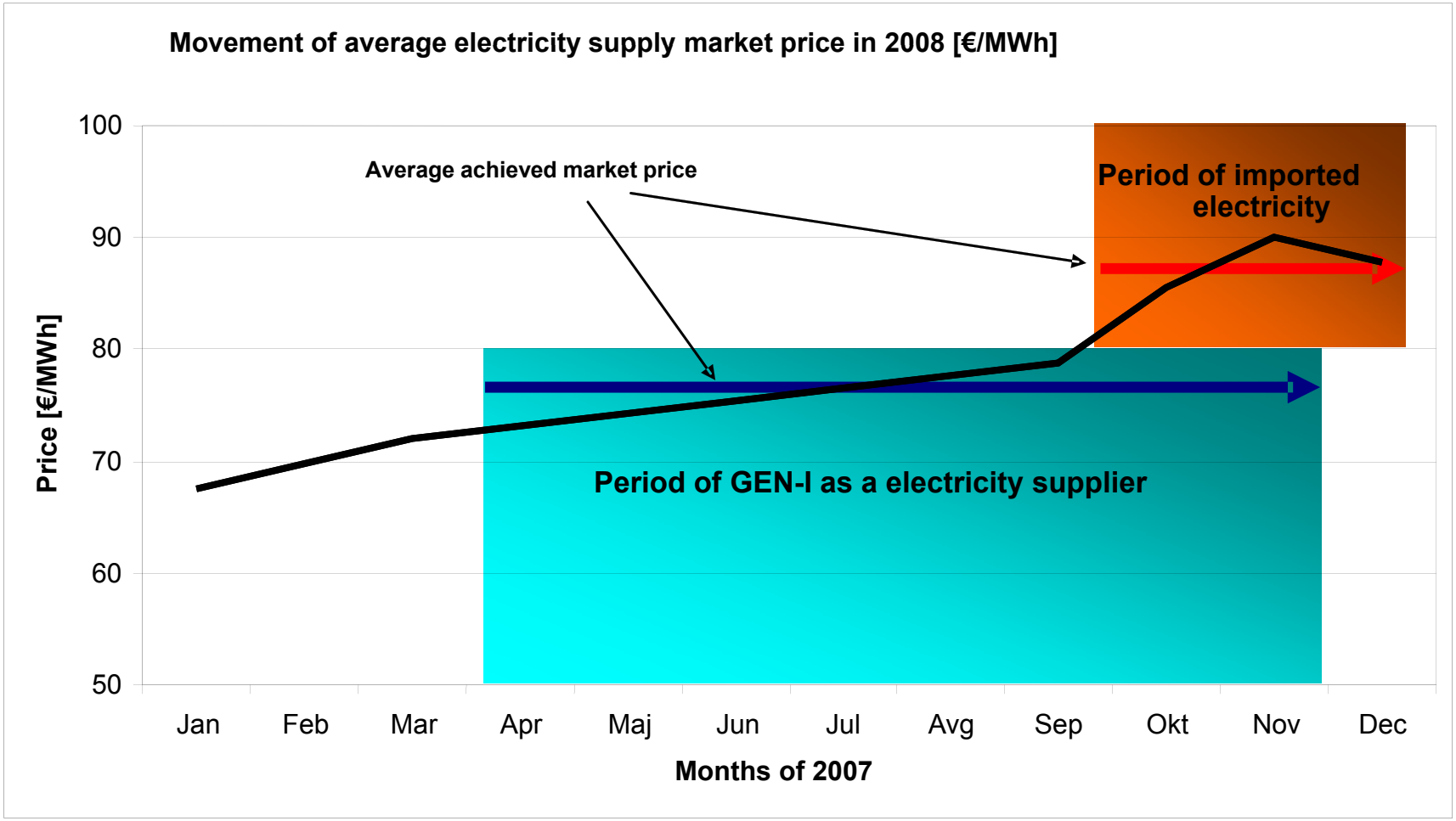
# 2. NO SURPLUS OF ELECTRICITY

- Overview in the region
- SLO situation, net importer
- Limits of Net Transfer Capacity in boarders with Austria and Italy
- Import Price increases

