

BROOKINGS

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The Outlook for Nuclear Power After Fukushima

NCAC-USAEF Washington June 17, 2011

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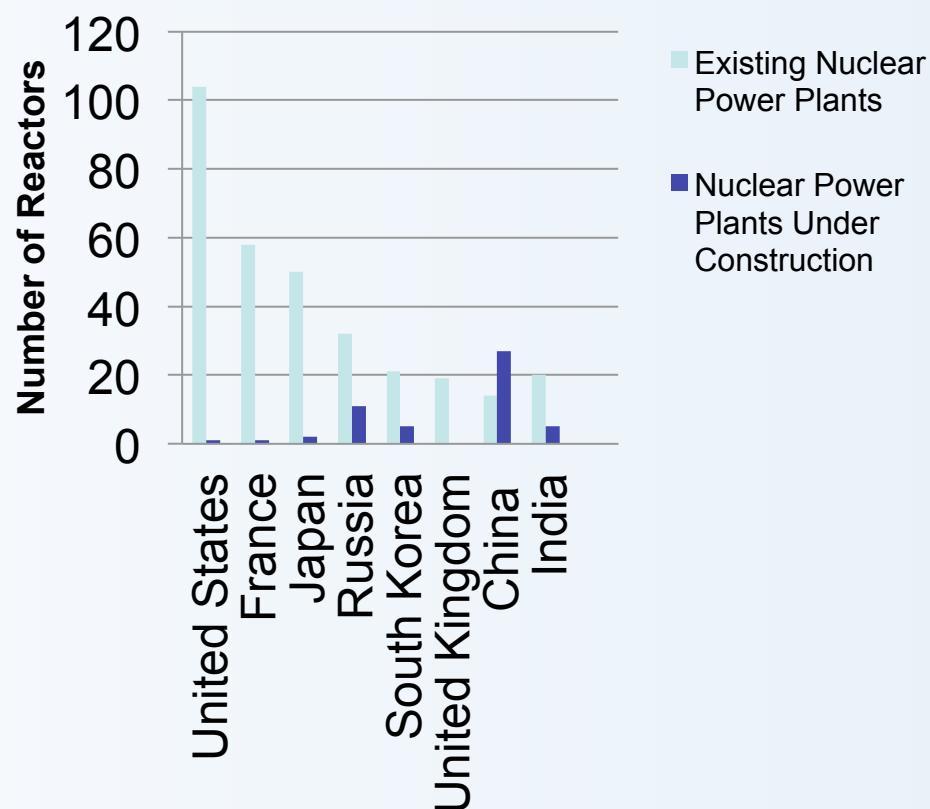
Agenda

- Global Nuclear Capacity
- Where was the “renaissance” happening
- Post-Fukushima
 - » Who is phasing out nuclear and why
 - » Who will keep building
 - » Implications for regulators
 - » Implications for power markets

Update on World Nuclear Energy

- Status of nuclear energy
 - » 440 reactors worldwide
 - » 374 GW of capacity
 - » About 8% of total global installed capacity
 - » 65 reactors under construction, with nearly 63 GW of total capacity

Reactors (Existing and Under Construction)
by Country



Where was the “renaissance” happening?

