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International Atomic Energy Agency

# Legal and Institutional Aspects of New Nuclear Technologies Deployment

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**Joint IAEA-ICTP Workshop on Physics and Technology of Innovative Nuclear Energy Systems**

**12-16 December 2022, ICTP, Trieste, Italy**



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International Project on  
Innovative Nuclear Reactors  
and Fuel Cycles

# Why legal aspects are important for nuclear power and fuel cycle?

- Nuclear Safety – national and international level
- Nuclear Security – national and international aspects
- Non-proliferation – international level

These aspects are “covered” by the Complex of the International Treaties and Conventions



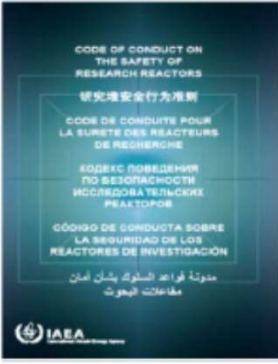
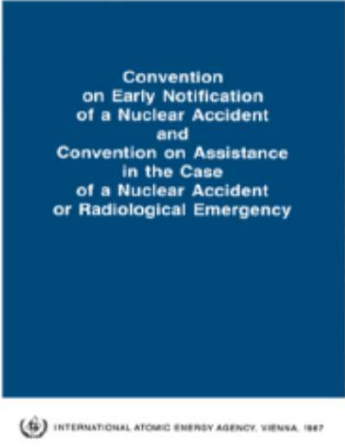
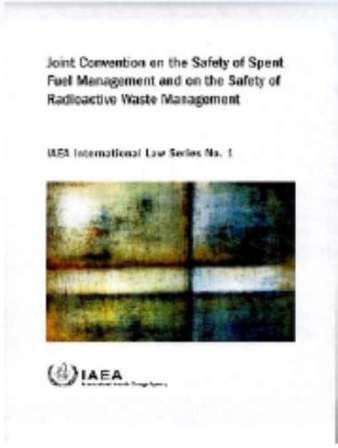
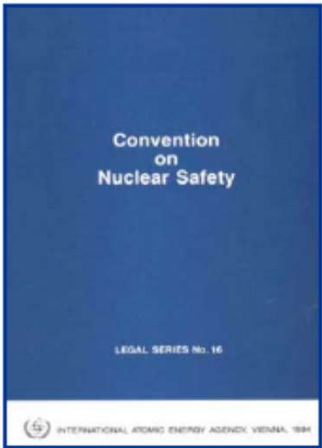
# International Legal Framework for Nuclear Safety



