The Netherlands' Future Energy Landscape

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NL Nuclear Energy now

SANE research and your risk perception

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Objective of WP4 (RISCOM)

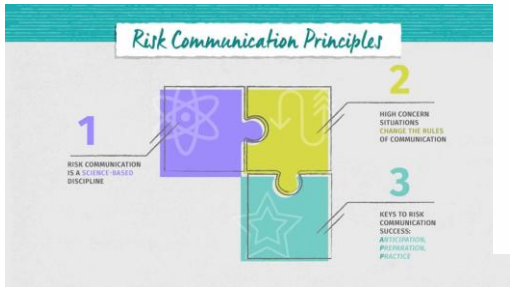
The general objective of the WP4 (RISCOM) is exploring and identifying the ways to improve communication of risk arising from the operation of NPP and in peculiar of SMR for heat production.

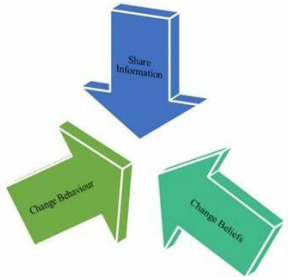
Goal of WP4.2: The task 4.2 aims at collecting information about the public acceptance in case of deployment of novel nuclear technologies. With this goal the following sub-tasks are foreseen:

1. Literature review, best practices, and recommendations;
2. Workshops with stakeholder groups in Finland and the Netherlands;
3. Connection and application of SMR risk assessments in supporting risk communication of national authorities, cities, and energy companies;
4. Comparison of nuclear industry risk with other risks from other industries and the use of comparison results in risk communication;
5. Definition of risk assessment objectives for WP2 to support risk communications

Having this in mind, literature study, interviews, and workshops, comparative case studies of qualitative level; Best practices and recommendations





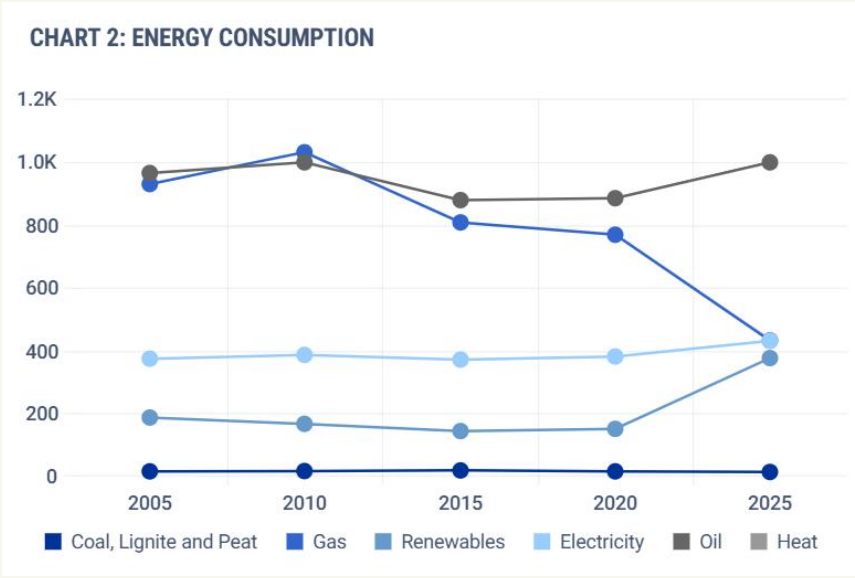


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[Country Nuclear Power Profiles]

Why the Renewed Interest in Nuclear Energy ?

Paris climate goals require **rapid decarbonisation**, transforming the energy system by mid-century.

Climate ambition

Net-zero pathways require deep decarbonisation of the energy system.

Rapid growth of renewables

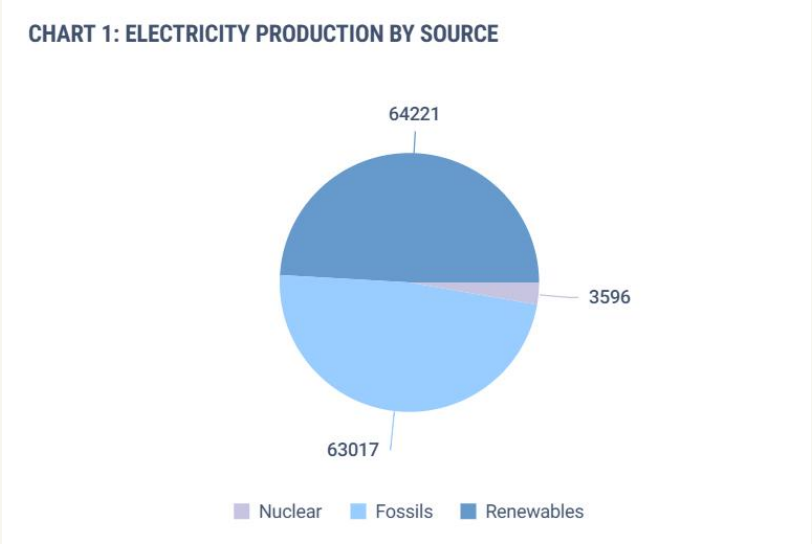
Wind and solar are transforming the electricity mix, but fossil generation remains significant.