# Energy deficit in the SE Europe (forecast 2008)

| IMPORTERS | | | | EXPORTERS | | | |
|---|---|---|---|---|---|---|---|
| COUNTRY | GWh | MWh/h | % CONSUMPTION | COUNTRY | GWh | MWh/h | % CONSUMPTION |
| Hungary | -8.115 | -926 | 19,9 | Romania | 7.815 | 892 | 14,5 |
| Greece | -4.230 | -483 | 7,6 | Bulgaria | 2.563 | 293 | 6,5 |
| Croatia | -4.212 | -481 | 22,8 | Bosnia | 1.044 | 119 | 9,2 |
| Slovenia | -3.751 | -428 | 27,0 | | | | |
| Albania | -3.204 | -366 | 47,5 | | | | |
| Serbia, Montenegro | -3.173 | -362 | 7,0 | | | | |
| Macedonia | -3.055 | -349 | 33,6 | | | | |
| **TOGETHER** | -29.740 | -3.395 | 15,7 | **TOGETHER** | 11.422 | 1.304 | 10,9 |

# IMPORT PRICE INCREASES




Source: internal analysis by GEN-I, d.o.o.

# 3. AVAILABLE OPTIONS

| | |
|---|---|
| • Import | • Net Transfer Capacity , security, price? |
| • Conservation of energy | • Priority, Efectiveness ? |
| • Renewable energy sources | • We are investing in Hydro, PV, price, quantity, environment? |
| • Coal | • We are removing existing plants on domestic coal – Kyoto?, price? |
| • Gas | • End of pipelines, security, prices, Kyoto ? |
| • Nuclear | • Sustainable energy source ! |

