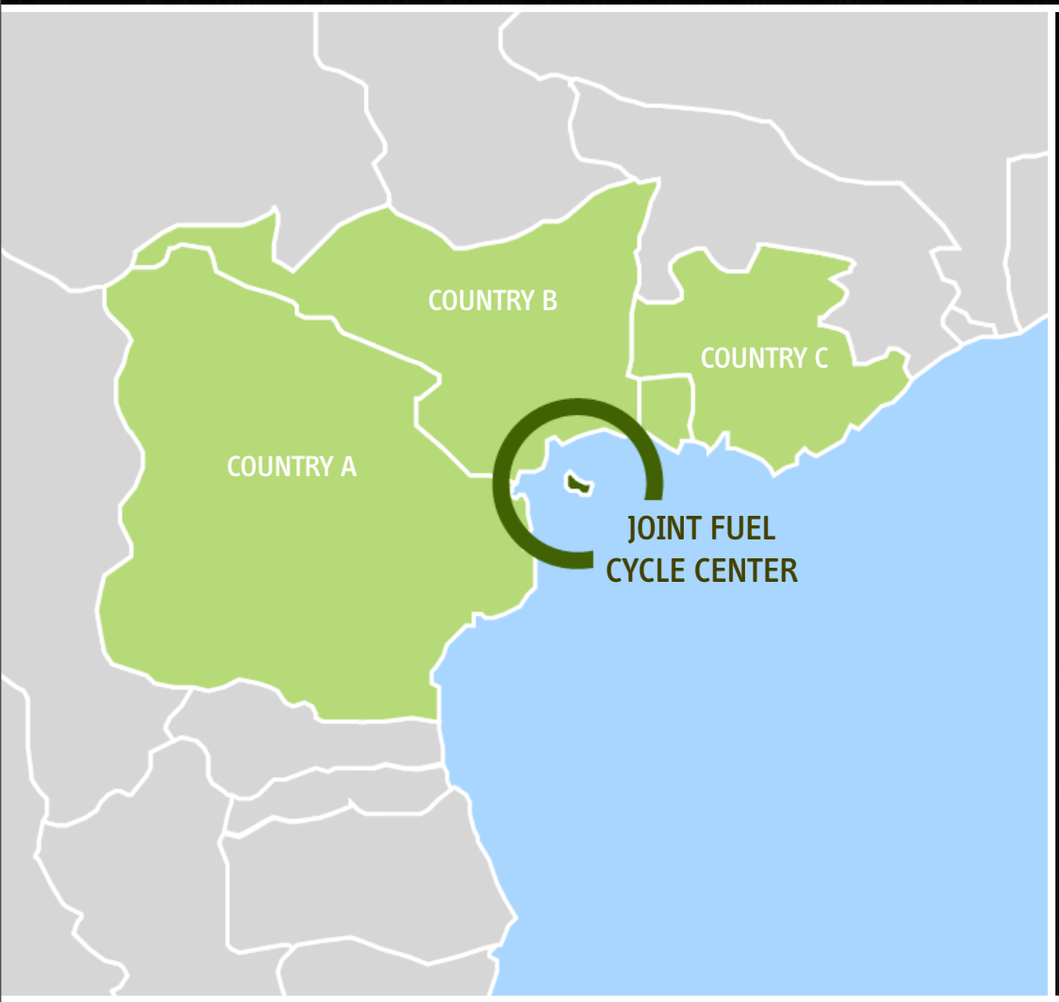


The Dilemmas of Multilateral Approaches to the Nuclear Fuel Cycle

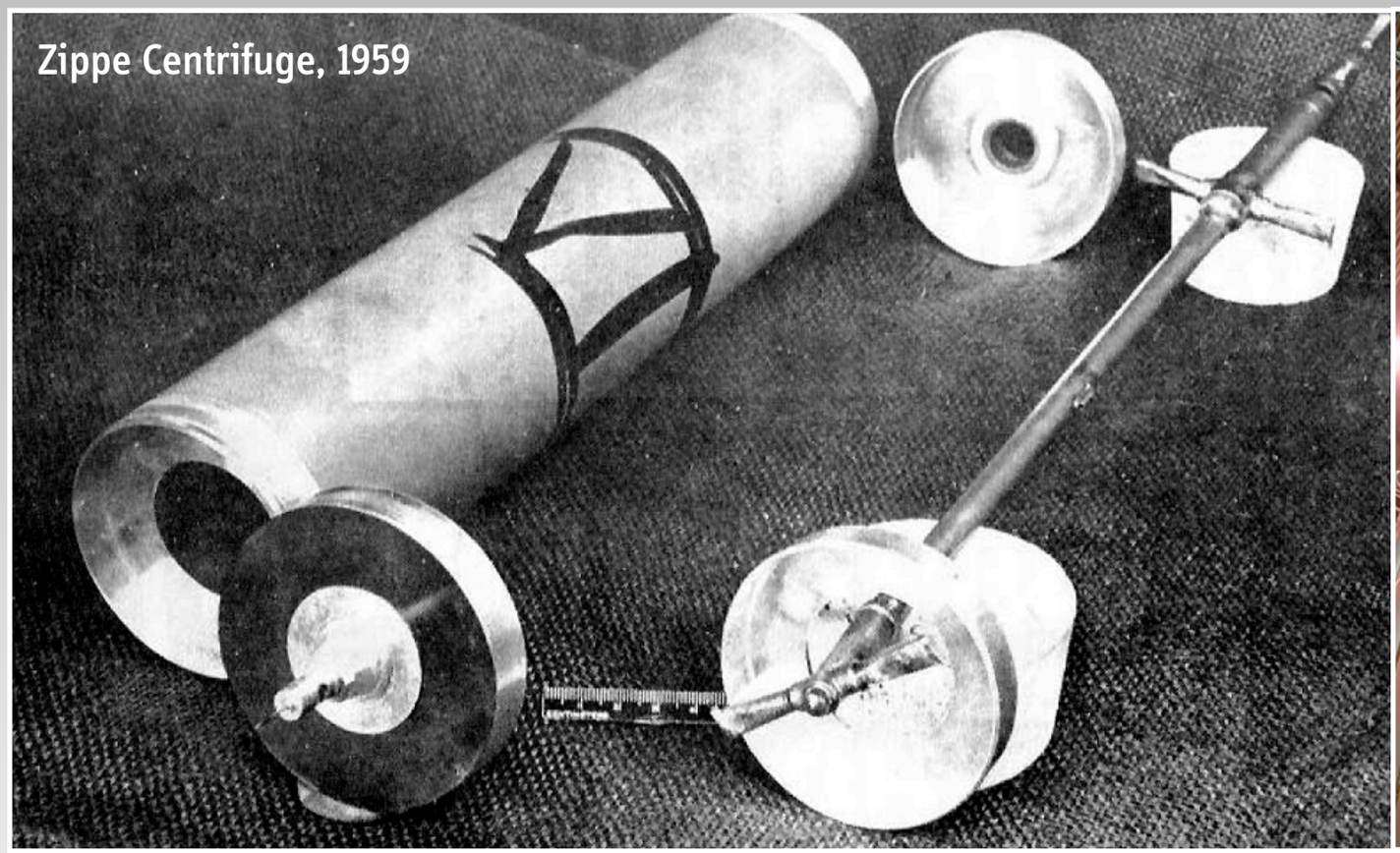
Alexander Glaser

United Nations, New York
May 5, 2009

Revision 8

Uranium Enrichment and the Future of Nuclear Energy

