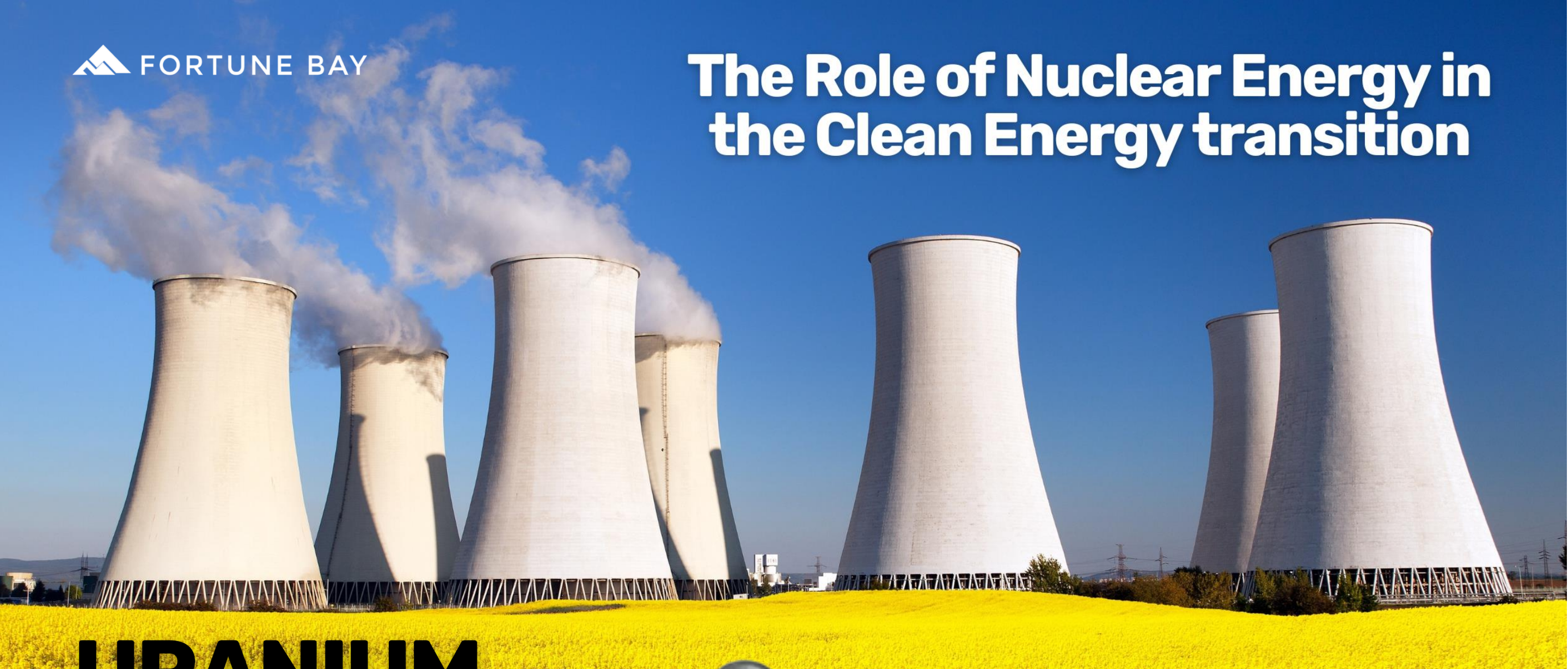


The Role of Nuclear Energy in the Clean Energy transition



URANIUM

The global trajectory is aimed at achieving net-zero carbon energy. With the growth of populations and energy demands, upcoming energy sources must possess traits of cleanliness and sustainability. Among these sources, which one stands out as the most environmentally friendly?



