



# Standardization of Reactor Designs and International Safety Framework

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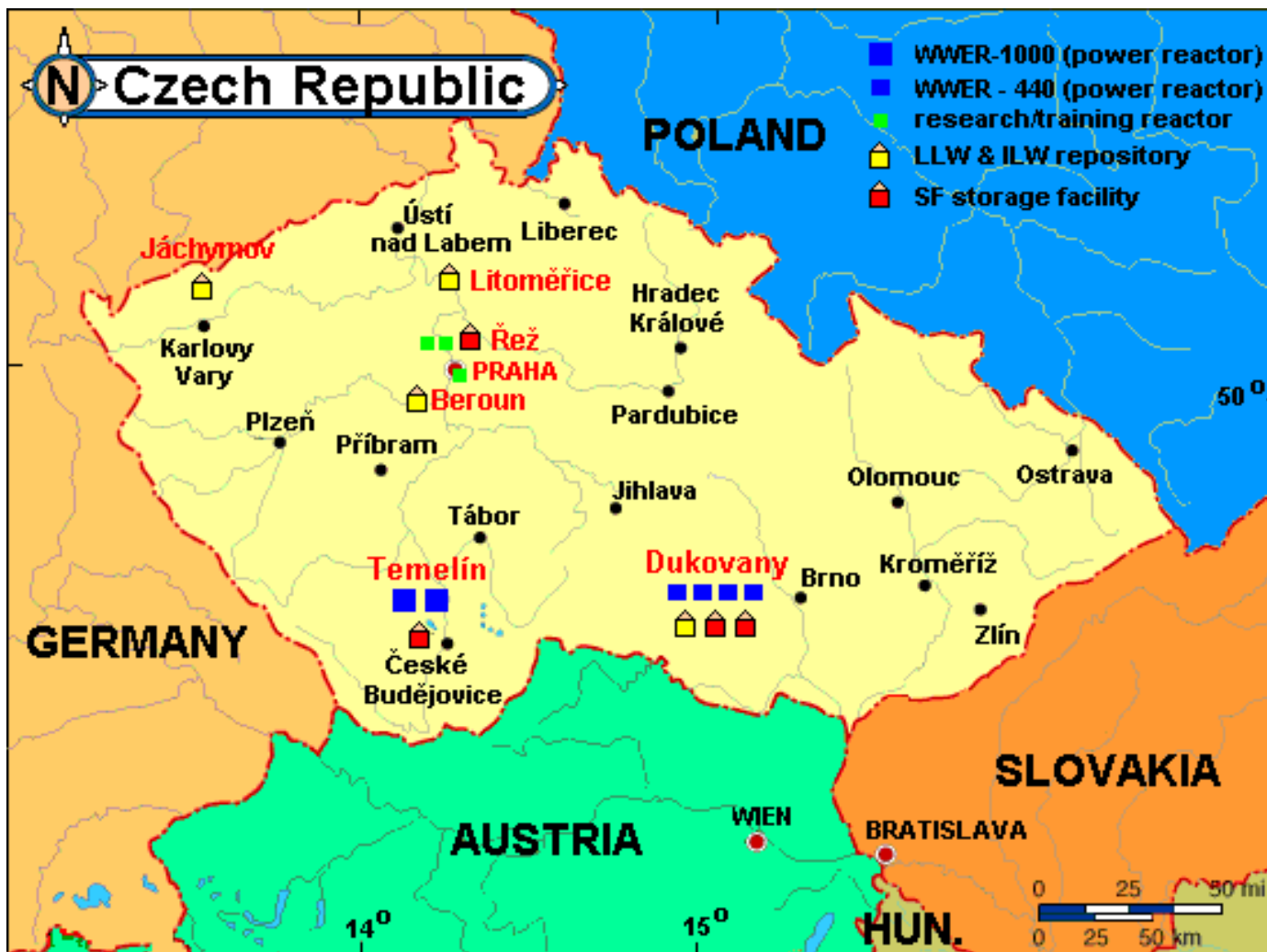


