LET'S TALK NUCLEAR!

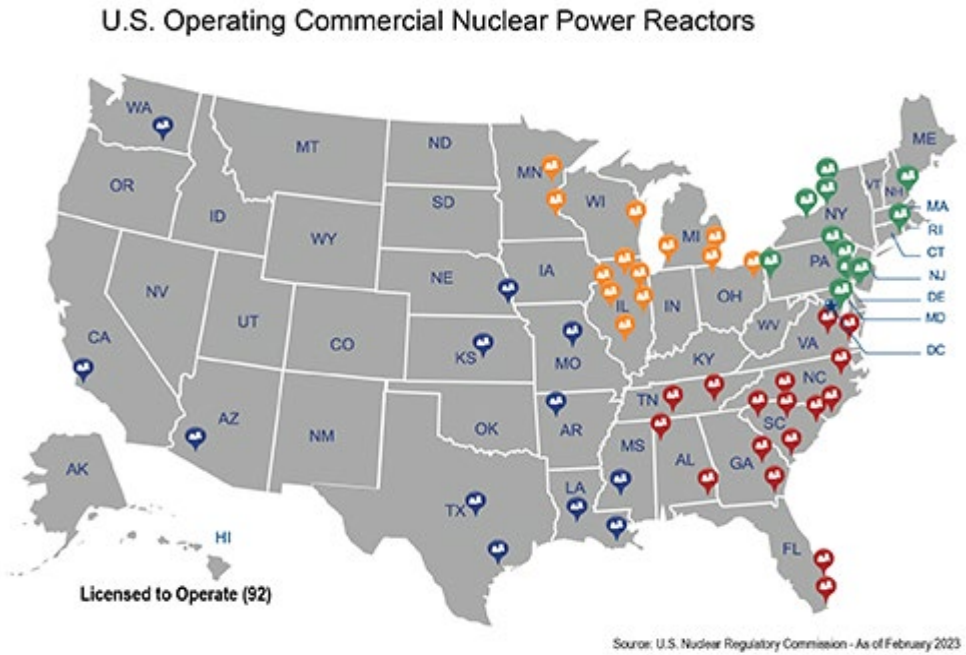
Jason Hou, PhD

Associate Professor of Nuclear Engineering

North Carolina State University

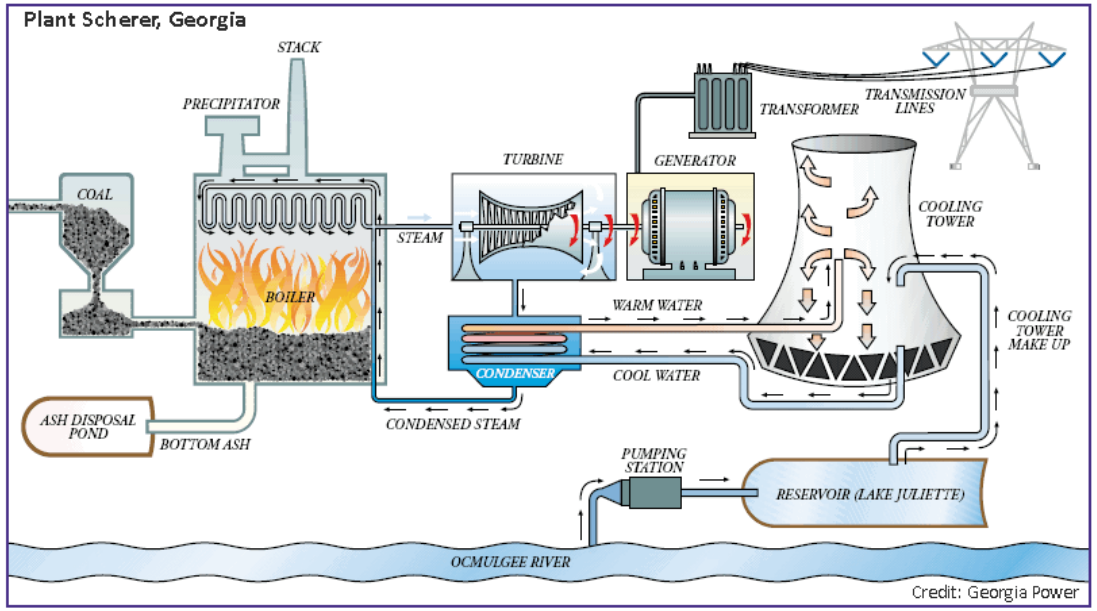
Shearon Harris Nuclear Power Plant

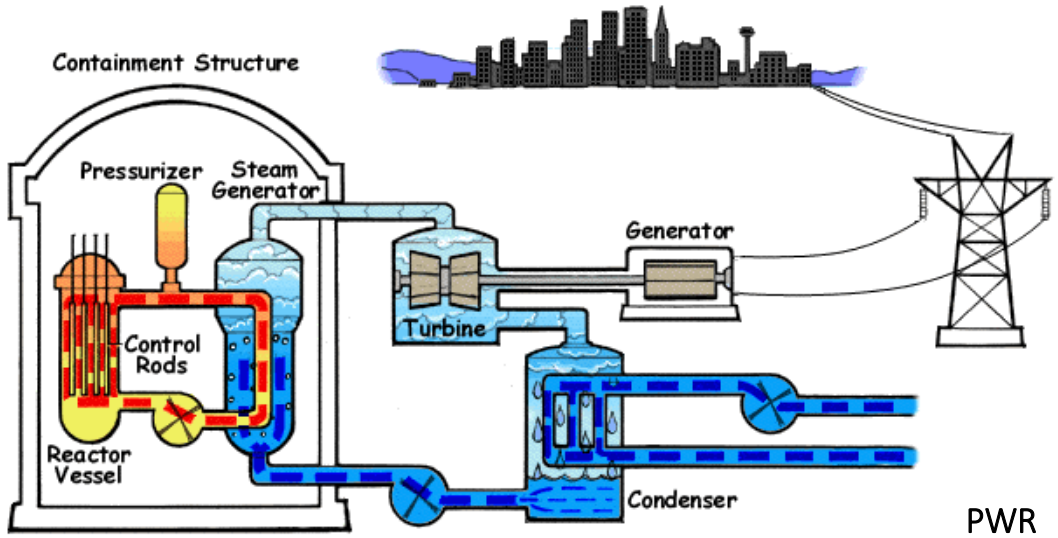
- Operating license: 1986 – 2046
- Technology: Generation 2 Pressurized Water Reactor (PWR)
- Capacity: 964 MW → power > 720,000 homes
- Radiation to a person living next to it: < 1 millirem per year (versus 620 millirems elsewhere)



