The Prospects for U.S. Nuclear Retirements in the International Context

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When Nuclear Plants Close
NRDC/Clearwater Conference at New York Society for Ethical Culture, 15 October 2015
Reactor Startups and Shutdowns in the World in Units, from 1954 to 1 July 2015

Source: IAEA-PRIS, MSC, 2015
Reactor Startups and Shutdowns in the US
in units, from 1956 to 1 July 2015

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Source: IAEA-PRIS, MSC, 2015
Nuclear Reactors & Net Operating Capacity in the US
in GWe, from 1957 to 1 July 2015

108 reactors
98.5 GW
99 reactors
100.5 GW

Number of Reactors
GWe

Source: IAEA-PRIS, MSC, 2015
Evolution of Mean Age of Operating US & World Fleet as of 31 December of respective year

Source: IAEA-PRIS, MSC, 2015
Age of Shut Down Reactors in the World as of 1 July 2015

- 21-30 years: 57 reactors
- 31-40 years: 33 reactors
- 41-50 years: 29 reactors
- 0-10 years: 24 reactors
- >40 years: 19 reactors

Mean Age: 24.7 Years

Age Distribution of the 33 Shut Down US Reactors as of 1 July 2015

- 21-30 years: 5 reactors
- 31-40 years: 6 reactors
- 41-50 years: 6 reactors
- 51-60 years: 5 reactors
- 61-70 years: 7 reactors
- 71-80 years: 3 reactors
- >80 years: 4 reactors

Mean Age: 17.1 Years

New York City, 15 October 2015
Average Age of Shut Down Reactors in the World 1963-2015
(by shutdown year)

Average Age of Shut Down Reactors in the US 1963-2015
(by shutdown year)

Source: IAEA-PRIS, MSC, 2015
Projection 2015-2060 of Nuclear Reactor Numbers/Capacity
Operating and Under Construction in the USA in July 2015

General assumption of 40 years of mean lifetime + Authorized Lifetime Extensions
(GWe and number of units)

Source: IAEA-PRIS, NRC, Various, collected by MSC, 2015
Number of Reactors in Operation in the US from 2015 to 2060

- Orange bars: Lifetime ≥40 Years or Entered Extended Operation
- Green bars: Lifetime <40 Years

Source: IAEA-PRIS, NRC, Various, collected by MSC, 2015
Non-Concluding Remarks… Untouched Issues

• The US operates the world’s fifth oldest reactor fleet, and many of its oldest reactors. Average age has increased steadily over the past 40 years. The US is on an “organic nuclear phase-out” trajectory.

• Nuclear’s position in the power market is increasingly threatened by a shrinking client base, increasing production costs, stagnating electricity consumption, and ferocious competitors, especially from the renewable energy sector.

• Potential factors impacting shutdown vs. plant life extension
  - immediate vs. delayed decommissioning (the art of discounting)
  - availability of sufficient funding (especially for unplanned, early retirements)
  - waste storage/disposal strategies (BRC vs. dedicated categories)
“Large-scale power generation, however, will be the dinosaur of the future energy system: Too big, too inflexible, not even relevant for backup power in the long run.”

UBS (largest Swiss bank)
“Will solar, batteries and electric cars re-shape the electricity system?”
20 August 2014

Thank You!

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