



NUOVO NUCLEARE: OPPORTUNITÀ PER L'INDUSTRIA ITALIANA E PER IL PAESE

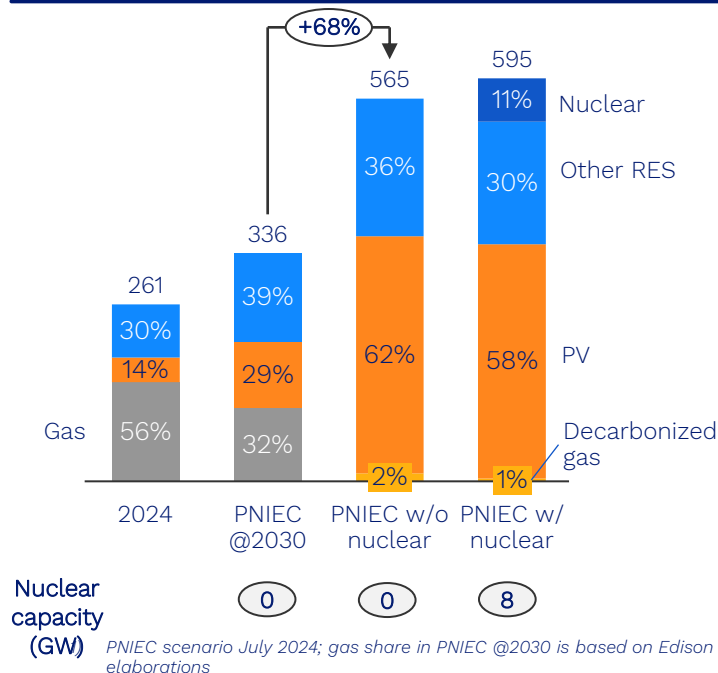
Alberto Pasanisi

Matera, 20 Giugno 2025

Italian nuclear scenario

Edison & PNIEC scenarios @2050

Italian electricity mix evolution @2050¹ (TWh)



- SMRs/AMRs can contribute to decarbonization, alongside RES
 - PNIEC scenario published in July 2024 envisages the possibility of covering **11% of the production mix by 2050 with nuclear energy, 8 GW**
- Nuclear power would allow the achievement of 2050 decarbonization targets at a **lower cost** than the scenario without nuclear power: **€17 billion in savings**, according to PNIEC
- The **first wave** of plants will be mainly based on **SMRs**, which have a more mature technology (GenIII+), while the **second wave** of plants from 2040 on will see the entry of **AMRs** (GenIV)
 - Some fast neutron AMR technologies will be able to **close the fuel cycle**, by using the waste produced by SMRs as input fuel, thus increasing the energy extracted from uranium and reducing nuclear waste radioactivity

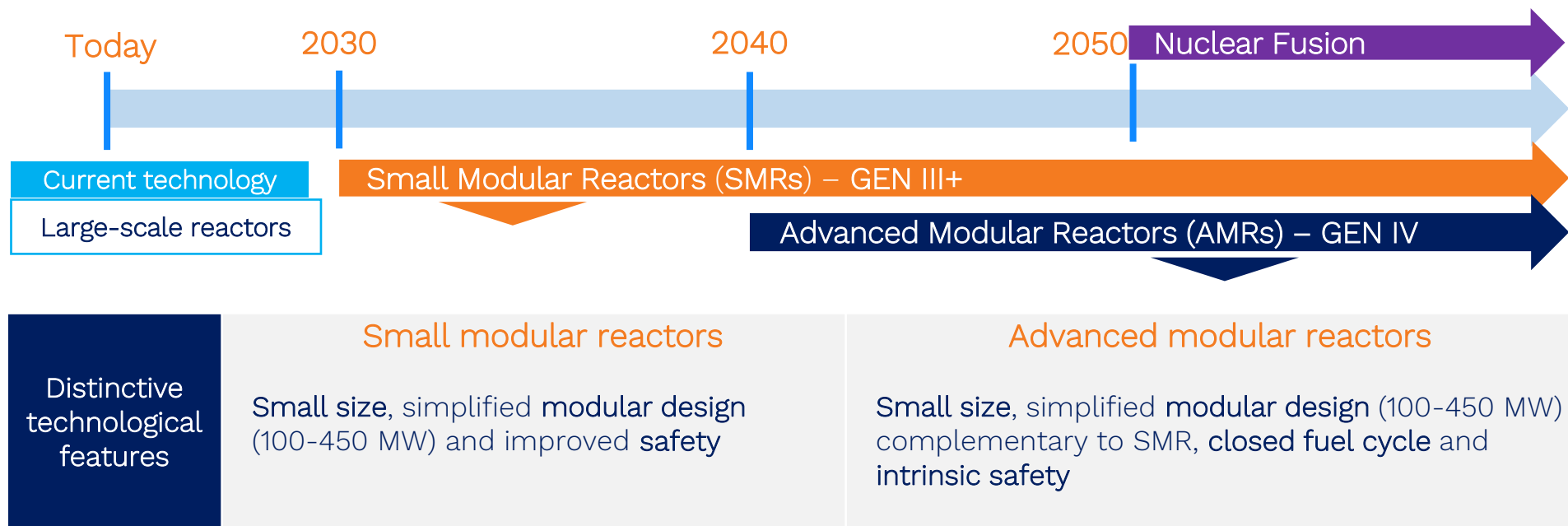
Nuclear and other technologies in comparison

