Autoriteit Nucleaire Veiligheid en Stralingsbescherming

Regulating SMRs and more in the Netherlands

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Authority for Nuclear Safety and Radiation Protection (ANVS)

The Netherlands 10-06-2026

Nuclear Innovation Conference

Licensing of Nuclear Installations

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Introduction ANVS

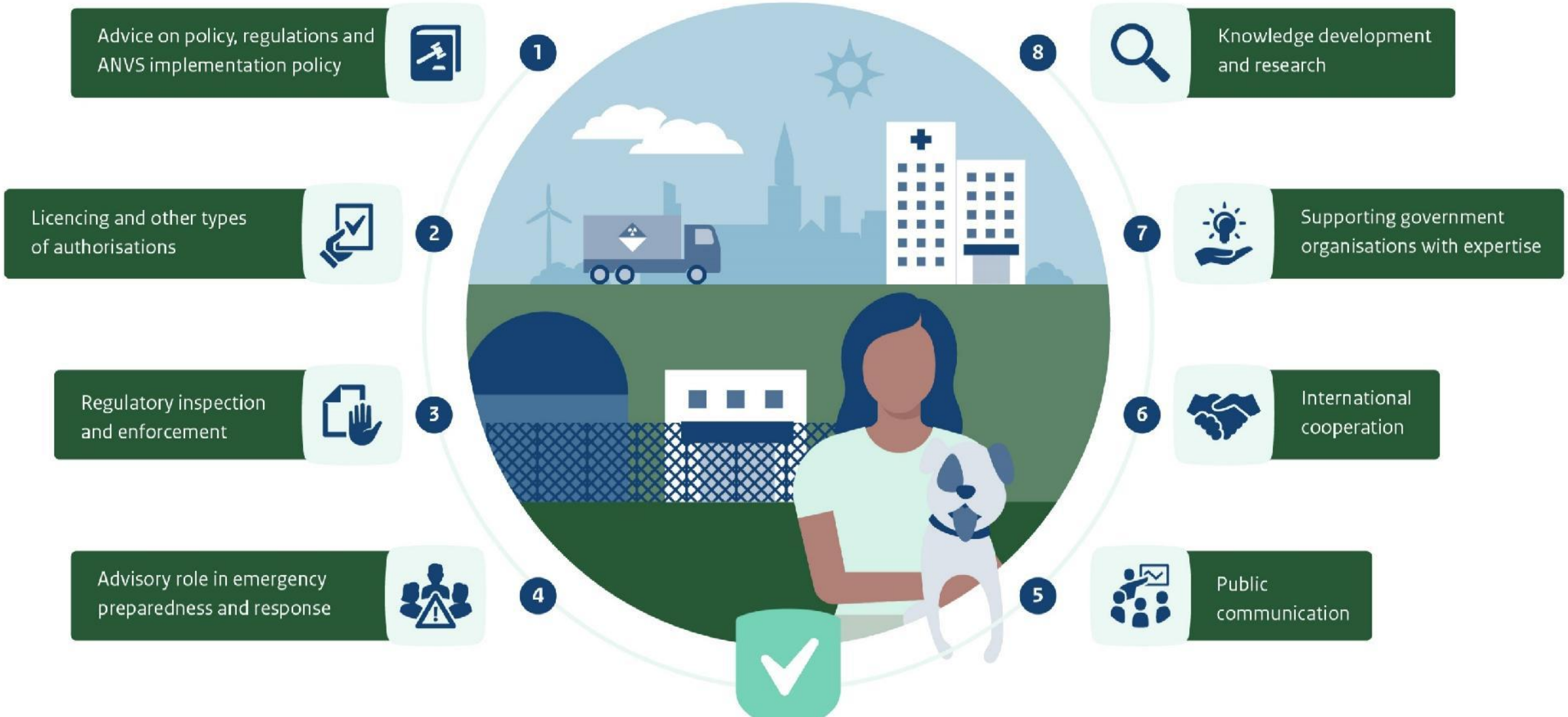
We safeguard the following for present and future generations:

