Radiation Safety as an Object of Licensing of New Nuclear Units in the Czech Republic

Czech approach to licensing practice of new nuclear units from the regulatory perspective.

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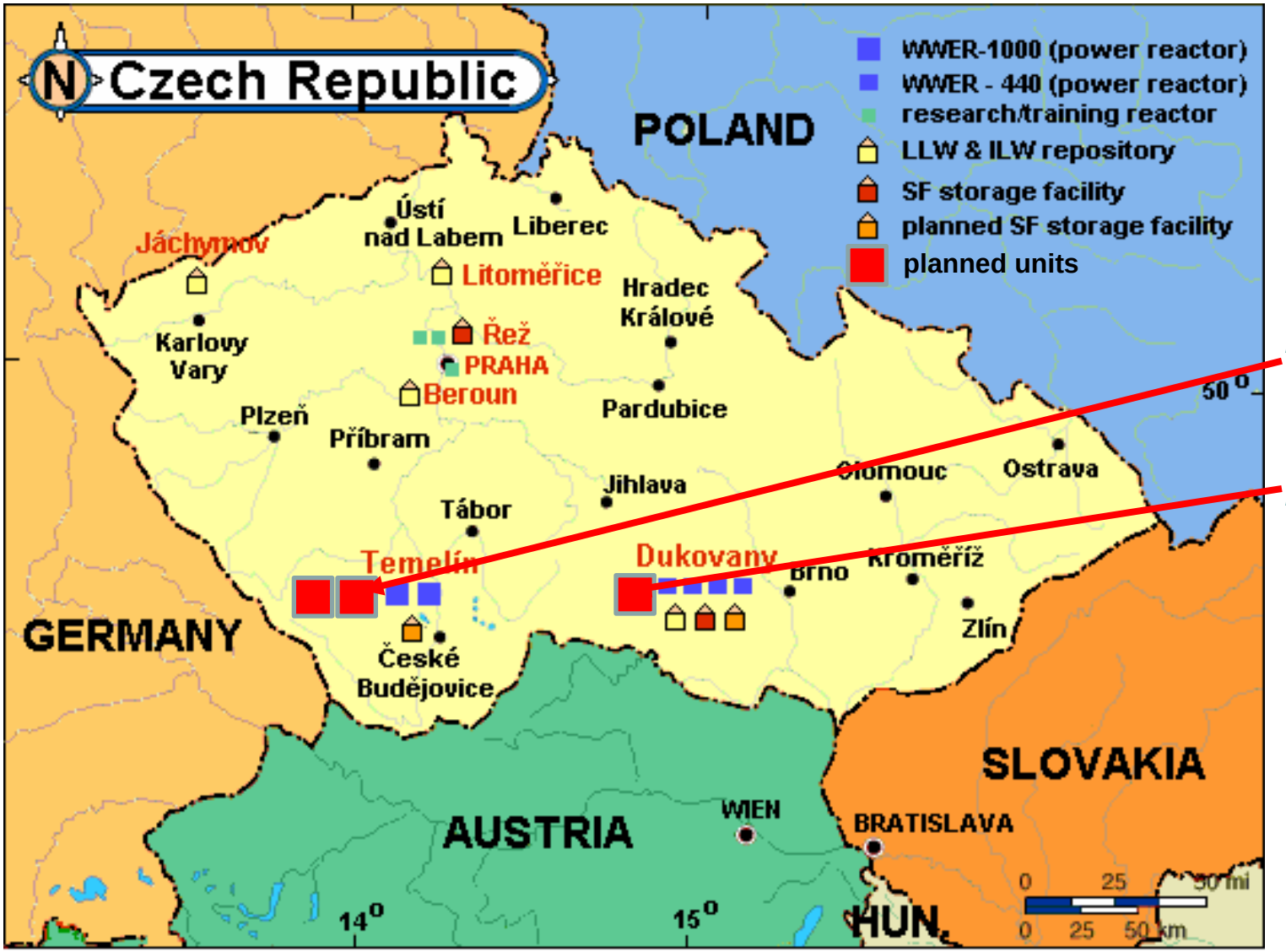
Introduction

Location of New Reactors



Invitation to tender

Intention

Czech approach to licensing practice of new nuclear units from the regulatory perspective

