




MacroVoices
Holiday Special
Series

Nuclear Energy
With Mark Nelson

Conventional Nuclear costs too much & takes too long

We need a **clean energy solution that costs less** than energy from fossil fuels. It must be **fast to build**, to make energy transition by 2050 plausible.

	<u>Conventional Nuclear</u>	<u>Coal & Gas</u>	<u>Nuclear SMRs</u>
Levelized Cost of electricity:	>\$100+/MWh	~\$50-75/MWh	\$20/MWh*
			
Time to build	>7 years	3-4 years	< 1 year
Cost to Build (per KW)	\$7,000-\$12,500	\$1,000 - \$3,000	\$500* - \$1,500

MAKING CLEAN ENERGY CHEAPER THAN ENERGY FROM FOSSIL FUELS

The most common SMR Misconception is that SMRs are only for small applications



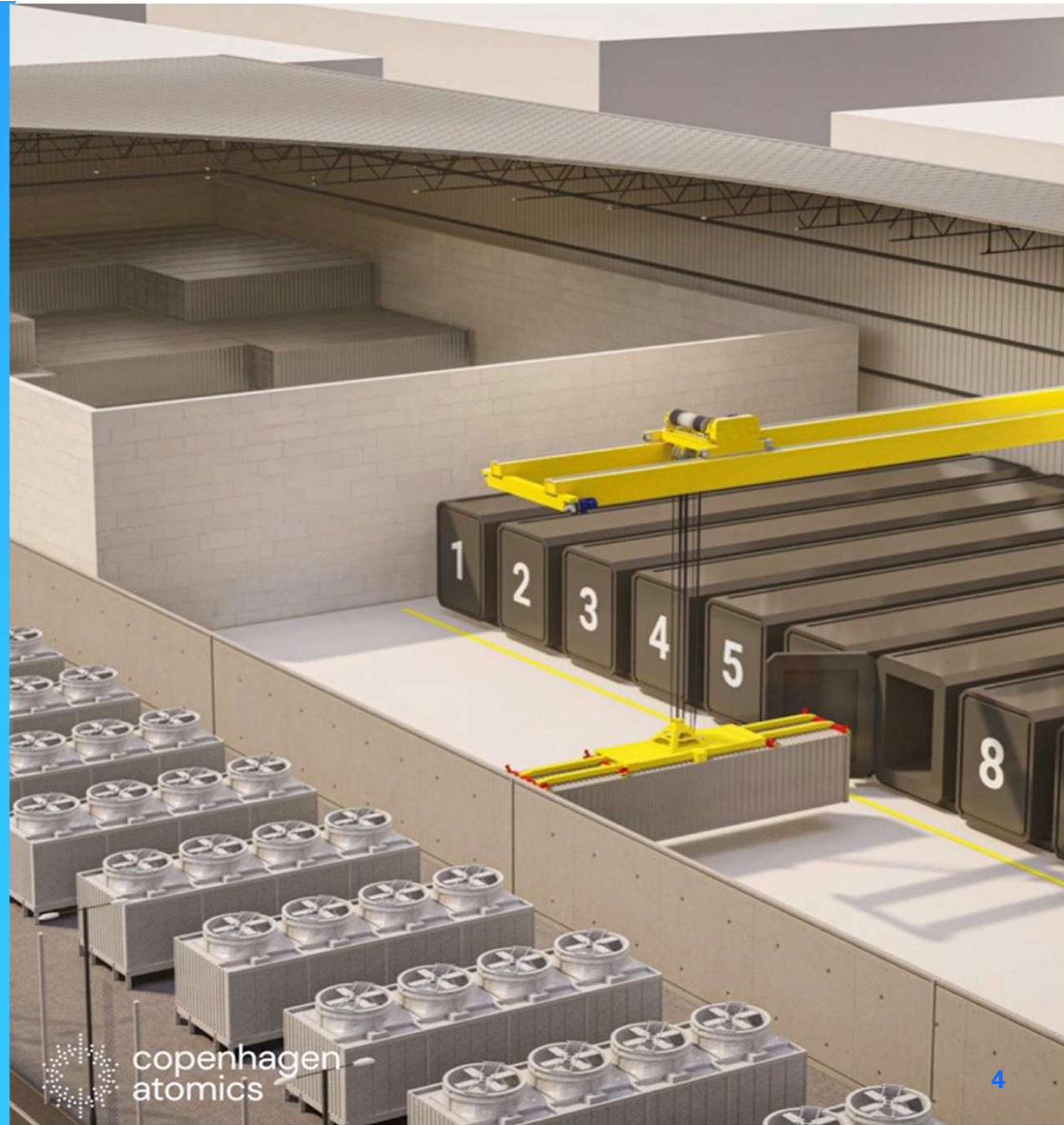
...NOT MEGAWATT POWERPLANTS!!!

