NUCLEAR POWER: A PANACEA FOR SLOVAKIA?

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pan-a-ce-a (pan uh see'uh) n. pl. <-ce-as>

1. a remedy for all ills; cure-all.

2. a solution for all difficulties.

[1540-50; < L < Gk panákeia = panake-, s. of panakés all-healing (pan- PAN - + akés a cure) + -ia - IA]

[RANDOM HOUSE DICTIONARY]

Origin of Energy. Physics knows only one type of energy: Nuclear Energy. Energy is produced in nature only in fusion of light nuclei or in fission of heavy nuclei.

Irrepleacibility of Energy. Practically all raw materials can be replaced or substituted by something else. This is not valid for Energy. Energy cannot be substituted or replaced. Energy can only be conserved or transformed; one can save energy or waste it.

Unevenness in Energy use. Humankind uses Energy extremely unevenly:
20% of mankind uses 80% of Energy,
80% of mankind the remaining 20% of Energy.

Energy and "Civilization". The GNP and several other important "civilization" parameters, as, e.g., life expectation or infant mortality, are related to the amount of Energy disposed by the society. Mankind, therefore, has to expect a considerable increase in Energy consumption to compensate the present unevenness (unjust) in Energy use.

Energy and Freedom, Energy and Independence. Energy is even related to such seemingly abstract terms as "freedom" or "independence".

Energy and democracy and political pluralism. Our democratic institutions and political pluralism assumes abundance of Energy, free access to it. In a society with a severe Energy shortage it would be difficult to arrange free election in our Western understanding.

Population explosion. Until now we have not succeeded to stop the population explosion: the population of our planet increases daily by over 200 000 people.
Taking the average installed power generation capacity 2,1 kW per capita we reach to an almost absurd conclusion that every 2-3 days we have to put in operation one new Temelín reactor or equivalent 1000 MW(e) power generating capacity to bring the population increase to the average world consumption level only.

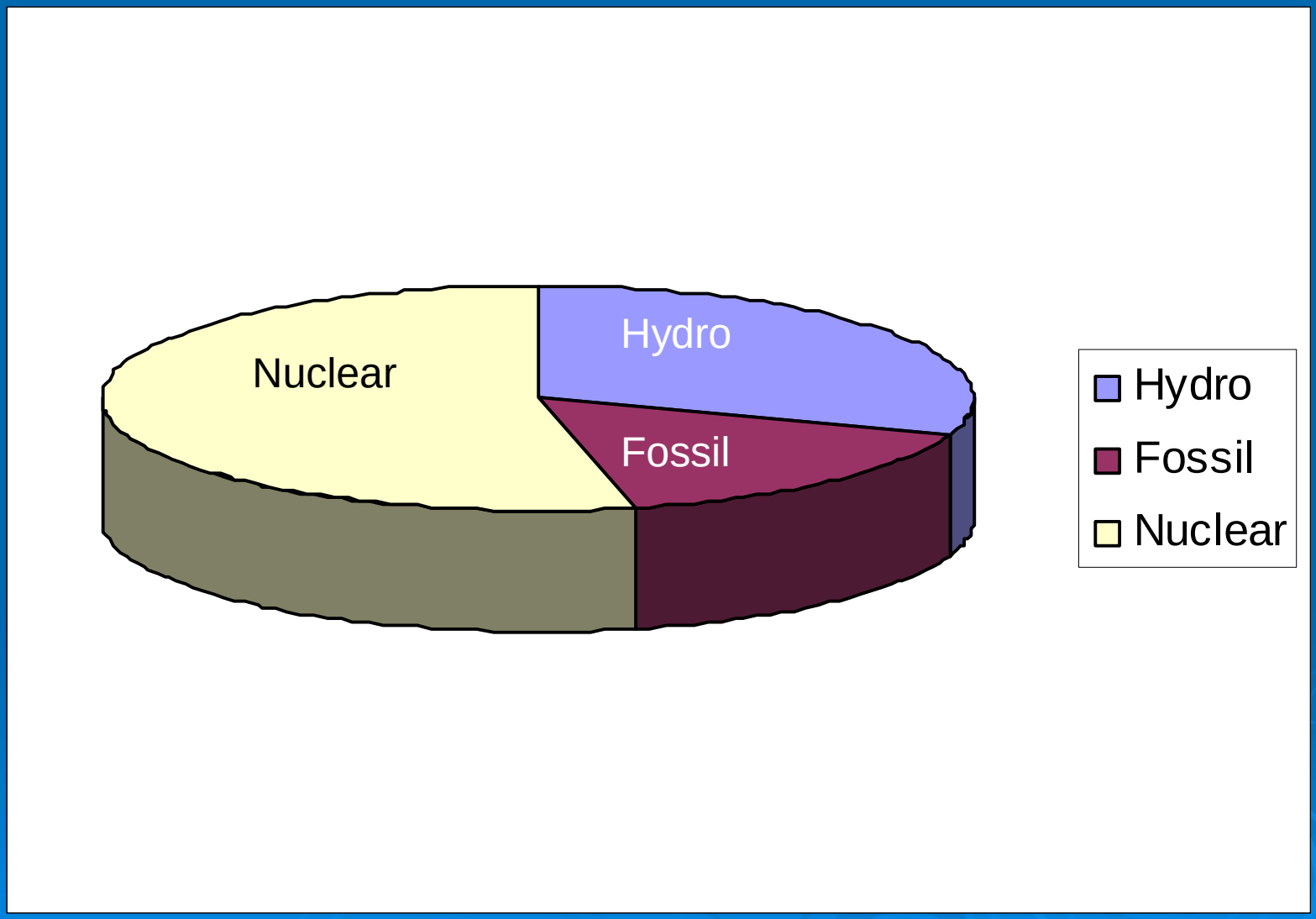
Fossils. At the present time over 80% of all consumed Energy is obtained by burning fossil fuels.

End of fossils. At this consumption rate the fossil fuels will be exhausted within couple of dozens max within some hundred years. And since they were created within several hundred of million years essentially by absorbing carbon dioxide from the atmosphere, we are today emitting CO_2 into atmosphere million times faster then it was once absorbed from it.

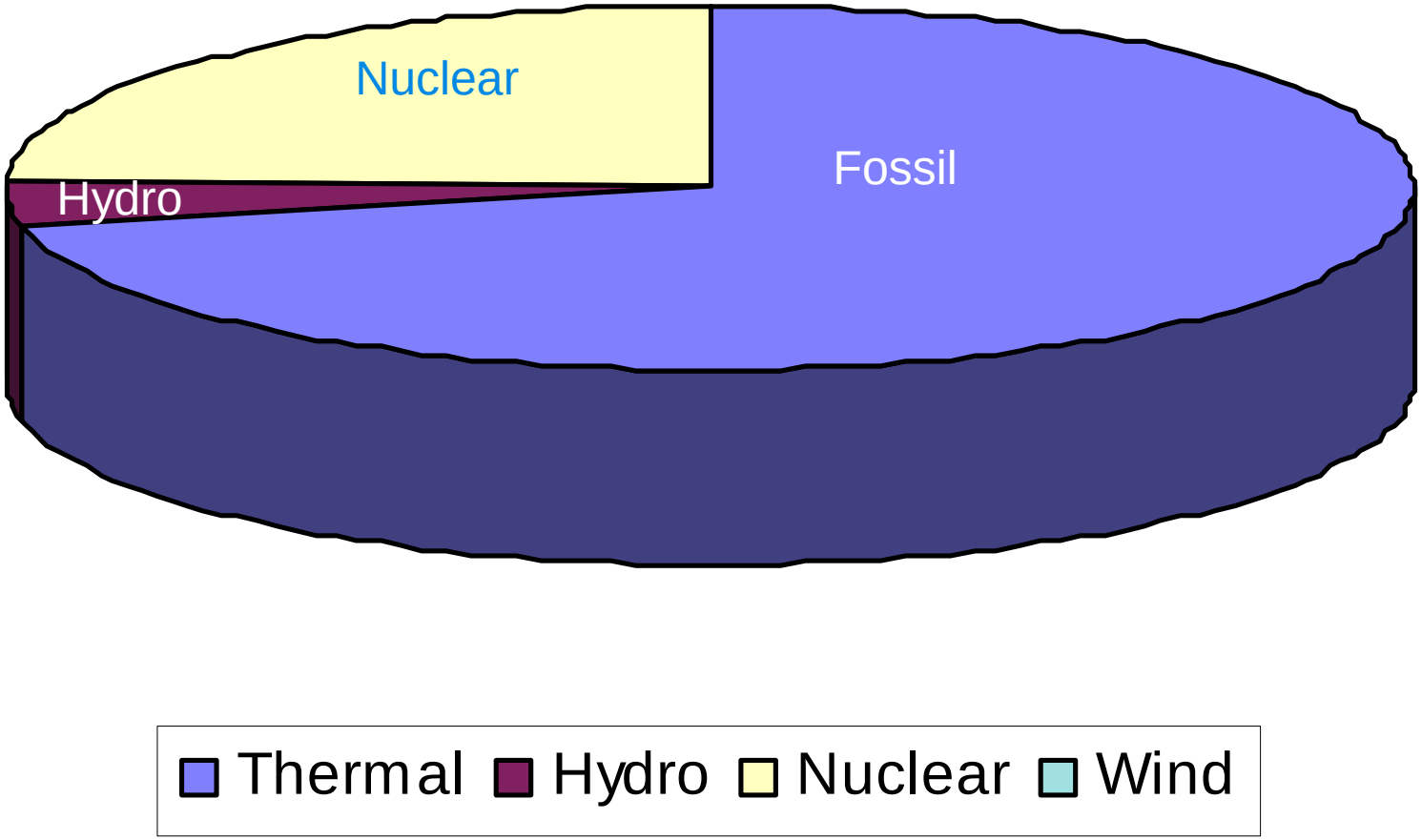
It will require policy leadership to bring energy to the top of the policy agenda and to keep it there;
It will require vision to anticipate problems well ahead of time so that they can be addressed in an orderly manner;
It will require political courage to make difficult choices, notably for the trade-offs between the welfare of the present versus future generations.