1 URANIUM FUEL PELLETT
the size of your fingertip

HAS AS MUCH ENERGY AS:



17,000
CUBIC FEET OF
NATURAL GAS



149
GALLONS
OF OIL

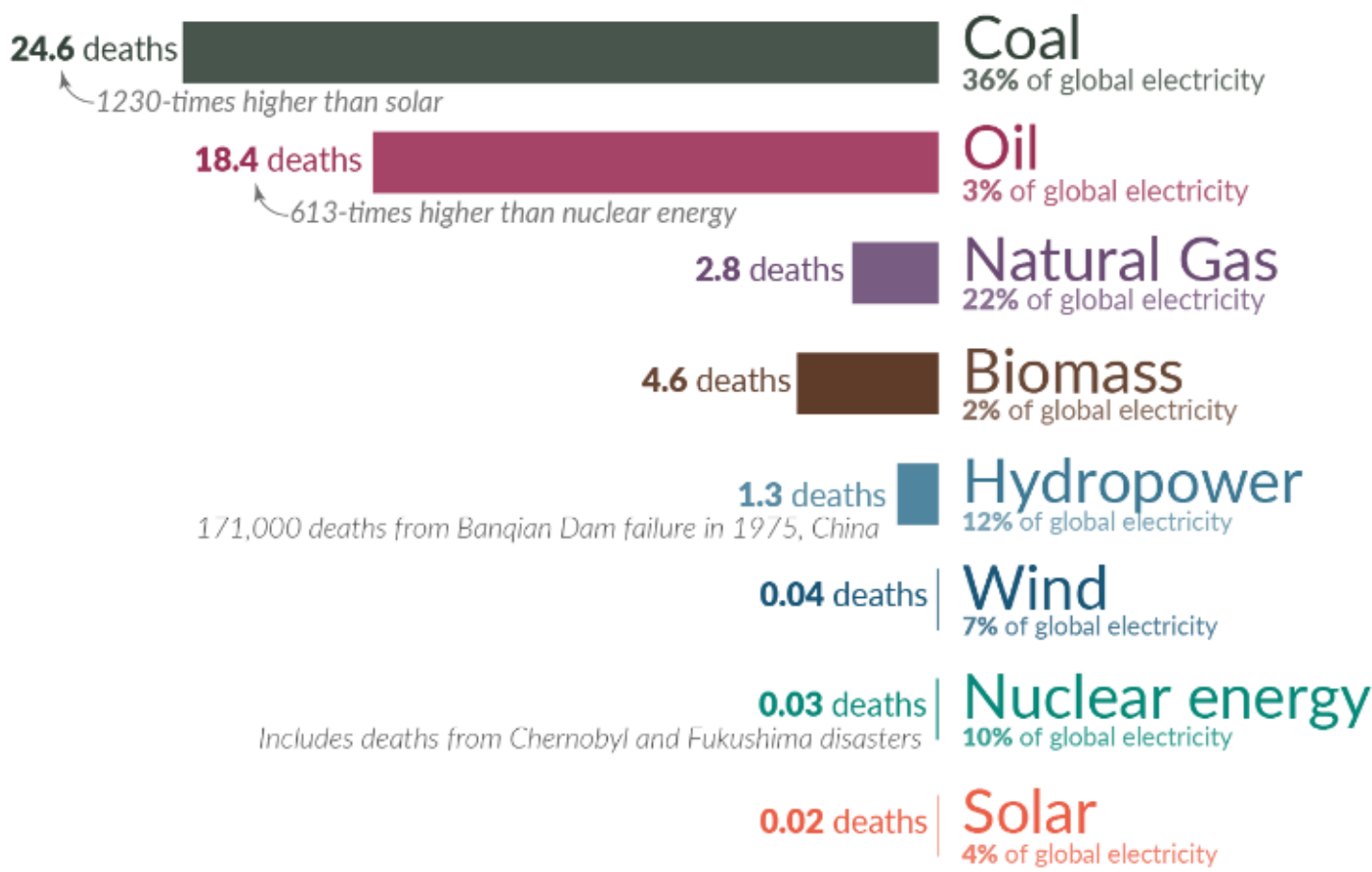


1 TON
OF COAL

What are the **safest** and **cleanest** sources of energy?

