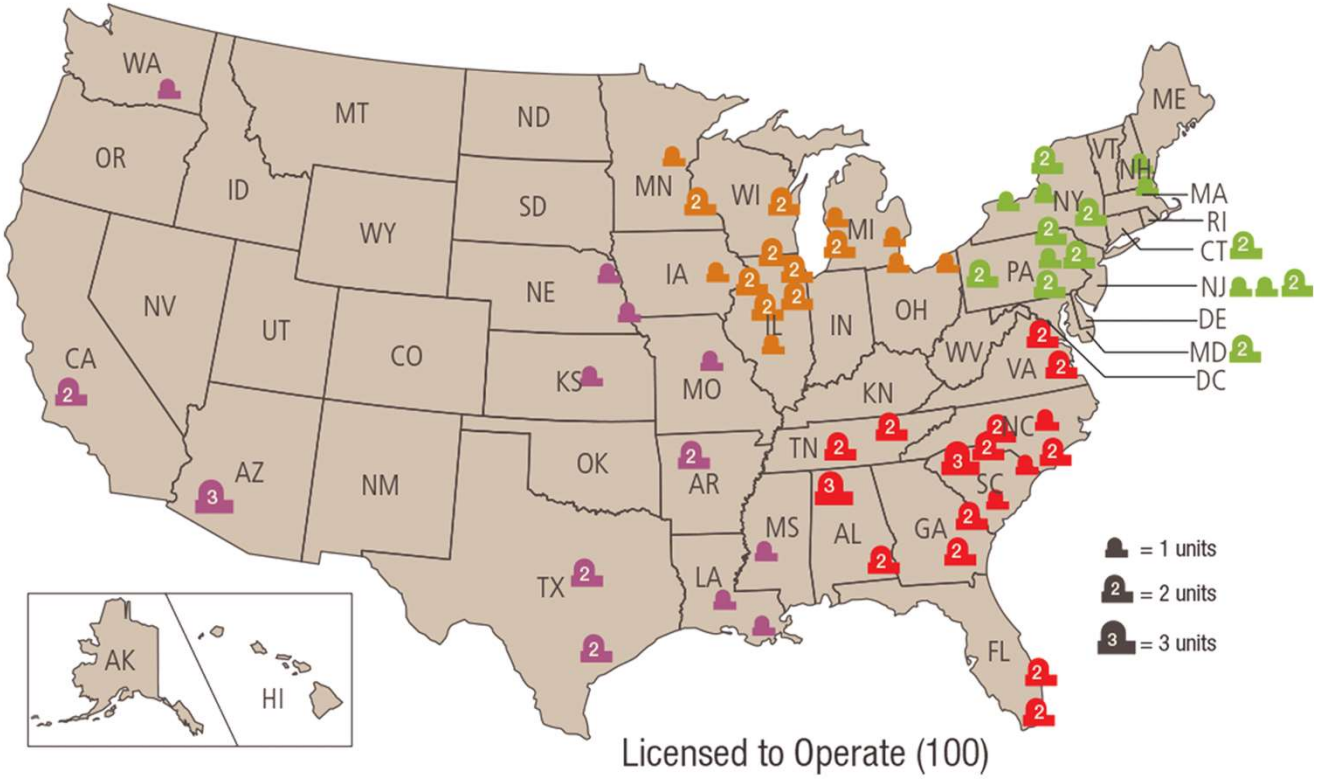
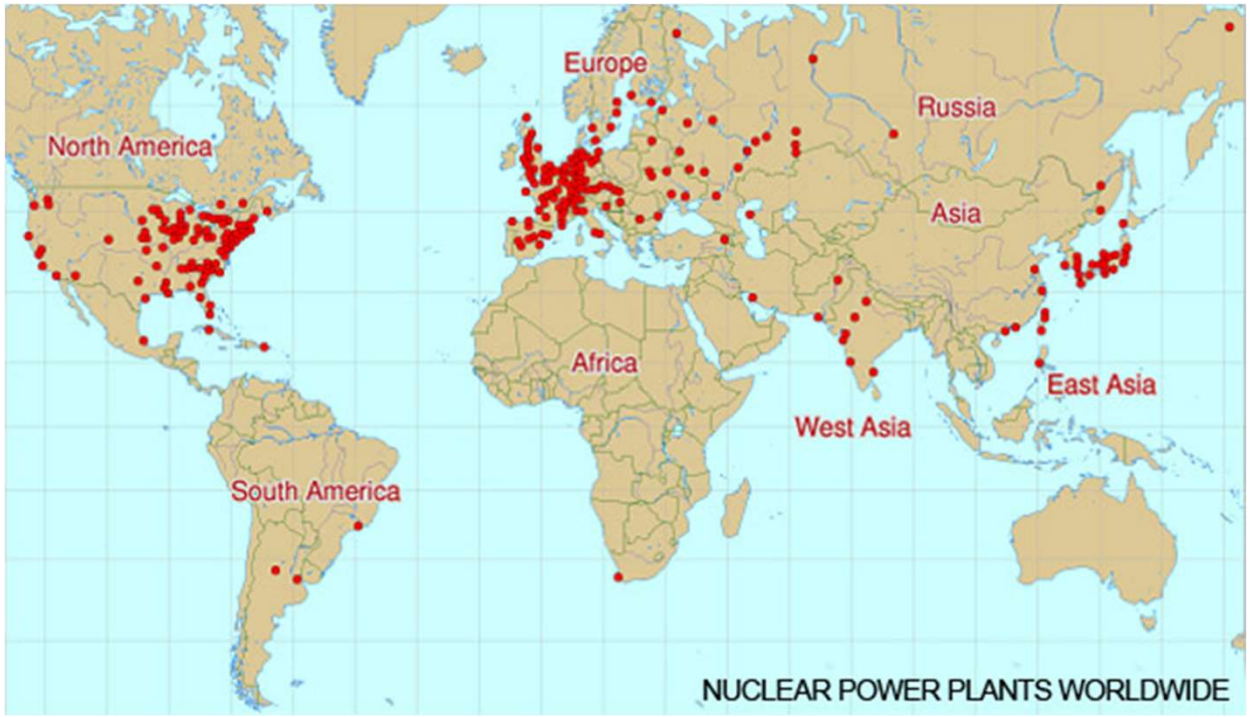
Introduction to Nuclear Power

