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Security of Fuel Supply The IAEA Initiative

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Security of Fuel Supply
The IAEA Initiative

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International Atomic Energy Agency

Nuclear Power Status (October 2012)

- 437 nuclear power plants in 29 States
- 64 under construction

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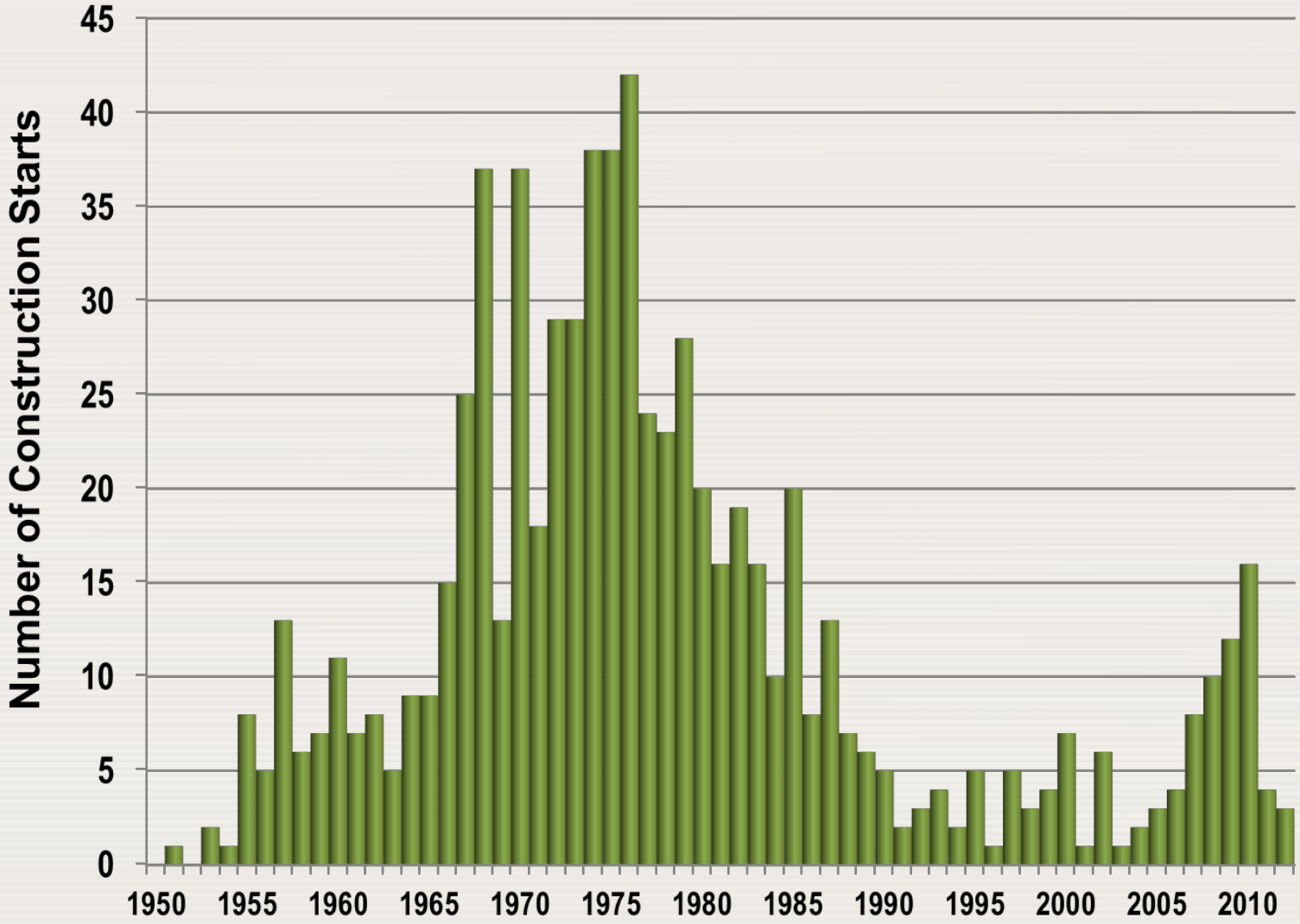
Construction Starts of NPPs by Year