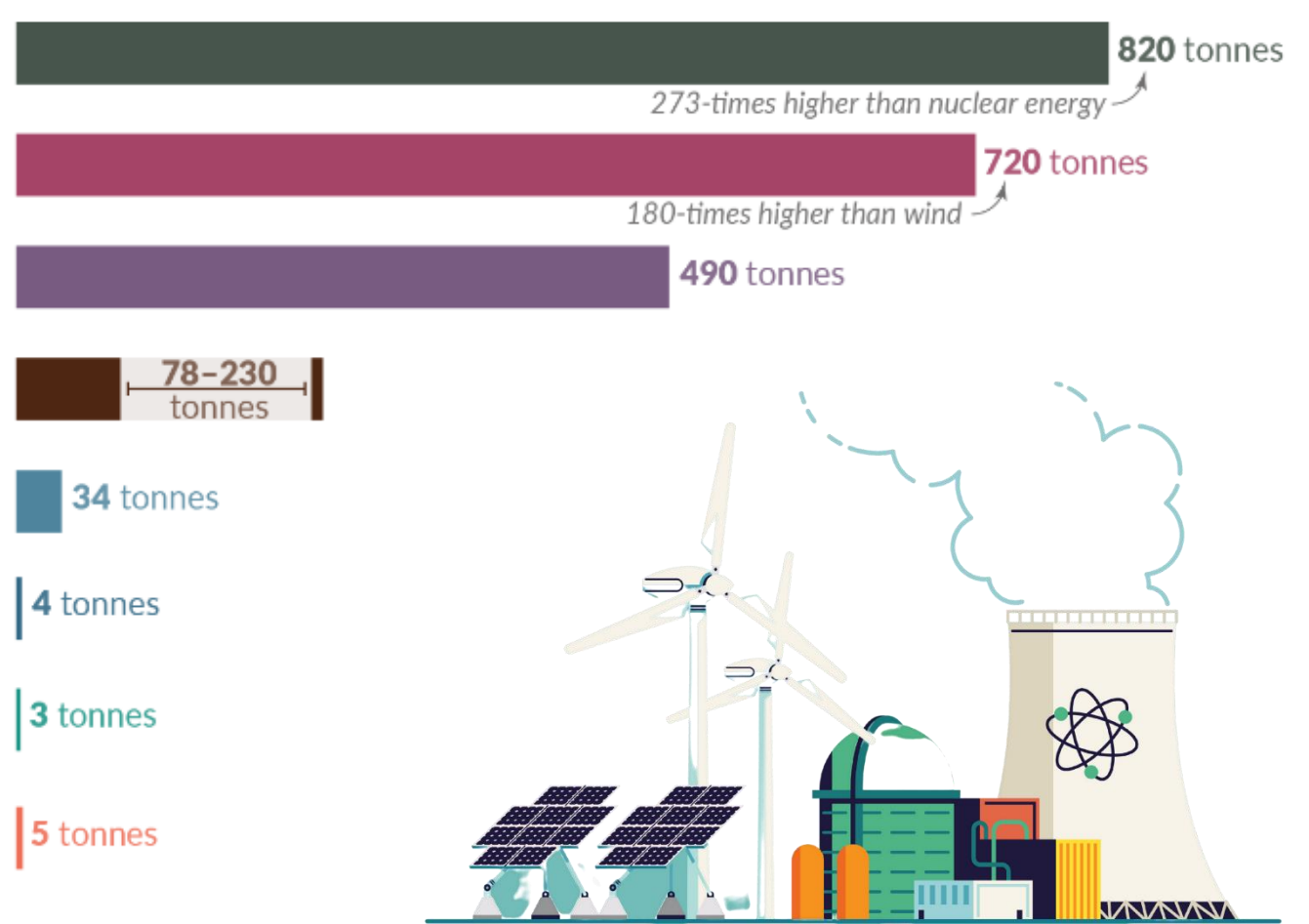
Death rate from accidents and air pollution

Measured as deaths per terawatt-hour of electricity production. 1 terawatt-hour is the annual electricity consumption of 150,000 people in the EU.



