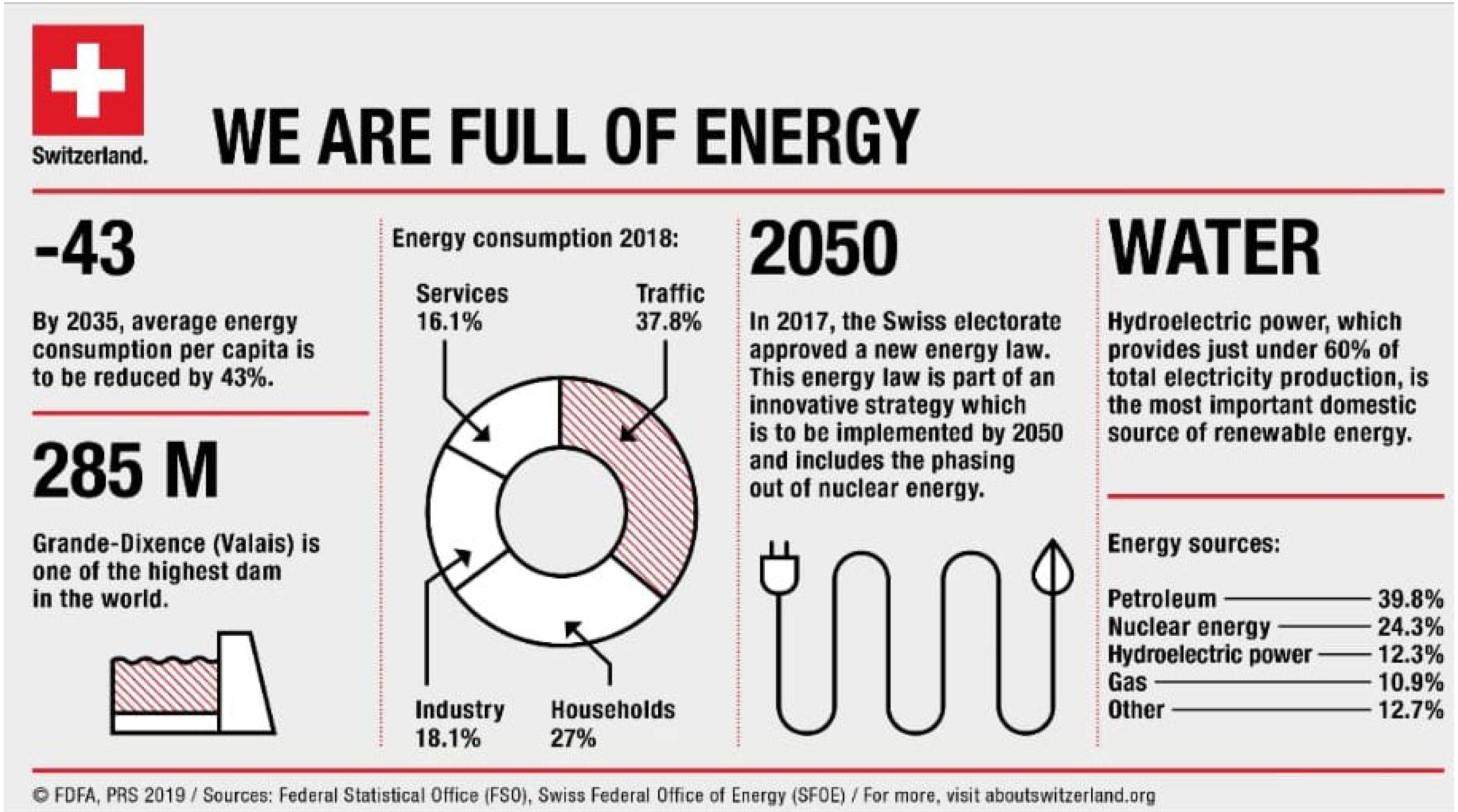
*New*cleo's Lead-cooled Fast Reactor: a potential game changer for a sustainable Swiss energy transition

Swiss Nuclear Forum
A. De Min

11th November 2024

The genesis (2021)



A *new*, innovative player in nuclear energy

REACTOR DESIGN:
Small Modular (SMR) + Lead-cooled Fast Reactors (LFR) = AMR

*new*cleo is working to design, build, and operate Gen-IV Advanced Modular Reactors (AMRs) cooled by liquid lead

FUEL MANUFACTURING:
Mixed Uranium Plutonium Oxide (MOX)

MOX and Fast Reactors allow the multi-recycling of nuclear waste into new fuel with no new mining for generations

INTRINSICALLY SAFE power production

CIRCULAR nuclear waste recycling

COMPETITIVE energy cost

Presence across **EUROPE**

Launched in **SEPTEMBER 2021**

€537 million of private funds
~€50 million expected turnover in **2024**

French **first licensing stage completed** for the first reactor and the fuel production facility

Selected by **France 2030** and the **European Industrial Alliance on SMRs**

850+ EMPLOYEES GLOBALLY

30+ YEARS OF R&D

14 PATENTS PUBLISHED

HIGHLY SPECIALISED EPC CAPABILITIES

FUCINA ITALIA – A newcleo company
S.R.S. – A newcleo company
RÜTSCHI – A newcleo company

IS09001 and ISO19443 certification
Italy: certification released - France: second stage completed

Nuclear energy's critical role in energy future

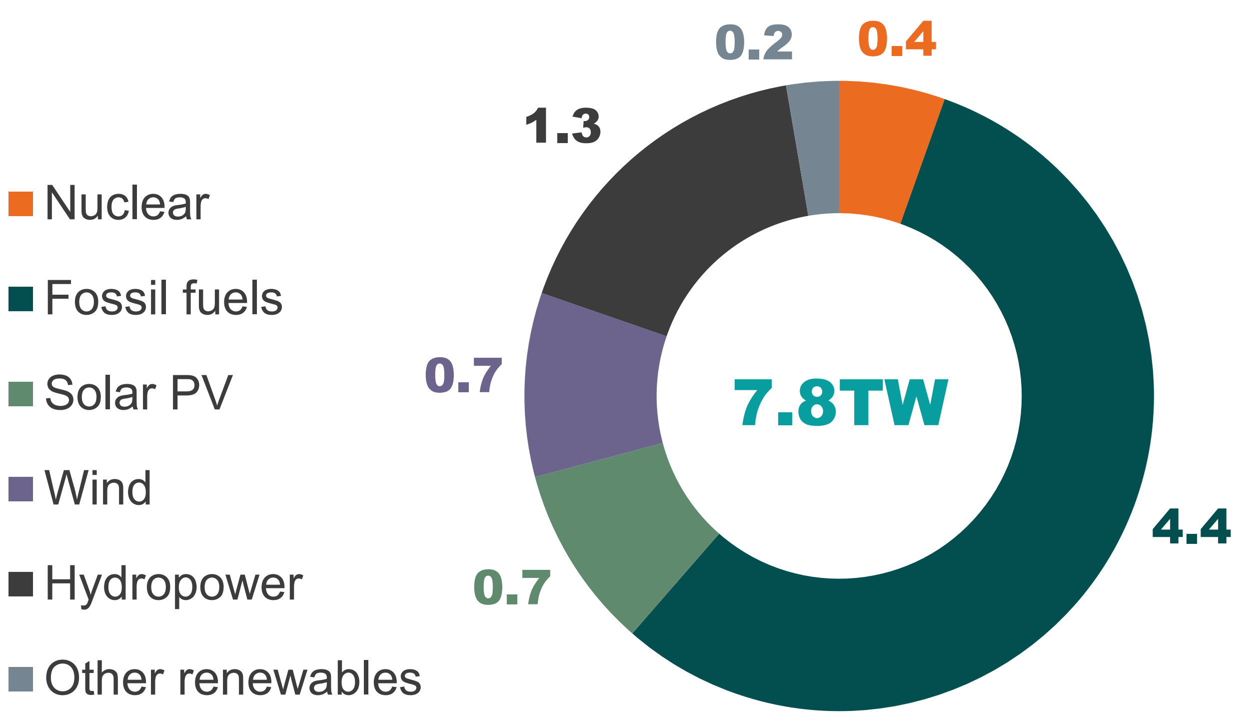
Decarbonisation and energy security dilemma

- Growing energy demand
- Decarbonisation objectives
- Increasing installed intermittent renewable sources
- Higher electrification of end-uses
- Higher volatility of fossil markets
- Geopolitical security of supply
- Critical materials scarcity

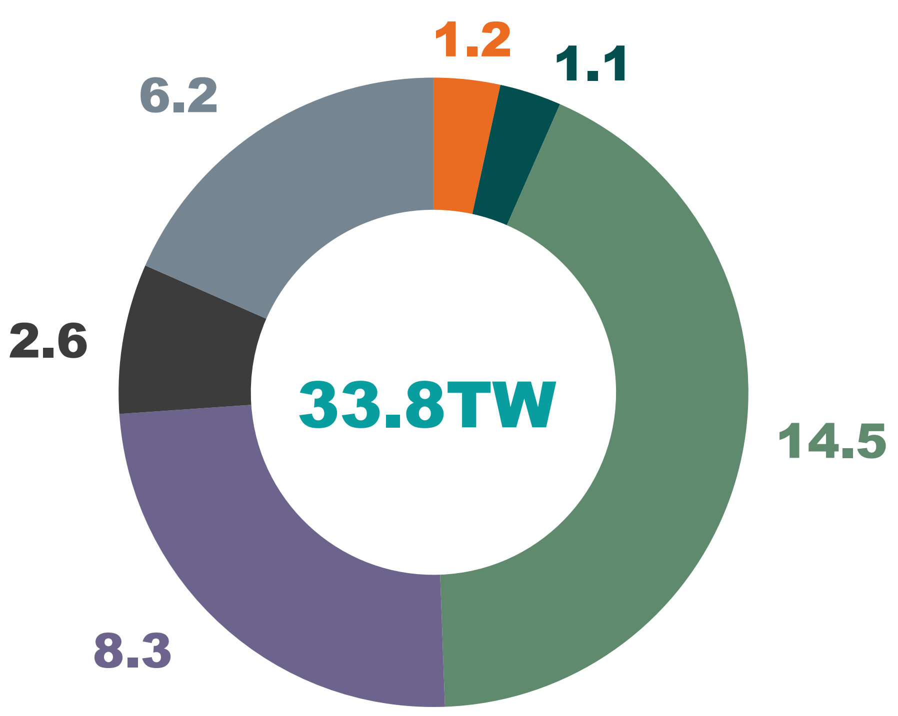
Fission can be the answer:

- Reliable and dispatchable, complementing intermittent renewable sources
- Dense, with small footprint on the environment and large availability of fuel supply
- Enables energy security and independence
- No direct CO_2 or pollutants emission

