
UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH
UPC Virtual
Postgraduate Fair
From 3 to 7 March

UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

UPC Virtual Postgraduate Fair

Master's degree in Nuclear Engineering

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Contents of the presentation

- UPC/ETSEIB introduction
- Master in Nuclear Engineering
- How to Apply
- Q & A

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The UPC

Bachelor's and master's degree graduates

6,556

Doctoral candidates

2,189

Continuing education programmes

141

Agreements with companies and research projects

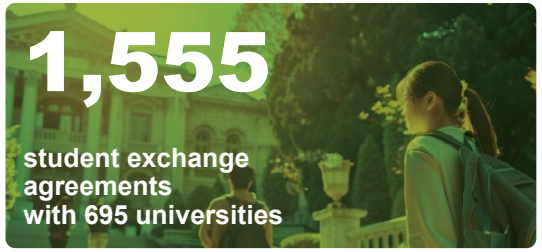
1,801

54 %

of doctoral degree students

28 %

of master's degree students are international



2,143

Technical, management, administrative and service staff

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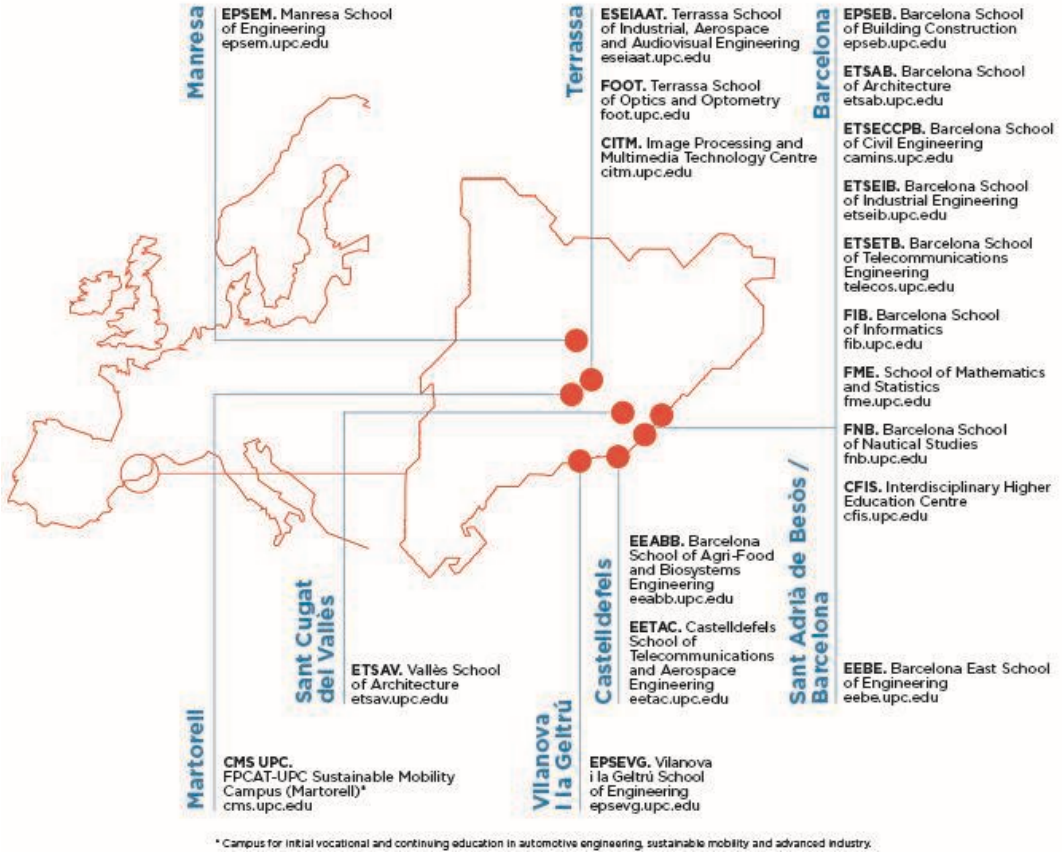
The UPC



* Campus for initial vocational and continuing education in automotive engineering, sustainable mobility and advanced industry.

Campuses 9

Schools 18

Master's degrees 96

Master's degree in English 50

Doctoral programmes 46

54 international double degree agreements with 11 countries

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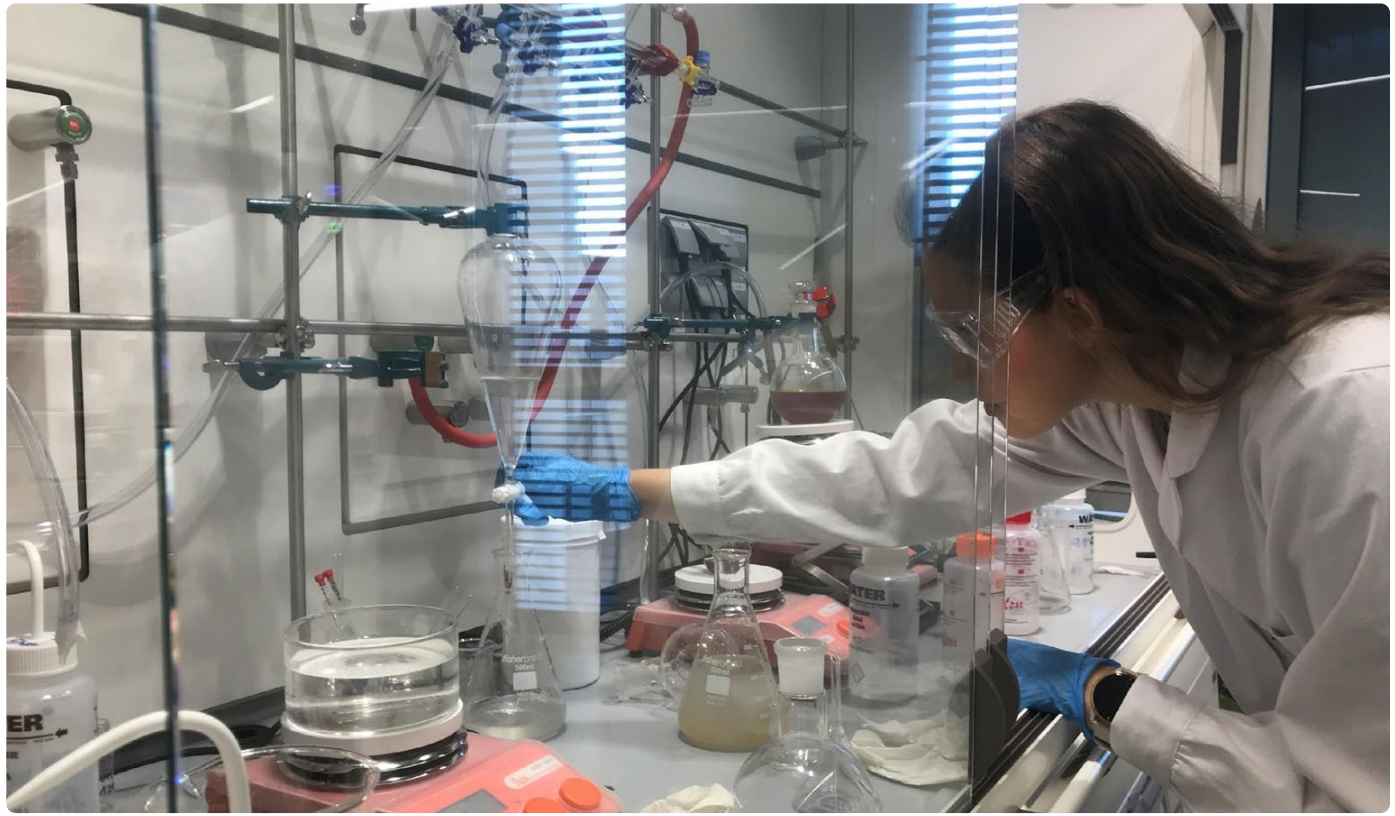
The UPC