Energy Policy: Key Challenges for the 21st Century.
Donald J. Johnston, Secretary-General, OECD, April 2002

Electricity Production in Slovakia 2001



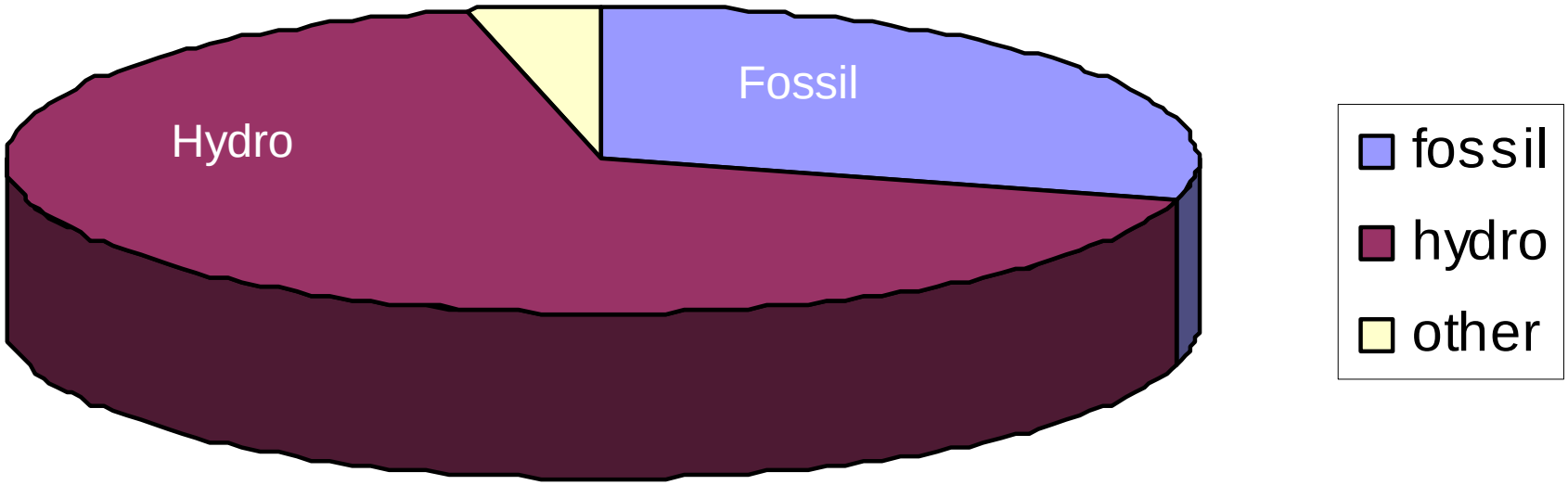
Electricity Production ČR 2002



Electricity Production in ČR and SR (GWh)

	ČR (2002)	SR (2001)
THERMAL	5476.2 (71.7%)	9175 (30.3%)
HYDRO	2845.5 (3.7%)	4851 (16%)
NUCLEAR	18738.2 (24.5%)	16.24 (53.6%)
WIND, RENEW	1.6 (0.1%)	NA
TOTAL	76348.1	30290.0

Electricity Production
Austria 2002



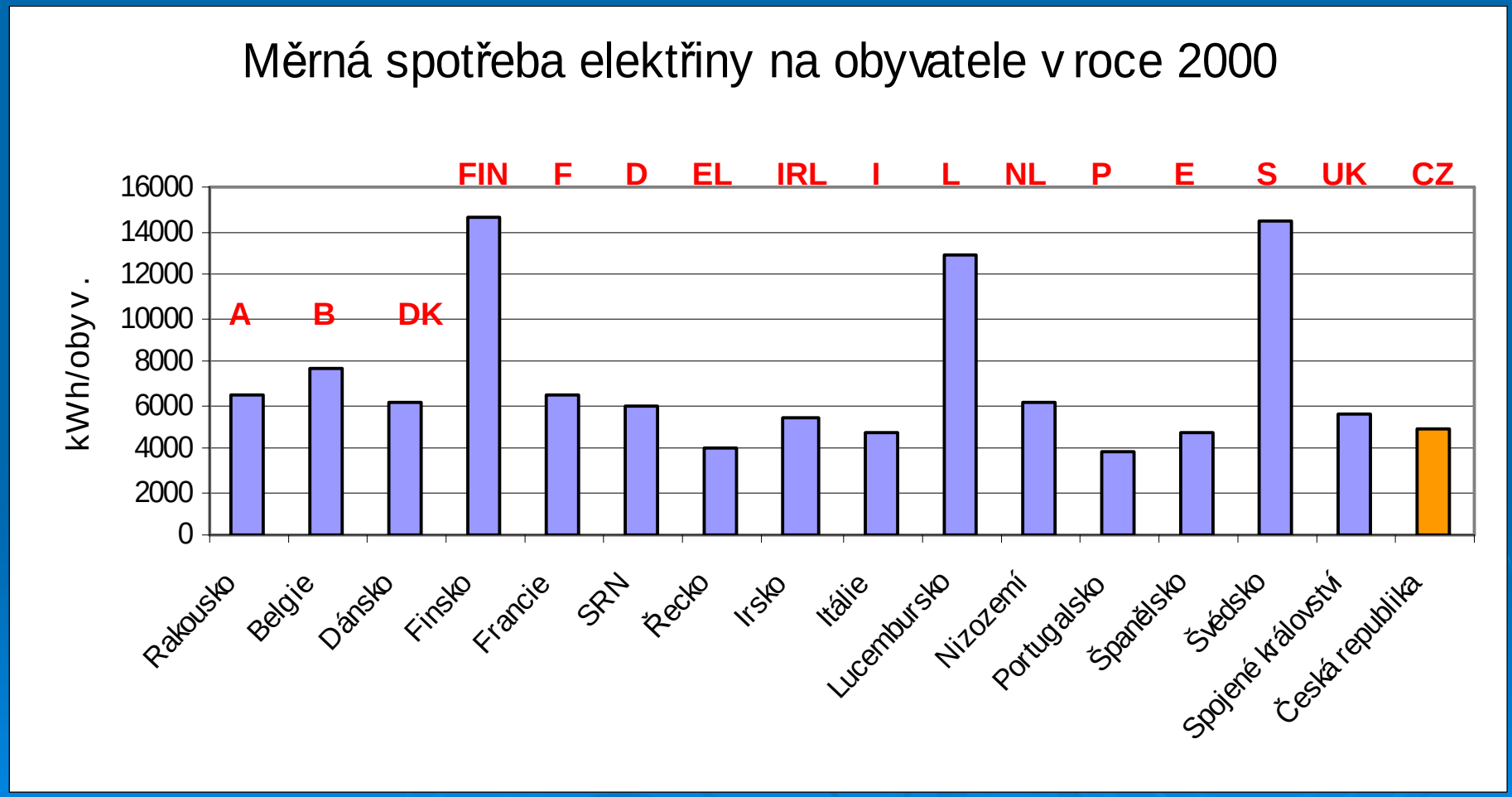
Sytý hladovému nerozumí

Der Satte weiss nicht wie dem Hungrigen zu mute ist

Сытный голодного не разумеет

A well-fed belly does not believe in hunger

Electricity consumption per capita, 2000



Electricity consumption in SR 4495 kWh/pers

Average Energy costs/household in % of income

F	D	USA	CZ Average Family	CZ Retired
3-4 %	4,5%	4 -5%	11,7 %	16,7 %

...we renew our commitment that no household in Britain should be living in fuel poverty by 2016-18.
***Tony Blair*, Foreword to the UK White Paper on Energy, March 2003**

SLOVAKIA*

FOSSILS

No coal

Oil consumption	82000 bbl/day or 29930000 bbl/year
Known reserves	4500000 bbl
Natural Gas consumption	7.932×10^9 m^3/year
Known reserves	7.504×10^9 m^3

* Figures taken from CIA Fact Book, 2004 Edition

CZECH REPUBLIC
ENERGY POLICY

Ministerstvo Průmyslu a Obchodu, ČR **MPO**
(Ministry of Industry and Trade, ČR)

Ministerstvo Životního Prostředí ČR **MŽP**
(Ministry of Environment, ČR)

The Czech legislation requires (Law No. *406/2000 Sb. On Energy use) that the* Czech Republic Energy Policy is formulated in documents, approved periodically by the Czech Government.

