

# The future of nuclear energy in Europe: Nuclear safety and management of radioactive waste

Nils Bøhmer  
The Bellona Foundation

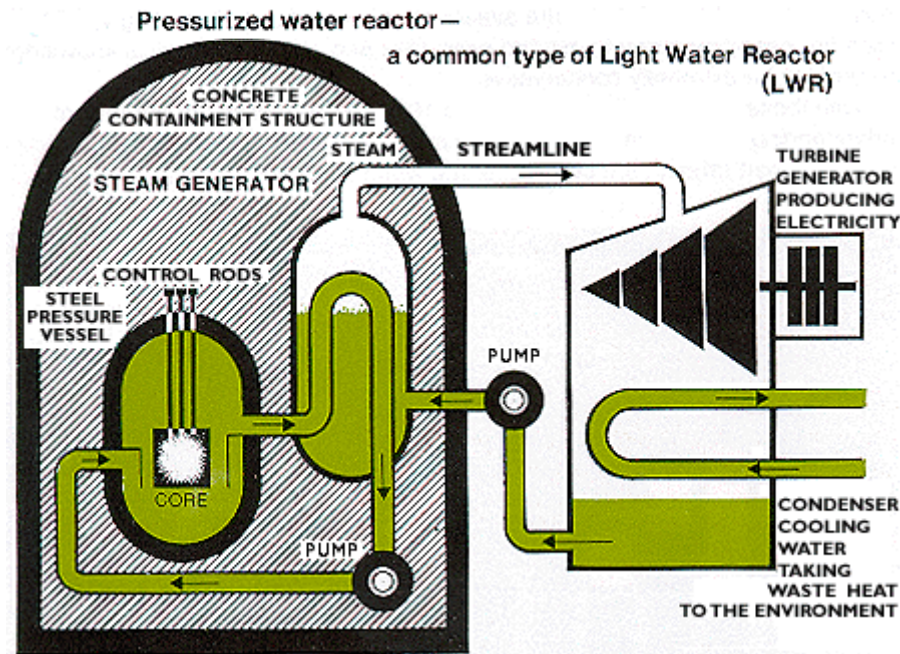


# The Bellona Foundation

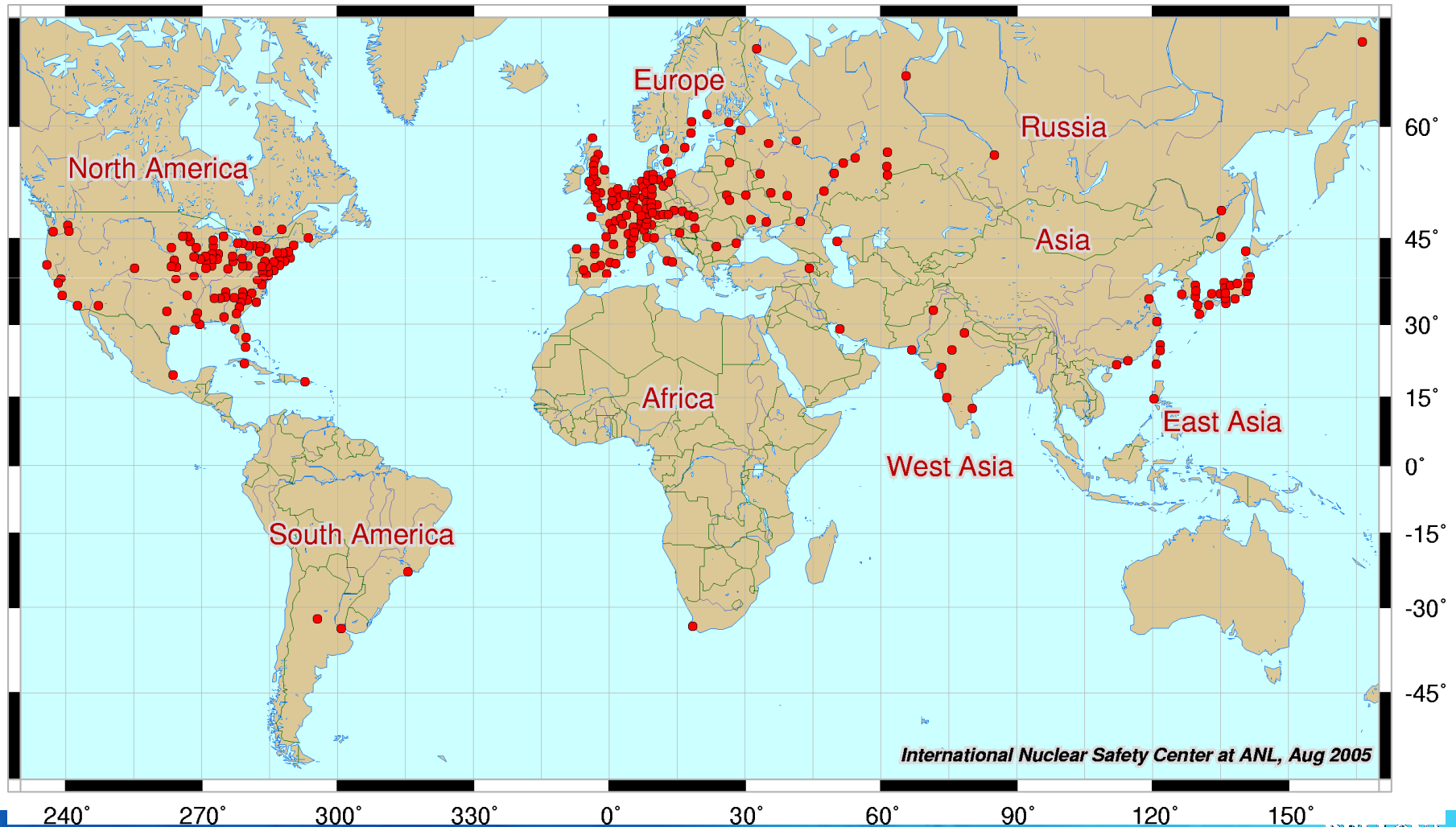
- **Norwegian environmental NGO**
- **Founded in 1986**
- **Offices in Oslo, St. Petersburg, Murmansk, Brussels and Washington DC**
- **Carbon Capture and Storage (CCS)**
- **Nuclear focus on Russia and Sellafield**