**FOR ENERGY
TRANSITION, WE NEED
GIGAWATT
POWERPLANTS...**



OUR FUTURE

REMOTELY MANAGED
SMRs IN THE FORM
FACTOR OF STANDARD 40'
SHIPPING CONTAINERS



GIGAWATT POWERPLANTS

MADE FROM FACTORY-BUILT
SMRs RATHER THAN
CONVENTIONAL LARGE SCALE
NUCLEAR REACTORS



Storage for decommissioned reactors

Remote controlled crane

Cooling

Each tube holds 2x 40 foot containers

Double lock

1x reactor being delivered by truck

SMRs Inside Containers

A conceptual visualization of a 1GW Power

**SMRs ARE BUILT IN
FACTORIES, ON FULLY
ROBOTIC ASSEMBLY
AND TEST LINES**

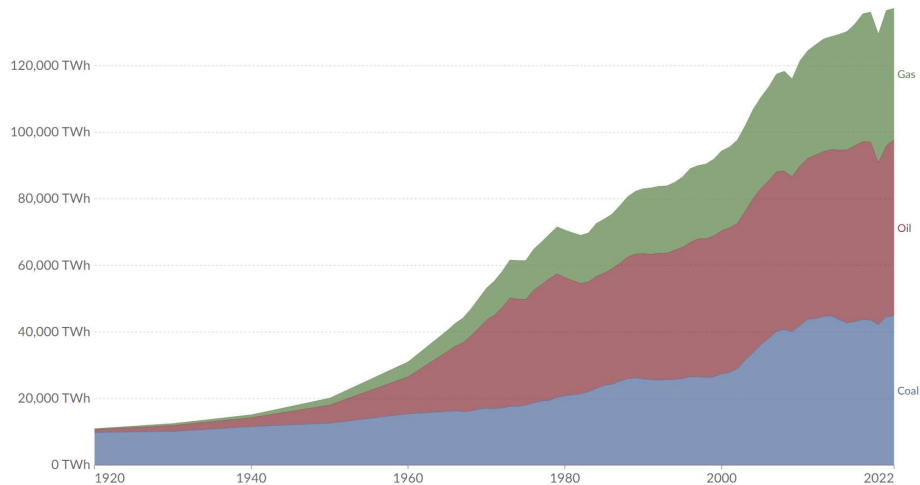


To completely replace all the energy we derive from fossil fuels today would require 217,200 SMRs rated at 100MW(t) each

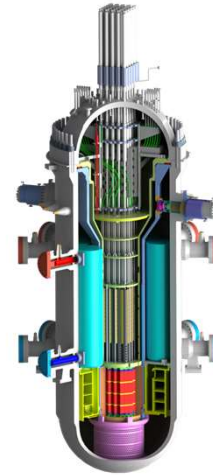
Global fossil fuel consumption

Global primary energy consumption by fossil fuel source, measured in terawatt-hours (TWh).

Table Chart



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x217k*

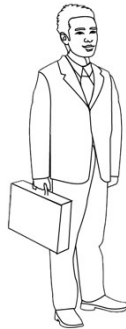
* Assumptions: 137k TWh(t) total energy derived from FFs = 7,819 GW(e) continuous demand @ 50% average FF thermal efficiency. Assume 90% SMR load factor = 8,688 GW(e) = 217,200 SMRs @ 40% nuclear thermal efficiency. Advanced new, higher thermal efficiency supercritical CO₂ turbines could reduce the number of reactors required to 173,760.

Western Governments are standing in the way of progress!

Advanced nuclear engineers and entrepreneurs are ready to build the technology we need RIGHT NOW...