- Nuclear safety
- Radiation protection
- Security

Responsibilities ANVS

Independent Nuclear Regulator

~ 240 employees, supported by TSO



International cooperation

International treaties

- Euratom treaty
- Joint Convention Radioactive Waste (IAEA)
- Convention on Nuclear Safety (IAEA)

EU Directives

- EU Nuclear Safety Directive
- Basic Safety Standards Directive
- Radioactive Waste and Spent Fuel Management

Review Meetings, working parties and missions

- Review meetings IAEA, Convention on Nuclear Safety and JC
- Joint Convention review meeting
- Working parties ENSREG, WENRA, HERCA, NEA
- Missions IRRS, IPPAS, ARTEMIS, TPR

Bilateral relationships

- Ongoing cooperation with neighbouring countries (FANC, BMUV)
- Targeted reinforcement of cooperation with regulators (e.g. Finland, France, US)

Current nuclear landscape

1. High Flux Reactor and other facilities in Petten
2. PALLAS for medical isotopes (under construction)
3. Higher Education Reactor in Delft
4. Borssele Nuclear Power Plant
5. Central Organisation for Radioactive Waste in Nieuwdorp
6. Dodewaard Nuclear Power Plant (in safe enclosure)
7. URENCO (enrichment) in Almelo

Long term operation NPP Borssele

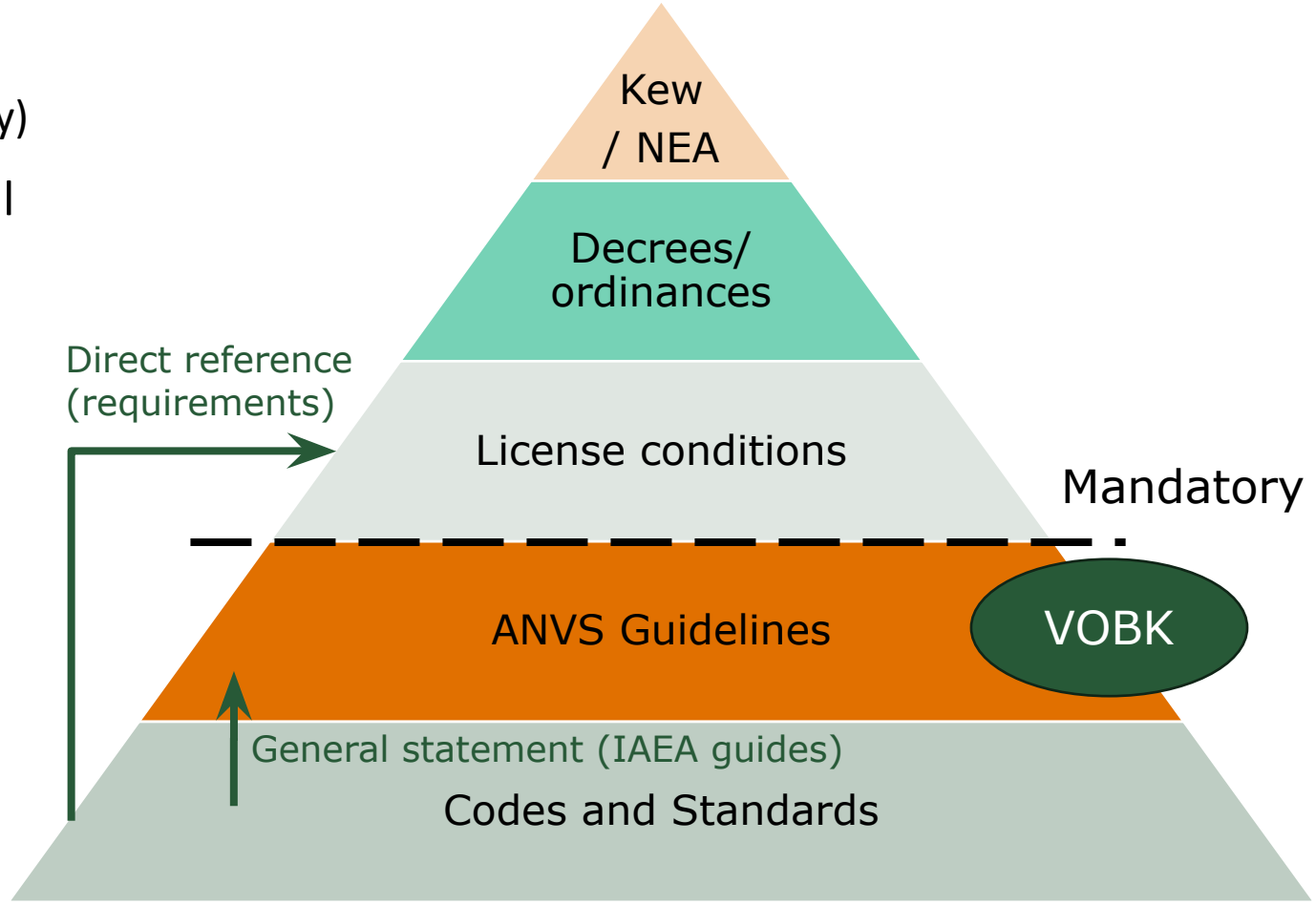
- NPP Borssele is second oldest NPP in Europe
- One of the earliest NPP’s working on its second LTO project (in Europe)
- Needs an amendment to nuclear energy act
- Then a license application (foreseen in 2027)
- Review & Assessment of safety case in the coming year