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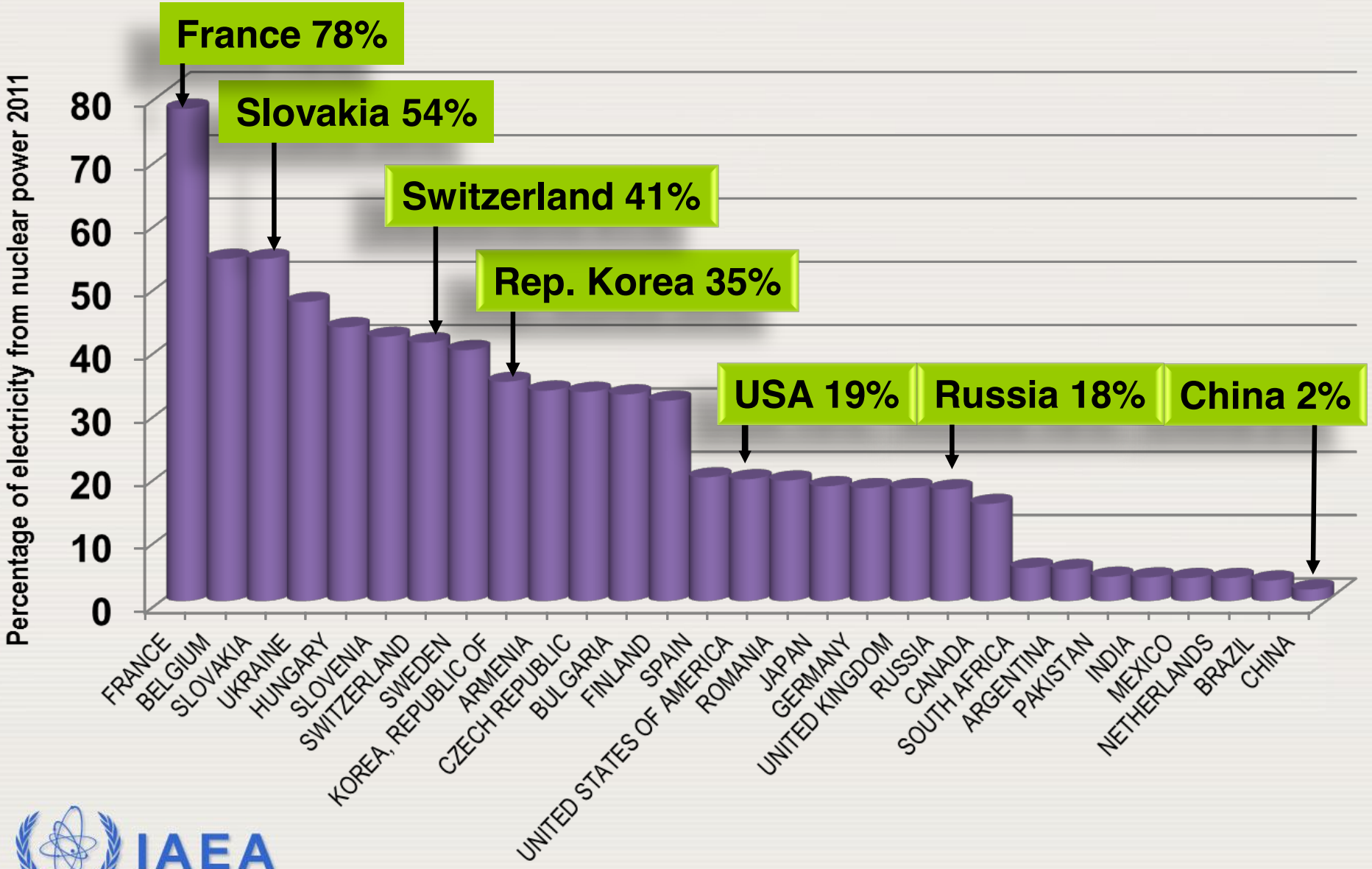
Nuclear share of electricity (approx.)