"The state energy policy is a principle document expressing targets in field of energy management in concordance with the needs of economical and social development including the protection of environment. It is elaborated as an open ended document by the Ministry of Industry and Trade for the perspective of 15-20 years and approved by the Government. From the Czech Government decision No. 50 from Jan 12, 2000".(Unofficial translation).

Government decision No. 50/2000 is a relatively short document (8851 words, 53900 characters) dealing mostly with legislative goals and problems.

The following version of the Czech Energy doctrine was approved with a considerable delay, only a month ago, on March 10, 2004 (Czech Government Decision No 211/2004) after many postponements and profound discussions among the specialists, in the mass media and in the public. The delay was no doubt influenced by several high level Energy doctrines, published during the last three years.

I. **The US National Energy Policy**, May, 2001, in which "Reliable, Affordable, and Environmentally Sound Energy for America's Future" was sought by the Energy group, consisting of the Vice-President, 7 Secretaries of State and several Directors of Federal Agencies.

II. **The EU Green Paper – Towards a European Strategy for the Security of Energy Supply**, EU 2001.

III. **The UK Energy White Paper** (Our energy future - creating a low carbon economy), March 2003, With Foreword of Prime Minister Tony Blair.

The MPO vision is trying to achieve:

1. Maximal Independence
- Independence on foreign energy sources
- Independence on energy sources from risk regions
- Independence on reliability of supply of foreign energy sources

2. Maximal Security
- Security of energy sources including nuclear security
- Reliability of supply of all types of energy
- Rational decentralization of energy systems

3. Maximal Sustainable development
- Protection of Environment
- Economical and social development

UT DESINT VIRES TAMEN EST LAUDANDA VOLUNTAS

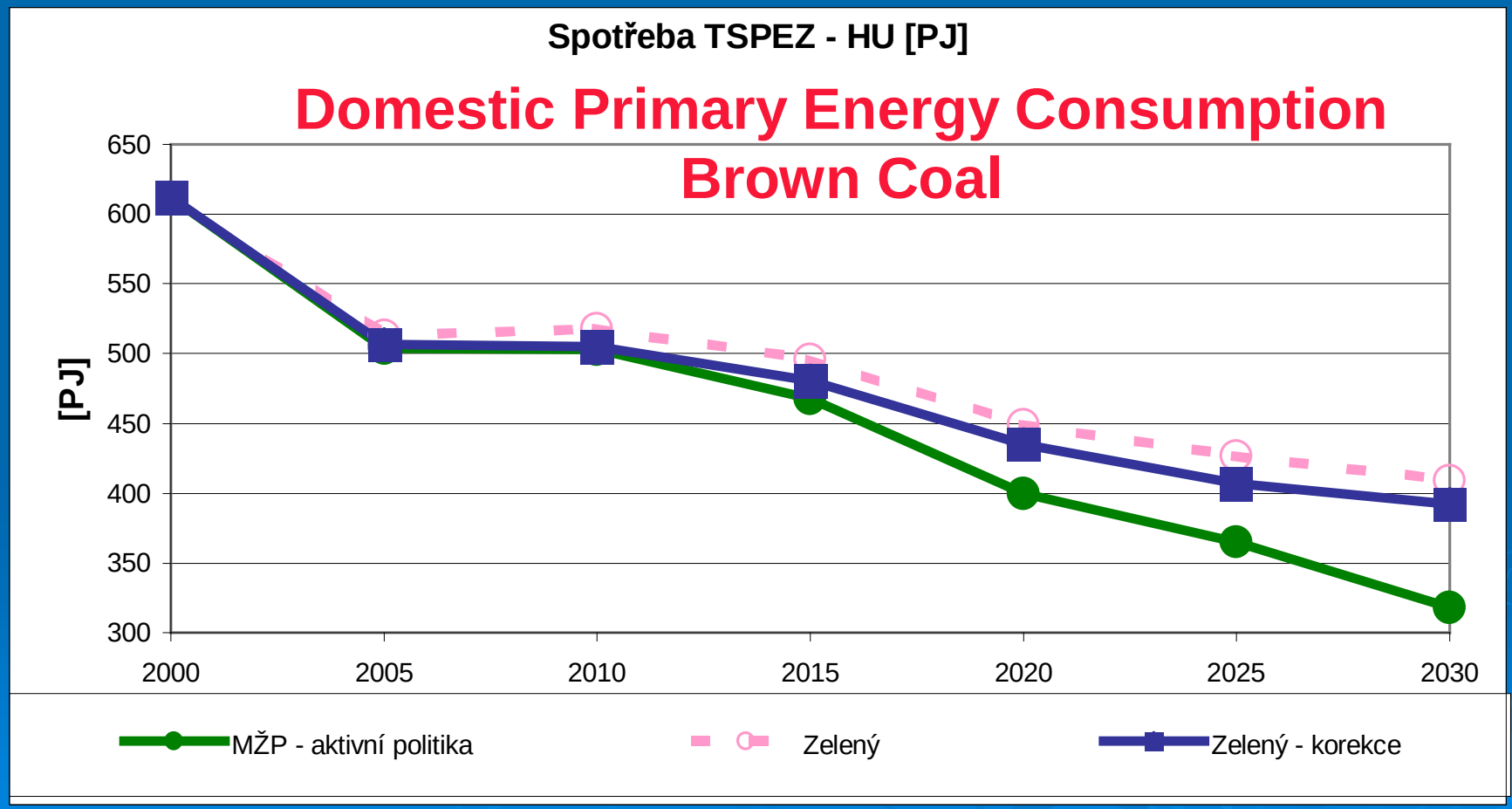
Mögen auch die Kräfte fehlen, so ist doch der gute Wille zu loben.

Although the power is lacking, the will is commendable.

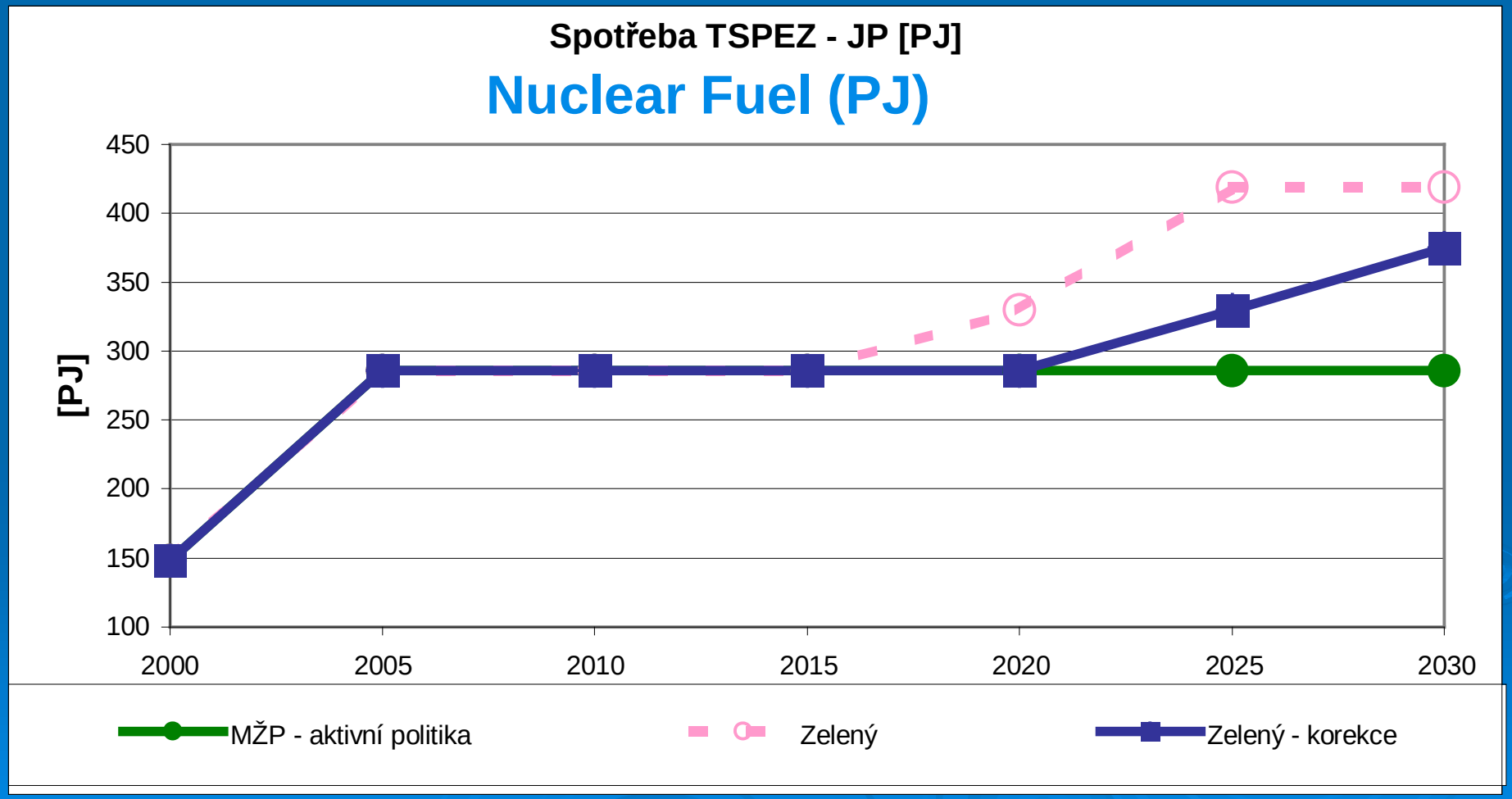
The MPO and MZP proposals differ in several points:

The level of Energy consumption in 2030
The continuation of the exploitation of the North-Bohemian Brown Coal mines
The role of Nuclear Energy
The role of Renewables
The role of Natural gas

Porovnání energetických scénářů



Porovnání energetických scénářů



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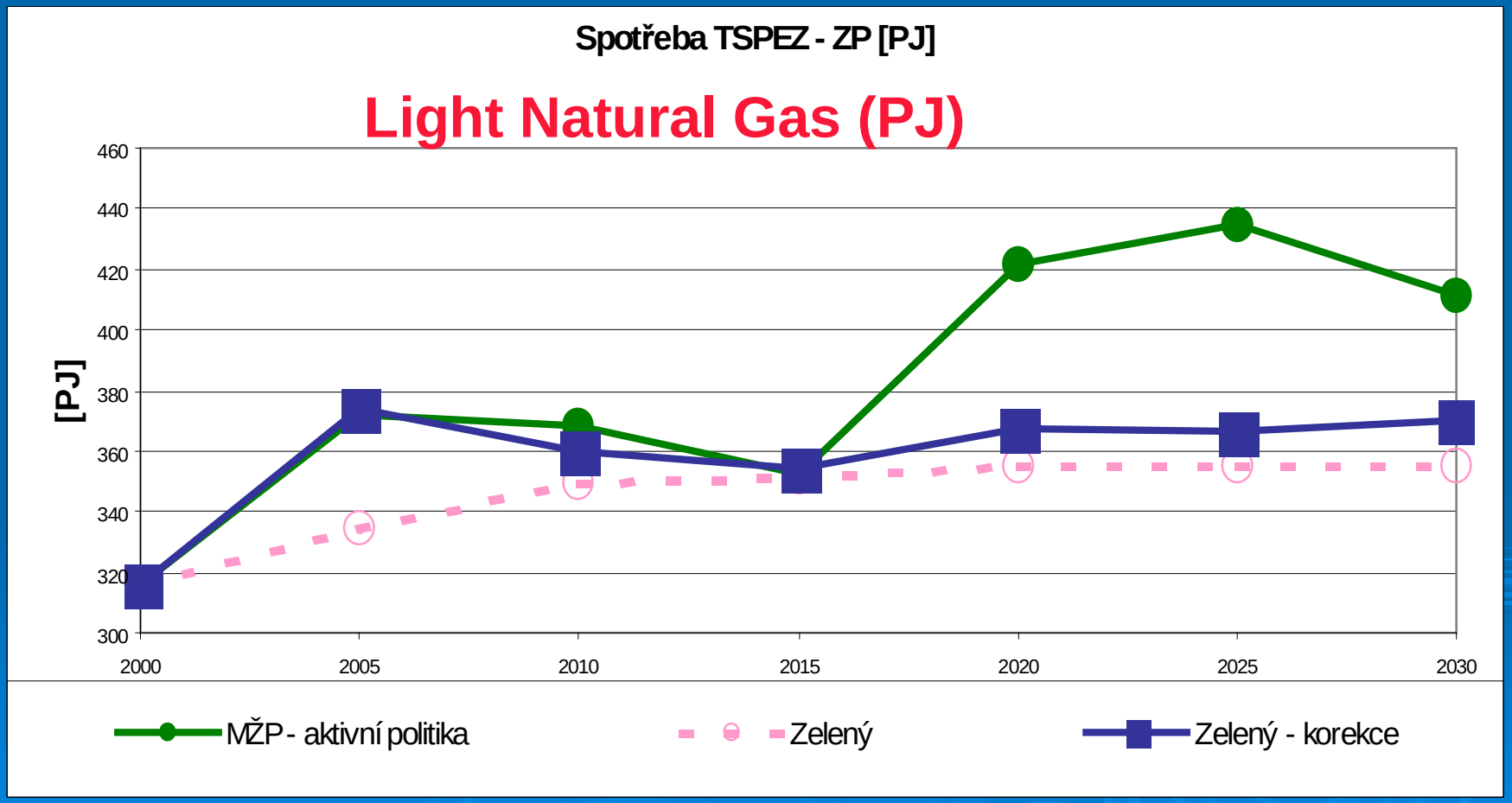

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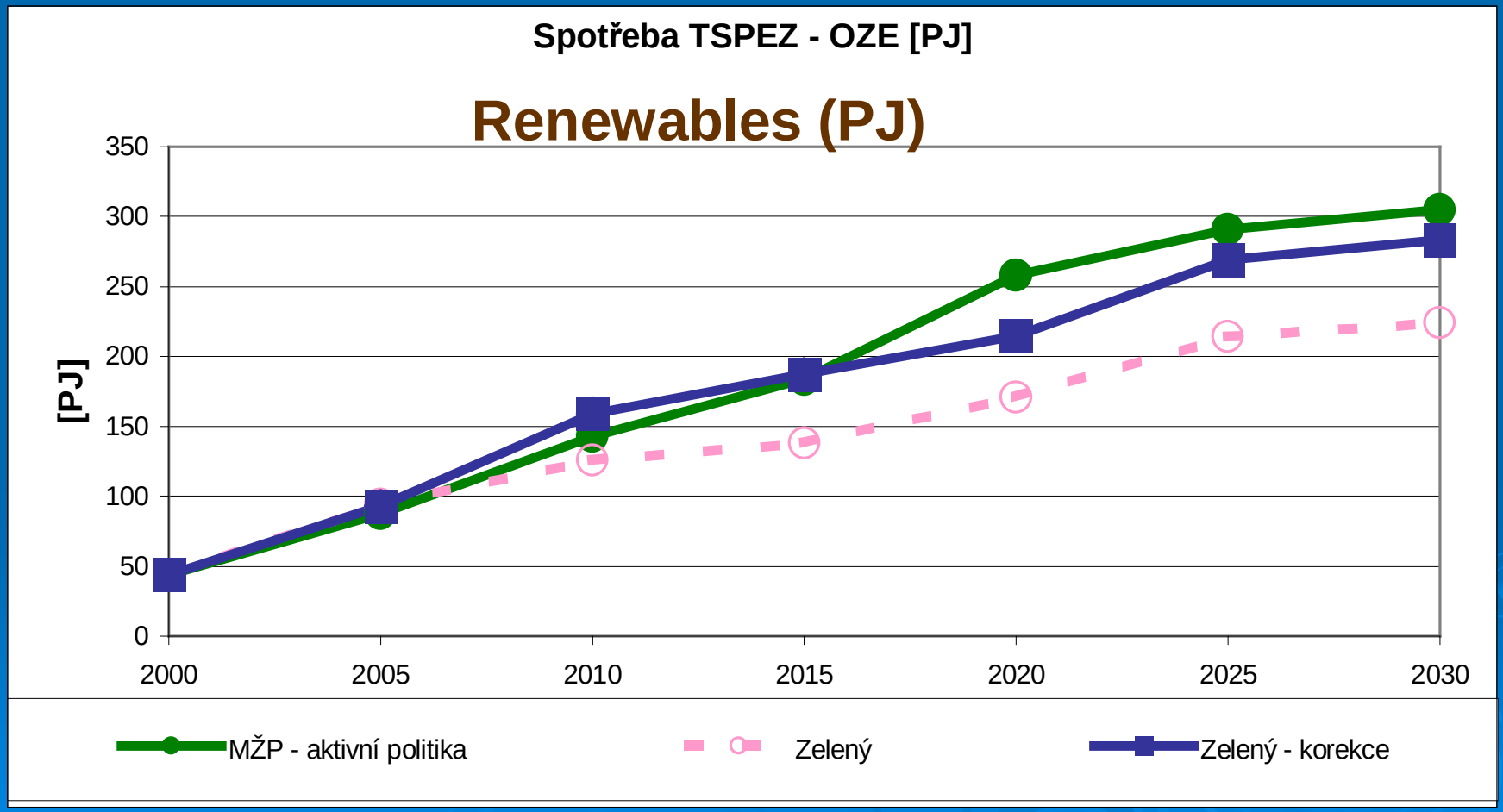
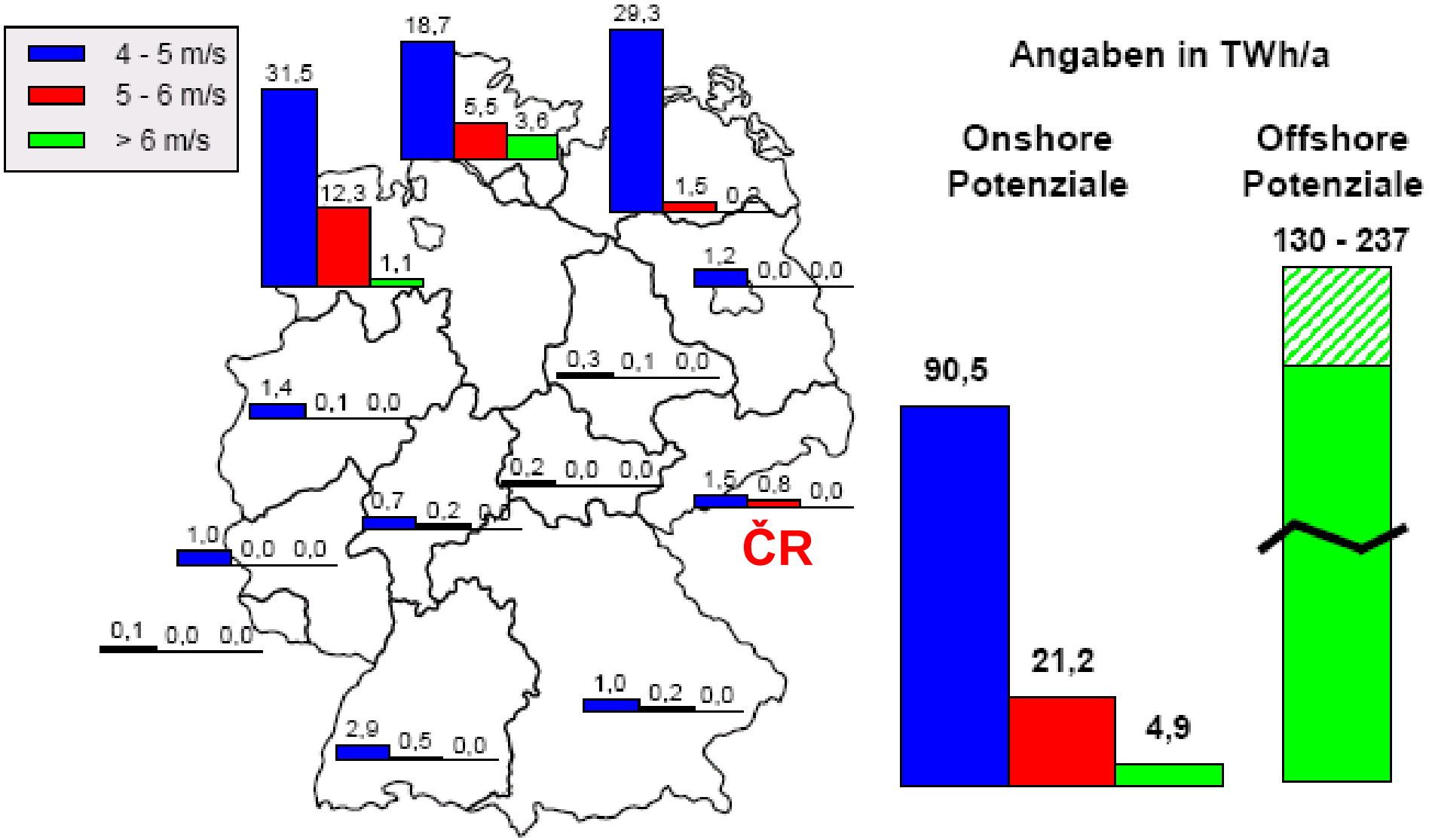