# Nuclear energy

Nuclear core with fissile material (fuel) which produces heat



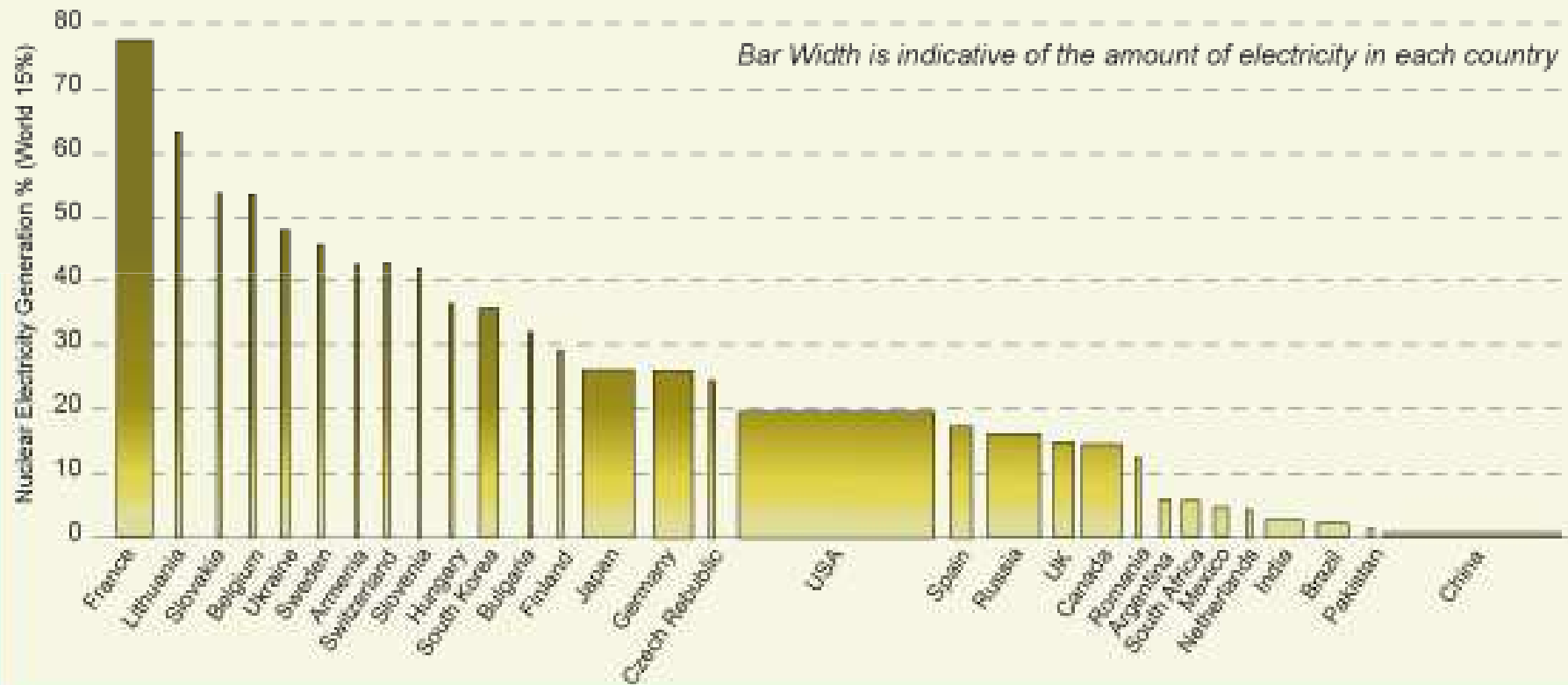
# Nuclear energy today



# Nuclear energy today

- World :439 reactors in 31 countries
- 14 % of the worlds electricity, 6 % of the worlds energy production
- Europe: 195 reactors in 17 countries
- EU: 14 % of energy production

## Nuclear Electricity Generation 2007



# Radioactive waste and Spent Nuclear Fuel (SNF)

- **Low-level waste:**

Paper, rags, tools, filters etc. from hospitals and industry; short-lived

- **Intermediate-level waste:**

Resins, chemical sludge and fuel cladding

- **High-level waste:**

Spent Nuclear fuel and high level vitrified waste



# Radioactive waste and Spent Nuclear Fuel (SNF)

- 95 % of radioactivity in the high-level waste, mostly SNF
- Europe: 40 000 m<sup>3</sup>/year of radioactive waste



# Spent Nuclear Fuel (SNF)

- World: 270 000 tonnes of SNF and 10 000 tonnes/year
- Europe: 60 000 tonnes of SNF and 2 400 tonnes/year

# Storage of Spent Nuclear Fuel

- Long-term storage
- Repository in deep geological formations
- Reprocessing

# Nuclear accidents

- Windscale (1957, UK)
- Three Mile Island (1979, USA)
- Chernobyl (1986, Ukraine)
- Fukushima (2011, Japan)