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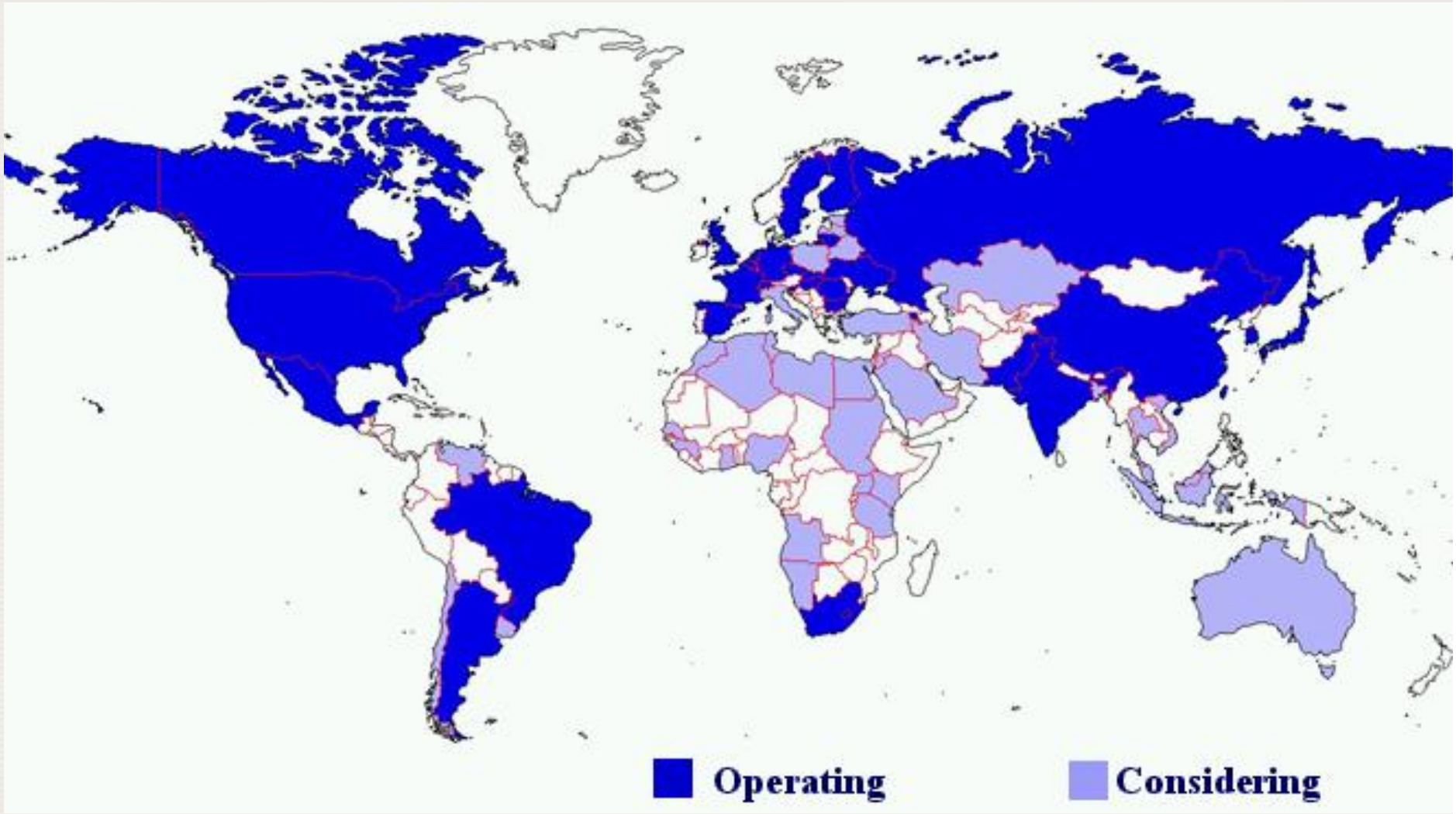
Nuclear Power States