Why Centrifuges Are Different

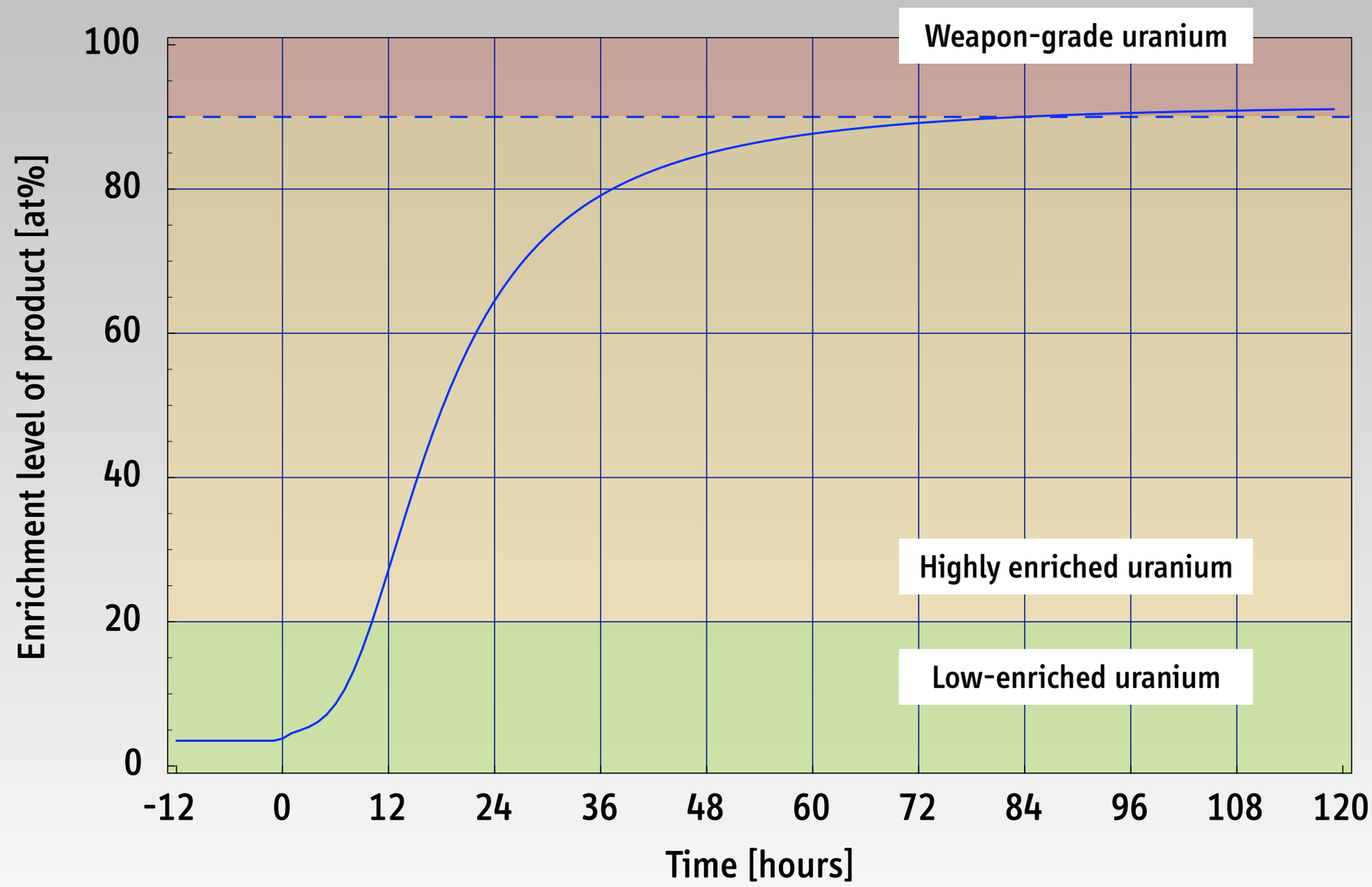


Characteristics of centrifuge technology relevant to nuclear proliferation

Rapid Breakout and Clandestine Option

Rapid Breakout

