



Keeping Europe lights on - a role for nuclear

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Perception of nuclear energy



Source: globalaccountantweb.com

Nuclear in EU institutions - Elephant in the room



Source: pokerhead1ush.com

Nuclear as a complex matter



Source: cryptome.org

Strong anti-nuclear approach of the public



Source: fourthwallevents.com

Nuclear industry as such



EUROPEAN CONTEXT

Membership



The membership of **FORATOM** is made up of 15 national nuclear associations representing more than 3,000 companies.

Belgium

Bulgaria

Finland

France

Hungary

Italy

Netherlands

Romania



Slovakia

Slovenia

Spain

Sweden

Switzerland

Ukraine

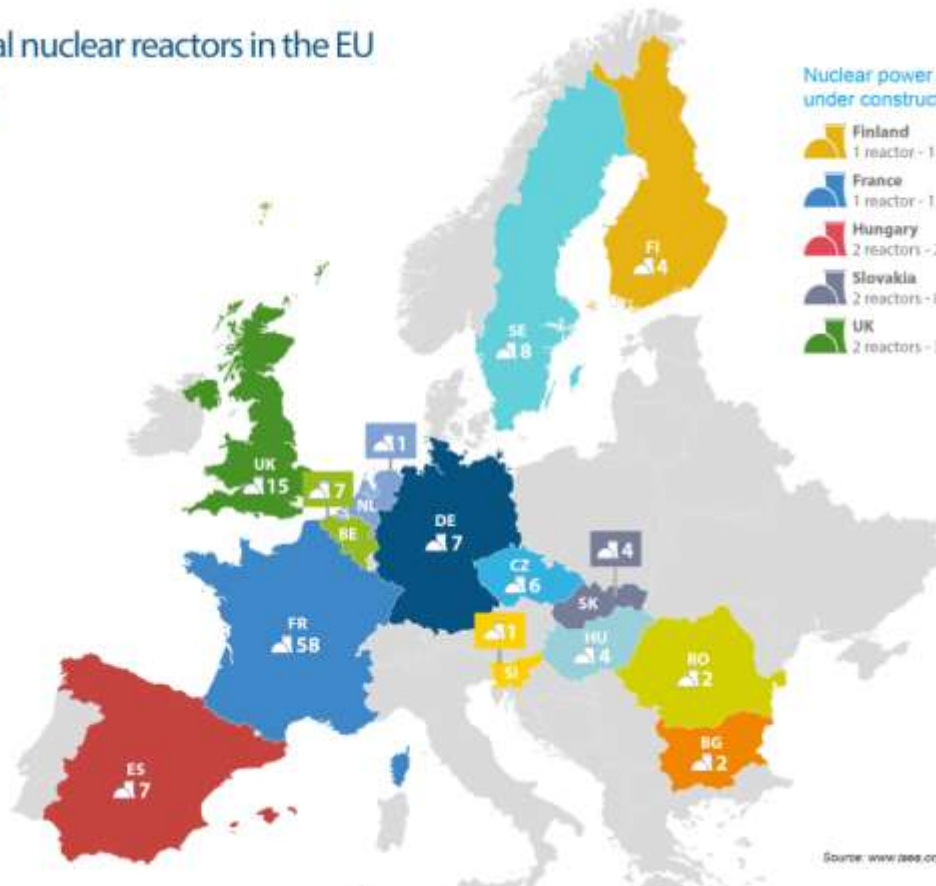
United Kingdom