94 %

graduate employment

94 %

have full-time jobs

93 %

graduate employment
In less
than 6 months

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Much more than studying

Students associations

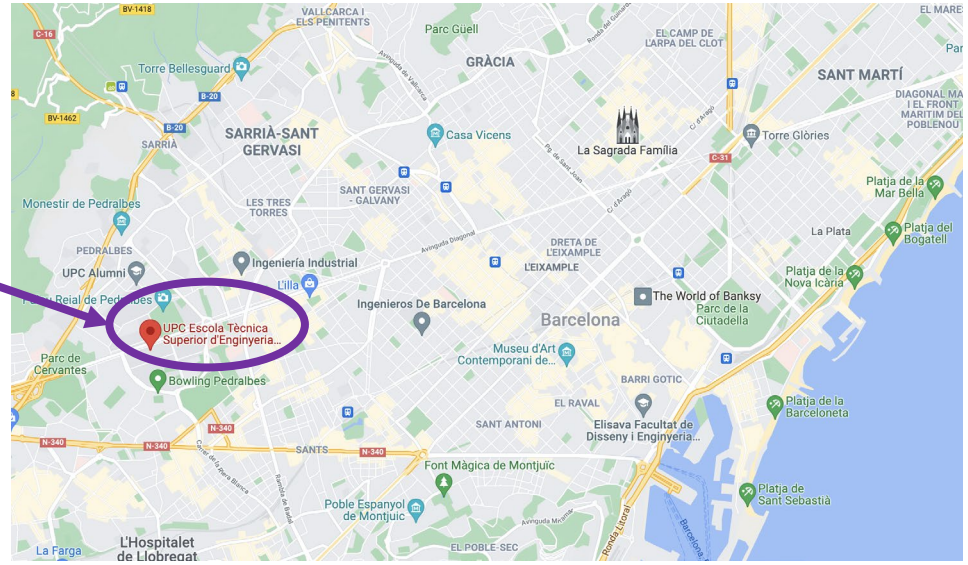
Cooperation projects

Awards and competitions

Sports

Cultural activities

ETSEIB School



ETSEIB: Escola Tècnica Superior d'Enginyeria Industrial de Barcelona

Over 170 years of educating professionals with a very strong scientific and technical foundation

https://etseib.upc.edu/

ETSEIB Master's degree programmes

1. Master's degree in Neuroengineering and Rehabilitation (with UAB)
2. Master's degree in Biomedical Engineering (with UB)
3. Master's degree in Automatic Control and Robotics
4. Master's degree in Automotive Engineering
5. Master's degree in Management Engineering
6. **Master in Nuclear Engineering / EMINE**
7. Master in Electric Power Systems and Drives
8. Master in Thermal Engineering
9. Master in Renewable Energy Engineering

MSc Programmes in Energy InnoEnergy

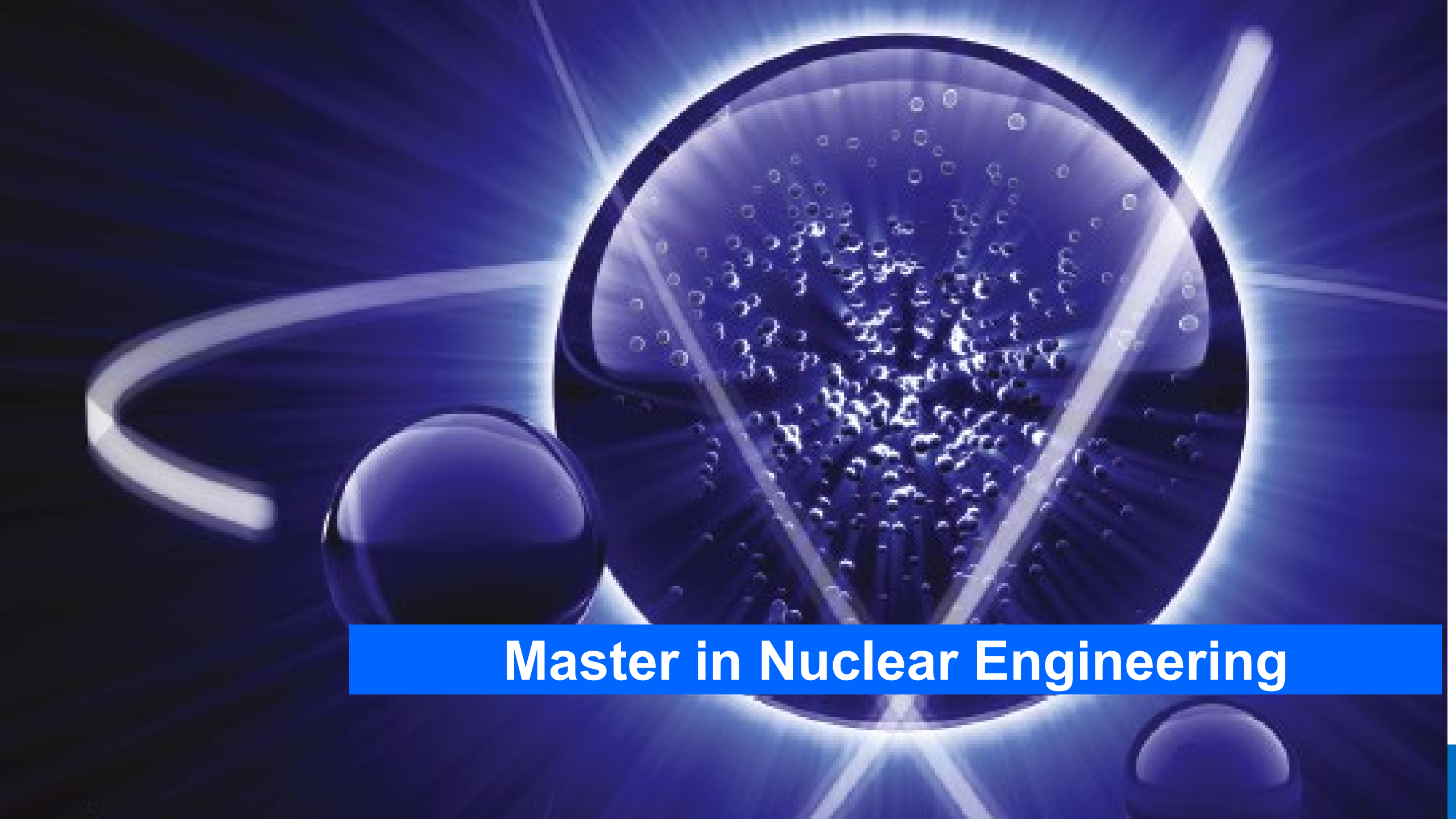
E+ programmes

ETSEIB Double Degree programmes

Master's degree in Industrial Engineering

+

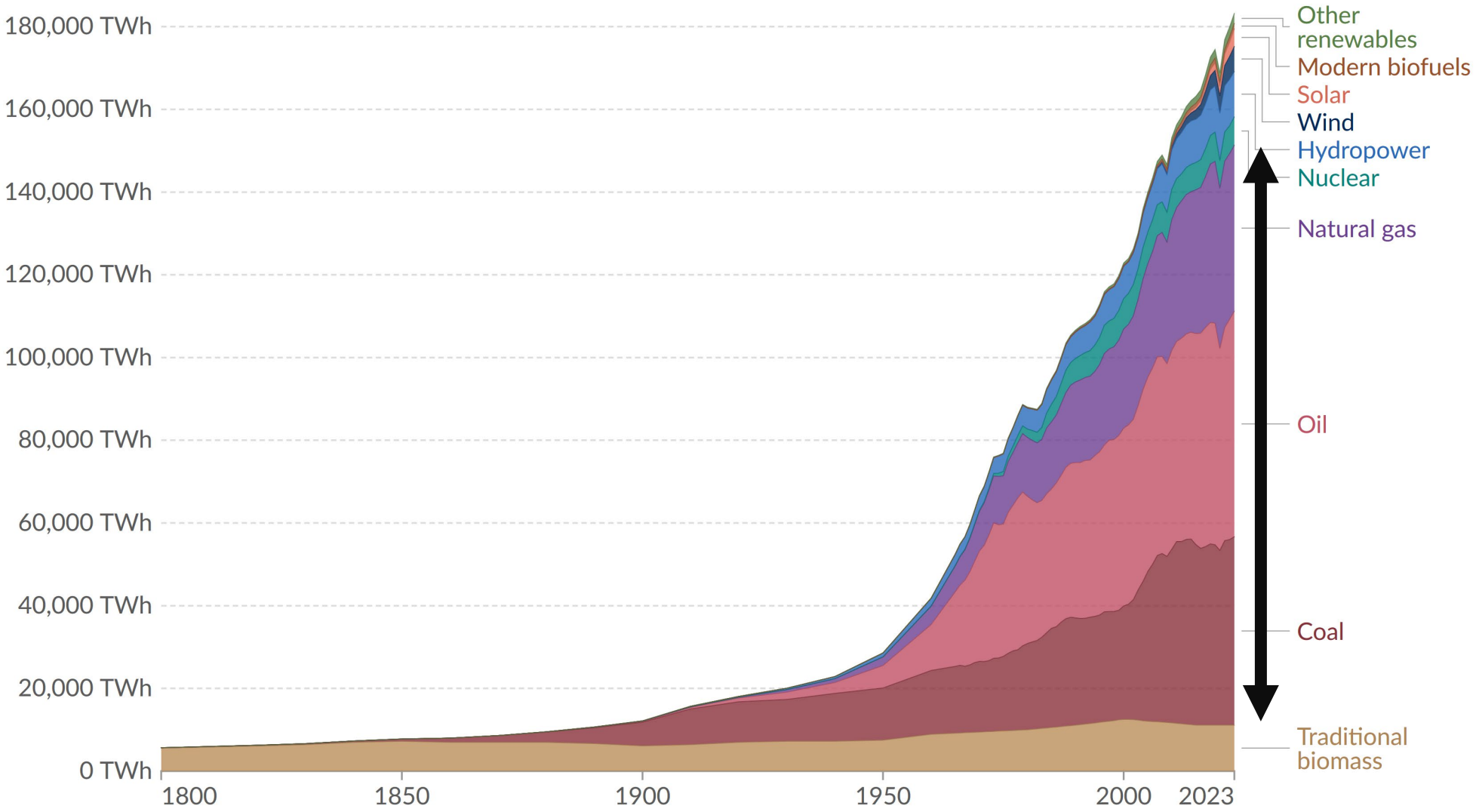
Master's degree in Automatic Control and Robotics
Master's degree in Automotive Engineering
Master's degree in Management Engineering
Master in Renewable Energy Engineering
Master in Nuclear Engineering /EMINE