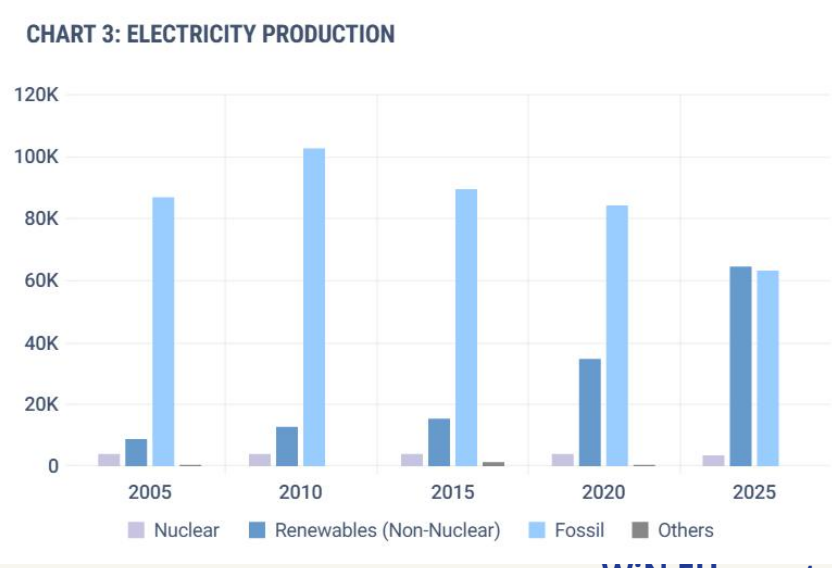
Growing system needs

Electrification and security of supply require sufficient, reliable and diversified generation capacity.

A complementary role for nuclear

Nuclear can provide reliable, low-carbon energy source alongside an expanding renewable energy system



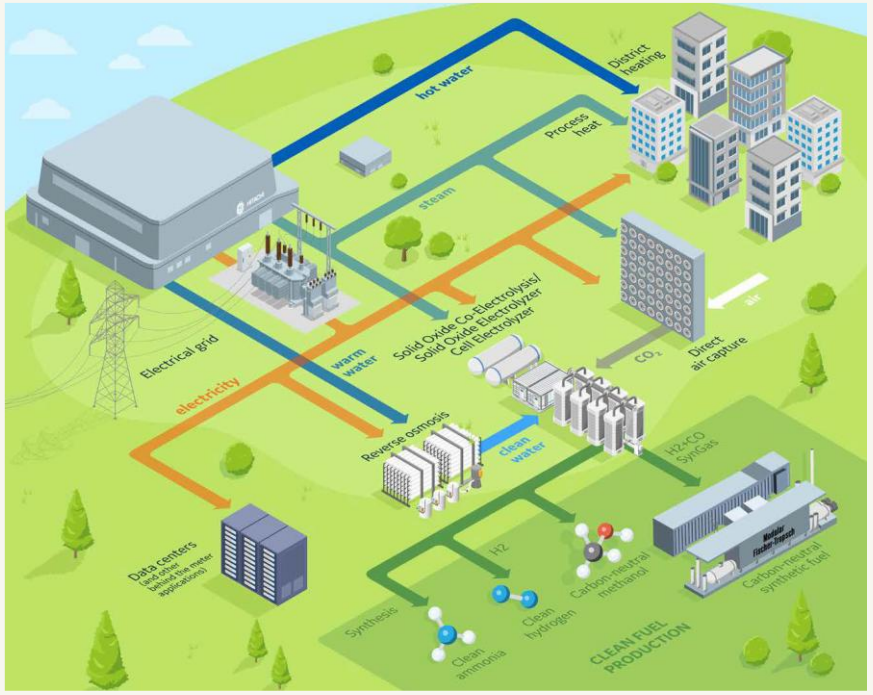


Country Nuclear Power Profiles

Why the Renewed Interest in Nuclear Energy ?

Nuclear energy can strengthen a reliable, low-carbon energy system by providing both electricity and heat.