Nuclear Power Plants in America



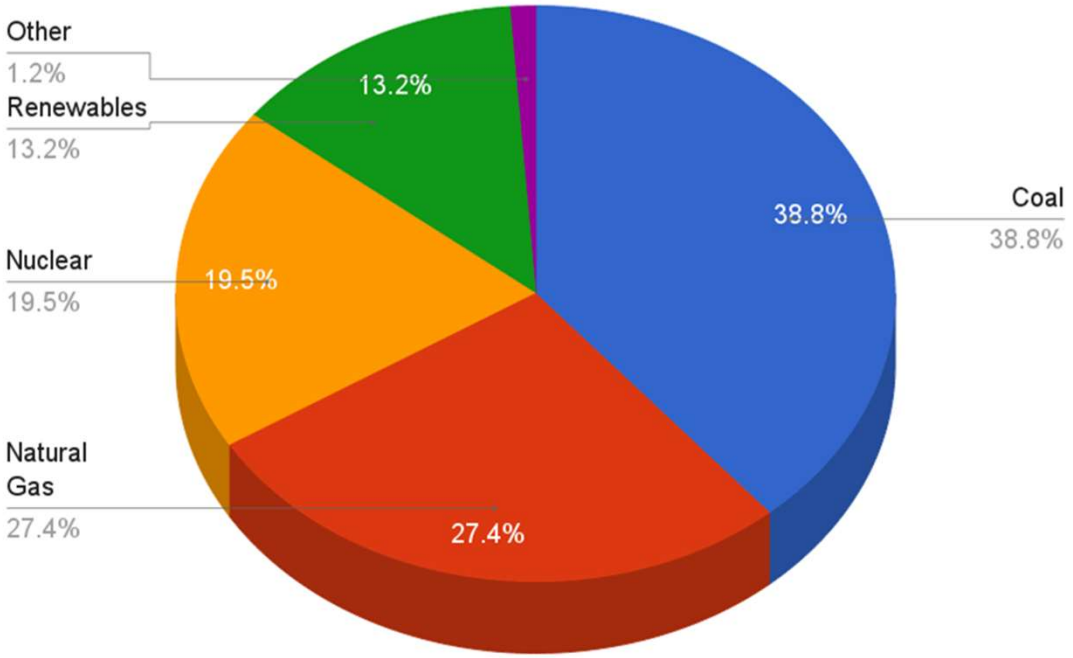
Nuclear Power: Clean, Safe, and Effective