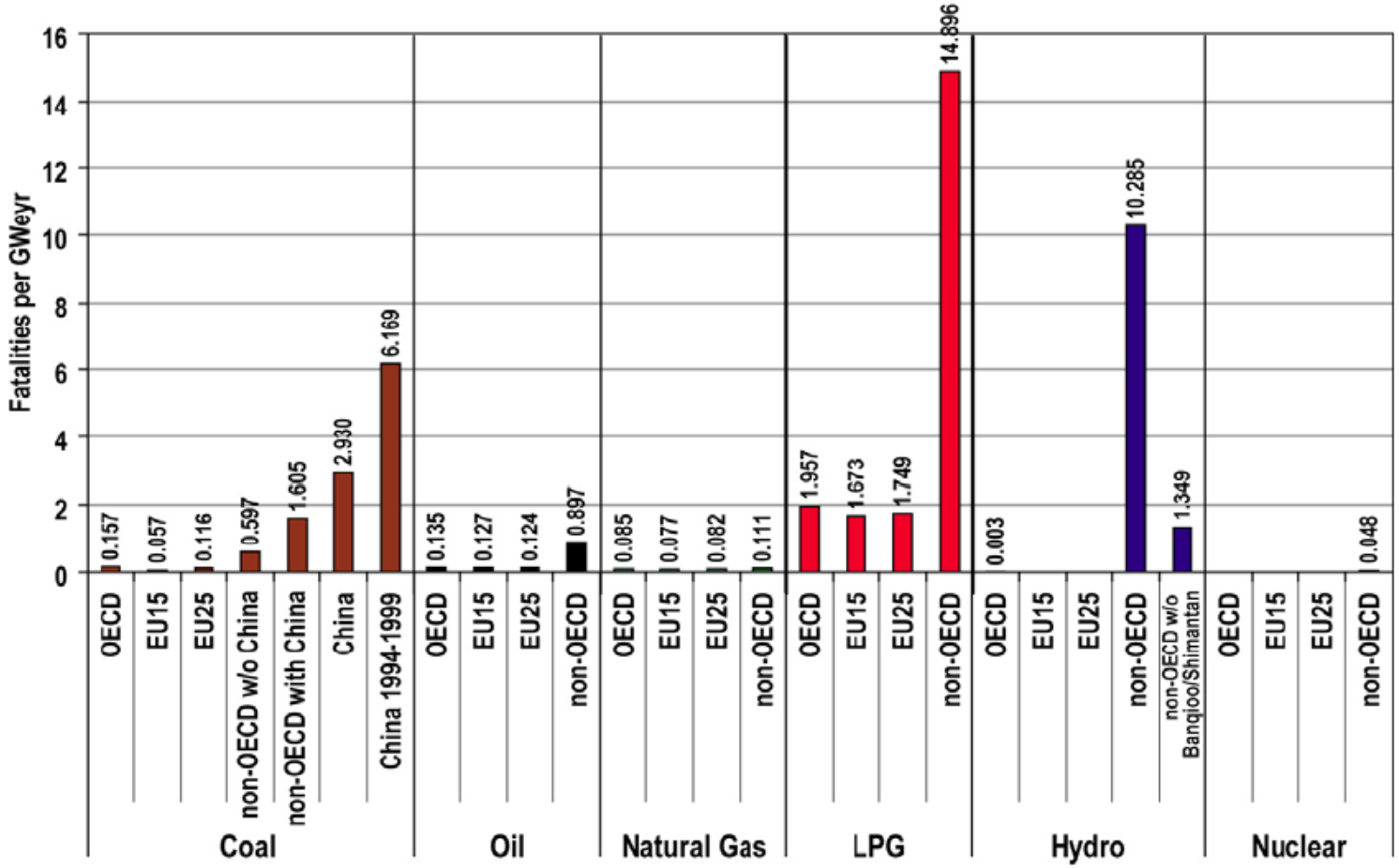
# 4. SUSTAINABLE ENERGY SOURCE

- Security of supply
- Environmental impact
- Use of land
- Economy
- Positive impact on region economy

# ENVIRONMENTAL IMPACT

- Green house effect
- Clean atmosphere
- Waste production
- Land use
- Fossil resources consumption
- Transport

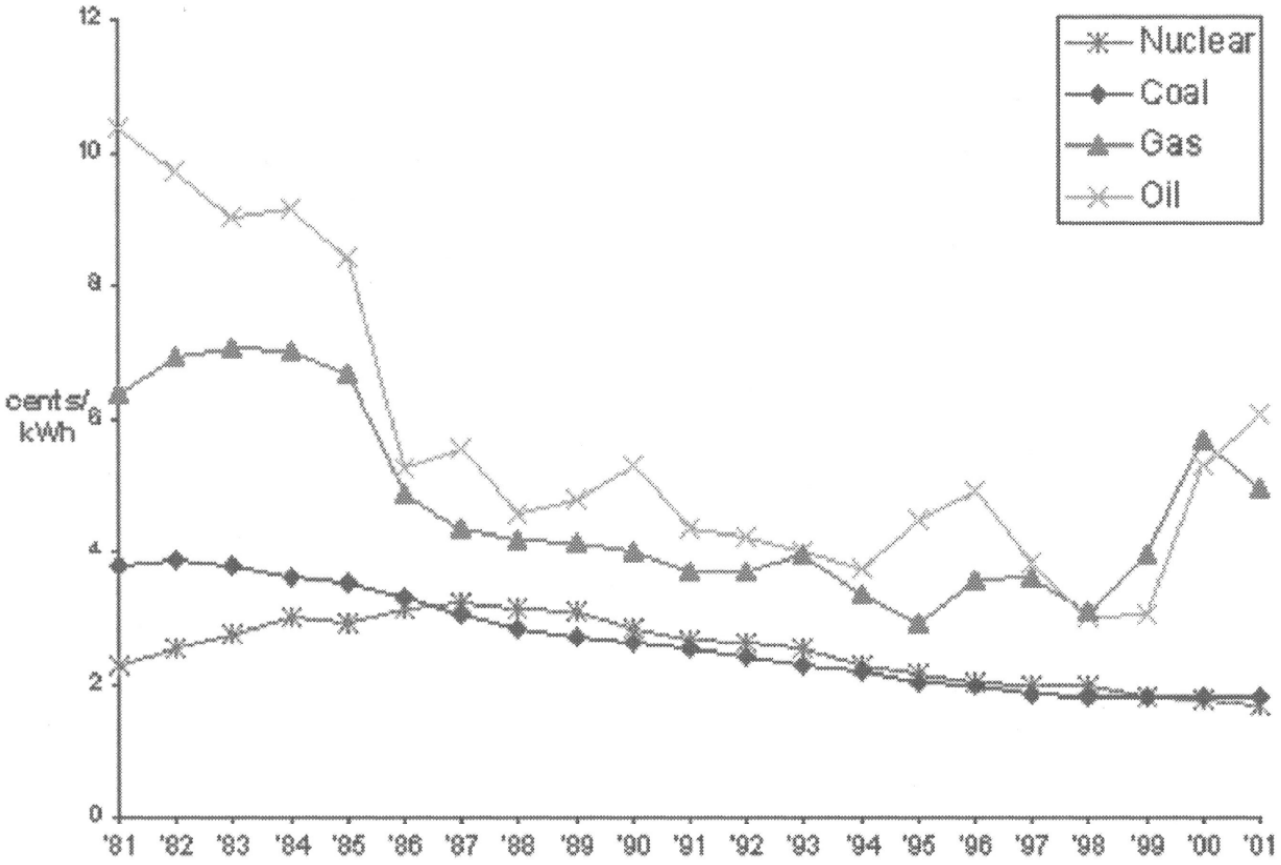
# Environment;
# Severe accident indicators for OECD and non-OECD countries for energy chains (actual data).



