Nuclear Safety in the International Context

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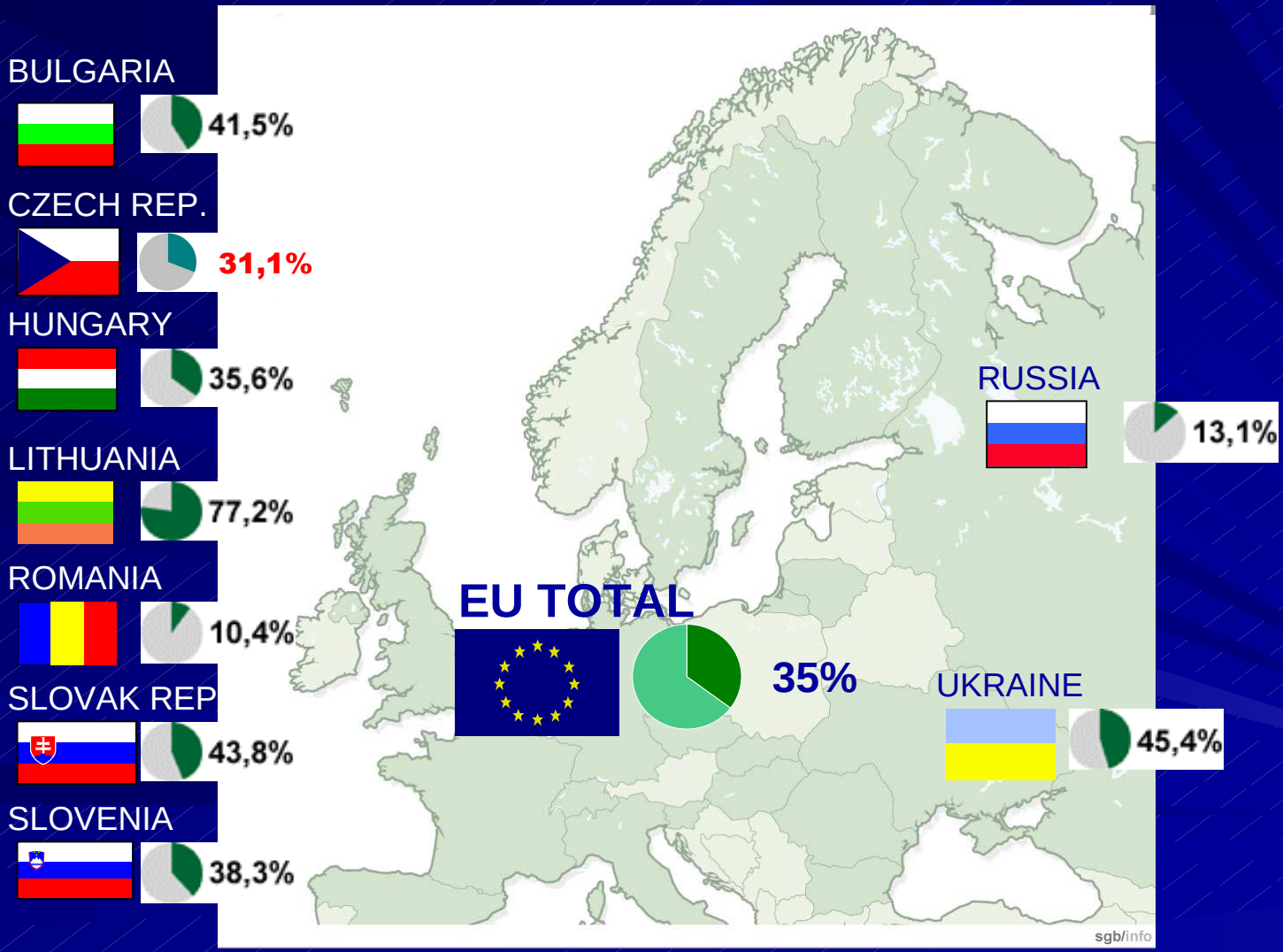
The European Nuclear Perspective



Nuclear share of electricity

Nuclear energy in the EU

- supplies 35% of electricity
- very good safety record
- fully mastered technology
- cheapest source
- investments mostly written off the books
- stable structure of costs
- plant can be and are backfitted at reasonable costs
- needs qualified workforce (high-tech branch)
- does not increase risk of import dependence

Nuclear : viable midterm solution , what about long term future?