Suite of legally binding and non-binding instruments

Complemented by safety standards

Peer review

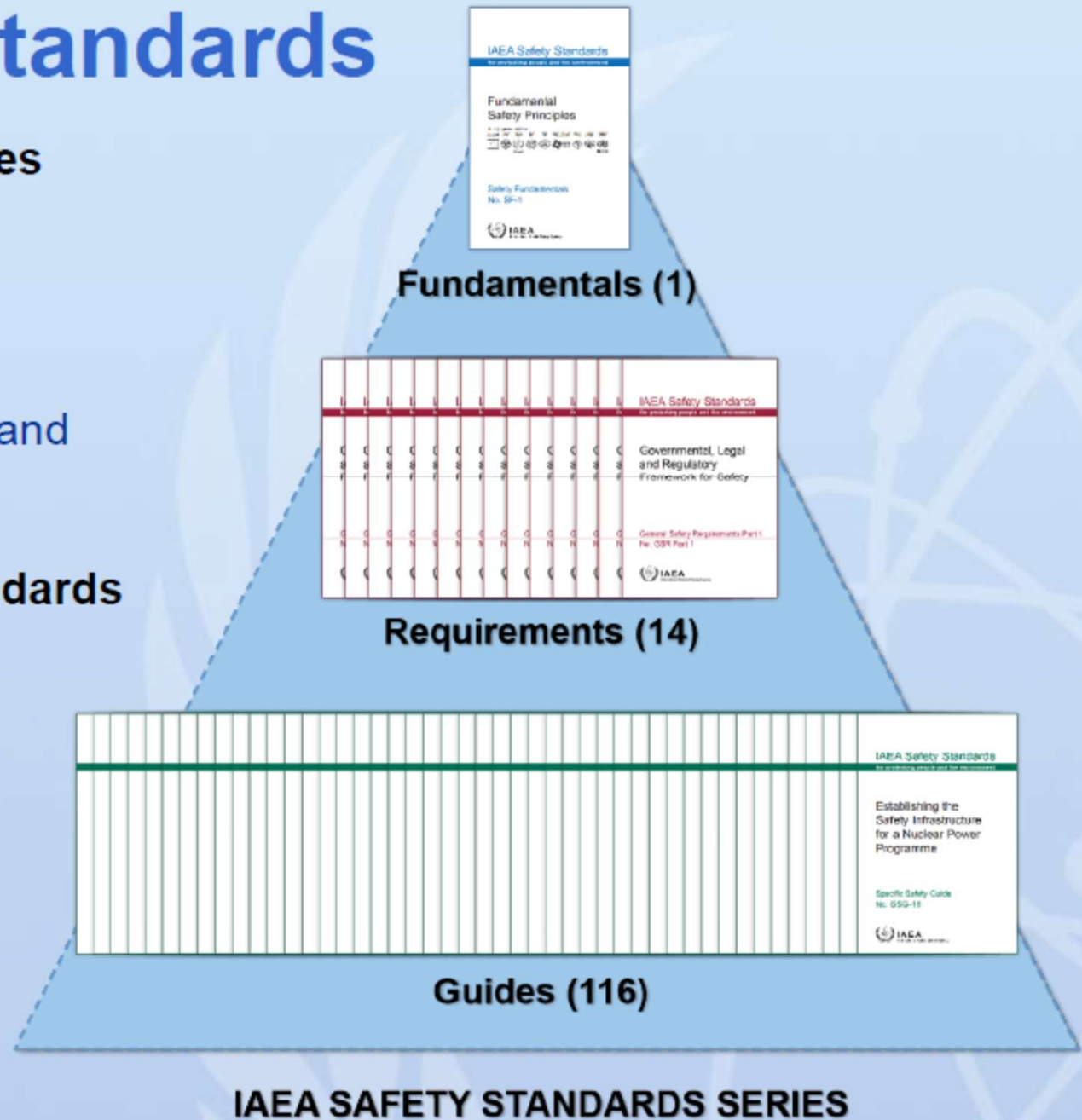


# IAEA Safety Standards

## Safety Standards Committees

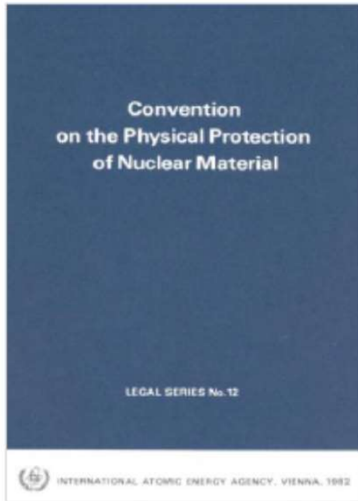
- Nuclear Installations
- Waste
- Transport
- Radiation Protection
- Emergency Preparedness and Response

**Commission on Safety Standards**  
25 Member States





# International Legal Framework for Nuclear Security

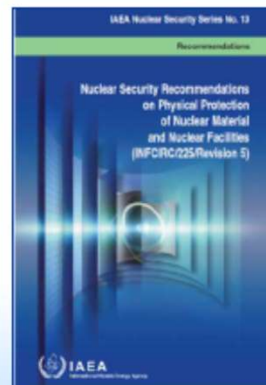


CPPNM + Amendment

Non-binding instruments

Various other treaties – UN, IMO, ICAO etc.