using batch recycling, avoiding cascade reconfiguration

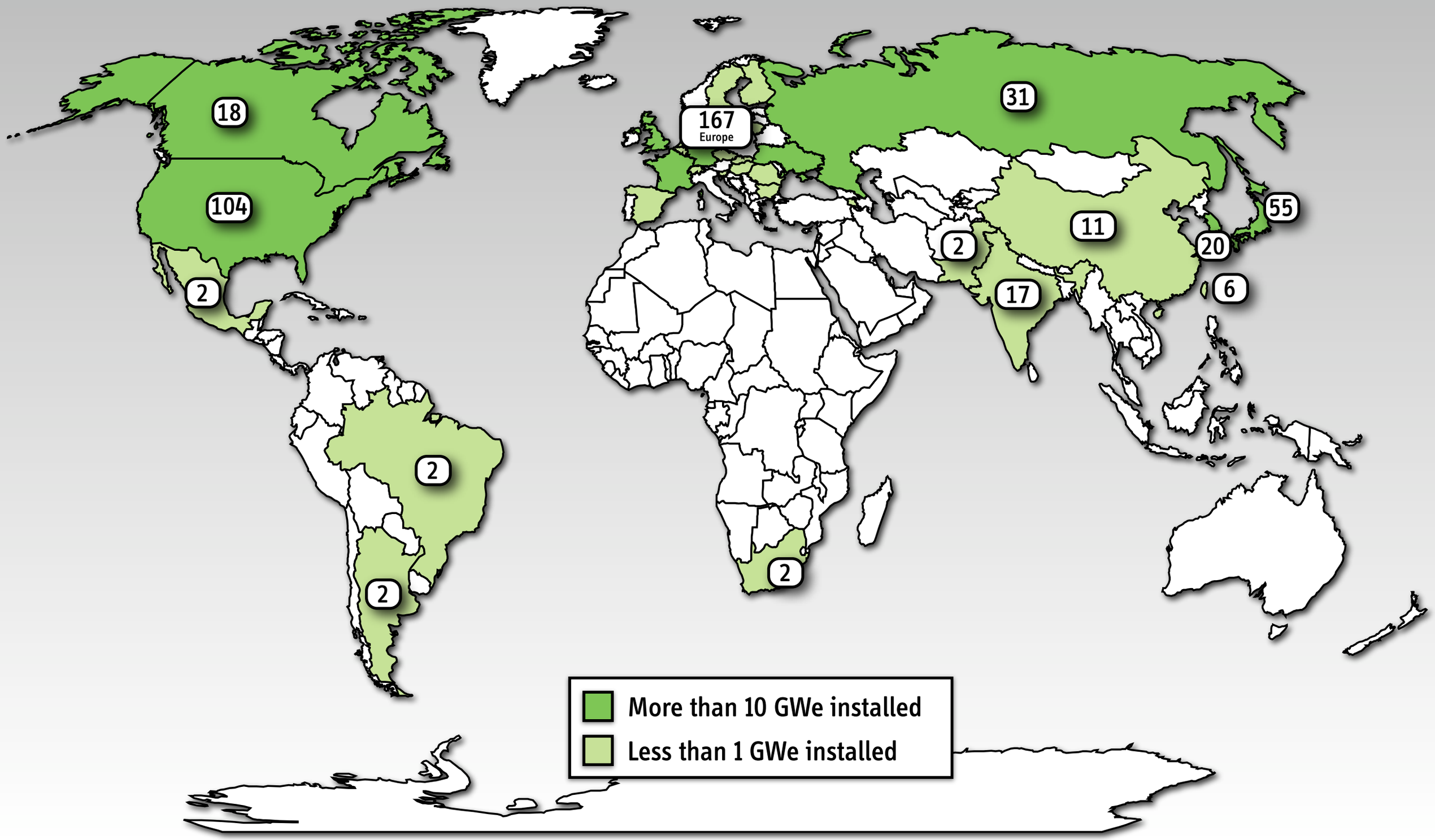


A. Glaser, "Characteristics of the Gas Centrifuge for Uranium Enrichment and Their Relevance for Nuclear Weapon Proliferation" *Science & Global Security*, 16(1–2), 2008, pp. 1–25