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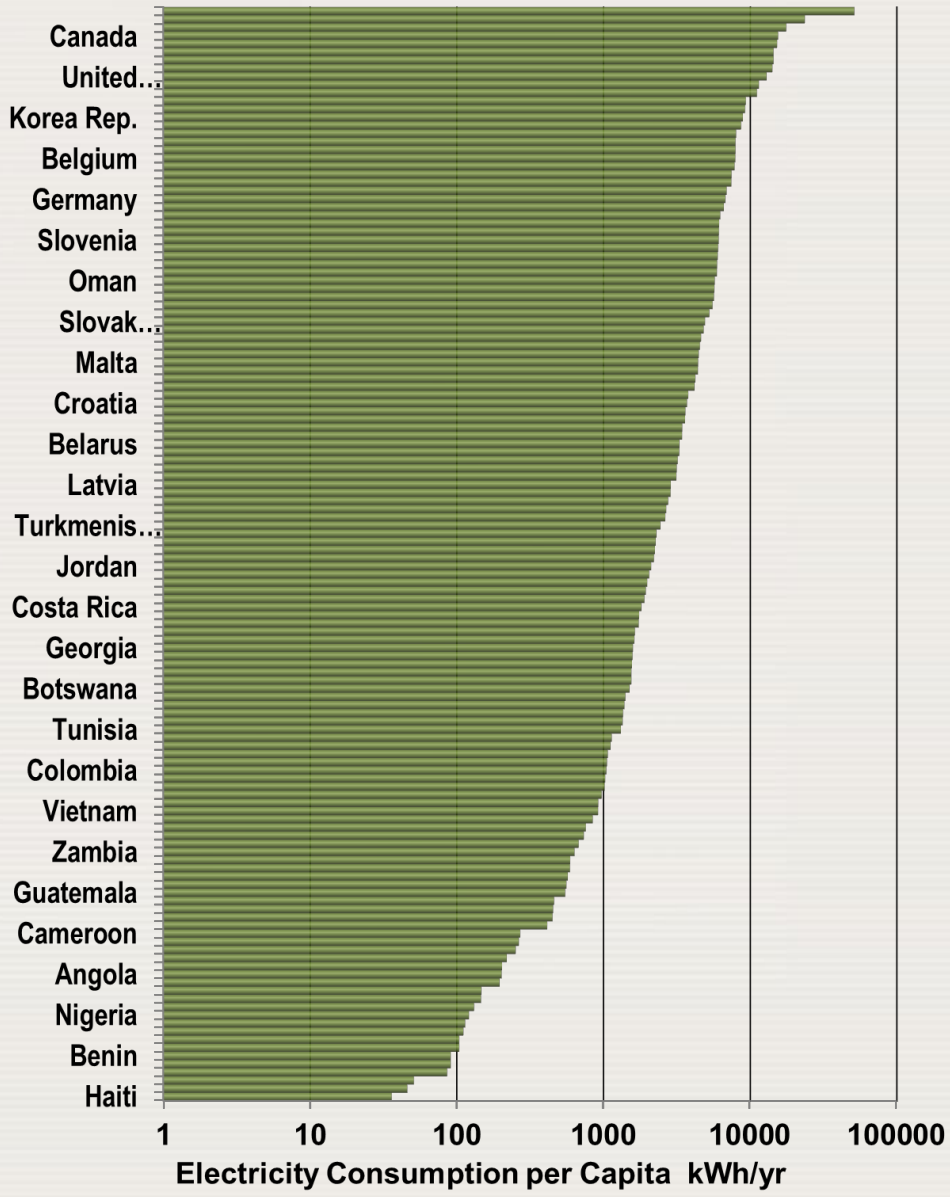
Nuclear Renaissance …

Energy is the engine of development

- 1.6 billion people have no access to electricity
- Several countries with electricity consumption per capita < 100 kWh/year
- OECD countries: electricity consumption per capita is 9000 KW/h/year



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Expectations of Nuclear Energy

- Many countries considering nuclear power in the energy mix.
- Vital to fully address safety, security, economics, and non-proliferation

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Expectations of Nuclear Energy

- Increased reliance on nuclear power will prompt questions:
  - How will the nuclear fuel cycle in general be managed?
  - How will the demand for fuel cycle services be met?
  - Will existing supply sources suffice?
  - Will new fuel cycle facilities be needed?
- A supply security framework will be essential to ensure that nuclear energy remains a source of hope and prosperity for humanity and is not a tool for self-destruction ~ which is a vision of the IAEA Statute