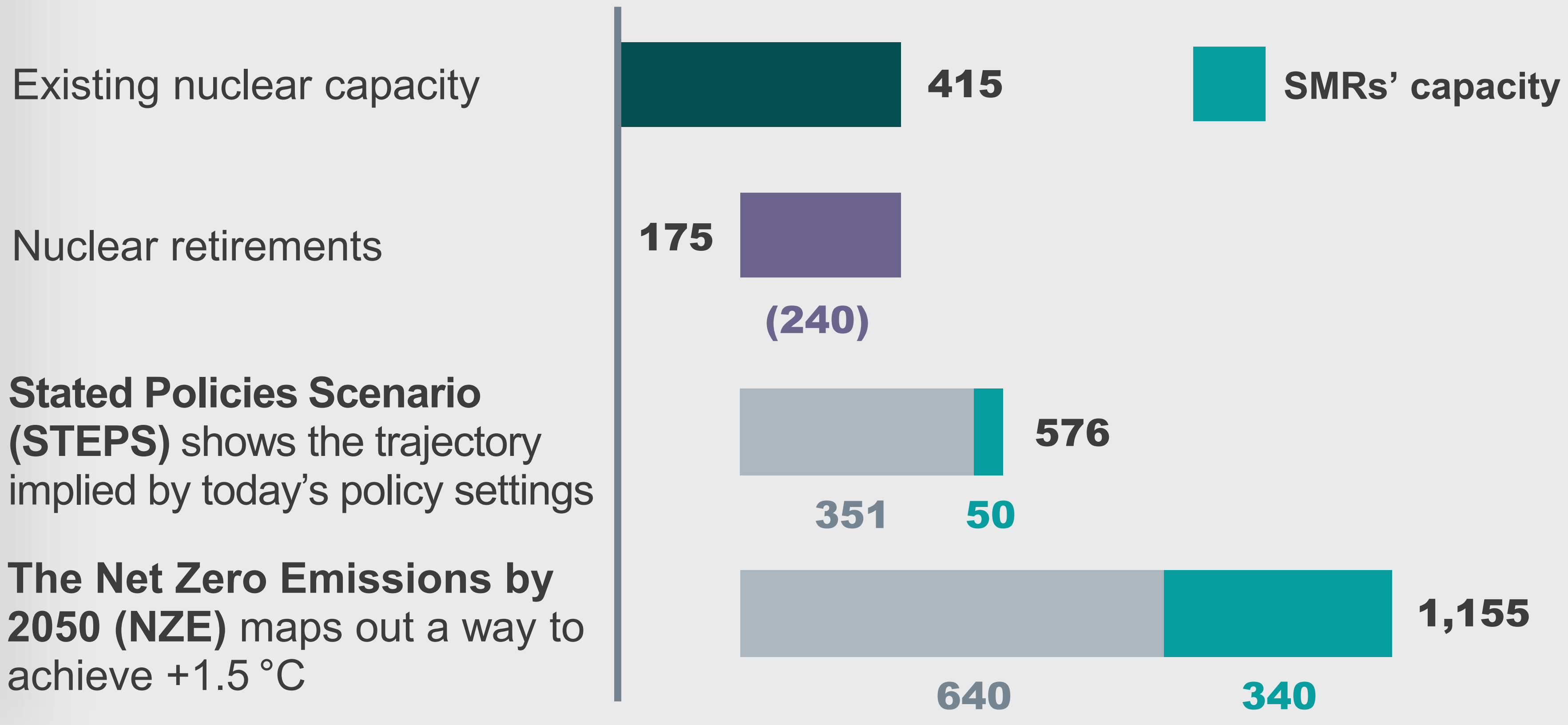
INSTALLED CAPACITY 2020



INSTALLED CAPACITY 2050



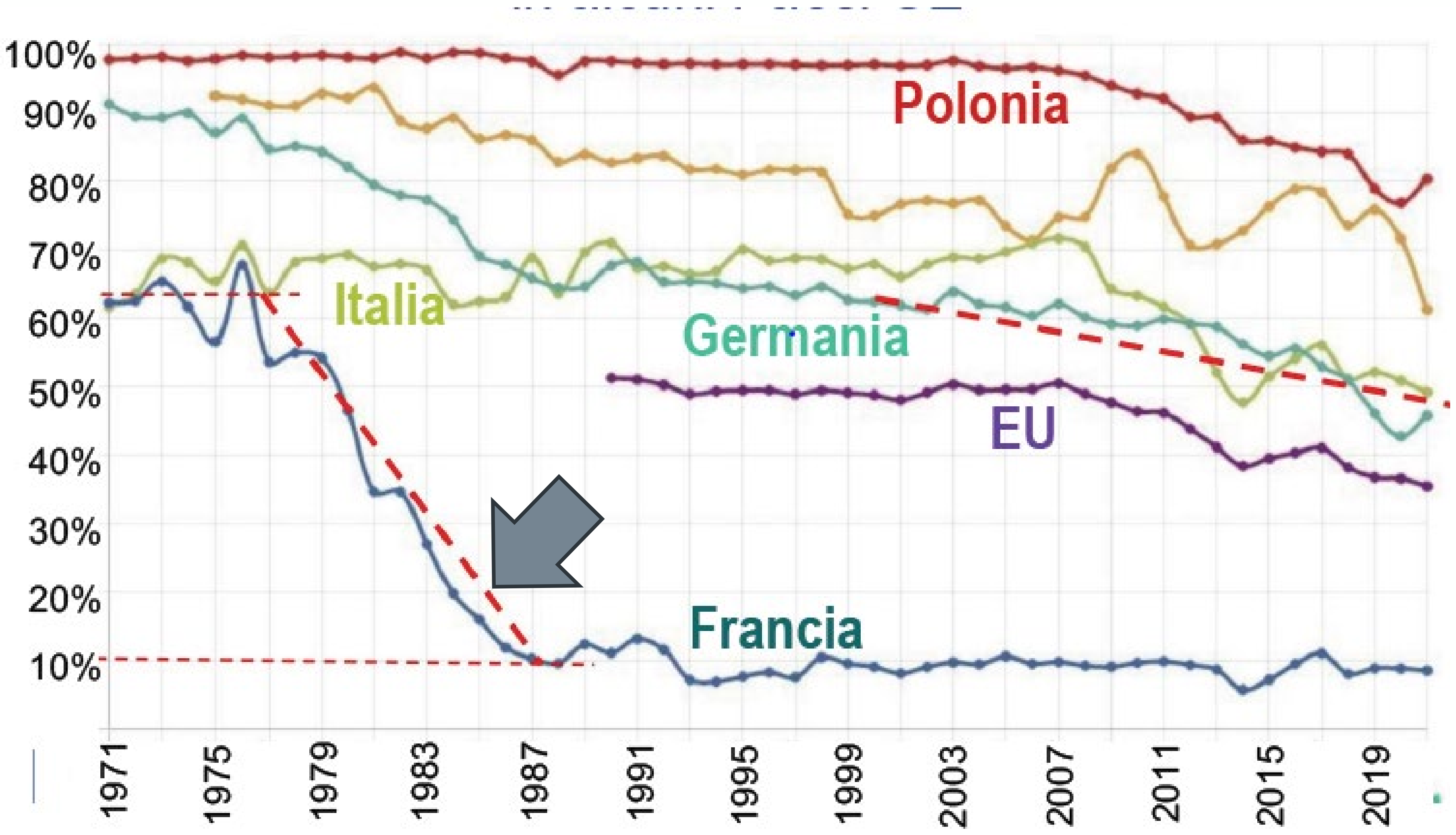
Nuclear installed capacity (GW) by 2050 as per IEA



Nuclear is essential for decarbonization

France has decarbonized its energy sector in 15 years @ low electricity prices

Fossil fuel contribution to electricity generation*



Carbon intensity in electricity production (2023):

- France: 45 g/kWh
- Germany: 425 g/kWh

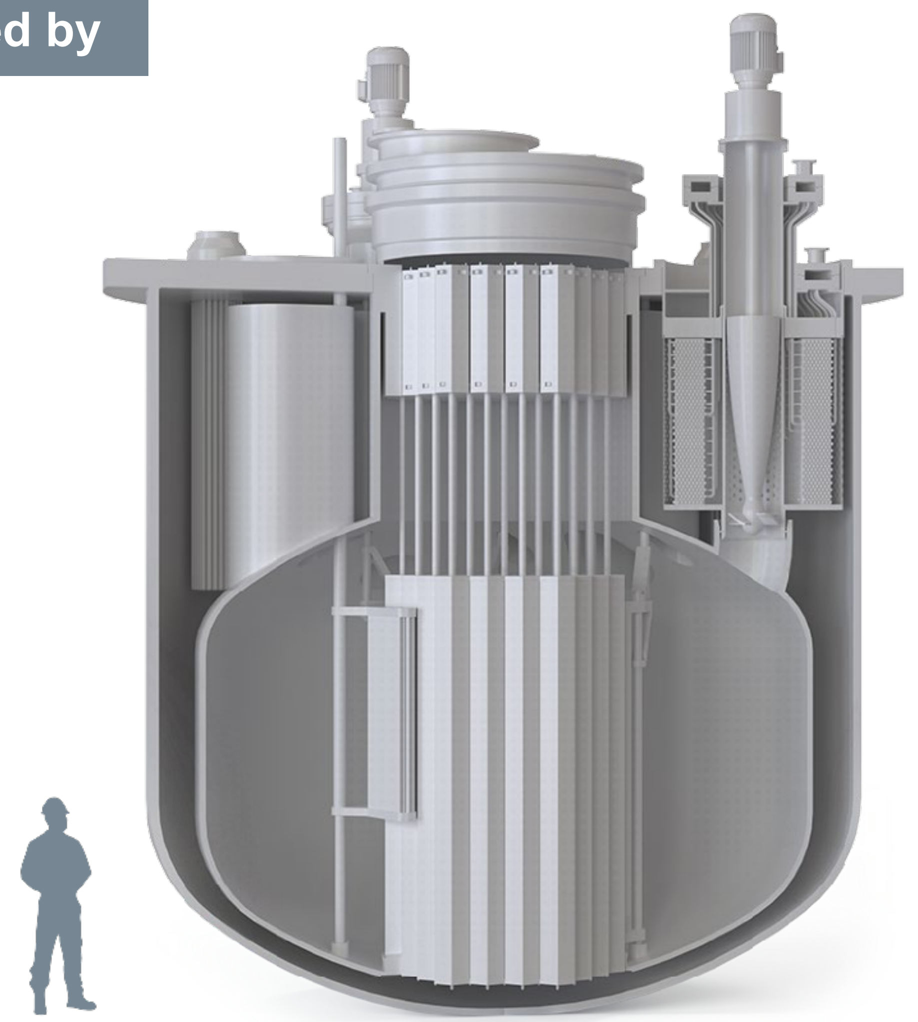
* G.Zollino, University of Padova, *Scenari energetici italiani a zero emission*, September 2024

SMRs improve economics and flexibility in nuclear

Small Modular Reactors (**SMRs**) are nuclear fission reactors. Smaller than conventional nuclear reactors, they are designed to be manufactured at a plant and transported to a site for installation

ECONOMIES OF SCALE
Large reactors > 1GWe

replaced by



ECONOMIES OF SERIES
Small, standardised designs < 300MWe

Serial production
Reduced costs and risks of overrun

- Learning curve and economies of series
- Centralised factory production to limit onsite costs
- Transportable on site

Modularisation
Shorter construction time

- Modular construction
- Multi-module deployment enabling “chain” financing of one module to the next

Simplification
Enhanced safety

- Reduced complexity enhancing overall safety, while limiting costs (e.g., passive safety) and reducing local permitting requirements

Limited capital intensity
Better affordability

- Lower upfront capital costs
- Limited financing risk, with greater access to private capital

Smaller footprint
Greater site flexibility

- Reduced site size
- Reduced emergency planning zone

Flexible applications
Wider range of users

- Remote locations and small grids, suitable for fossil plant replacement
- Non-electrical applications (e.g. desalination)
- Marine based (floating, propulsion)

Necessary conditions for SMR success:

a) Harmonization of regulatory requirements
b) In-factory construction
c) Transportability
d) Short construction time
e) Multi-unit siting

newcleo
Futurable Energy

Advanced Modular Reactors: Generation IV (Gen-IV) can further improve economics and sustainability of nuclear

Advanced Modular Reactors (AMRs) explore the use of alternative cooling fluids.

Since 2000, an international forum coordinated by the Office of Nuclear Energy of the U.S. Department of Energy (DoE) has prioritised **six Generation IV** nuclear technology systems for development.

Why LFRs amongst the Gen-IV technologies?

- Only **Fast Reactors (like the LFRs) allow closing the fuel cycle**, a sustainable use of nuclear energy as it recycles the nuclear waste. This because in Fast Reactors neutrons maintain very high energy and can more easily fission the elements heavier than Uranium which, instead, accumulates in Thermal Reactors where neutrons are very slow and tend to be captured and create long lived waste
- **LFRs are an evolution of the (well known) SFRs** but decrease costs and exhibit intrinsic safety in any accident scenarios
- **Lead does not interact chemically** with water or air unlike sodium. Lead works at atmospheric pressure. Lead is an excellent shield for gamma radiation. **LFRs can be simplified and made more cost competitive** compared to other Advanced Nuclear Reactor designs

Gen-IV categories:

- Sodium-cooled Fast Reactor (**SFR**)
- Lead-cooled Fast Reactor (**LFR**)
- Gas-cooled Fast Reactor (**GFR**)*
- Molten Salt (Fast or Thermal) Reactor (**MSR**)
- Super Critical Water-cooled Reactor (**SCWR**)*
- Very High Temperature (Thermal) Reactor (**VHTR**)

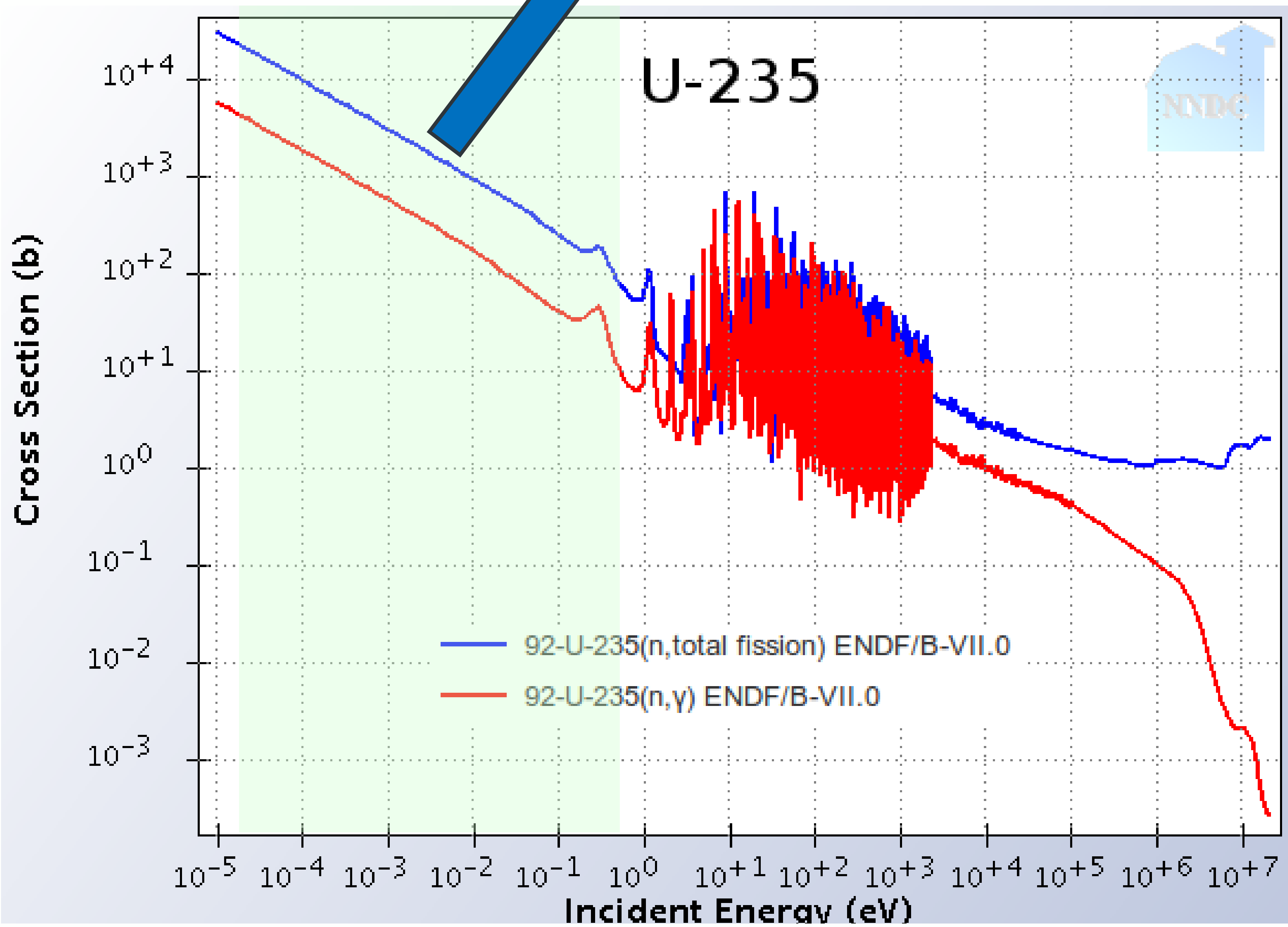
**these two technologies are virtually abandoned*

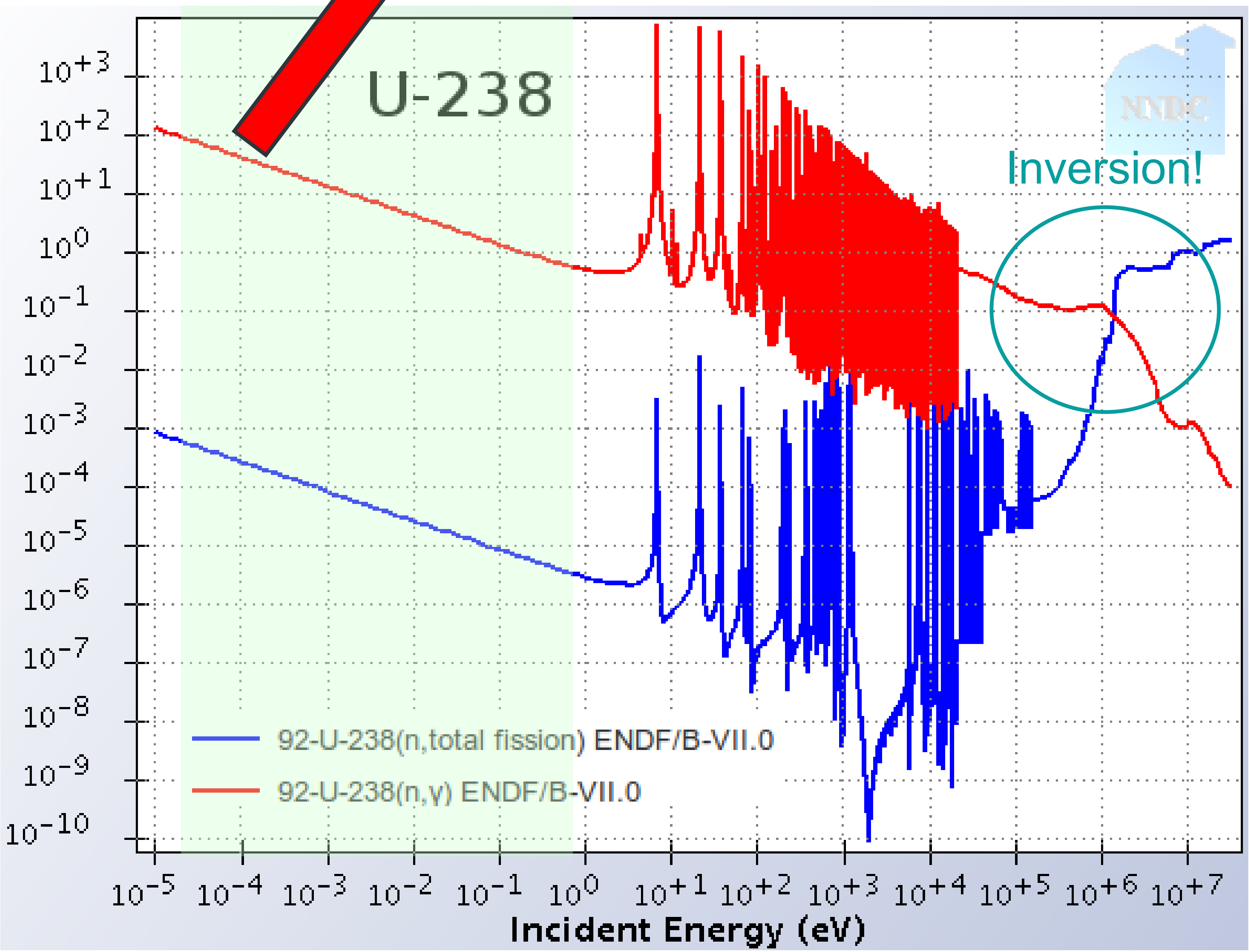
Slow neutron reactors

Conventional slow neutron reactors (water cooled) use U235 (~5%)+U238 fuel:

Fission -> thermal energy, electricity

Pu, Am, Cm, Np, … -> long-lived “waste”





Fission-> energy

neutron capture- > transmutation

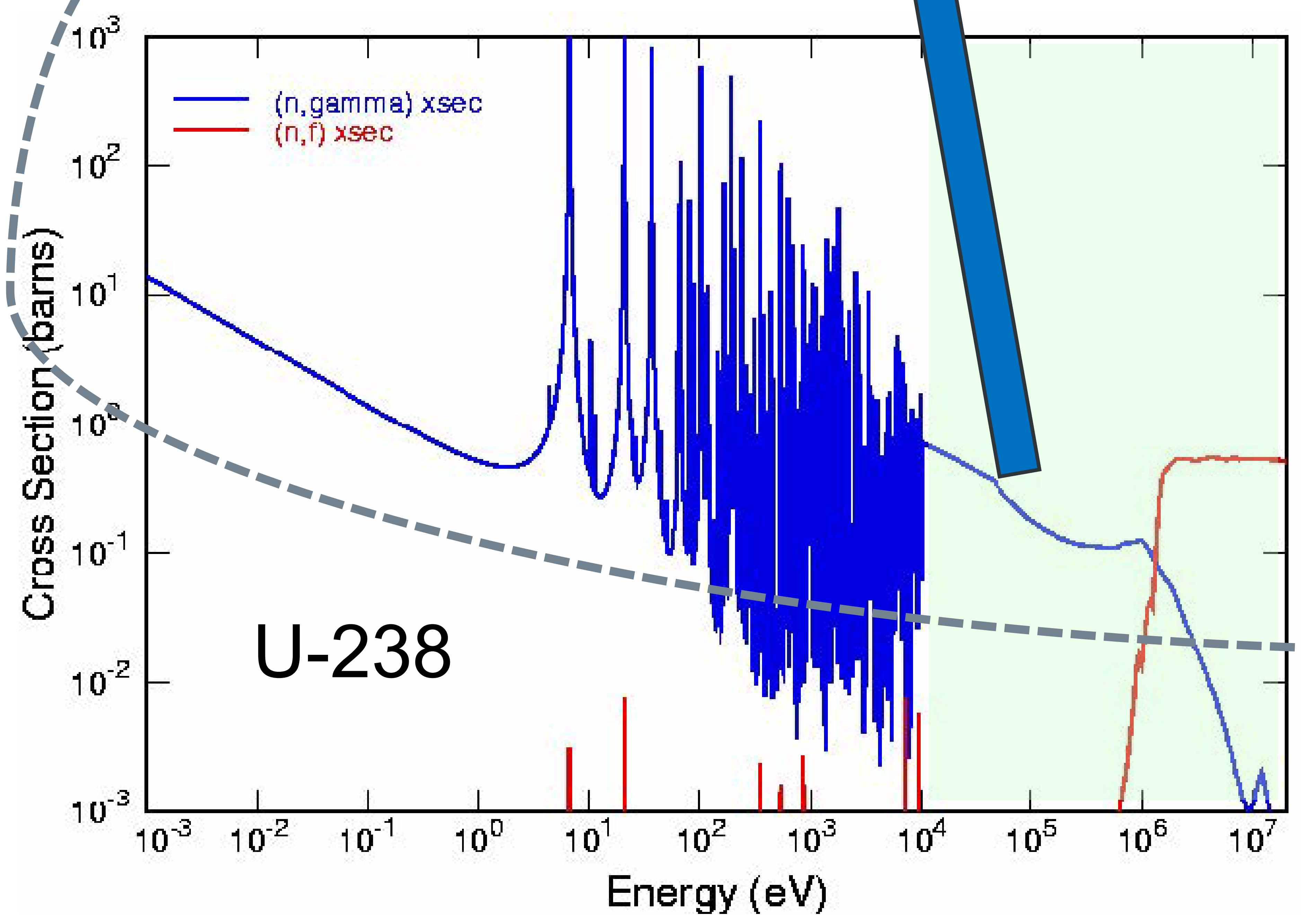
* D. Mistry et al. Case study of travelling wave reactor (TWR) and its future impact, June 2014

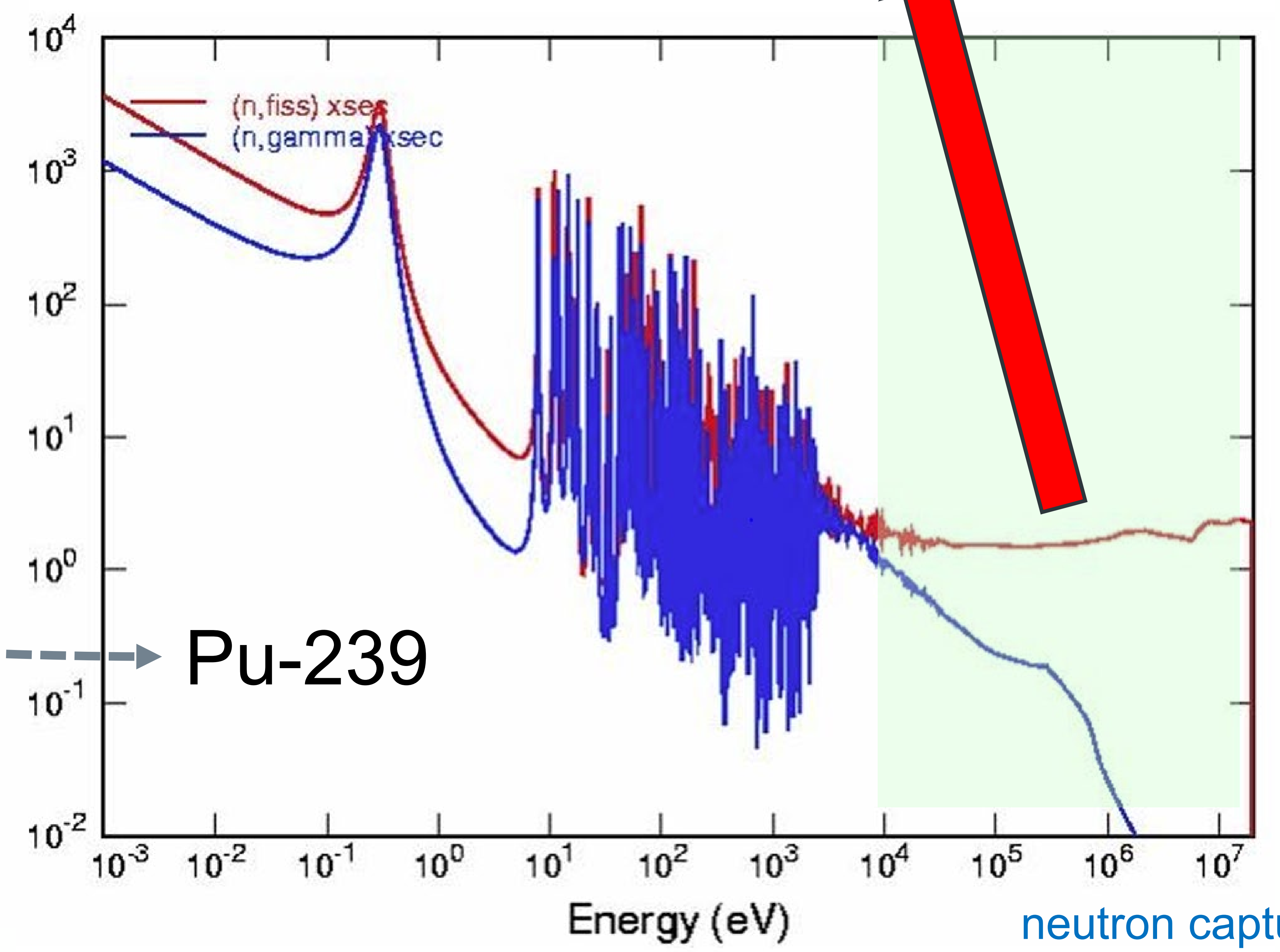
Fast neutron reactors

Fast neutron reactors (no water cooling) use (normally) Pu239 (~20%) + U238 fuel (MOX fuel):

Pu, Am, Cm, Np, … -> long-lived “waste”

Fission -> thermal energy, electricity





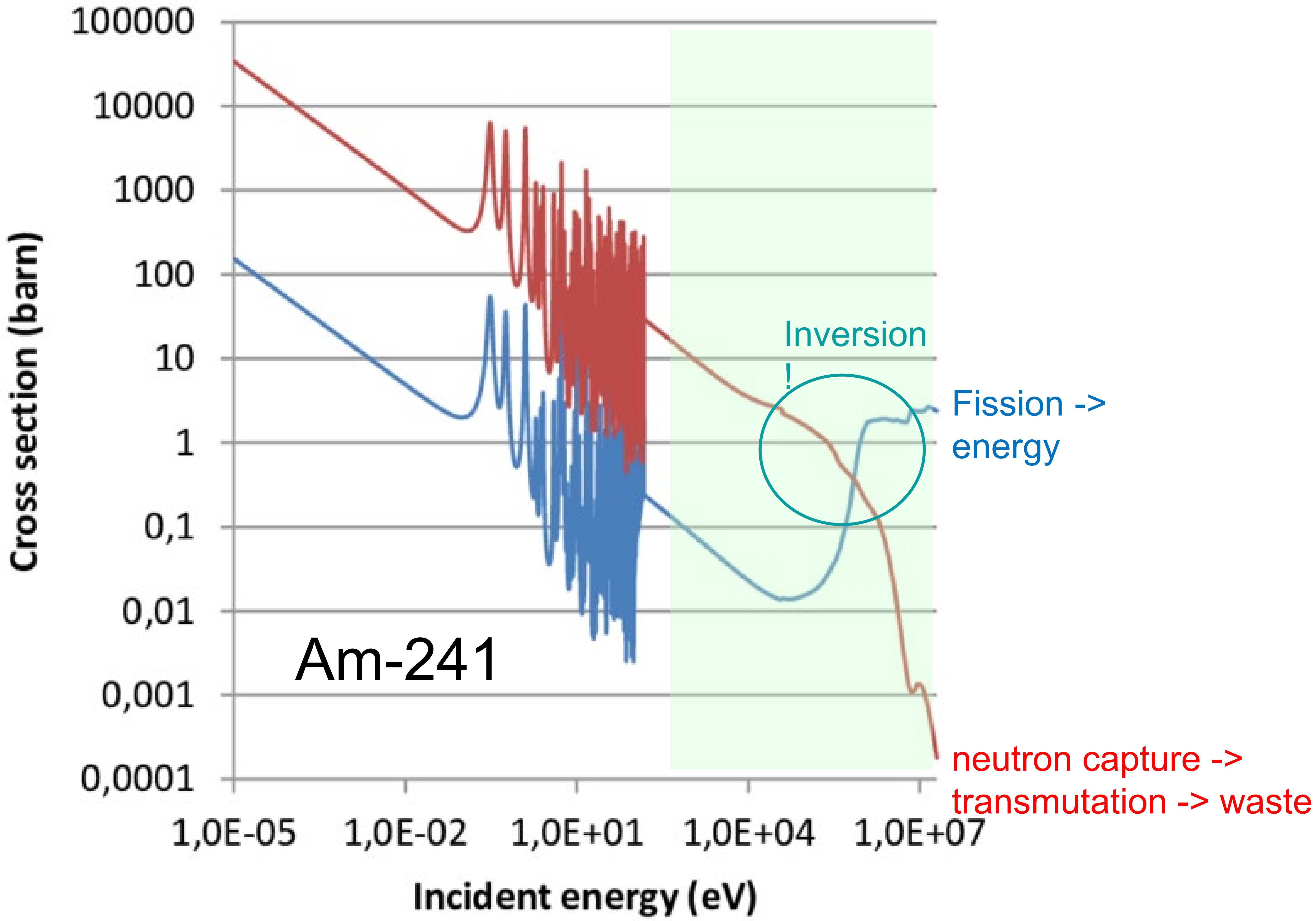
Fission-> energy

neutron capture -> transmutation

* R. Hill, Argonne, *Fast reactor physics*, March 2019
** Please notice that, unfortunately, colors are inverted with respect to the previous slide

