



A Nuclear Turning Point

Daniel B. Poneman

President & CEO

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American Nuclear Society & Institute of Nuclear Materials Management

Forward-Looking Statements

Disclaimer: My commentary and responses to your questions may contain forward-looking statements, including my outlook on the remainder of the year and future periods, and Centrus undertakes no obligation to update any such statement to reflect later developments. Factors that could cause actual results to vary materially from those discussed today include changes in the nuclear energy industry, pricing trends and demand in the uranium and enrichment markets and their impact on Centrus' profitability, the competitive environment for Centrus' products and services, the impact and potential extended duration of the current supply/demand imbalance in the market for low-enriched uranium, risks related to trade barriers and contract terms that limit Centrus' ability to deliver LEU to customers, risks related to actions that may be taken by the U.S. government or other governments that could affect Centrus' ability or the ability of Centrus' sources of supply to perform under contract obligations, including the imposition of sanctions, restrictions or other requirements, as well as those provided in Centrus' most recent Annual Report on Form 10-K and subsequent reports as filed by Centrus with the SEC.

Industry / Market Data: Industry and market data used in this presentation have been obtained from industry publications and sources as well as from research reports prepared for other purposes. We have not independently verified the data obtained from these sources and cannot assure you of the data's accuracy or completeness.

MISSION: IMPOSSIBLE
MISSION: IMPOSSIBLE



In the next 30 years:

REDUCE

**emissions from electricity
generation by almost 100 percent**

INCREASE

**world electricity generation
by 100 percent**

In the next 30 years:

INCREASE

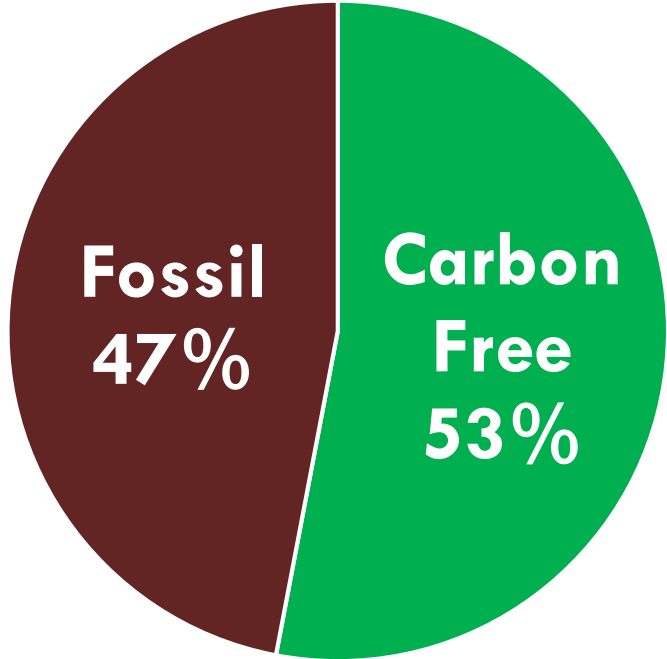
**world electricity generation
by 100 percent**

REDUCE

**emissions from electricity
generation by almost 100 percent**

California: the “Renewable-Only” Game Plan (2011 to 2018)

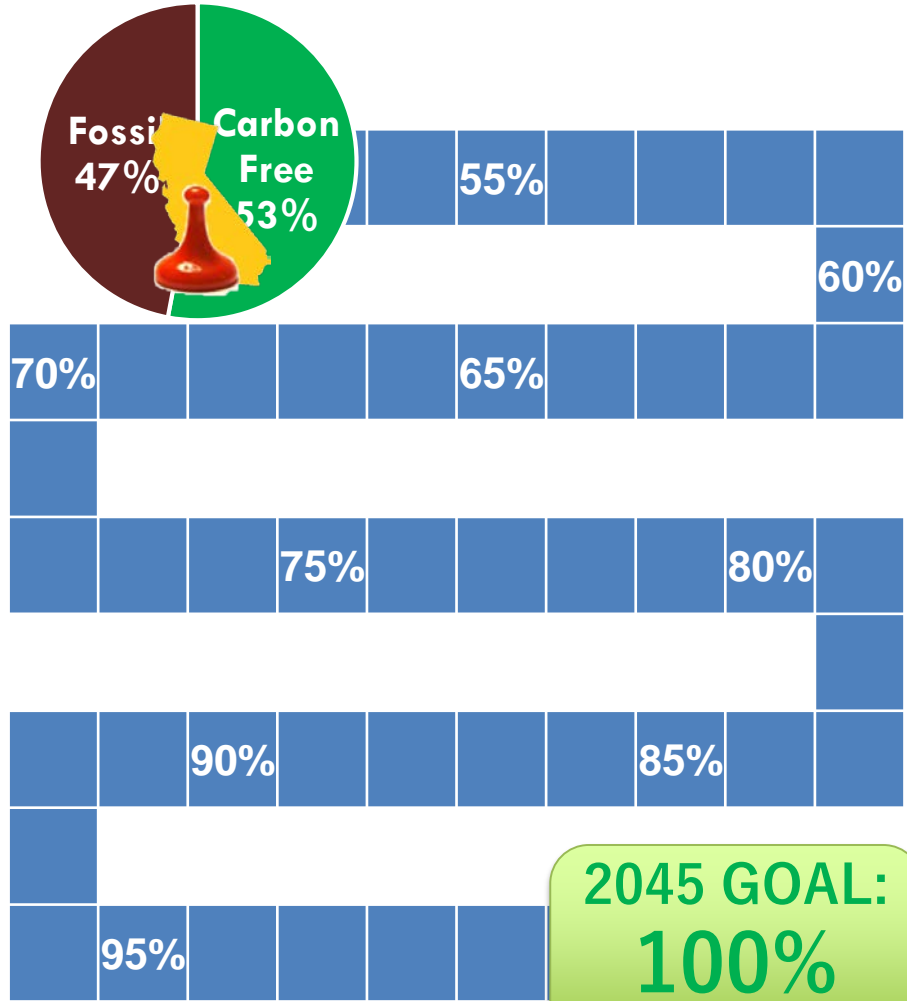
2011



2045 GOAL:
100%
Carbon Free

California: the “Renewable-Only” Game Plan (2011 to 2018)