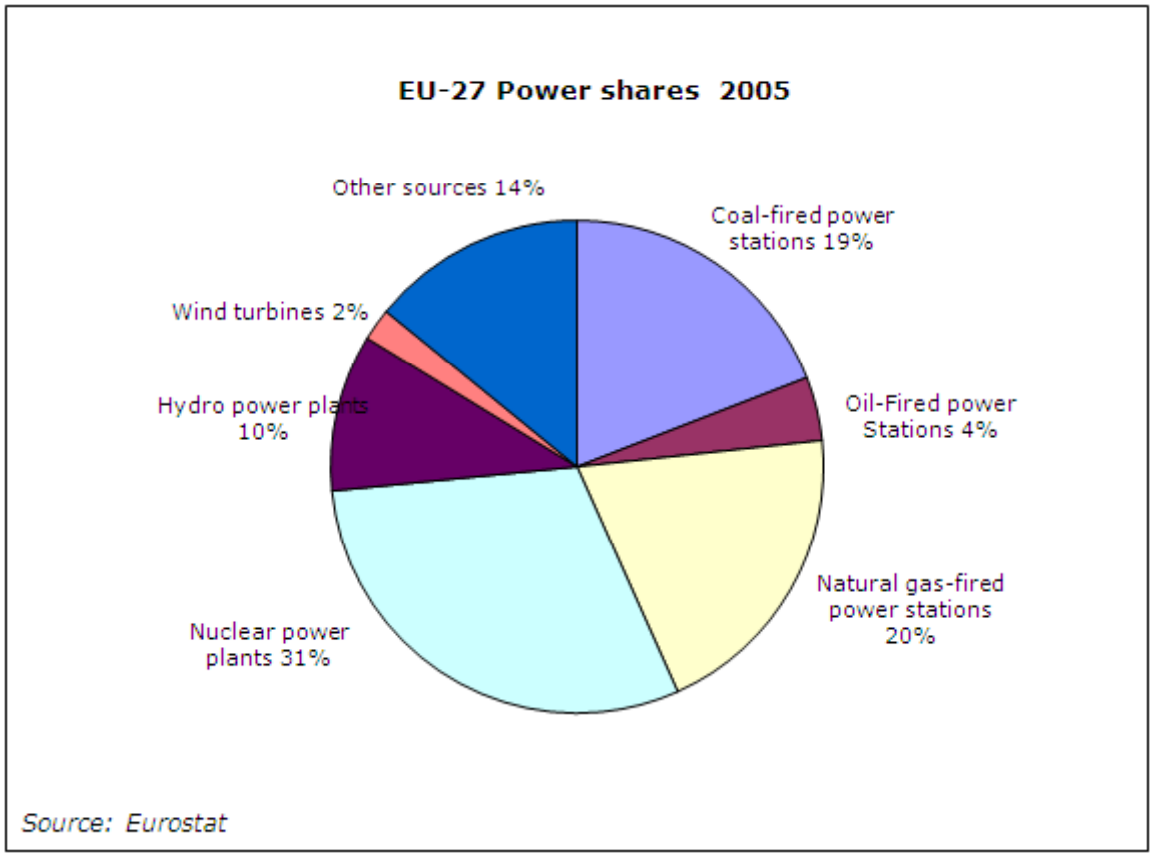
# ECONOMY

- Electricity generation cost
- Electricity price stability
- Security of supply
- Total production costs (with external costs)

