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# The Nuclear Renaissance

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# Where We Are

- 436 commercial nuclear power stations in 30 countries
- 372,000 MWe of total capacity
- 15% of world electricity
- 8 countries known to have nuclear weapons capability
- 56 countries operating civilian research reactors
- 30 new reactors under construction
- ~90 new reactors planned
- France, Lithuania, Slovakia and Belgium get over 50% of their electricity from nuclear power
- The United States gets about 20%

# Drivers of the Nuclear Renaissance

- Climate change and local/global emissions legislation
- Growing global energy demand
  - Electric vehicles?
  - Energy-intensive desalination plants for fresh water?
  - Hydrogen-powered vehicle demand?
  - Ageing global energy infrastructure; replace old reactors
- Energy security / security of supply
- Public perception of nuclear safety

# Global Nuclear Activities

## Europe

- Poland, Estonia, Latvia considering joint project with Lithuania
- UK replacement of ageing reactors and new builds
- Finland and France fleet expansions  
Both plants over budget and construction times
- Italy reviving its nuclear program

## **Russia**

- Doubling of nuclear capacity by 2020; also expecting floating power plant by 2012

## **Canada**

- Extending lifetime of existing plants and expanding fleet; possible use of nuclear power for oil sands extraction

## **Southeast Asia**

- Vietnam first plant by 2017; planned programs in Thailand, Indonesia and Philippines; China and Bangladesh to cooperate

## **East Asia**

- Japan and South Korea (fleet expansion): SK looking at pyroprocessing

## **South Asia**

- Pakistan (fleet expansion)

## **Middle East**

- UAE (agreement with S.Korea for 4 reactors by 2020) and Jordan (for use in desalination)

## **Africa**

- South Africa (fleet expansion); Nigeria (2 reactors); Egypt (nuclear power and desalination)

## **China**

- target to increase capacity to 50 GW by 2020

## **India**

- target to increase capacity by 20 – 30 new reactors by 2020; US-India Nuclear Agreement; possible collaboration with South Korea

## **Brazil**

- Plans to build 4 new plants by 2015 and complete a fifth unfinished plant; has 5% of world's uranium reserves

## **Argentina**

- Plans fleet completion and life extension of existing builds and plants, expansion to 4 plants by 2015

## **Chile**

- Considering establishing nuclear power by 2025 to ease reliance on hydropower, natural gas (from Argentina) and coal; much opposition from environmentalists

## **Mexico**

- Considering expanding fleet of 2 plants; one by 2015 and 7 more by 2025; smaller reactors under consideration for desalination

# Major Companies

- GE-Hitachi
- Westinghouse-Toshiba
- Babcock & Wilcox
- Areva
- Mitsubishi Heavy Industries
- Exelon
- China National Nuclear Corporation
- Atomstroyexport (Russia)
- AECL (Canada)



# Critical Issues

- Preventing the spread of enrichment and reprocessing technologies (non-proliferation)  
Brazil, S.Africa, Australia, Canada, Kazakhstan
- Need for a robust nuclear power management system, including nuclear waste
- Nuclear fuel supply guarantees and fuel management : Multilateralization of E/R ?
- Costs: subsidies, financing, operation
- Greater Transport of Nuclear Materials

# NPT Review Conference

- Adaptation of a civilian nuclear power program for weapons purposes
- Proliferation driven by illicit supply networks
- Security concerns related to commercial nuclear operations
- Inadequately secured fissile material
- Institutional deficiencies
- Inadequate enforcement

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