- Reactor construction

In the Western Hemisphere



In the Eastern Hemisphere



Source: World Nuclear Association

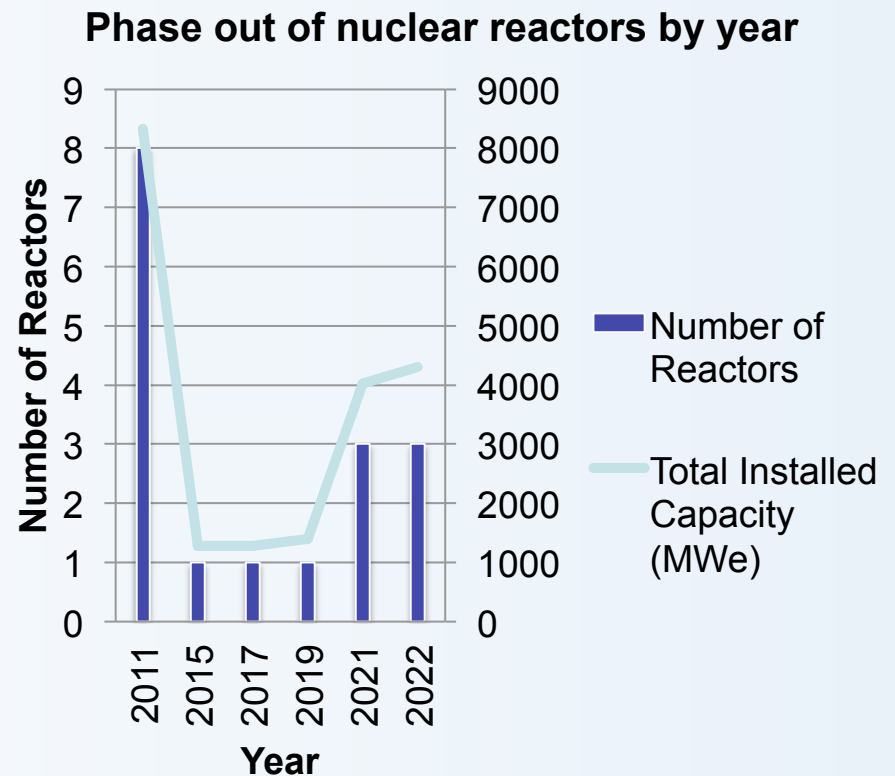
The Impact on Fukushima: Stay the course or phase out?

- Country: China
- Strategy: Stay the course
- Reaction:
 - » Existing reactors passed a safety inspection (June 14, 2011)
 - » Safety inspections of reactors under construction will be finished by fall 2011
 - » After the safety review, China will determine the approval of new reactor permits



The Impact on Fukushima: Stay the course or phase out?

- Country: Germany
- Strategy: Phase out
 - » On May 30, Angela Merkel announced Germany would resume its phase out of nuclear energy by 2022
 - » 23% of Germany's electricity comes from nuclear power
 - » Political factors
- CO2 Reduction Targets
 - » 40% reduction (from 1990 levels) by 2020
 - » 80% reduction by 2050

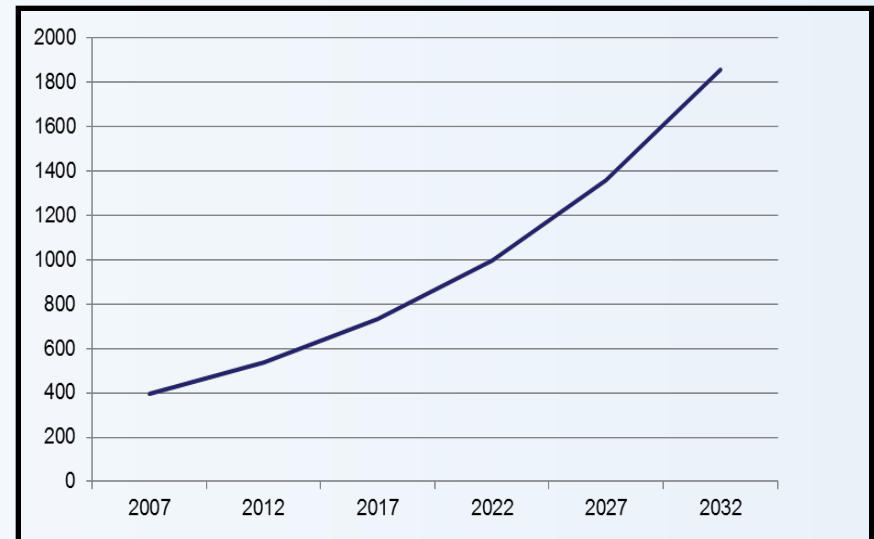


Source: Eurasia Group

The Impact on Fukushima: Stay the course or phase out?