Courtesy: Urenco

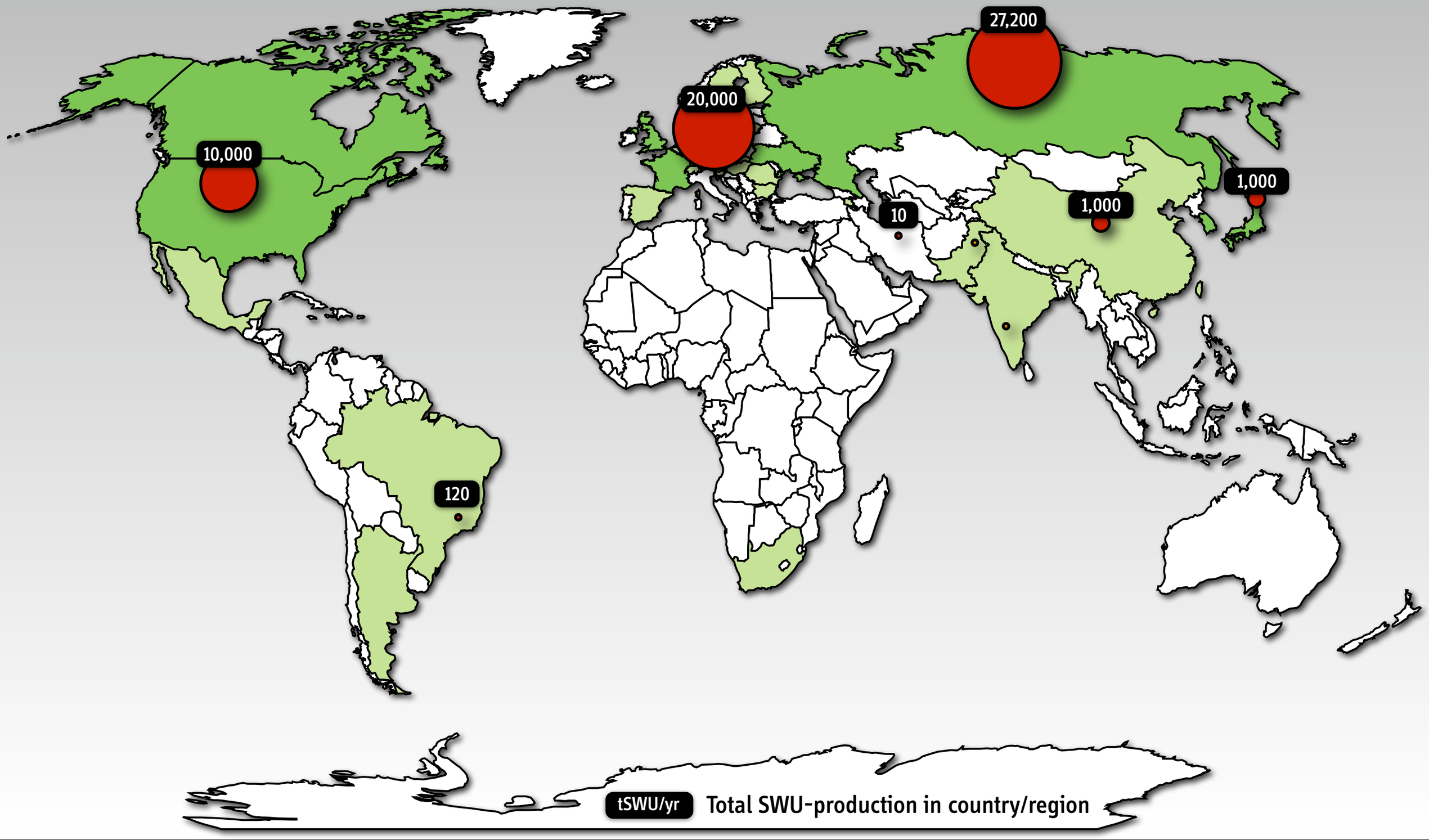
Nuclear Power Reactors in the World, 2008

(439 reactors in 31 countries)