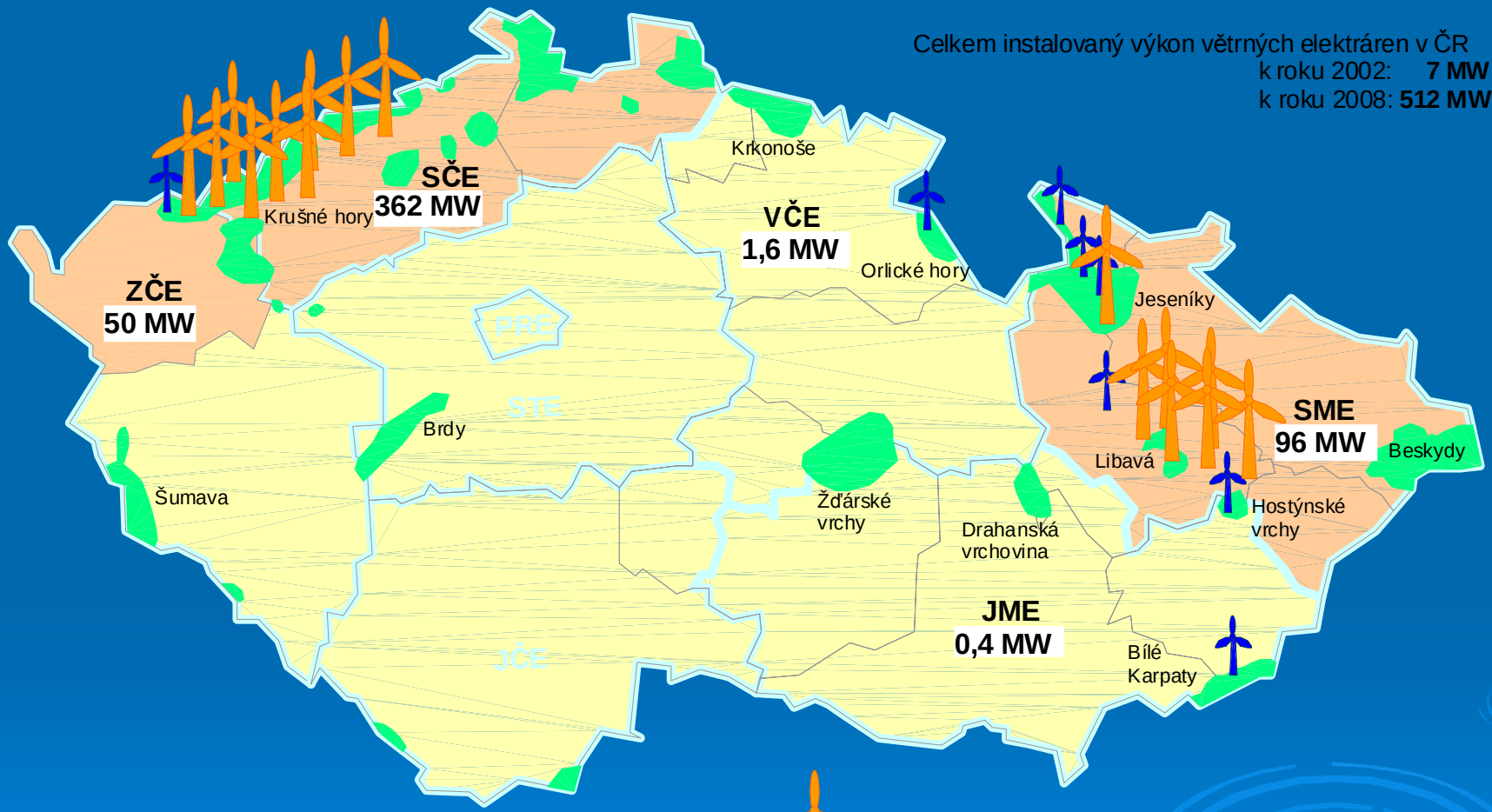
RENEWABLES

WIND

Technische Potenziale der Windenergieerzeugung in Deutschland



Současné a předpokládané lokality umístění větrných elektráren do roku 2008 s vyznačením větších oblastí s vhodnými podmínkami pro jejich výstavbu

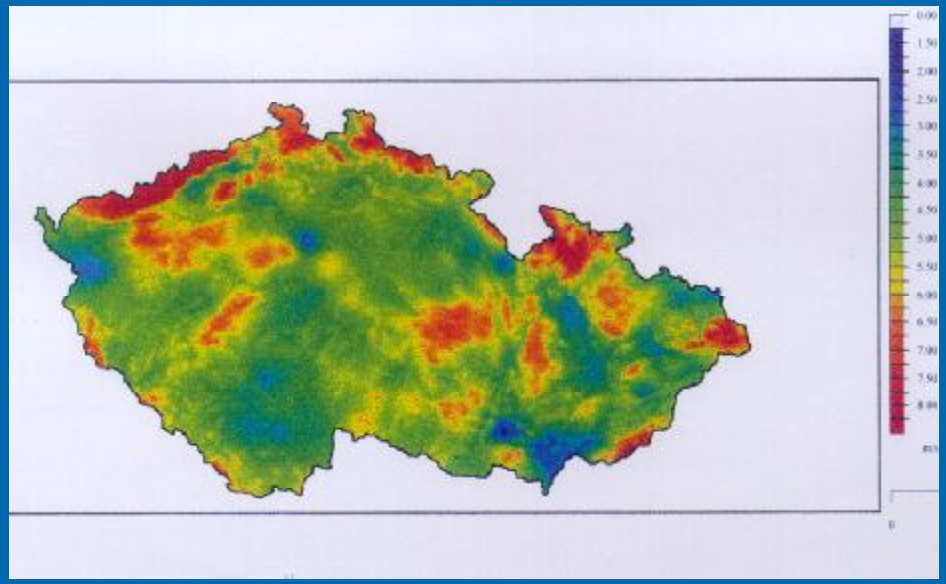


Gesamter Rohstoff- und Materialaufwand

	Eisen [kg / GWh_{el}]	Kupfer [kg / GWh_{el}]	Bauxit [kg / GWh_{el}]
Steinkohle (43 %)	2.308	2	20
Braunkohle (40 %)	2.104	8	19
Erdgas GuD (57,6 %)	969	3	15
Nuklear (DWR, dir. Endlagerung)	445	6	27
PV poly	6.708	251	2.100
(5 kW) amorph	8.153	338	2.818
Wind 5,5 m/s	5.405	66	54
(1 MW) 4,5 m/s	10.659	141	110
Wasser (3,1 MW)	2.430	5	10