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- Regulatory framework for licensing process in the Czech Republic
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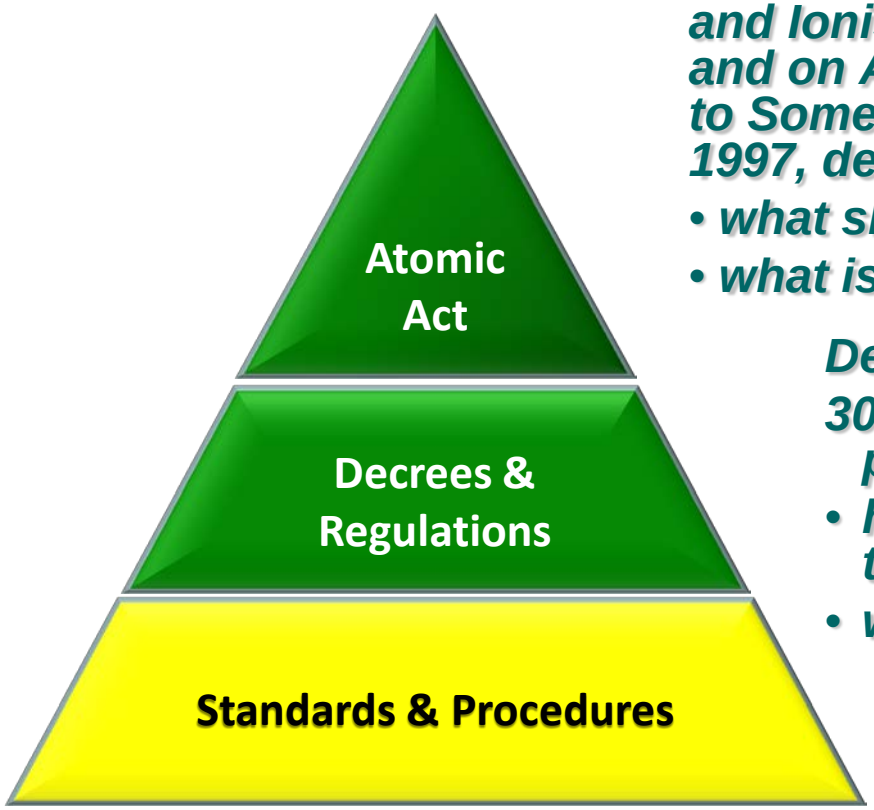
Czech legislation

in the field of licensing of new NPPs



Atomic Act:

Act No. 18/1997 Coll., as amended, on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act) and on Amendments and Alterations to Some Acts, Prague, 24 January 1997, determines:

- ***what should be regulated and***
- ***what is to be achieved.***

Decrees:

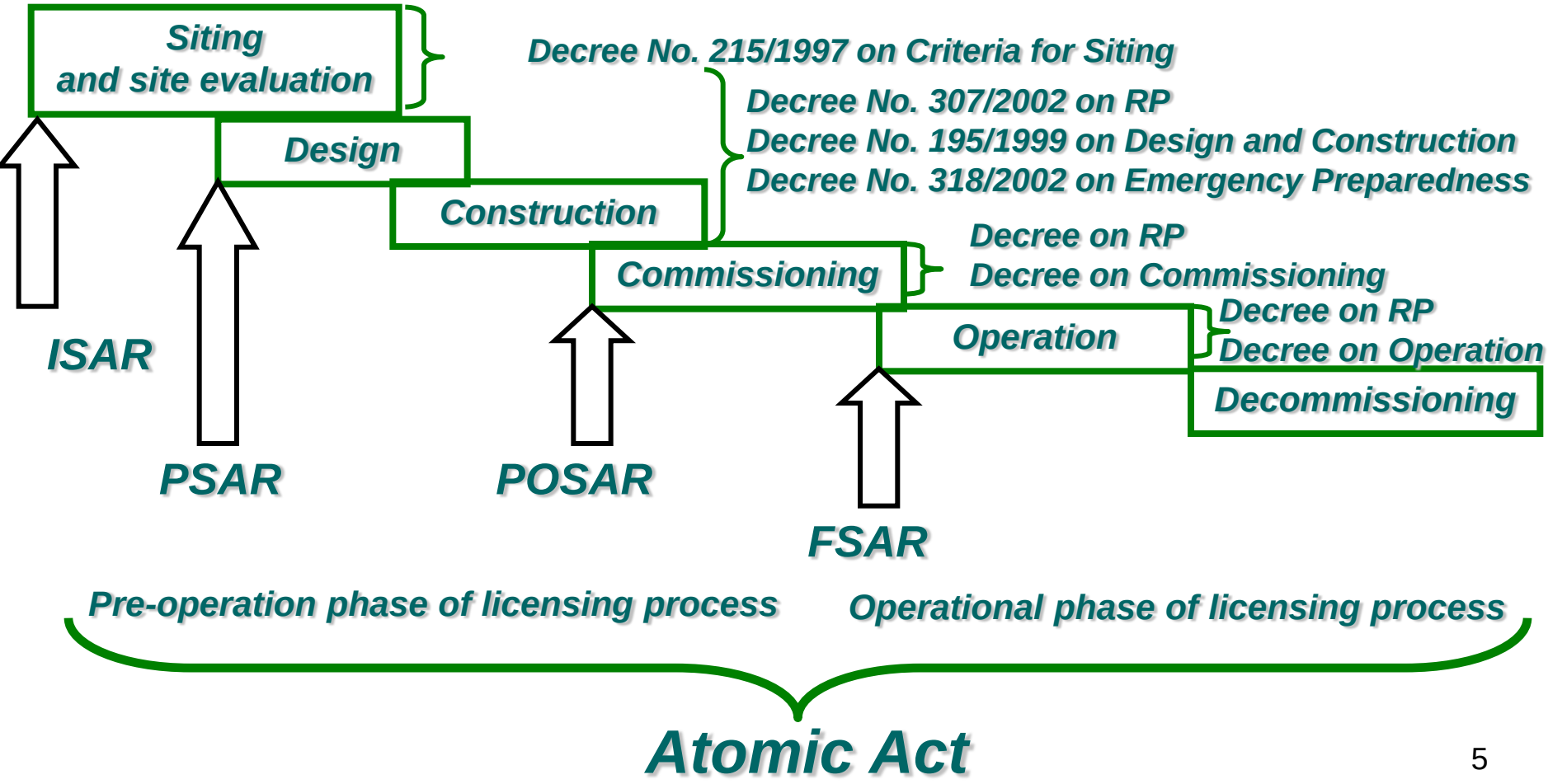
307/2002 Coll., on radiation protection, and others specify:

- ***how both the regulation and the control are carried out and***
- ***with what intensity.***

Czech industry standards ensure the implementation of the requirements of decrees.

Czech legislation

covers the licensing process as a whole



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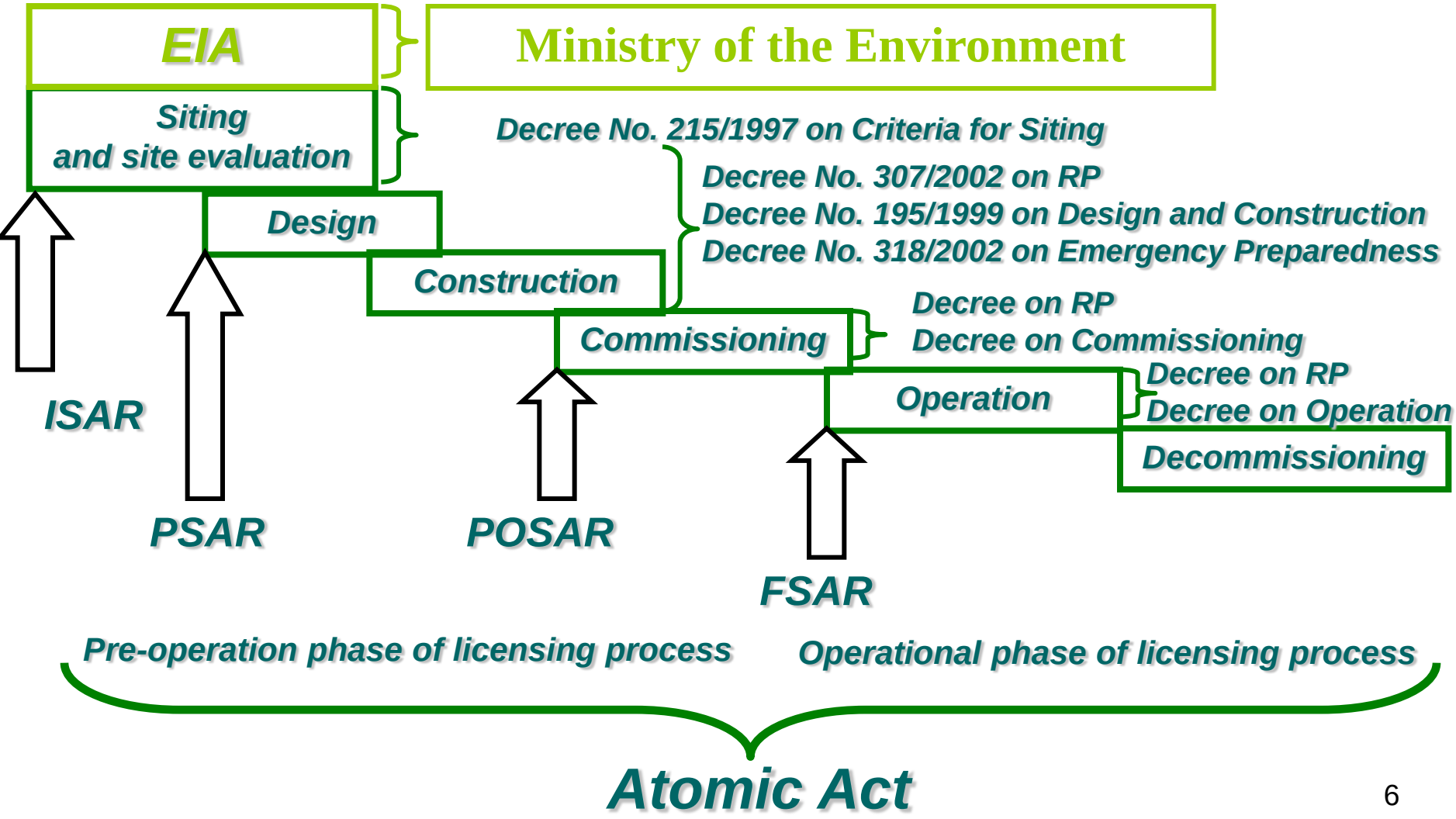