Pallas

- First draft of safety documentation: March 2020
- License application: June 2022
- License to construct: February 2023
- Pit and foundation finished: June 2024
- First newbuild reactor in the Netherlands in 50 years.
- New set of safety requirements (VOBK) drafted and applied.
- First major project of ANVS as independent Regulatory body.
- Pallas as a ‘pilot’ project

The regulatory framework

- Nuclear Energy Act (Kew) sets the frame (most prominent law, other laws do also apply)
- Governmental Decrees contain additional regulation, as well as the subordinate Ministerial Decrees or ordinances
- Further Conditions specified in License, including IAEA requirements for safely operating a nuclear installation
- ANVS Guidelines, e.g. VOBK/DSR, based on IAEA requirements
- Various industrial codes and standards may be part of the licensing base



Guidance on Safe Design and Operation of Nuclear Installations (VOBK)

- The Nuclear Energy Act (Dutch: Kew) and underlying legislation is **goal-oriented**,
  - Achieving the result is obligatory.
  - Means of achieving left to operator: freedom, but also need for guidance
- VOBK describes assessment framework in a license application for a nuclear installation
- VOBK gives further clarification and interpretation on subjects in nuclear safety in the context of the Dutch nuclear legal framework as set out in
  - Nuclear energy act,
  - Governmental decree on nuclear installations, fissile materials and ores and the
  - Ministerial decree on nuclear safety for nuclear installations (implementation Euratom directive).

Important safety requirements

- Formal legal framework is goal oriented and very limited in level of detail.
- 2014/87/EURATOM (implemented in ‘regeling nucleaire veiligheid’)
  - Principle of defence in depth
  - Practical elimination of early and large releases
- Nuclear facilities, ores and fissile materials decree:
  - Dose limits for anticipated operational occurrences->
  - Individual risk < 10^{-6} per year.
  - Group risk < 10^{-5} per year for 10 direct fatalities
    (Or n^2 times smaller for n times direct fatalities)

Frequence	Allowed effective dose	
	Adults	Children
$F \geq 10^{-1}$	0,1 mSv	0,04 mSv
$10^{-1} > F \geq 10^{-2}$	1 mSv	0,4 mSv
$10^{-2} > F \geq 10^{-4}$	10 mSv	4 mSv
$F < 10^{-4}$	100 mSv	40 mSv

Interlude

Lessons learned:

- Goal oriented framework
- Harmonizing technical guidelines with IAEA
- Increased workforce
- Experience and expectations
- Things are happening now, not just over the horizon
- Siting, designing and building up an organization is critical for licensees
- Licensing of a Research Reactor, SMR or Large sized NPP is not different.