Master in Nuclear Engineering

Global primary energy consumption by source

Primary energy[1] is based on the substitution method[2] and measured in terawatt-hours[3].



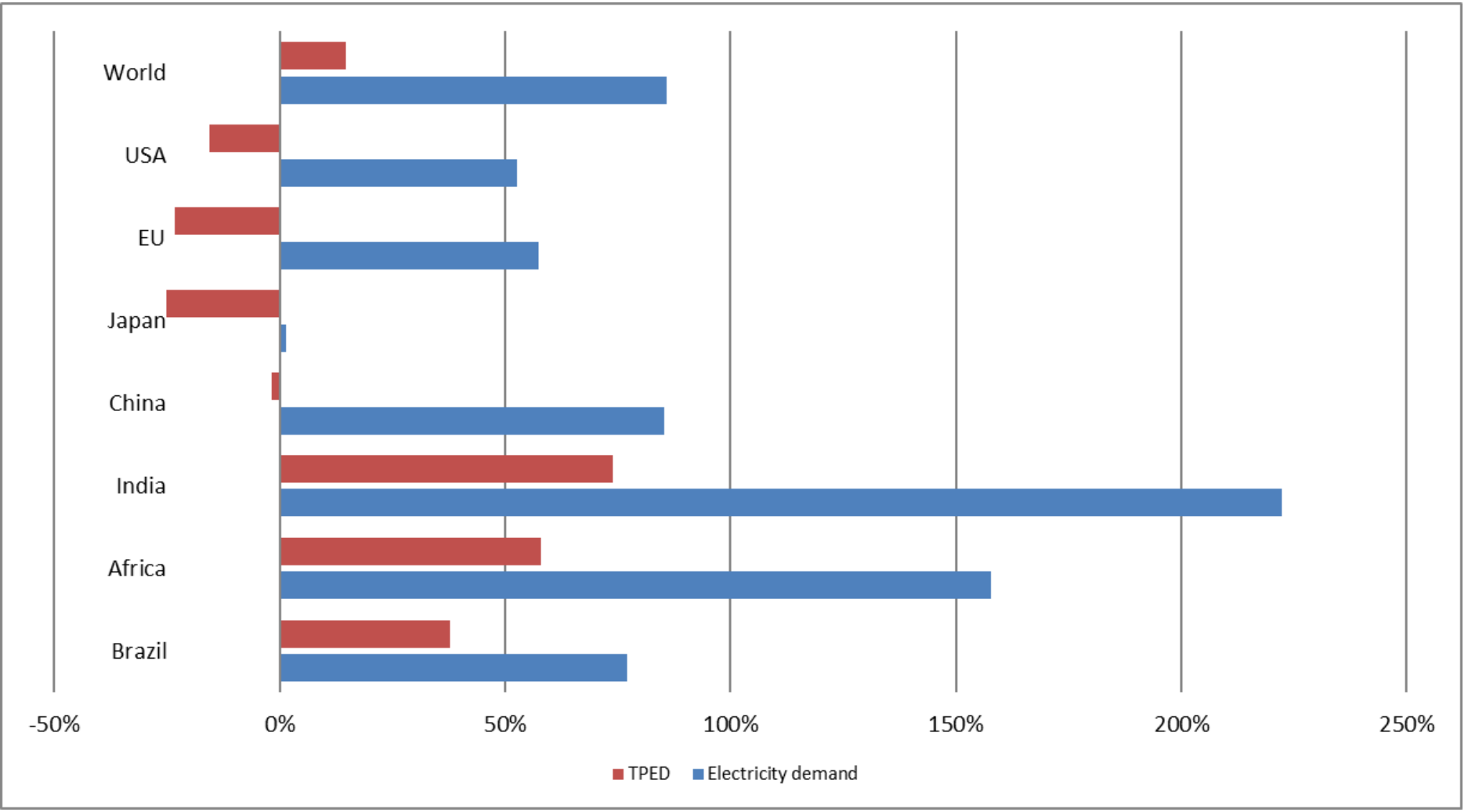
Data source: Energy Institute - Statistical Review of World Energy (2024); Smil (2017)

OurWorldinData.org/energy | CC BY

Note: In the absence of more recent data, traditional biomass is assumed constant since 2015.

Towards decarbonisation

Comparison of the increase (%) of TPED and electricity demand (2050 vs. 2022) Stated Policies Scenario



Increase mainly due to industry, larger use of electrical appliances and building cooling

Source: IEA WEO 2023

Own elaboration

The EU's needs to decarbonize are massive…across all sectors

Electricity

1600 TWh/y
EU Low carbon electricity production to be deployed by 2040

80GW
European Nuclear capacity to be replaced by 2050 (end of life)

Hydrogen

>20 Mt H_2/y
REPowerEU Market Estimate for 2030

1000 TWh/y
Equivalent additional clean electricity demand

Industrial heat

~1250 TWh_{th}/y*
Iron – Steel, Non-metallic minerals and chemicals heat demand in EU