Existing constraints

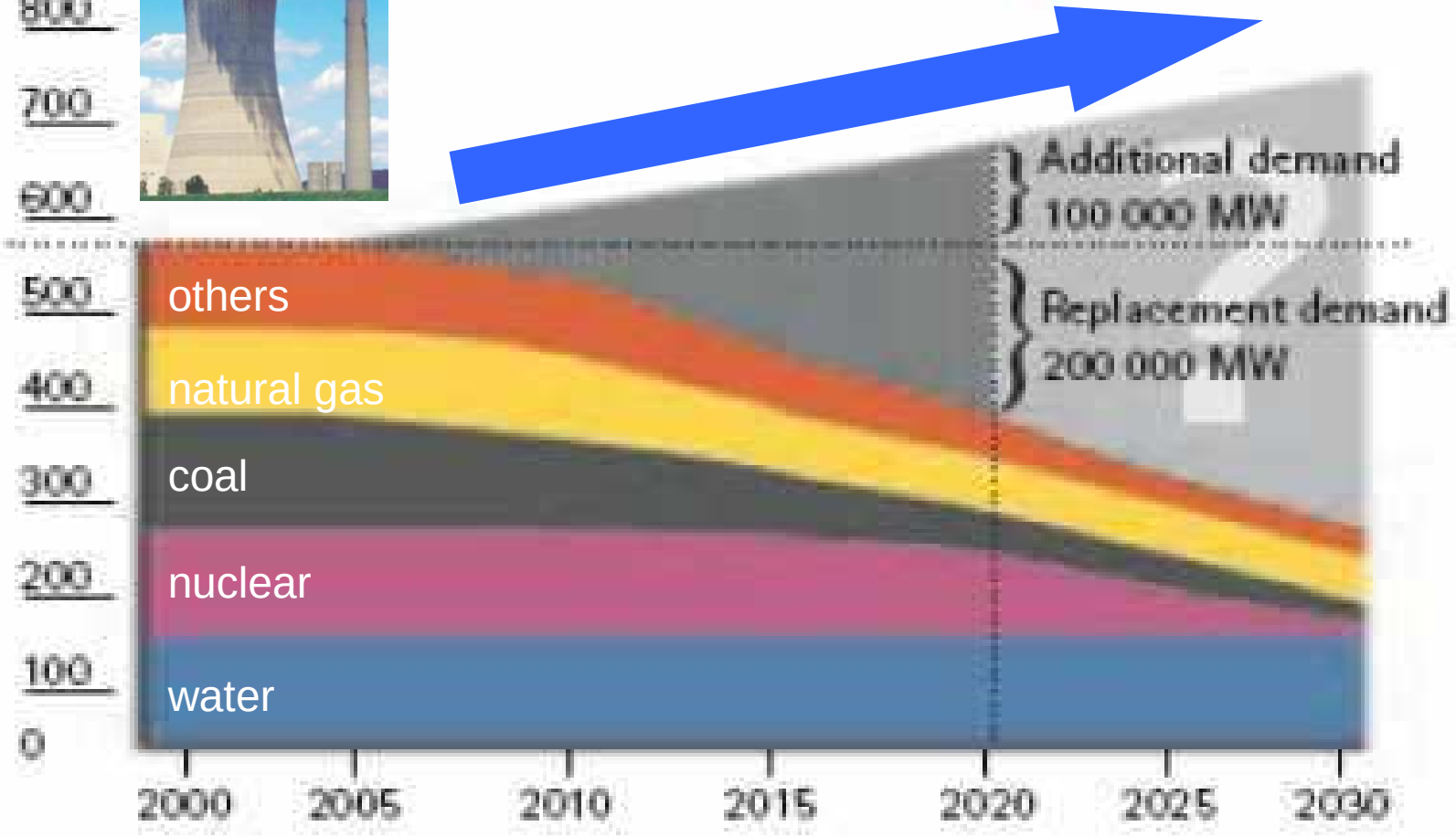
- oldest plants will have to be shut down, replacement needed (by what?)
- operation termination and decommissioning time consuming and costly
  - influencing regional infrastructure
- uncertainties concerning radwaste management
- unstable legislative framework (maximizing of requirements often without technical reasoning)
- public opposition

Development of the power plant portfolio in Europe from 2000 to 2030

Capacity EU 15
GW

Assumption:
decommissioning after
40 operating years

- Others
- Natural Gas
- Coal (total)
- Nuclear power



Some key factors influencing investor's decision making

- General regulatory and legal environment
  - somewhat unclear and unstable
- The time needed to build the planned power plant
  - nuclear has not achieved good record
- The time needed and the time schedule for the authorisation process
  - extremely complicated esp. for nuclear
- The general policy framework via results of regulator's studies and risks taken by the bidder
- The financial situation including the development of taxes and environmental fees

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

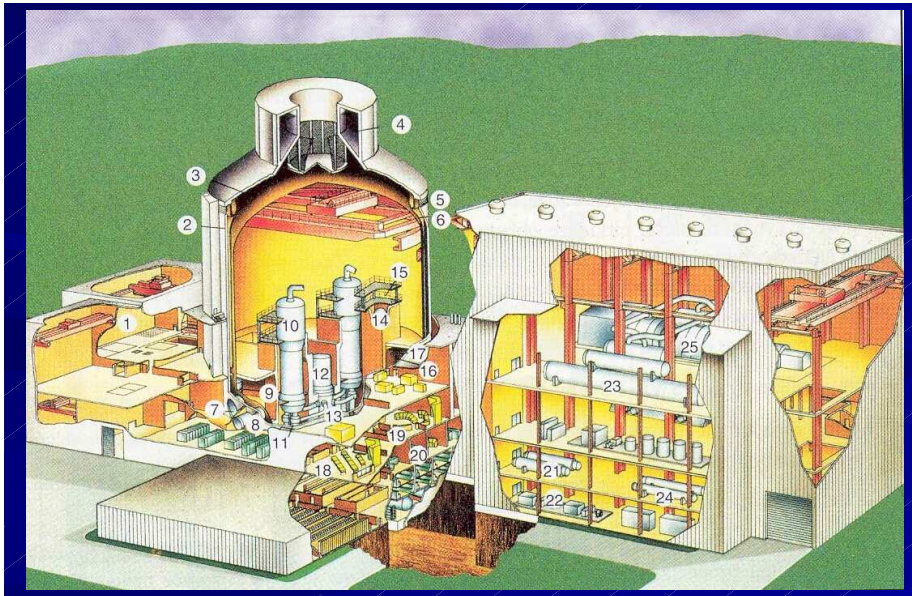
State Office for Nuclear Safety decision