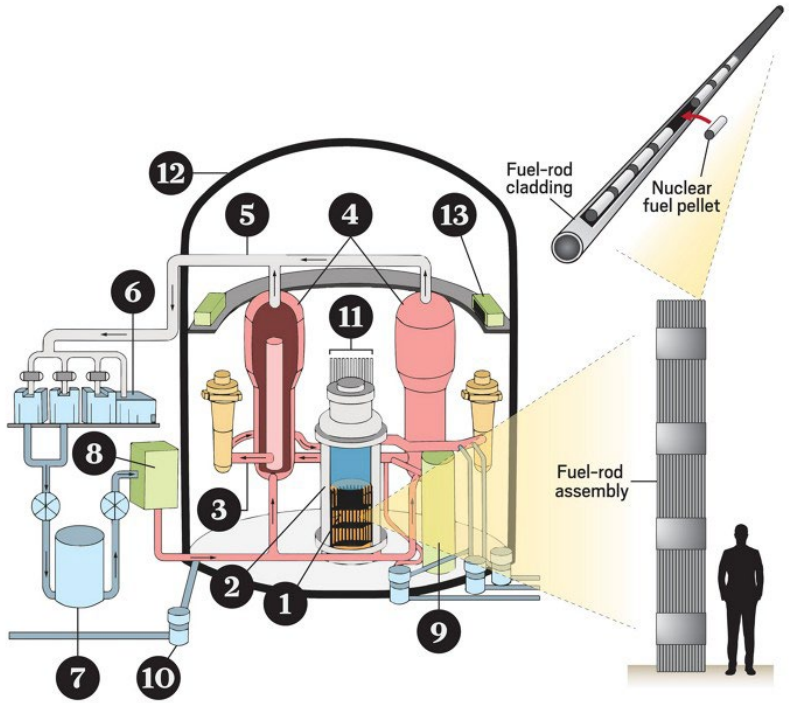
- 93 reactor currently operate in 28 U.S. states
- Produced 772 billion kilowatt hours of electricity in 2022

Nuclear Power Plants (NPP) are remarkably similar to large fossil fuel fired plants





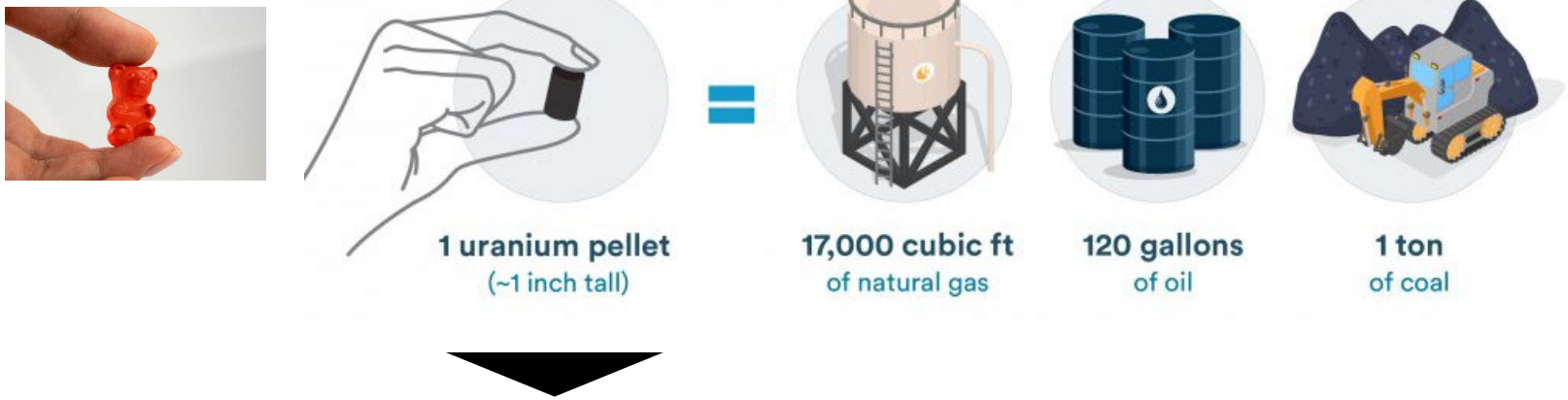
PWR

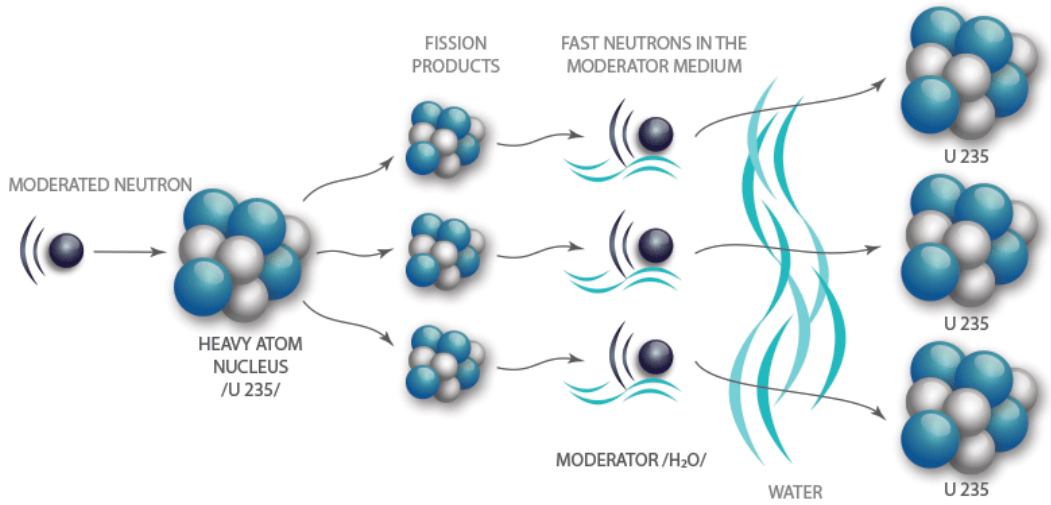


1. Core
2. Reactor vessel
3. Coolant loop
4. Steam generators
5. Steam line
6. Turbine generator
7. Condenser
8. Heater
9. Pressurizer
10. Emergency water supply system
11. Control rods
12. Containment building
13. Containment cooling system