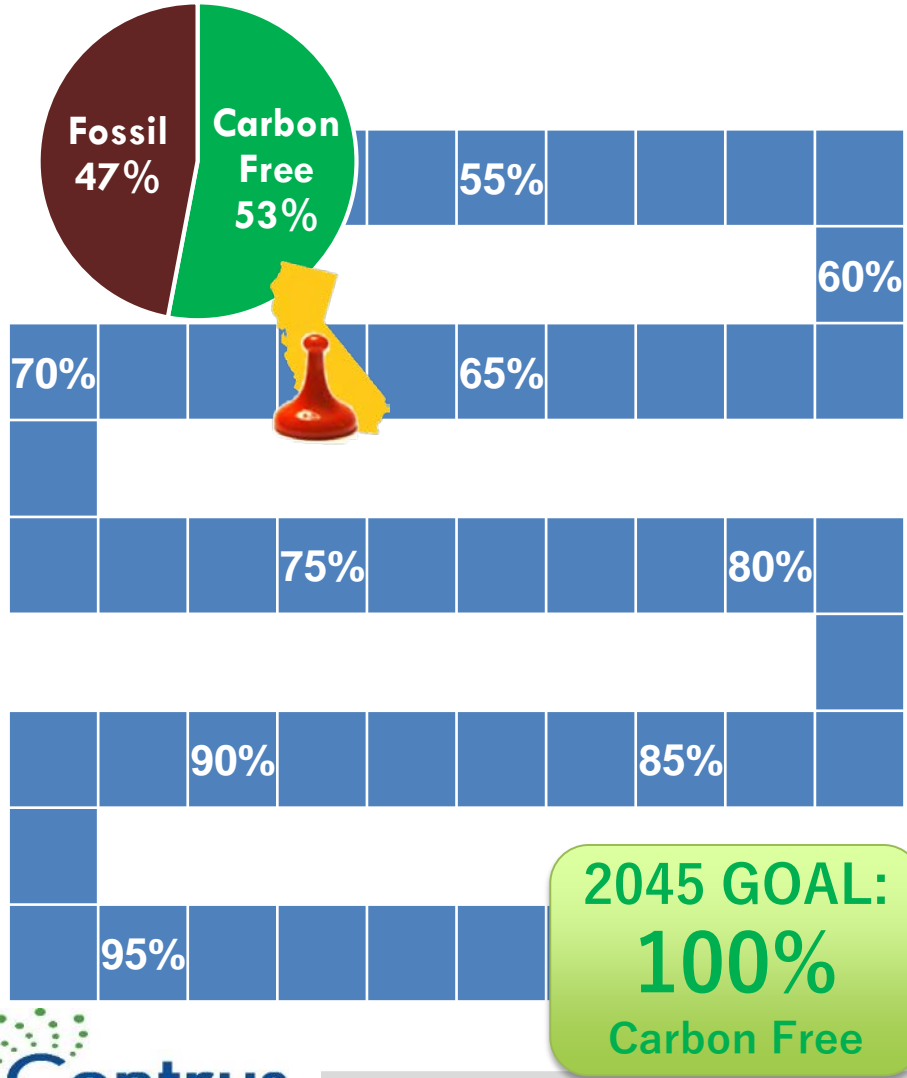
2011



2045 GOAL:
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2011



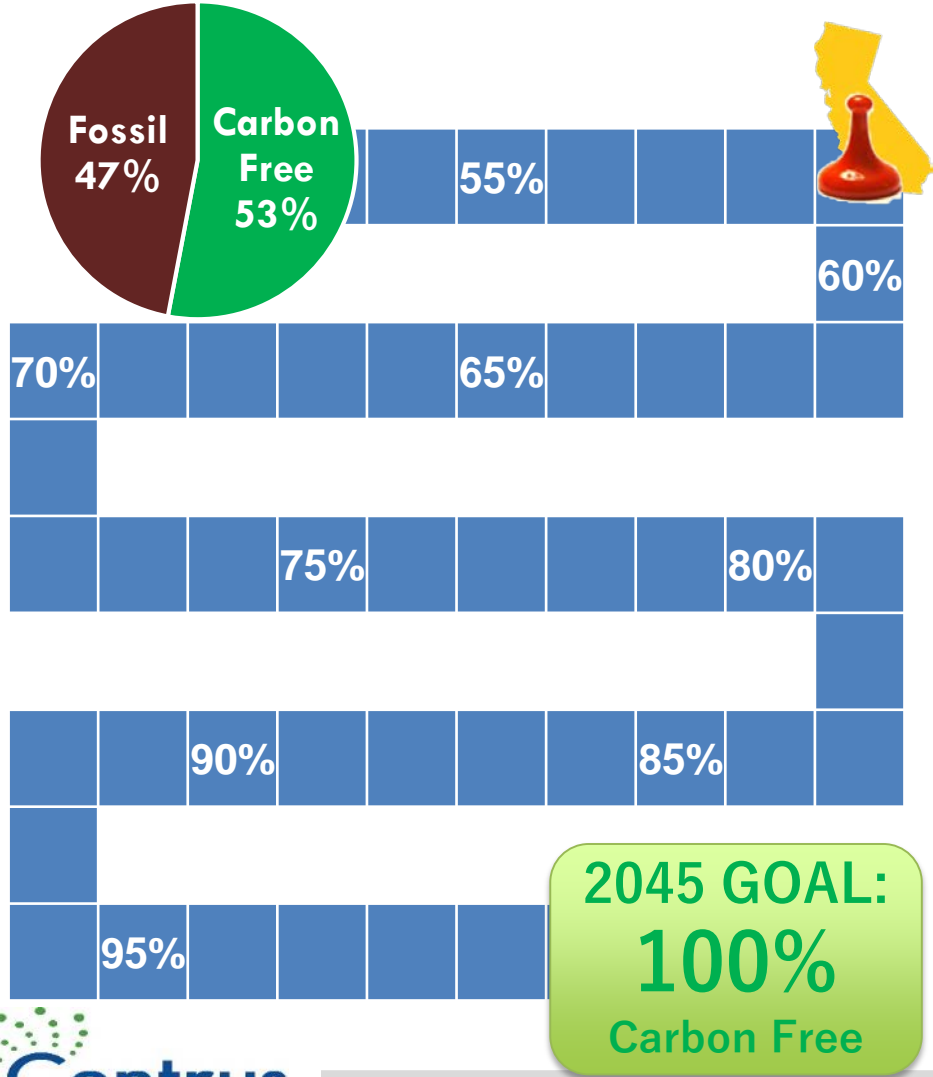
**ADD
26 BILLION KWH
SOLAR**



ADVANCE TOKEN 14%

California: the “Renewable-Only” Game Plan (2011 to 2018)

2011



SUSTAINED DROUGHT

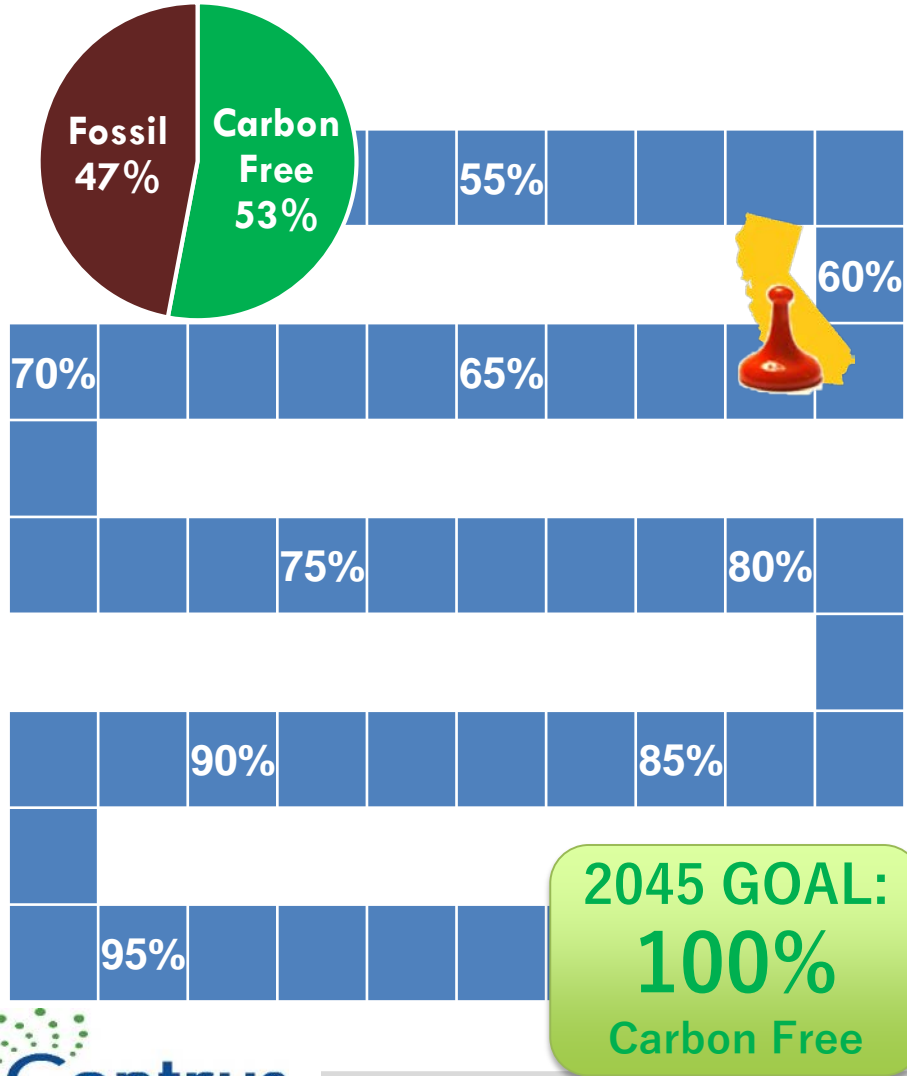
LOSE
16 BILLION KWH
HYDRO
GO BACK 8%

ADD
26 BILLION KWH
SOLAR

ADVANCE TOKEN 14%

California: the “Renewable-Only” Game Plan (2011 to 2018)