Greenhouse gas emissions

Measured in emissions of CO₂-equivalents per gigawatt-hour of electricity over the lifecycle of the power plant. 1 gigawatt-hour is the annual electricity consumption of 150 people in the EU.



Death rates from fossil fuels and biomass are based on state-of-the-art plants with pollution controls in Europe, and are based on older models of the impacts of air pollution on health. This means these death rates are likely to be very conservative. For further discussion, see our article: [OurWorldinData.org/safest-sources-of-energy](https://ourworldindata.org/safest-sources-of-energy). Electricity shares are given for 2021. Data sources: Markandya & Wilkinson (2007); UNSCEAR (2008; 2018); Sovacool et al. (2016); IPCC AR5 (2014); Pehl et al. (2017); Ember Energy (2021). OurWorldinData.org - Research and data to make progress against the world's largest problems.

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Nuclear Reactors

Nuclear power reactors use the heat produced from splitting atoms to generate steam to drive a turbine. No greenhouse gases are produced in the fission process, and only very small amounts are produced across the whole nuclear life-cycle. Nuclear power is an environmentally-friendly form of electricity generation and does not contribute to air pollution.

Nuclear power generates about

10%

of the world's electricity

From about

440

power reactors

Over

50

countries utilize nuclear energy as part of their energy production

Pipeline Projects

About

60

power reactors are currently being constructed

About

100

are on order or planned

And over

300

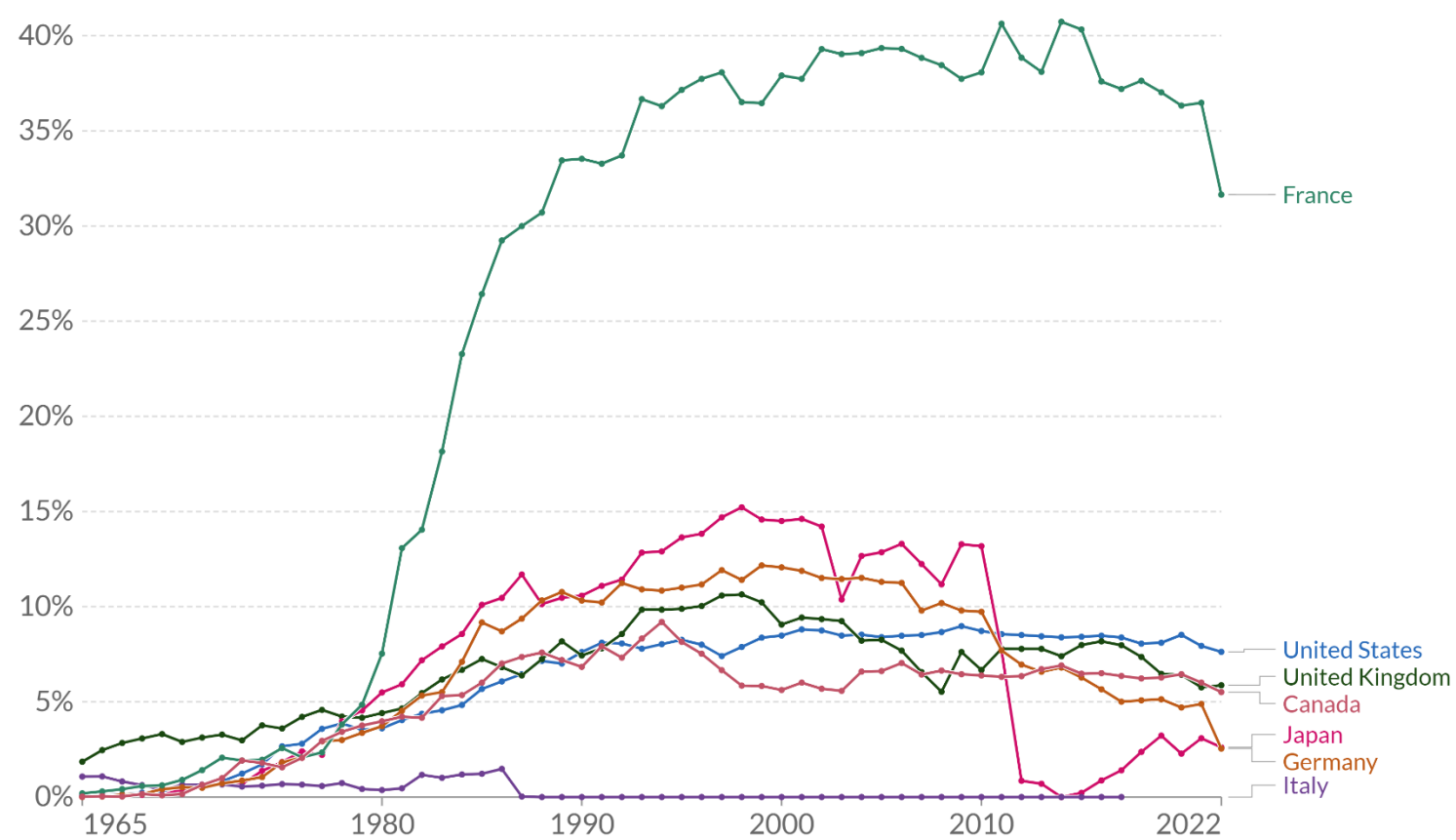
More power reactors are proposed

Share of primary energy from Nuclear

This interactive chart shows the share of primary energy that comes from nuclear sources.

France has one of the highest levels of nuclear energy consumption in the world. In 1974, following the oil shock, France made a strategic decision to rapidly expand its nuclear power capacity. Currently, over 70% of France's electricity is generated from nuclear power. This high reliance on nuclear energy has contributed to France's low electricity sector emissions and its ability to export energy to other countries.

Share of primary energy from nuclear



Source: Energy Institute Statistical Review of World Energy (2023)