## Content:

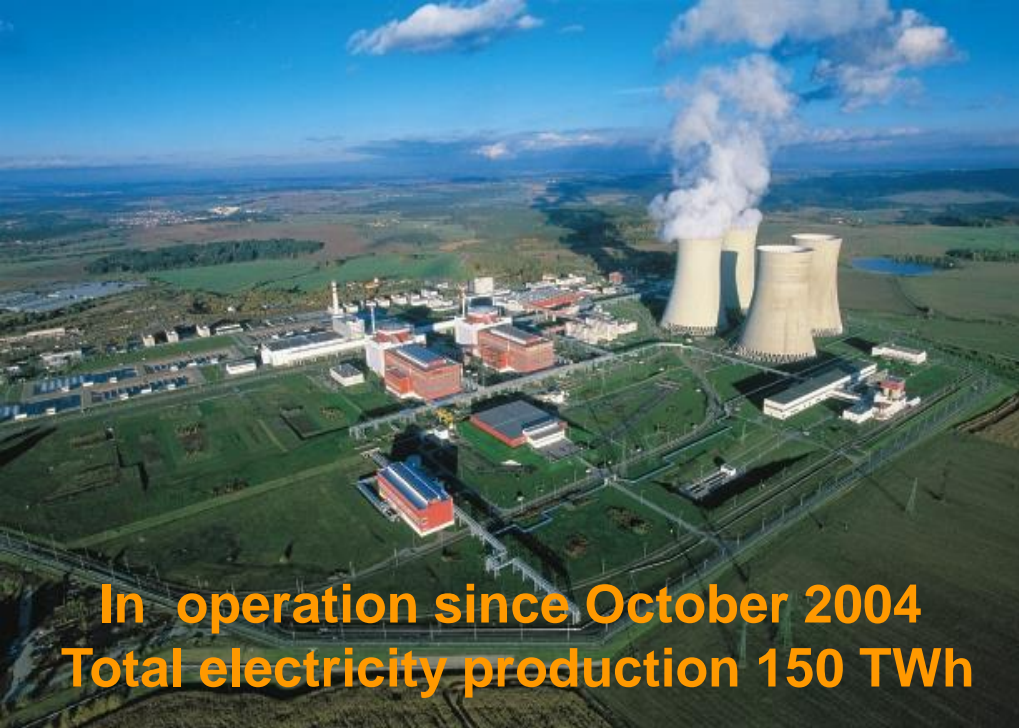
- Who are we?
- Roles and responsibilities
- Nuclear Safety Scene
- Harmonization/Standardization as seen by Regulator