- **Electricity**
  Reliable, low-carbon power for the electricity system.
- **Heat**
  Nuclear heat can support **industrial processes, district heating, desalination and hydrogen production**.
- **Cogeneration: electricity + heat**
  Producing electricity and useful heat from the same nuclear facility can **increase overall energy utilisation and broaden the services provided by the plant**.
- **Industrial decarbonisation**
  Nuclear cogeneration can support energy-intensive industries requiring both electricity and process heat, particularly where fossil fuels are currently used to provide industrial heat.



Nuclear energy is therefore not only a source of electricity, but a platform for delivering low-carbon power, heat and energy products.

NL Nuclear future

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The Netherlands is now scaling up its nuclear ambitions



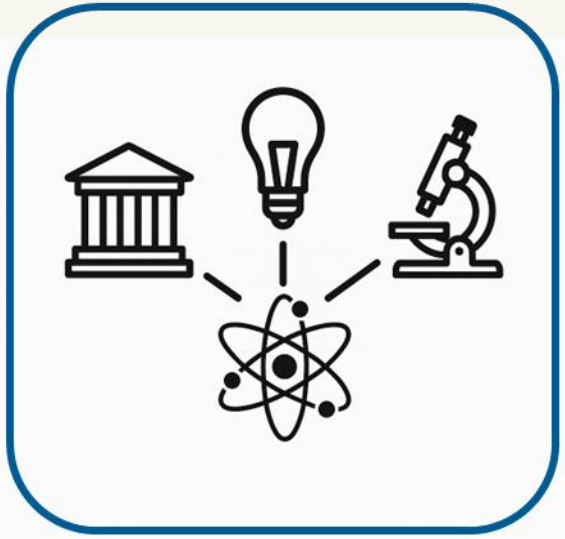
EPZ LTO



Build New NPPs



Explore the SMR

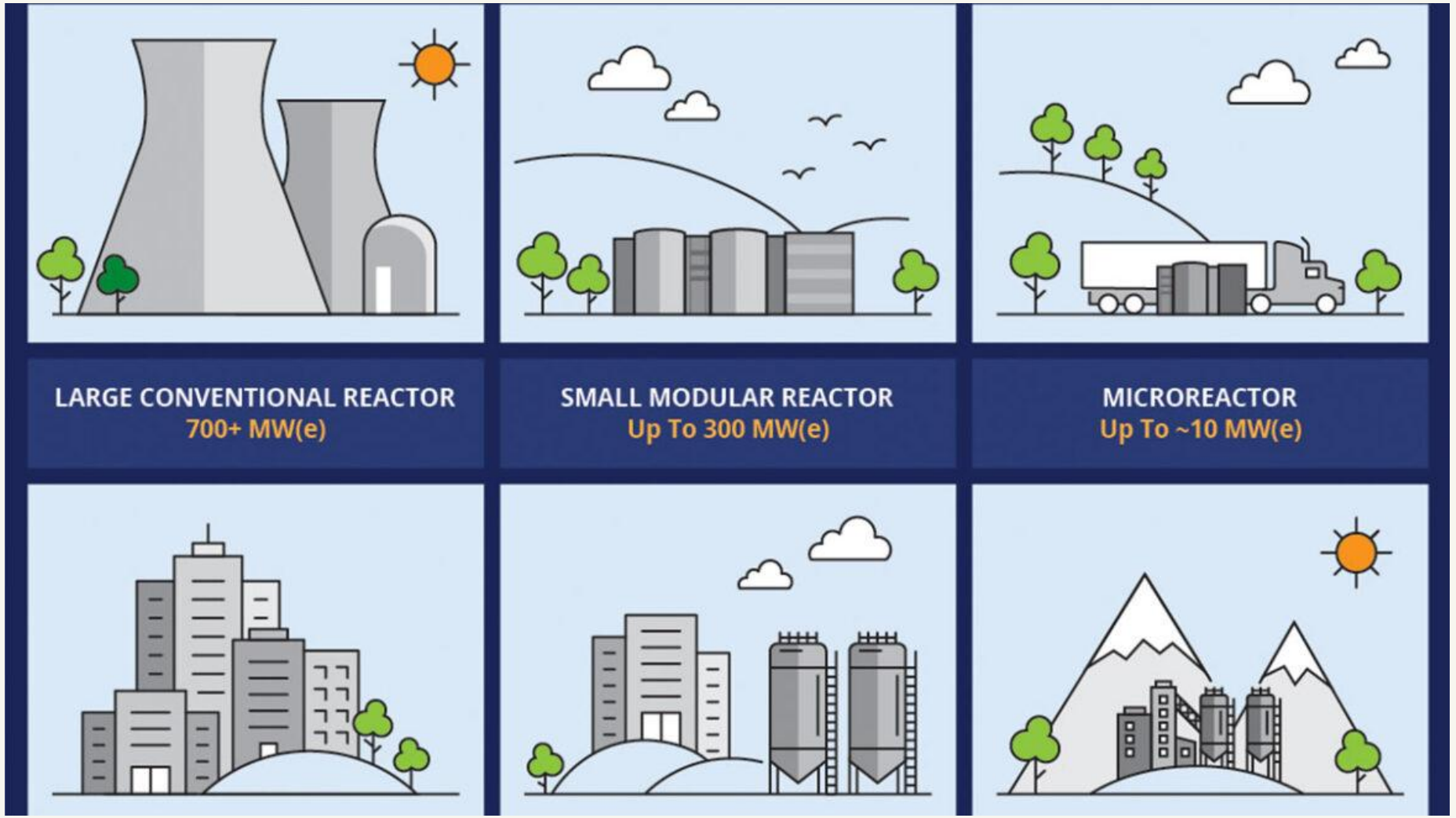


Strengthen Nuclear Ecosystem

The 2026 Coalition Agreement calls for at least **four new** nuclear power plants, opening the door to both conventional reactors and SMRs and strengthening cooperation between government, industry and regional partners.

The Future of Nuclear Energy in the Netherlands

NPP and SMRs



Nuclear landscape overview

A relatively small nuclear sector, with well-equipped infrastructure