CEZ (Czech Republic) and PGE EJ 1 (Poland) are Corporate Members

Nuclear energy in the EU – current status

126 Operational nuclear reactors in the EU

Nuclear share of electricity



Source: www.iaea.org/pns, 2018

**ELECTRICITY
PRODUCTION**

27%



**LOW-CARBON
ELECTRICITY**

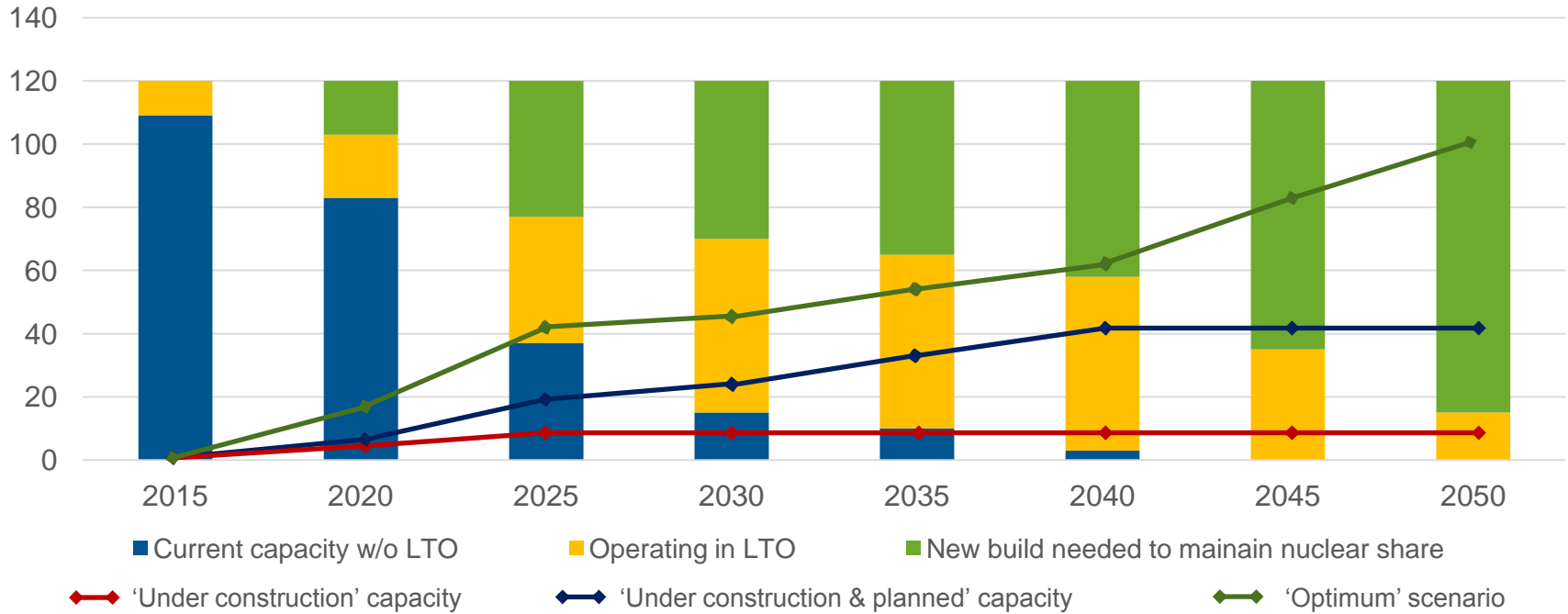
50%



Future of nuclear in the EU



Nuclear capacity (GW)



*Source: PINC, European Commission, 2017
 Estimated investment needs in LTO (until 2050): EUR 46,9 billion

New build in the EU – construction & plans



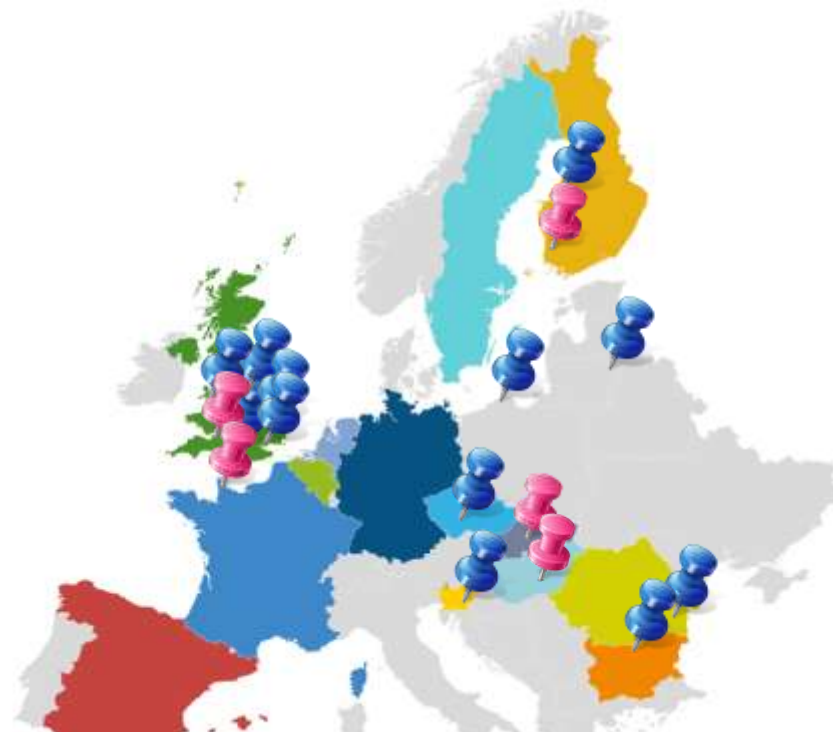
Nuclear power plants under construction



	Finland 1 reactor - 1 600 MW
	France 1 reactor - 1 630 MW
	Hungary 2 reactors - 2 400 MW
	Slovakia 2 reactors - 800 MW
	UK 2 reactors - 3 200 MW