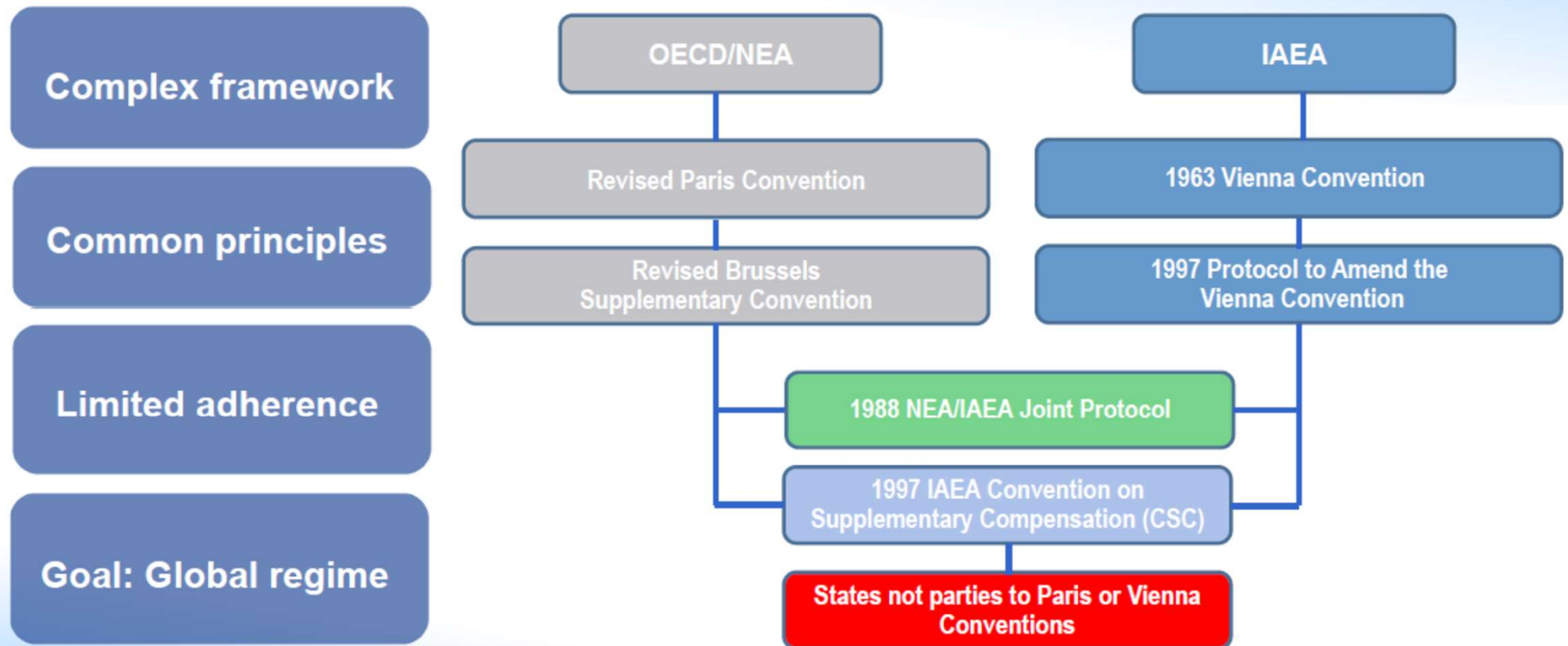
UNSC Resolutions







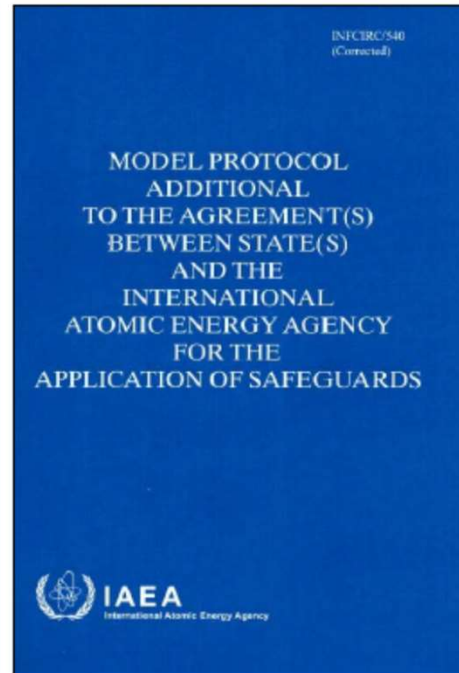
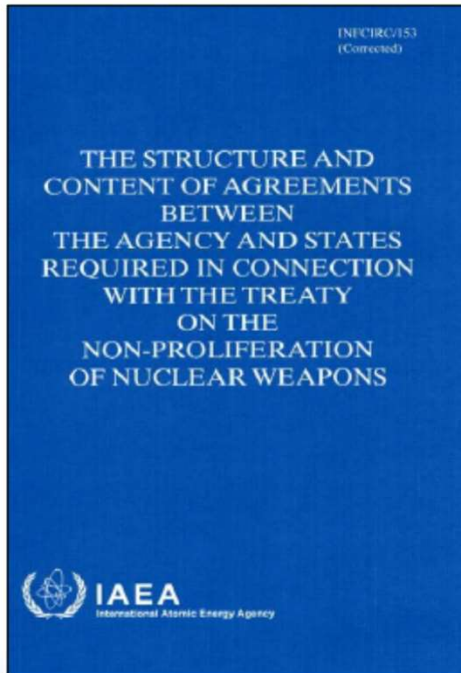
## International Legal Framework for Civil Liability