World Wide

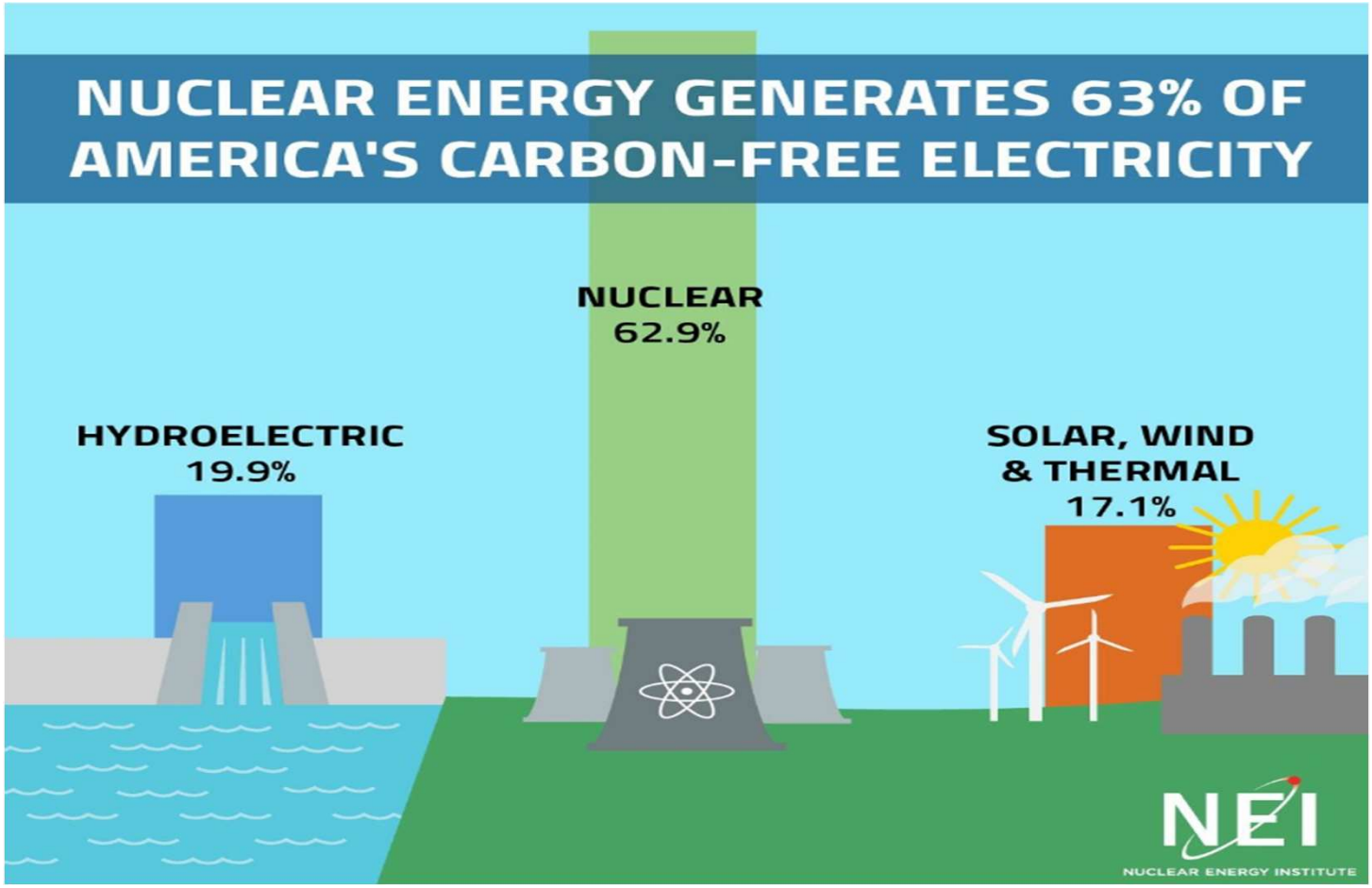


Nuclear Power: Clean, Safe, and Effective

US 2014 Electricity Generation By Type

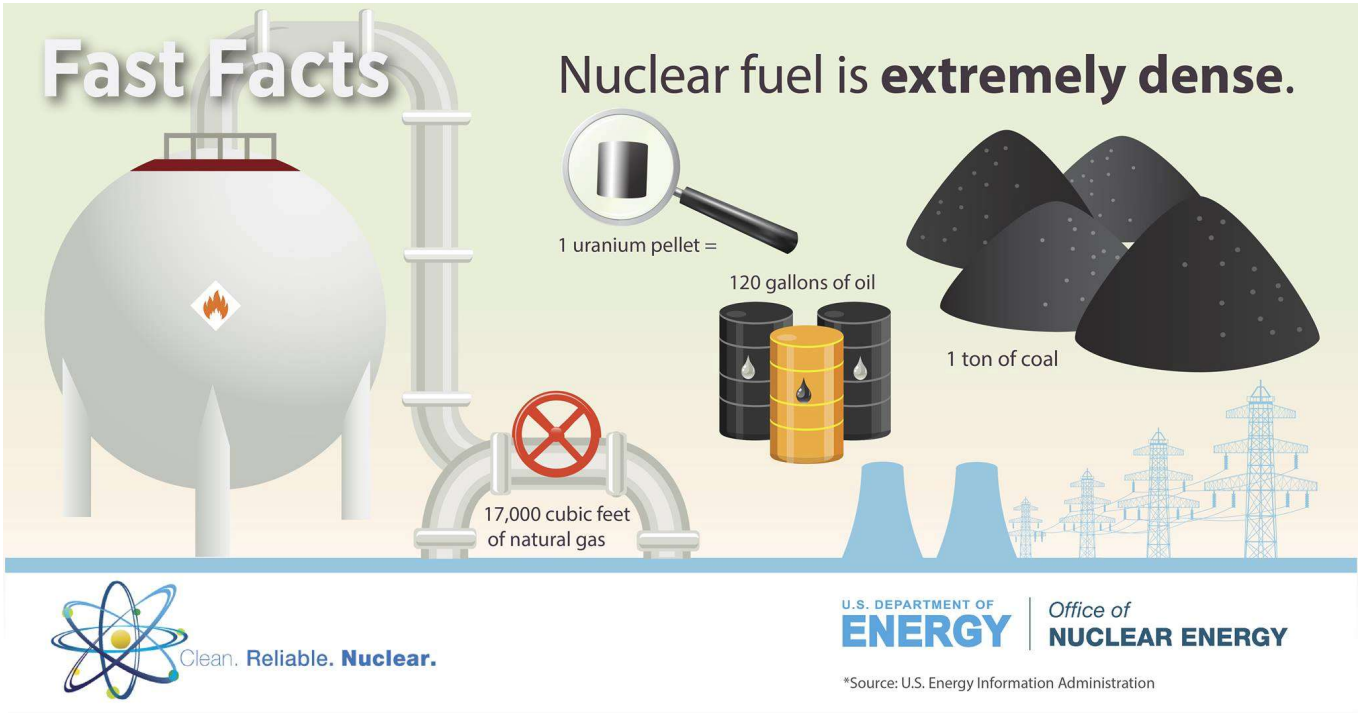


Nuclear Power: Clean, Safe, and Effective



Nuclear Power: Clean, Safe, and Effective

More Bang For Your Buck

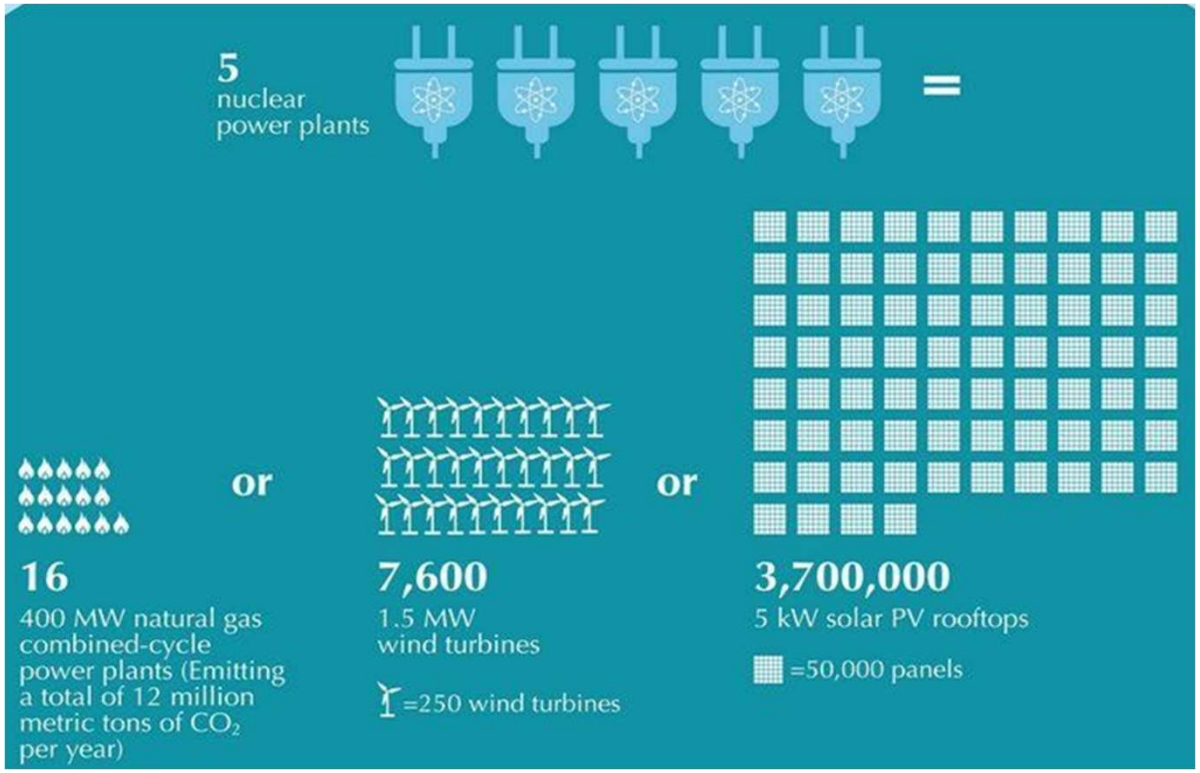


1 Uranium Fuel Pellet weighs 10 grams or 0.35 oz or 0.02 lbs.

Nuclear Power: Clean, Safe, and Effective

A Closer View

Nuclear Power Output



Nuclear Power: Clean, Safe, and Effective

A Bright Idea

- One light bulb requires 876kW-hr to be powered for one year.
- It takes 714 lbs of coal to produce 876kW-hr
  - 1lb to produce 1.23kW-hr to power the bulb for 12 hours
- One gram of uranium produces 22,813 kW-hr
  - Enough to power a 100W light bulb for 26 years

Myths About Nuclear Power

- **Myth # 1: Americans get most of their yearly radiation dose from nuclear power plants.**
  - **Truth:** We are surrounded by naturally occurring radiation. Only 0.005% of the average American's yearly radiation dose comes from nuclear power; 100 times less than we get from coal, 200 times less than a cross-country flight, and about the same as eating 1 banana per year.