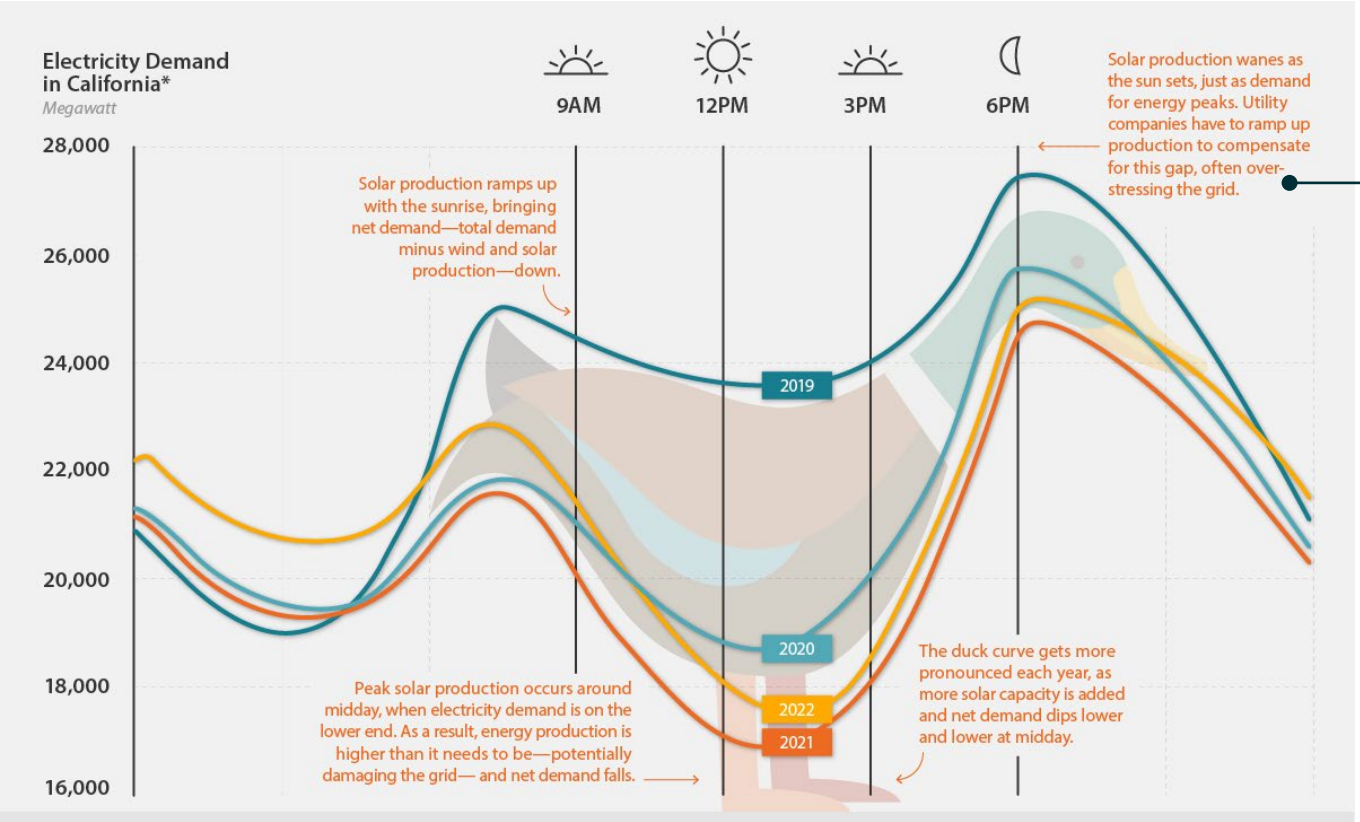
Nuclear Power Plant Design

Nuclear Fuel is Extremely Energy Dense

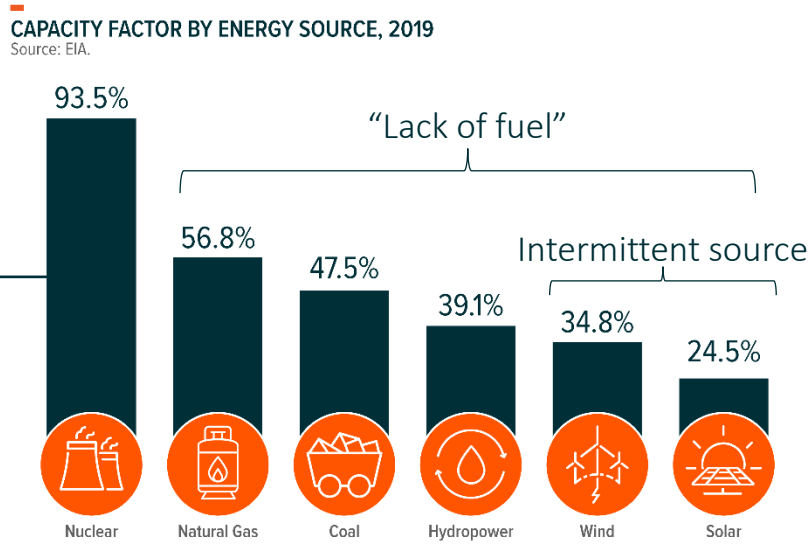




Nuclear Energy is Reliable

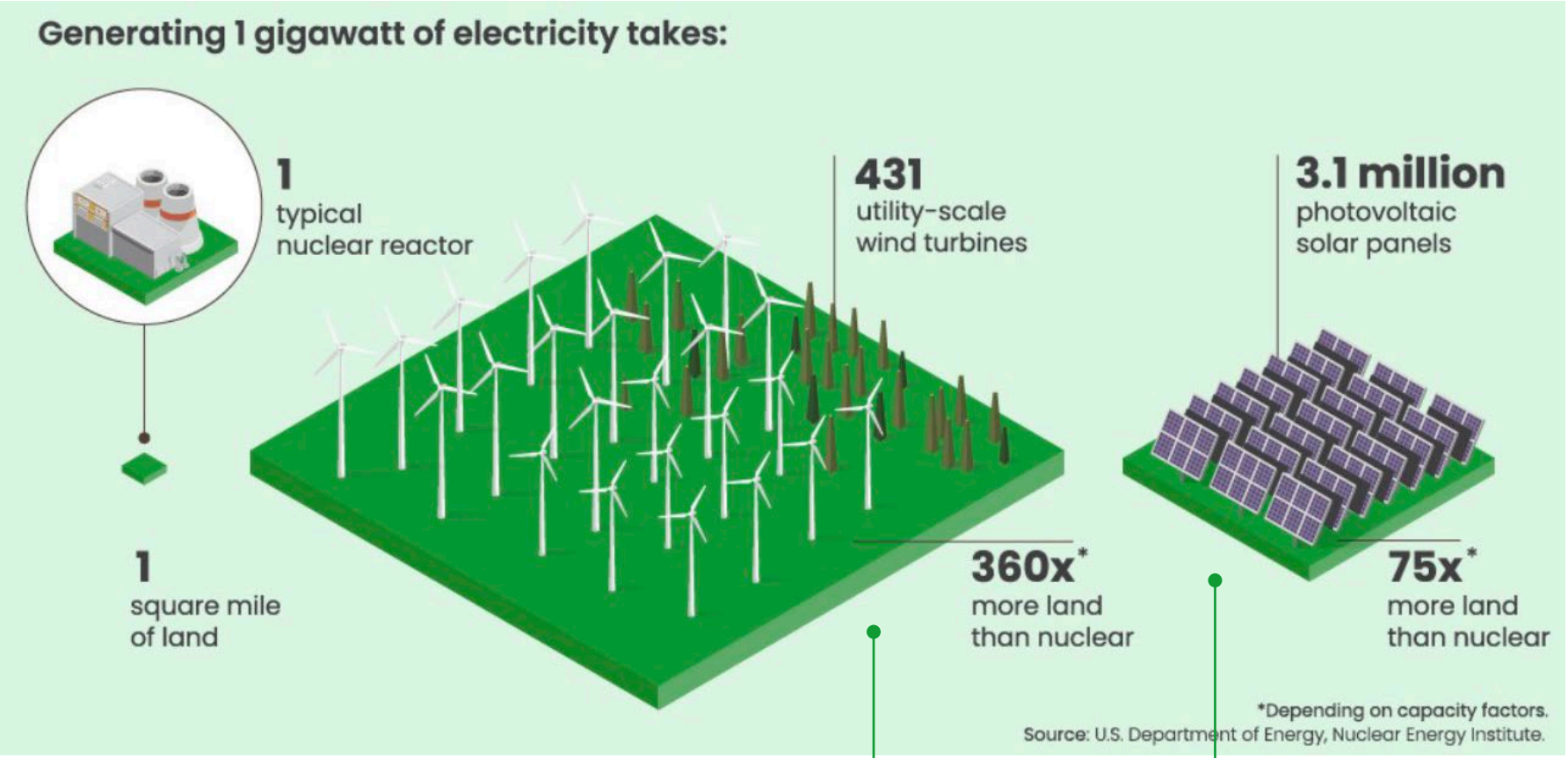


Data source: CAISO, Visualization: elements.visualcapitalist.com



- Nuclear plants are steadfast in natural disasters
- Nuclear can be the grid's backbone

Nuclear Energy's Land Footprints is Small



Nuclear energy can scale to meet the immense need for zero-carbon energy while also avoiding deforestation or industrialization of desert and other fragile ecosystems.

- *Diffuse* energy sources
- Land-use is not necessarily a critical criterion
- Dual-use land solutions are possible