# Economy;
# Fuel price increase sensitivity



# Economy;
# Security of supply (geopolitical factor)



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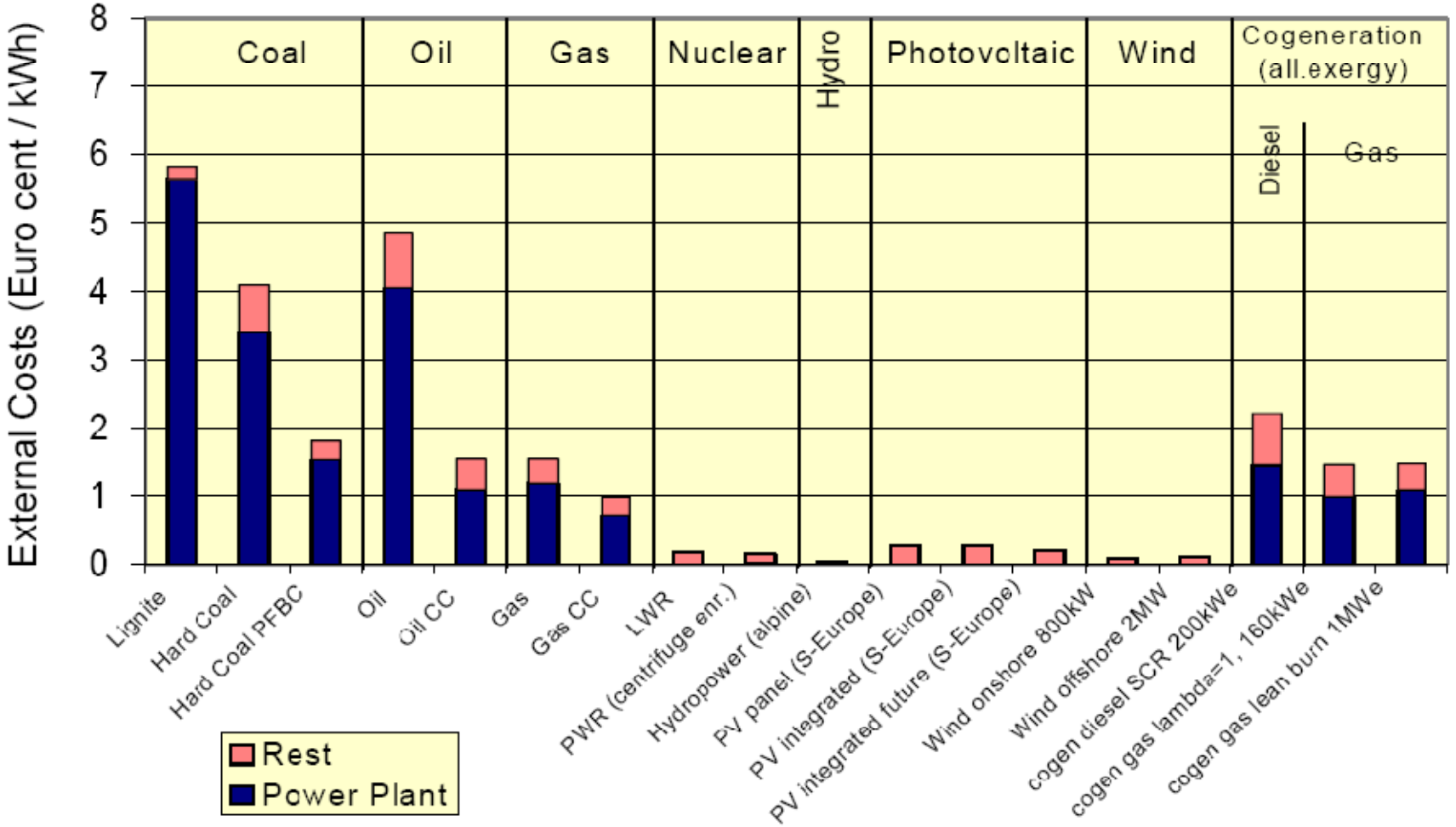
# Economy;
# External costs of electricity for current European average and selected new systems, associated with emissions from the operation of power plants and the rest of energy chains.