Safety requirements – Rework of VOBK in 2025

- Coupling of Dutch legal obligations to international practices
- More focus on direct reference to IAEA Safety Requirements
- Complemented by an ANVS-guide on the use of IAEA Guides
- Informed by WENRA but no direct reference to specific SRLs
- Some clarification/ANVS interpretation on IAEA requirements
- Product of in-depth discussions with neighbouring countries

VOBK 2025 – direct reference to IAEA

- Description how nuclear safety is assessed in license applications & periodic safety reviews
- ANVS policy rule defines guideline VOBK as assessment framework
- New revision: December 2025
- Direct reference to IAEA standards
- Technology neutral

2.2 IAEA Safety Requirements & Security Recommendations

The ANVS expects the IAEA requirements to be implemented as follows:

2.2 (1) Site evaluations for nuclear installations shall be performed according to the requirements in IAEA SSR-1 [5].

2.2 (2) Design and operation of nuclear power plants shall be performed according to the requirements in SSR-2/1 (Rev. 1) [6] and SSR-2/2 (Rev. 1) [7].

ANVS-Specific Requirements

- Interpretation on certain IAEA requirements where the IAEA leaves room for national interpretations;
- Implementation of WENRA Safety Reference Levels where these go beyond the IAEA Safety Standards;
- Specification on how the Dutch regulatory framework relates to IAEA requirements or definitions.
- Example:

3.9 (3) When a probabilistic argument is used to support the justification[19] of practical elimination, extremely unlikely shall be considered to be less than 10^{-6} /y with a target value[20] of 10^{-7} /y for the sum of the frequencies of all events leading to large or early releases.