- Country: India
- Strategy: Stay the course
 - » Government has ordered a safety review of all plants
 - » PM Manmohan Singh stands behind nuclear energy
- Energy demand in India is projected to grow by more than 3% per year to 2035
- India targets 20,000 MW of nuclear capacity by 2020 (currently at less than 5,000 MW)
- Questions around liability and compensation are swirling again

Indian Energy Demand to 2032 (mtoe)

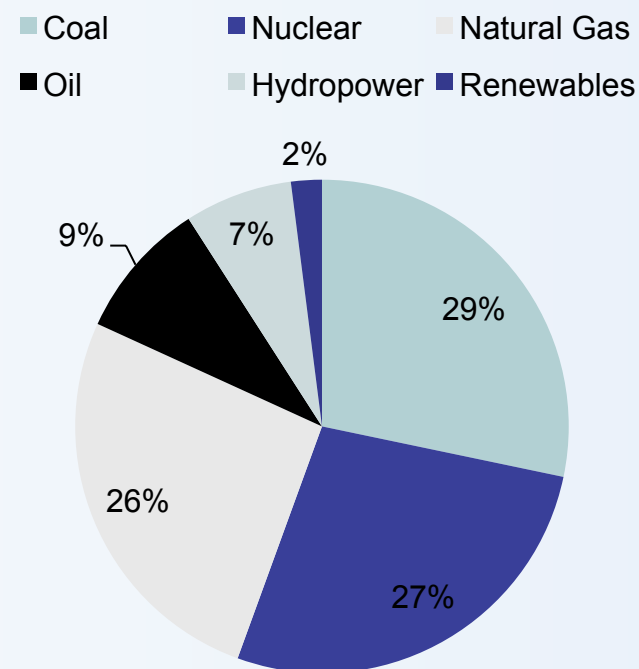


Source: Government of India, Integrated Energy Plan

The Impact on Fukushima: Stay the course or phase out?

- Country: Japan
- Strategy: Uncertain
 - » Government has ordered a review of all new plants
 - » Government has abandoned plans for 50% of electricity from nuclear by 2050
 - » Public opinion: In a recent poll, 74% of Japanese respondents favor a gradual phase out of nuclear energy
- Shifting away from nuclear would mean more coal, natural gas, and oil-fired generation
- Climate targets: Tokyo plans to reduce CO2 emissions by 25% (from 1990) levels by 2020

Japan's Electricity Mix in 2009 (%)



Source: IHS CERA

The Impact on Fukushima: Stay the course or phase out?

- Country: United States
- Strategy: Stay the Course
 - » Government has ordered a safety review of all plants
 - » White House clean electricity target: 80% of electricity by 2030
 - » \$36 billion for loan guarantees for nuclear plants in FY12 budget
 - Upfront costs of nuclear require government assistance
 - Stalled Congress spells trouble for nuclear industry

Which comes closer to your view about increasing the number of nuclear power plants in the country -- nuclear power is necessary to help solve the country's current energy problems, (or) the dangers of nuclear power are too great, even if it would help solve the country's current energy problems?

	% Nuclear power is necessary	% Dangers of nuclear power are too great	% No opinion
Mar 25-27, 2011	46	48	6
May 18-20, 2001	49	46	5

GALLUP

Generally speaking, do you think nuclear power plants in the United States are safe or not safe?

	% Safe	% Not safe	% No opinion
Mar 25-27 2011	58	36	6

GALLUP

Fukushima and its impact (cont'd.)

- Impact on natural gas, coal
 - » Natural gas demand will grow substantially
 - » LNG and coal exports to Japan will increase in the short and mid-term
 - » Inflationary pressures?
- Importance of independent regulation
 - » Japan's regulatory had independence questions that are partially to blame
 - » New or growing nuclear programs will require stringent independent regulation
 - » Countries of concern: China, Saudi Arabia, etc.
- Public will have a choice:
 - » Nuclear vs. fossil fuels: If countries move away from nuclear, coal is a likely alternative
 - » CO2 emissions targets will be pointless

Thank You

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