Nuclear Energy is Clean

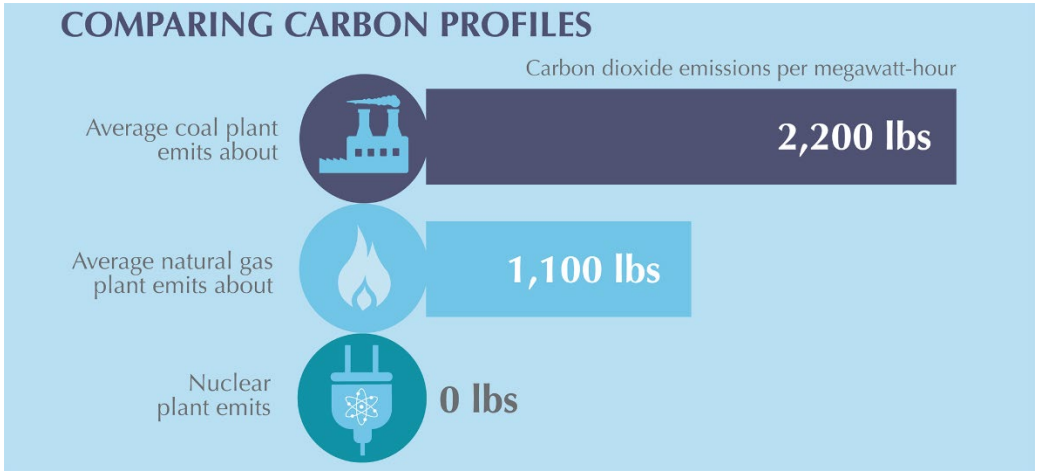
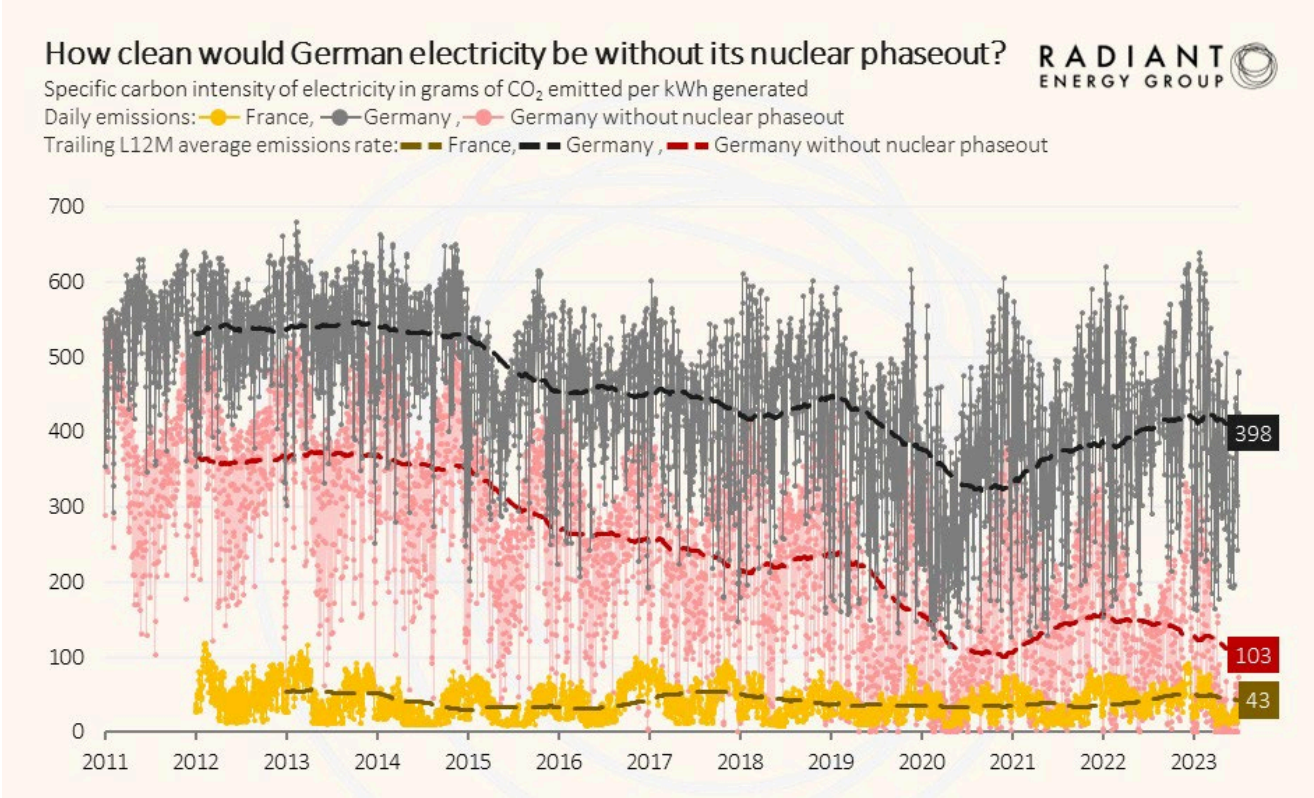
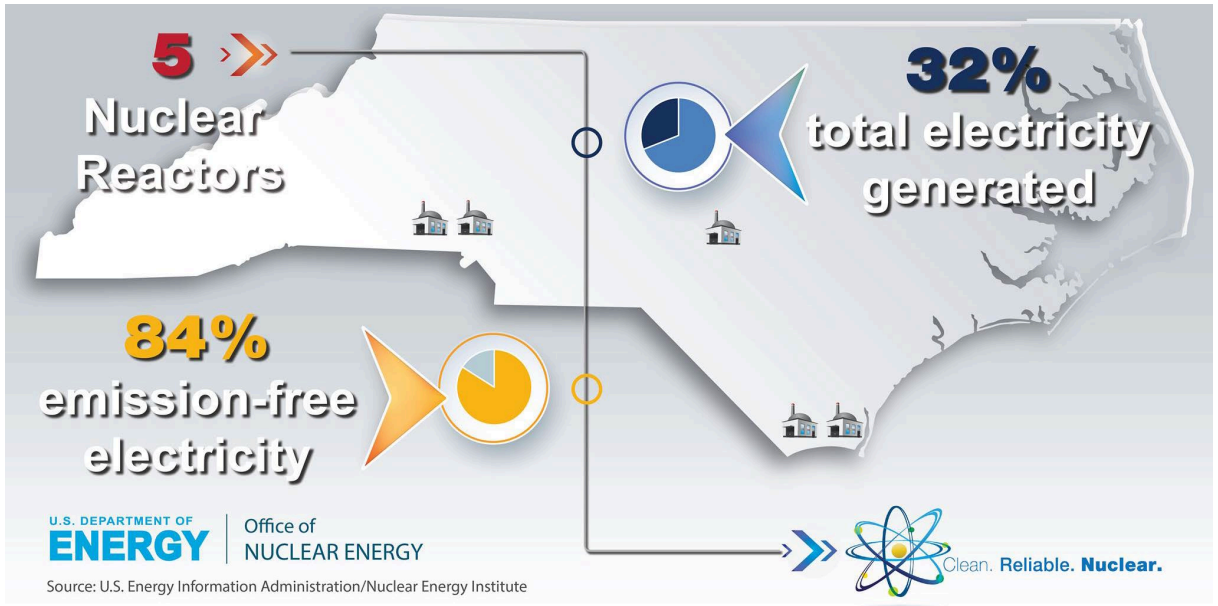


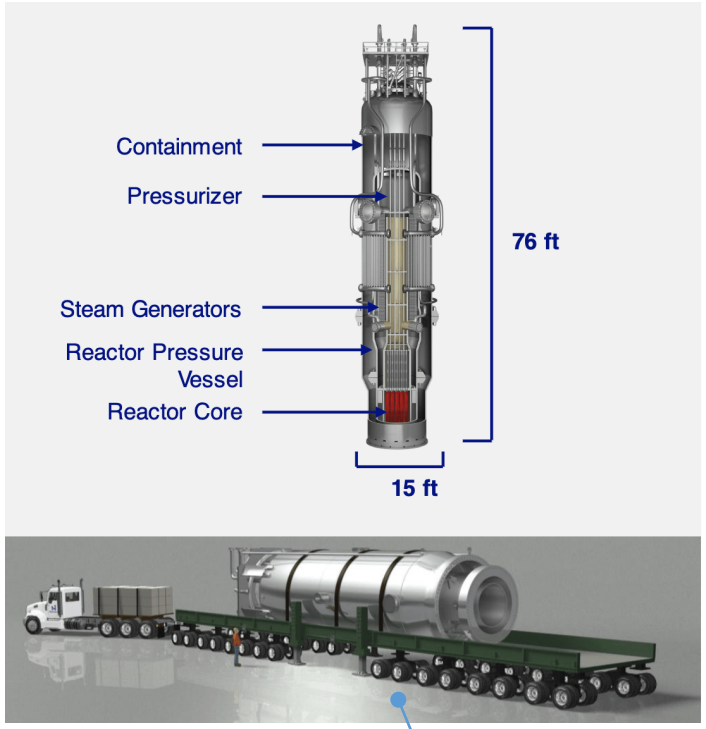
Image Courtesy: Center for Climate and Energy Solutions