Engineers



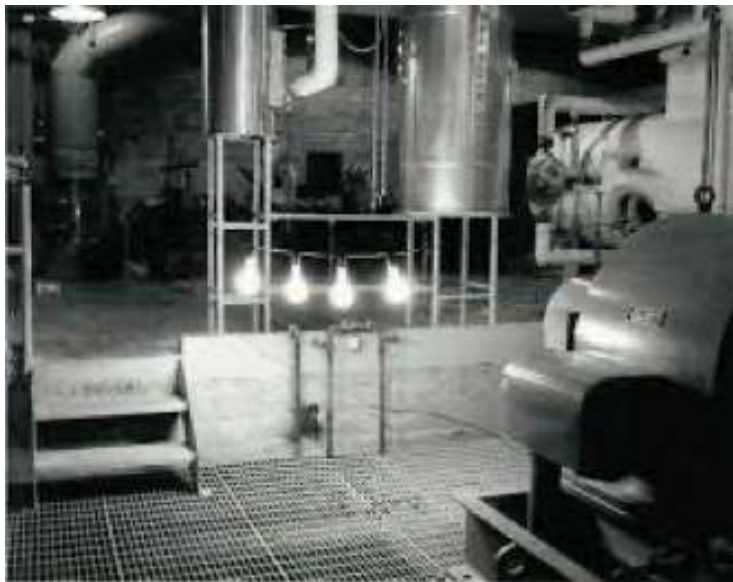
Entrepreneurs



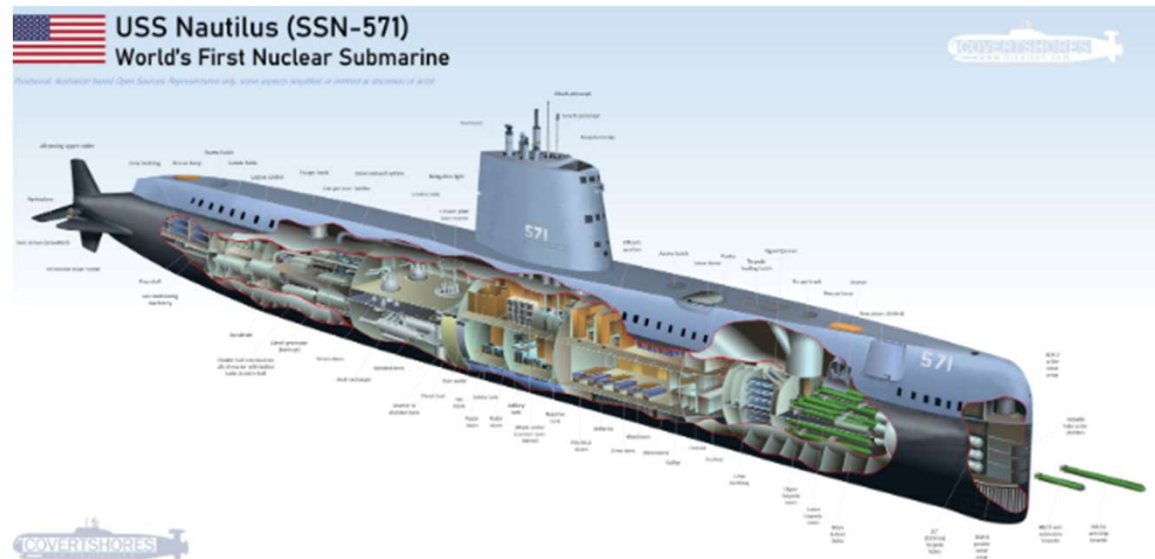
...but investors know better than to invest in an idea that depends on nuclear regulators approving something new and different.

When the government wants to make something happen ...

In 1951, the very first demonstration of electricity from nuclear was proven *in a laboratory*. Four years later, the first Nuclear submarine entered service!