Quelle: Marheineke 2002

ROLE OF OTHER RES



Wind power

Wind speed	4,8 - 4,9 m/s	5,0 - 5,9 m/s	> 6 m/s
Area (km^2)	4 612	4 298	1 269
Available area (km^2)	1 420	766	112

Potential:

- **1-1,5 TWh (in 2010-2020)**
- **Major projects planned in Krušné hory**

Hydro power plant

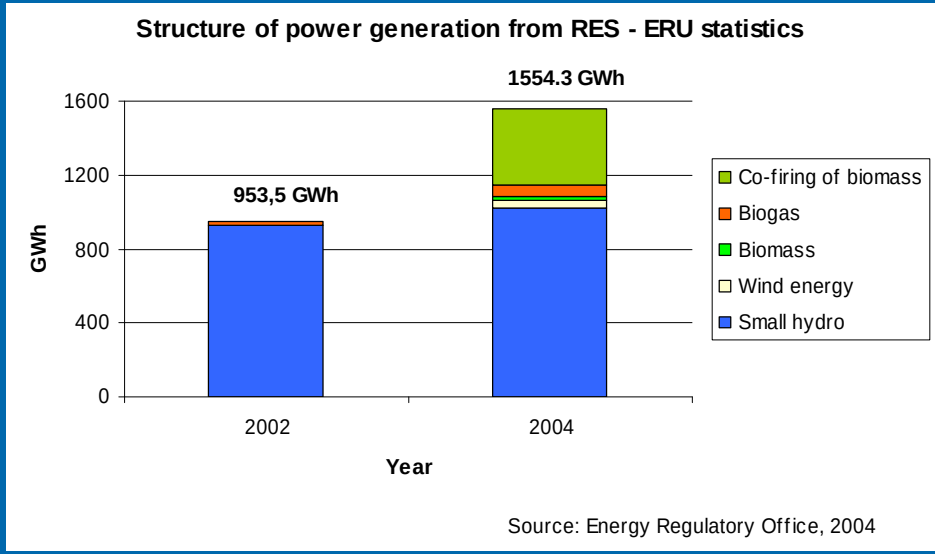
- **limited potential in small hydro (400-800 GWh at maximum)**
- **many restrictions for new construction**

	2000	2001	2002	2003
Total gross production	2313	2467	2845	1794
therein pumped storage	555	413	353	408

RENEWABLES

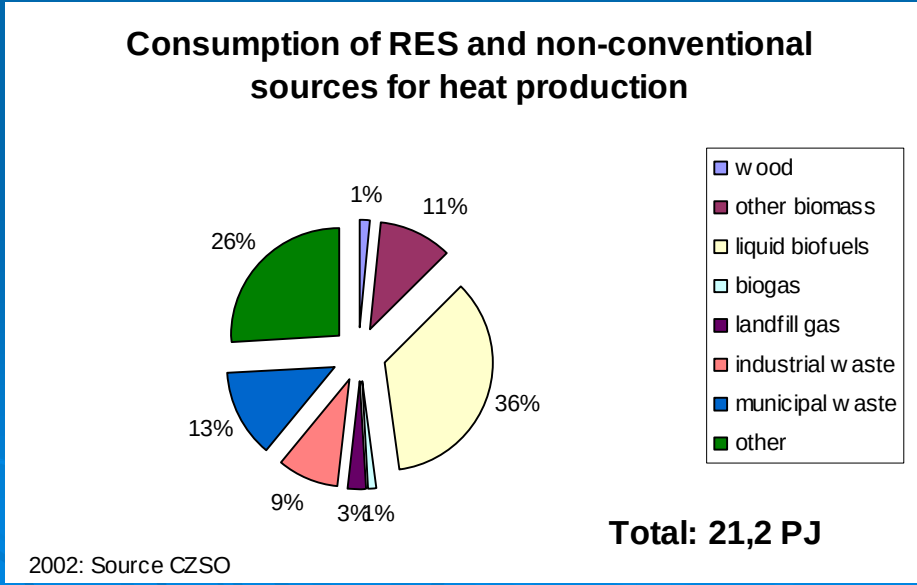
BIOMASS

STRUCTURE OF RES UTILISATION IN ČR



- 30-40 PJ, app. 2-2,5% of PES
- app. 4,5% of gross electricity consumption (2004)
- Directive 2001/77 target: 8%

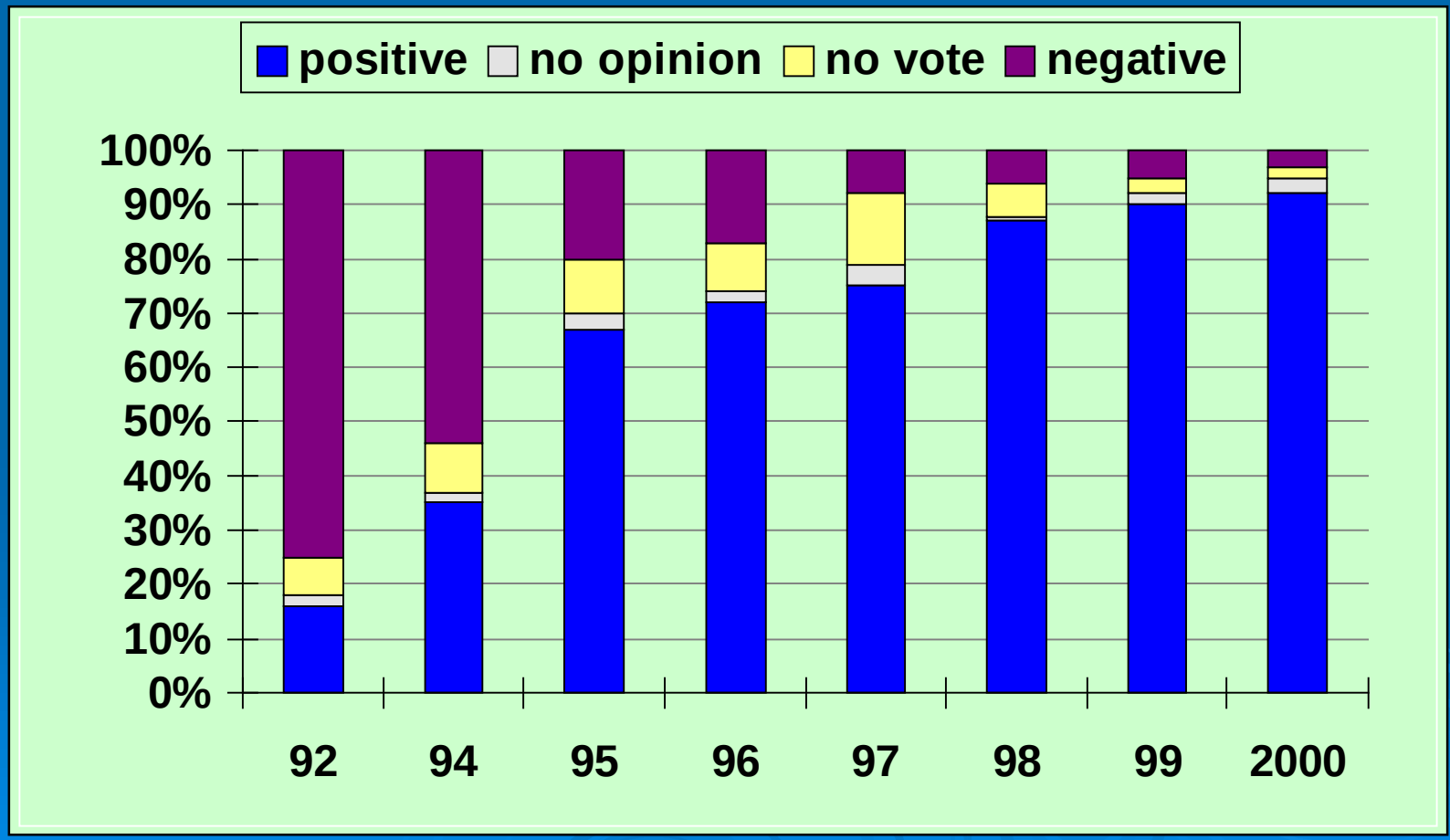
- Biomass app. 2/3 of RES
- Mainly local application (wood waste, etc.)
- App. 20 heating stations in small town (from 1 TJ to max. 60 TJ)