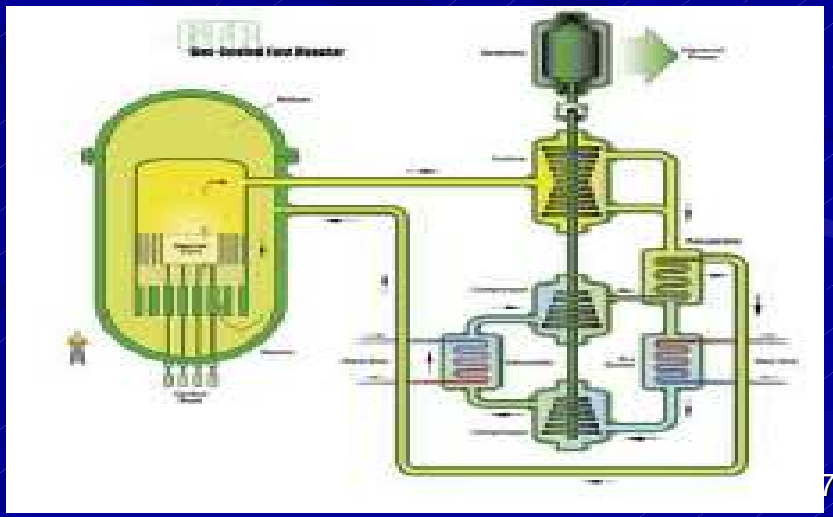
site permission

contract

State Office for Nuclear Safety decision

construction decision





Requested parameters of a new source

- safe
- affordable
- environmentally friendly
- sustainable
- flexible
- publicly (and politically) acceptable

From available options only nuclear is capable to deliver all of them. But it will not be easy way

If all beer drinkers joint us having drunk three glasses, we won't need the Temelín Nuclear Power Station more.

The primary question

- **is not**
  - do we like nuclear ?
- **but**
  - **Do we need nuclear for growth in the next 50 years?**
  - **At which price?**
  - **Under what safety conditions?**

Nuclear energy debate

The use of nuclear energy and ionising radiation is being extensively scrutinised once again in light of present debate on its role in sustainable development and on global security problems. The primary objective is to allow mankind to maximise the benefits and minimise the risks emanating from nuclear sciences and their applications. **The key words of this debate are safety, verification & security and technical co-operation in the peaceful uses of nuclear technology.**

Nuclear safety

- Building and maintaining global nuclear safety regime
- Safeguarding against proliferation of nuclear weapons and strengthening the security of nuclear material and facilities - and last but not least -
- Further expanding of nuclear science and technology transfer as one of the prerequisites for socioeconomic development.

Three pillars of safe use of nuclear energy and ionising radiation:

- Well defined regulatory framework, legislation, independent regulatory body
- Well developed nuclear infrastructure including competent license holders
- Independent third party peer reviews of the nuclear power infrastructure key components

Convention on Nuclear Safety

- **Conclusions to the CR National Report after review in 1999:**
  - **The new nuclear legislation complies with international standards.**
  - **The SUJB is an independent authority as required by the Convention.**
  - **Positive statements regarding approaches to nuclear safety level improvements of nuclear power stations**
- **2002 conclusion**
  - **Nuclear safety situation in CR is in compliance with the CNS intent**