Countries preparing or considering new build

- ✓ Bulgaria
- ✓ Czech Republic
- ✓ Finland
- ✓ France
- ✓ Lithuania
- ✓ Poland
- ✓ Romania
- ✓ Slovenia
- ✓ UK



-  - nuclear power plants under construction
-  - nuclear projects being developed or planned

Nuclear Long-Term Operation

Key benefits of LTO

LTO incurs low capital investment costs

Low investment risks for investors and capital markets

Maintaining indispensable skills, expertise & supply chain capabilities

Positive impact on jobs (creating new & maintaining current) & local economy

Public acceptance of currently operating NPPs

Short realization time for necessary LTO upgrade work



Selected EU countries which have recently conducted or are currently discussing LTO projects:

- | | |
|------------------|------------------------|
| ✓ Belgium | ✓ France |
| ✓ Bulgaria | ✓ Hungary |
| ✓ Czech Republic | ✓ Slovenia (+ Croatia) |
| ✓ Finland | ✓ UK |



WHY NUCLEAR?

Key challenges at EU level



**EU energy & climate goals:
CO₂ emissions goals vs. RES goals**



**Clean Energy Package & other energy files
(role of nuclear)**



**Balance of power
pronuclear vs. antinuclear countries**



**New build projects facing opposition
by selected EU members**



**Future of the Euratom Treaty
(EC's 2018 Work Programme)**

EU Energy Policy



EU Energy Policy Focus

Cutting
GHG
emissions

Contribution
to the Paris
Agreement

Affordable
energy for
consumers

Security of
energy
supply

Increasing
the share
of RES

Limiting
the number
of fossil
fuel power
plants

Robust
EU-ETS
system

New
opportunities
for growth
and jobs

Reducing
dependence
on energy
imports

Helping RES
integrate into
the system
(network
stability &
flexibility)



ROLE FOR NUCLEAR





SECURITY OF ENERGY SUPPLY

Current state of play



Import of energy:

- EU imports **54%** of energy
- oil - **90%**, gas - **69%**, solid fuels - **42%**

Key challenges:

- External suppliers - **mostly gas**
- New projects - **Nord Stream II**

Costs:

- **€1 billion per day**
– EU external energy bill
- **€300 billion** – import of crude oil & oil products to EU



Affected countries:

- Every **Member State** - in particular the **Baltics** & **Eastern Europe**

Examples:

- **6 MSs** depend from Russia (gas supply)
- Russia & Norway supply: **+50%** of gas & **+40%** of oil
- **Algeria** is the EU's third-largest energy supplier

Additional challenges:

- Energy demand worldwide - increase by **27%** by **2030**

Diversity of suppliers

Who supplies uranium to the EU?



Source: EURATOM Supply Agency 2017

In addition:

- Identified resources of uranium are sufficient to support continued use of nuclear for over **120 years**
- Additional exploitable resources would extend this to over **300 years**
- New reactor designs & recycling fuel could increase this to **thousands of years**

Power generation, capacity levels & prices



Quantity of fuel necessary to produce a given amount of electricity



Nuclear reactors operate at high capacity levels

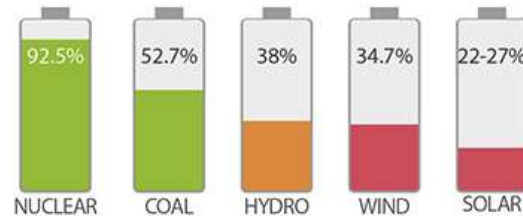


Uranium are marginal in the total cost of electricity produced by a nuclear reactor.



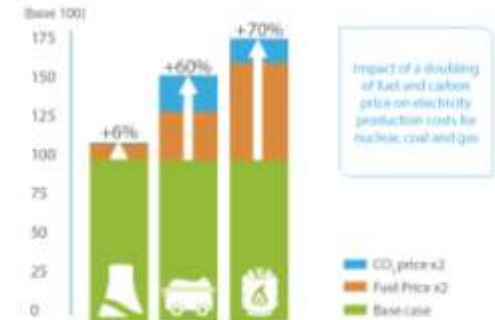
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Energy performance*