Fast neutron reactors: burning of long-lived nuclear waste

The case of Am-241



The other actinides

Fission / neutron capture ratio**

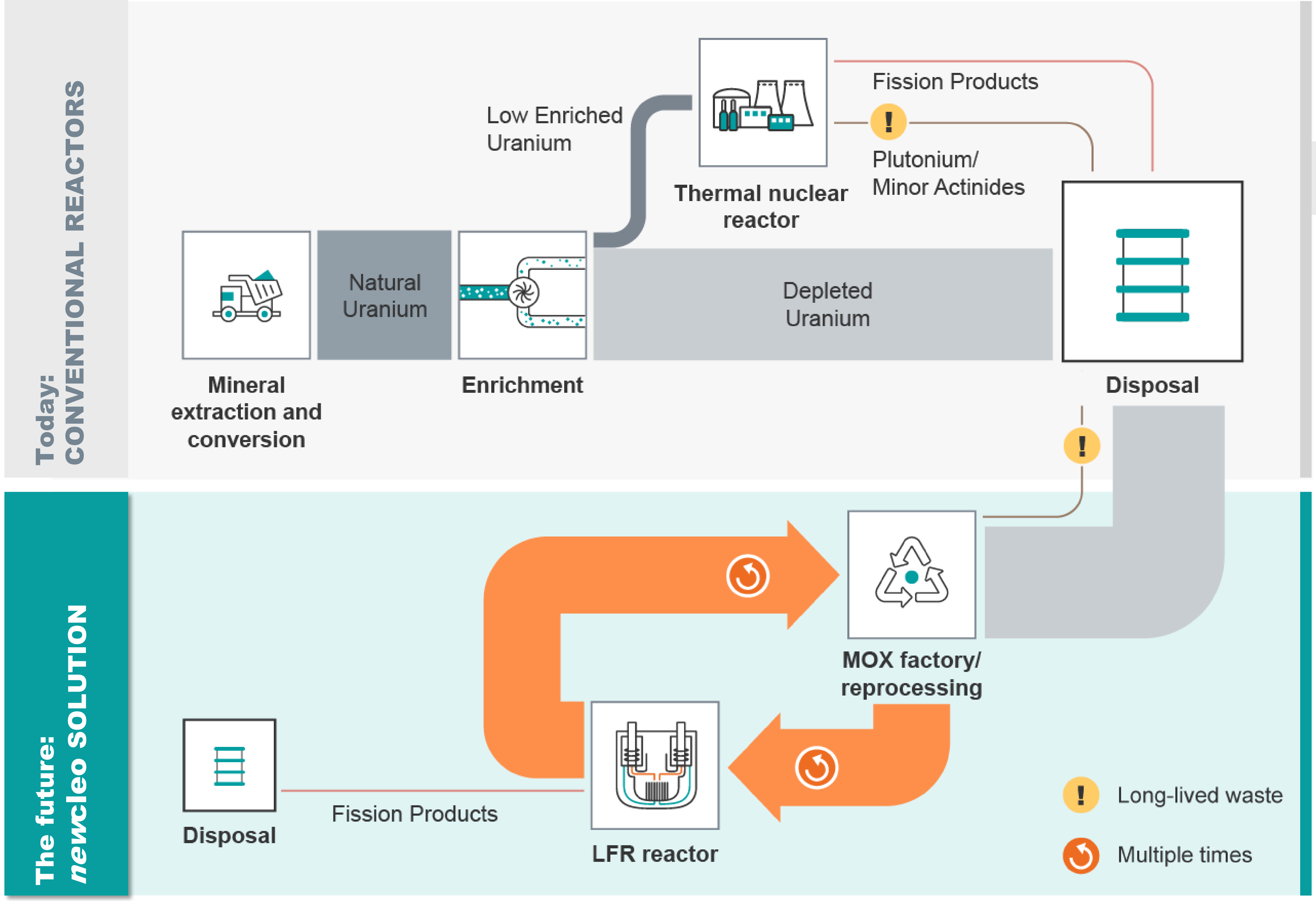
Isotope	Fast Reactor (Metal fuel)	Thermal Reactor
U235	0.80	0.81
U238	0.17	0.10
Np237	0.27	0.02
Pu238	0.70	0.08
Pu239	0.86	0.64
Pu240	0.55	0.01
Pu241	0.87	0.75
Pu242	0.52	0.02
Am241	0.21	0.01
Am243	0.23	0.01
Cm244	0.45	0.06

** R. Hill, Argonne, *Fast reactor physics*, March 2019

* A. Mueller, ACM Consult, *Transmutation of nuclear waste and the future MYRRHA demonstrator*, October 2012

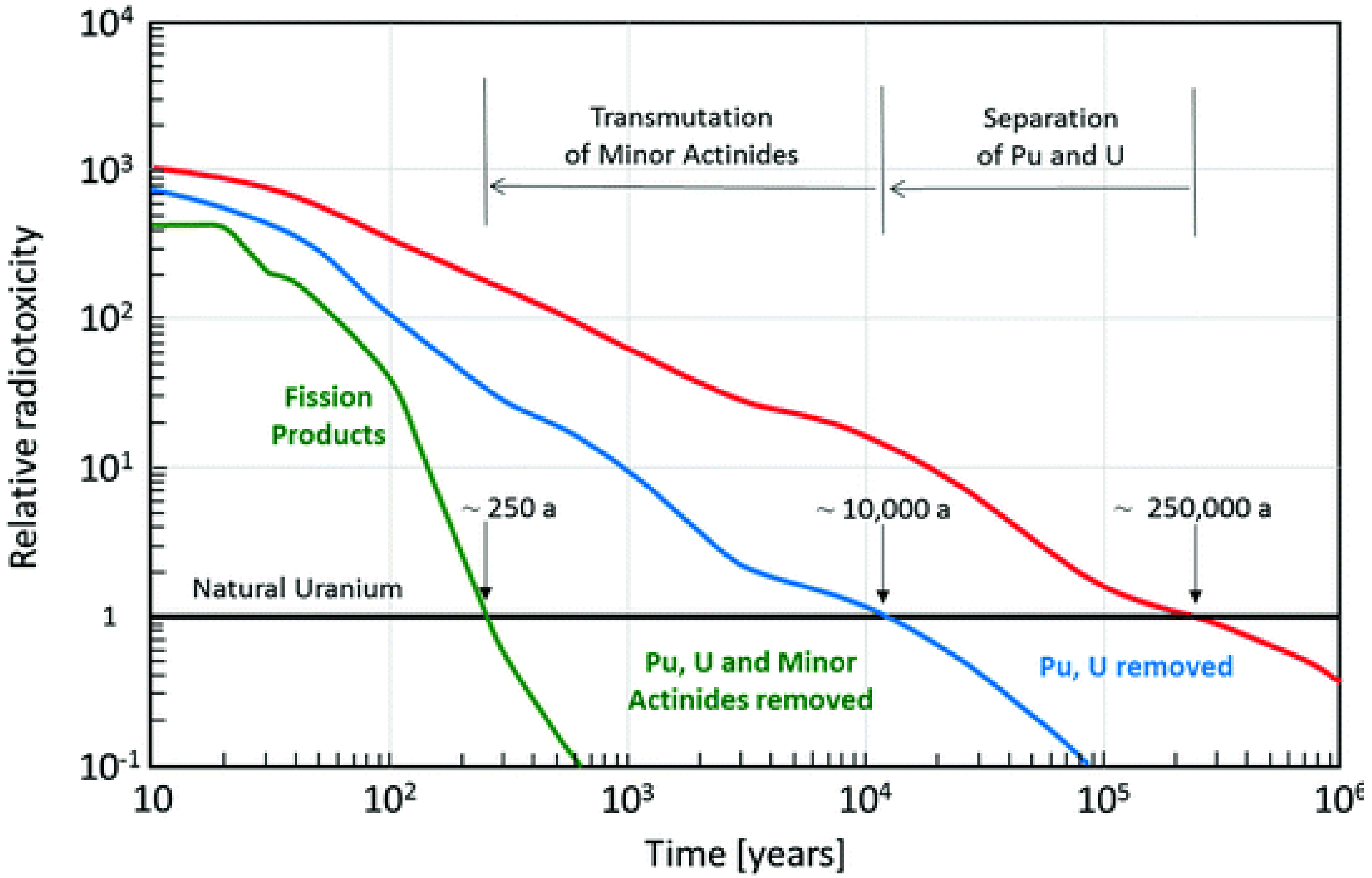
Closing the fuel cycle: MOX

Including MOX (Mixed Pu-U Oxides) for cost effective, cleaner, and virtually inexhaustible production of nuclear energy, with no need of mining



Thermal fission reactors use a very small portion of the extracted uranium: an average 1GWe LWR uses every year 200t of mined uranium of which only 1t is fissioned (Fission Products), the rest is not used

High-level waste has become an expensive liability

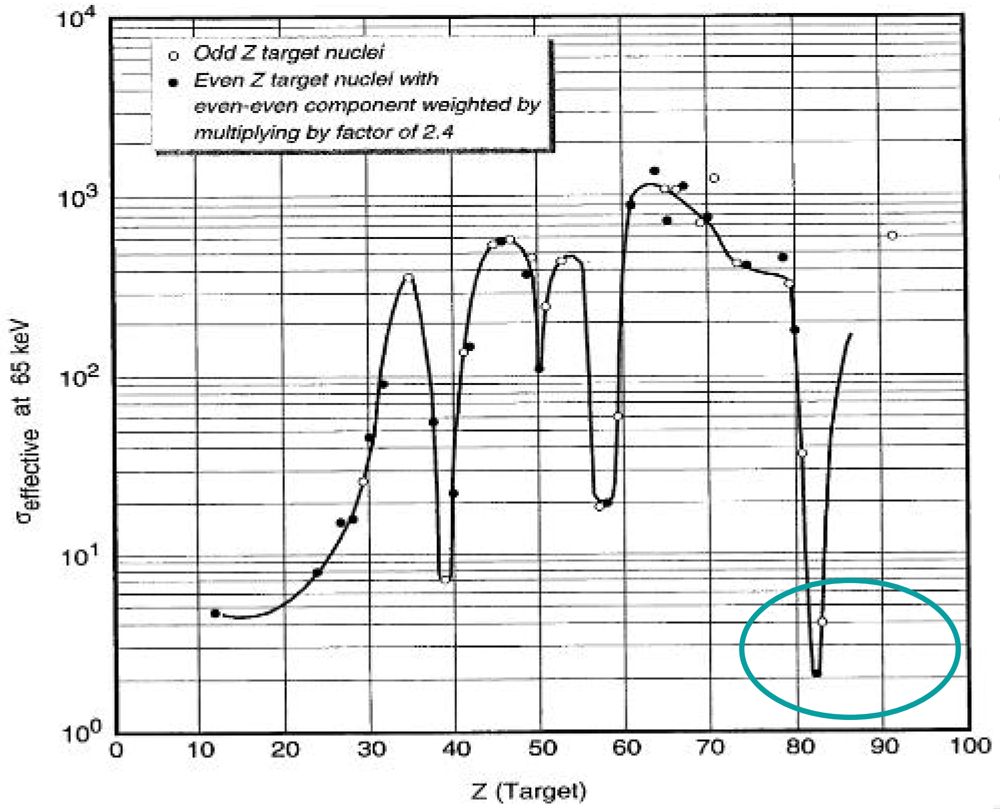


Fast Reactors and fuel reprocessing can extract energy from existing material and at the same time reduce radiotoxicity of residual waste to dispose: Fission Products return to value of the natural uranium ores after ~250 years

Significant advantages of Lead-cooled Fast Reactors

Lead properties enable design simplification (hence **economic benefits**) and a high degree of inherent safety:

- Operating at atmospheric pressure, hence **thick forging not needed** as in traditional Pressurised Water Reactors (PWRs)
- No significant energy release in case of vessel failure, hence **high pressure-resistant containment not needed**
- Favourable chemical properties, hence **extra safety provisions can be avoided, no intermediate loop, possible use of low-cost water or air loops for Decay Heat Removal (DHR)**
- Coolant boiling practically eliminated, hence no **safety injection systems needed**
- Significant thermal inertia in case of a loss of cooling helps the reactor to switch off naturally with no damage
- Lead fission product retention capability, gamma radiation shielding
- **High plant energy conversion efficiency (40-50%)**
- **High operating temperature enables non-electrical uses**



Neutron capture probability as a function of coolant element

Unique properties for fast reactors design

Absorption cross-section	Boiling Point	Heat transfer properties	Density @400°C
Low	1737°C	Good	10580 kg/m^3
Large fuel pin lattice, low core pressure losses	No loss of core cooling	Reduced risk of fuel cladding overheating	No risk of core compaction

Critical properties that discouraged some designers were solved by *new*cleo

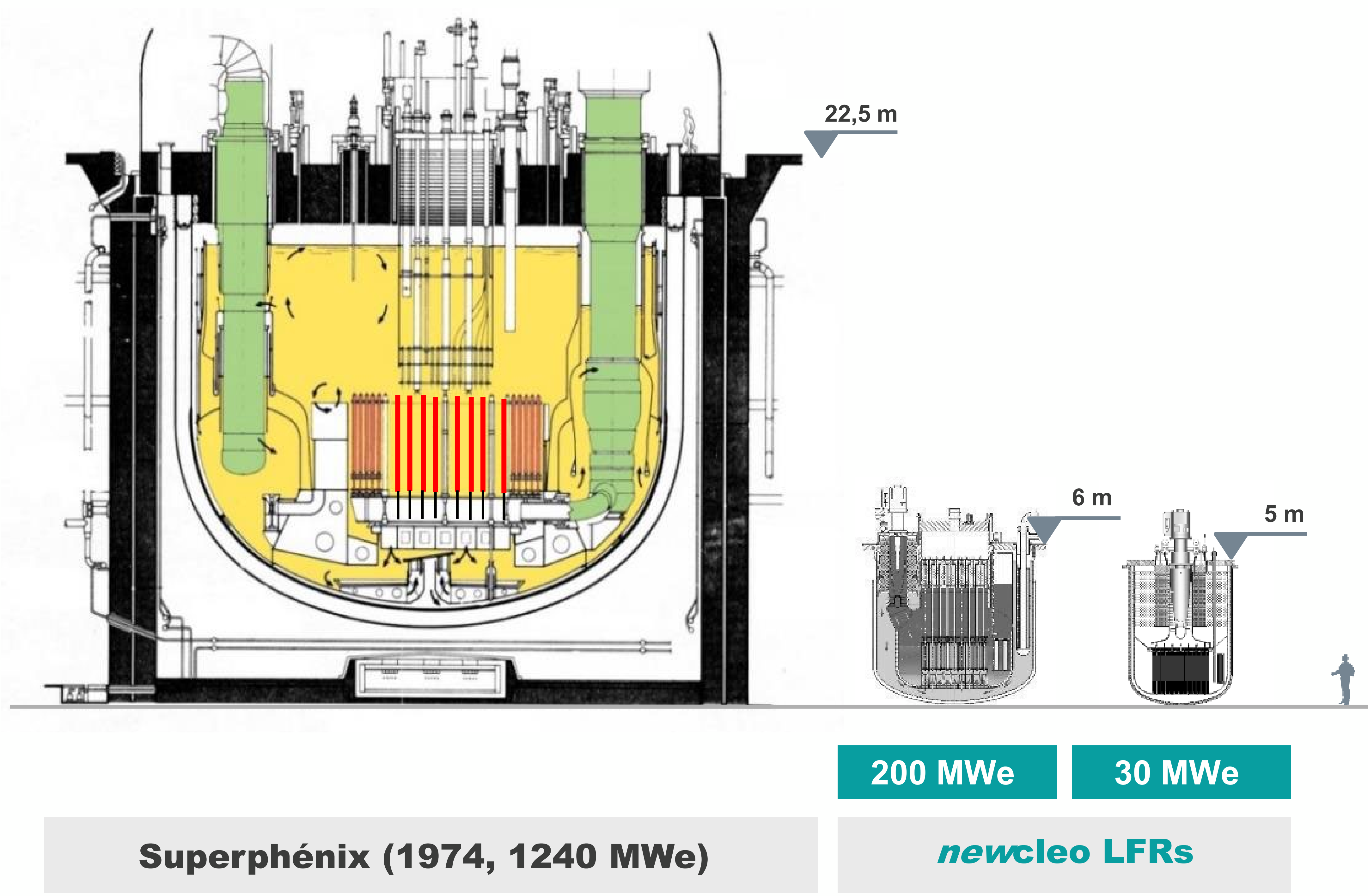
Density @400°C	Melting Point	Opacity	Compatibility with structural materials
10580 kg/m^3	327°C	Yes	Corrosive at high temperature
Significant weight in earthquakes	Risk of freezing	Difficult operations inside	Need of new materials

80 effective reactor-years of experience with Lead-Bismuth reactors: 15 reactors operated among land-based and submarines in Russia starting in the 1950s

A new LFR construction started in Jun-2021 in Russia

Evolution of Fast Reactors

From old-generation SFRs to a new generation of small, modular LFRs



The development of Sodium Fast Reactors (SFRs) particularly amongst other Fast Reactors has been an area of huge investment in recent years, but there has been limited deployment. Sodium is chemically reactive with both water and air; safety issues required complications to design which made SFRs **expensive.**

Learning from the past

Fortunately, the **experience** acquired with SFRs can be almost entirely used for the development of LFRs. They use a similar fuel, behave in a similar way functionally, present similar thermal-hydraulic and mechanical aspects. **LFRs are much more promising in terms of cost and safety than SFRs.**