NRG PALLAS (Noord-Holland)
Type reactor
- HFR (45 MW)
- PALLAS (25MW) – WIP 2032

Thorizon (Noord-Holland)
Type reactor
- MSR – Thorizon ONE

Allseas (Zuid-Holland)
Type reactor
- HTR

TU Delft - RID (Zuid-Ho...
Type reactor
- HOR Delft (2 MW)

COVRA (Zeeland)
Facility:
- Waste Management Organization

EPZ (Zeeland)
Type reactor
- Borssele PWR (485 MWe)
- Long Term Operation

URENCO (Overijssel)
Facility
- Urenco Enrichment
- New 15% Enrichment Expansion – WIP 2027



Kerncentrale Doodewaard (Gelderland)
Type reactor
- BWR (60 MWe) – permanent shutdown

#Mws: (Part of COVRA)

2100 FTE nuclear professionals in the Netherlands

NL relatively small compared to countries such as Belgium (~5500), UK (~87,000), France (~220,000)

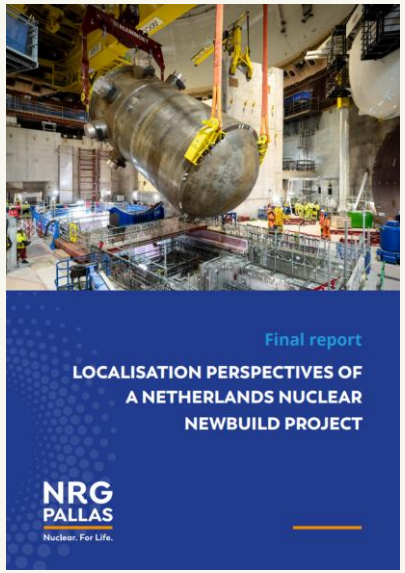
Optimal **use** of **existing knowledge infrastructure is essential** to give initiatives such as Allseas and Thorizon a chance in addition to the necessary growth for the realization of new nuclear power plants

SMR topic on the agenda of government and municipalities



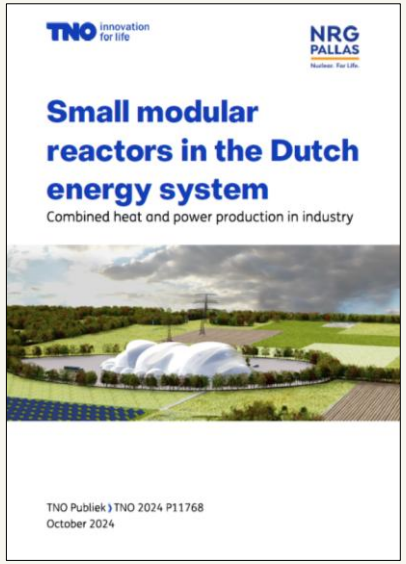
SMRs (Gen III)

- SMR marktanalyses en policy support
- (Pre)feasibility and location studies
- Support local communities, end users, vendors









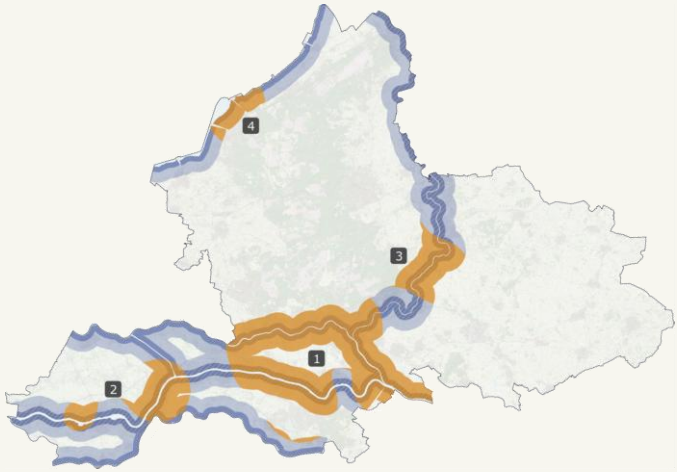


Identifying Suitable Sites for SMR Deployment

Several Dutch provinces are **exploring potential locations for future SMR deployment**.