	 CCGT 800 MW	 CCGT+CCS 720 MW	 PV 50 MW	 Wind 50 MW	 SMR-AMR 100-450 MW
Load factor (%)	80	80	20	30	90
Lifetime (years)	25+15	25+15	25	30	60+
LCA GHG emissions ¹ (gCO ₂ /kWh)	390 (320 direct emissions, 70 other emissions)	140 (50 direct emissions, 90 other emissions)	37 + 50-100 for battery	12-11 (onshore-offshore) + 50-100 for battery	4-6
EROEI ²	30	25	5	10	50
Land occupation (ha/GW)	10	15	1000	10000	16

Nuclear power is the most efficient solution to decarbonize the electricity system

1) Life Cycle Assessment of Electricity Generation Options, UNECE, 2022 2) EROEI Energy Returned On Energy Invested

SMRs, an innovation with benefits that can be amplified through the complementary development of AMRs



The distinctive features of “new nuclear” power and current projects under development

TECHNOLOGICAL LEAP

DISTINCTIVE FEATURES OF “NEW NUCLEAR”



Shorter **construction time**



Better **financial viability**



Enhanced **safety**



Flexibility of uses



Limited **land/water consumption**



Combination of **electricity** generation,
heat for industrial uses and **hydrogen***



Reduction of nuclear waste produced
and **fuel cycle closure**

SMR/AMR technology progress globally by project stage, 2024



- Countries with SMRs/AMRs operational or under construction
- Countries with SMRs/AMRs in the pre-authorization
- Countries with SMR/AMR under development

Benefits that new nuclear can enable in Italy – focus on SMRs



Decarbonization and contribution to competitiveness (industry and private customers)

- Complementarity with Renewables: programmability and modularity
- Electricity price reduction: minor system costs for energy storage and grid
- Decarbonization of hard to abate sectors: cogenerativity



Contribution to energy security and technologic independence

- Reduction of gas import dependance: lower energy price volatility
- Lower need for critical raw materials
- SMR technology in development in Europe