Configuration of *new*cleo's LFR

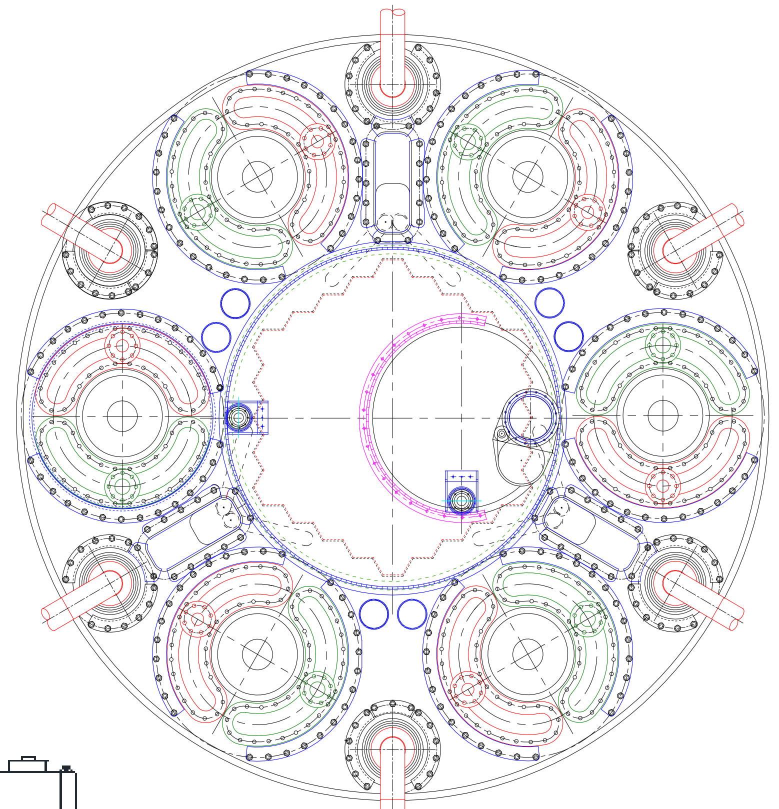
Economics

Compact primary system

- Innovative components
- Elimination of components no more needed
- Reversal of traditional engineering solutions

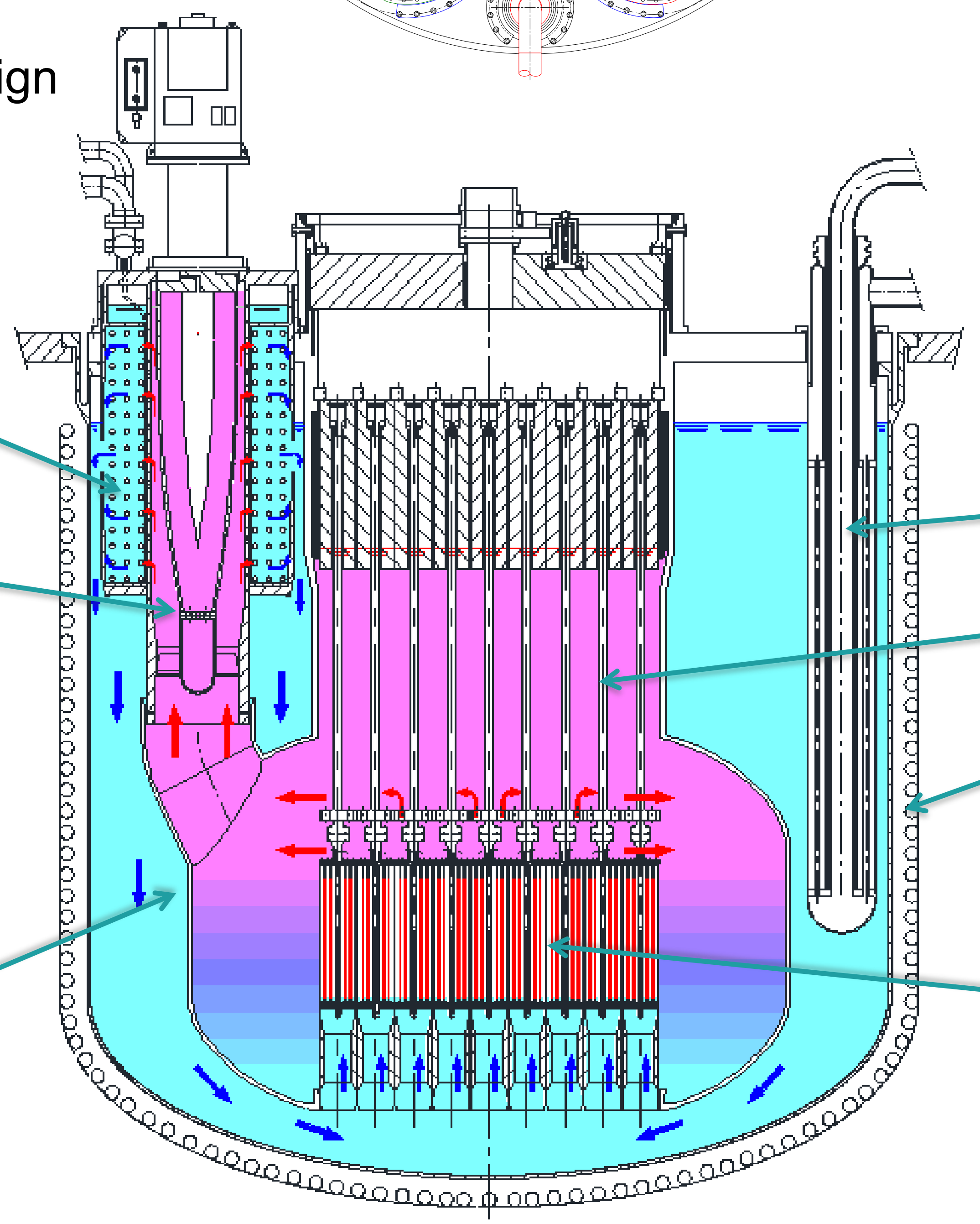
Compact reactor building

- No intermediate loops
- Compact primary system
- No risk of LOCA



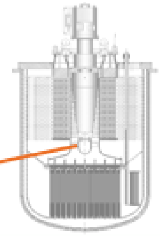
Plan view

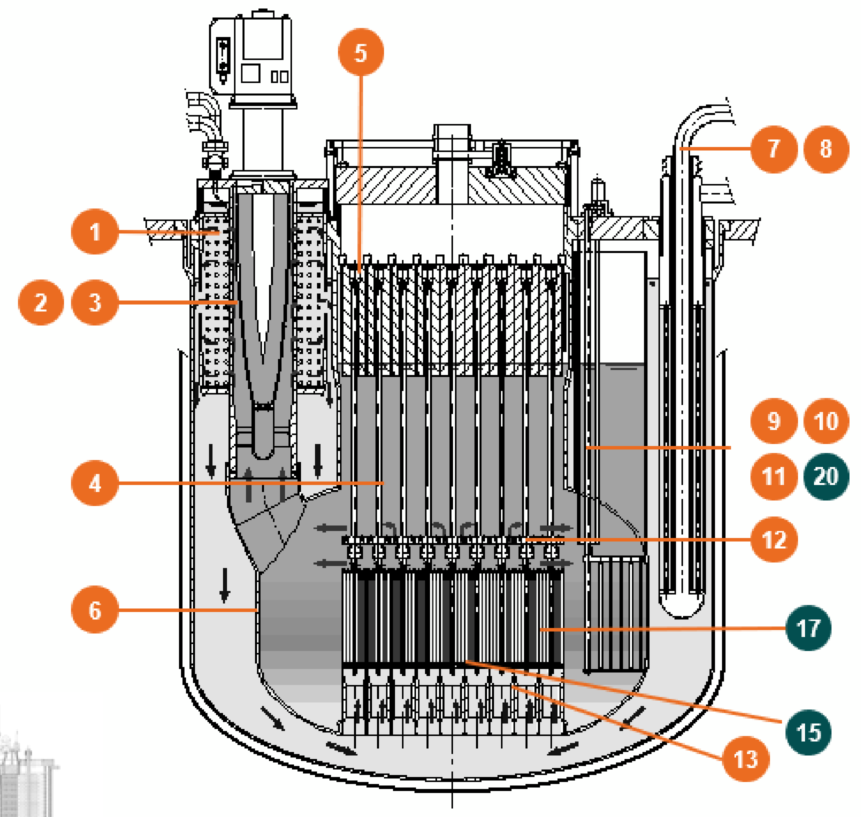
The LFR-AS-200 design



*new*cleo's patents

Patent 1 Spiral-tube Steam Generator	1
Patents 2 and 3 Pump/heat exchanger assembly	2 3
Patent 4 Extended stem FA	4
Patent 5 Self-supporting core	5
Patent 6 Amphora Shaped Inner Vessel	6
Patents 7 and 8 DHR passive systems	7 8
Patents 9, 10 and 11 Control and shut down rods	9 10 11
Patent 12 Expanders	12
Patent 13 FA with cooling ducts	13
Patent 14 Support system of the core of a nuclear reactor	14





Patent 15 – *filed 04 Aug 2023* FA for a nuclear reactor	15
Patent 16 – *filed 21 Aug 2023* System for the handling of fuel assemblies	
Patent 17 – *filed 19 Sep 2023* Spacer for fuel rod	17
Patents 18, 19 – *filed 15 Nov 2023* Thermal storage	
Patent 20 – *filed 13 Jun 2024* Shut down system	20
Patent 21 – *filed 20 Jun 2024* Austenitic stainless steel	
Patent 22 – *filed 17 Sep 2024* Heat pipes	
Patent 23 Preparation for filing	

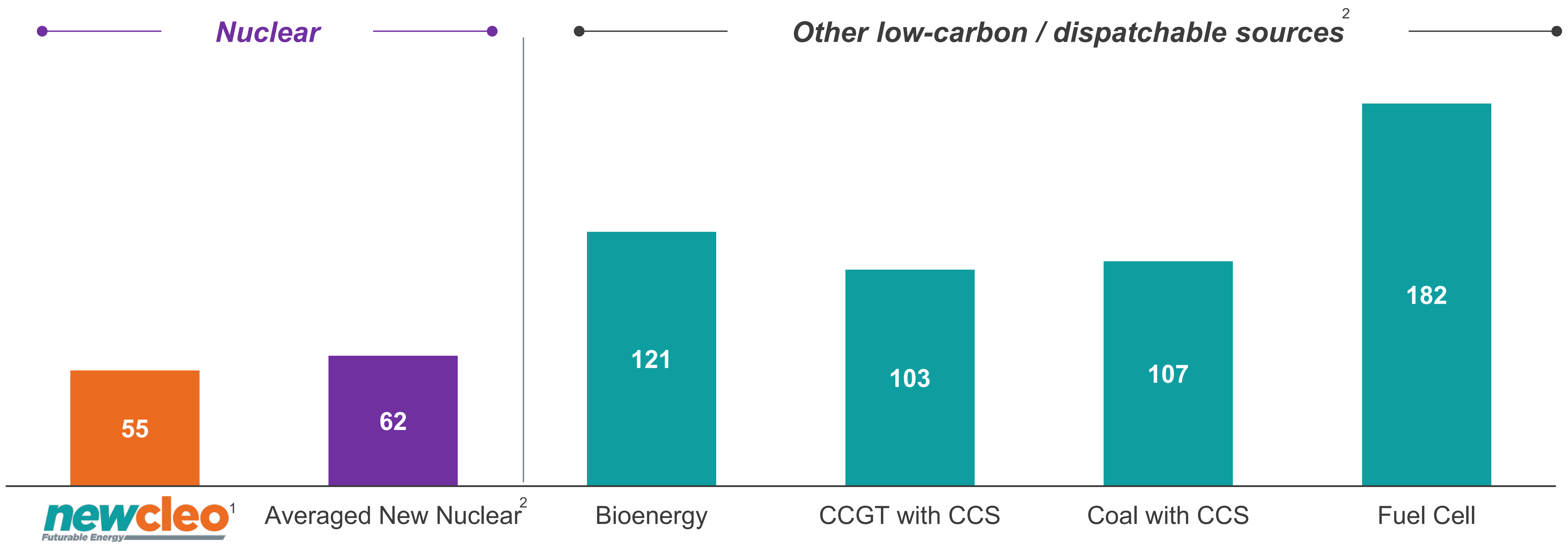
Published

Filed, not published

*new*cleo will be an LCOE-competitive dispatchable low-emission source

*new*cleo's LCOE will be lower than other CO_2 - free dispatchable sources

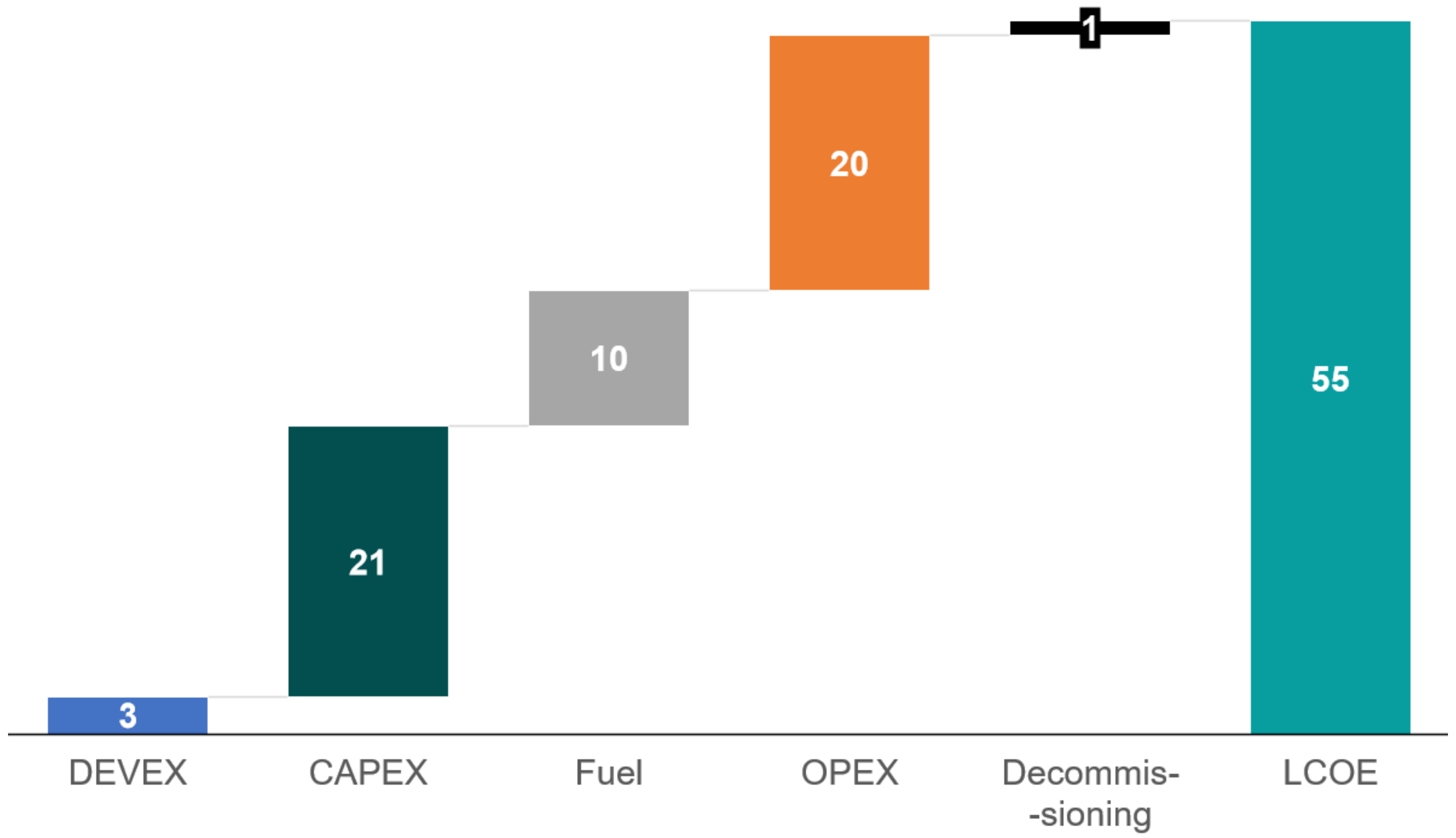
€/MWh LCOE (2024)