- **Myth # 2: A nuclear reactor can explode like a nuclear bomb.**
  - **Truth:** It is impossible for a reactor to explode like a nuclear weapon; these weapons contain very special materials in very particular configurations, neither of which are present in a nuclear reactor.

- **Myth # 3: Nuclear energy is not safe.**
  - **Truth:** Nuclear energy is as safe or safer than any other form of energy available. No member of the public has ever been injured or killed in the entire 50-year history of commercial nuclear power in the U.S. In fact, recent studies have shown that it is safer to work in a nuclear power plant than an office.

Safety in Numbers

Energy Source	Mortality Rate (deaths/trillion kWhr)	Percentage of Electricy Produced
Coal – global average	100,000	41% global electricity
Coal – China	170,000	75% China's electricity
Coal – U.S.	10,000	32% U.S. electricity
Oil	36,000	33% of energy, 8% of electricity
Natural Gas	4,000	22% global electricity
Biofuel/Biomass	24,000	21% global energy
Solar (rooftop)	440	< 1% global electricity
Wind	150	2% global electricity
Hydro – global average	1,400	16% global electricit
Hydro – U.S.	5	6% U.S. electricity
Nuclear – global average	90	11% global electricity (w/Chernobyl & Fukushima)
Nuclear – U.S.	0.1	19% U.S. electricity

Who is more trusted to operate?

The 25 year old civilian

- 4-6 years to earn an applicable college degree (not required but recommended)
- 1.5-2 years for on site training and instruction to earn a license
- 1 year of supervised hands-on training and experience

The 21 year old Navy Nuke

- 1 year of accelerated classroom instruction
- 6 months of supervised hands-on training on a live nuclear reactor
- 1 year of qualifications and training to operate a nuclear reactor

Nuclear Power Industry

Operational Experience Hiring Preference

From the DTE Energy Hiring Department: Ask Them Yourself!

Careers@dteenergy.com

Reactor Operators are hired:

- 98% from the military (Navy Nuclear Enlisted Background Experience)
- 2% from "Internal NO" (Nuclear Operator Non-Licensed Population)
- "Depending on the job classification, military are pretty much the only ones that can qualify"

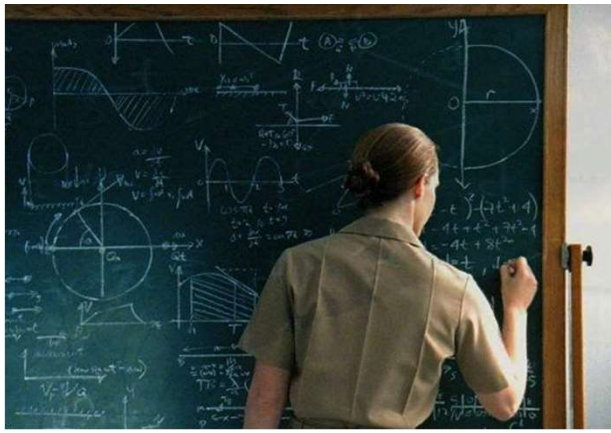
Senior Reactor Operator Positions (Operational Management)

- Preferred Employment Consideration
  - Navy Nuclear Officer
  - 4-Year Degree with operational experience (Prior Enlisted)

Engineering

- "The leadership team is very adamant on everyone having a 4-year degree."
  - Engineers with operational experience are preferred over those with only 4-year degrees