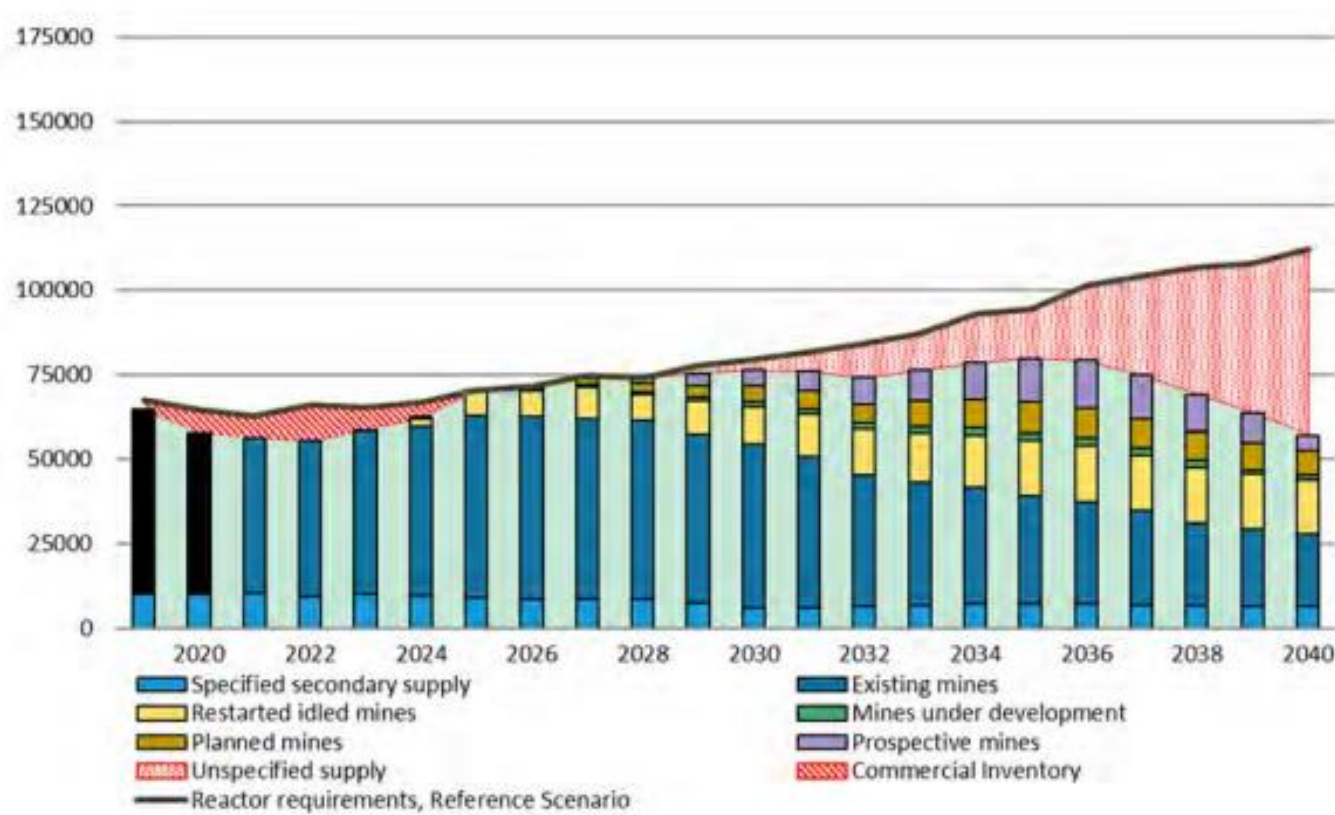
OurWorldInData.org/energy • CC BY

Note: Primary energy is calculated using the 'substitution method', which accounts for the energy production inefficiencies of fossil fuels.

Sources: [Our World in data](#) | [Wikipedia](#) | [NY Times](#)



Figure 7: Reference Scenario for uranium supply and demand, tU



Uranium Markets

Uranium Demand:

- Uranium demand is expected to rise ~160% over the next decades¹
- Geopolitical concerns continue to drive nuclear fuel contracting as buyers look to reduce or eliminate Russian exposure and reliance
- Positive demand outlook for existing reactor fleet, with major government efforts in the U.S., China, Japan, and South Korea
- Small modular reactors move closer to deployment. Uranium demand impact potentially beginning in the late-2020s

Sources: [World Nuclear](#)

Uranium is the fuel that powers Nuclear plants

The need to find new uranium deposits

Overview of current Uranium Reserves:

The total world resources of uranium are not known exactly, but the known reserves in the ground capable of being mined are estimated to be sufficient for several decades. According to the OECD-NEA, the world's uranium resources were estimated at 7.6 million tonnes at the end of 2019. Most uranium deposits are located within large uranium provinces where exploration is active and new deposits are discovered on a regular basis.

Importance of exploration and development of new uranium deposits:

Discovery and development of new uranium deposits are crucial for ensuring a long-term, sustainable supply of nuclear energy. The next generation of uranium deposits has the potential to revolutionize the energy industry by utilizing new technologies and developing innovative extraction processes, making uranium extraction more efficient and cost-effective. Governments and mining companies must work together to find new sources of uranium by exploring new deposits and developing new technologies such as uranium recycling.

Potential for uranium supply shortages:

The demand for uranium is expected to increase in the coming years as more countries adopt nuclear power as part of their energy mix. This could lead to potential supply shortages in the future if new sources of uranium are not discovered. However, the potential for uranium supply shortages can be mitigated by exploring new deposits and developing new technologies.

Sources: [Science Direct](#) | [OECD-NEA](#) | [IAEA](#) | [World Nuclear](#)