# Nuclear Installations in the Czech Republic

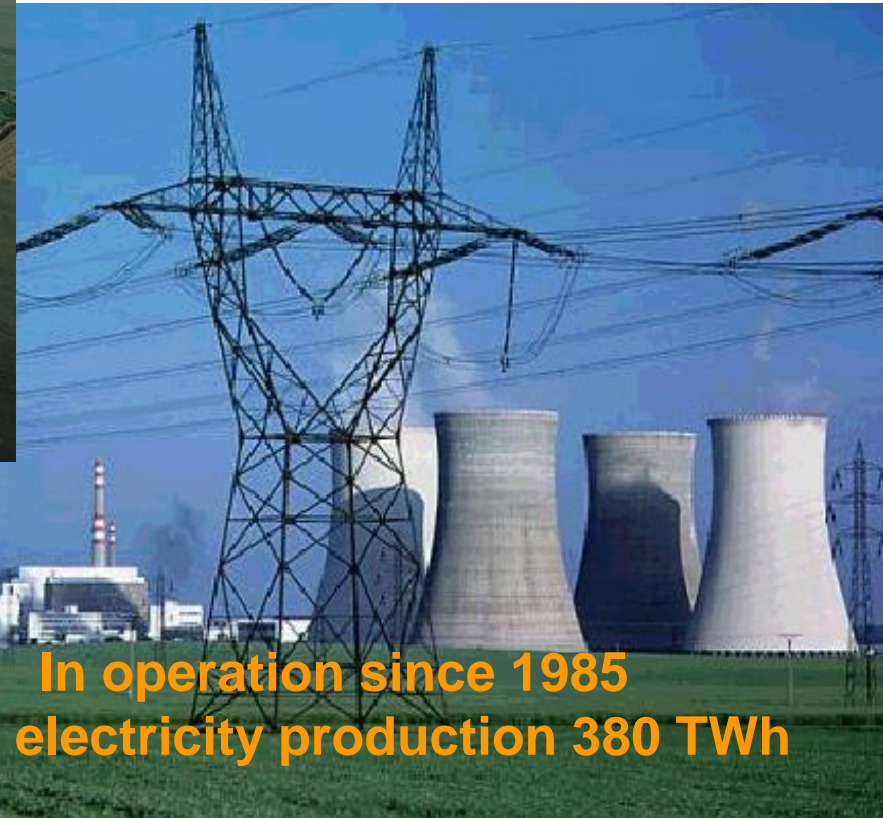


## Nuclear Power Plants in the CR



**In operation since October 2004**  
**Total electricity production 150 TWh**

**Dukovany NPP 4x440 MWe**  
**30 years of operation in 2015**



**Temelin NPP**  
**2x1000 MWe**

**In operation since 1985**  
**Total electricity production 380 TWh**



## Three pillars of safe use of nuclear energy and ionising radiation in the CR:

- Well defined regulatory framework, legislation, competent and independent regulatory body
- Well developed nuclear infrastructure including competent license holders
- International cooperation and harmonization of regulatory and industry approaches



## Nuclear safety actors

- The nuclear safety system comprises all those with an interest in the nuclear enterprise who in one way or another can influence its safe outcome.
- Many players:
  - nuclear designers,
  - vendors,
  - constructors,
  - suppliers,
  - operators,
  - regulators,
  - international bodies,
  - governments and other stakeholders (especially the public).
- To be robust it must not be vulnerable to any individual or combination of failures of single players' attention to nuclear safety or be subject to a common mode failure that affects all in the system.



## Roles and Responsibilities

- Applying the defense in depth philosophy to the nuclear enterprise leads to the identification of three main independent defensive barriers to prevent a nuclear accident from happening:
  - a strong nuclear industry;
  - a strong nuclear regulator; and
  - a strong set of stakeholders.
- It is recognized that the primary responsibility for safety lies with the operator, that the primary responsibility for safety oversight lies with the regulator, and that the primary stakeholder for safety are those who may be directly affected by a nuclear accident – the workers and the public. So each has clear and distinct important roles and responsibilities within the nuclear safety system.





## Licensee / Operator

- As a basis the licensee/operator must have a strong technical capability to underpin the safe operation of the plant and act as an “intelligent customer”.
- The operator/licensee must establish through its processes multiple barriers for safety related decisions and actions with the significant of the decision/action driving who in the executive hierarchy is responsible for it, and they must be suitably qualified and experienced to do so.



## Basic mission of nuclear safety regulatory authority

- Effective protection of the public health and safety, security, and of the environment against possible adverse effects of ionizing radiation.
- Enable the use and management of radioactive materials and nuclear fuels for beneficial civilian purposes in a manner that protects public health and safety and the environment, promotes the security of our nation, and provides for regulatory actions that are open, effective, efficient, realistic, and timely



## Key Stakeholders of Regulatory Authority

- There are three key stakeholders in the delivery of effective regulation
- Government, Industry and Society
- Government must have confidence in the competence and judgement of the Regulator
- Industry must have confidence in the competence and fairness of the Regulator
- Society must have confidence in the impartiality and judgement of the Regulator