Nuclear Safety in the Candidate Countries The WPNS General Observations

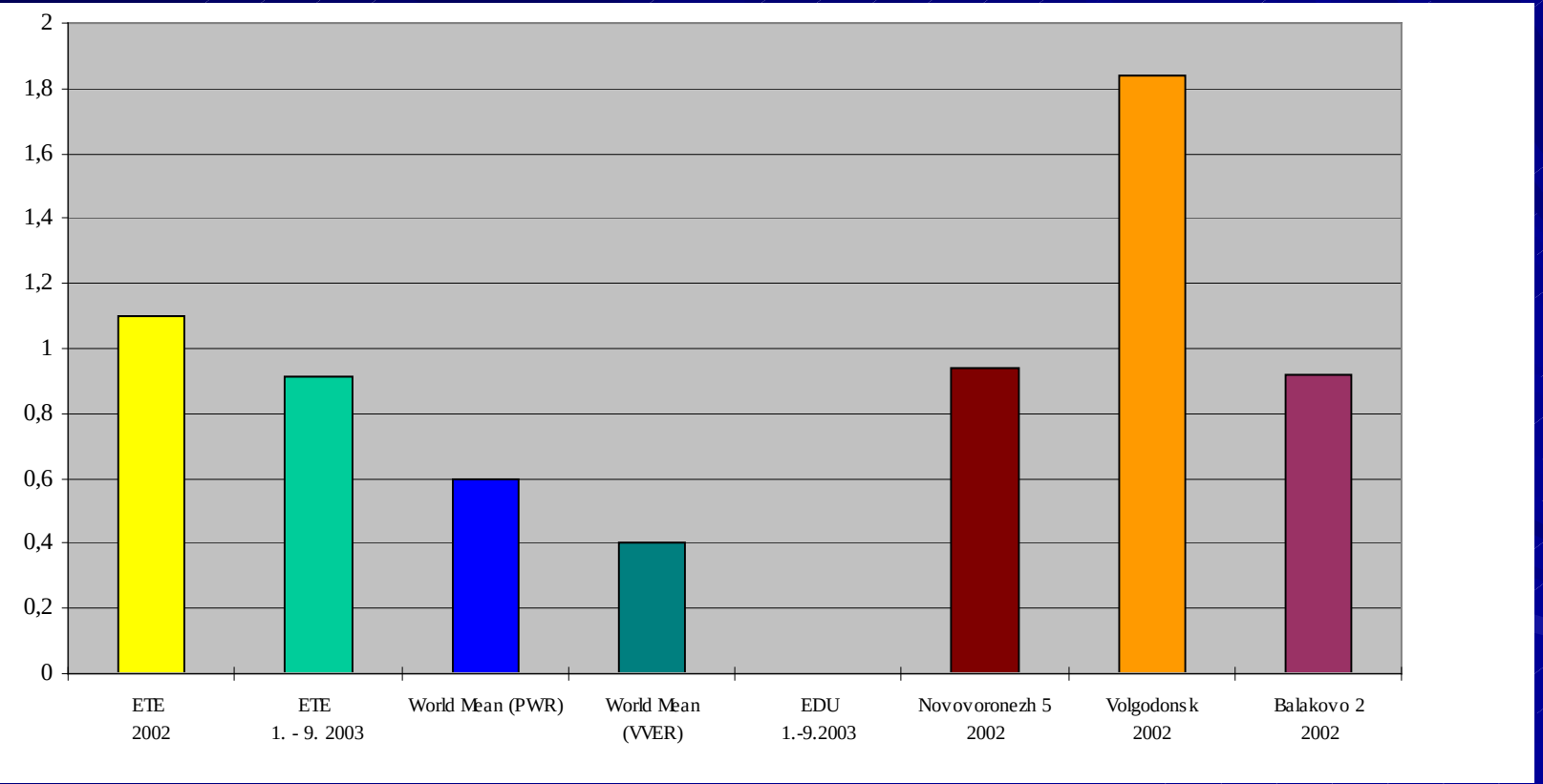
- All Candidate States have safety improvement programmes in place, based on IAEA, EU and bilateral co-operation and support.
- Considerable safety improvements implemented to date.
- Timely completion of ongoing and planned programmes is essential to achieve a high level of nuclear safety
- Recommendations made where programmes found not sufficient or progress too slow

AB(C) Strategy

- **Acceptance**
- **Best Safety**
- **(Competitivenes)**

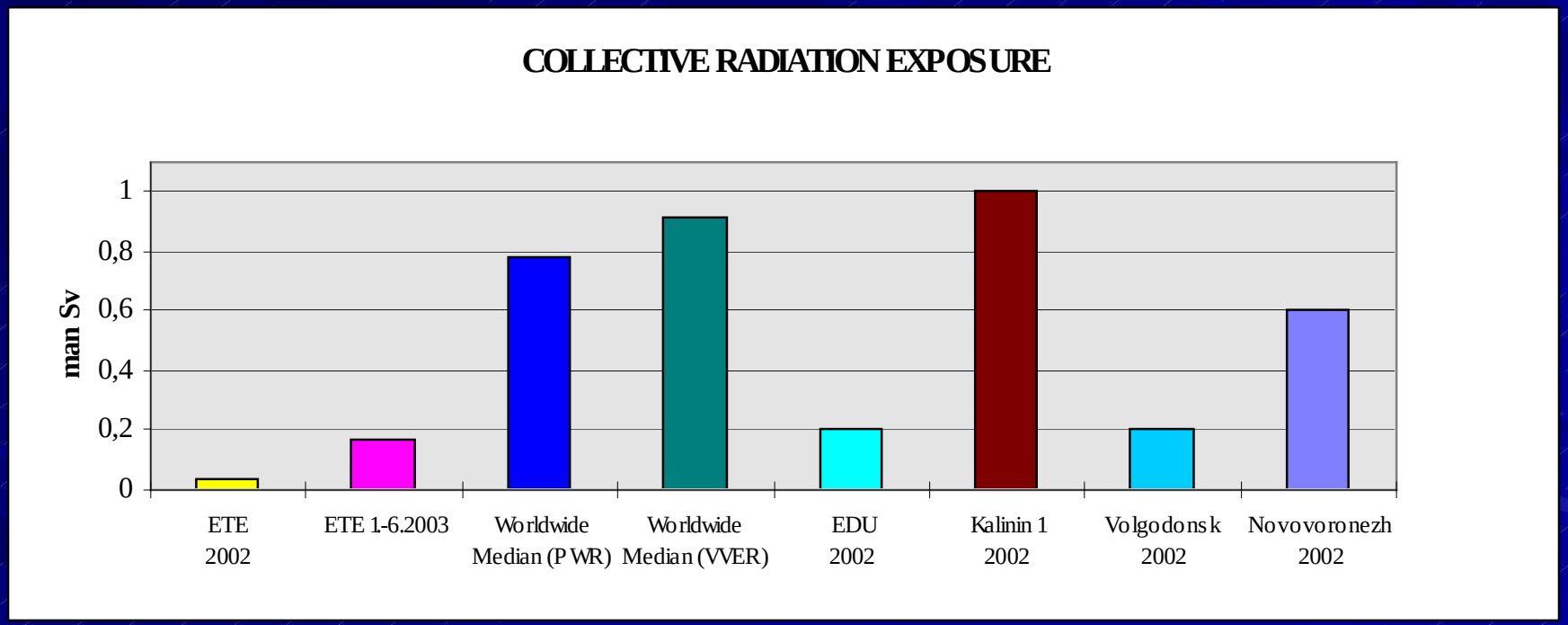
Unplanned scrams per 7000 hours critical (WANO indicator)