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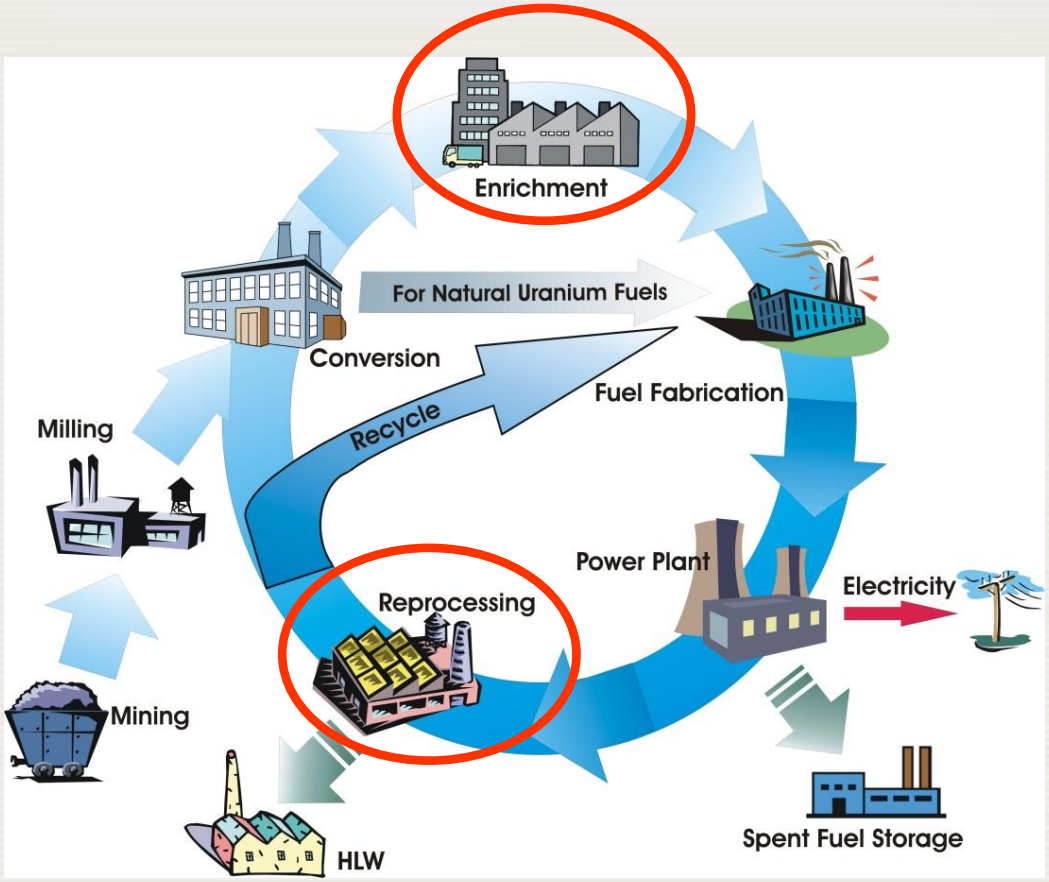
New Roles –Fuel Cycle Framework



- Primary concerns
  - Enrichment
  - Reprocessing
- Facilitate nuclear power
- Reduce proliferation risks

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Assurance of Supply of Nuclear Fuel

- States need confidence …
  - Predictable, stable and cost effective fuel supplies over the long term
  - Back-up mechanisms to protect against disruptions
- Different States may develop different approaches to fuel supply security
- Each State has the right to decide on all matters regarding nuclear fuel cycle options
- At the start of this new phase, the focus has been on the front-end of the nuclear fuel cycle – beginning with assurance of supply of LEU

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Assurance of Supply of Nuclear Fuel

- Assurance of supply has the potential to:
  - Facilitate the continued and expected increased use of nuclear energy for peaceful purposes
  - Provide the benefits of cost-effectiveness and economies of scale in the use of nuclear power
  - Provide additional assurance to the international community that the sensitive parts of the civilian nuclear fuel cycle are used only for peaceful purposes
- Thus, development, economic and non-proliferation considerations can coincide and be mutually reinforcing, while providing security of supply of nuclear fuel to consumer States

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Past Efforts

- Multilateral nuclear fuel cycle initiatives are not new:
  - Baruch Plan (1946): proposed an International Atomic Development Authority
  - Atoms for Peace (1953): speech to UNGA by US President Eisenhower proposed an IAEA and international control of the nuclear fuel cycle
  - IAEA Statute (1956): Article III.B.2 and Article XII.A.5 provide for Agency control over excess special fissionable materials
  - IAEA study project on regional nuclear fuel cycle centres (RNFC) (1975 to 1977)
  - Committee on International Plutonium Storage (IPS) (1978 to 1982)
  - International Fuel Cycle Evaluation Programme (INFCE) (1977 to 1980)
  - United Nations Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy (UNCPICPUNE) (1987)
  - Committee on Assurances of Supply (CAS) – 1980 to 1987
  - International Symposium on Nuclear Fuel and Reactor Strategies: Adjusting to New Realities (1997)
  - Technical, Economic and Institutional Aspects of Regional Spent Fuel Storage Facilities (RSFSF) – 2003 IAEA TecDoc