# Treaty on the Non-Proliferation of Nuclear Weapons (NPT)



## Safeguards



## Safeguards Agreements

Item-specific

Comprehensive

Voluntary Offer

Additional Protocol

## Safeguards Findings and Conclusions

# Where "gaps" can be impediments for innovations?



Nuclear Safety

**Technology or facility design is not meet current standards or requirements**



Nuclear Security

**Facility design is not meet current security and/or safeguard requirements**



Civil Liability for Nuclear Damage



Safeguards

**Using of "sensitive" materials**

Contradictions between different areas of safety



# Nuclear Infrastructure for new NP program



National position



Nuclear safety



Management



Funding and financing



Legal framework



Safeguards



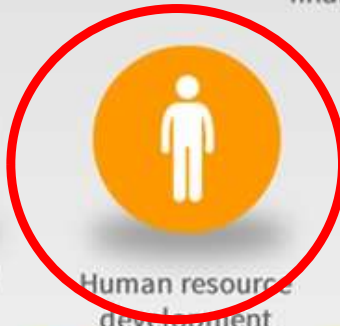
Radiation protection



Regulatory framework



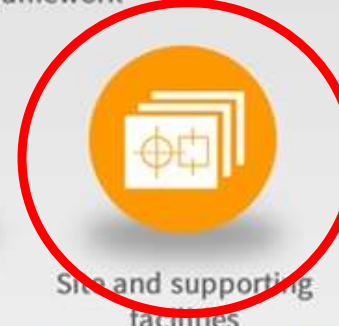
Electrical grid



Human resource development



Stakeholder involvement



Site and supporting facilities



Environmental protection



Emergency planning



Nuclear security



Nuclear fuel cycle



Radioactive waste management

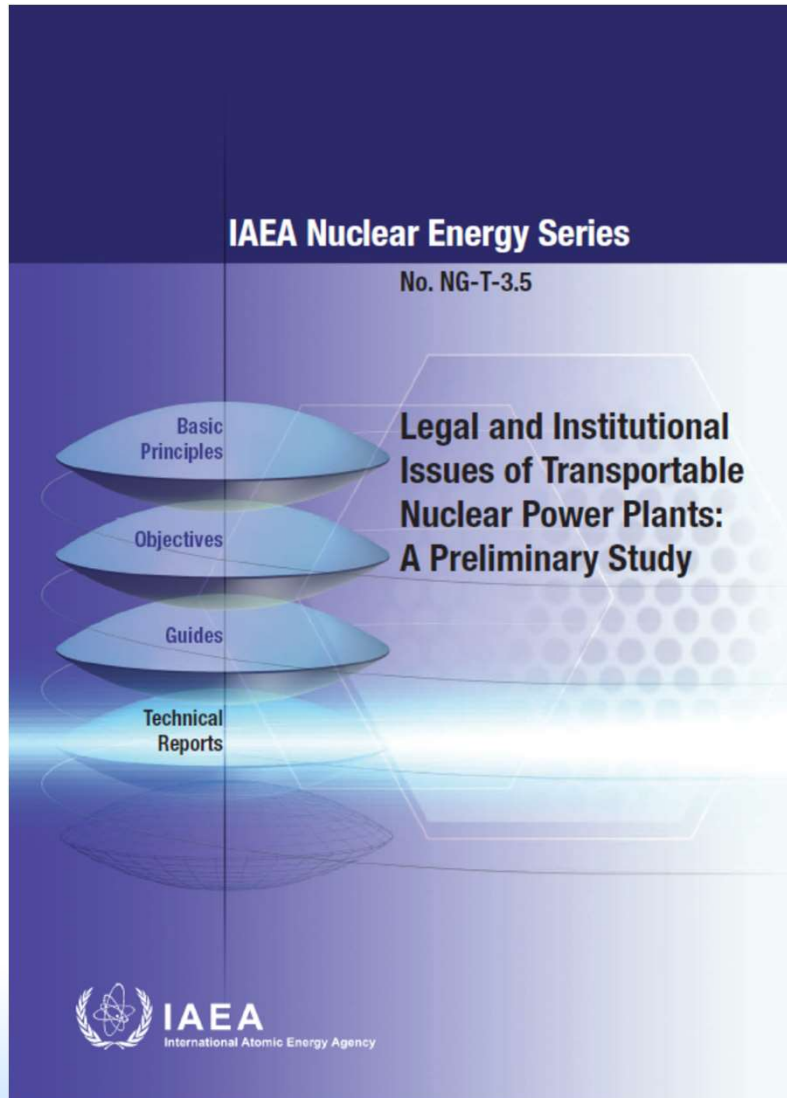


Industrial involvement



Procurement

# Studies of legal and institutional aspects of innovations (by INPRO)



- (TNPP) Legal and Institutional Issues of transportable Nuclear Power Plants: A Preliminary Study (published in 2013)
- Second Case study (TNPP-2): “INPRO Case study for the Deployment of a Factory Fuelled Small Modular Reactors (SMR)” will be published soon.
- Cooperative Approaches to the Back-end of the Nuclear Fuel Cycle: Drivers and Institutional, Economic and Legal Impediments (will be published in 2023)
- New INPRO Study: Legal and Institutional Issues of prospective deployment of Fusion facilities (started in 2022.)



