



RESEARCH & INNOVATION ACTIVITIES

NEA International Workshop on
'Nuclear Innovation Roadmap'
(NI2050)

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NRG MISSION & VISION ON R&I

NRG Mission:

- **NRG responds to the social need for high quality nuclear research and innovation, safe and reliable nuclear isotope production and services to organisations working with nuclear technology.**

Vision on Research & Innovation:

- **NRG develops and employs nuclear technology to support the development of nuclear systems (e.g. reactors, accelerators, irradiation facilities)**

RESEARCH & INNOVATION PROGRAM

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Budget (Meuro)	13	13	14	13	10	12	11	11	10	10

Budget = national budget + EU contribution from EU framework programs

- **National budget has decreased with ~20% (2013-2015)**
- **NRG strives to implement full cost recovery which is an essential boundary condition for continuation of our experimental nuclear R&D activities.**

RESEARCH & INNOVATION PROGRAM

Reactor Operation & Safety

Reactor safety

- H₂ Management
- Core cooling (thermal & mechanical behavior)
- System behavior
- Fires
- Spent fuel pool

Long term operation

- RPV material and internals
- PTS
- Fatigue
- Stress Corrosion Cracking

Fuel behavior & efficiency

- Fuel creep

Advanced Nuclear Technology

Safety & design

- Core cooling (thermal & mechanical behavior)
- System behavior

Advanced fuels & materials

- Accident Tolerant Fuel & Cladding

Resource optimization

- Fast reactor fuels
- Molten salt behavior under irradiation

**SMR, LMFR
HTR, MSR**

Decommissioning

Footprint reduction

- Concrete
- Steel

Radiochemical characterization

- Method Development

Reprocessing

- Leaching & Dissolution Behaviour

Risk Analyses

Instrumentation

Radiation Protection

Dosimetry

- Data Analysis & Benchmarking
- Method Development

Training & education

- Public Information
- E-learning
- Safety Culture

Measurements & Modelling

- Shielding
- In-situ NORM Analyses
- Radon/Thoron
- Distribution Models

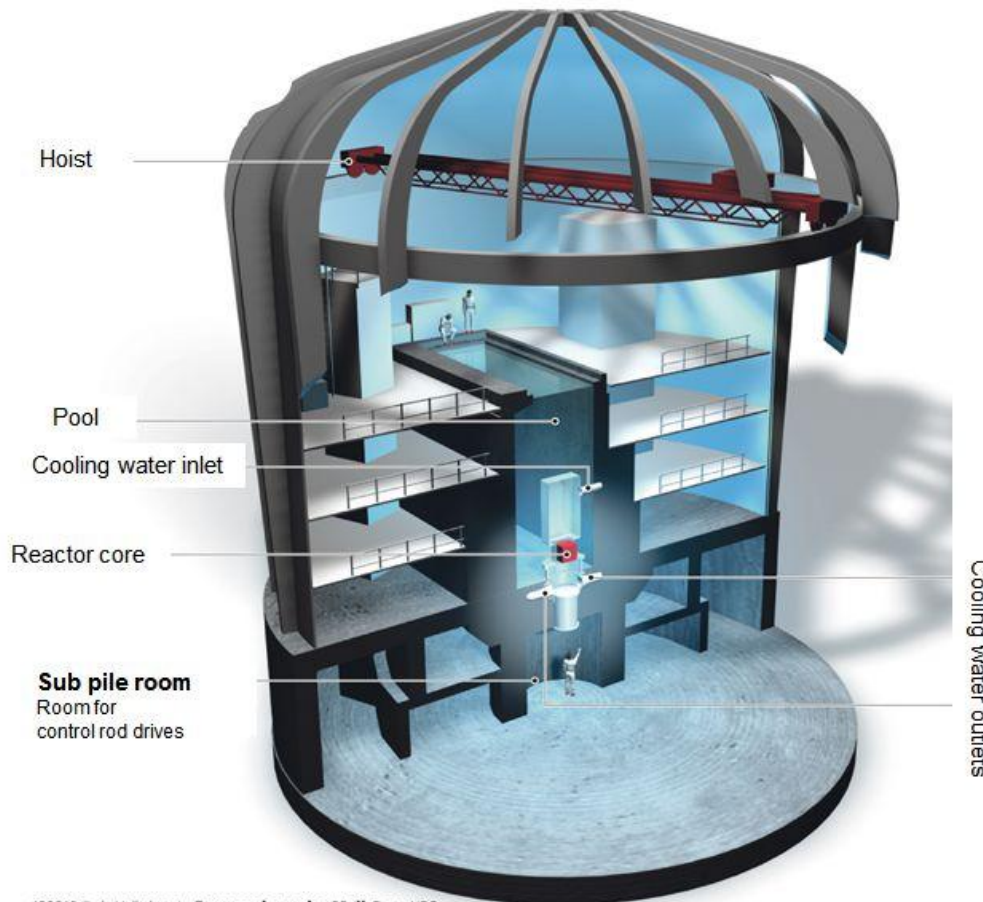
RESEARCH & INNOVATION PROGRAM

International cooperation:

- EU framework programs (FP7 – H2020)
- OECD/NEA benchmarks
- IAEA CRPs and TWGs
- US-DOE INERI
- Bilateral collaborations



INFRASTRUCTURE - HFR



- 45 MW_{th} tank-in-pool type material test reactor
- Light water cooled and moderated
- Low enriched uranium plate-type fuel elements with burnable absorber material
- More than 250 days of operation per year in 9 four week cycles
- R&D Examples:
 - RPV steel for LWRs
 - HTR graphite
 - Thorium fuel cycle
 - Transmutation
 - MA and nitride fuels for fast reactors
 - Functional & breeder materials for fusion

INFRASTRUCTURE - OVERVIEW





PALLAS



- Foundation for the preparation of PALLAS
 - Dutch government and province of Noord-Holland allocated budget of 80 M€ to enable design, procurement and licensing of PALLAS
 - Tractebel selected as owner's engineer
- Licensable Design Phase 2013-2017
- Realisation Phase 2018-2023
- Operational Phase 2024>