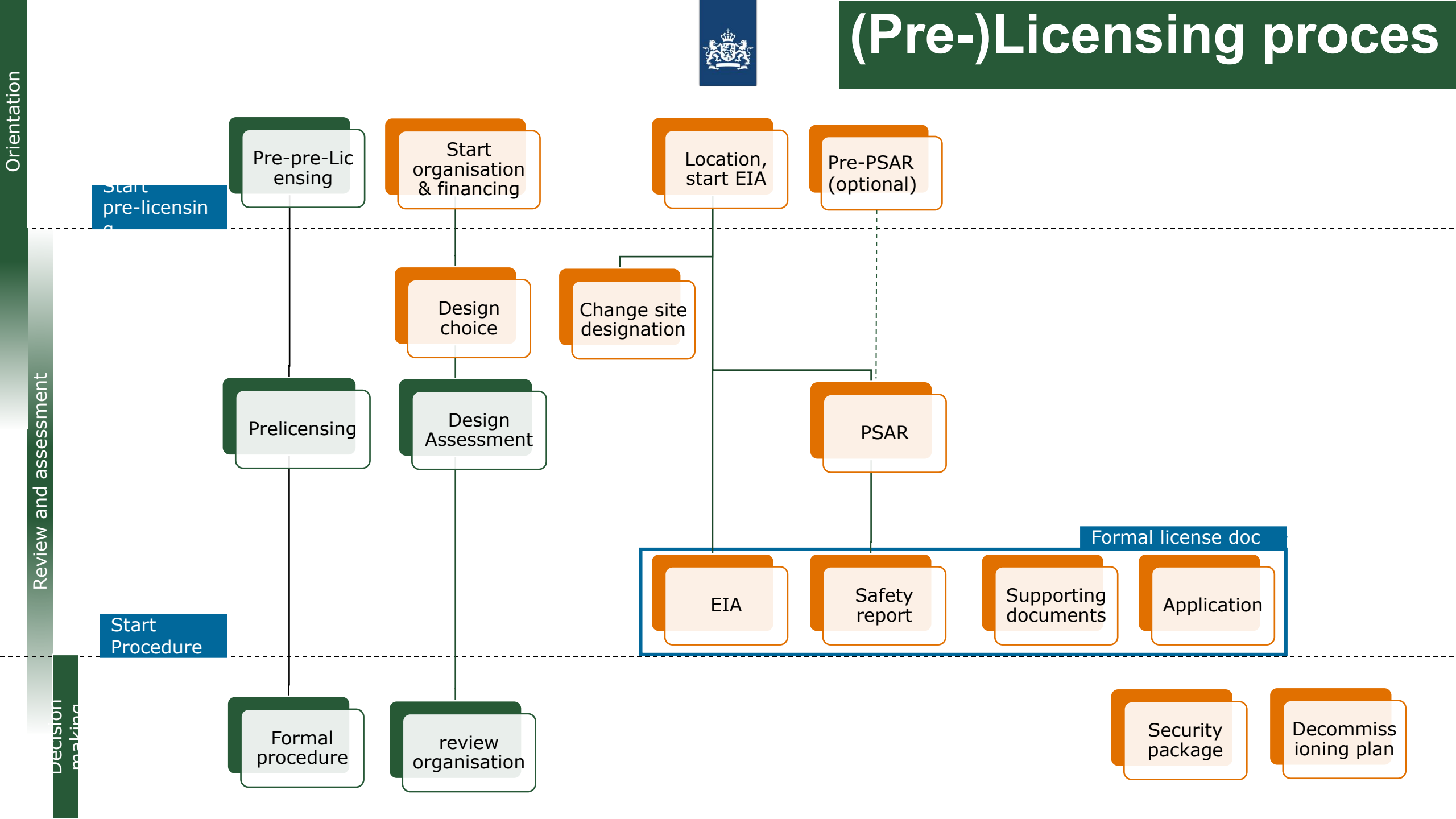
19 Examples of justification are probabilistic or deterministic arguments, engineering judgement, the complexity of the SSC, robust maintenance and/or testing, or a cost-benefit analysis.