2011



**ADD
6 BILLION KWH
WIND**



ADVANCE TOKEN 3%

SUSTAINED DROUGHT



**LOSE
16 BILLION KWH
HYDRO**

GO BACK 8%

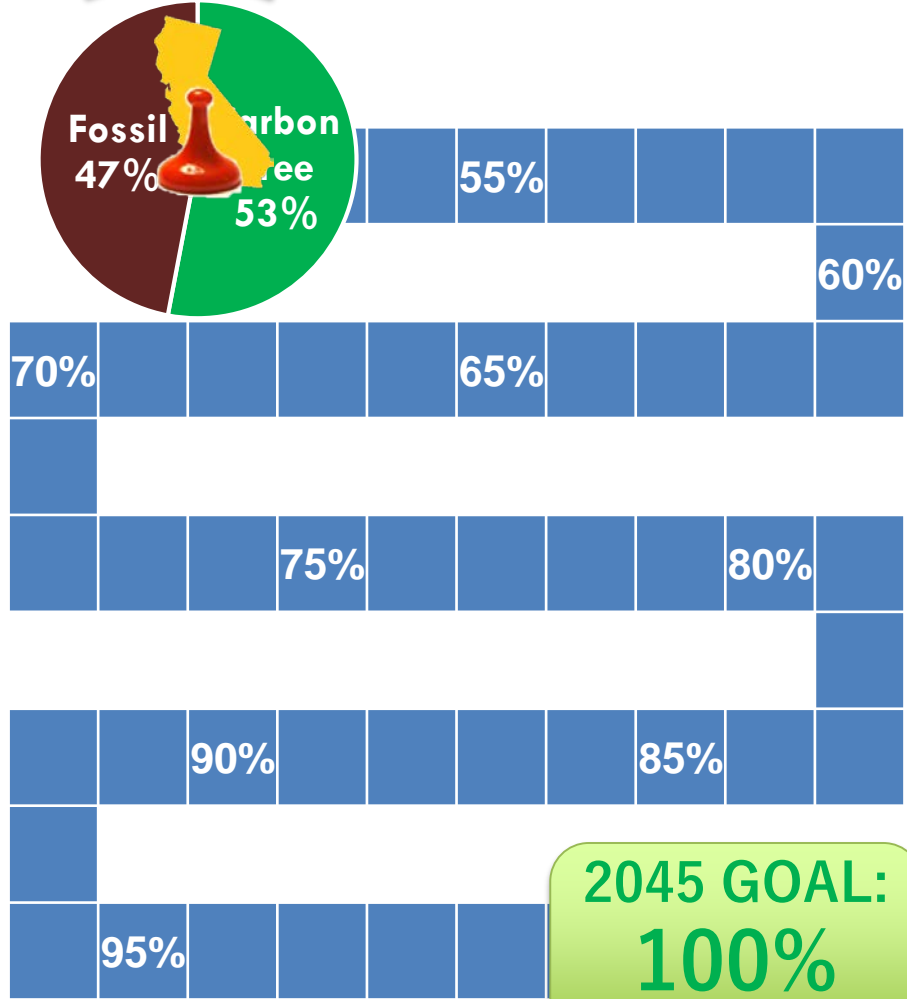
**ADD
26 BILLION KWH
SOLAR**



ADVANCE TOKEN 14%

California: the “Renewable-Only” Game Plan (2011 to 2018)