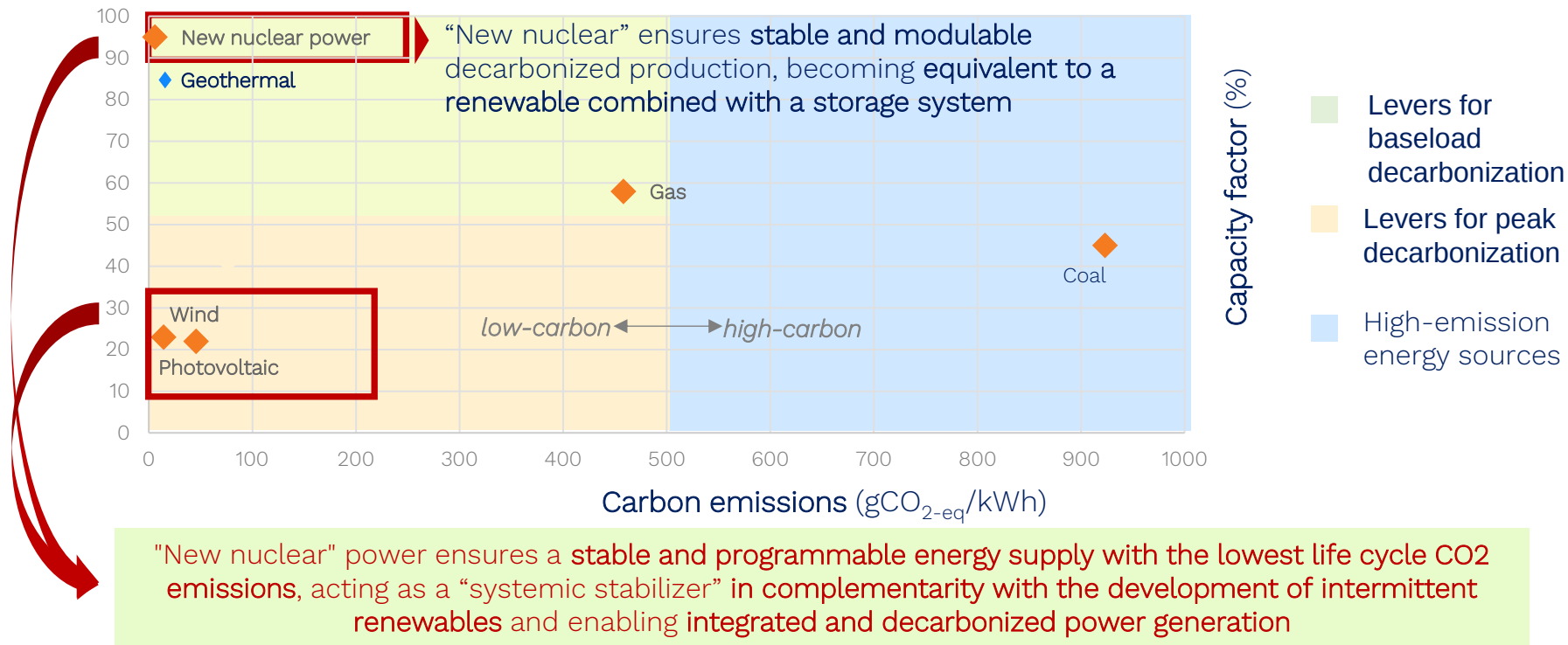


Contribution to the industrial and economic development of the country

- Valorization of Italian competences and nuclear supply chain, both for Italy and for export
- Contribution to GDP and employment growth

The role of “new nuclear” power within energy solutions

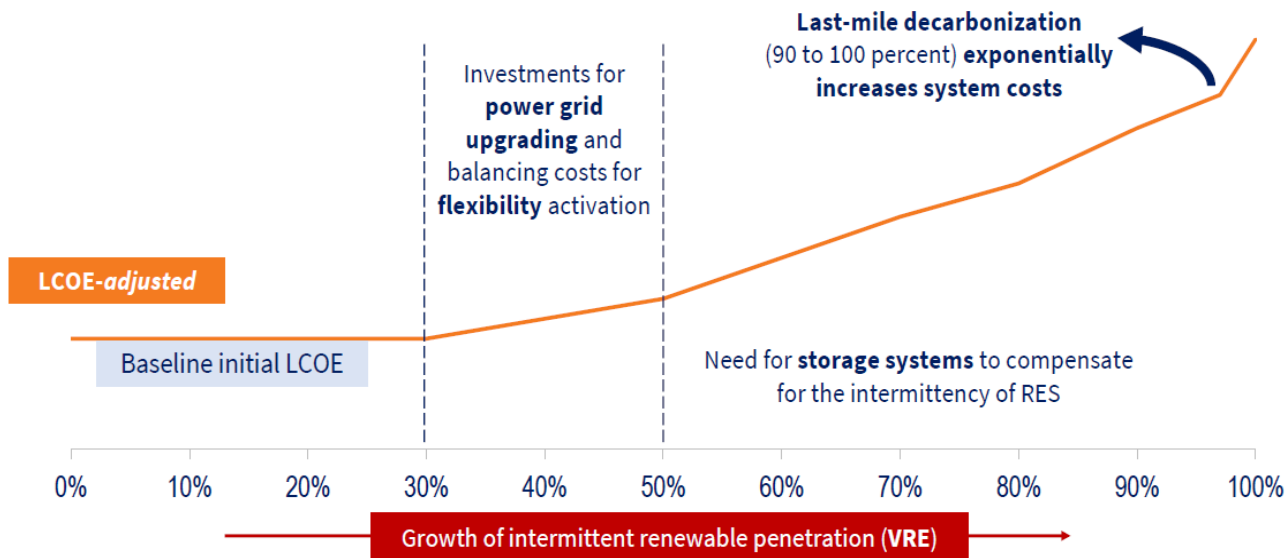
Main energy sources by capacity factor and carbon emissions, 2024



New nuclear role in decarbonizing the last mile

DECARBONIZATION

System costs in a scenario of increasing RES penetration up to 100% of the electricity mix (illustrative)



In this context, "new nuclear" power contributes to:

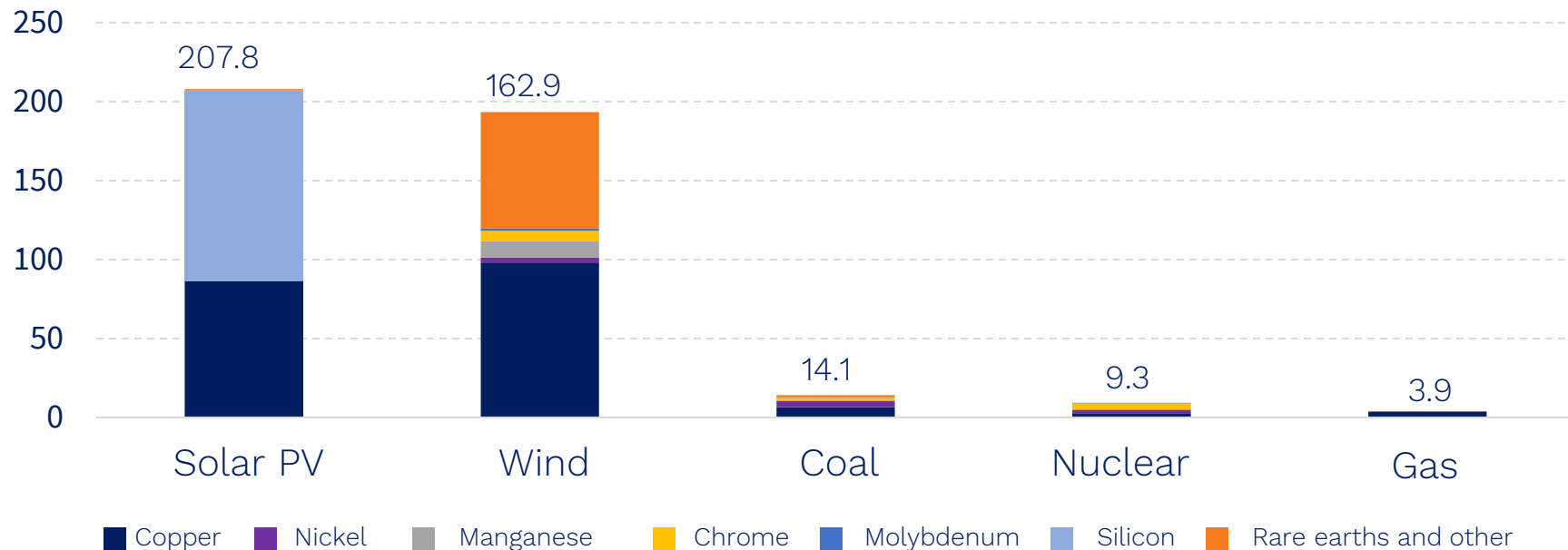
- Reduced system costs (lower investment in storage, transmission grids and plants), enabling the full potential of renewables
- Price stabilization due to greater geopolitical stability of producing countries and low incidence of uranium in the final price