- Provides 47% of the nation's clean energy in 2022
- Does not emit criteria air pollutions (no soot, no contribution to smog or acid rain)

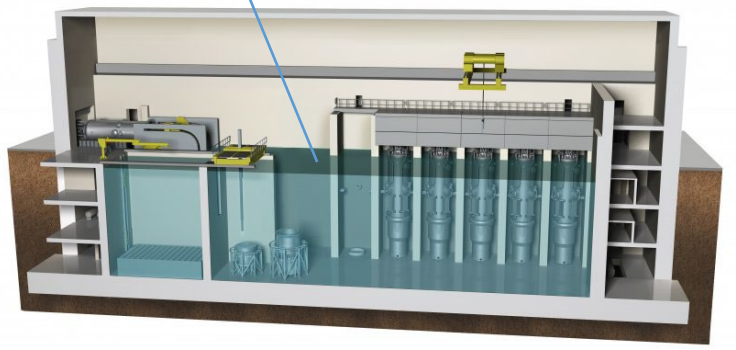
Nuclear is “bedrock” of Energy Roadmap for NC





NuScale SMR

- At least one Small Modular Reactors (SMRs) are planned to be installed in NC by 2035 to achieve statutory carbon reduction targets
- A bill pending in NC General Assembly would replace the term *renewable energy source* from the state law governing public utilities with *clean energy source*, and specify that clean energy includes nuclear power

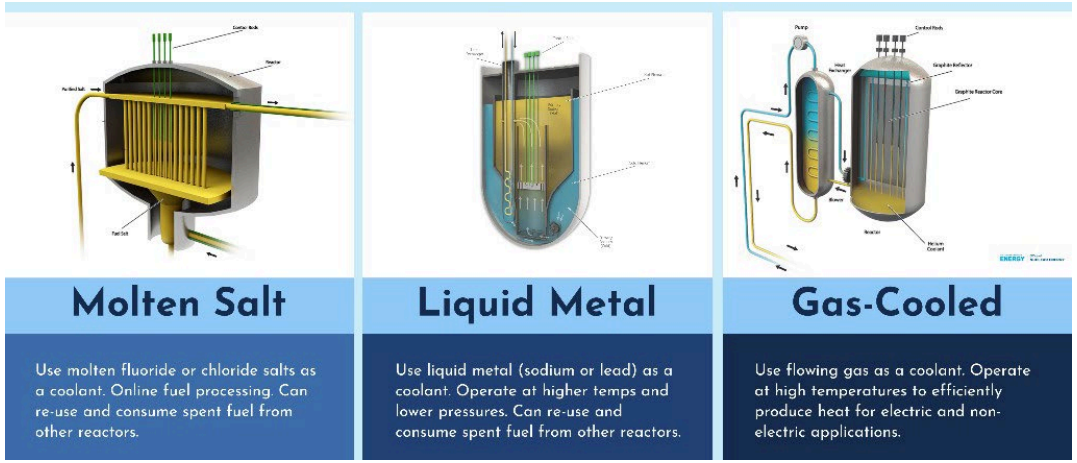


NuScale Power Reactor Building

What are Advanced Nuclear Reactor Concepts?

improved fuel and material performance

lower waste yields



the ability to integrate into electric applications and nonelectric applications

additional inherent safety features

enhanced reliability or improved resilience

modular sizes to allow for deployment that corresponds with the demand for electricity or process heat

increased tolerance to loss of fuel cooling

reduced consumption of cooling water and other environmental impacts

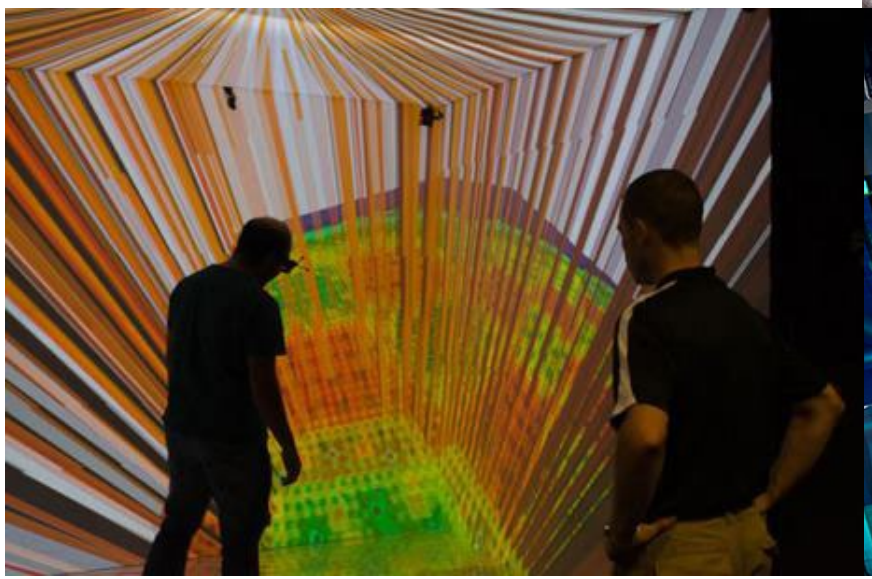
operational flexibility to respond to changes in demand for electricity or process heat and to complement integration with intermittent renewable energy or energy storage

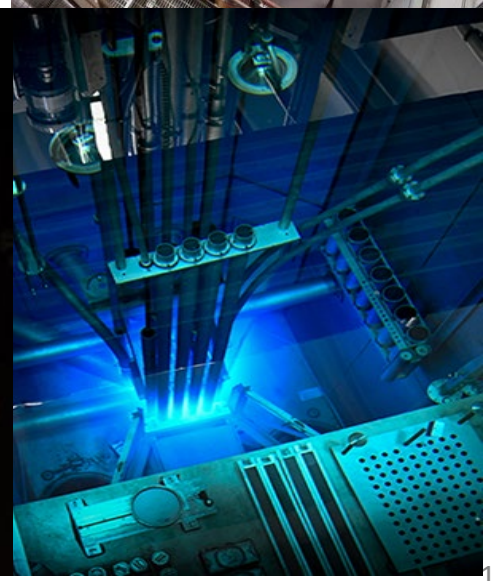
increased proliferation resistance

increased thermal efficiency

Phew, that was tough! Time to relax…

- Nuclear energy is a powerful way to respond to climate change and move people out of energy poverty
- New advanced designs can meet the changing demands for all types of carbon-free baseload energy
- Hybrid nuclear-renewable energy systems can decarbonize both electric grids and industry by providing heat for industry use
- They must be thoroughly and rapidly demonstrated to expand market opportunities before the U.S. loses access to key infrastructure and supply chain capabilities
- Universities provide important research and development support to accelerate success in the nuclear energy sector