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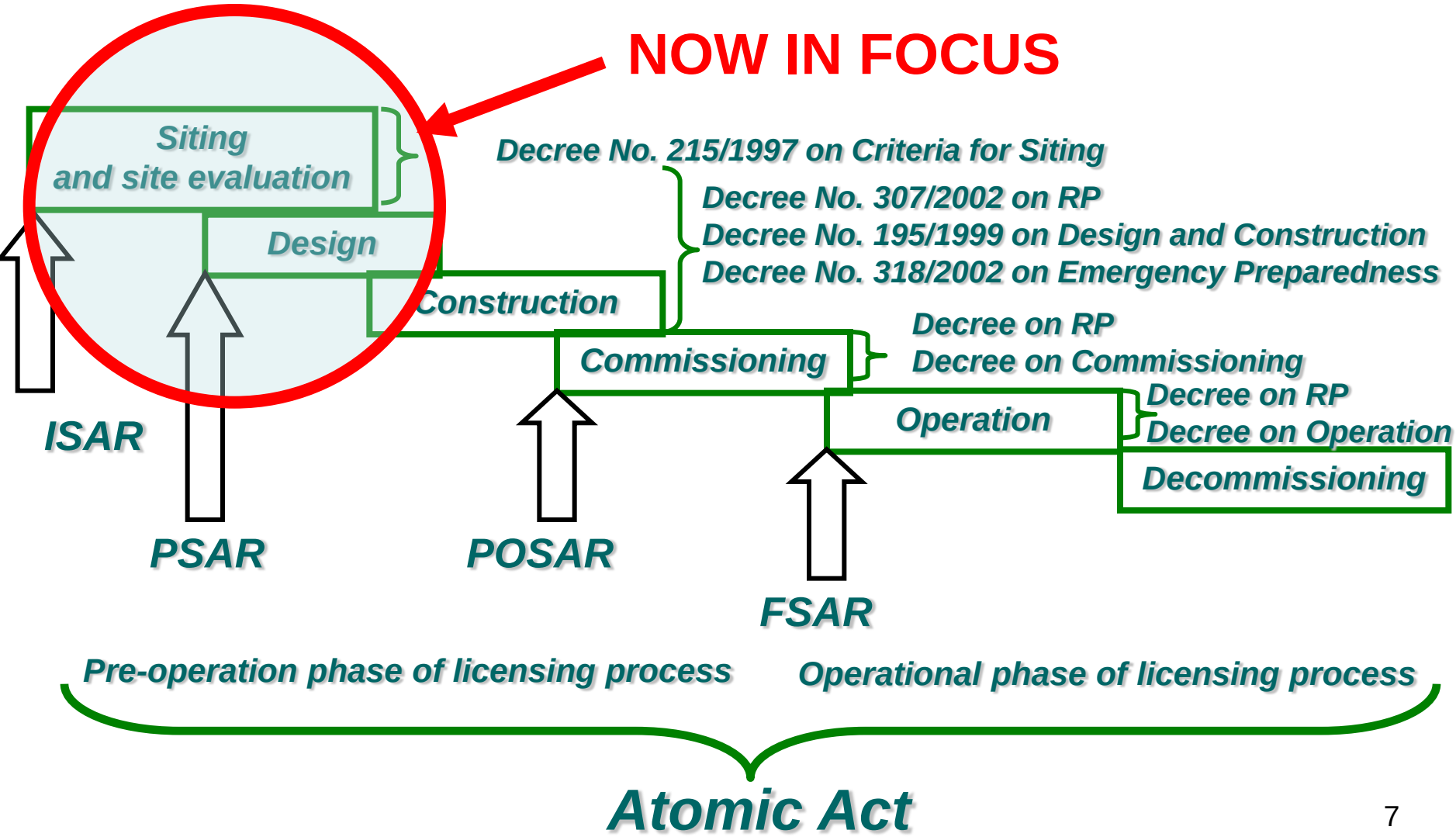
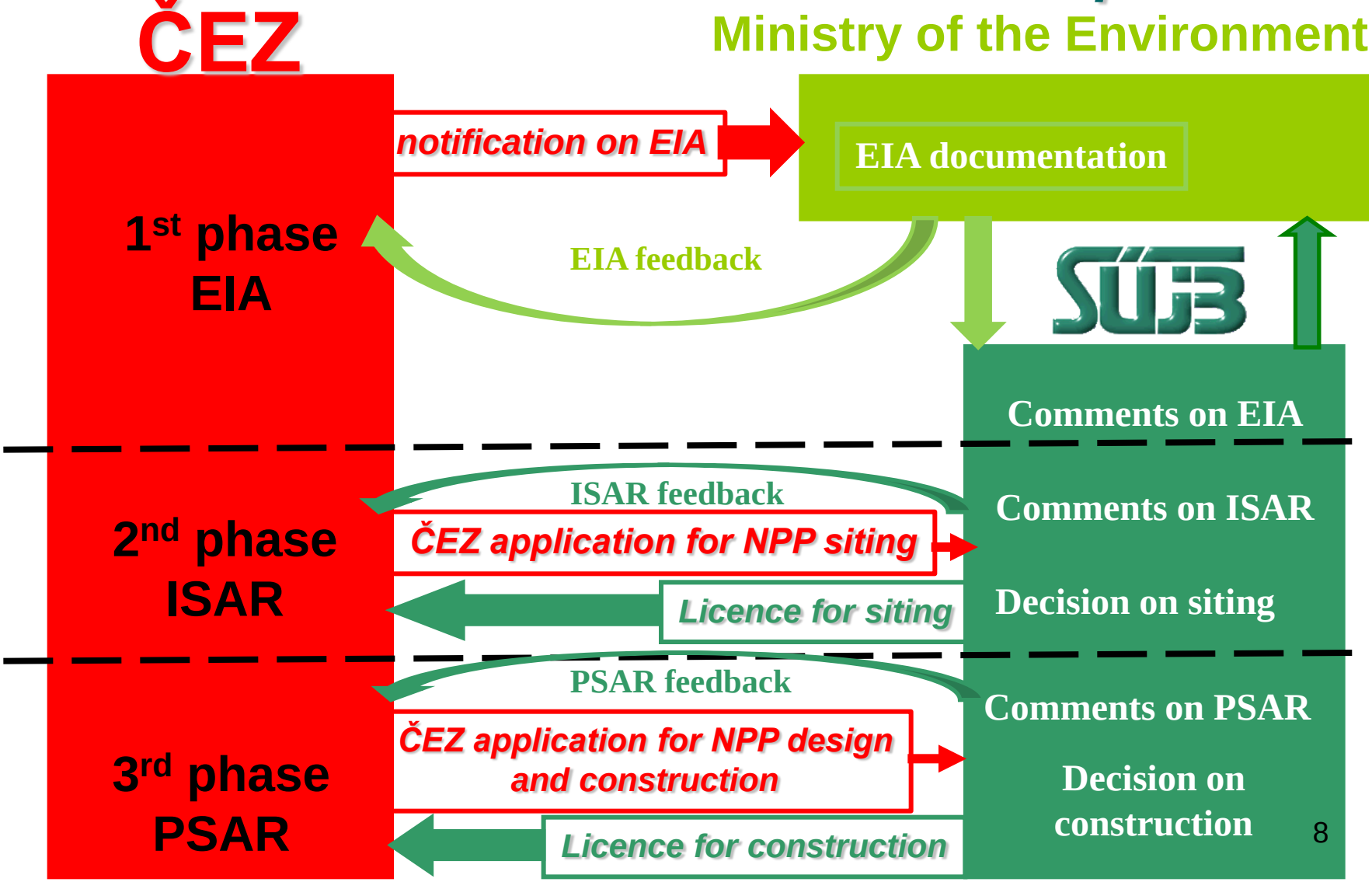