Source TEHA Group elaboration on NEA, DoE data and various sources, 2024

Nuclear power has a low supply risk

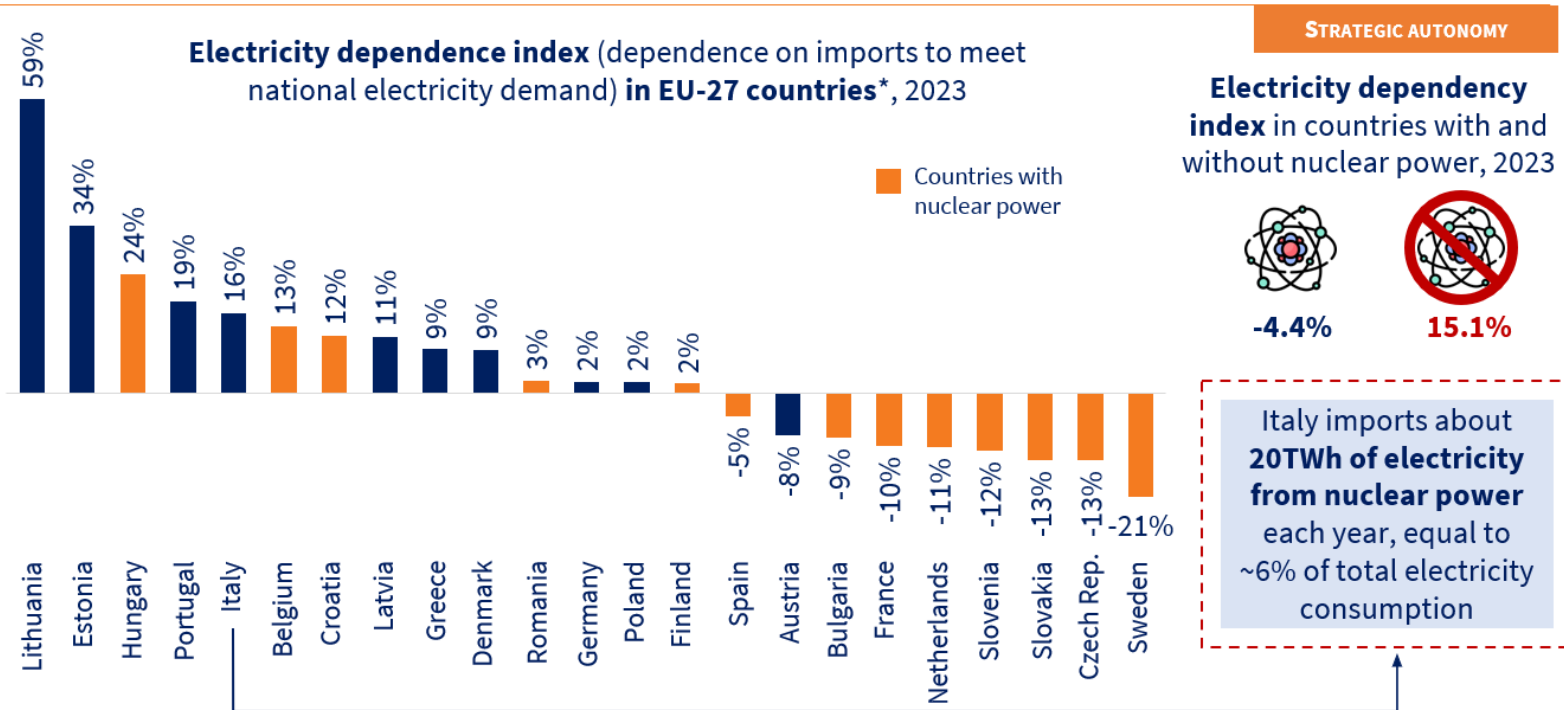
STRATEGIC AUTONOMY

Critical raw materials by type of energy source (kg per GWh), 2021



According to the European Commission, 97.1% of critical nuclear raw materials have a low supply risk

Countries with nuclear power have lower dependence on electricity imports

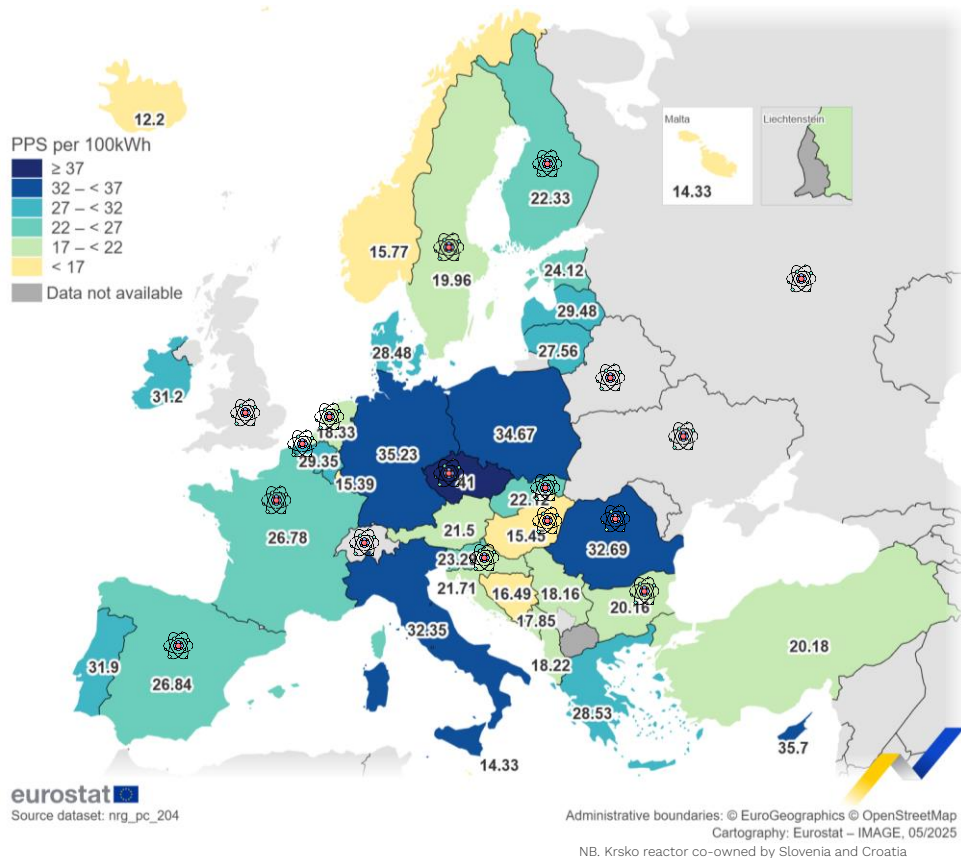


N.B. : Data not available for Cyprus, Ireland, Luxembourg and Malta. (*) Net electricity imports out of total electricity consumption.
Source: TEHA Group elaboration on Ember and EnAppSvs data and IEA. 2024

Countries with nuclear power have (globally) lower electricity prices

Electricity prices for household consumers, 2nd semester 2024 in purchasing power standards* (PPS) per 100 kWh

*The Purchasing Power Standard (PPS) is an artificial currency used in the European Union to compare the economic output of different countries, eliminating the effects of price level differences.