~~2011~~ 2018



2045 GOAL:
100%
Carbon Free

SHUT DOWN SAN ONOFRE NUCLEAR PLANT

LOSE
18 BILLION KWH
NUCLEAR

GO BACK 9%

ADD
6 BILLION KWH
WIND

ADVANCE TOKEN 3%

SUSTAINED DROUGHT

LOSE
16 BILLION KWH
HYDRO

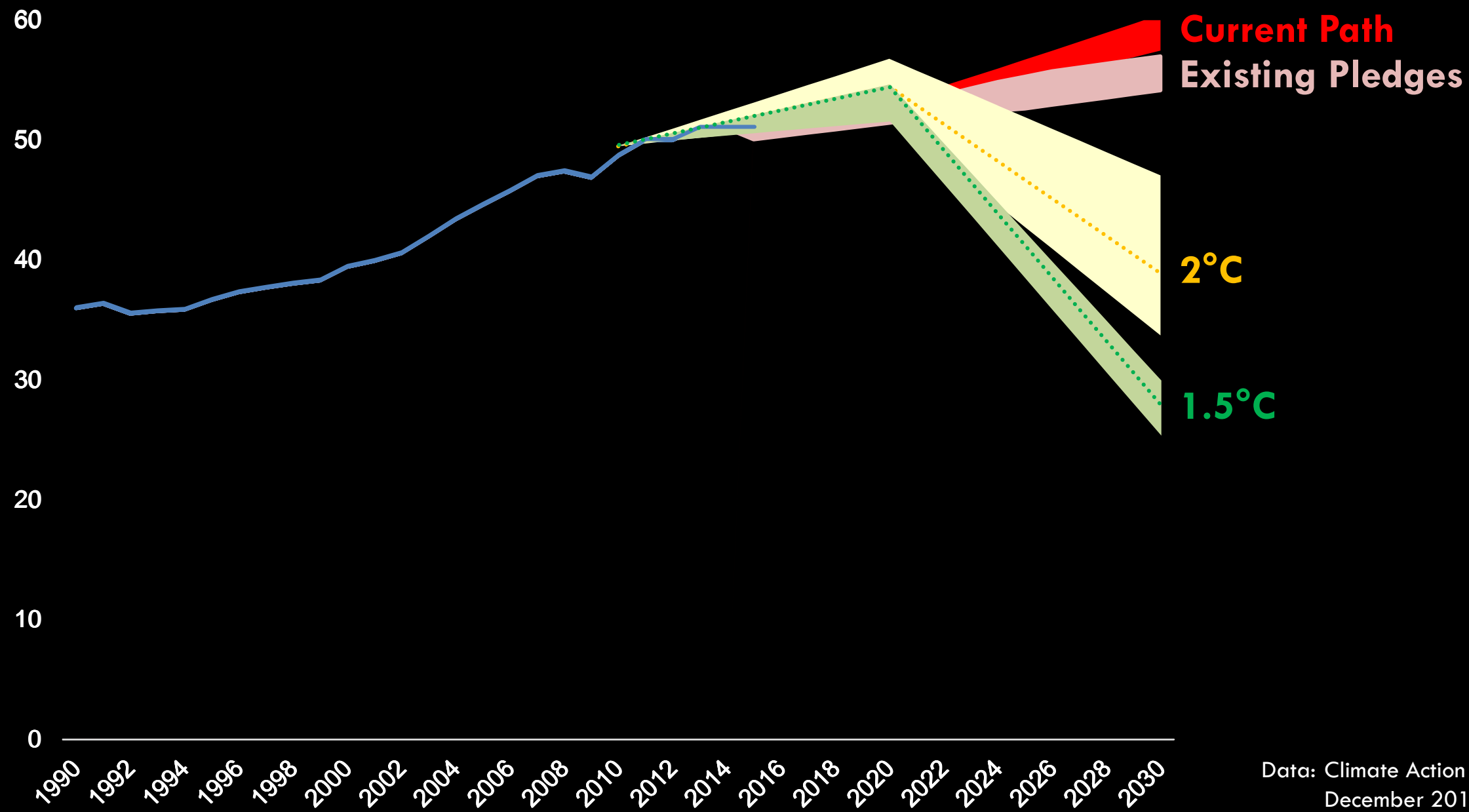
GO BACK 8%

ADD
26 BILLION KWH
SOLAR

ADVANCE TOKEN 14%

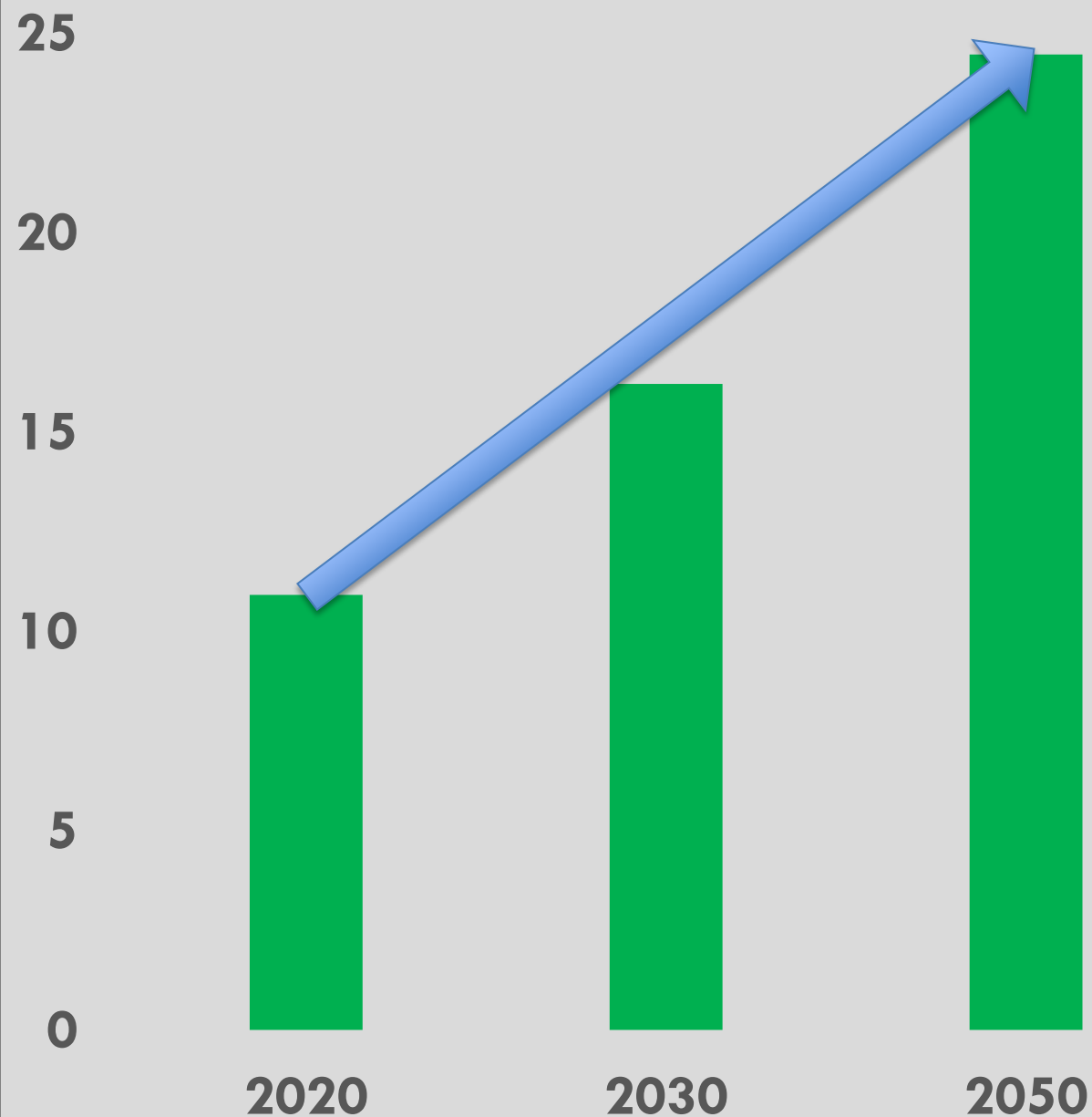
Global Emissions

(Gigatonnes CO₂/year)



Data: Climate Action Tracker
December 2018 Update

IPCC Total World Nuclear Generation Median of 1.5° C Pathways



**Every credible
pathway to 1.5° C
requires more
nuclear**

← GOOD NEWS

BAD NEWS →

Good News: Some Positive Signs for U.S. Nuclear Industry



- ✓ U.S. still the global leader in innovation
- ✓ Vogtle project going forward
- ✓ State actions in Illinois, New York, New Jersey, and Ohio to save reactors
- ✓ POTUS 90-day review

Bad News -- Impact of Fukushima

2010



104
U.S. Reactors

Bad News -- Impact of Fukushima

2019

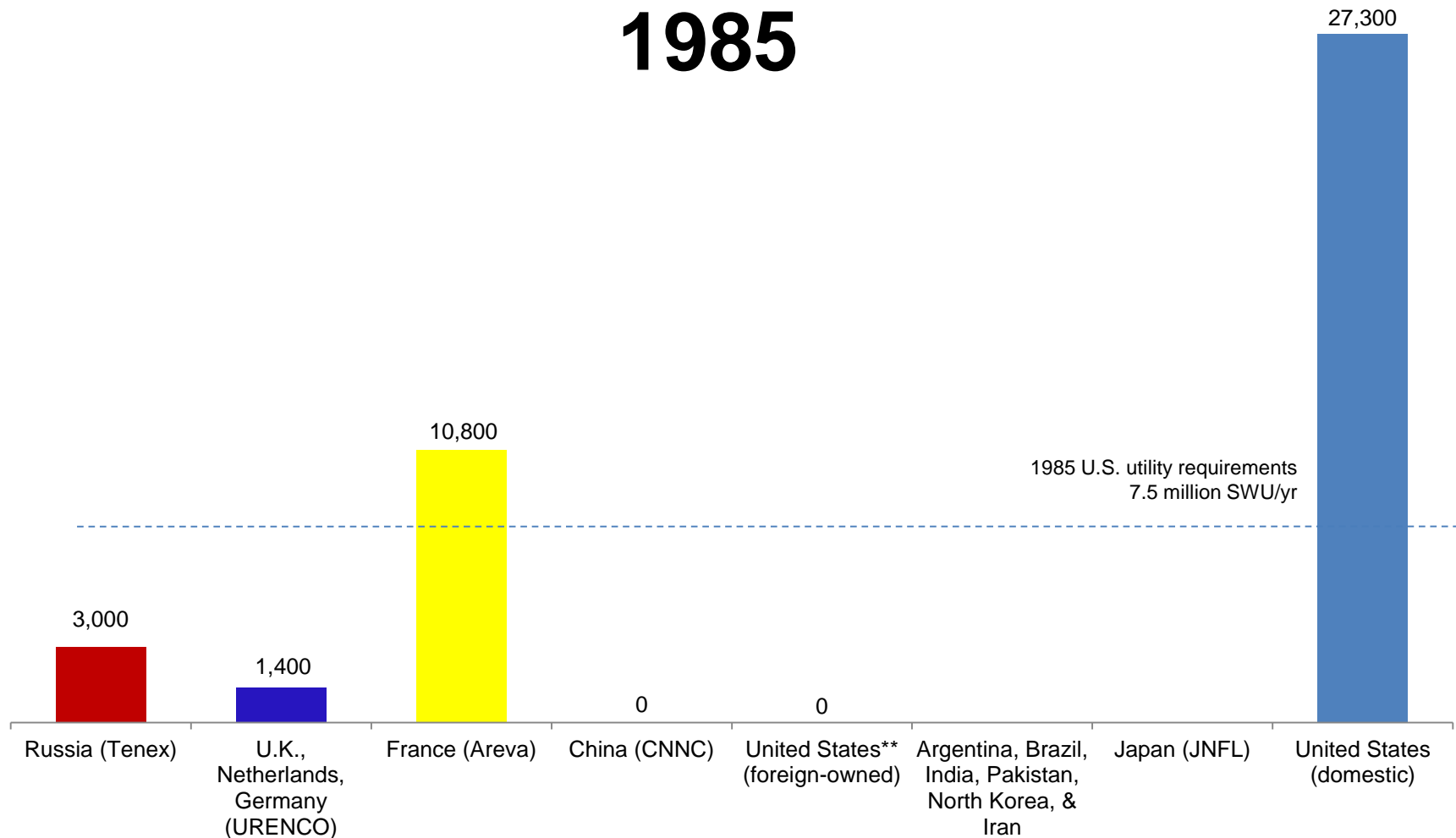


97
U.S. Reactors

The Loss of U.S. Nuclear Fuel Leadership

Uranium Enrichment Capacity
(Thousand SWU/year)

1985



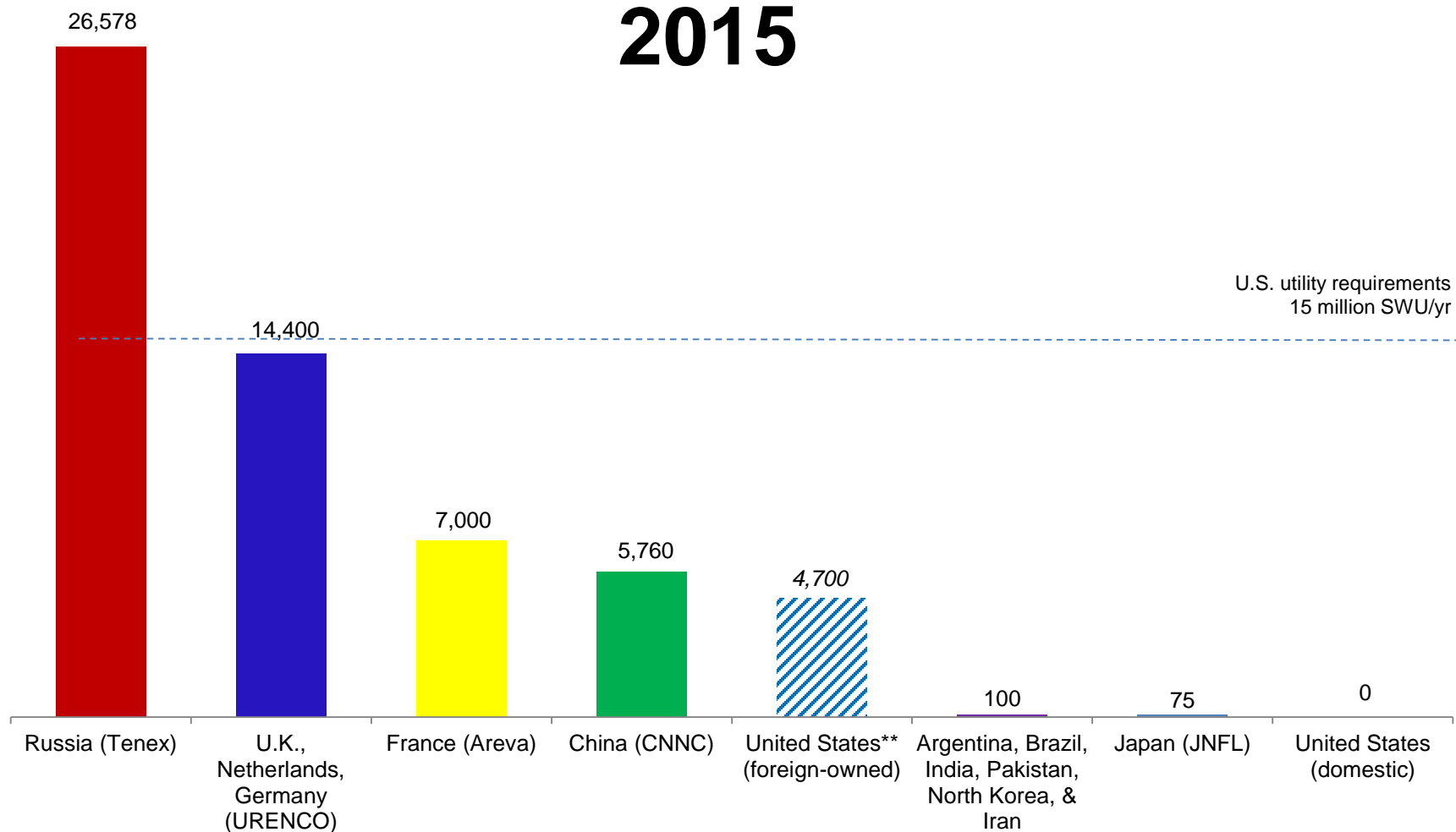
* Separative Work Units (SWU) are used to measure the amount of work done to enrich uranium.