Licensing process

of New Nuclear Units in the Czech Republic



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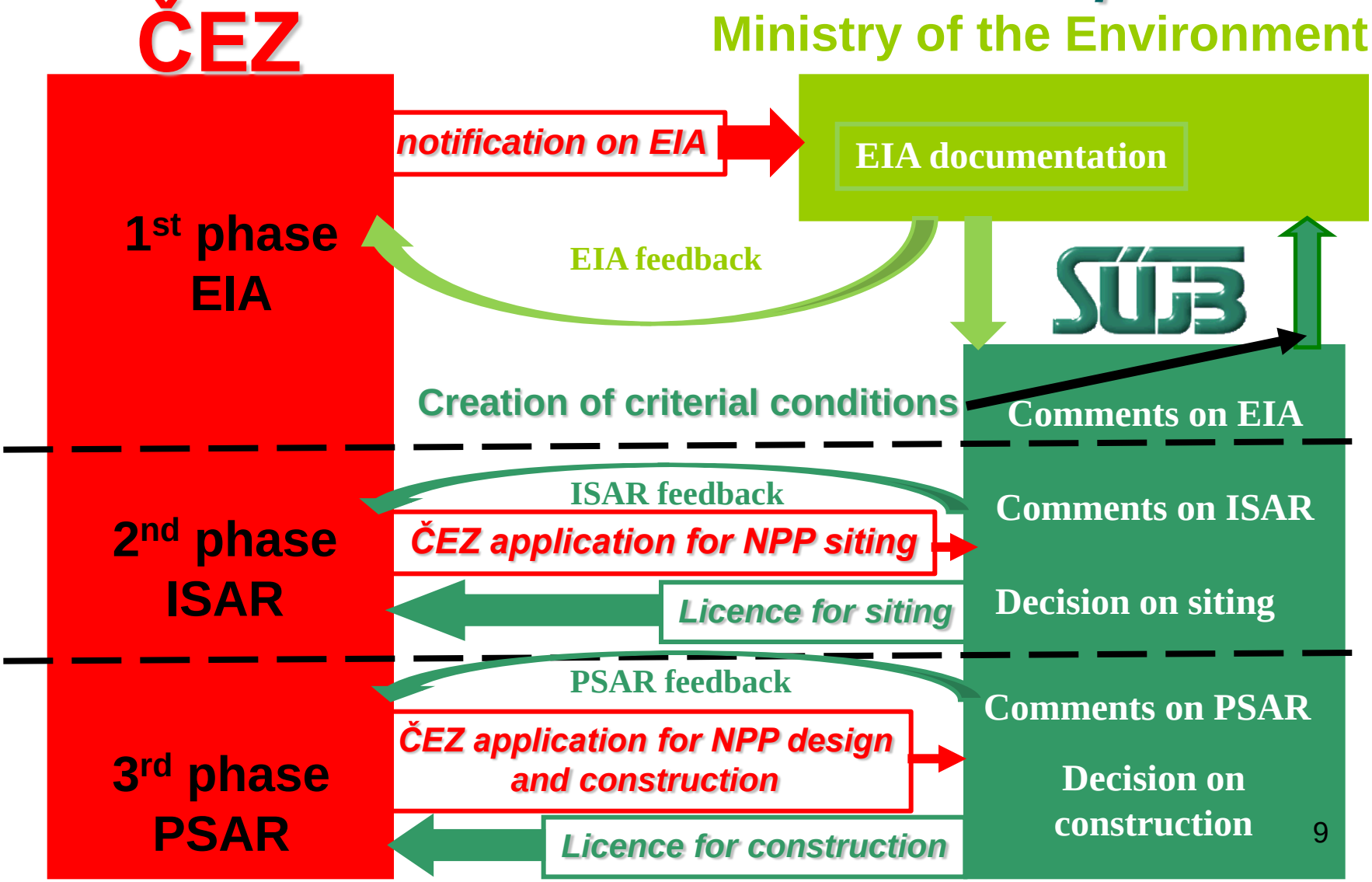


Licensing process

creation of criterial conditions

There is an essential issue to set up general criteria of radiation protection that must be fulfilled during the entire licensing process. Czech legislation is sufficient for the licensing process but must operate in an environment of international regulations. For SÚJB is the international legal environment the WENRA documentations as an organization of regulatory authorities. Documents IAEA are significant support for the Czech licensing process, as well.