The indicator is defined as the number of unplanned automatic scrams (reactor protection system logic actuations) that occurred per 7000 hours of critical operation.



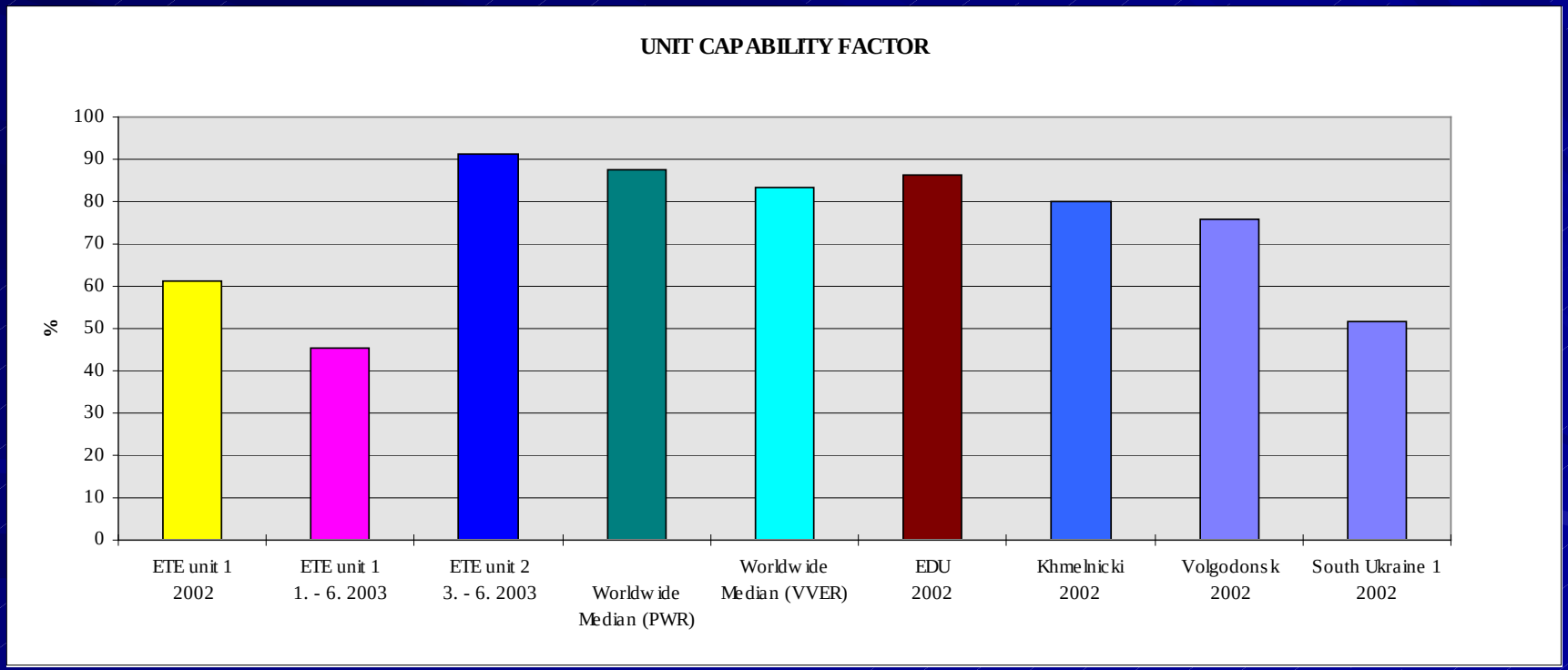
Collective Radiation Exposure (WANO Indicator)

- Collective radiation exposure, for purposes of this indicator, is the total external and internal whole body exposure determined by primary dosimeter (thermoluminescent dosimeter (TLD) or film badge), and internal exposure calculations. All measured exposure should be reported for station personnel, contractors, and those personnel visiting the site or station on official utility business.



Unit Capability Factor (WANO Indicator)

- Unit capability factor is defined as the ratio of the available energy generation over a given time period to the reference energy generation over the same time period, expressed as a percentage. Both of these energy generation terms are determined relative to reference ambient conditions.