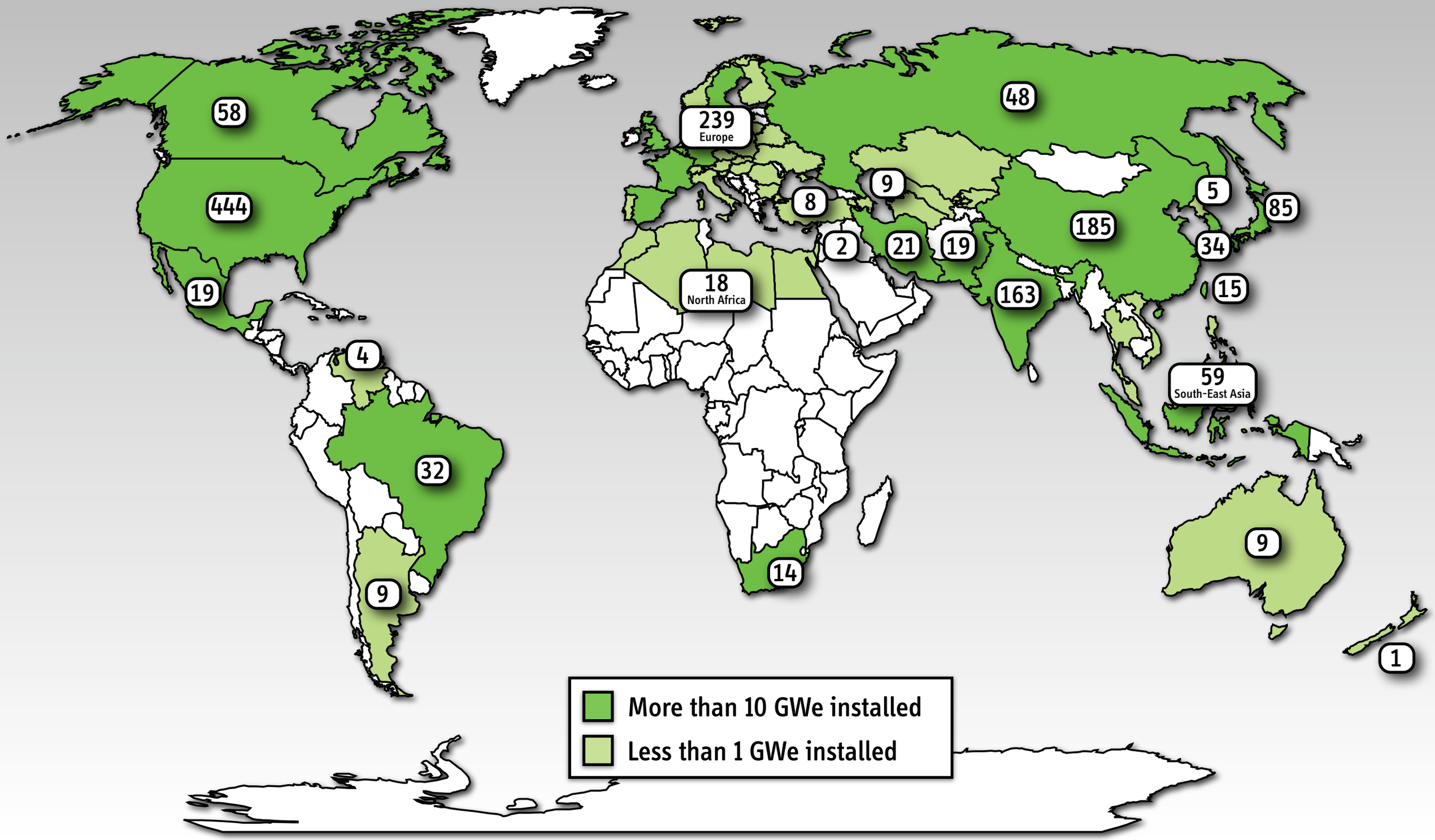
Global Enrichment Capacities, 2008

(14 operational plants in 10 countries, not including two military plants)



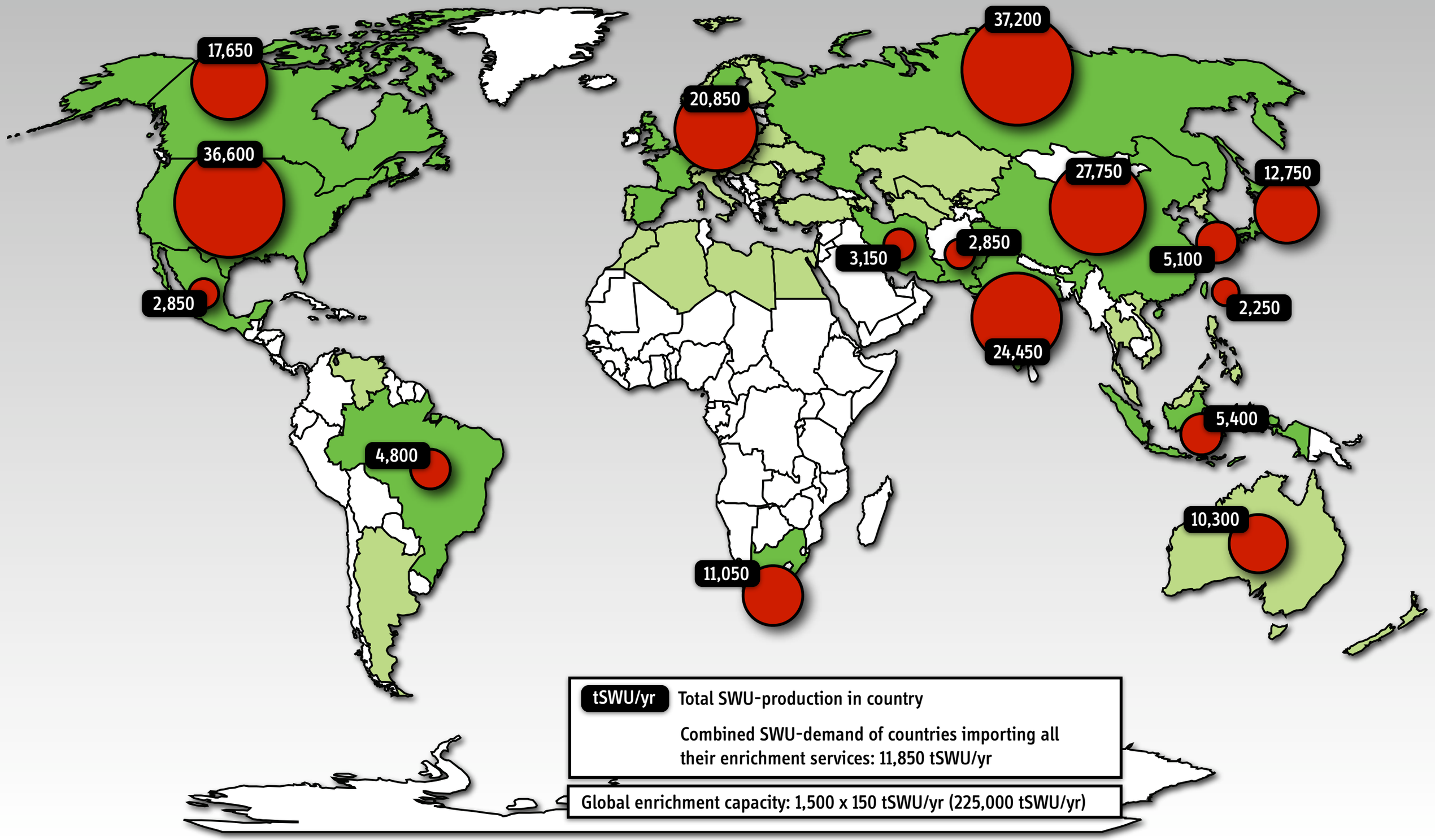
Global Nuclear Expansion Scenario

(1500 GWe in 58 countries, based on 2003 MIT study)



Enrichment Demand and Distribution

(for 1500 GWe Global Nuclear Expansion Scenario)



Multilateral Approaches to the Nuclear Fuel Cycle

Fuel Assurances

Joint Ownership of Enrichment Plants

Construction of new facilities exclusively under multilateral control
Conversion of existing facilities

Dilemmas of Fuel Assurances

Energy Security

Fuel banks too small to be relevant for countries with large nuclear programs

Those who are most worried about fuel disruptions today may not trust the concept of a fuel bank either

"Entitlement"

Article IV of the NPT and the "inalienable right" to develop and use nuclear energy for peaceful purposes "without discrimination"

Fuel assurances tend to increase this tension

Dilemmas of Joint Ownership

Proliferation

Can one share centrifuge technology without disseminating proliferation-sensitive information?