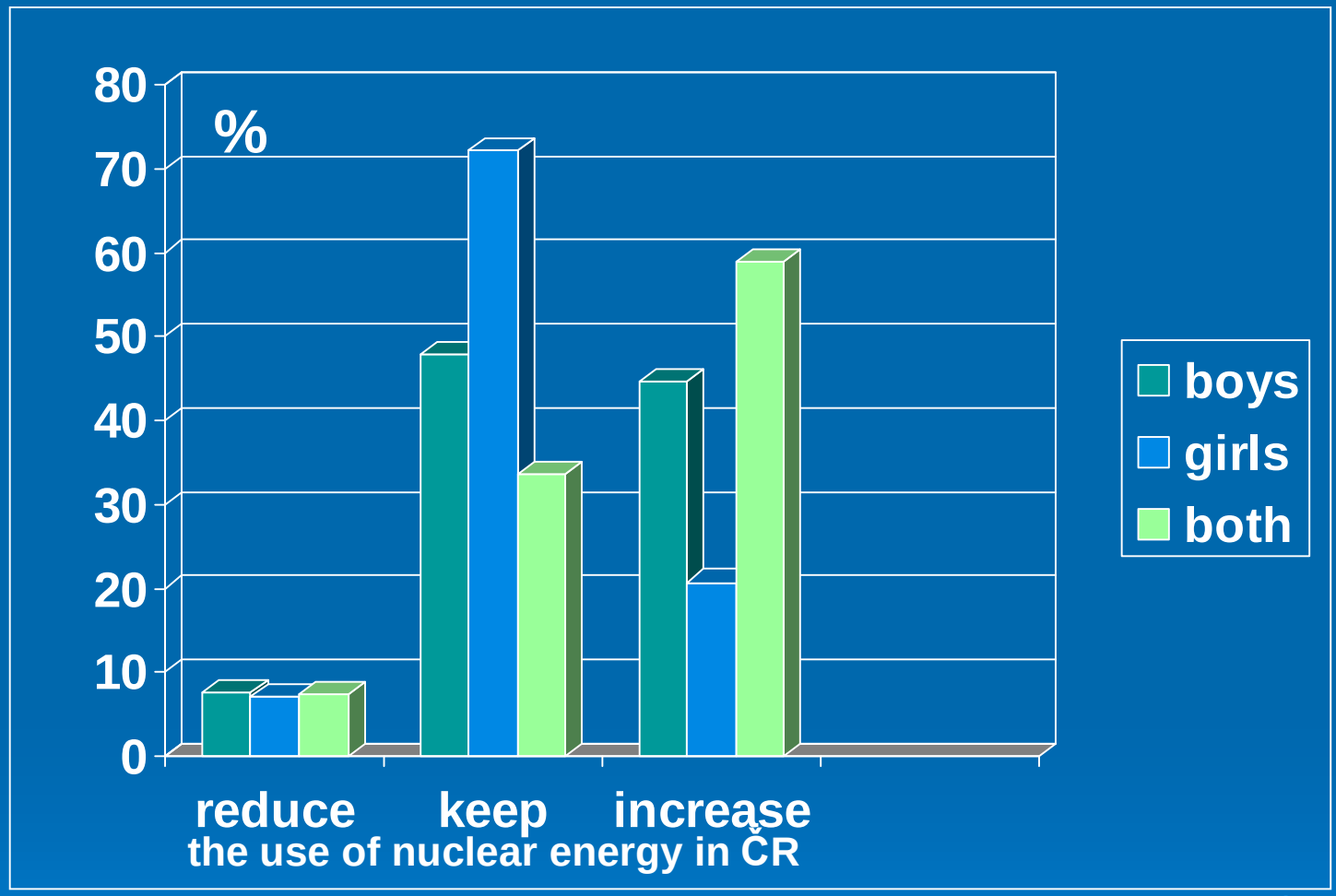
BIOMASS AND AGRICULTURE POLICY IN EU?

ČEZ

„Referendum“ on Dukovany NPP



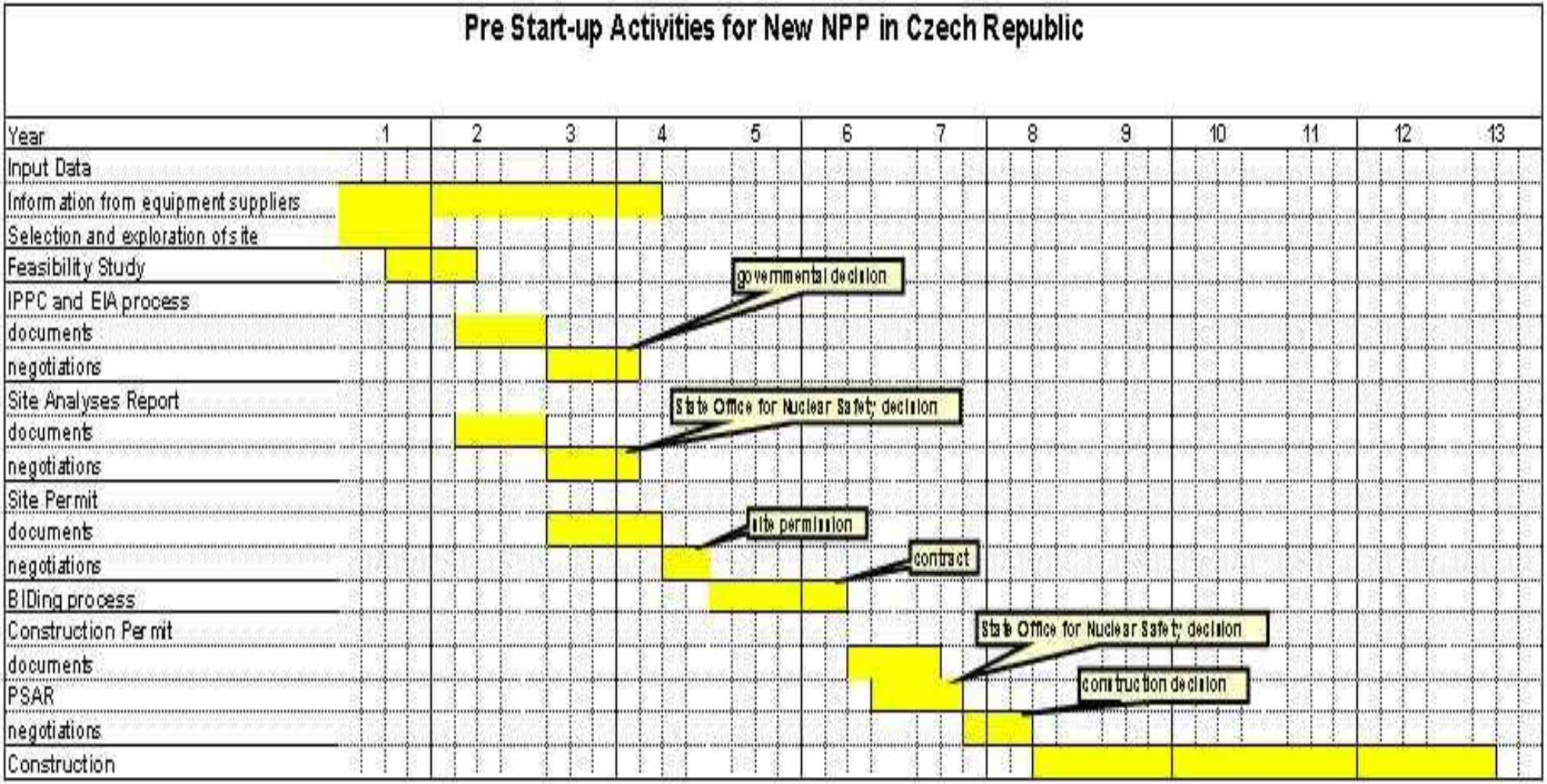
RECENT PUBLIC OPINION POOL



2573 teenagers in over 100 schools mostly in small towns, 2003-2004
Czech Republic

ČEZ

Over 90% of Czech teenagers want either to keep the present level of nuclear energy use in Czech Republic or to increase it