Current situation

- shortage of graduated engineers
- competitive environment
- public risk awareness
- ageing of equipment and staff
- early termination due to political decision

Near future perspective and requirements

- Licensing and safety remain national responsibility
- International safety standards will become Community law
- Technologies for decommissioning and waste management do exist and have to be implemented
- More research and development should be foreseen
- Transparency and unbiased information have to be ensured

Challenges and opportunities

- harmonization of safety requirements and regulatory approaches at EU level
- modernization of operating plants
- further development of nuclear option
- final disposal of spent fuel
- international terrorism

Governance issues – ownership, financial and organisational

- Dilution of responsibilities for safety (change in ownership, portions of nuclear site leased to other companies).
- Decoupling of owners and business managers at the top of the organisation from the technical managers operating the nuclear plants.
- Greater use of low-price contractors (perhaps less qualified).
- Financial qualification of licensees may be reduced.
- Less than adequate funds for decommissioning and spent fuel and radioactive waste management.

Direct safety challenges

- Operator management focused on economics over safety.
- More pressure on workers, perhaps overstressing them.
- Excessive overtime causing worker fatigue.
- Lower quality of work (reduced expertise, lower quality equipment).

Direct safety challenges

- Plant ageing problems (reduced maintenance and pressure for life extension).
- Reduced safety margins (power upgrades, increased fuel burnup).
- Less investment for equipment upgrades and safety backfits.
- Reduced equipment reliability due to changed maintenance strategies (reduced preventive maintenance, increased on-line maintenance).
- Decreased electricity grid stability and reliability.

Nuclear technology infrastructure issues

- Less expertise in operator organisations, at vendors and at contractors.
- Diffusion of design authority capability (loss of design basis knowledge).
- Less co-operation among operators.
- Less safety research by operators, with consequent less support for their safety positions.
- More pressure to reduce the regulatory safety research programmes.

Increased pressures on the regulatory body

- New regulatory competencies needed.
- Less expertise available to the regulator.
- More aggressive relations between operator and regulator (more pushback, unwillingness to backfit).
- Information flow reduced because of sensitive market information.
- Legislative basis for enforcement may be inadequate.
- Pressure on regulator to avoid requiring shutdown (projected long shutdown may lead to decommissioning).

Increased pressures on the regulatory body

- Operators will demand more international consistency of regulations.
- Pressure to reduce regulatory impact costs (fees, research and size of regulatory body).
- Increased direct pressure on the regulator to reduce perceived unnecessary regulatory burdens.

Regulatory authorities all the time need to consider:

- if clear, unambiguous regulations are in place
- if regulators are responsive to licensee requests
- if regulators are aware of their impacts on the operating organization
- that the regulatory strategies should encourage open reporting
- that the regulatory intervention strategy should be clear and timely
- that regulatory enforcement powers must be proportionate to the issues
- the importance of regulatory transparency

Tasks for near future:

- knowledge management, competent staff, technical support
- effectivness and efficiency of reglation
- safety culture
- education and research (incl. material research and engeneering)
- trust building

Nuclear regulator and the public

Recent experience of SUJB shows some controversial aspects of offering information on licensee safety performance to the public. We must have in mind that:

- The expectations of the public are very high
- The public wants to be protected by a perfect regulator
- The public will not forgive any weakness of the regulator

Nuclear regulator and the public

On the other hand, to build up “sustainable” trust of the public we must try to explain that:

- The persons of the regulator staff are good and motivated but not perfect
- The regulator surveillance and inspection programme cannot cover 100%
- Incidents and accidents cannot be totally avoided, but occurrence probability can be reduced
- Scientific knowledge is limited by several uncertainties

Nuclear regulator and the public

Do not try to be loved by the public

Do not look for easy success by playing attractive roles like:

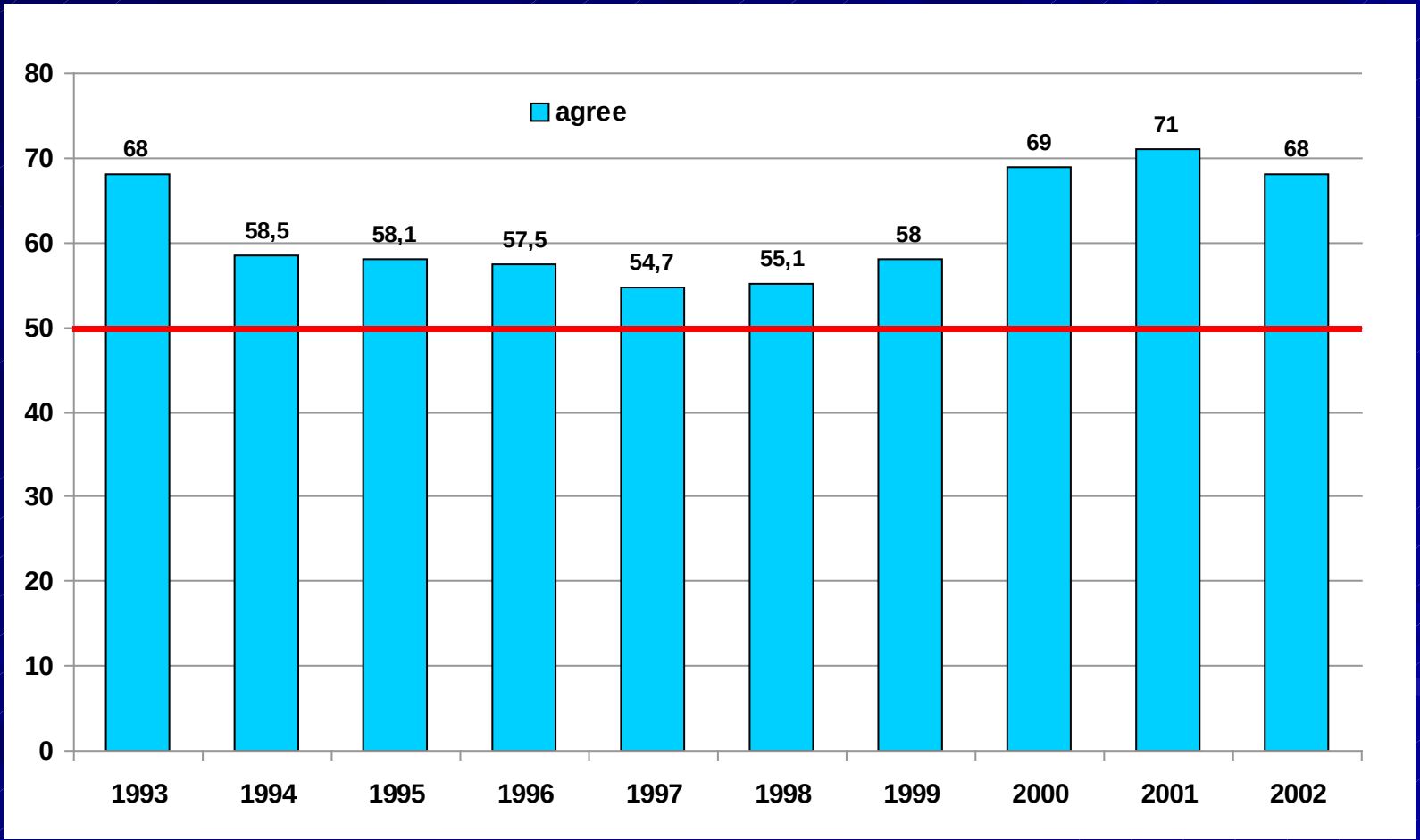
- **Little David winning against Goliath**
- **The severest among all regulators**

Nuclear regulator and the public

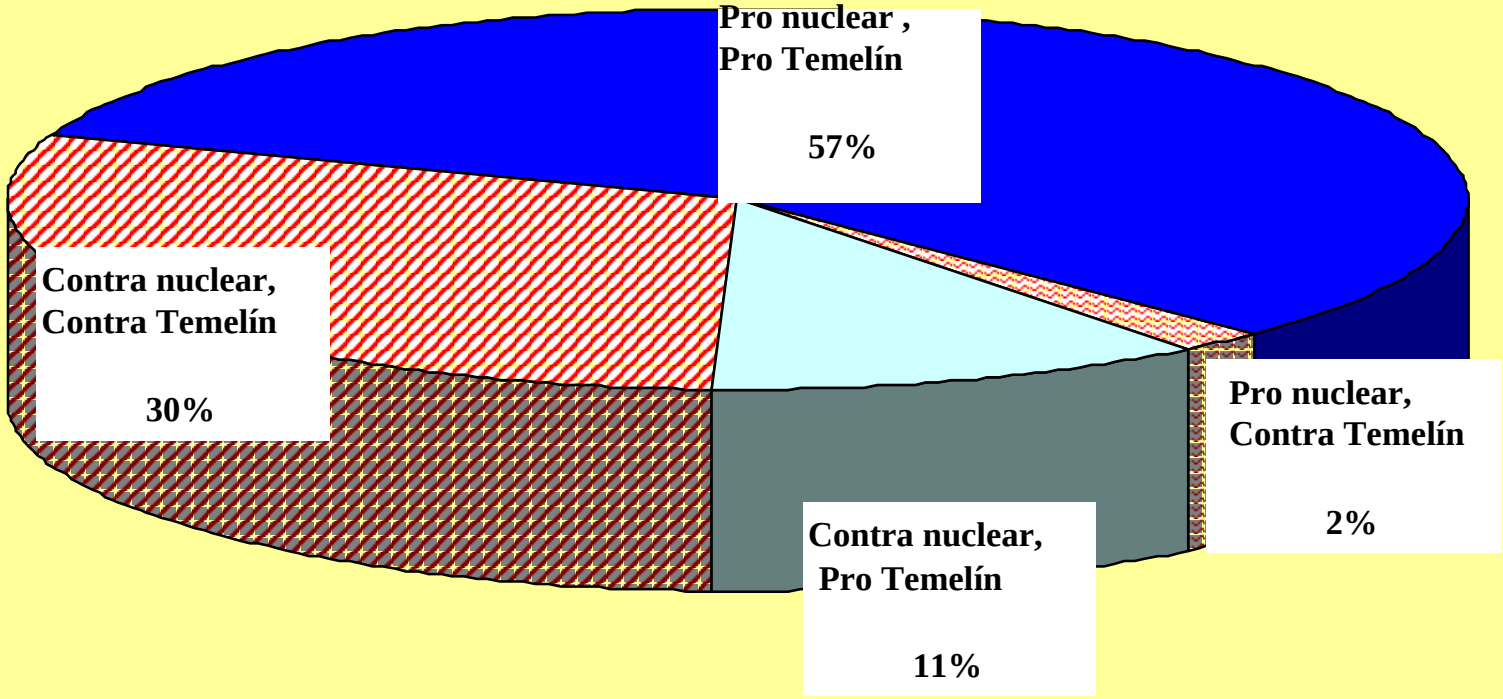
„Temelín“ experience:

In time of long lasting politically driven media campaigns like in case of Temelín NPP start-up (with specific cross-border influence) none of the standard rules for regulatory information on licensee safety performance can be employed - this is the negative side of such political attention (“crusades for safety”).

Public Consent with Temelín NPP



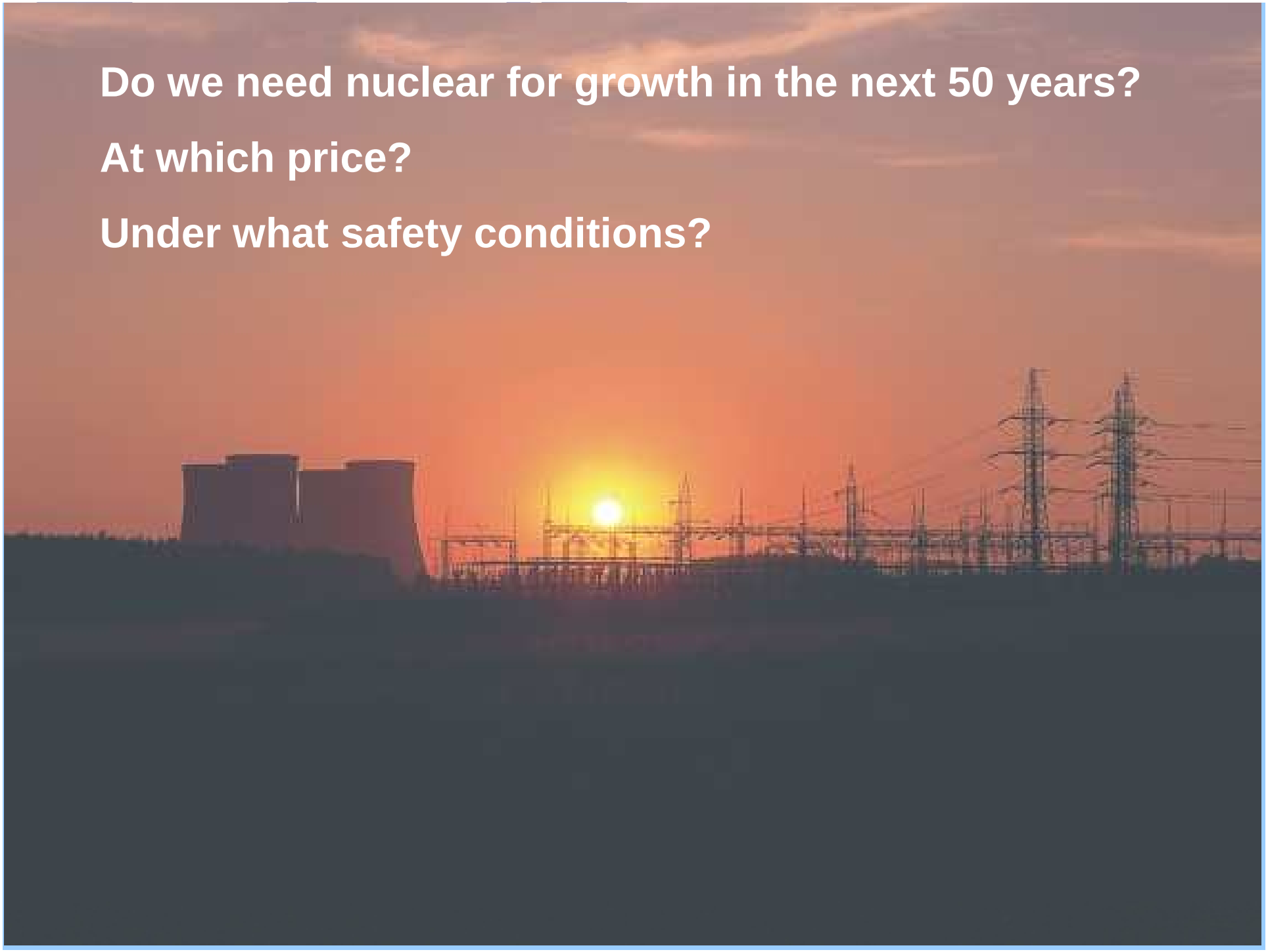
Temelín NPP x Nuclear Option



**Coming together is a beginning,
keeping together is a progress, and
working together is a success**

A vision for future (proposed by IAEA)

A strong, sustainable and visible safety regime, ***that provides for the protection of people and the environment from effects of ionizing radiation, minimization of the likelihood of accidents or malicious acts that could endanger life and property, and effective mitigation of the effects of any such events.***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