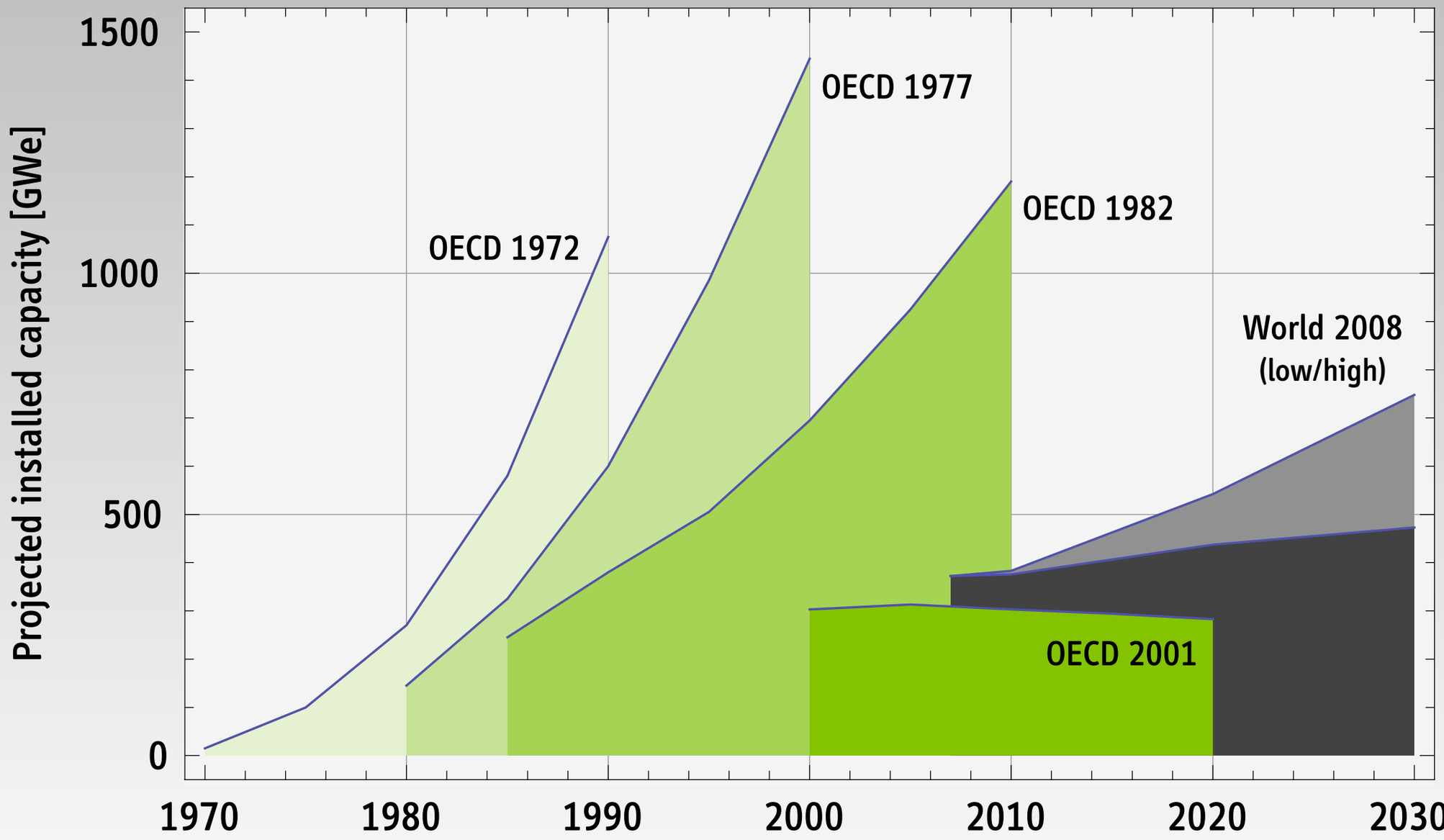
Risk of premature deployment of sensitive nuclear technologies where they are not needed

Market

Support of current technology holders needed (e.g. for new plants using “black-box” technology)