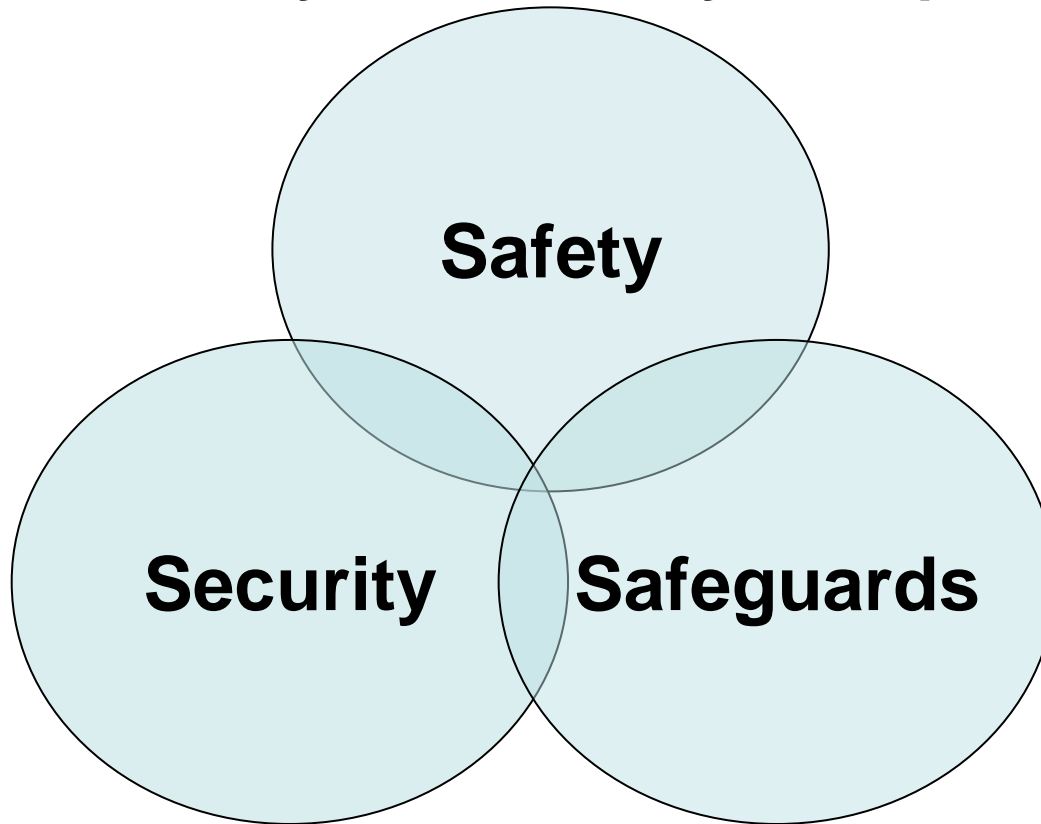


## Regulation is effective when:

- Regulator influences and contributes to a safety and security conscious industry
- Government accepts that the nuclear industry is safe and secure
- Society accepts that the use of nuclear energy is safe and secure
- Regulator contributes to international recognition of a global approach to the harmonisation of nuclear safety and security regulation