**The only remaining enrichment plant physically located in the U.S. is controlled by URENCO, a European state-owned corporation.

The Loss of U.S. Nuclear Fuel Leadership

Uranium Enrichment Capacity (Thousand SWU/year)

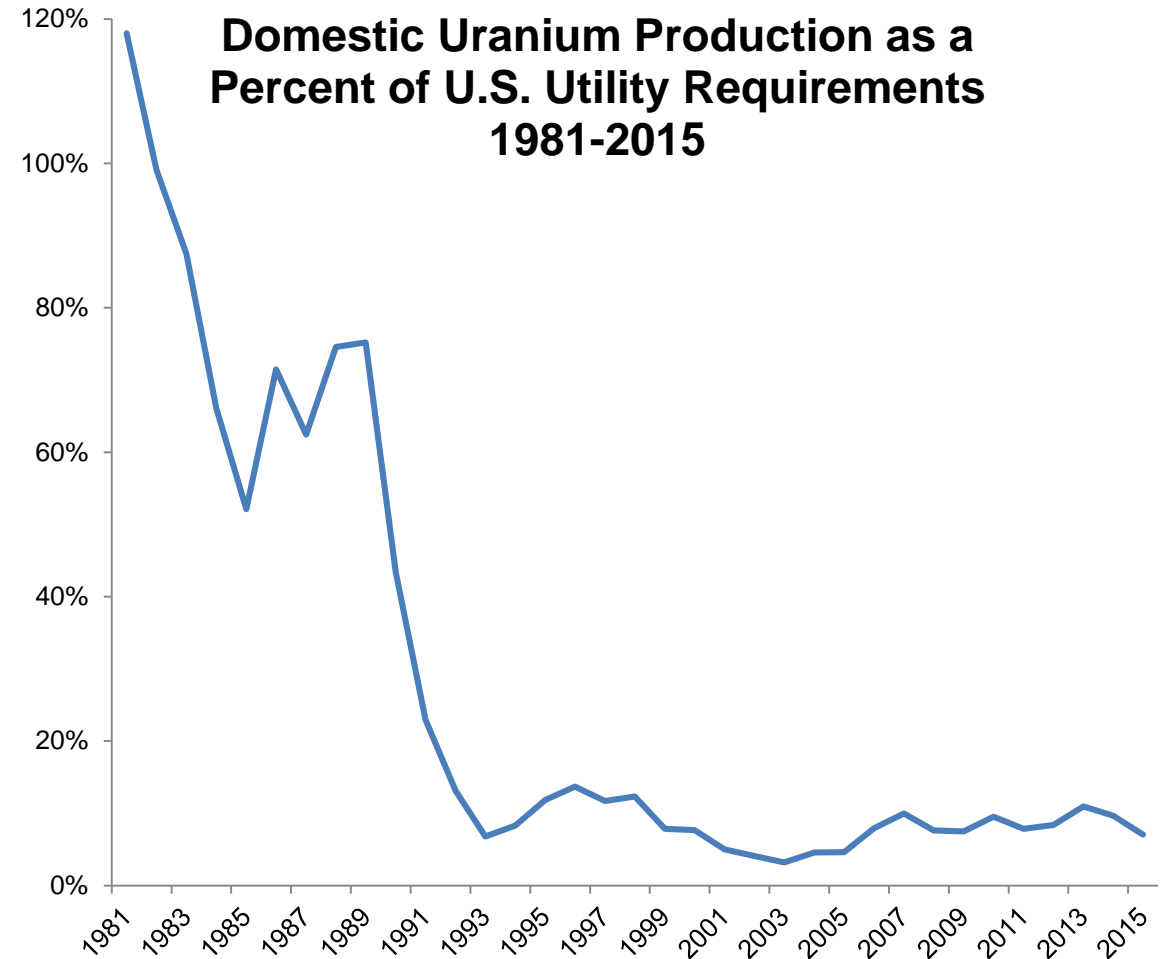
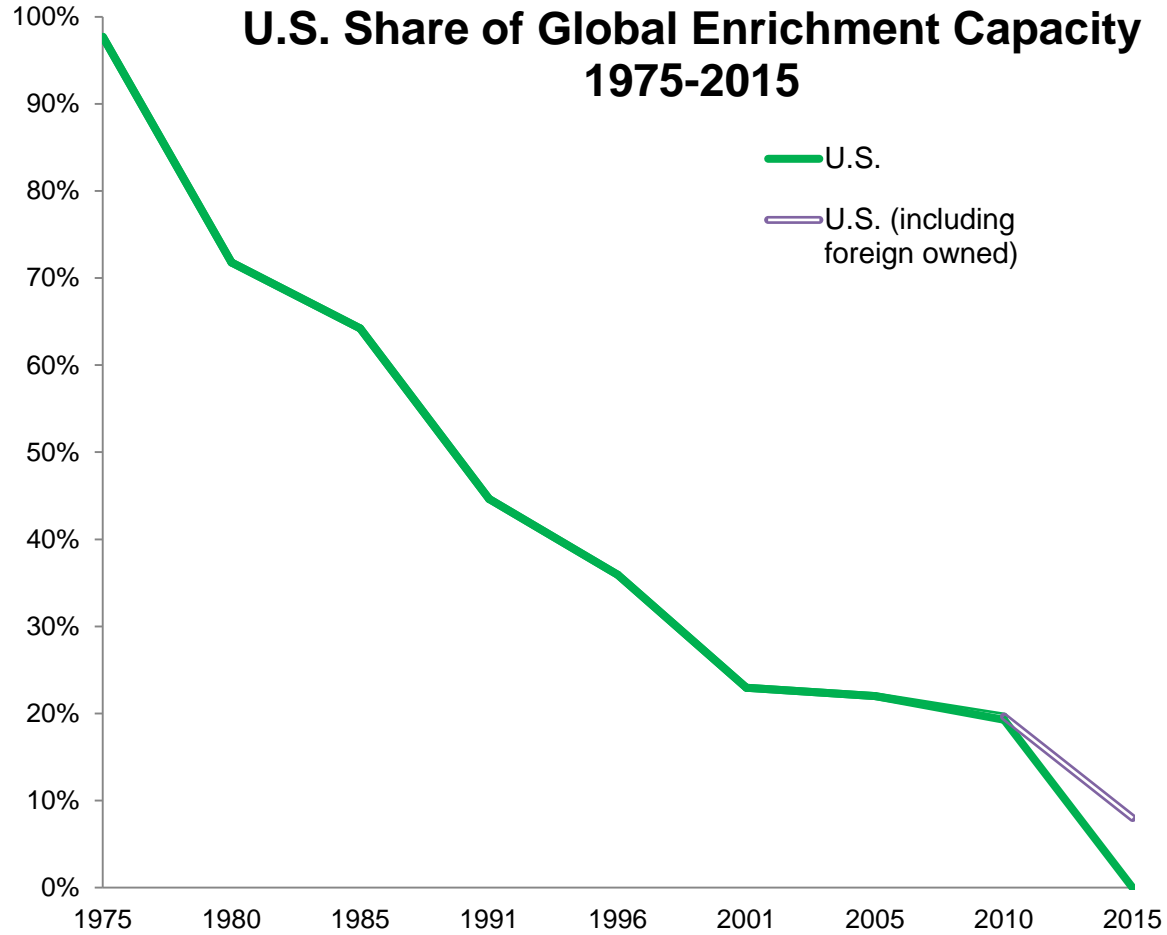
2015



* Separative Work Units (SWU) are used to measure the amount of work done to enrich uranium.