- *new*cleo LFR can be a **competitive programmable and scalable zero-carbon** source featuring a LCOE projected to be less than €60/MWh[1]
- Alternative **low carbon dispatchable energy sources (e.g. Gas with Carbon Capture and Storage and bioenergies) are physically limited due to geological storage sites or feedstock growth**
- Moreover, **MOX_{LFR}-fuelled nuclear power ensures independence** from both fossil fuel supplying countries and Uranium suppliers for fresh nuclear fuel fabrication

*new*cleo's LCOE build-up[1]

€/MWh, LCOE (2024)



- **LCOE of a many-of-a-kind 4-units site of LFR-AS-200MW**
- Key cost drivers for LCOE are **capex, opex and fuel costs**
  - Devex cost for site is shared among units
  - Capex optimisation is assumed for a reactor fleet
  - Operational staff costs and central management overhead are shared among several units

Source: [1] €55/MWh refers to a *new*cleo LFR-AS-200 site consisting of 4 x MOAK self-sustaining, high-temperature reactors with 93% capacity factor and 5% discount rate; [2] LCOE data for other sources obtained from: https://www.iea.org/data-and-statistics/data-tools/levelised-cost-of-electricity-calculator with a common discount rate of 5% applied to match newcleo LCOE calculation

*new*cleo relies on 30+ years of international research efforts

1993

The concept of the **Accelerator Driven System** was first introduced at **CERN** by Nobel Laureate and Director General Carlo Rubbia as 'Energy Amplifier'

1994

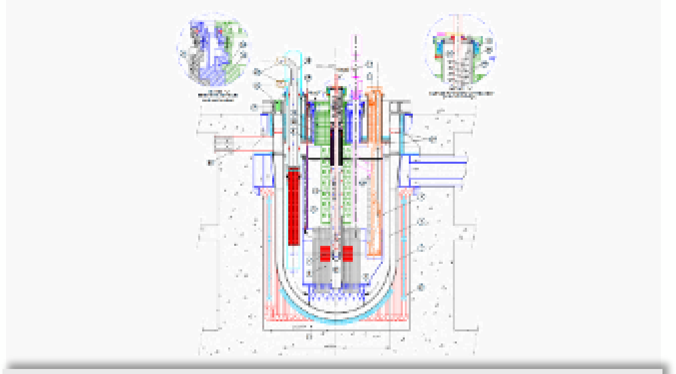
FEAT (First Energy Amplifier Test) run at CERN to demonstrate the ADS **feasibility** for energy production

1995

First contacts with Russian scientists who designed the Alpha class nuclear Pb-Bi **submarines**. V. Orlof presents at CERN the conceptual project of his BREST reactor (now under construction)

1996

TARC (Test of Adiabatic Resonance Crossing) experiment at CERN to demonstrate **neutrons phenomenology in pure lead**



1999

Italian Government funding an industrial project producing a reference configuration of the **ADS Experimental Facility** (XADS) with Luciano Cinotti as technical project manager

2000

LFR chosen as one of the **six leading technologies** developed by the **GIF** (Generation IV International Forum)

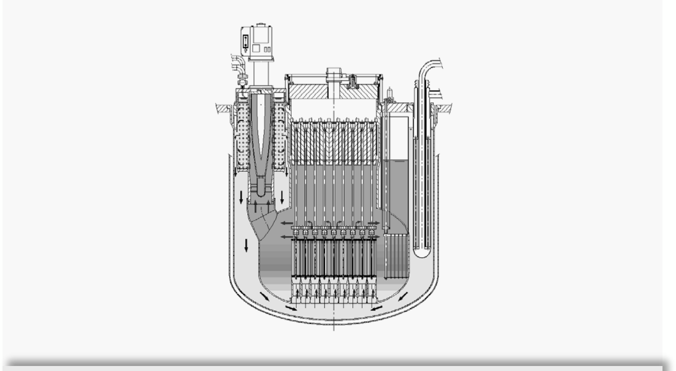
GEN IV International Forum
Expertise | Collaboration | Excellence

2002

Design and realisation of the large-scale liquid lead test facility CIRCE at ENEA-Brasimone, today the most relevant R&D infrastructure for LFR development worldwide

2003

The EU, through the 5^{th} **Framework Program**, launched a broad R&D program (~50 academic and industrial organisations) on lead-based ADS technologies



2013

Hydromine Nuclear Energy incorporated to design the **AS-200 and TL-X**, part of the Gen-IV projects listed by the International Atomic Energy Agency (IAEA)

2021

newcleo incorporation and acquisition of Hydromine Nuclear Energy with its set of international patents
Capital raise: **€100m**

A strong track record

Mar 2022

First AGM, launch of €300m equity raise

ENEA partnership

Mar 2023

ENEL partnership

Second capital raise launch

Conceptual design AS-30 reactor completed

May 2023

Choose France summit

First technical meeting with **ASN and IRSN**

Jun 2023

Awarded **France 2030** call for projects

Jul 2023

Partnerships with **Fincantieri and RINA** for naval reactors

Oct 2023

Acquisition of **SRS-Fucina**, worldwide nuclear engineering leader

Cooperation and investment agreement with **Tosto Group**

Nov 2023

WNE participation

Partnerships with **Assystem, Ingérop, Onet**

Dec 2023

Acquisition of **Rütschi Group**, leader in pumps manufacturing

First experimental facility: **CAPSULE**

Jan 2024

Agreement with **MAIRE** for hydrogen and chemicals production

Contract with **Nuclear Transport Solutions (NTS)**

Apr 2024

Regulatory Justification submitted in the UK

CEA partnership

Second experimental facility: **CORE-1**

Jul 2024

Licensing process: completed the "preparatory stage" set up by the French nuclear safety authorities (**ASN and IRSN**)

Sep 2024

Agreement with **Saipem** to study offshore applications of our technology

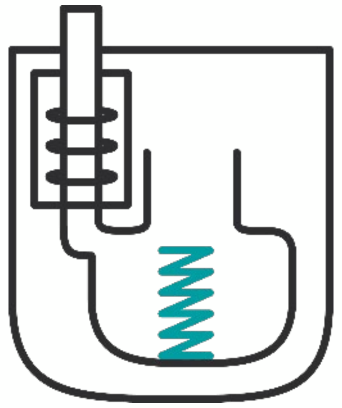
Relocation of holding headquarters from London to Paris

Oct 2024

Selected by the **European Industrial Alliance on SMRs** as one of the projects to be supported

newcleo Futurable Energy

A well-defined roadmap to achieve tangible development goals



2026

R&D and Precursor

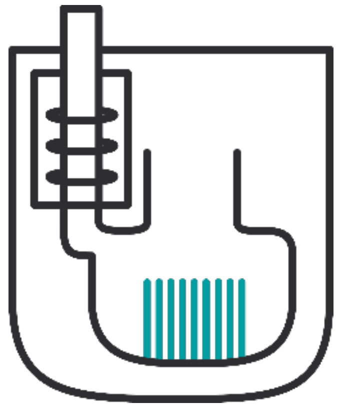
Several R&D and qualification facilities, and a **10 MW non-nuclear reactor** with turbo-generator (Precursor) built in ENEA-Brasimone

Design, manufacturing and operation in progress

2030

MOX production

FR-MOX production facility, starting from available (separated) material in France

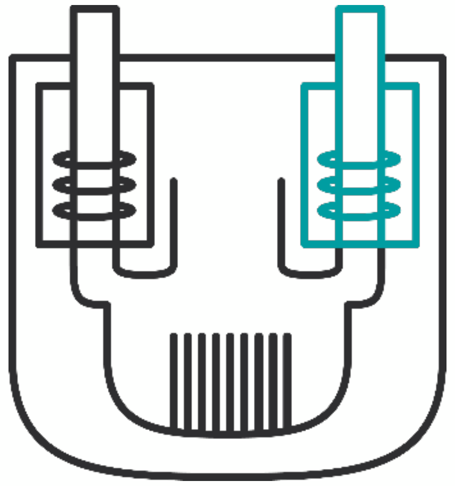


2031

LFR-AS-30

30 MWe nuclear irradiation reactor with core outlet at 440°C and later 530°C in France

Basic Design in progress
Pre-licensing “preparatory stage” ended in June 2024



2033

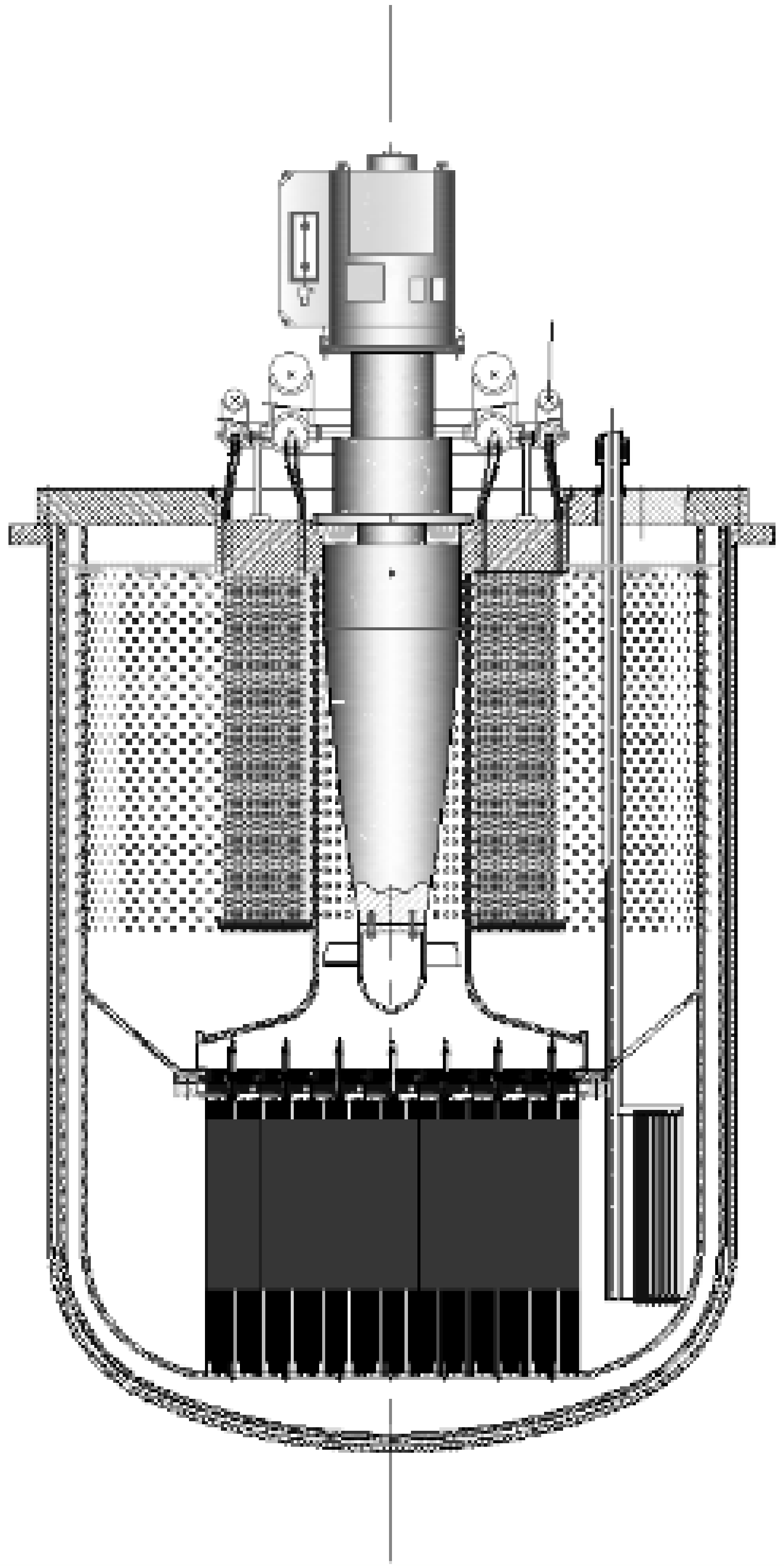
LFR-AS-200

200 MWe FOAK, also for non-electrical uses (e.g. cogeneration and chemicals production)

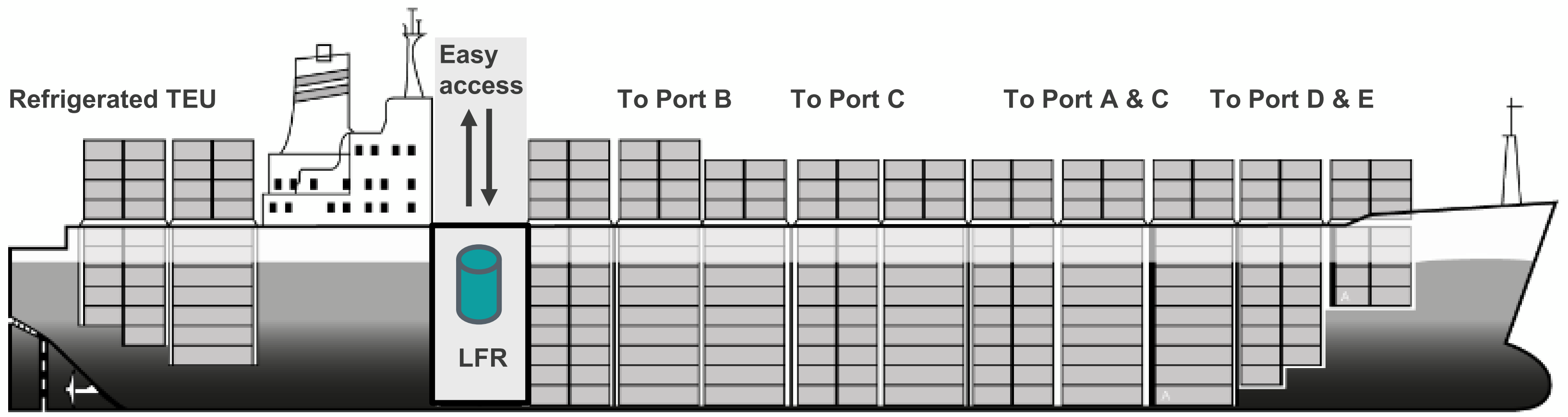
Conceptual design closes Q3 2024

Ongoing M&A Acquisition programme

LFR-TL-30: Transportable Long-lived, 30MWe



A mini reactor, producing 30MW electric output and having infrequent refuelling (10y+) and maintenance: a **closed reactor** to be easily replaced at end of life



RINA FINCANTIERI

Since July 2023: working together on feasibility study for nuclear naval propulsion