Current (and mid-term future) enrichment demand already covered

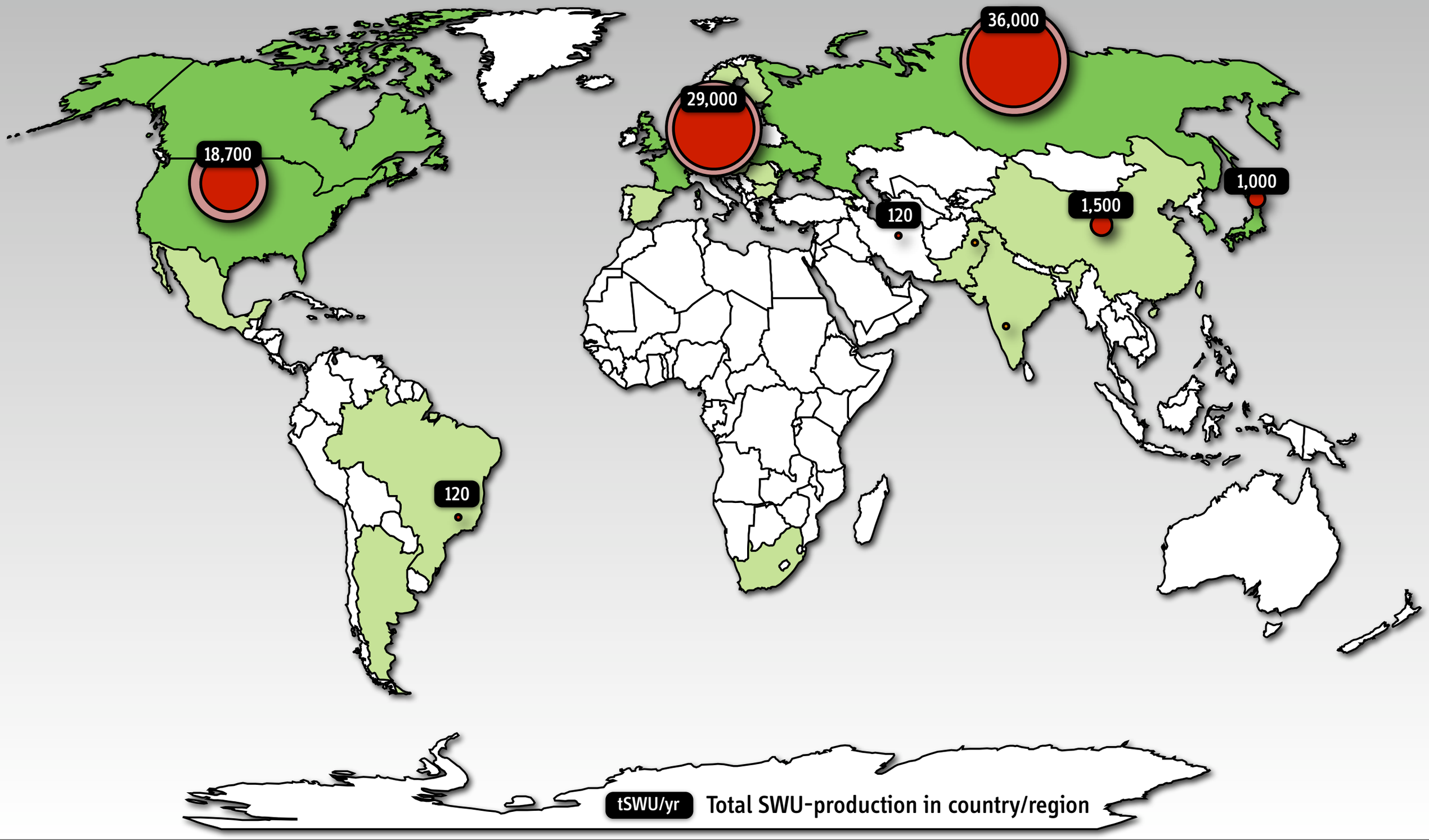
Evolution of IAEA/OECD Forecasts



International Atomic Energy Agency, *Energy, Electricity and Nuclear Power Estimates for the Period up to 2030*, Reference, Data Series No. 1, 2008 Edition, August 2008

Global Enrichment Capacities, 2015

(as expected today, sufficient for more than 700 GWe)



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Territoriality

How effectively will the fact that a plant is multinationally owned
reduce the risk of a “take over” by the host state?

Can Multilateral Approaches Strengthen the NPT?

Development and Peaceful Use of Nuclear Energy

Possibility of a new regional enrichment plant with partners currently not enriching?

Nuclear Nonproliferation

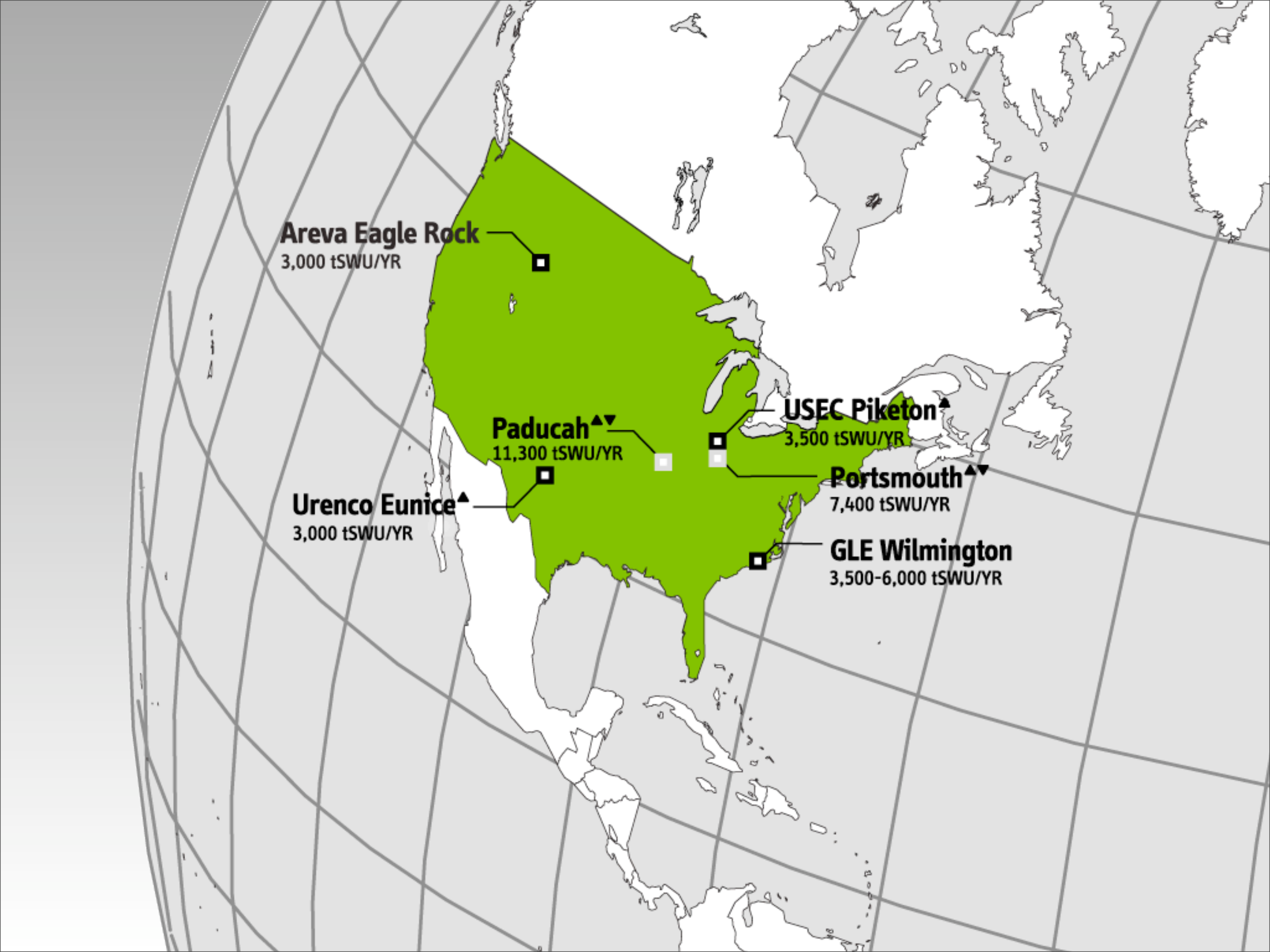
Possibility of implementing advanced safeguards approaches in new plants