Italy can play a leading role by leveraging a nuclear industry that has expertise throughout the entire supply chain

- TEHA reconstructed the **Italian industrial supply chain** of companies active in nuclear power (~70 companies)
- Through analysis from AIDA, **socio-economic values related to the nuclear energy sector** were estimated

Nuclear supply chain segments covered by Italy, 2023

Segment	Italian presence
Fuel supply	0 companies
Large components	17 companies
Engineering companies	13 companies
Instrumentation	13 companies
Materials and metalworking	11 companies
Assembly and installations	5 companies
EPC/General Contractor	4 companies
Disposal	3 companies
Valves	2 companies
Piping and fittings	2 companies

INCREASED COMPETITIVENESS

Turnover 2022

**€457
million**

Value Added 2022

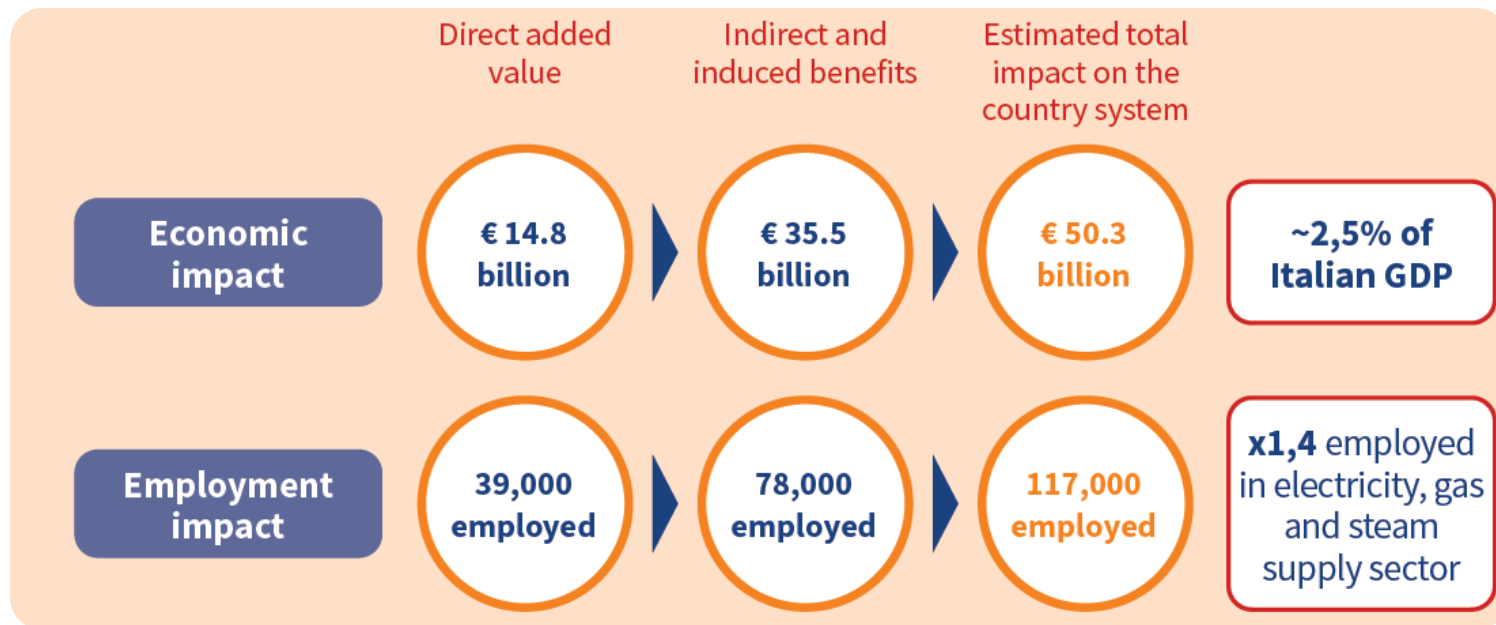
**€161
million**

Employment 2022

**2,800
employees**

New nuclear enabler of economic impact by 2050

INCREASED COMPETITIVENESS

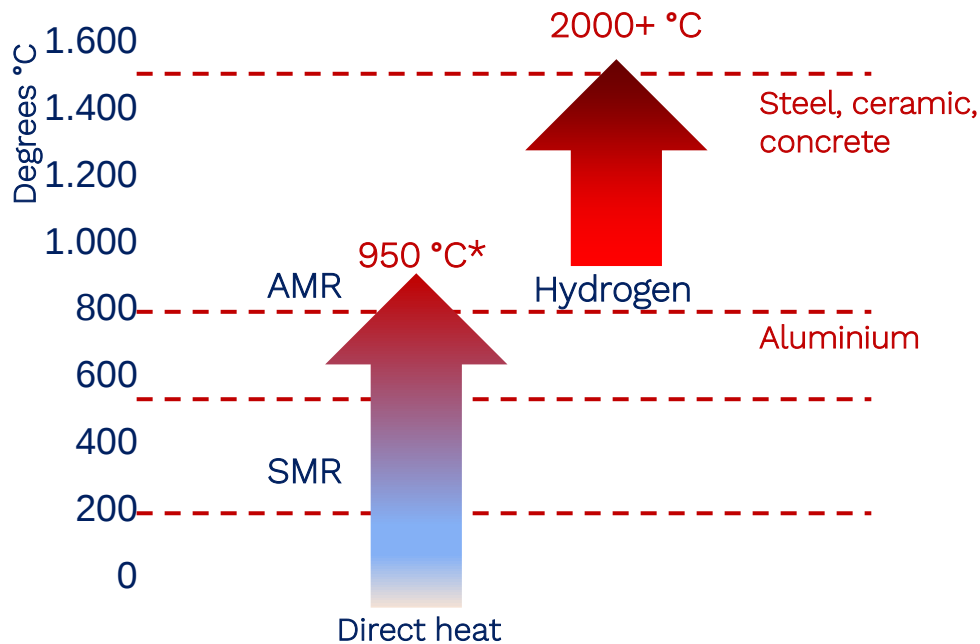