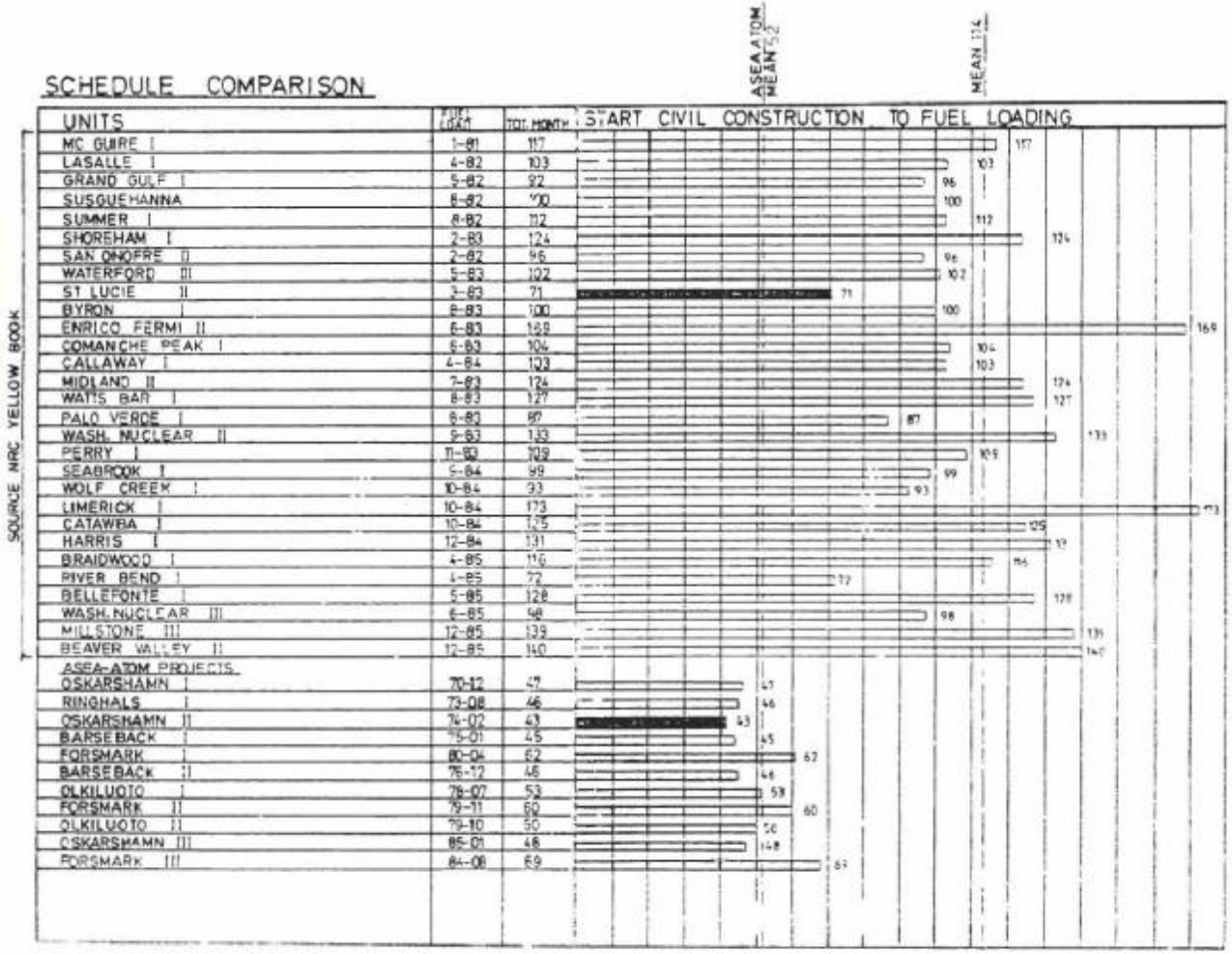

Pre Start-up Activities for New NPP in Czech Republic
Year
1
2
3
4
5
6
7
8
9
10
11
12
13
Input Data
Information from equipment suppliers
Selection and exploration of site
Feasibility Study
IPPC and EIA process
documents
negotiations
Site Analyses Report
documents
negotiations
Site Permit
documents
negotiations
BIDing process
Construction Permit
documents
PSAR
negotiations
Construction
governmental decision
State Office for Nuclear Safety decision
site permission
contract
State Office for Nuclear Safety decision
construction decision

JÄMFÖRELSE MELLAN BYGGTIDEN FÖR AMERIKANSKA AGGREGAT FÄRDIGA 1981-1985 OCH ASEA-ATOMS FÄRDIGA 1970-85.

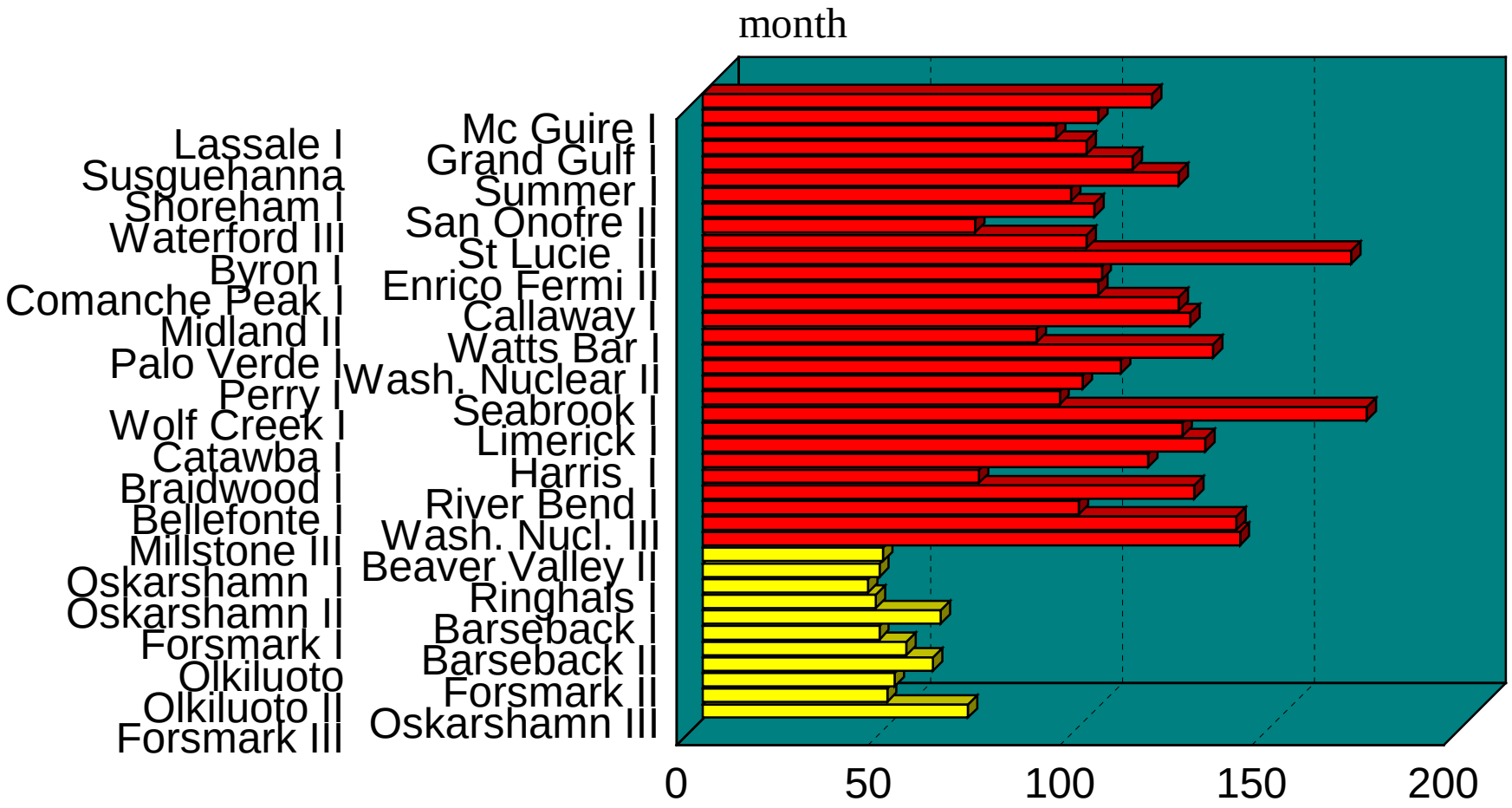
Den övre delen av diagrammet visar det amerikanska kontrollorganet NRCs jämförelse av byggnadstiden för amerikanska reaktorer laddade under åren 1981-85. Den undre delen visar motsvarande jämförelse för Asea-Atom under åren 1970-85. Det framgår att Asea-Atoms samtliga elva reaktorer färdigställts snabbare räknat från byggstart till laddning än något av de amerikanska, trots att flera byggdes redan på 70-talet.

Översättning av termer i diagrammet

Source NRC yellow book	= Källa NRC
Fuel load	= Bränsleladdning
Tot. month	= Antal månader
Start civil construction to fuel loading	= Byggstart till laddning
Asea-Atom mean 52	= Medeltal för Asea-Atom 52
Mean 114	= Medeltal för USA 114
Asea-Atom projects	= Asea-Atoms aggregat



Comparison of construction time of US and Swedish Nuclear Power Plants



	months
Longest construction time USA	173
Sweden	69
Shortest construction time USA	71
Sweden	43
Average construction time USA	114
Sweden	52

NOTE!!!

THE LONGEST CONSTRUCTION TIME OF A NPP IN SWEDEN IS SHORTER THAN THE SHORTEST NPP CONSTRUCTION TIME IN USA

NUCLEAR POWER – A NEW RENAISSANCE?

1. Finland
2. Czech Republic
3. Bulgaria
4. USA
5. Russia
6. Ukraine
7. Far East
8. Germany
7. Sweden

SWEDEN

2003 - NUCLEAR POWER 65 TWh
HYDRO 53 TWh

Referendum 1980 – three lines
The Riksdag – Parliament - accepted a law ordering phasing out nuclear power to the year 2010 and in fact not allowing no research in nuclear power

For many years Nuclear Energy was in fact a forbidden topics in Swedish politics

2004

Jan Björklund, deputy chairman of the Swedish Liberal Party, To cancel the validity of the Referendum, to continue to operate Nuclear Power Reactors in future and to build new reactors when needed.

Trade Union support

Bo Bobylund, chairman of the government commission on nuclear energy, published an article (January 22, 2004) warning that phasing out Nuclear Power will be difficult if not impossible to the year 2010.

Quite recently Ringhalls NPP asked for permission to increase the power of two reactors by 380+40 MW.

(Note that the closed Barsebäck NPP 1 unit was 600 Mw)

IS NUCLEAR ENERGY A PANACEA FOR SLOVAKIA?

DOES SLOVAKIA HAS ANY VIABLE AND REALISTIC ALTERNATIVE TO NUCLEAR ENERGY?


THE END