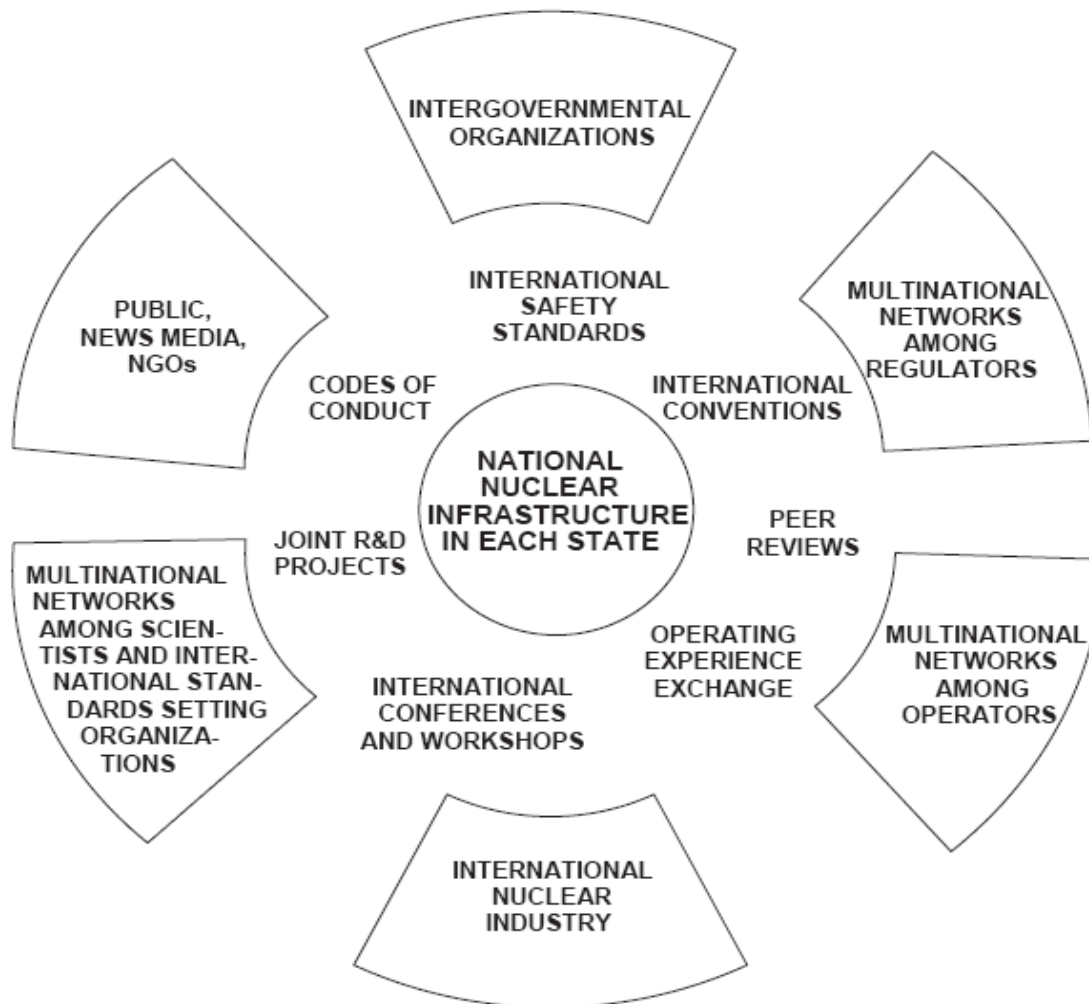


## Sustainable nuclear energy Availability, Affordability, Acceptability



To prepare for the future there is a need for new and fully integrated approach to all infrastructure areas, including also regulation.