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Four Decades of Decline



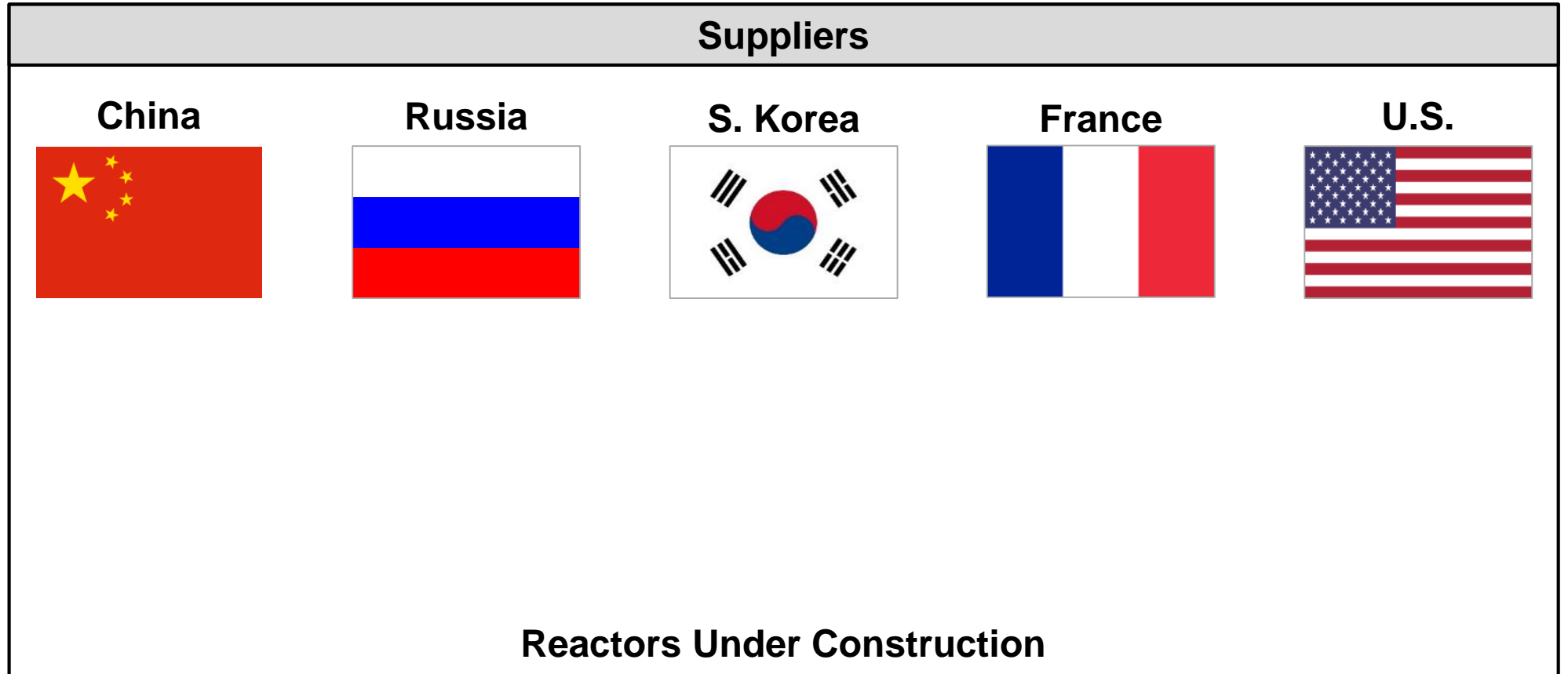
Sources: IAEA, Stockholm International Peace Research Institute, Congressional Budget Office, World Nuclear Association

Source: U.S. Energy Information Administration

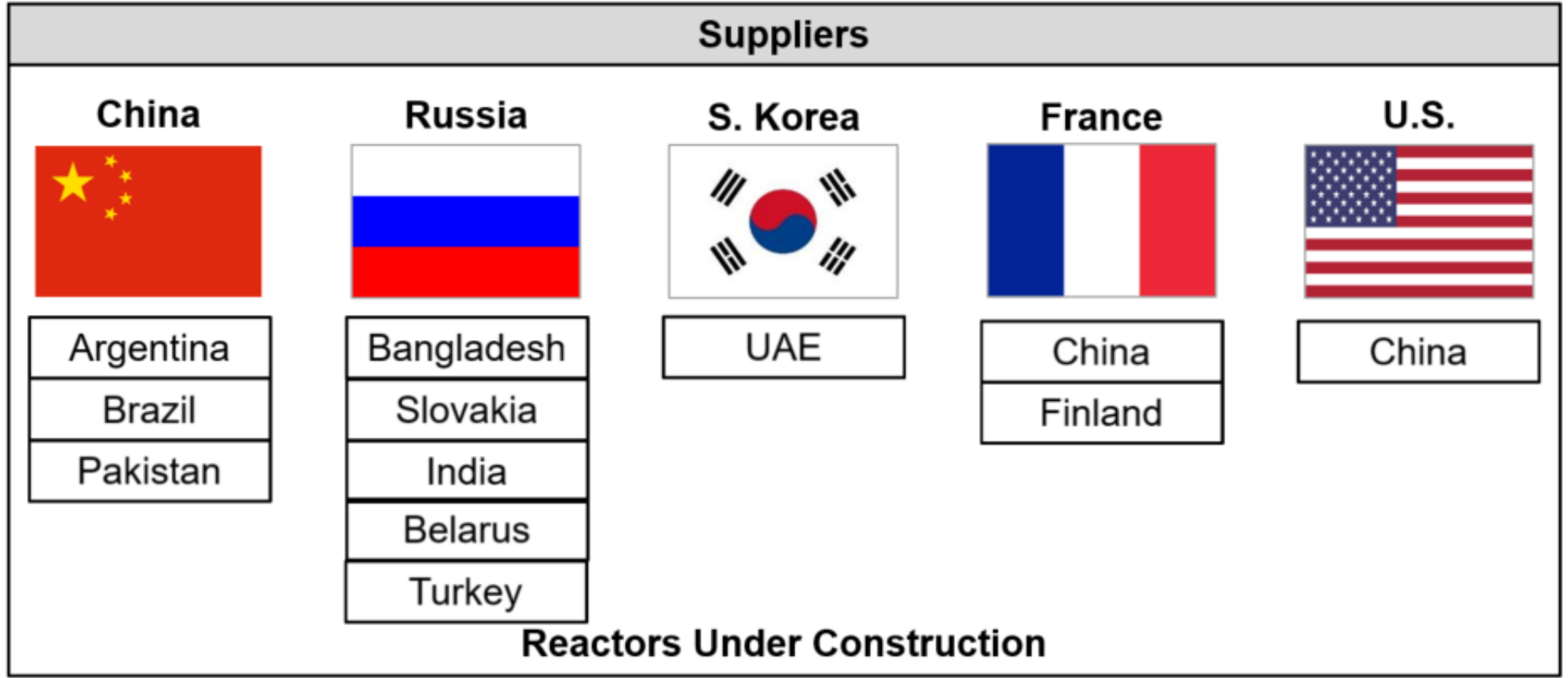
Exporting Reactors: Courting a 100-Year Relationship

Reactors Under Construction

Customers
Argentina
Bangladesh
Belarus
Brazil
China
Finland
India
Pakistan
Slovakia
Turkey
UAE