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# Key Focus of TNPP-2 Study

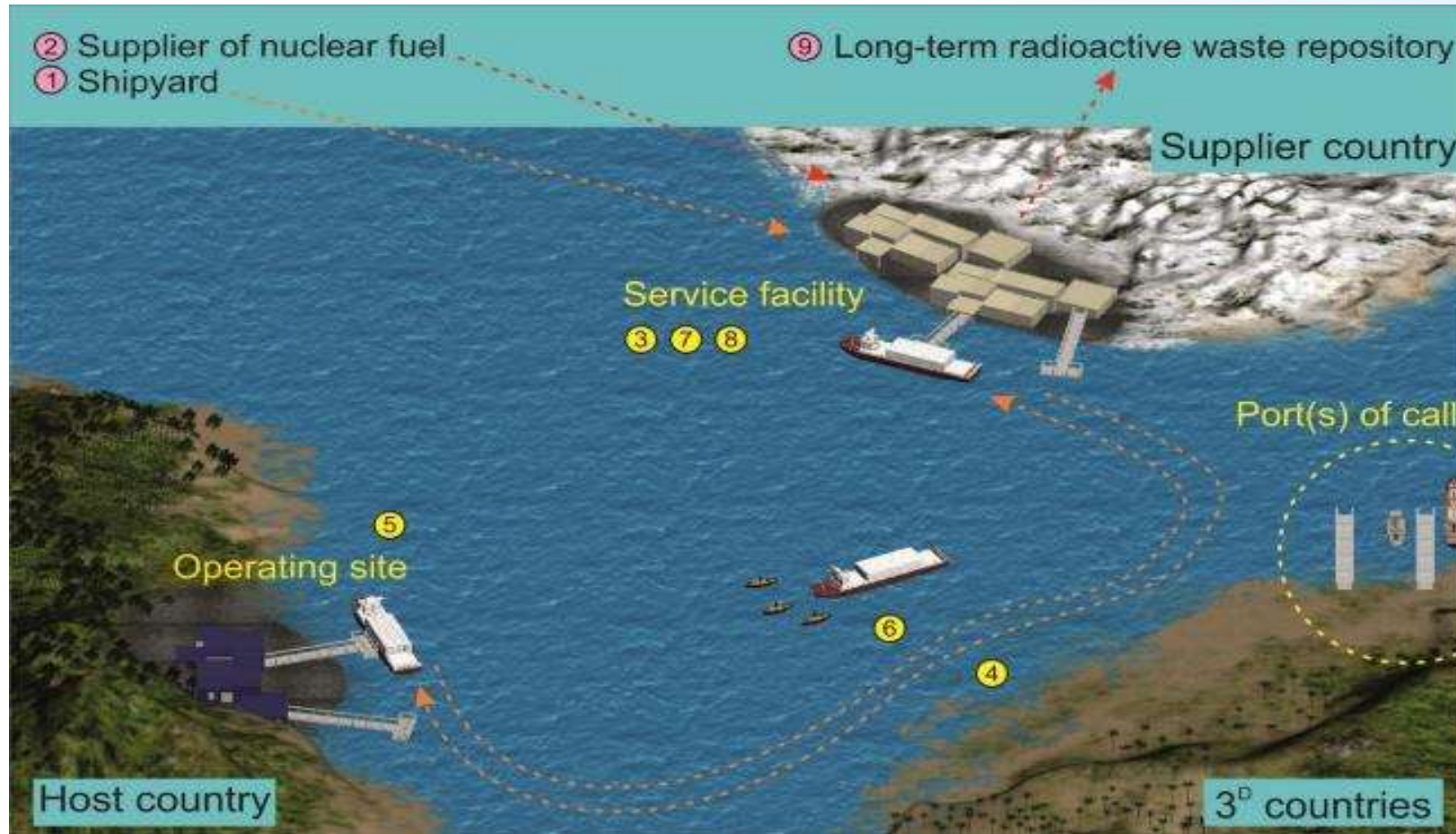
- The export of TNM (Transportable Nuclear Module) for deployment as TNPP (Transportable Nuclear Power Plant) may face specific issues in the international context related to the compliance:
  - Safeguards Agreements – IAEA and Regional
  - International legal norms
  - IAEA safety standards and security recommendations
- Three TNPP case studies deploying a transportable module as an integral part of a TNPP have been selected for analysis:
  - (1) a TNPP deploying a submersible TNPP
  - (2) a TNPP deploying a floating TNPP
  - (3) a TNPP deploying a land-based TNPP
- Focus on the issues with
  - Floating TNPP
  - Micro Modular Reactor (MMR)