*% of rated capacity factor

The cost of nuclear power is less vulnerable to fuel price fluctuations



Source: IAEA 2014



ECONOMIC ASPECTS

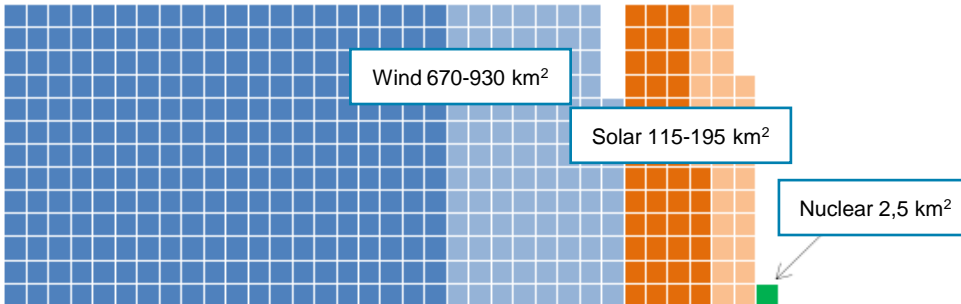


ENVIRONMENTAL IMPACT

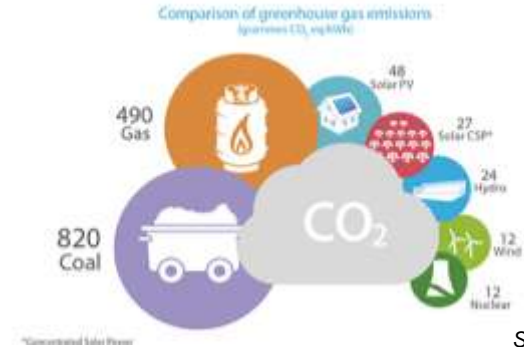
Environmental impact



Land Use		
Technology	Capacity Factor, %	Km ² needed for 1 GW
Wind	32-47	670-930
Solar	17-28	115-195
Nuclear	90	2,5



Source: NEI



Source: IPCC

Other pros:

- ⑩ Helps avoid the same amount of CO₂ as emitted by all cars in Germany, Spain, France, Italy & UK.
- ⑩ Complies with air quality standards as it does not emit any air pollutants
- ⑩ Efficient management of waste & spent fuel is assured at all times.



MOVING FORWARD WITH NUCLEAR

FORATOM

FORATOM's key area of focus is convincing EU institutions that nuclear can:

✓ I.

⑩ Help meet EU energy targets

II.

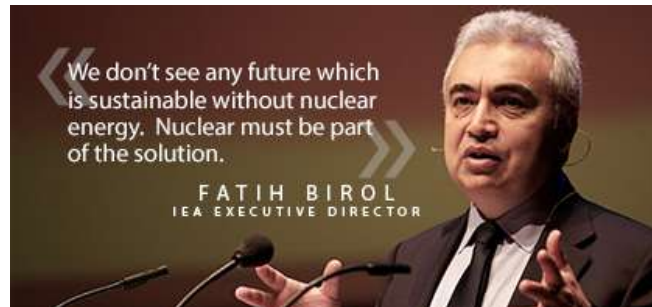
- Work alongside RES (as a reliable & low-carbon source)

III.

- Help fight Climate Change

IV.

- Predictable investment framework for New Build & LTO is **needed!!**



FORATOM's 2050 Energy Long-Term Vision

The study will:

- ✓ Analyse strategies & documents used while preparing the revision of **the EU's 2050 energy and low-carbon strategy**.
- ✓ Present scenarios for Europe's future energy mix **highlighting the contribution of nuclear energy**.
- ✓ Explain why nuclear should play **one of the key roles**.

Planned publication: **Early 2019**



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Member States

Making nuclear recognised requires a great effort both at EU and national level.

Highlighting the importance of nuclear & its benefits.

National authorities & representatives in the EU should endorse nuclear.

Working closely with other **pro-nuclear countries**.