Key criteria for initial site screening include:

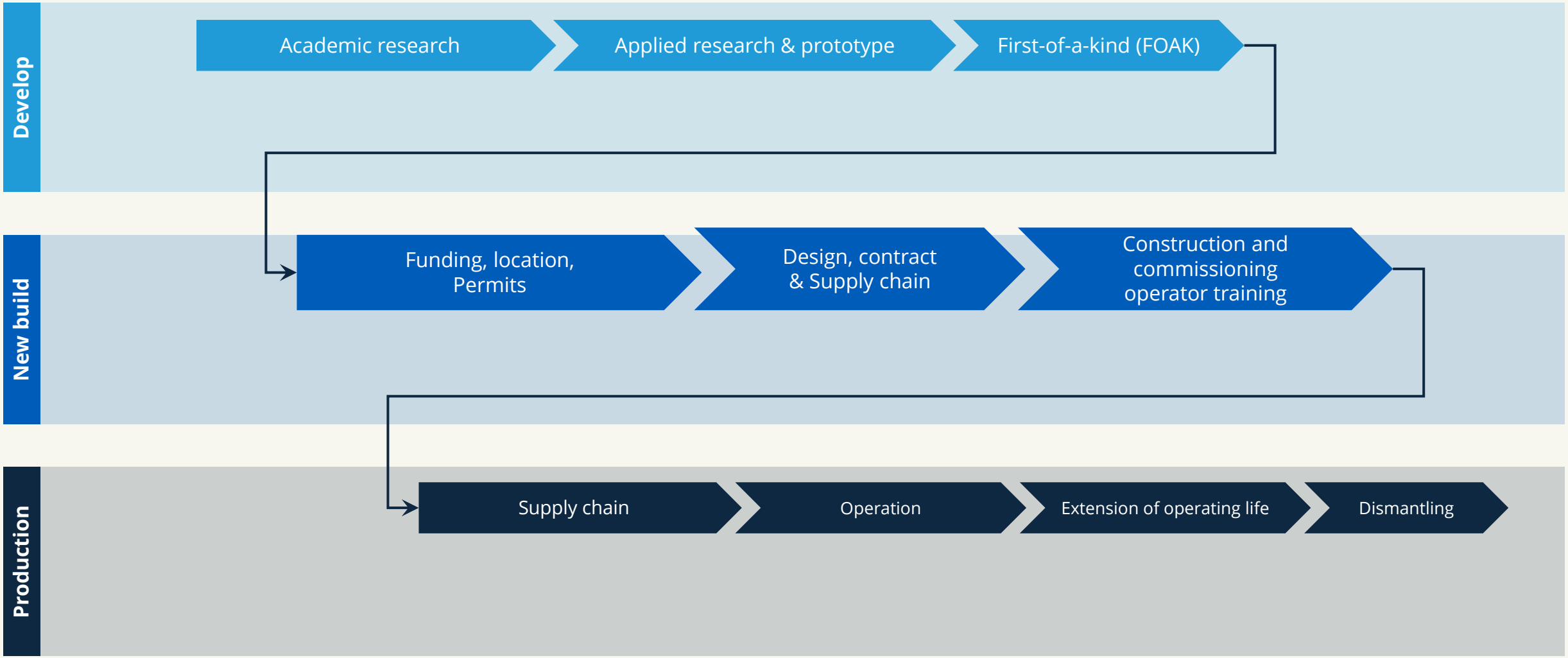
- **Cooling capacity:** Is there a sufficient cooling available and can residual heat be effectively dissipated?
- **Energy demand:** Is there a nearby demand for **electricity, process heat and/or hydrogen**?
- **Surrounding environment:** What constraints arise from residential areas, protected nature areas and other land uses?
- **Safety:** Are surrounding activities compatible with nuclear safety requirements, and can appropriate emergency preparedness arrangements be established?
- **Infrastructure:** Is the site adequately connected to the **electricity grid, transport infrastructure and potential heat or hydrogen networks**?



A suitable SMR site must bring together technical feasibility, energy demand, safety, infrastructure and compatibility with the surrounding environment.