Estimate of the total economic and employment impact by 2050 for the country system through investments in the construction of "new nuclear" power in Europe and Italy (billions of euros and numbers of jobs). Source: TEHA Group elaboration based on data from AIDA, ISTAT and various sources, 2024.

NB Settore D - Fornitura di energia elettrica, gas, vapore e aria condizionata

New nuclear enabling the production of industrial heat and hydrogen for industries

DECARBONIZATION



- Although it does **not** reach the **1,500°C** needed for some industries (steel, ceramics and cement), nuclear power can **produce hydrogen to decarbonize** the processes of those industries
- The EU has established that nuclear-produced hydrogen can be considered “**low-carbon hydrogen**”

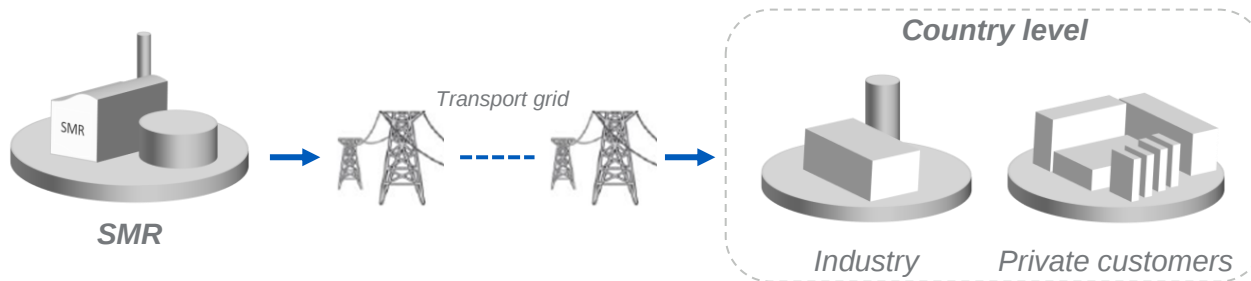
N.B. “New nuclear” power can produce heat to be used for electrolysis, and the hydrogen thereby produced - more efficiently than with other energy sources - can be used for industrial processes of energy-intensive companies. () The figure refers to the temperature reached by some AMR models.*