20 When reaching the 'target value' the ANVS will not require additional measures to improve this value.

Licensing procedure

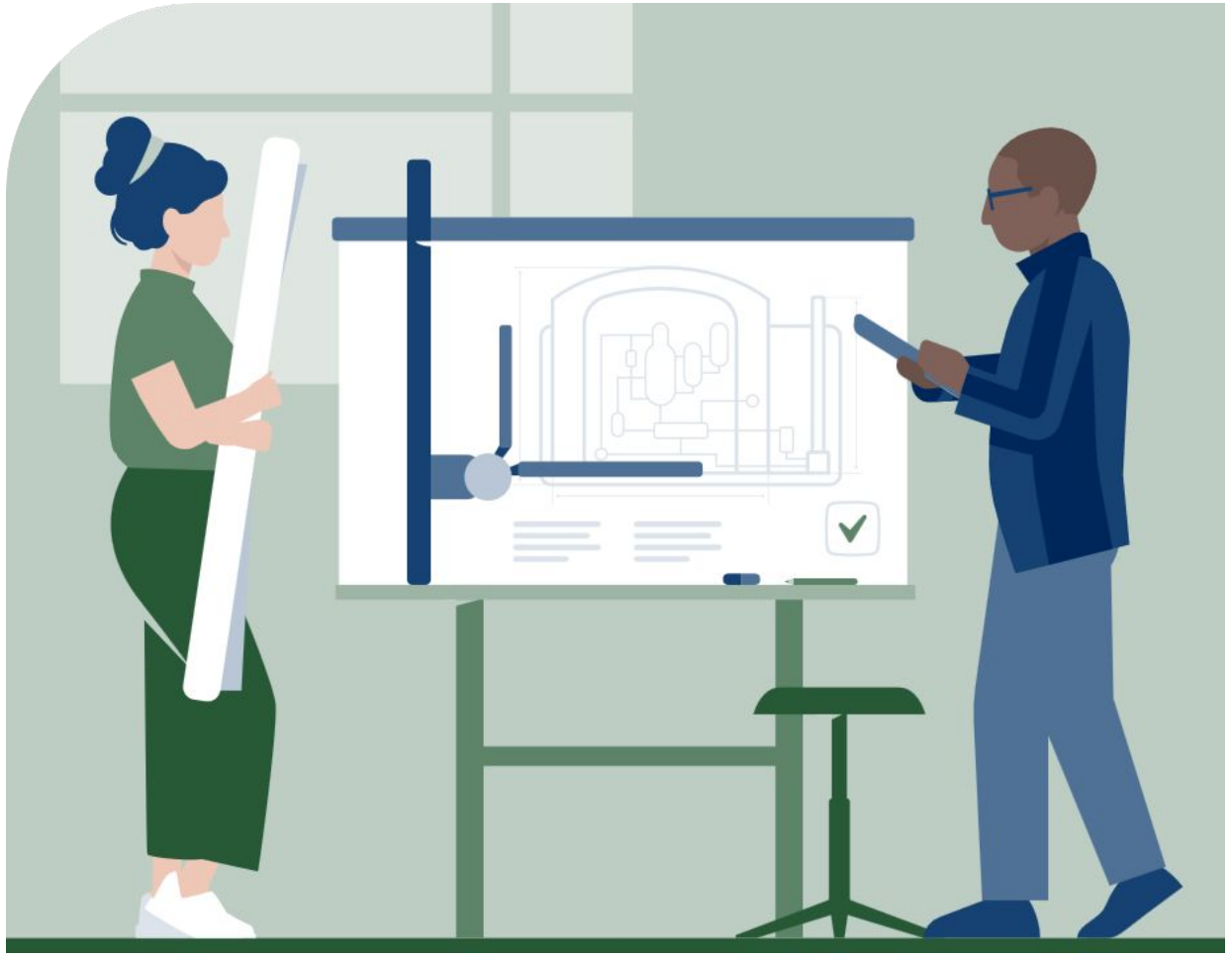
- No design assessment or site permitting.
- ANVS license verifies that a specific design on that specific location is safe and complies with the regulation.
- Includes environmental safety
- Decides on license application
- Parallel trajectories on Security of facility.

(Pre-)Licensing proces



Prelicensing

- Only starts when there is a design, location and organization.
- In depth review and assessment of the safety of the installation at the foreseen location.
- Needs detailed safety analyses and report (PSAR).



Formal Procedure

Preparation and technical discussions (Pre-licensing phase)

Unrestricted period

Pre-licensing takes multiple years

Application of License and EIA
Start Formal Licensing procedure

Concept decision from ANVS

Consultation of concept decision by the ANVS

6 week period

Final decision by ANVS

6 months period

Publication by ANVS and possibility for legal appeal.

6 week period

Environmental Impact Assessment (EIA)

Why is an EIA required?

- To ensure the environment receives full consideration in decisions on licence application

What does an EIA describe?

- Impact on the environment
- Alternatives

Who conducts the EIA?