> 45% market
Heat < 400°C

District heat

~500 TWh_{th}/y**
Current district heat demand in EU

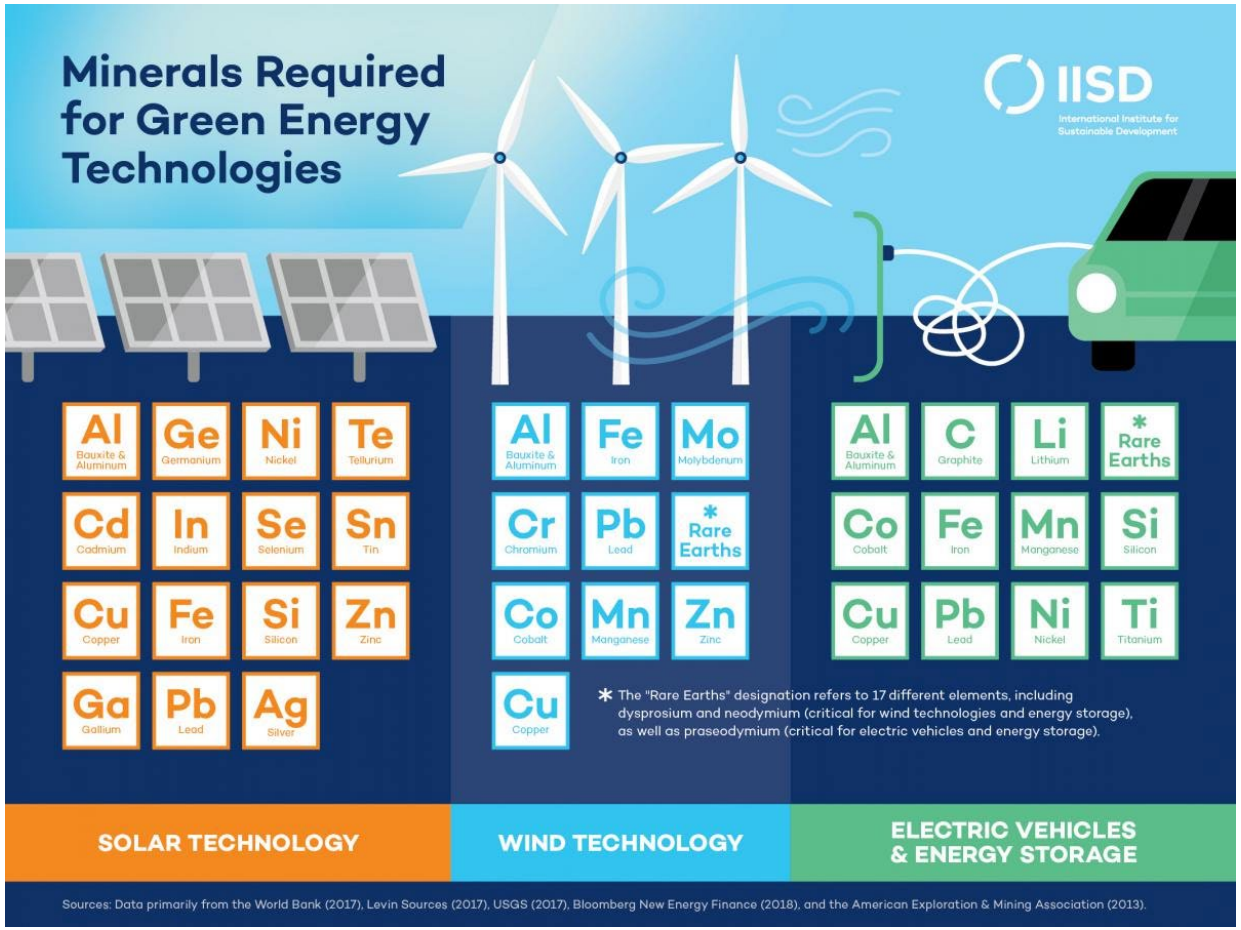
> 2/3 fossil-fueled
Assets to be retired and replaced in the coming two decades

*IAEA report on Industrial Applications of Nuclear Energy – 2017
** Calculations based on:

- Statistics | Eurostat (europa.eu)
- D2.3 (wedistrict.eu)
- Country Profiles | Euroheat & Power

nuclearеurope

You can’t make an omelet without breaking an egg



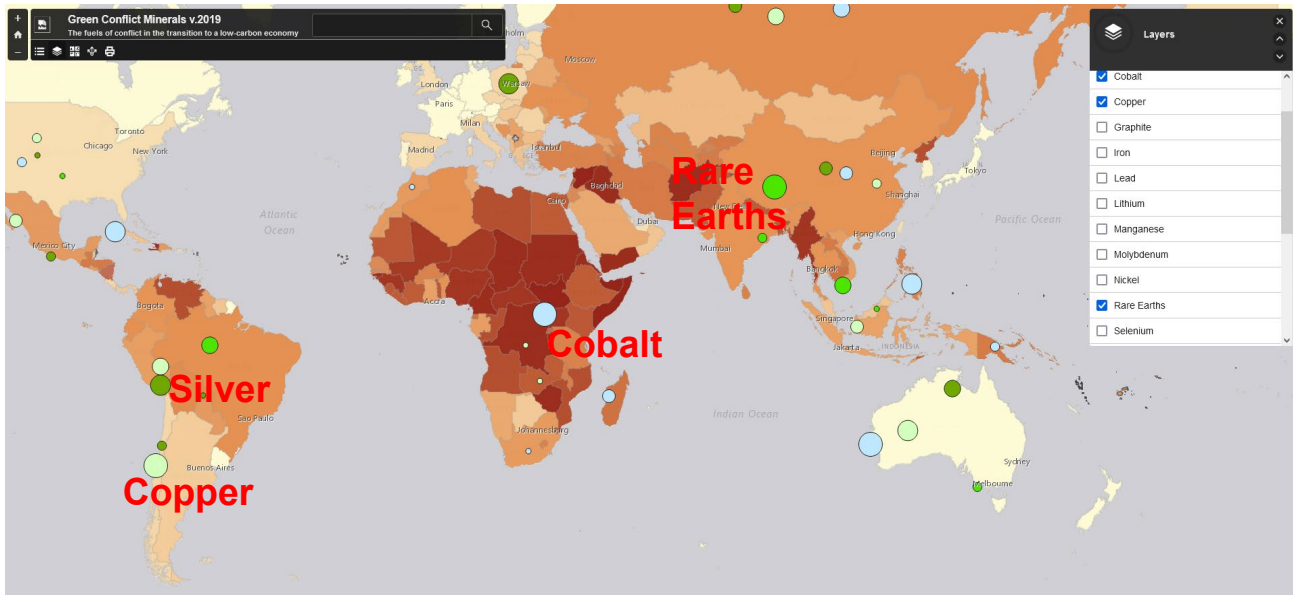
[Green Conflict Mineral Hotspots 2019]

Green Conflict Minerals: The fuels of conflict in the transition to a low-carbon economy

Clare Church, Alec Crawford on August 13, 2018

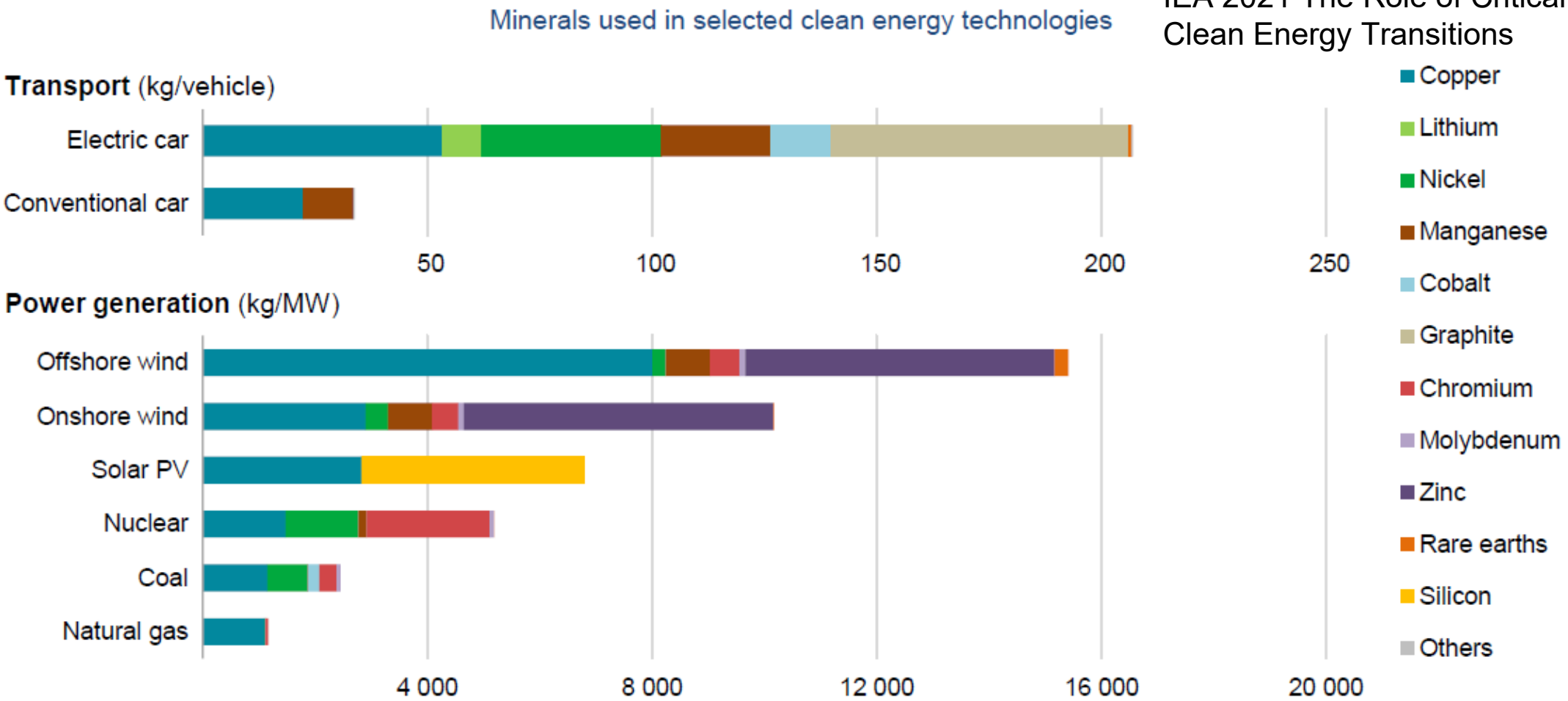
International Institute for Sustainable Development