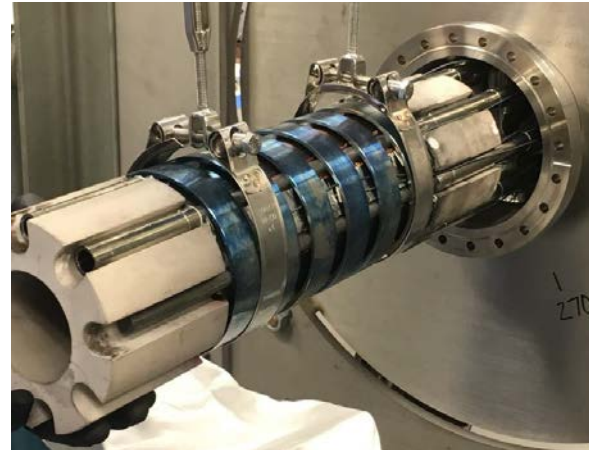
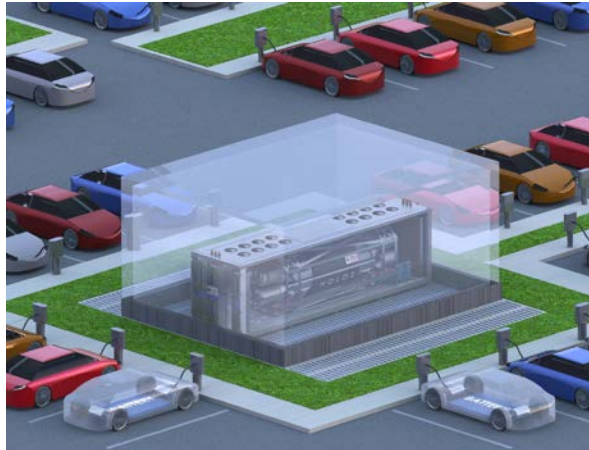


Exporting Reactors: Courting a 100-Year Relationship



In the next 5 to 10 years, U.S. government and industry will begin deploying a new generation of advanced nuclear reactors:

- ✓ Smaller
- ✓ Carbon Free
- ✓ Proliferation-resistant
- ✓ Factory-built
- ✓ Transportable
- ✓ Inherently safe: shuts down with no human intervention
- ✓ Lower capital costs
- ✓ Streamlined licensing



U.S. Army Fuel Convoy Afghanistan



The Cost of Fueling U.S. Ground Forces

\$25-\$45/gallon

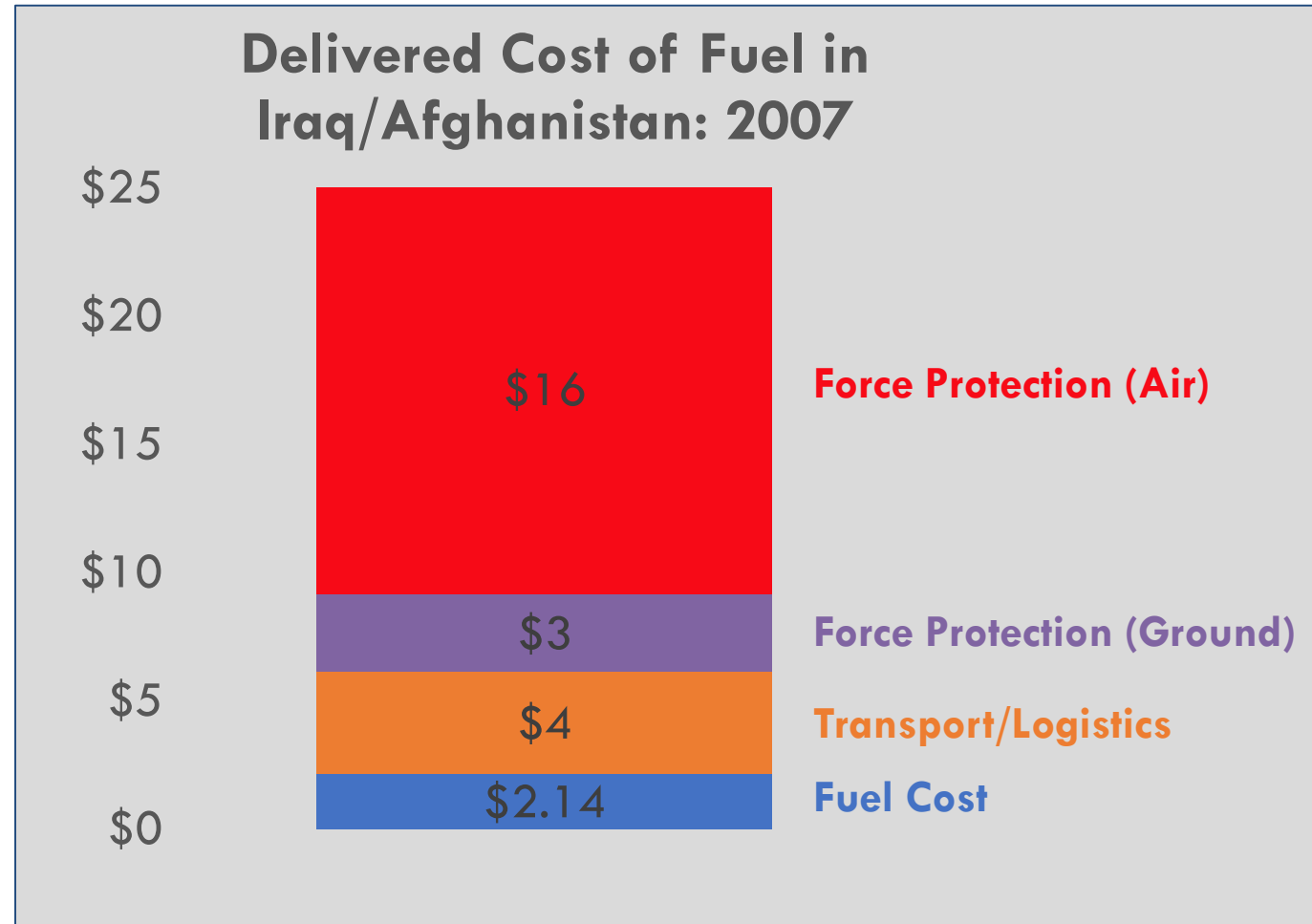
500,000,000 gallons (6,000 convoys) per year in Iraq and Afghanistan (2007)

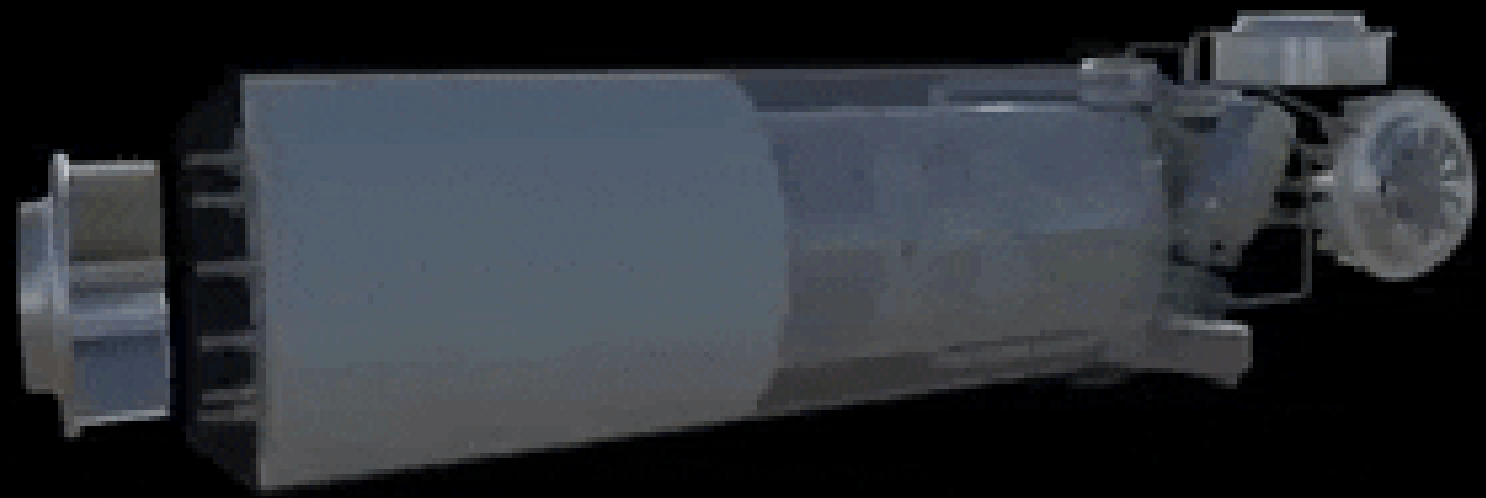
Human cost:

1,500 Americans killed or wounded in fuel supply convoys from 2003 to 2007



Delivered Cost of Fuel in Iraq/Afghanistan: 2007





DOD Project Pele: Game Changer for U.S. Industry and U.S. Military

- 1-10 MW, transportable, >3 years without refueling.
- Awards to multiple reactor design teams in 2019.
- Downselect in 2020/2021.
- Prototype operational by 2023.
- Follow-on production of reactors in mid-2020s?
- Requires HALEU TRISO fuel.



Proven Model for Commercialization

Prototype

June 1940:

U.S. Army solicits bids for a “four-wheel-drive reconnaissance truck” to replace its horses and mules.

