

# The Nuclear World is Changing, whether We Want It to or Not

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# My viewpoint

- I represent the Finnish nuclear safeguards and safety regulator
- Main developments of the civilian nuclear fuel cycle during the next 10-20 years
- Risk of
  - diversion of nuclear materials and technologies from peaceful use to military, terroristic or unknown purposes
  - undeclared nuclear activities and/or materials

# Use of nuclear energy will globally grow (whether we want it to or not); Why?

- **Historically, interest in nuclear power has fluctuated considerably**
  - Growth has largely matched that of electricity needs
- **Significant changes in horizon (2020 perspective)**
- **Global, regional and national drivers**
  - Main trends and drivers are long term and only temporarily dependent on short term economic cycles
  - Growing world population, urbanization, increasing need for energy and electricity
  - Economies consuming larger volumes of energy and electricity
  - Substantial energy expansion plans in key countries (China, India)
  - Concerns about environment and climate change
  - Security of energy supply, energy independency
  - Competitiveness and cost stability (nuclear energy is insensitive to price of Uranium)
  - Good safety records and performance
- **Upgrades and life extensions of old nuclear plants**
- **New builds (a nuclear power plant is a 100y commitment)**

# Nuclear is already globalizing fast

- Already today, nuclear Vendors' modern business models include activities and actors all over the world with long supply chains
  - Example of Finnish EPR OL3: over 2000 companies from 28 countries
- Amounts of nuclear material and sensitive knowledge are growing and spreading (even without “renaissance”)
- Number of “virtual nuclear weapon states” grows
  - Uranium enrichment capabilities
  - Plutonium separation (reprocessing) capabilities

***Potential Risk: Nuclear “Renaissance” focuses only on reactors and forgets (again) the whole life cycle: assuring fuel supply, spent fuel management, Pu-reprocessing, spent fuel and waste disposal, which are vital for successful non-proliferation!***

# Verification culture needs to change (1)

- IAEA stands as world's central verification body. However,
  - IAEA's resources can not increase in the same pace with increasing verifications activities
  - Many see IAEA's future role differently
  - Productivity requirements get higher
- Verification culture change need new thinking, approached, methods and technologies
  - State level verification approaches, optimum use of all information available, risk assessments, more information driven verification activities, use of state-of-the-art technologies, high calibre staff, outsourcing (R&D etc.), syntheses, integration and synergies, management of huge data flows, use of social media, etc.
- Transparency and cooperation with States, stronger and more independent national regulators enabling and strengthening IAEA's work

## Verification culture needs to change (2)

- States with developed safeguards systems need to transfer safeguards knowledge to those embarking on nuclear and/or developing their national regulatory systems
- Verification systems and components should be incorporated into regulatory licensing requirements for plant designs, operations, maintenance and ageing management
  - Nuclear vendors to embed safeguards features directly deep into their facility designs, systems and components (see air and automobile industries)
- Unfortunately, there is no single globally accepted safeguards and verification standard
  - Good 2020 Safeguards Standard: Optimum combination of comprehensive safeguards agreement and additional protocol leading to State Level Safeguards Approach.
  - Finnish experience: Under IAEA new safeguards implementation, number of IAEA inspections to Finnish nuclear facilities decreased 60% last year, but quality of safeguards conclusions increased because of more measures for optimum use were available to the IAEA

## **Main Conclusions:**

***The nuclear world is changing***

***Non-proliferation and safeguards systems  
have to change along with it***

***Proliferation is a political problem  
which does not have a technical solution***