Recent Proposals

- Multilateral Approaches to the Nuclear Fuel Cycle: IAEA Expert Group Report, Feb 2005; INFCIRC/640
- 17.4 MT of excess HEU for down-blending as LEU fuel and used as part of a fuel bank under an assurance of supply scheme – USA (Sept. 2005) INFCIRC/659
- International Nuclear Fuel Cycle Centres - Russian Federation (Jan.2006) INFCIRC/667
- Global Nuclear Energy Partnership – USA (Feb.2006)
- World Nuclear Association – TENEX, AREVA, URENCO, USEC (May 2006)
- Six-Country Proposal for Assured Access to Nuclear Fuel (June 2006)
- Japan "IAEA Standby Arrangements System for Assurance of Nuclear Fuel Supply" (Sept. 2006) INFCIRC/683
- IAEA Administered Nuclear Fuel Bank (NTI offer of US$ 50m) (Sept.2006)
- United Kingdom "Enrichment Bonds" (Sept. 2006) INFCIRC/707 "Nuclear Fuel Assurance"
- Russian Federation "LEU Reserve" at IUEC at Angarsk (Jan and May 2007) INFCIRC/708
- German Proposal for an International Nuclear Fuel Centre (May 2007) INFCIRC/704 /727 /735/ 765/
- Austrian proposal for a International Nuclear Fuel Bank (May 2007) INFCIRC/706
- Nuclear Fuel Cycle (EU) (June 2007)
- Germany/Netherlands/UK "Multilateral Cooperation on Energy Security" (Sept. 2007) INFCIRC/713

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Possible LEU Assurance of Supply of Framework

For LEU a suggested possible framework might have three levels:

Level 1: existing global market arrangements for nuclear fuel supply

Level 2: back-up commitments provided by suppliers of enrichment services and governments,

Level 3: a physical LEU reserve under IAEA control, or a virtual LEU reserve based on commitments by governments

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Possible Framework for Assurance of Supply of Nuclear Fuel: Three Levels

	LEU	Fuel Assemblies
Level 1	Normal market	Normal market
	If supply disruption, then the Director General assesses if criteria are met	*If supply disruption, then the Director General assesses if criteria are met*
Level 2	If so, the remaining enrichers cover the contract in equal shares and government commitments apply	If so, government commitments apply, and the customer seeks alternative acceptable bid
	If any enricher or government fails to honour its Level 2 commitments	*If no acceptable bid is received*
Level 3	LEU is provided from a physical reserve controlled by the Agency, and possibly other physical reserves *and/or* LEU is provided by governments according to prior supply commitments	Contingent clauses take effect to expand fabrication alternatives *and/or* Customer seeks acceptable bid from expanded pool of alternatives

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IAEA LEU Bank

- Establishment approved by IAEA Board of Governors 3rd December 2010
- Level 3 supply assurance
- Donated funds of approximately $150 million
- Physical reserve of LEU in the form of UF_6
- LEU to be provided to the IAEA for supply to Member States experiencing a supply disruption
- Rights of Member States not affected to develop their own nuclear fuel cycle production facility
- No conflict with other proposals on assurance of supply - adds to options available

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LEU Stored and Shipped in 30B Cylinders

- UF_6 in 30B cylinders
- Industry standard for LEU
- Can be safely handled without radiation shielding
- Easily handled with proper lifting equipment
- Monitoring, maintenance, emergency response: industrial UF6 infrastructure necessary
- UF6 chemically poisonous; violent reaction with water generating hydrogen fluoride

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IAEA LEU Bank

- The rights of Member States, including establishing or expanding their own production capacity in the nuclear fuel cycle, remain intact and not in any way be compromised or diminished
- One of several mechanisms for an international framework for assurance of supply designed to provide an additional level of assurance for the front end of the fuel cycle
- Additional option for assurance of supply
- No Market disruption

What it is:

- Assurance
- Last-resort
- Small
- LEU (UF_6)
- Transparent
- Reliable

What it is not:

- Constraint
- Abridging rights
- Market alternative
- Fabricated fuel

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Supply of LEU to a Member State

- Eligibility criteria approved by the Board and applied by the DG
  - LEU supplies are disrupted for reasons not related to technical or commercial considerations
  - the State is in good standing on safeguards implementation issues and has a safeguards agreement in force that applies to any LEU from the IAEA LEU bank

Supply of LEU to a Member State

Process

- MS would submit request to DG for specified amount of LEU for a power reactor along with an explanation of disruption of supply
- DG determines if the MS meets eligibility criteria
- If so, Member State would conclude an agreement with the IAEA for the supply of LEU (based on the Model Agreement), pay IAEA in full in advance
- Following EIF of the Agreement, LEU supply would commence
- DG would keep the Board informed throughout the process

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Questions?