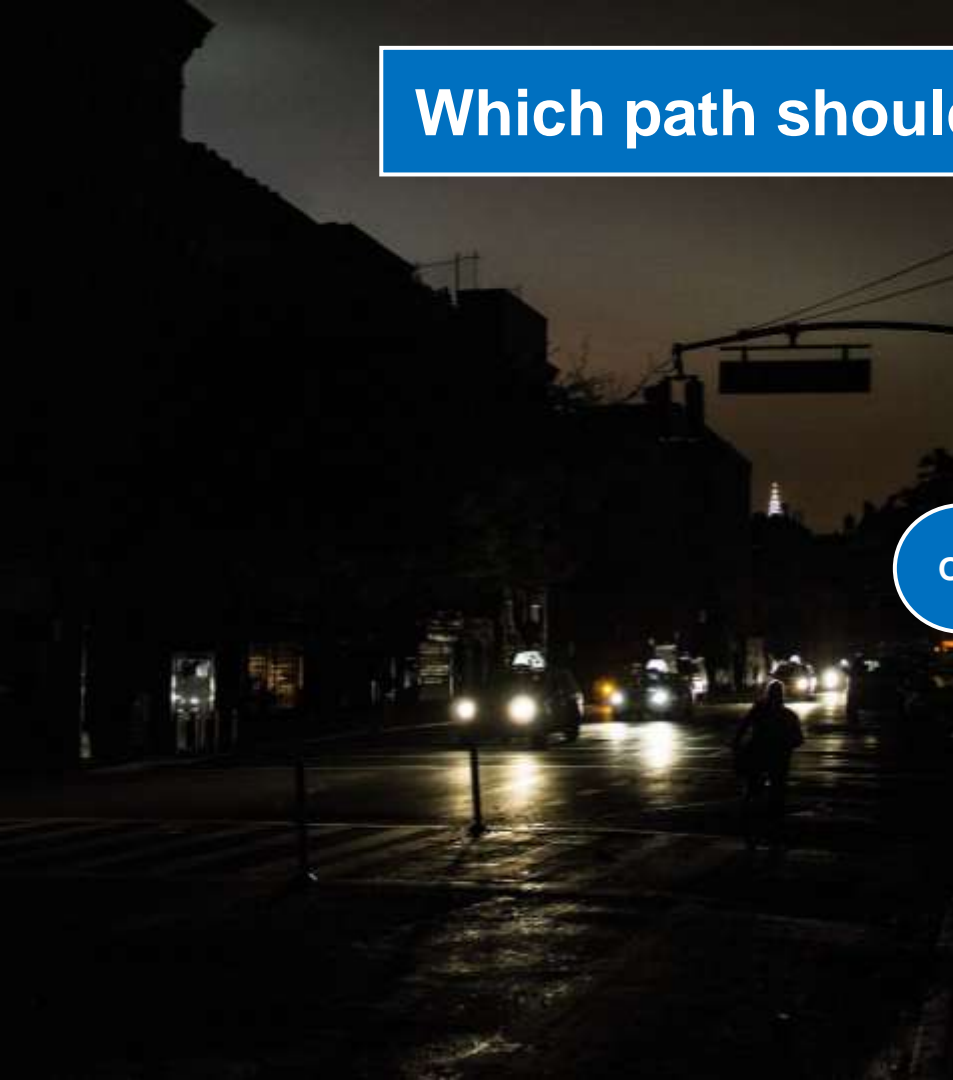
Together we can convince the EU that a successful energy transition cannot be achieved without nuclear!



Bulgaria as a **good example** for other countries to follow:

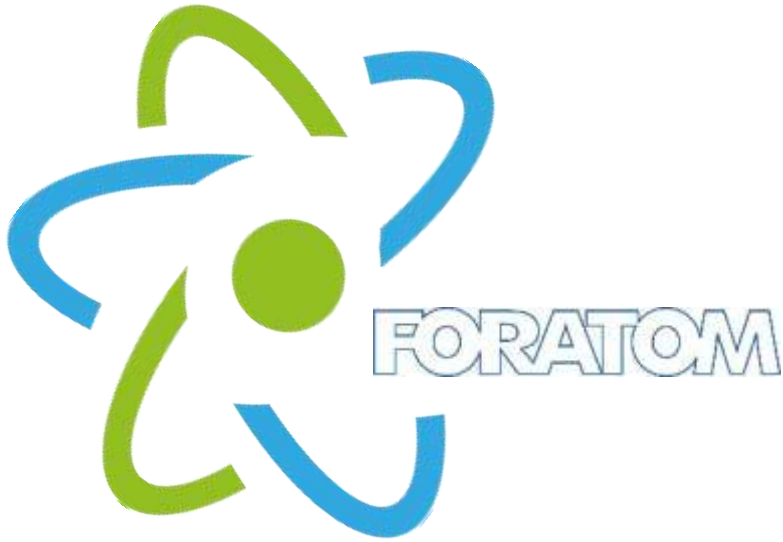
1. **Government's strong commitment to nuclear energy – seeing it as an essential part of the mix**
2. Currently 2 nuclear reactors generate approx. 35% of electricity (70% of low-carbon electricity)
3. LTO of operating nuclear reactors
4. Concrete plans to build a new NPP
5. High public support for nuclear
6. Operating research reactor
7. Estimated 15,000 jobs in the nuclear industry

Which path should Europe choose?



OR





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