IISD



The rapid deployment of clean energy technologies as part of energy transitions implies a significant increase in demand for minerals

IEA 2021 The Role of Critical Minerals in Clean Energy Transitions

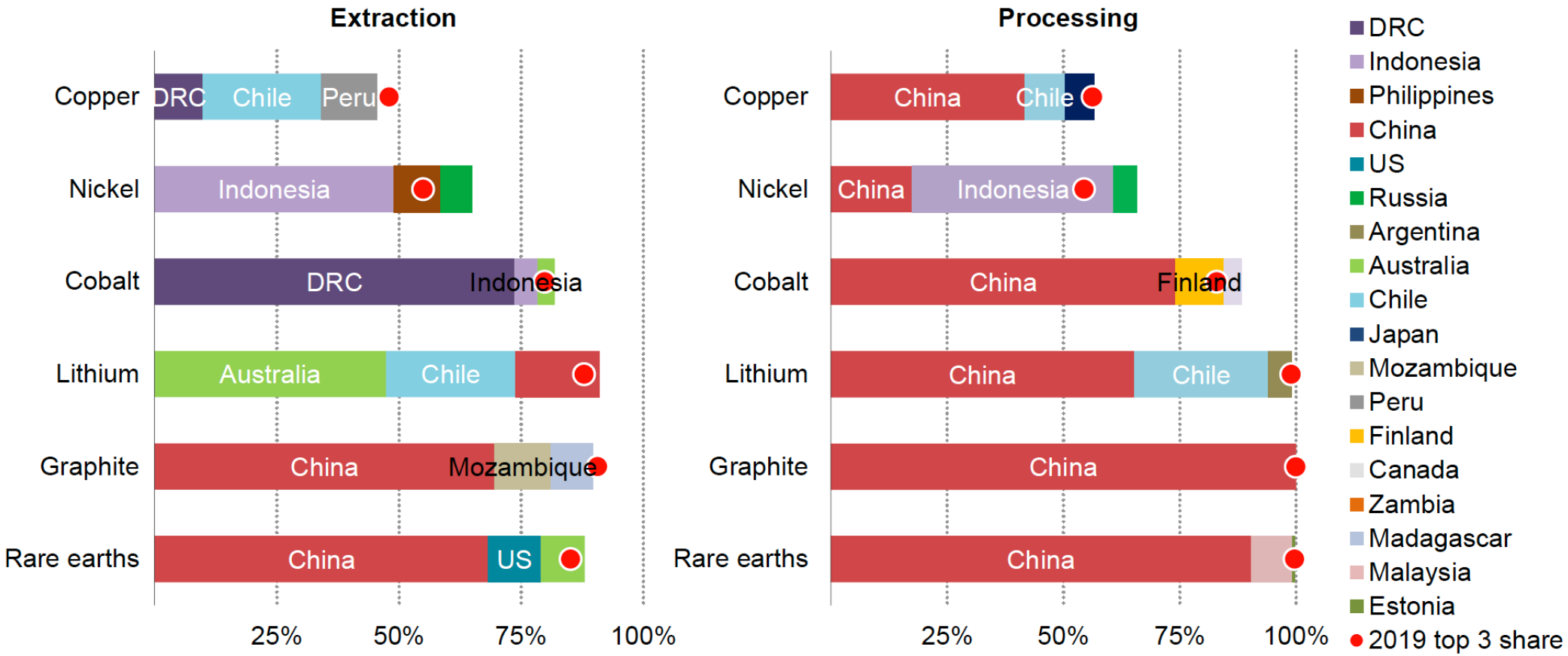


Notes: kg = kilogramme; MW = megawatt. Steel and aluminium not included. See Chapter 1 and Annex for details on the assumptions and methodologies.

There has been limited progress in terms of diversification over the past three years; concentration of supply has even intensified in some cases

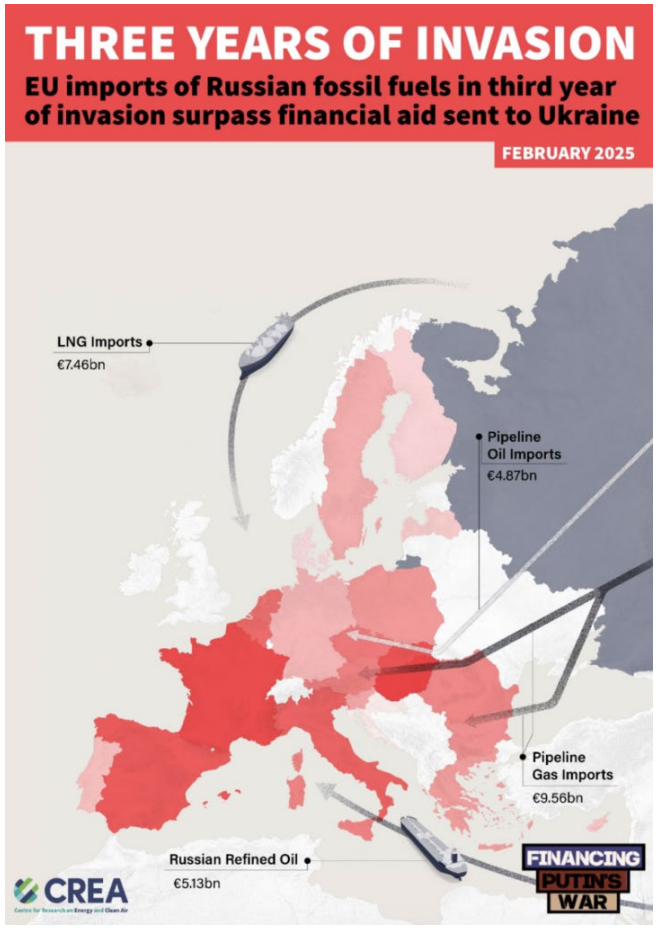
IEA 2023 Critical Minerals Market Review 2023

Share of top three producing countries in total production for selected resources and minerals, 2022