Source: TEHA Group elaboration on NEA, DoE data and various sources, 2024

Decarbonized electricity & heat: potential SMR applications

Applications

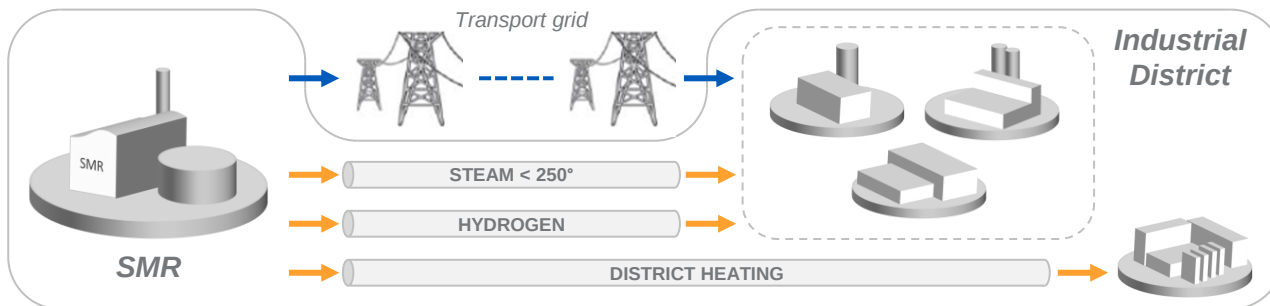
Electricity only



Impact on territories

- SMR requirements:
 - Water (little)
 - Seismicity
 - Transport grid
- Possibility to reuse existing nuclear sites

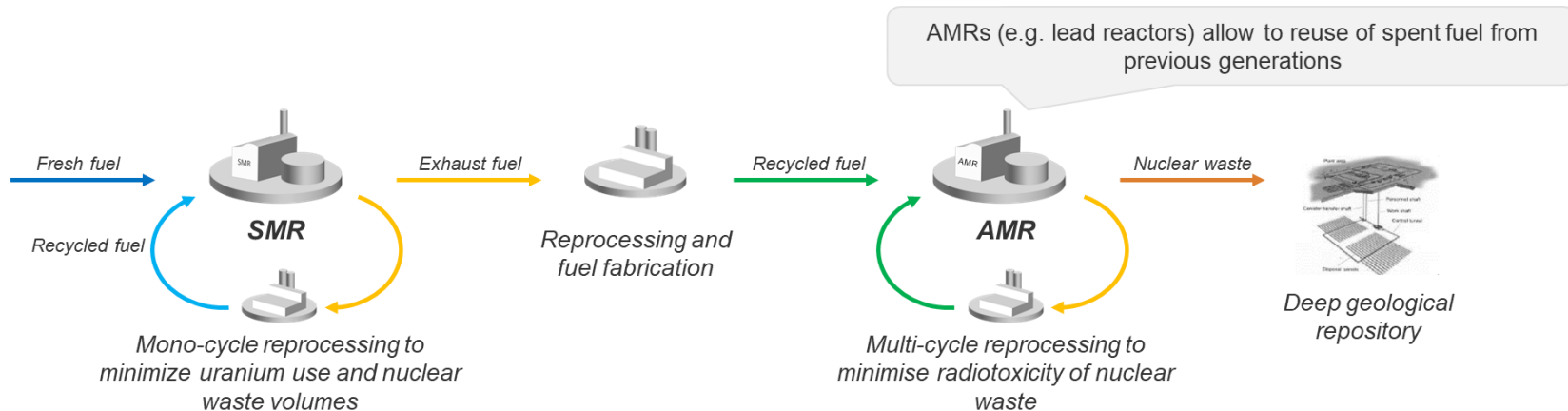
Cogeneration



- SMR requirements:
- Industrial requirements and thermal needs temp:
 - Steam for temp < 250°
 - Hydrogen for temp > 250°
- Installation inside industrial districts

Installing SMRs close to industrial districts is an opportunity for energy intensive industries' decarbonization

Closing nuclear fuel cycle: SMRs-AMRs complementarity



Momentum and opportunity for an ambitious strategy encompassing fuel cycle for:

- Reducing the volume and radiotoxicity of nuclear waste → lower cost and impact of nuclear waste management
- Minimizing the use of fresh uranium → greater energy independence
- Minimizing the overall cost of the fuel cycle → competitiveness of nuclear energy

Closing the fuel cycle allows to minimize volume and residual radioactivity of nuclear waste (~300 years)
Need to act at EU scale. Competitiveness not reachable at National level due to limited nb Italian reactors
An EU partnership is to be sought for, starting from SMR technology of choice

Edison engagement for the development of new nuclear in Italy



LOI Edison, EDF, Ansaldo Energia and Ansaldo Nucleare

- Industrial cooperation for the development of new nuclear in Italy and abroad



MOU Edison, EDF, Ansaldo Nucleare and Federacciai

- Collaboration for the development of SMRs to address industry energy needs
- Assessment of possible supply of steelmakers' facilities with French nuclear energy for the transition period



MOU Edison, EDF, Enea

- Studies on passive safety systems and SMRs in cogeneration mode



Cooperation Agreements among Edison, Framatome and Politecnico di Milano

- Training and research joint programs for the development of new nuclear in Italy



Active participation in platforms for new nuclear

- Piattaforma Nazionale per il Nucleare Sostenibile
- EU SMR Industrial Alliance
- Progetto Nucleare Confindustria

Edison ambition is to build 2 SMRs in Italy by 2040

Thank you for your attention