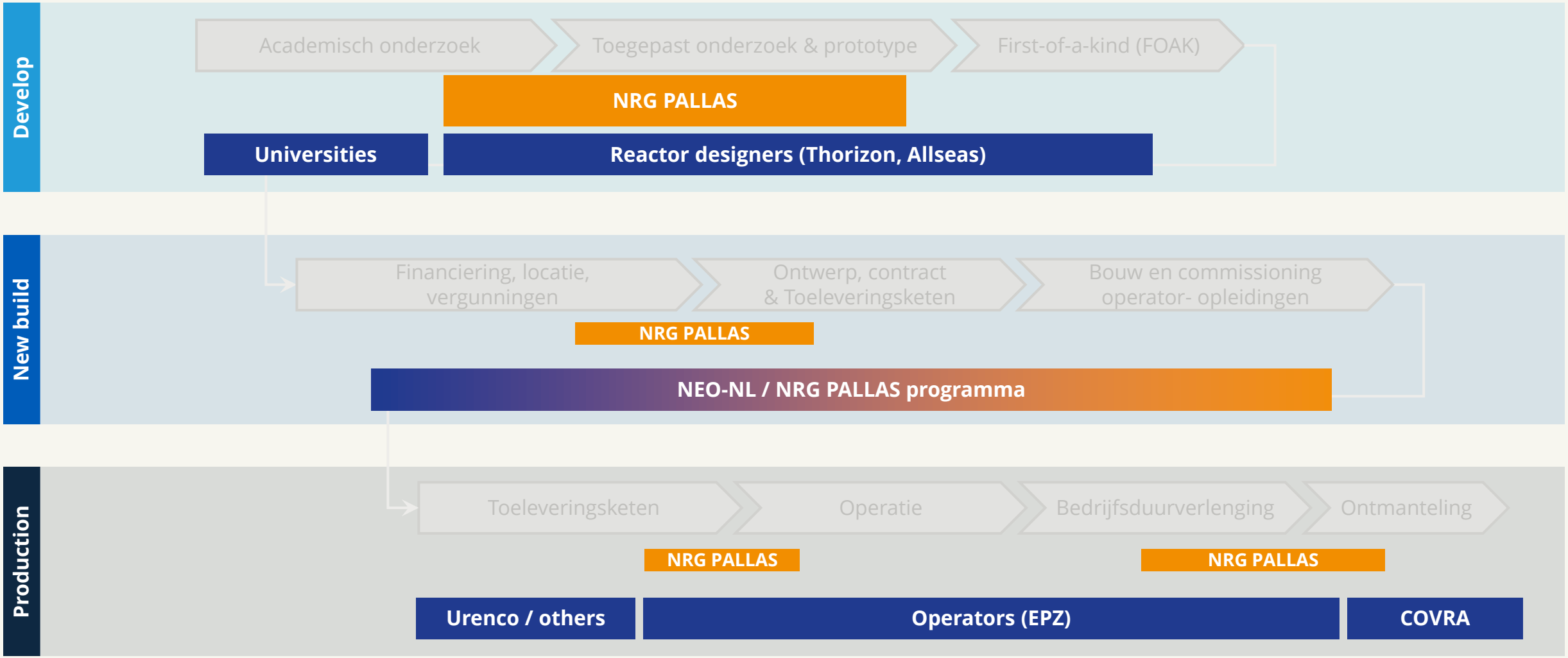
The 'Ecosystem' of nuclear energy

Developing technology, Building reactors, Innovating electricity in every area

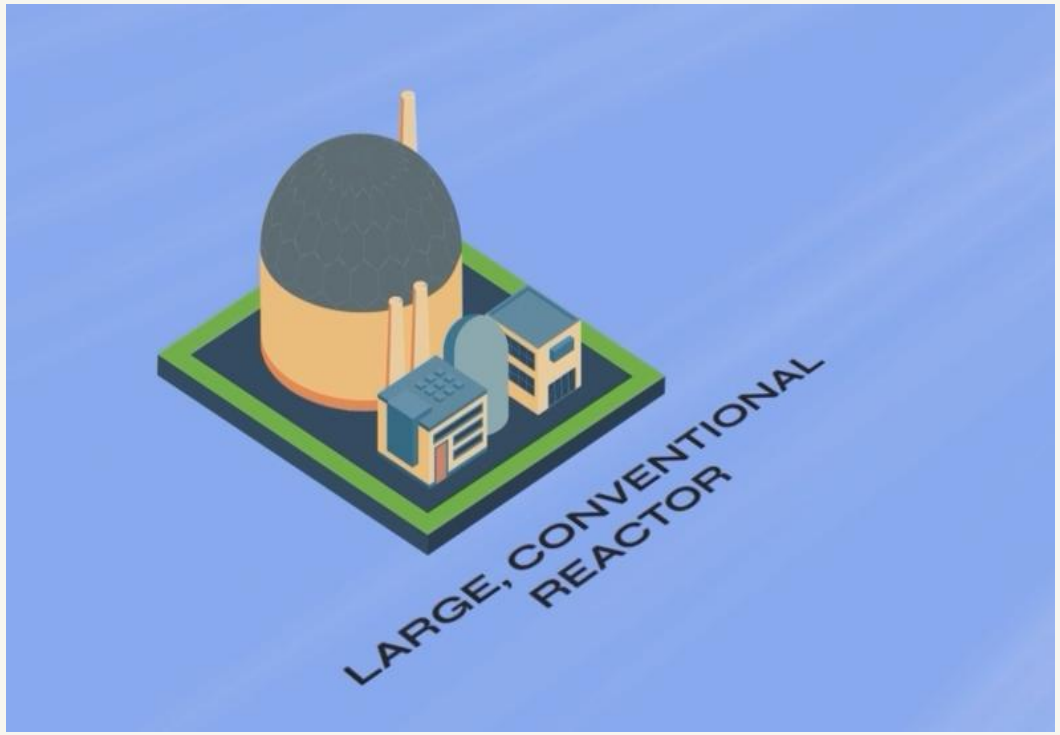


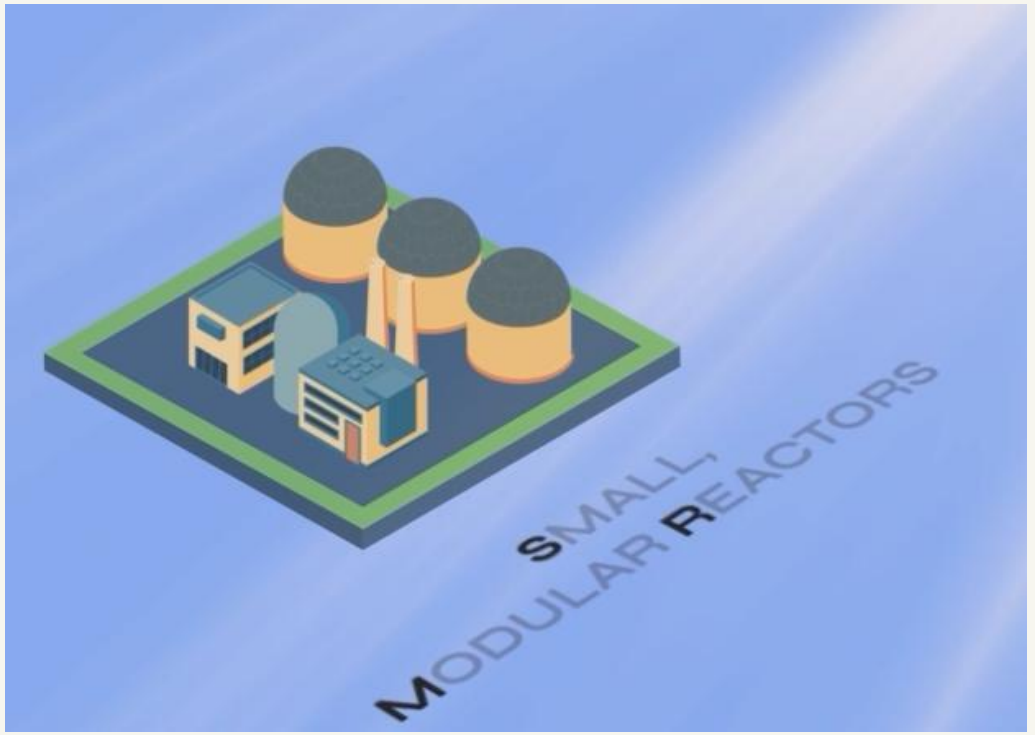
Where the NL nuclear sector adds value

Activities of the players in the Dutch nuclear sector, including NRG PALLAS



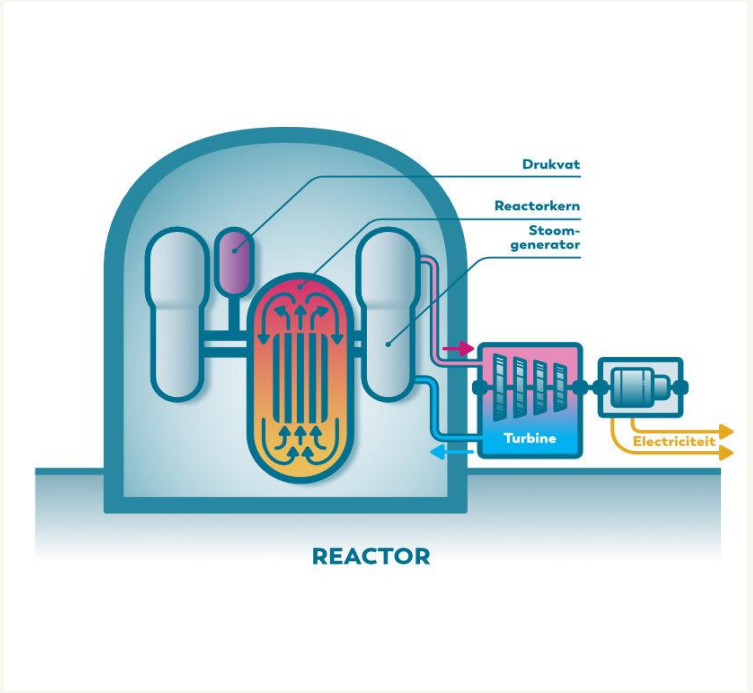
Different types of nuclear reactors





Large Nuclear Power Plants: Proven Technology at Scale

- Generation III reactor technology
- Large unit capacity for high-volume electricity generation
- Proven technology with international operating experience
- Predominantly site-built, requiring major infrastructure
- Multiple layers of safety through redundancy and passive features
- Eemshaven and Terneuzen are currently being investigated as potential locations for two new large nuclear power plants.

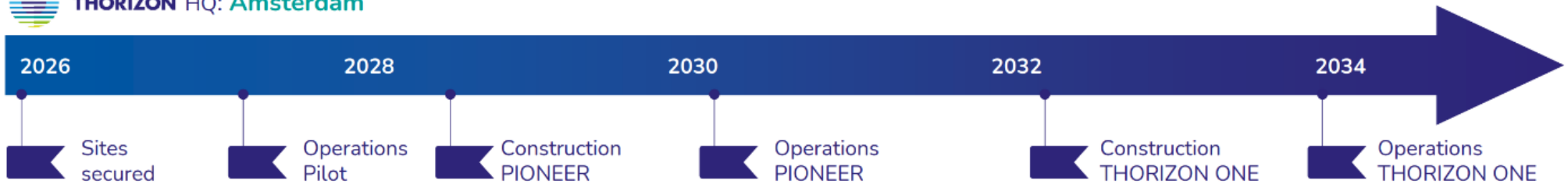


Proven technology • High capacity • Reliable low-carbon generation

Dutch AMR developments - Thorizon

We have an ambitious step-by-step roadmap with strong support of and footprint in Noord Holland