Power	**90MWth**
Core coolant	**Pure lead**
Core coolant temperature	**inlet 420°C outlet 530°C**
Layout	**Pool type**
Circulation	**Forced: 1 pump**
Spectrum	**Fast**
Fuel form	**Hexagonal fuel assembly**
Fuel	**UO_2 or MOX**
Secondary side fluid	**Water**
Steam generators	**1 spiral-tube SG**
Design life	**10+ years**

***new*cleo's broad R&D programme**

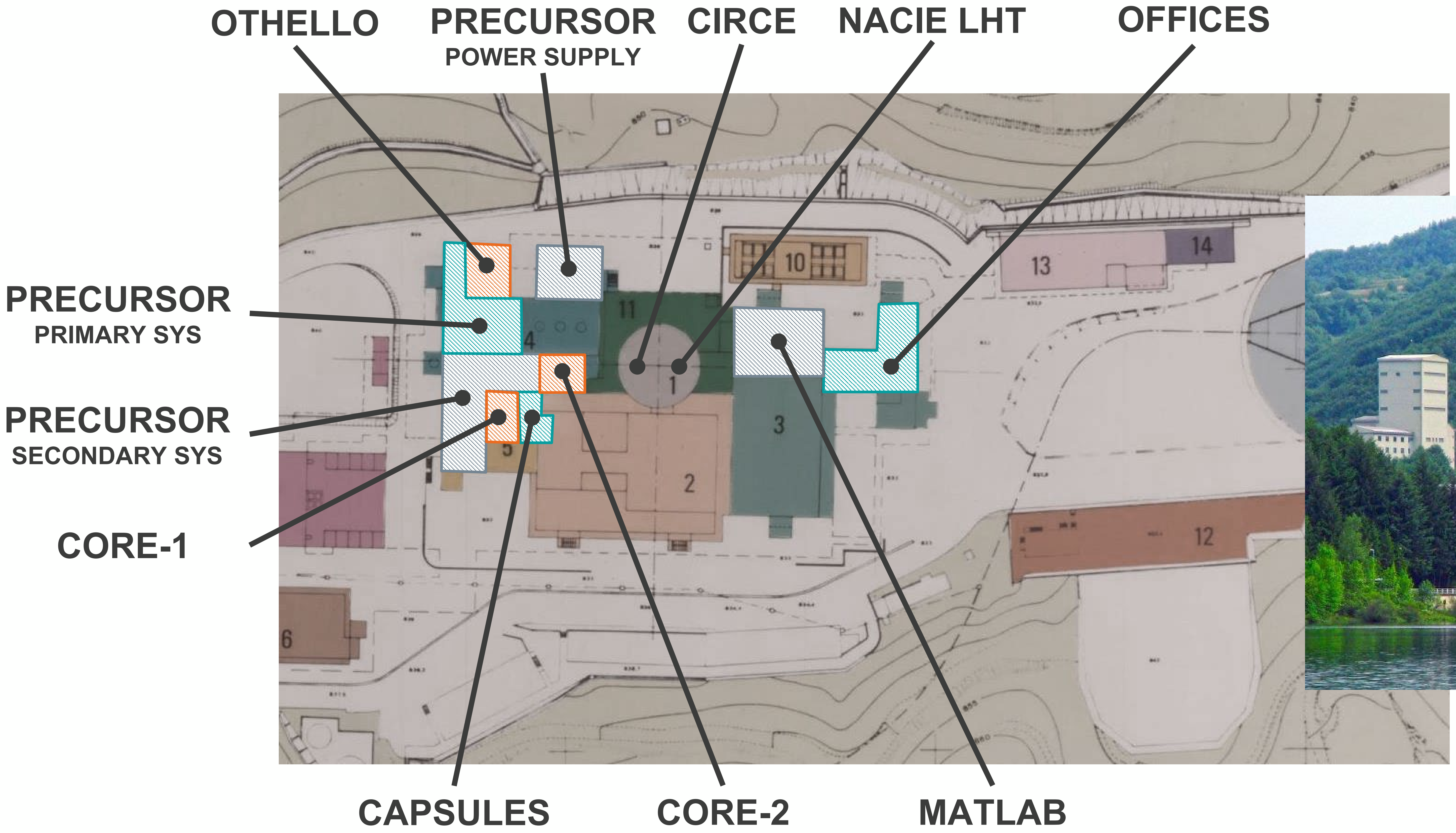
*new*cleo has established and is rapidly deploying a broad R&D programme to consolidate mature technologies and validate our innovative engineering solutions, as well as evolve our commercial reactor offering

Working closely with our partner ENEA and thanks to the deep and well-established know-how of SRS and Fucina, we are installing **several new facilities** as well as test section at existing facilities

Experimental Facility / **LFR Technical Domain**	**CAPSULE**	**CORE-1, CORE-2**	**LEAD/CHEM LAB (BRA)**	**MAT LAB (TO)**	**NACIE-LHT**	**DCI**	**MANUT dry, in-lead**	**EFESTO**	**CIRCE-NEXTRA**	**OTHELLO**	**HUSTLE**	**PRECURSOR**
Structural materials and coatings	■	■	■	■								
Core, fuel and control/shutdown rods							■			■		
Coolant chemistry and auxiliary systems	■	■	■							■		■
Primary system integrity and component studies					■	■		■	■	■		■
Fuel and component handling							■					
Plant operation and accident response										■		■
Balance of plant integrity studies										■		■
In-Service Inspection and Repair											■	

To broaden and complement this programme, **further collaborations** with nuclear companies, universities, laboratories and institutes **are being established and actively pursued by *new*cleo** to leverage existing infrastructure and accelerate R&D programmes

ENEA-Brasimone Facilities



Material R&D – programme and infrastructure

Static corrosion capsules

- **CAPSULES**: 6 skids of 3 capsules; 108 samples
- Active control of [O] and T (400-750°C)

Flowing Pb loops

- **CORE-1**: 32x corrosion (1 m/s, T<650°C) + 3x erosion (10 m/s, T<520°C) + cold-trap and mechanical filters
- **CORE-2**: 160 corrosion samples (1 m/s, T<650°C)

Laboratories

Mechanical tests in Pb

- Creep and fracture mechanics frames
- Tensile test/SSRT frame

Metallography and Microscopy

- Metals, corrosion layer thickness, morphology and chemical composition

Metrology

- Dimensional measurements with μm precision

Perform corrosion exposure experiments on steels, surface treatments and new materials, in static and flowing conditions and under mechanical stress

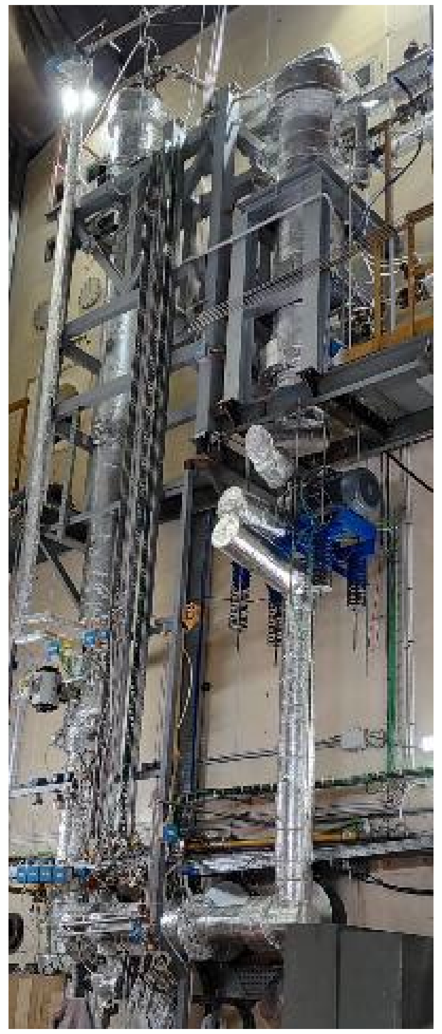
LFR Primary System: thermal-hydraulics, components and structural integrity

- Thermal-hydraulic tests in normal and off-normal conditions
- Design validation and testing of components
- Instrumentation development

Fuel Assemblies
Steam Generator
Primary Pumps
Decay Heat Removal (DHR)
Primary system integrity

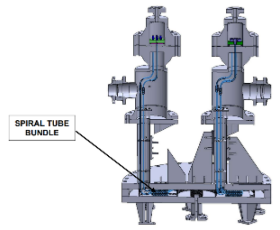
Refurbishment of ENEA facilities	
NACIE-LHT	Test section to study lead cross flow heat transfer of the Steam Generator
CIRCE-NEXTRA	One or more test sections at existing ENEA-CIRCE: Component testing/qualification and Steam Generator Tube Rupture (SGTR) tests



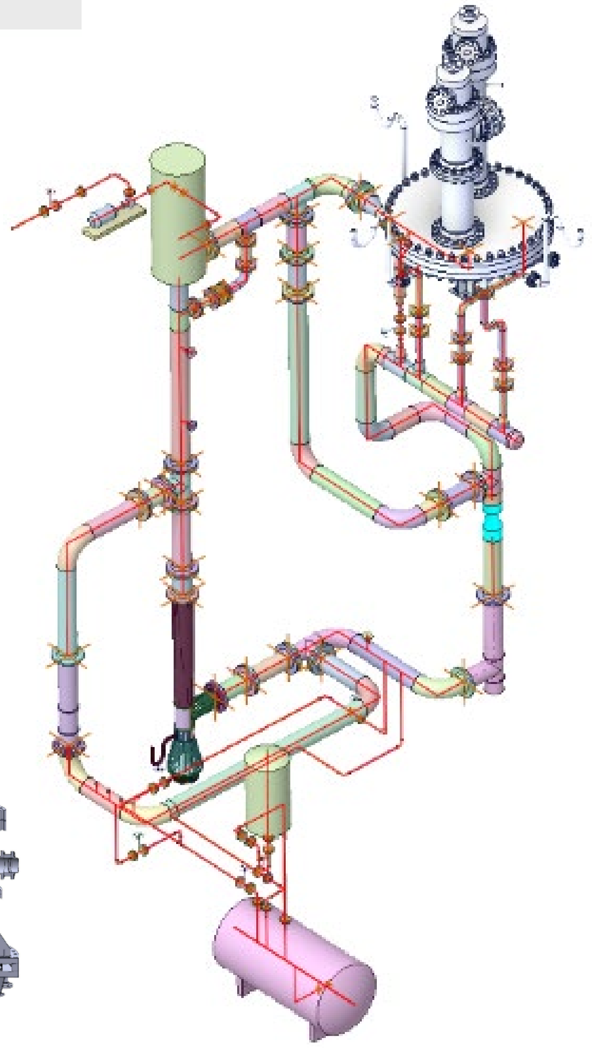



CIRCE and NACIE facilities

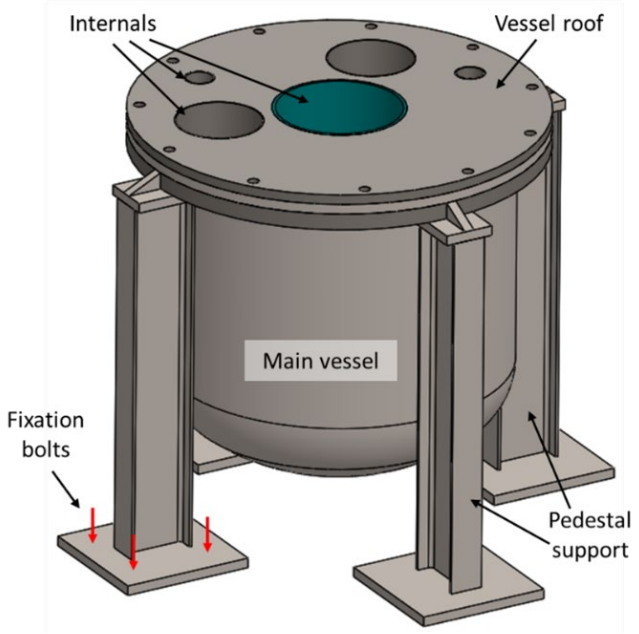
New test facilities	
OTHELLO 2 MW	New thermal-hydraulics loop test facility for thermal-hydraulics and component performances
DIP COOLER INSTABILITY Turin	New test facility for TH investigation on Decay Heat Removal system
EFESTO	Fluid-structure interaction test: Earthquake and Sloshing

DCI test section



OTHELLO



EFESTO notional sketch

Fuel and Component handling / control rods / ISI&R

MANUT programme

- Mechanical design validation and equipment testing
- Instrumentation
- Functional tests and operations / procedures