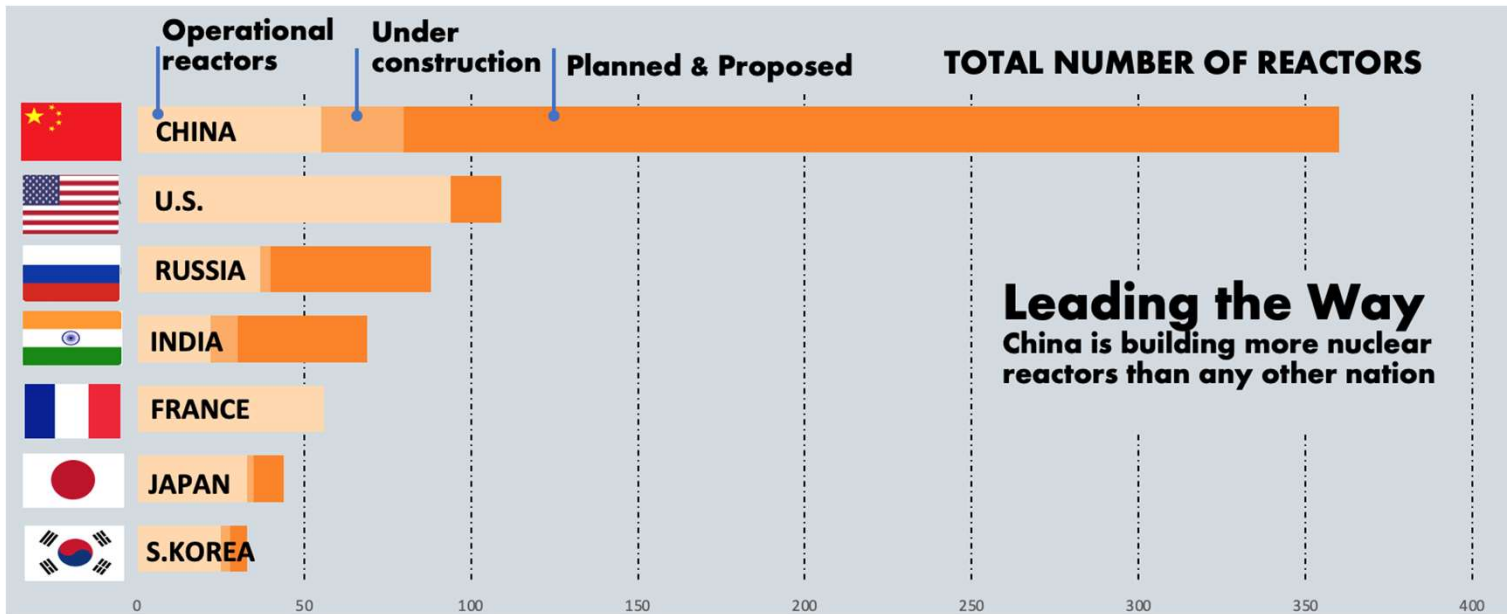
1951: FIRST ELECTRICITY FROM NUCLEAR



1955: USS NAUTILUS ENTERS SERVICE!

China is already a serious threat, and we need to act now!

China is already planning to build the most CONVENTIONAL nuclear reactors. And they're already way ahead of everyone else on ADVANCED nuclear research as well (see next slide).