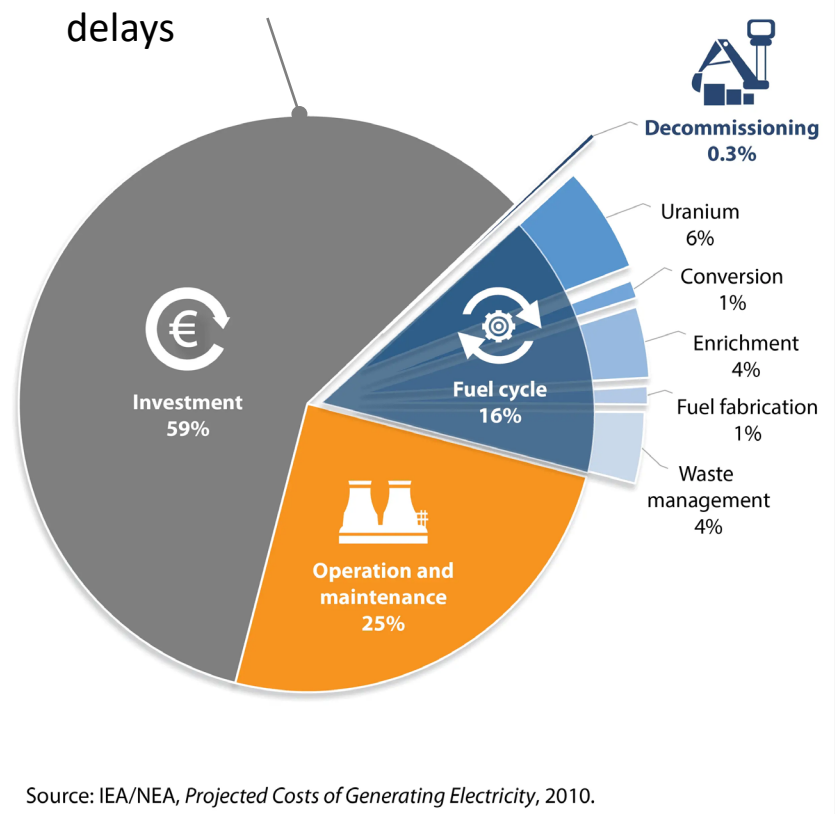


Thanks!

Backup slides

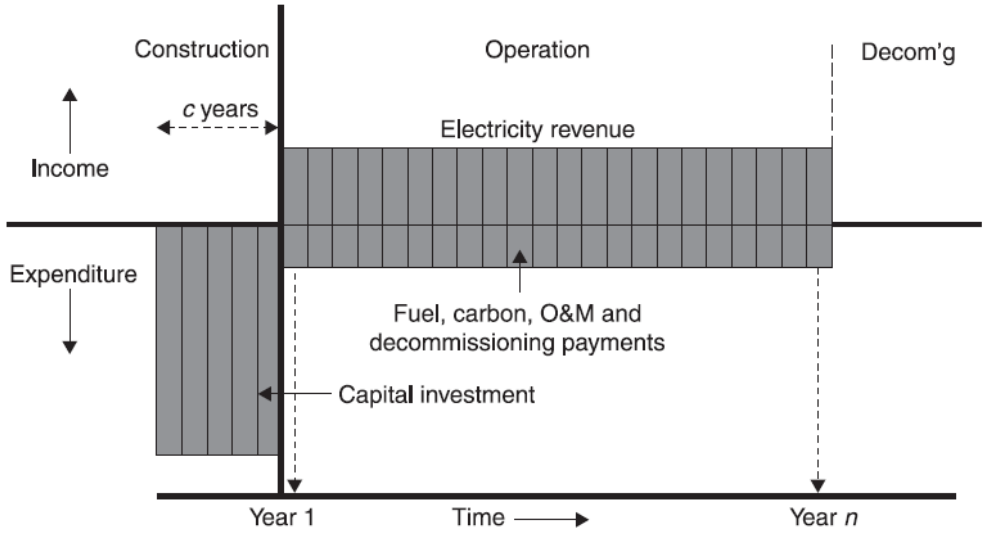
Nuclear Energy is Affordable

- High capital cost
- Lengthy construction delays



Source: IEA/NEA, *Projected Costs of Generating Electricity*, 2010.

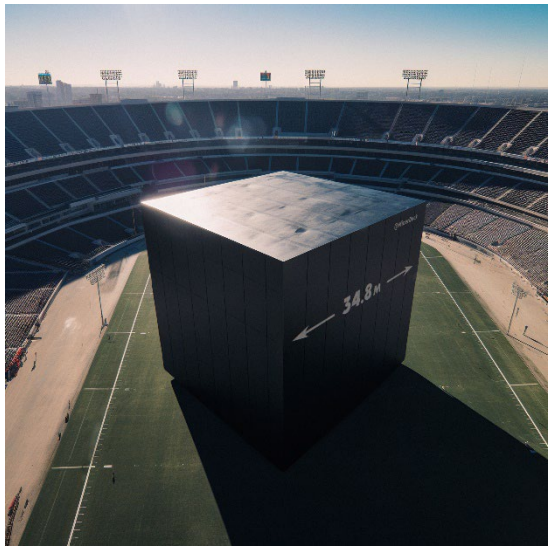
Levelized cost of electricity (LCOE) model



- Requires high upfront investment but results in a levelized cost of electricity that is a bargain because it can deliver 24/7
- Solutions
  - FOAK vs. NOAK
  - Modularization
  - Efficiency …