THORIZON HQ: Amsterdam





Prototyping: Components and loops

Development of components, containment and subsystems, 3 loops operational

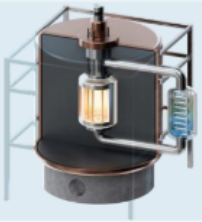
Thorizon labs Amsterdam and Eindhoven and at EPZ (Borssele)



Pilot: Full-scale non-nuclear

Prototyping program of core module of Thorizon One, ramp up supply chain towards commercial scale-up

Thorizon labs (TBC)



PIONEER: Nuclear demonstrator

Research reactor, one-off critical experiment with design unrelated to Thorizon One cartridges

Site options at NRG Pallas (Petten) and at EPZ (Borssele)



THORIZON ONE: Commercial reactor

First full scale, grid-connected power plant delivering 100MWe for end-user

Site with existing nuclear license at EPZ (Borssele)

Cross-program validation: Reduce risks in MSR fuel salt behavior by generating irradiation, materials, and corrosion data through experiments in Petten at NRG Pallas (MOCHA, PRONTO), with intended collaboration with JRC (material characterization) and TNO (corrosion)

Technology - Thorizon

Allseas: Taking Nuclear Energy Offshore

25 MWe HTGR for onshore and maritime applications

Concept

- High-temperature gas-cooled reactor (HTGR)
- ~25 MWe
- TRISO fuel
- Designed for onshore industry and offshore vessels



Roadmap
2025–26 → Design & pre-licensing
2027–28 → Detailed design & testing
2029–30 → Production capability
From 2030 → Onshore deployment → Offshore roll-out

Key challenges
Licensing & maritime regulation | Siting | Fuel supply | Waste management

Key takeaways

1. The Netherlands is entering a new nuclear era
2. Nuclear complements renewables in a reliable low-carbon system
3. Ambition requires a strong nuclear ecosystem
4. The Netherlands has valuable capabilities to build on
5. People and collaboration will determine success

The Dutch nuclear ambition is growing. Turning ambition into reality will require technology, people, skills and collaboration

Together, we build not only nuclear capacity, but the community and ecosystem needed to sustain it.

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Thank you

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