The US Navy Track Record – Batting Average: 1.000

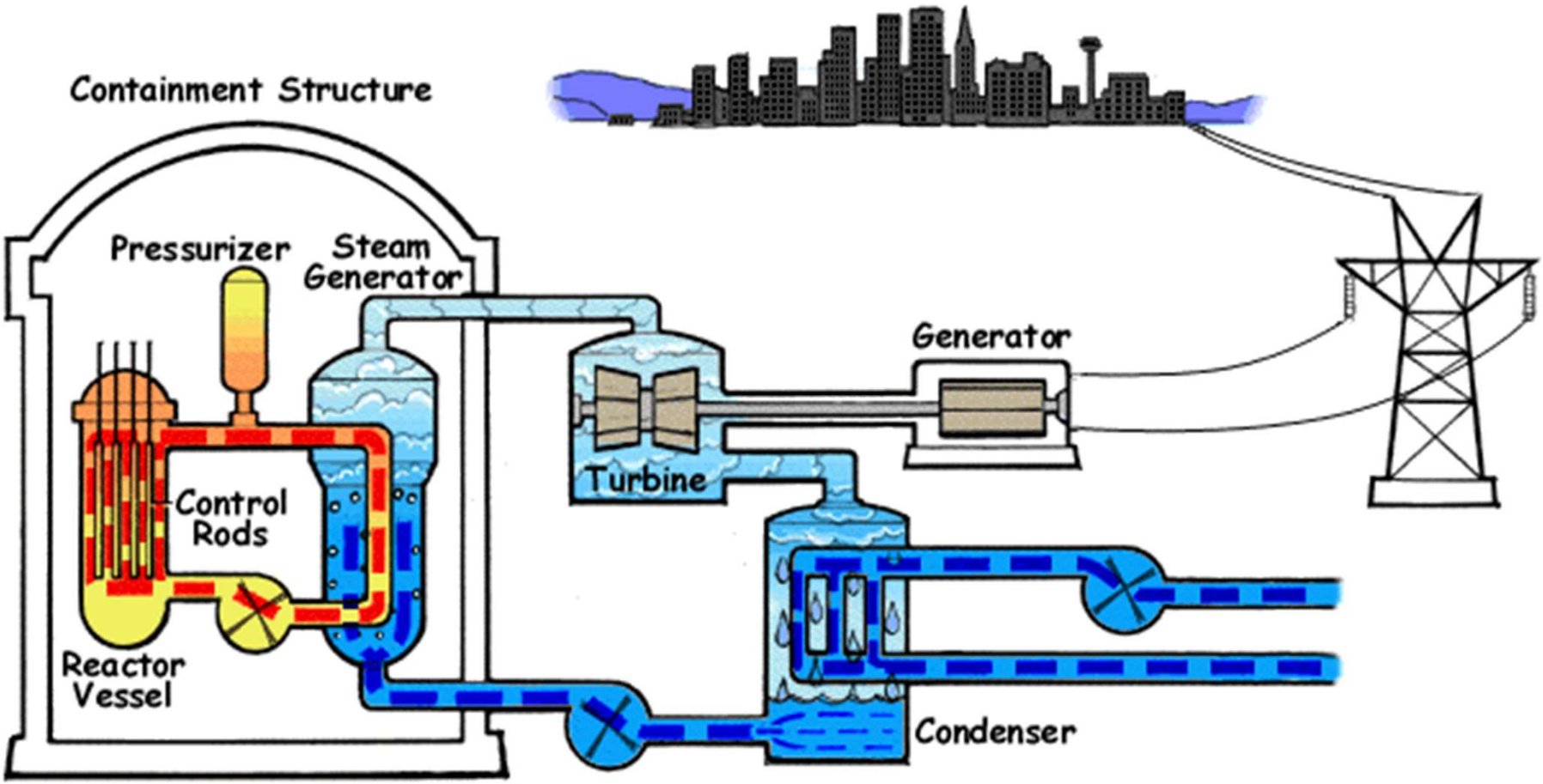


Currently operating 82 active platforms, and with a history in excess of 50 years of operating Nuclear Reactors, the United States Navy has NEVER had a nuclear reactor accident.

- 11 Aircraft Carriers, 71 Submarines

Nuclear Power was invented by the United States Navy in 1954. Since it's invention, we have maintained a perfect record. But how?

- Military Discipline Instilled in All Operators
- Multiple Testing Schedules and High Standard Maintenance Practices
- Extensive World-Class Training (training continues after qualification)
- Routine Inspection Schedules
- Multi-Million Dollar Safety Systems / Multi-Billion Dollar Engineering Designs


Containment Structure
Pressurizer
Steam Generator
Control Rods
Reactor Vessel
Turbine
Generator
Condenser