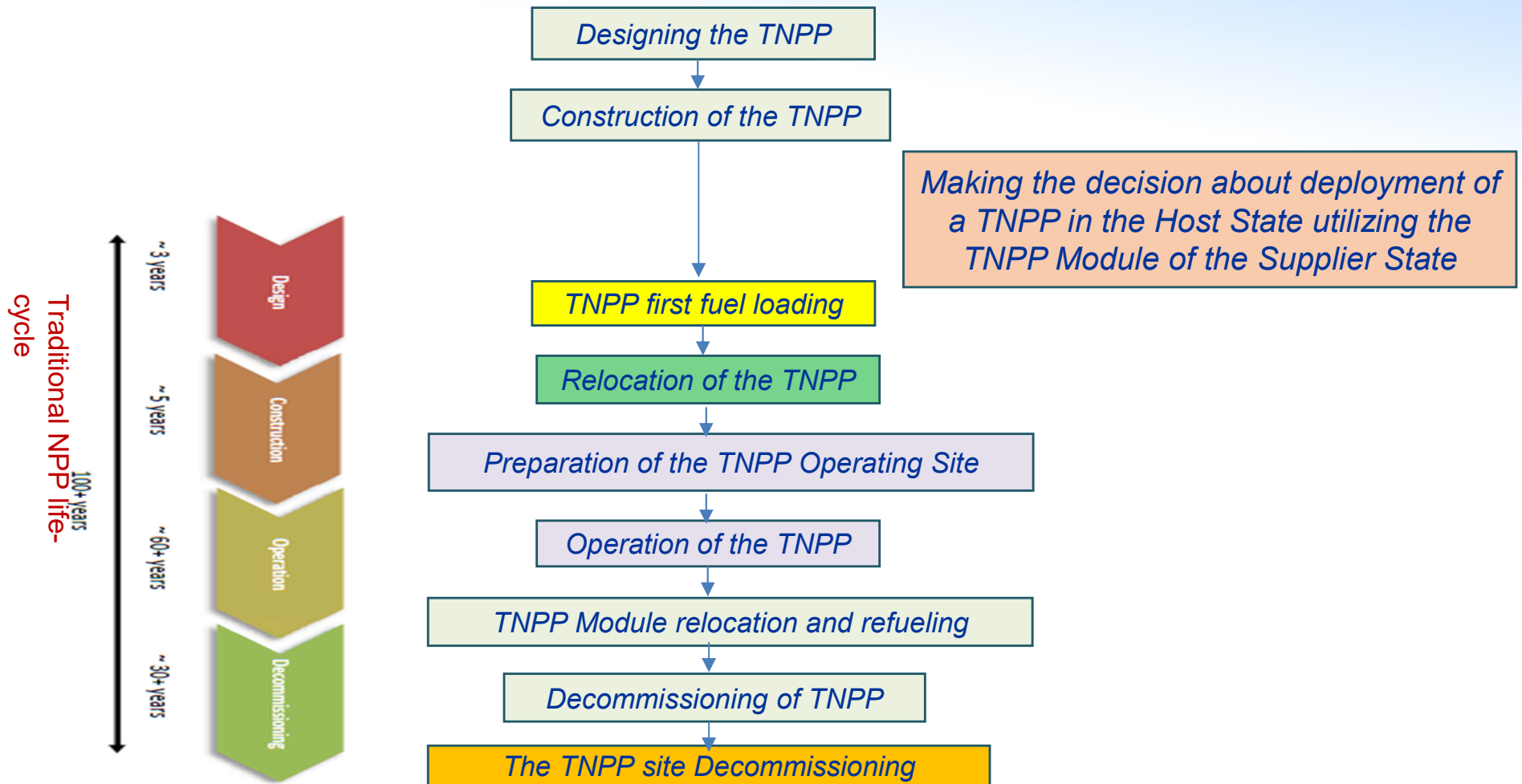


# Life-Cycle of Floating TNPP (Designs – Russia, ROK, Denmark, China, USA [1960s])

## Sea Transport – Sea Mooring for Operation



# TNPP life-cycle vs. NPP





# Thee TNPPs have these life cycle issues needing focus

- Special Issues relating to legislation
  - Maritime Law – supplier, host and transit (ports of call and international water)
  - Civil liability for nuclear damage – define supplier and host country responsibility
    - Transit and liability - Fresh Fuel and Spent Fuel experience vs. fueled reactor transport
- Nuclear Safety Issues – licensing and regulation of designs
  - Experience with water cooled reactors
  - Need to regulate FRs and MSR
- Special issues relating Safeguards – Multiple States and Transport Overseas
- Nuclear Security Considerations – regulate more or less than present NPPs?
- Licensing Process – Safety, security and safeguards concerns
- Staffing and Training – rules and regulations to fit multinational cooperation



# New INPRO Study: Legal and Institutional Issues of prospective deployment of Fusion facilities

- Expected frame of the Study (**started on 2022** followed by INPRO MSs recommendation):
  - Discussion on the long-term sustainability issues for prospective deployment of fusion based facilities with a focus on non-technical aspects (jointly with other IAEA Departments and Sections)
  - Consideration of INPRO methodology and approaches application for long-term sustainability assessment of innovative energy systems with fusion based facilities
  - Review of legal and institutional issues, factors, and challenges, then identify gaps considering the current international instruments and national nuclear legislation and regulations.
  - Identification of main drivers and impediments for fusion based facilities implementation



# Institutional innovations: effect on “Nuclear Power Landscape”





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*Thank you!*

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**INPRO**

*Enhancing global nuclear energy sustainability*

Some used slides prepared  
by IAEA for Seminar for  
diplomates

<https://www.iaea.org/services/key-programmes/international-project-on-innovative-nuclear-reactors-and-fuel-cycles-inpro>



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