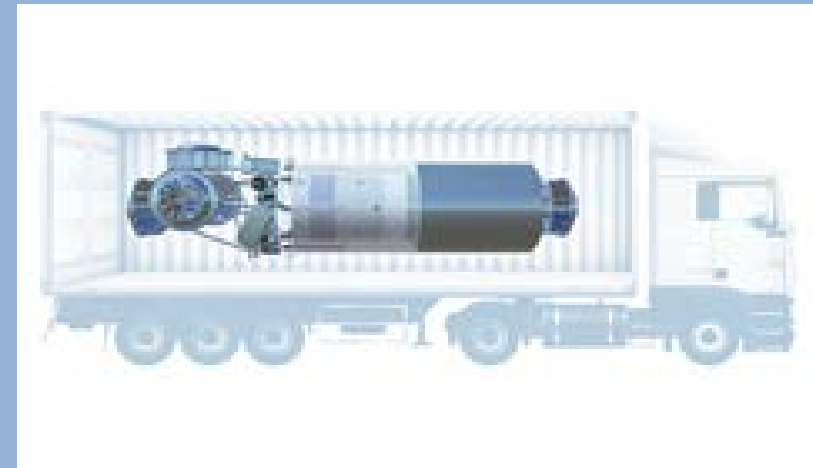
Prototype due in 49 days.



May 2019:

U.S. DoD solicits bids for HALEU TRISO-fueled mobile micro-reactor.

Prototype due in 3-4 years.



Proven Model for Commercialization

Military Use

1940-1945

660,000 Jeeps produced during WWII.

After the war, Jeep manufacturing plants in Ohio and Michigan can serve the commercial market.



Post 2023:

Follow-on production for U.S. military/FEMA.

Micro-reactor manufacturing plants, HALEU & TRISO production facilities can expand for commercial needs.



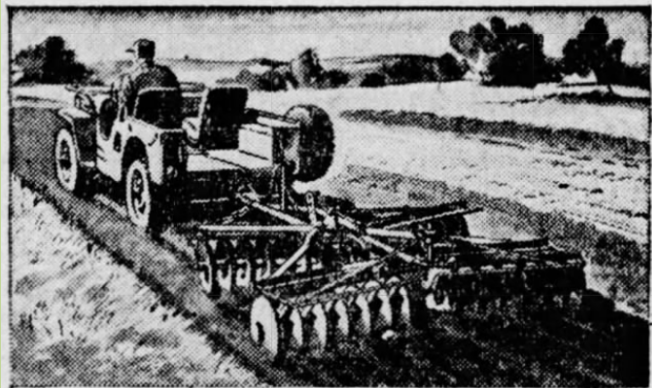
Proven Model for Commercialization

Niche Market Commercialization

Late 1945

Target market for the first civilian Jeeps: family farms, 66% of which lack a tractor.

A Jeep can do the work of three horses.



USE IT AS A TRACTOR to pull your plows, harrows, mowers, etc.

Mid-2020s

Target market for first civilian HALEU TRISO reactors: remote locations where diesel-powered electricity is extremely expensive.



Proven Model for Commercialization

Mass Commercial Production

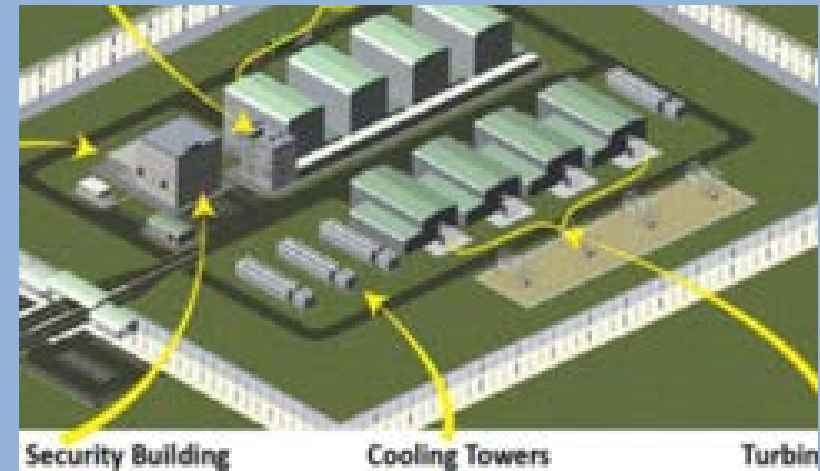
2018

1.6 million Jeeps sold worldwide.

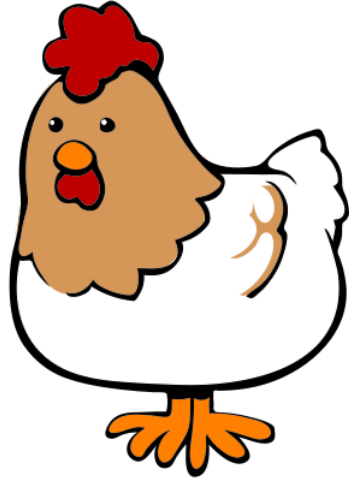


Late 2020s/Early 2030s

Large potential global market for micro-reactors, SMRs, and advanced reactor fuel.



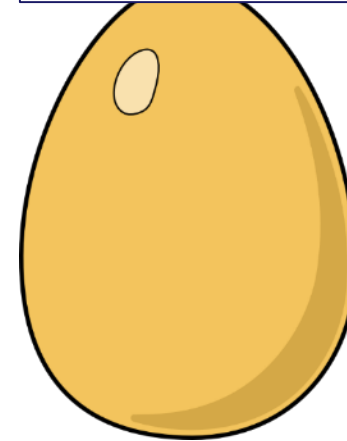
The HALEU Conundrum



Advanced Reactors:

Who will buy them from the U.S. if the U.S. lacks a guaranteed fuel supply?

The U.S. has solved this kind of problem before...



High Assay Enrichment:

Who will invest in HALEU licensing/production without a guaranteed customer base?

Lesson from Ike:

Leverage U.S. National Security Investment to Promote Broader National Interest

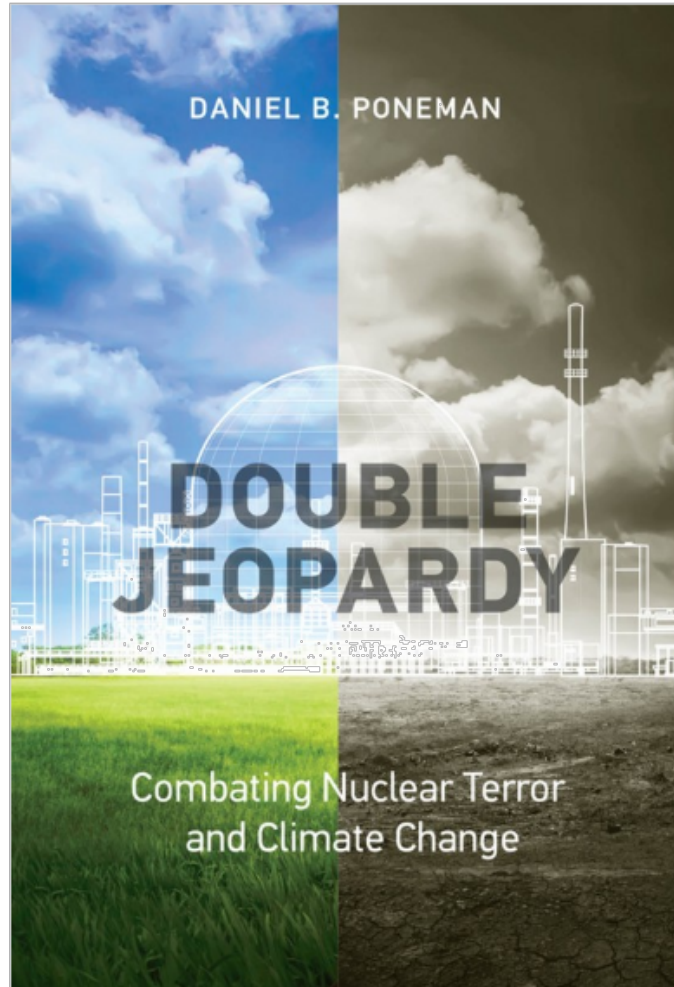


Commercial nuclear industry could not have emerged without U.S. government investments in reactor designs and enrichment capacity.

Same model could work today:

- 1) Develop advanced reactors, HALEU enrichment, and fabrication capacity for U.S. government needs.
- 2) Allow for commercial deployment to meet U.S. utility needs.
- 3) Supply global market – export U.S. safety and nonproliferation standards.

The Book is Always Better Than the Powerpoint



From Belfer Center Studies in International Security

Double Jeopardy

Combating Nuclear Terror and Climate Change

By Daniel B. Poneman

Making the case that we can use nuclear power to combat climate change even as we reduce the risks of nuclear terror.