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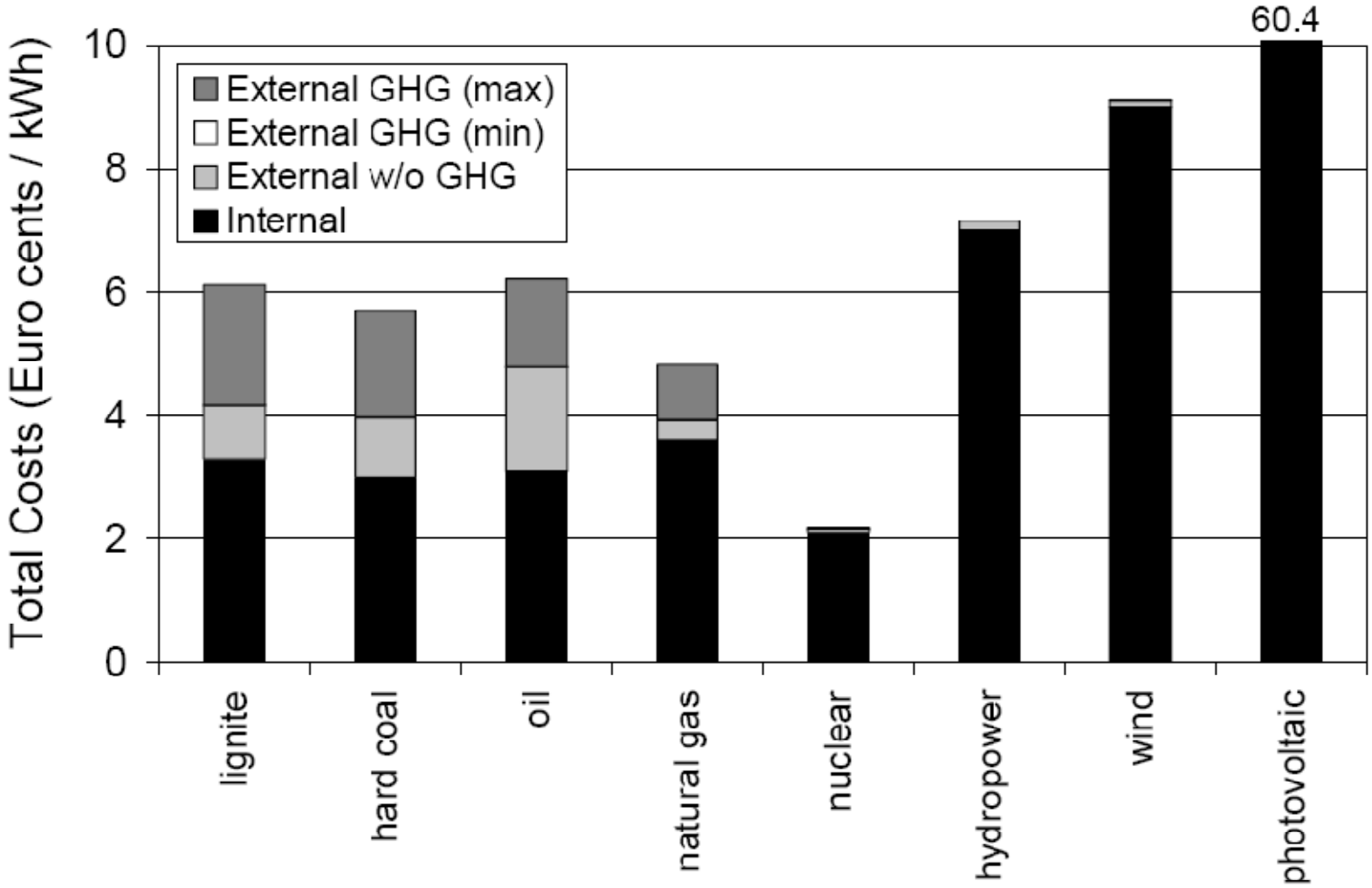
# Economy;
# Total generation costs

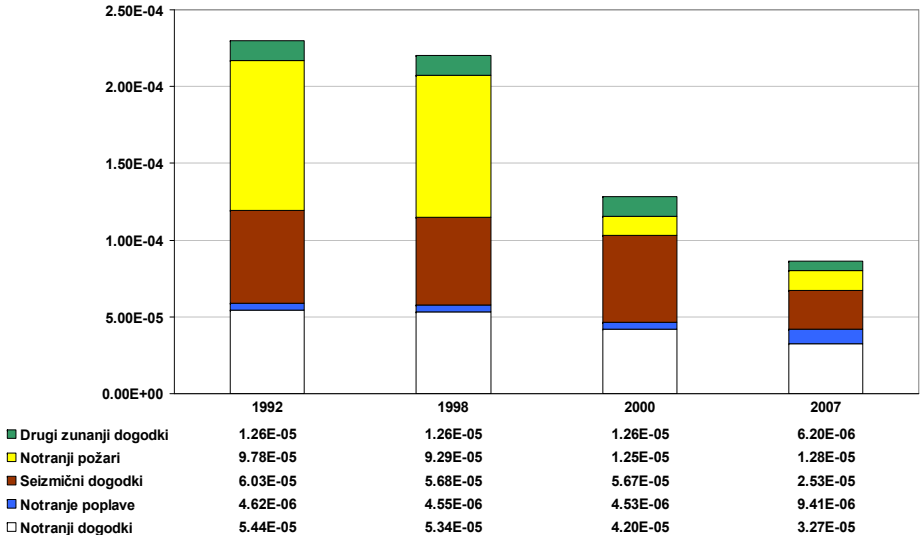


# Krsko Nuclear Power Plant I

- Krško NPP
  - Westinghouse PWR, 2 loop
  - today: 2000 MWt, 696 MWe
  - commercial operation since 1983
  - power up-rates and modernisations
    - 2000 SG replacement: 664 MW - 707 MW
    - 2006 LP turbine replacement: 707 MW - 727 MW
    - 2007 MSR and LP HD replacement: 727 MW - 728 MW