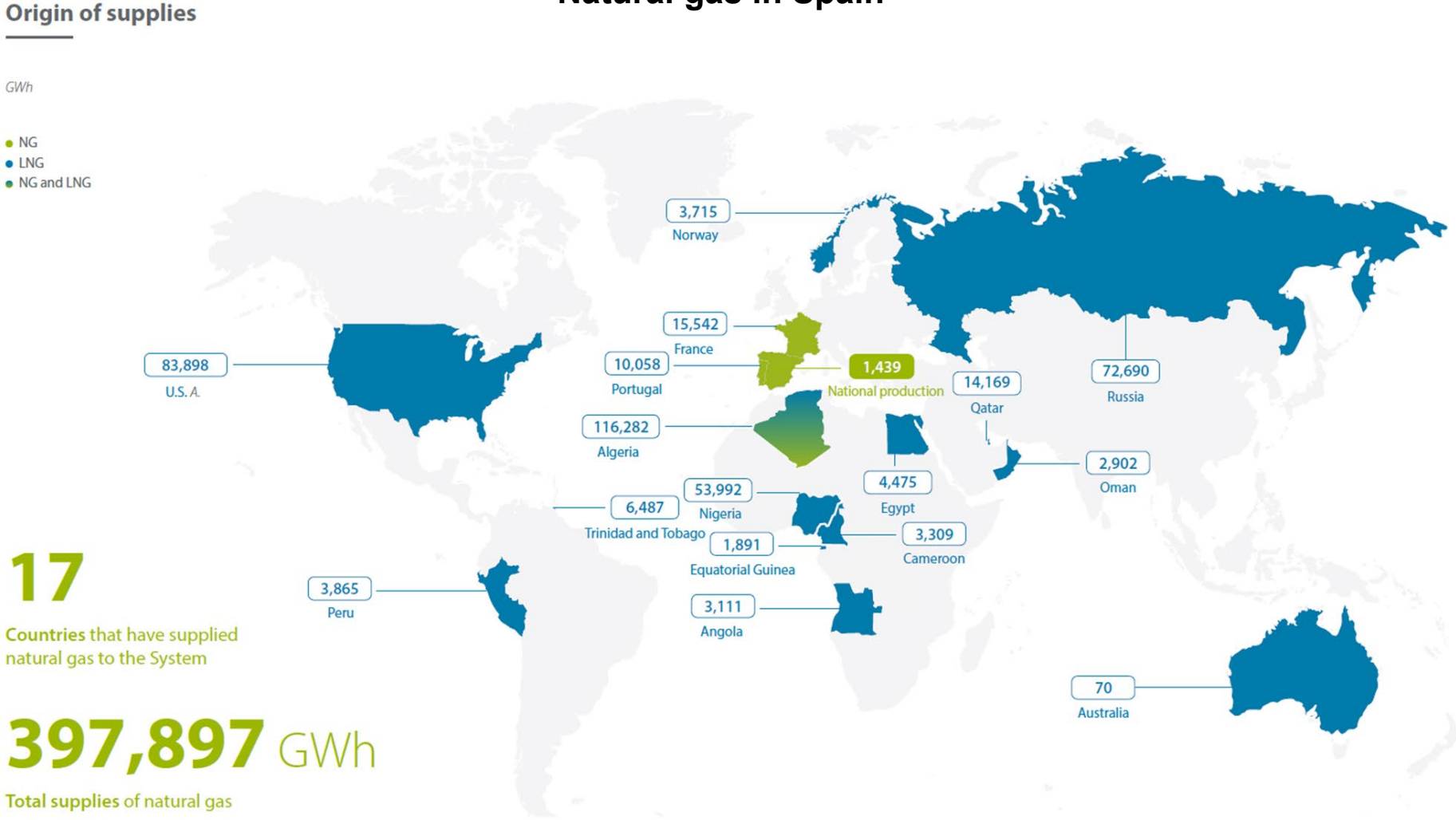


Notes: DRC = Democratic Republic of the Congo. Graphite extraction is for natural flake graphite. Graphite processing is for spherical graphite for battery grade.
Sources: IEA analysis based on S&P Global, USGS (2023), Mineral Commodity Summaries and Wood Mackenzie.

More on geopolitics



Natural gas in Spain



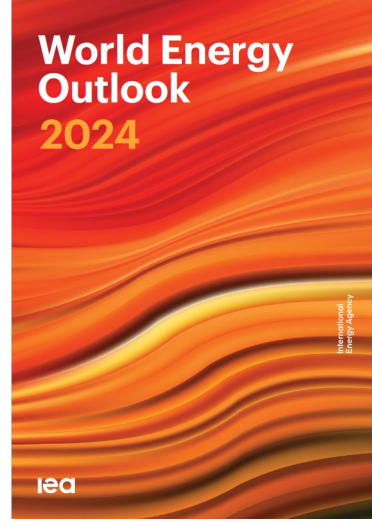
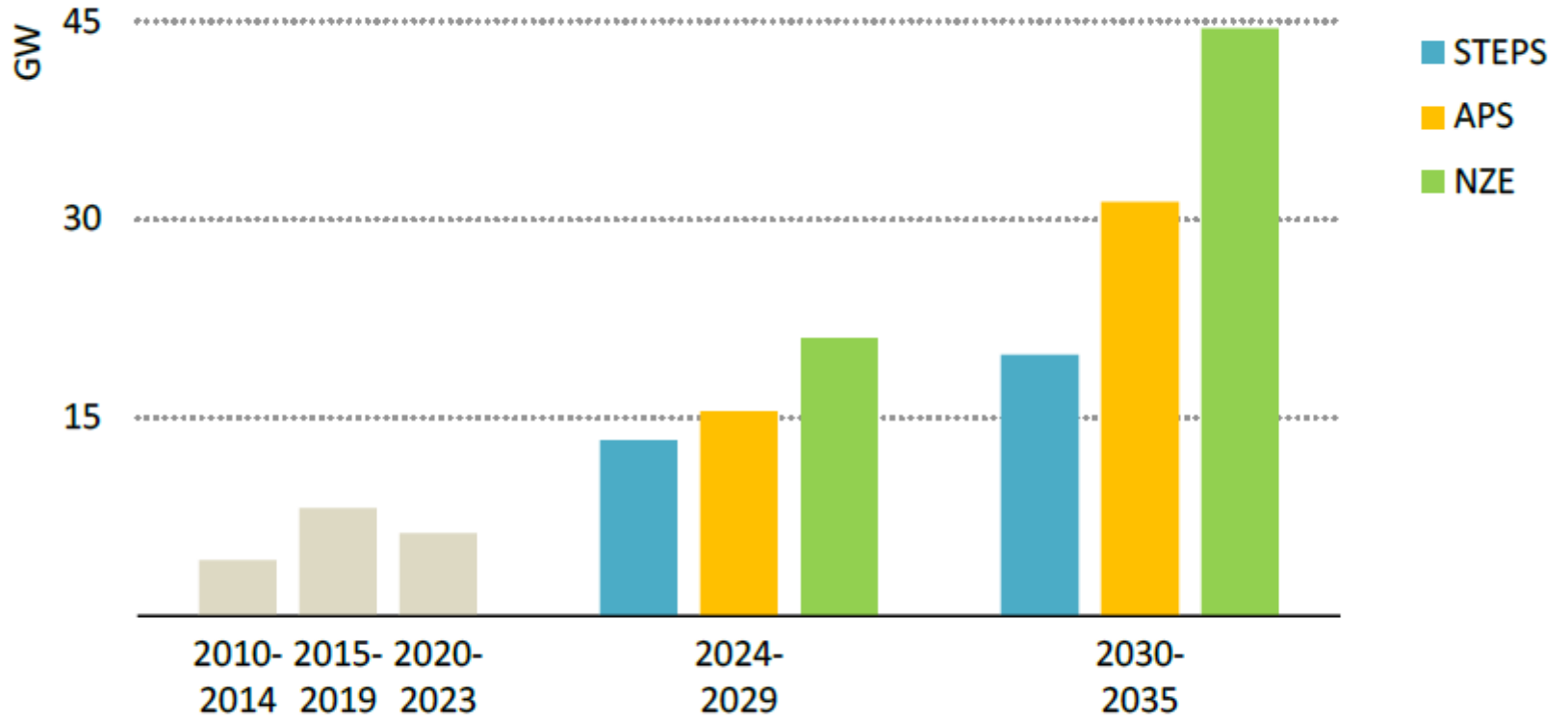
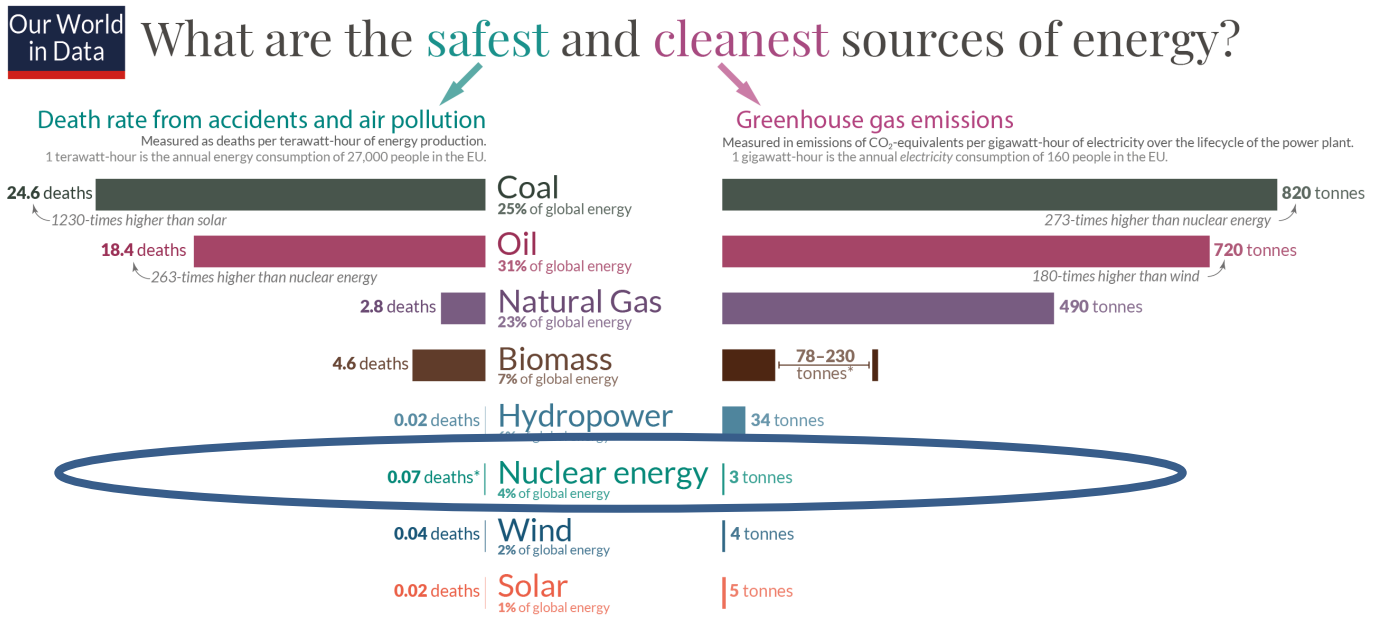