# Nuclear Safety Scene



# Nuclear Safety Scene

## Global

Convention on Nuclear Safety

IAEA - Safety Standards



## European

EU Council Directive  
2009/71/Euratom

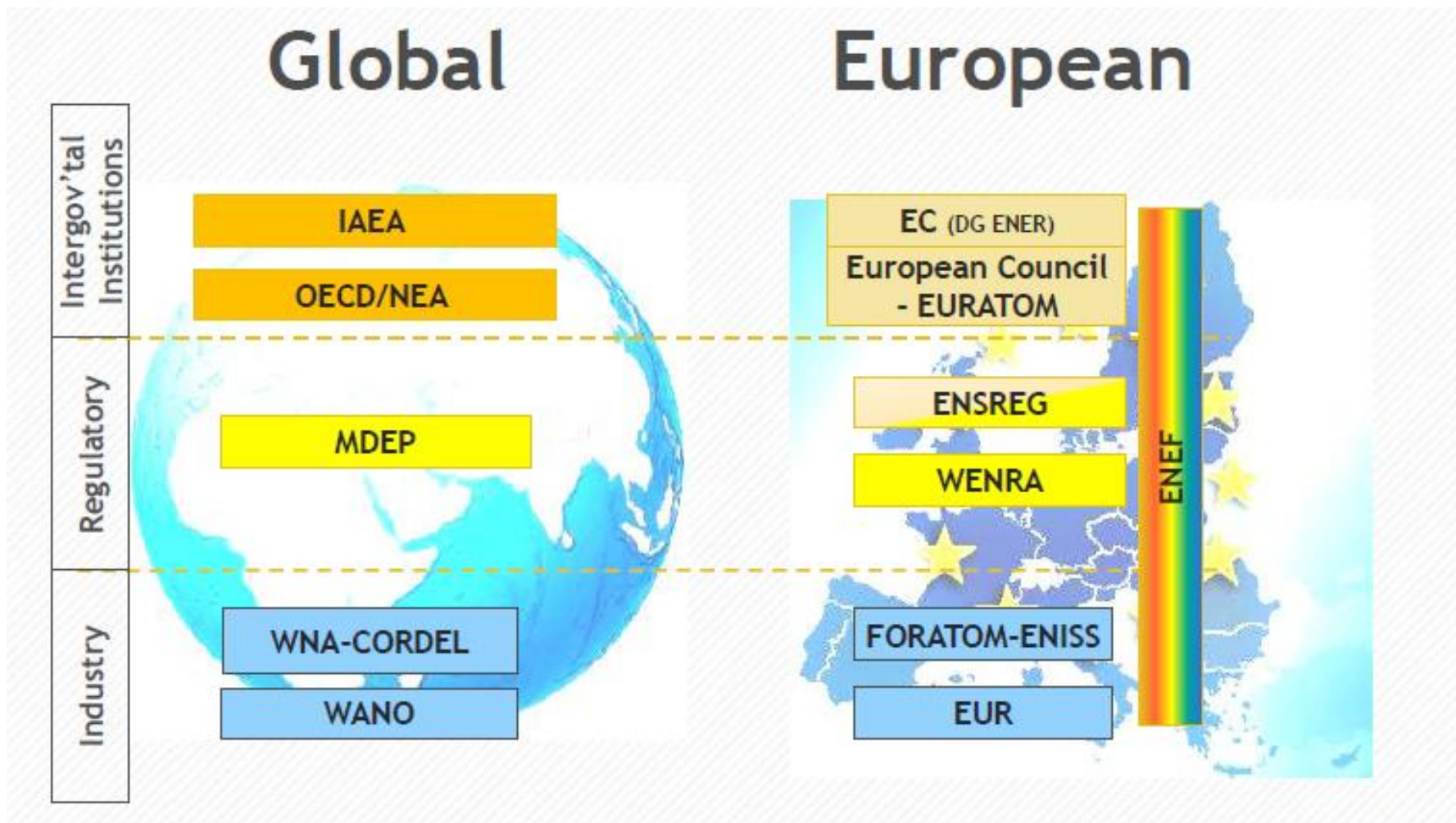
Establishing a Community  
Framework for the nuclear safety of  
nuclear installations

Other Directives will follow...