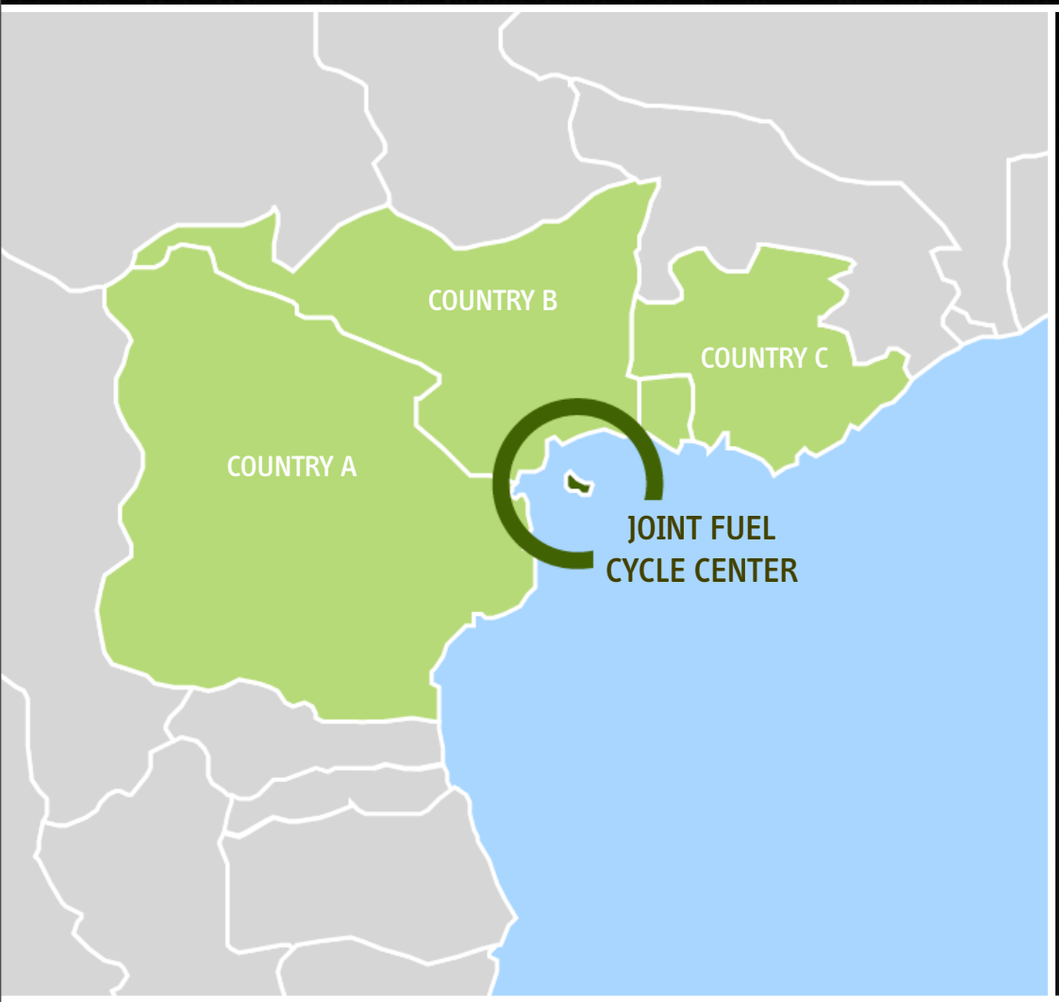
Avoiding additional small-scale deployment of centrifuge technology under national control

Nuclear Disarmament

Possibility of bringing plants that are currently under construction under joint ownership?

Application of IAEA safeguards in plants even if located in NPT weapon states


Areva Eagle Rock
3,000 tSWU/YR
Paducah
11,300 tSWU/YR
Urenco Eunice
3,000 tSWU/YR
USEC Piketon
3,500 tSWU/YR
Portsmouth
7,400 tSWU/YR
GLE Wilmington
3,500-6,000 tSWU/YR



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