Figure 3.45 ▷ Annual average nuclear power capacity additions by scenario, 2010-2035

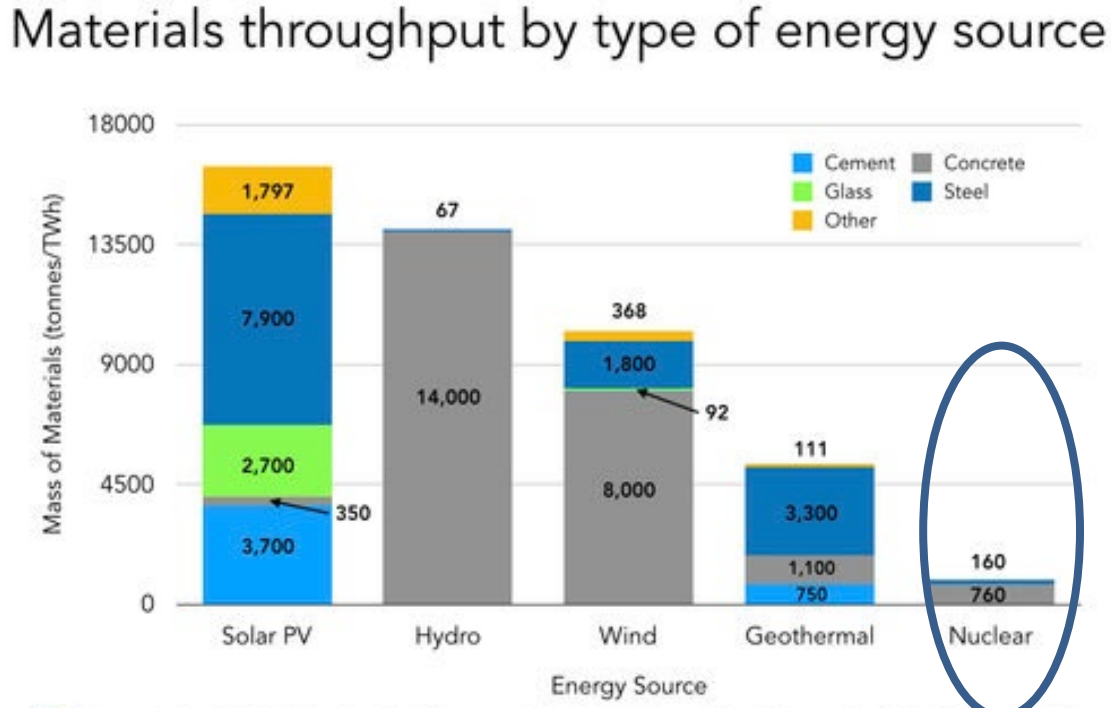


Nuclear capacity additions accelerate in all scenarios, with China accounting for 40% of global additions in the STEPS by 2035 and nearly 50% in the NZE Scenario

Concluding remarks



*Life-cycle emissions from biomass vary significantly depending on fuel (e.g. crop resides vs. forestry) and the treatment of biogenic sources.
*The death rate for nuclear energy includes deaths from the Fukushima and Chernobyl disasters as well as the deaths from occupational accidents (largely mining and milling).
Energy shares refer to 2019 and are shown in primary energy substitution equivalents to correct for inefficiencies of fossil fuel combustion. Traditional biomass is taken into account.
Data sources: Death rates from Markandya & Wilkinson (2007) in *The Lancet*, and Sovacool et al. (2016) in *Journal of Cleaner Production*;
Greenhouse gas emission factors from IPCC AR5 (2014) and Pehl et al. (2017) in *Nature*; Energy shares from BP (2019) and Smil (2017).
OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.



"Quadrennial Technology Review: An Assessment of Energy Technologies and Research Opportunities," Table 10. September 2015. United States Department of Energy. Nuclear and hydro require 10 tonnes/TWh and 1 tonne/TWh of other materials, respectively, but are unable to be labeled on the graph.

Master in Nuclear Engineering

- 90 ECTS (English)
- 30 seats
- **Main profiles:** Industrial (Mech.) Eng., Material Eng., Energy Eng., Chemical Eng.
- **Other profiles:** Other Engineering degrees and BSc. (Physics, Chemistry).
- **Objective:**

  Educate the future experts in nuclear engineering and to equip them with the competencies required to take on positions of responsibility in companies and research centers in the nuclear sector.

- **Professional opportunities:**

  The programme aims to respond to the demand of the nuclear industry and the society, and focuses not only on training professionals to be highly prepared for the industry, but also on preparing qualified personnel for research and development, or to work as technical staff for the Regulatory Authority.

MNE overview

TYPE OF SUBJECT	CREDITS
Required	46,5
Elective	13,5
Internship	15
Master's Final Project	15
TOTAL	90

Required subjects provide students with the necessary multidisciplinary training

Elective courses complement students education in different topics of interest

- The Master is strictly focused on nuclear power and will benefit of the experience of ENDESA and of the long term collaboration existing between the Nuclear Safety Council (Spanish regulatory body) and the UPC concerning nuclear safety.

- Another of the assets of the Master is the collaboration of other Spanish research institutions (e.g. CIEMAT) and companies (e.g. ENUSA, TECNATOM, ENRESA, ENSA, Westinghouse, IDOM, etc.) both in lecturing and in hosting internship students.

MNE overview

SEMESTER 1

Fundamentals of Nuclear Eng. and Rad. Protection	Nuclear Power Plants	Fuel Cycle and Environmental Impact