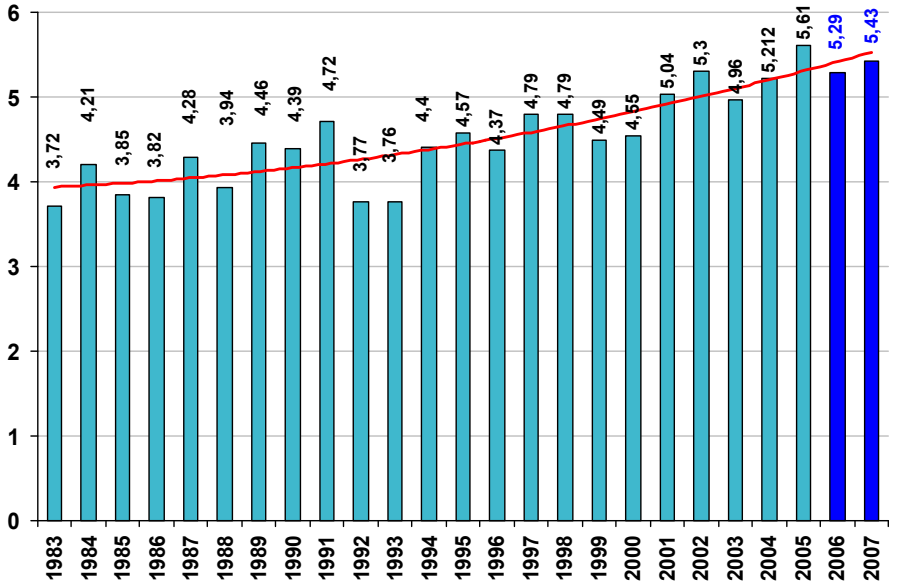
# Krsko NPP I – Operational and safety records

## Increasing Safety Parameters: lower CDF




| | 1992 | 1998 | 2000 | 2007 |
|---|---|---|---|---|
| Drugi zunanji dogodki | 1.26E-05 | 1.26E-05 | 1.26E-05 | 6.20E-06 |
| Notranji požari | 9.78E-05 | 9.29E-05 | 1.25E-05 | 1.28E-05 |
| Seizmični dogodki | 6.03E-05 | 5.68E-05 | 5.67E-05 | 2.53E-05 |
| Notranje poplave | 4.62E-06 | 4.55E-06 | 4.53E-06 | 9.41E-06 |
| Notranji dogodki | 5.44E-05 | 5.34E-05 | 4.20E-05 | 3.27E-05 |