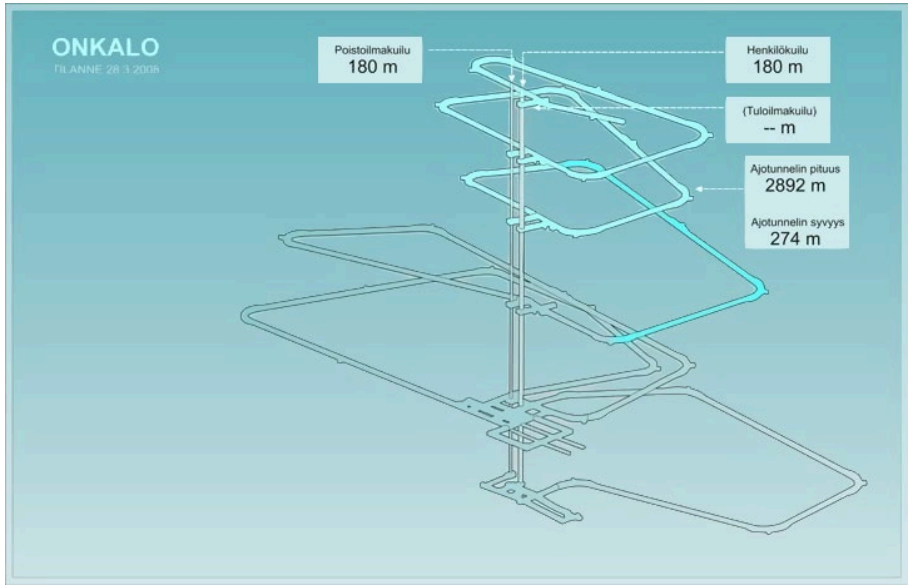
Nuclear “Waste” is Manageable

- U.S. nuclear plants represent one of the few electricity generators that manage all their waste
- Used nuclear fuel is safely and securely stored at plant sites in storage pools or specially designed dry storage containers
- >1,300 spent fuel shipments have been completed over the past 35 years
- Solutions for radioactive waste disposal exist and being implemented



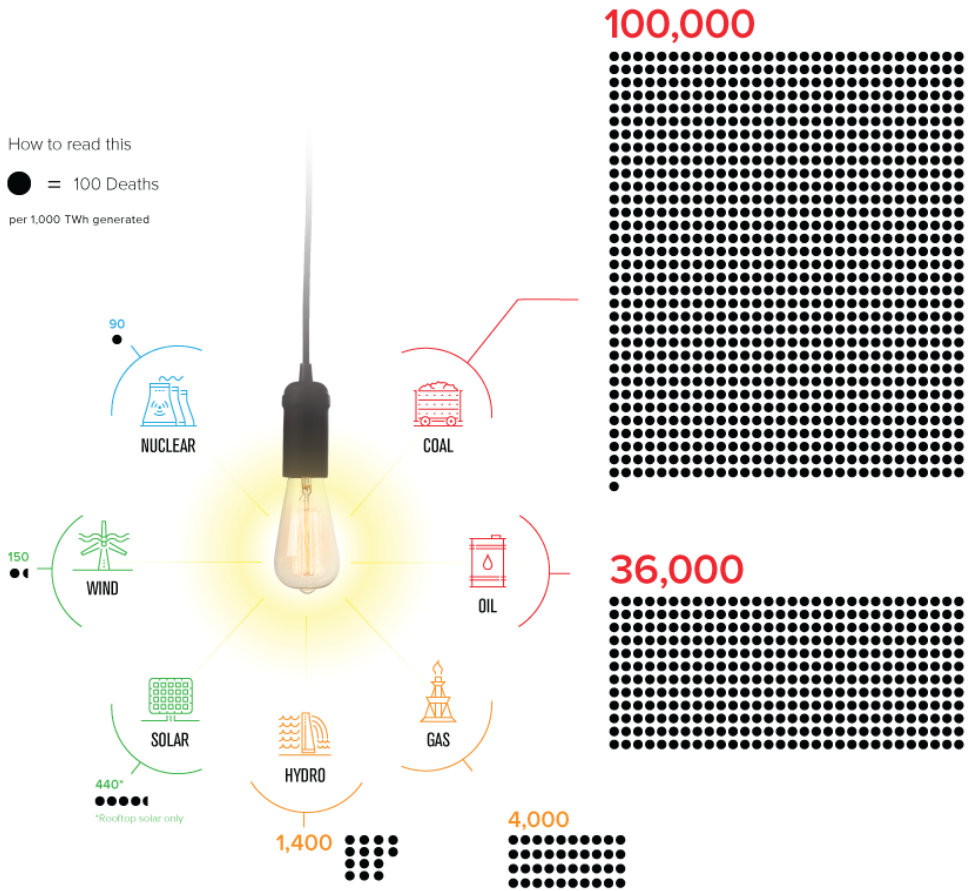
All spent fuel ever discharged since the start of nuclear electricity production in 1951 could fit in a football field.

Dry storage casks



A geologic repository under construction in Finland

Nuclear Energy is Safe



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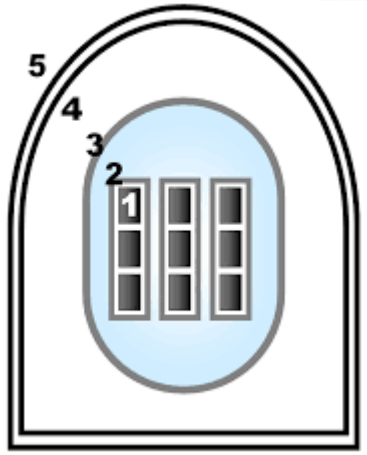
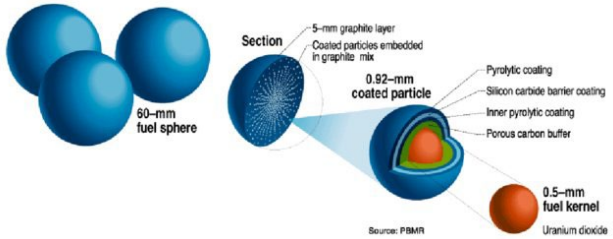


Safety philosophy: defense-in-depth



Pebble fuel with TRISO particles

- In the history of commercial nuclear energy, there have been no radiation-related health effects linked to their operation
- The greatest source of exposure to human-made radiation is not from nuclear plants (<1%) but from medical imaging and procedures