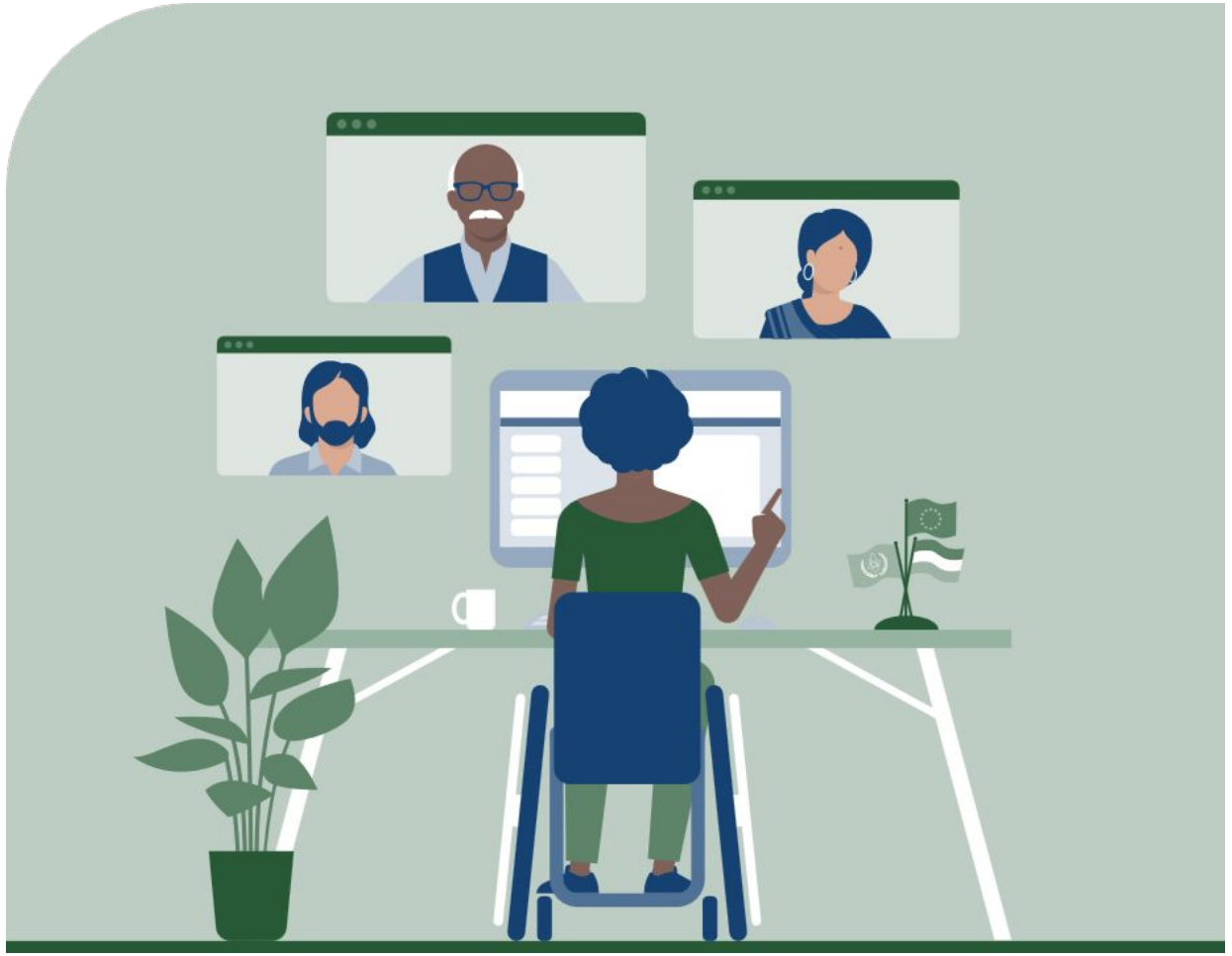
- The applicant

What do you need to get your SMR licensed by the ANVS?

- A location with the relevant site investigation.
- A mature design of your installation.
- An organisation that is capable of ‘owning’ the details of their project.
- A robust safety case

What is not our job

- Site selection and spatial planning decision making.
- Designing your SMR for you
- Water and environmental permitting
- Creating public acceptance.



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