Licensing process

WENRA and IAEA plant states

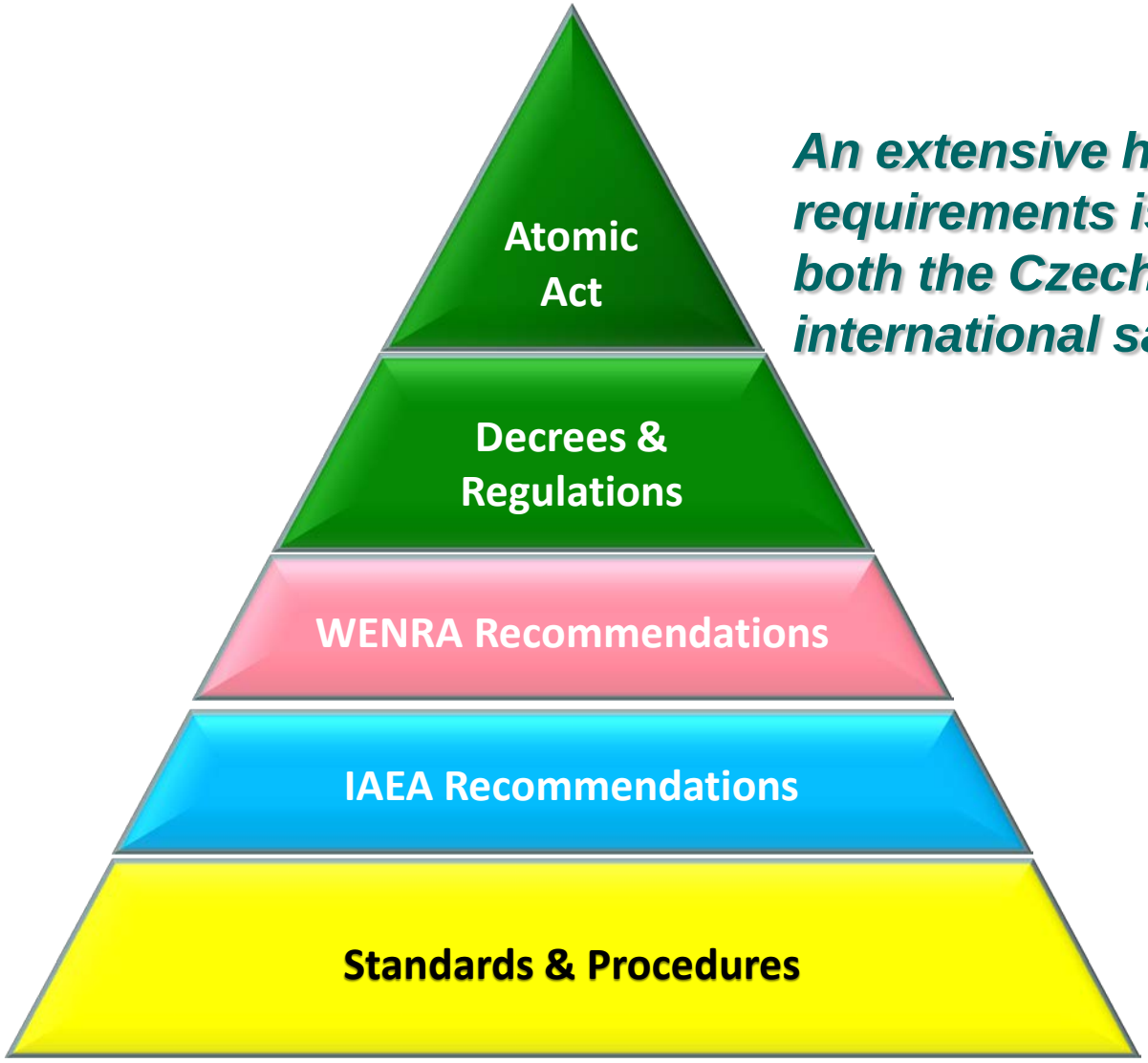
Operational states		Accident conditions			
		Within design basis accidents		Beyond design basis accidents	
Normal operation	Anticipated operational occurrences	a	Design basis accidents	b	Severe accidents
				Accident management	
Normal operation	Anticipated operational occurrences	Postulated single initiating events		Selected multiples failure events	Postulated core melt accidents (short and long term)

a *Accident conditions that are not design basis accidents as explicitly considered but which are encompassed by them.*

b *Beyond design basis accidents without significant core degradation.*

Licensing process

with WENRA and IAEA contributions to the Czech licensing process



An extensive hierarchical database of requirements is created on a bases of both the Czech legislation and international safety documentation.