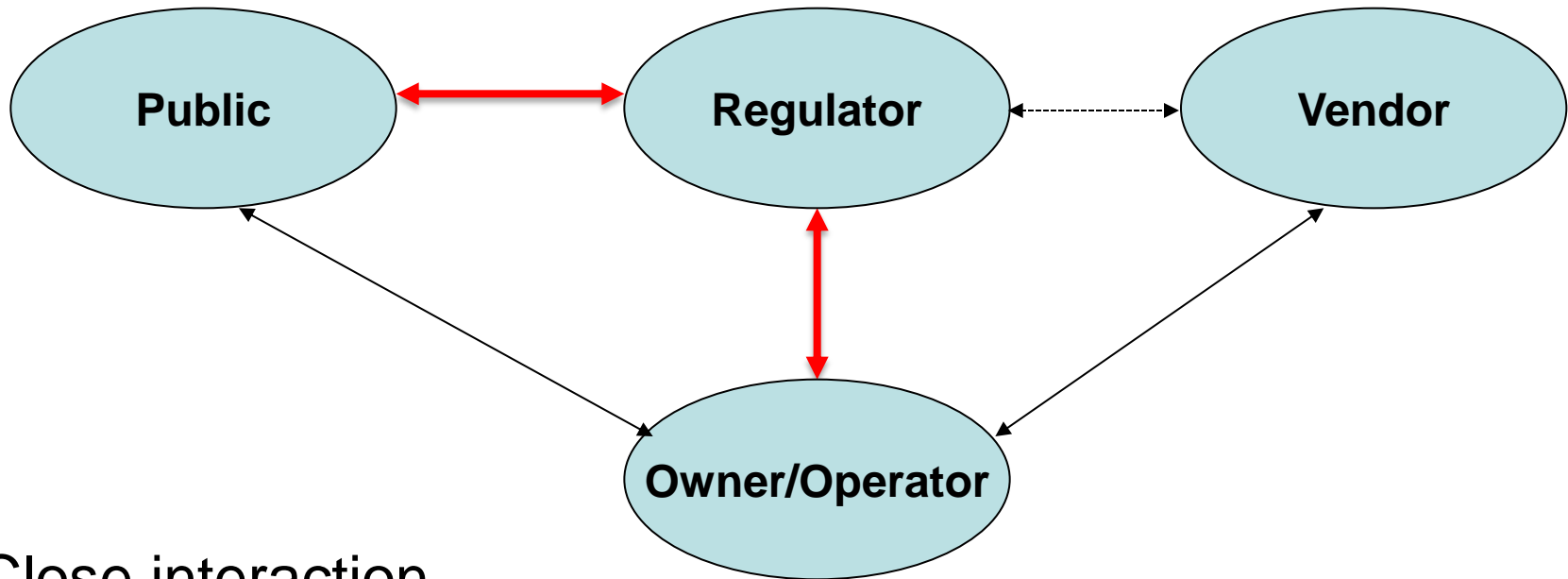
# Standards Setting







# Nuclear Safety Requirements: Stakeholders



- Close interaction
- Some overlapping, some distinct interests
- Viability, cost, political support, public acceptance
- **Safety, harmonization/standardization**



## Regulation of Nuclear Safety and Radwaste Management in EU

- National responsibility
- Nuclear Regulator in every nuclear EU state
- National legislations are in line with international standards
- Nuclear EU states are members to the
  - Convention on Nuclear Safety and
  - Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- IAEA standards, codes and guides
- OECD/NEA – enhancing co-operation
- WENRA – voluntary common “standards” - reference levels



## Why do we speak more and more about the need for standardization/harmonization?

- One of the reasons probably is that the context in which nuclear regulators has changed. Protecting citizens and the environment is a more demanding task in the 21st century. Nuclear operators must perform more efficiently and be more innovative in a highly integrated international economy. Perhaps not surprisingly, regulators can hear from the industry that the current regulatory system often acts as a constraint to innovation, competitiveness, investment and trade.



## Existing regulatory/legal situation

- Each NPP is licensed by an independent regulatory body within
  - specific national licensing process, which vary from country to country
  - Specific national safety requirements, which can vary considerably in details
- A design approval in one country is legally irrelevant for others
- This is felt as an obstacle to deployment of standardized designs across a range of countries



## Context Changes

### Past:

- Investment by state-owned utilities in regulated markets
- Investment by national players
- Custom-made reactors: almost every reactor was different

### Present:

- Investment by private-owned utilities in highly competitive markets
- Emergence of multinational utilities choosing among a small number of international designs
- Standardization is required to facilitate new build



## Substantial Bottle Necks

- Not every detail in a nuclear plant can be standardized: a certain degree of adaptation, dictated by site-specific conditions and other local factors, would be necessary
- Design change management and regulatory assessment, maintaining the integrity of design basis throughout whole plant life cycle
  - **HOW TO PRESERVE KNOW WHY?**
- Sovereignty and independence of each country's regulator has to be respected
- Regulators are bound by law to apply their national safety requirements and licensing procedures
- Regulators need to build up knowledge of the design

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