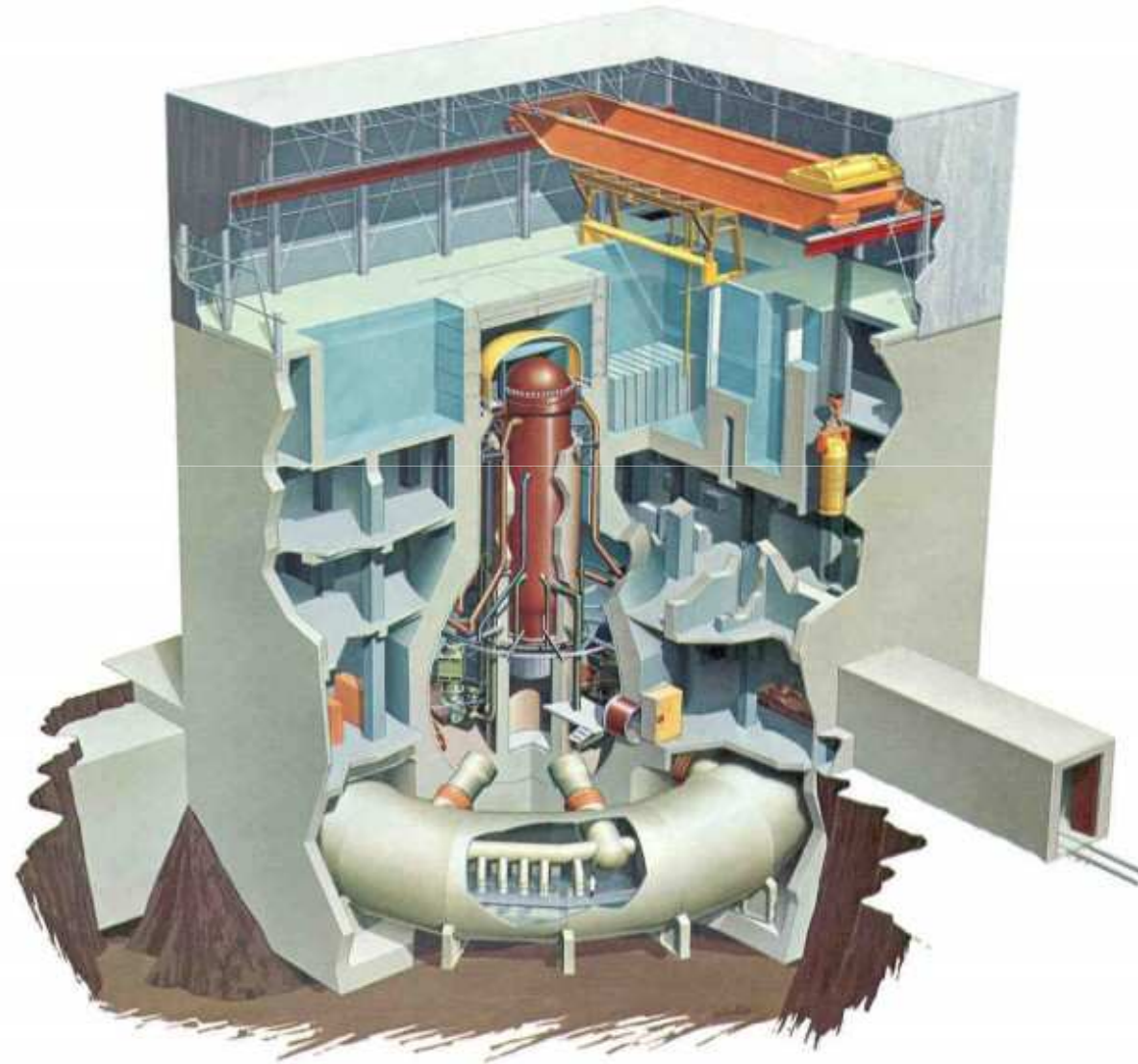
# Chernobyl

- 26. april 1986
- Fire in graphite in the nuclear core
- Fallout over Europe
- Uncertain numbers of death
- Still counter measures in Norway

# Fukushima



# Fukushima





# New Nuclear plans

- Mainly Asia
- Concrete plans for over 35 new plants in numerous countries:
  - Finland, France, South-Korea, Japan, China, India and Iran
  - Egypt, Turkey, Pakistan, North-Korea, Russia?
- Fukushima will lead to a new round of discussion about nuclear energy



# Conclusion

- Produces radioactive waste
- Short link between civilian and military use
- The unthinkable can happen
- The IPPC climate targets can be achieved without nuclear energy