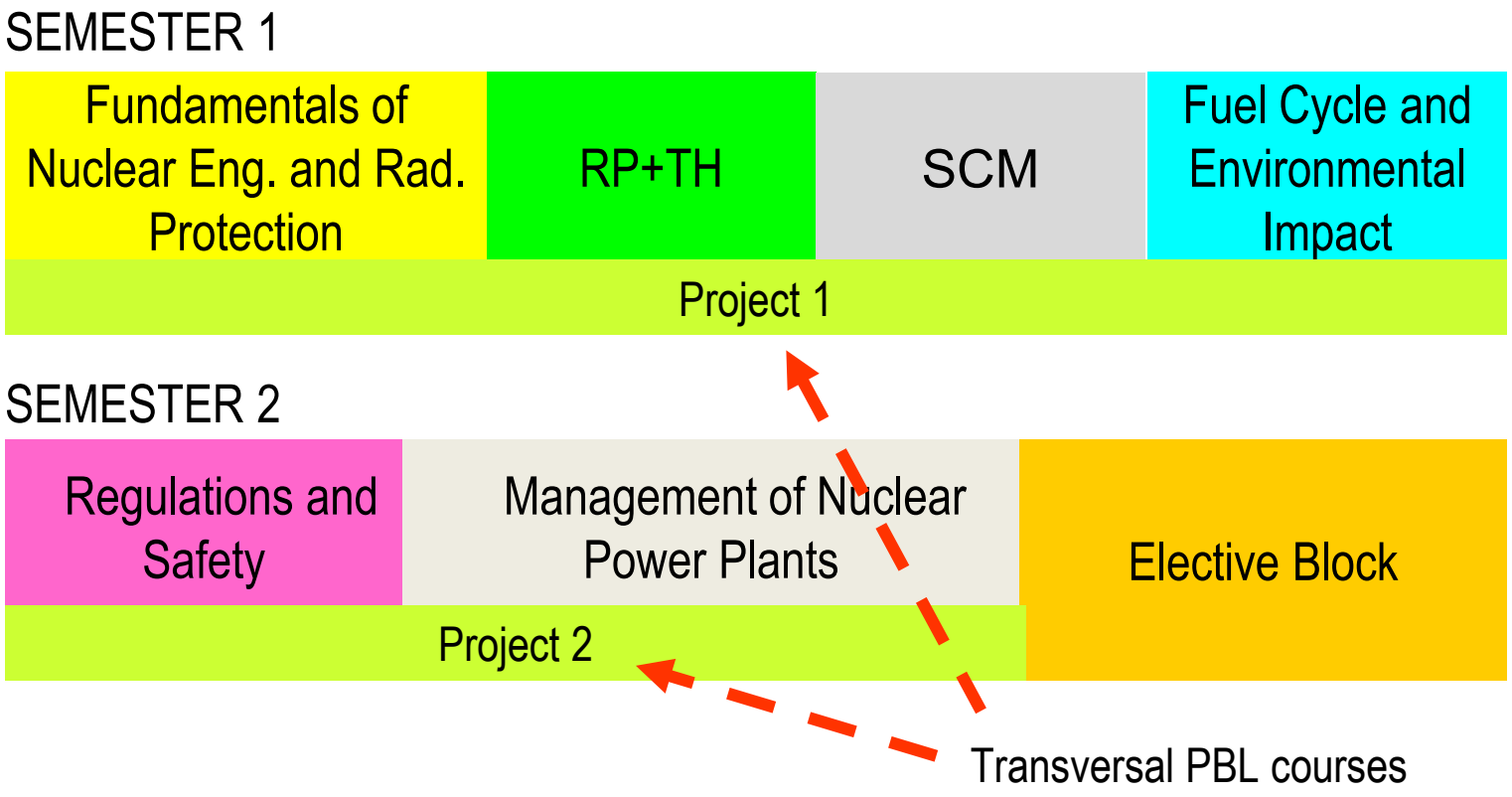
SEMESTER 2

Regulations and Safety	Management of Nuclear Power Plants	Elective Block

SEMESTER 3

Internship	Final Project

MNE overview



Methodology

- Learning by Doing
- Completely adapted to ESHE.
- 1 ECTS = 25 h of student dedication
- Combination of lectures, practical sessions, self-guided study, use of computational codes, and laboratory practice with guided visits to different nuclear installations
- An important part of the learning process will take place via Project Based Learning (PBL), i.e. solving a complex combined problem, working mostly in small cooperative groups.

Syllabus

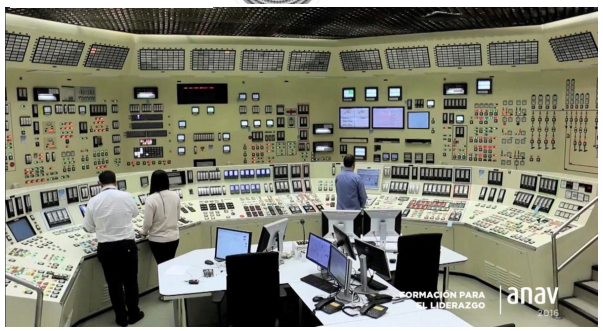
COURSES	CREDITS
First semester	
Fundamentals of Nuclear Engineering and Radiological Protection	8
Reactor Physics and Thermal-Hydraulics	7.5
Systems, components and materials	6
Fuel Cycle and Environmental Impact	5.5
Project 1	3
Second semester	
Regulations and Safety	5
Management of Nuclear Power Plants	8.5
Elective block (3 subjects)	3 x 4.5
Project 2	3

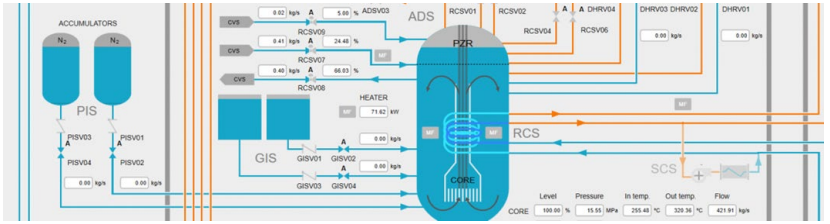
Master in Nuclear Engineering

ETSEIB

Key elements:

- Sponsored and supported by ENDESA
- Relevant involvement of professionals from the nuclear industry and regulatory authority
- Field visits to nuclear sites and facilities
- Embedded in the educational project of InnoEnergy.





COURSE OF
LEADERSHIP FOR SAFE OPERATION OF
NUCLEAR POWER PLANTS

To be included in the Topic Area 240NU022 - Management of Nuclear Power Plants, of the Master in Nuclear Engineering, Universitat Politècnica de Catalunya

Involvement of Industry

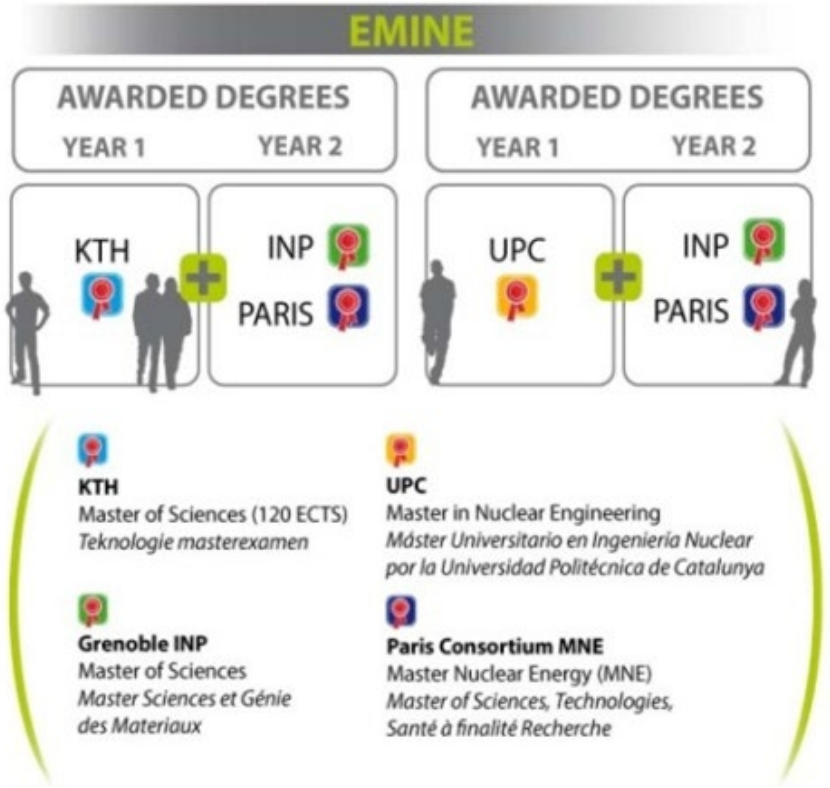
- Contribution to the design of the programme
- Study visits
- Lectures by external experts
- Internships

Proud of our alumni

UPC at ENYGF

European Master in Nuclear Energy (EMINE)

- **MsC EMINE:**
  - Two year programme (120 ECTS)
  - Double master degree: UPC+Paris Consortium; UPC+INP Grenoble
  - Students from around the world



2 week **summer course** in a **business school** between Y1 and Y2 (ESADE)

SUPPORTED BY

Co-funded by the European Union

Master in Nuclear Engineering

- 2013 MNE Distinctive Mention International Master's Programme (AGAUR)
- 2013 EMINE gets the EIT label for 4 years
- 2015 the Program is accredited by ANECA
- 2016 MNE Accredited in progress towards Excellence by AQU Cat.
- 2017 EMINE gets the EIT label for 5 years
- 2020 MNE Accredited in progress towards Excellence by AQU Cat.
- 2022 EMINE gets EIT label for 5 years

Double master MUEI-MUEN

Q1 **36.5 ECTS**	**Q2** **36 ECTS**
Q3 **37 ECTS**	**Q4** **31.5 ECTS**
Q5 (TFM+int.) **42 ECTS**	

Total:
183 ECTS

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How to apply

www.etseib.upc.edu/en → Academic Programmes → **How to apply to ETSEIB'S academic programmes**

- **Application:**

Round 1 (February 24th to March 23th) **Round 2** (April 21th to May 18th)

* Recommentation to apply on the first round. In case we don't open second round.

- **Provisional list of accepted people:**

Round 1: End of April 2025 Round 2: End of June 2025

- **People seat acceptance:** Up to 7 days from the pubication list
- **Definitive list of accepted people:** Mid – July 2025
- **Enrollment:** September 2025

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

How to apply

Applications Round 1
February 24th to March 23th of 2025

Applications Round 2
April 21th to May 18th of 2025

https://www.upc.edu/en/masters/access-admission-enrolment/pre-enrolment

General Information, Admission and access requirements and syllabus

Required documentation for the application

https://etseib.upc.edu/en/Academic%20programmes/academic-procedures/acces/documentation

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

How to apply

Contact information

admissions.etseib@upc.edu

https://demana.upc.edu/etseib/

ETSEIB
Escola Tècnica Superior
d'Enginyeria Industrial de Barcelona

Escola de referència:
Formació i recerca
de màxim nivell
científic i tecnològic.

molt + a l'ETSEIB MÀSTERS

Thank you for your attention

admissions.etseib@upc.edu

UPC

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