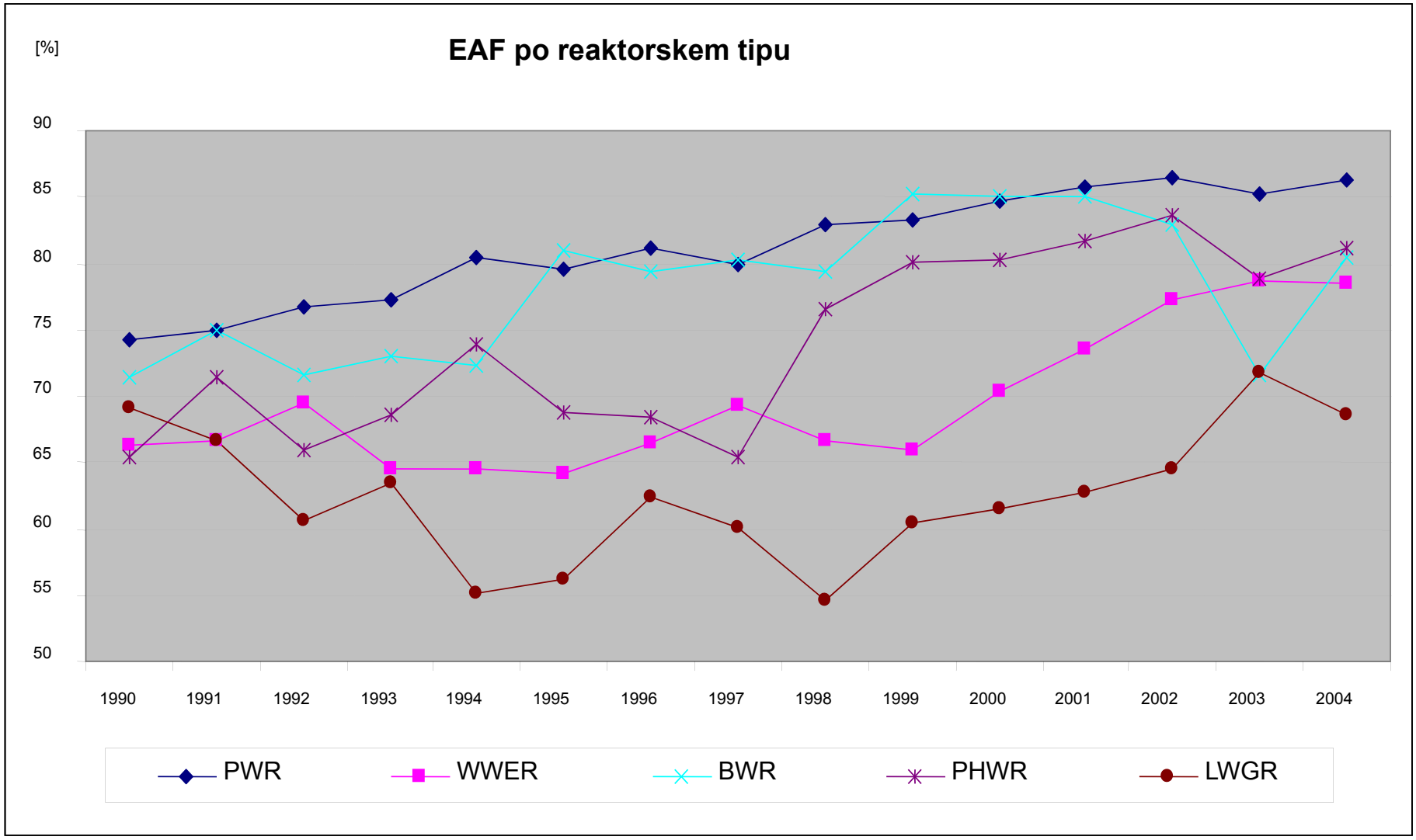
## Increasing Production Records



# 5. POSSIBLE PROJECT

- PWR technology
- Highest safety standards
- Krško II

# Energy availability factor for different reactors



# KRŠKO II

Short overview of characteristic technical data of available state-of-the-art nuclear power plants suitable for second unit in Krško

| Reactor | Supplier | Capacity [MWe] (net) | Type | Short description of main characterictic<br>Kratek opis glavnih značilnosti |
|---|---|---|---|---|
| EPR | AREVA | 1600 | PWR | Evolutionary power plant 3.rd genaration, 4 - time redundancy of safety systems, in construction in Finland, France, China and in preparedness in USA |
| AP1000 | Westinghouse | 1150 | PWR | Evolutionary power plant 3.rd genaration with passive safety systems, in construction in China and in preparedness for construction in USA |
| US-APWR | Mitsubishi | 1700 | PWR | Evolutionary power plant 3.rd genaration, 4 - time redundancy of safety systems, in construction in Japan, in preparedness for licensing and construction in USA |
| ATMEA 1 | Atmea (AREVA/Mitsibushi) | 1100 | PWR | New power plant 3.rd generation with multiple redundancy of safety systems and passive systems, in design develoment, for Europe market |
| MHI 3 loop | Mitsubishi | 900 | PWR | Up to date power plant, two in operation in Japan and third in construction |


Investitor:
ENERGIJA
Projektant:
ADAR
Objekt: CELOSTNA PODOBA JEK2
Vrsta risbe: ŠTUDIJA MODELA
Vrsta projekta: IDZ
Odg. projektant: mag. Darja LIST, u.d.i.a.
Obdelal: Matej PESTOTNIK, u.d.i.a.
Datum: februar 2008
List: 2

# 6. DECISION MAKING - CONCLUSION

- Waste disposal
- Acceptability
- Parliament decission
- Timing
- Co investments possibilities