Safety objectives of the WENRA

Important definitions from WENRA safety objectives:

- ***Long term**: considering the time over which the safety functions need to be maintained. It could be months or years, depending on the accident scenario.*
- ***Early releases**: situations that would require off-site emergency measures but with insufficient time to implement them.*
- ***Large releases**: situations that would require protective measures for the public that could not be limited in area or time.*
- ***No or only minor off-site radiological impact** means that the off-site radiological impact of accidents without fuel melt is less than the intervention levels for iodine prophylaxis, sheltering and evacuation.*
- ***Limited protective measures in area and time** means no permanent relocation, no long term restriction in food consumption, no need for emergency evacuation outside the immediate vicinity of the plant, limited sheltering.*

Radiological consequences in surroundings of the NPP depending on plant states

<table>
<tr><td colspan="2">Operational states</td><td colspan="4">Accident conditions</td></tr>
<tr><td colspan="2"></td><td colspan="2">Within design basis accidents</td><td colspan="2">Beyond design basis accidents</td></tr>
<tr><td>Normal operation
NO</td><td>Anticipated operational occurrences
AOO</td><td>Accident conditions that are not design basis accidents as explicitly considered but which are encompassed by them</td><td>Design basis accidents
DBA</td><td>Beyond design basis accidents without significant core degradation</td><td>Severe accidents</td></tr>
<tr><td colspan="3"></td><td colspan="3">Accident management</td></tr>
<tr><td>Normal operation
NO</td><td>Anticipated operational occurrences
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<tr><td colspan="2">Regulatory operating limits for discharge</td><td colspan="3">No off-site radiological impact or only minor radiological impact</td><td>Limited protective measures in area and time</td></tr>
</table>

Radiological consequences in surroundings of the NPP depending on plant states

Operational states		Accident conditions			
		Within design basis accidents		Beyond design basis accidents	
Normal operation NO	Anticipated operational occurrences AOO	Accident conditions that are not design basis accidents as explicitly considered but which are encompassed by them	Design basis accidents DBA	Beyond design basis accidents without significant core degradation	Severe accidents
				Accident management	
Normal operation NO	Anticipated operational occurrences AOO	Postulated single initiating events		Selected multiples failure events	Postulated core melt accidents (short and long term)
Regulatory operating limits for discharge		No off-site radiological impact or only minor radiological impact			Limited protective measures in area and time

Planned exposure situations

Emergency exposure situations

Unacceptable exp. situations

Radiological consequences in surroundings of the NPP depending on distance from NPP under conditions of severe accident at the NPP

Measure	WENRA: Evacuation zone (suggested < 3 km) Temelin NPP: Protection zone actually ≤ 3 km	WENRA: Sheltering zone (suggested < 20 km) Temelin NPP: Emergency planning zone actually ≤ 13 km	WENRA: Beyond Temelin NPP: actually > 13 km
Permanent relocation	**No**	**No**	**No**
Evacuation	**Yes**	**No**	**No**
Sheltering	**Yes**	**Yes**	**No**
Iodine prophylaxis	**Yes**	**Yes**	**No**
Agricultural product restrictions	**Yes (τ > 1 year)**	**Yes (τ < 1 year)**	**No**
Natural product restrictions	**Yes (τ > 1 year)**	**Yes (τ > 1 year)**	**Yes (τ > 1 year)**

Regulatory framework for licensing process:
SÚJB Feedback to the Ministry of the Environment

SÚJB general criteria for new nuclear units addressed to the EIA

- ***1st criterion***

Authorized limits for discharges of radionuclides into the environment must not be exceeded during plant states normal operation and anticipated operational occurrences. Dose constraints relating to exposure from discharges from all operated nuclear units at a site must not be exceeded for a representative person from the public and for a given year.

- ***2nd criterion***

Accidents without core melt must not induce any releases of radionuclides requiring the introduction of countermeasures such as sheltering, iodine prophylaxis nor evacuation of the public anywhere in surroundings of the NPP.

- ***3rd criterion***

For postulated core melt accidents design provisions have to be taken so that the evacuation of population is not needed and has to be introduced no long-term reduction in food consumption in the immediate vicinity. Core melt accidents which would lead to early or large releases have to be practically eliminated.

Conclusions

The SÚJB has started its licensing process for new projected nuclear units. It was found out, as follows:

- ***The Czech legislation is sufficient for that process with a support of several international documents;***
- ***Both the WENRA and IAEA documentation seems to be very useful in the field of licensing radiation protection of new projected nuclear units;***
- ***Legislative framework has been set in the licensing process as a combination of the Czech legislation and WENRA and IAEA safety requirements.***

Thank you for your attention.