Core design

Rotating Plugs

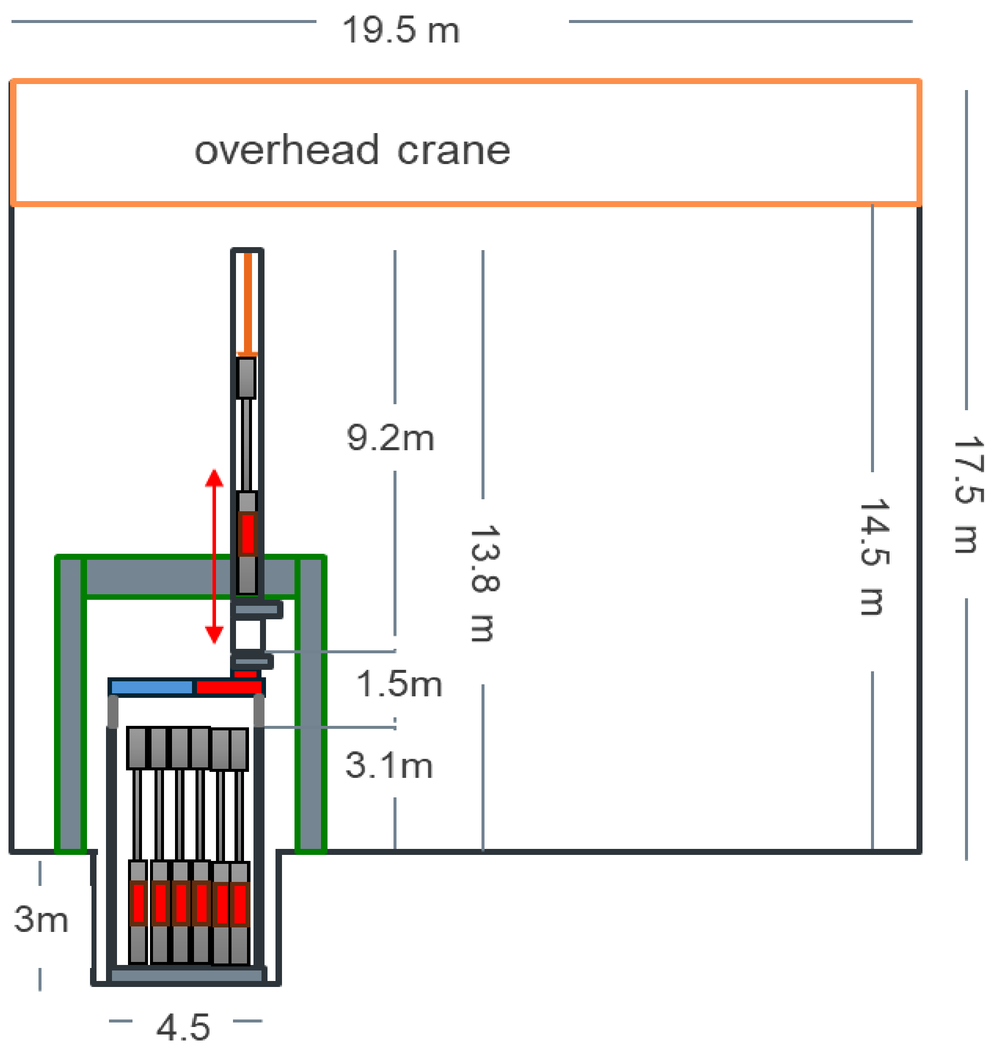
Fuel Handling Machine

Component handling and maintenance

Control Rods driving mechanism

Dry tests

- Tests in air on fuel and component handling



In-lead tests

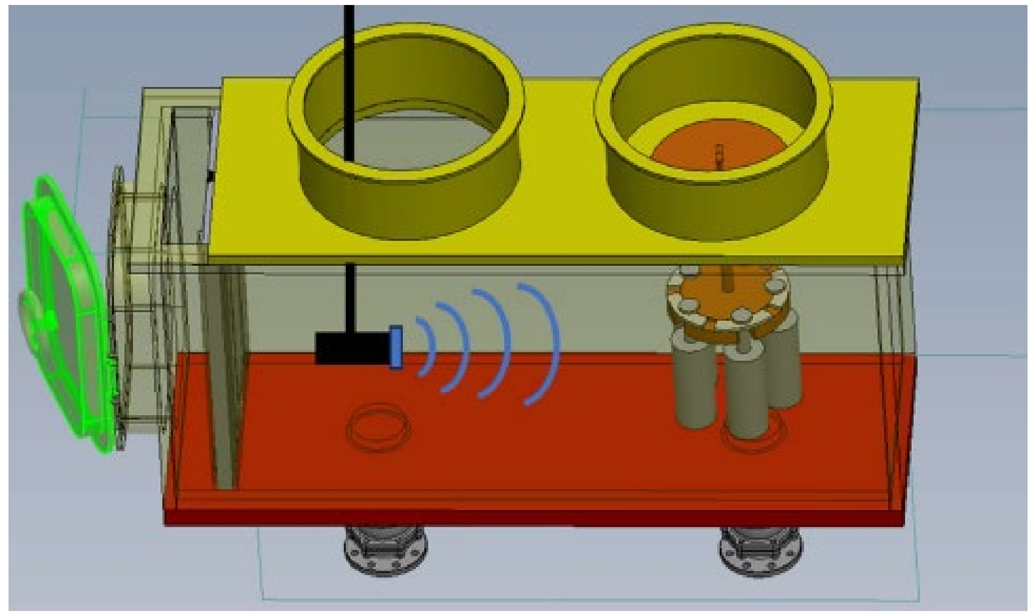
- Infrastructure under development **@Brasimone** site

HUSTLE

- Devoted to the development of ultrasonic technology for In-Service Inspection & Repair (ISI&R)
- Tests performed in a **tank filled by molten pure lead**

Phase 1 – US in hot air

Phase 2 – US in liquid lead



HUSTLE – Phase 2

PRECURSOR test facility

Integral-effect test facility representative of LFR-AS-30

PRECURSOR is a **10MWth (1/9 of LFR-AS-30) pool-type facility** that aims at investigating the thermal-hydraulic behaviour of the LFR-AS-30 reactor, with particular focus on:

- Normal Operating conditions, normal start-up/shut-down transients and, to some extent, accidental transients
- BOP transients, coupling with SG and test of its stability domain, and interactions with primary system

Challenge to find the best tradeoff between **representativeness** (both at system and components level), **cost-effectiveness** and other **side constraints** (e.g., time, space)

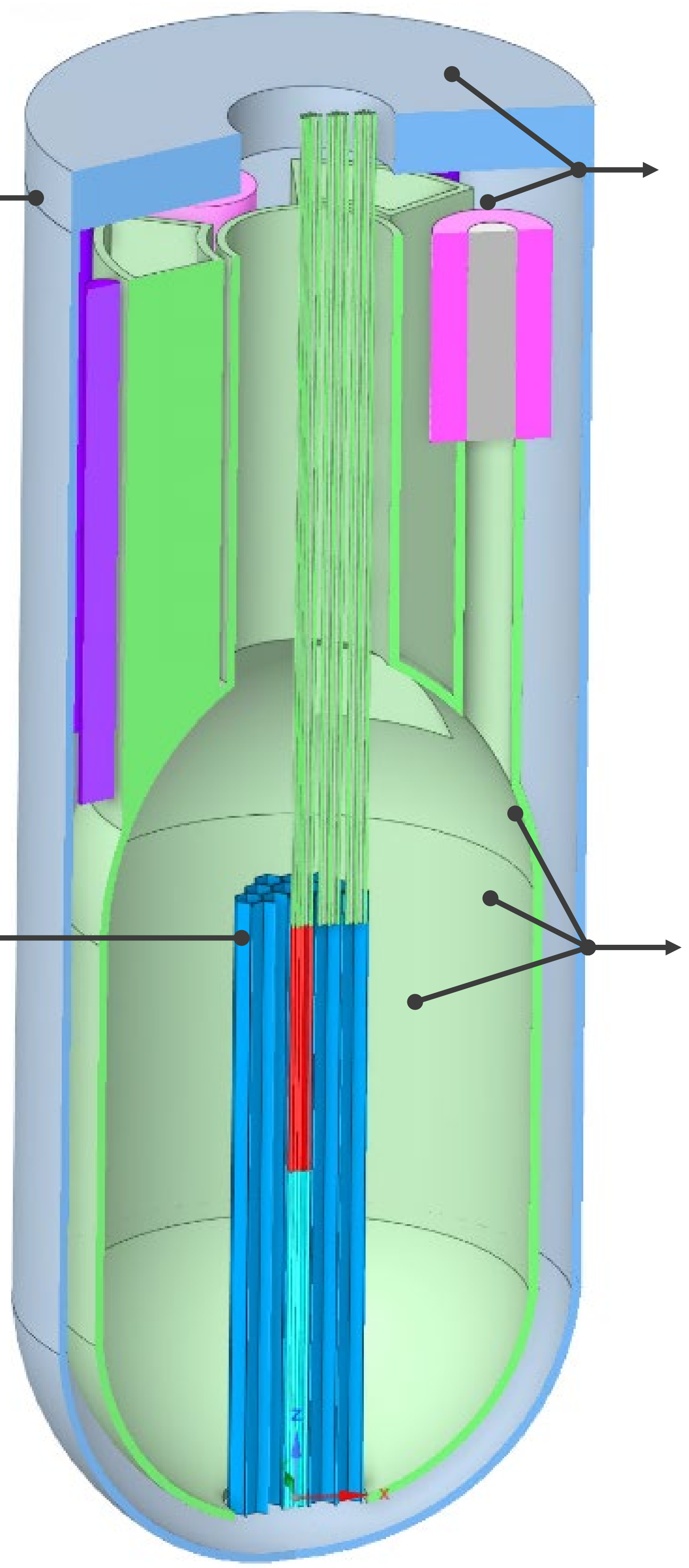
Consolidated **Power-to-Volume (P2V)** scaling method and **phenomena-driven approach** adopted

DHR2:

- three water-steam loops, each consisting of a dip-cooler, condenser and connecting piping

eCore:

- designed to **comply with P2V** while ensuring primary flow shaping (19 FAs) and minimising the number of heating rods
- Electric supply from **above**
- Ongoing activities to design cooling systems for **parasite power generation due to Joule's effect**



PRECURSOR facility, notional sketch

Pump and SG:

- SG designed to **minimise the radial footprint** (due to P2V constraints) while ensuring representative operating conditions of primary and secondary circuit
- Axial flow pump inside the SG as in LFR-AS-30

Pools and ASIV:

- PRECURSOR vessel and Amphora-shaped Inner vessel (ASIV) to **preserve ratio between hot and cold lead volumes**
- **Preserved** components and overall system **length**

Acquisitions accelerate our strategy and anticipate revenues

Building a highly synergetic EPC platform

Less than two years since its launch, ***new*cleo is developing a full Engineering, Procurement, and Construction (EPC) service provider**, constructing a model that facilitates the full implementation of our products and services, from design to delivery.

Beyond reactors and MOX manufacturing, *new*cleo develops skills and services for its own projects and the wider industry via the *new*cleo Group of companies. This includes **investing in the renovation of existing facilities and developing customer contract portfolios** to enhance revenues and drive business expansion.

Highly disciplined **M&A strategy** – c. 20 additional potential targets have already been identified to continue to **consolidate a whole ecosystem of unique expertise in nuclear**

*new*cleo's first acquisitions, SRS, Fucina and Rutschi are expected to generate **c. EUR 50 million revenue and c. EUR 13 million EBITDA in 2024** and their businesses are expected to grow substantially on the back of the projected **3x nuclear sector expansion** linked to global decarbonisation targets.

S.R.S. Servizi Ricerche e Sviluppo

Design and engineering since more than 50 years

S.R.S.
A newcleo company

90 employees

Rome (RM), Italy

More than **25 Lead Experimental Facilities successfully commissioned**

S.R.S. Servizi di Ricerche Sviluppo S.r.l. (SRS) offers multi-disciplinary engineering services in the industrial (mainly in the nuclear field), oil & gas and petrochemical sectors. SRS is a **major player in designing, construction, commissioning and operating lead-cooled experimental facilities**.

SRS developed skills and competences on lead-technology and on LFR's components and systems experimental validation and participated to the most relevant European and international projects in the field.

SRS and ENI/VERSALIS signed a joint development agreement to develop a new technology, starting from an SRS Patent, to transform mixed plastic waste, that cannot be mechanically recycled, into raw material to produce new virgin polymers.

Specialised in

Nuclear energy, conventional (oil & gas) energy, renewable energy, environment protection, chemical plants, petrochemical engineering, steel working, water treatment and desalination

Provided services

Design, technical specifications, purchase, project management, supervision of construction and assembling, final testing, engineering services

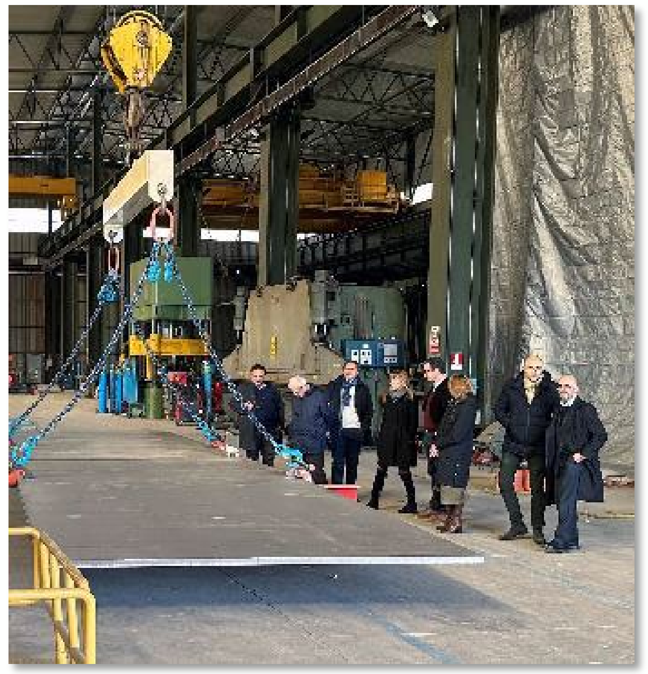
Among existing customers

eni, versalis, Westinghouse, SOGIN, ENEA, Technip, Institute of Nuclear Energy Safety Technology

Fucina Italia

FUCINA ITALIA
A *newcleo* company

Build mechanical components and systems and production lines since more than 30 years



65 employees | Piombino (LI), Italy | Construction according to nuclear standards

Founded to meet the growing requests for special lifting machines in the industrial environment, the company has found development **in the nuclear sector since the 90s** with the first patents related to the containment of nuclear waste and is today among the **leading companies in the nuclear decommissioning** sector in Italy and the **building of components for Liquid Lead systems** worldwide.

Fucina Italia has a strong production platform benefitting from:

- 20,000m^2 production area, of which 9,000m^2 covered
- 11,000m^2 additional available land, of which 6,000m^2 buildable land which will be a key production hub for *new*cleo

Specialised in

Steel machinery, cranes, cellulose handling in the port area, pressure vessels, containers for radioactive waste, heavy carpentry

Provided services

Design, manufacture and assembly of steel machinery, cranes and lifting equipment, patented sleepers and accessories for cellulose handling in the port area, pressure vessels, containers for radioactive waste, heavy carpentry, as well as mechanical processing, maintenance of lifting equipment and industrial machines and plants.

Among existing customers

SAIPEM, enel, FINCANTIERI, orano, SOGIN, NUCLECO

Rütschi

Pumps manufacturing since almost 80 years

RÜTSCHI
A newcleo company

80 employees | France, Switzerland | **> 5,000** pumps in operation

Founded in 1946, Rütschi is the pioneer of the canned pump technology, **widely used in nuclear applications**. Rütschi solutions are installed in **more than 100 nuclear power plants worldwide**.

Rütschi supplies with engineered pumps and spares parts an installed base of more than 5000 nuclear pumps and is also actively involved in special and highly customized projects in Asia and South America.

The group's two production plants in Mulhouse (France) and in Möhlin (close to Basel in Switzerland), provide a total covered area of 3,500sqm with manufacturing means, testing benches (with a semi-anechoic room in Switzerland), and clean assembling area.

Furthermore, Mulhouse offers an opportunity to further expand.

Specialised in

Canned motor pumps, mechanical sealed pumps, immersed vertical pumps, submersible pumps for nuclear, industrial and chemical plants

Provided services

Provision of nuclear spares for pumps installed in existing nuclear power plants, development of custom-made pumps for nuclear power plants, research centers and naval applications

Among existing customers

EDF, axpo, ENGIE Electrabel, WÄRTSILÄ, KHNP, Eskom, ROCKFIN

Increasing number of partners and suppliers

Creating a global strategy supporting our delivery

UK

TÜV SÜD · NIA Nuclear Industry Association · wnti · nexa · Nuclear Institute · DWD · National Nuclear Laboratory · Frazer-Nash Consultancy · Dalcour Maclaren · Siemens Energy · Achilles · Tecnimont · IBM · NTS Nuclear Transport Solutions · AtkinsRéalis · arabelle solutions · LSE The London School of Economics and Political Science · Nuclear AMRC · Jacobs · mace · Hydrock · Mott MacDonald

FRANCE

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NEI Nuclear Energy Institute

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JAEA · JNFL · NFI

GLOBAL

World Economic Forum · World Nuclear Association · VIVATOME Auvergne-Rhône-Alpes · SNETP · UNECE

newcleo Futurable Energy

What sets us apart

MULTIPLE MONETISATION STRATEGY

- EPC services, sales of components, licenses, operations, maintenance
- Fuel recycling, manufacturing, direct deployment of fleets

HIGH PRIVATE FUNDING AND CONSOLIDATING THE INDUSTRY

- EUR 537 million raised
- EUR 50 million expected turnover in 2024

UNIQUE PATENTED TECHNOLOGY AND KNOW-HOW

Lead Fast Reactors allow safer, cheaper and circular nuclear to be deployed
A vast and powerful R&D programme

UNIQUE COMPANY FOCUSED ON MOX

Using as fuel what today goes to *waste* (Pu, recycled and depleted U), reducing the high-level nuclear waste volume, uranium mining and boosting energy independence

The future belongs to those who have the energy to imagine it. And build it.

Thank you