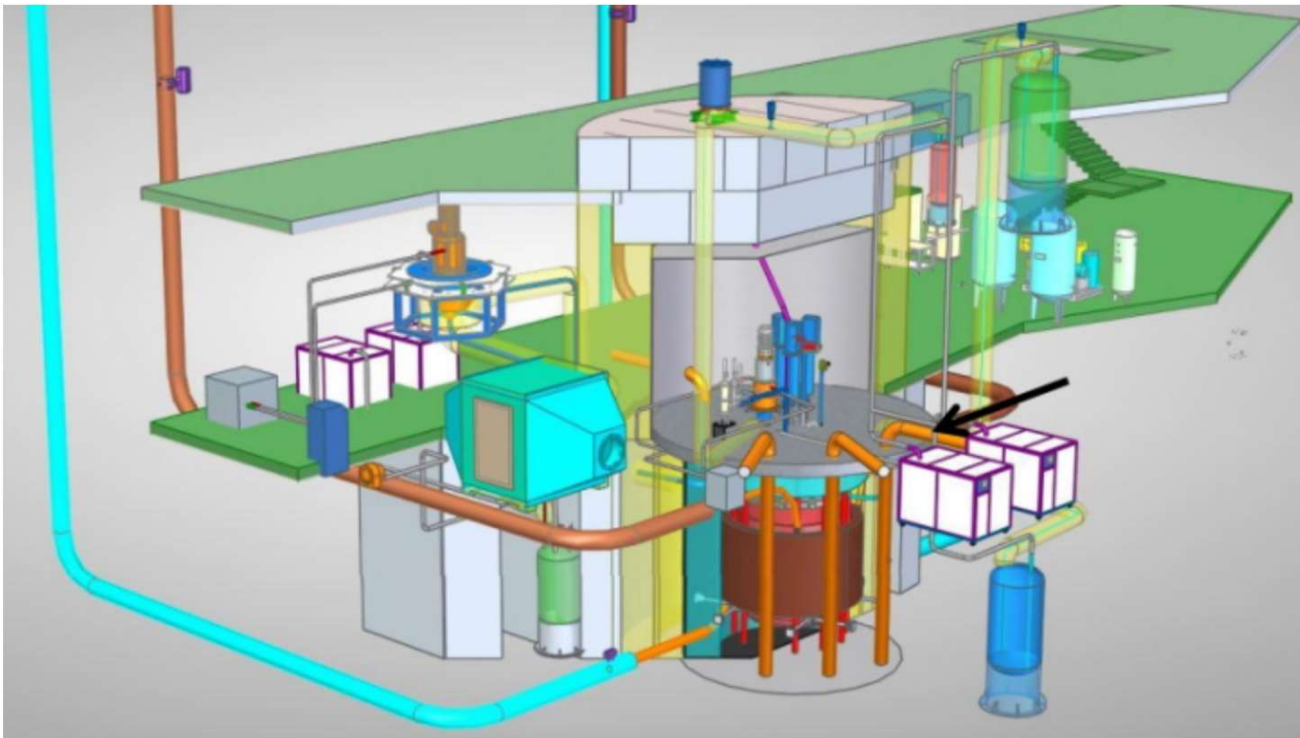
Source: World-nuclear.org 2023

Operating permit issued for Chinese molten salt reactor

15 June 2023



The Shanghai Institute of Applied Physics (SINAP) of the Chinese Academy of Sciences has been granted an operating licence for the experimental TMSR-LF1 thorium-powered molten-salt reactor, construction of which started in Wuwei city, Gansu province, in September 2018.



A cutaway of the TMSR-LF1 reactor (Image: SINAP)



Zhao DaShuai 无条件爱国 🇨🇳

@zhao_dashuai

...

China will build nuclear powered container ships ☢️

It's powered by a Thorium Molten Salt Reactor (MSR), the significance of which is beyond shipping.

The immediate [other] application would be nuclear powered aircraft carrier.

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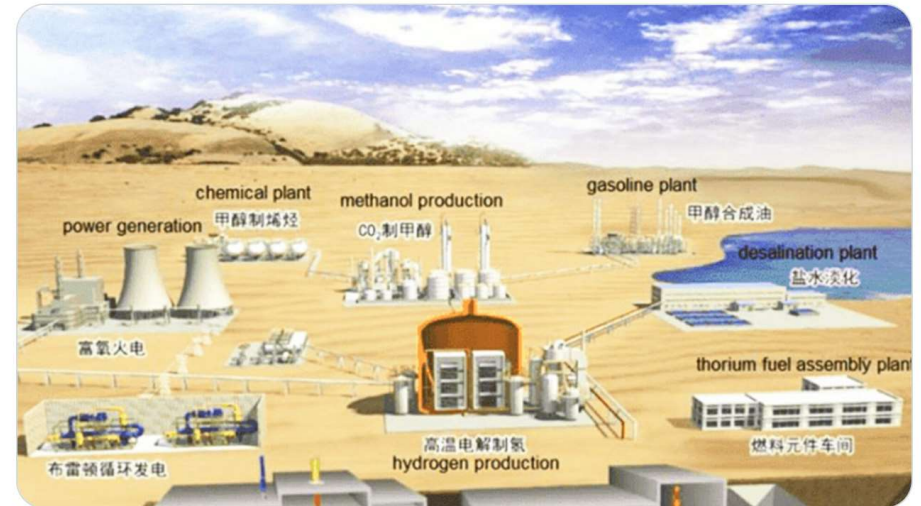
Zhao DaShuai 无条件爱国 🇨🇳 @zhao_dashuai · 13h

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Thorium Molten Salt Reactor (MSR), would provide affordable and safe nuclear energy.

MSRs doesn't need water for cooling, so they can be built away from seas or rivers.

Allowing much greater flexibility in location choice, very important for a continental country like China.



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Yin MR
@YinZP365

🇨🇳 China has completely solved safety problem of nuclear power plants! On Dec 6, my country's Huaneng Shidao Bay High Temperature Gas-cooled Reactor Nuclear Power Plant, world's first fourth-generation nuclear power plant with completely independent intellectual property rights,



Yin MR @YinZP365 · 17h ...
was officially put into commercial operation! It is the world's first inherently safe nuclear power plant.

The first point is that inherent safety of this nuclear power plant, whether it is Fukushima Nuclear Power Plant or Chernobyl, is due to the failure of the cooling system,

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Yin MR @YinZP365 · 17h ...
which causes the core of the nuclear reactor to melt down and finally the radioactive material leaks out. However, my country's fourth-generation nuclear power plants can ensure that even if all cooling capabilities are lost without taking any intervention measures,

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Yin MR @YinZP365 · 17h ...
the reactors can remain in a safe state and there will be no leakage of any radioactive materials.

Second point is that the temperature at the outlet of the high-temperature gas-cooled reactor reaches over 1,000 degrees. It can produce hydrogen by thermally decomposing water,

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Yin MR @YinZP365 · 17h ...
which once and for all solves the most critical cost problem of hydrogen production. In this way, low-cost hydrogen can be synthesized into ammonia and finally methanol, or even steelmaking, or even the future cost of hydrogen energy will become cabbage price.

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Yin MR @YinZP365 · 17h ...
With the breakthrough of this nuclear power technology, you will see that a series of industries will usher in changes!

The third point is that with completely independent intellectual property rights, from design to manufacturing to debugging to operation,

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