U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Safety Approaches / Harmonization for Innovative Nuclear Systems

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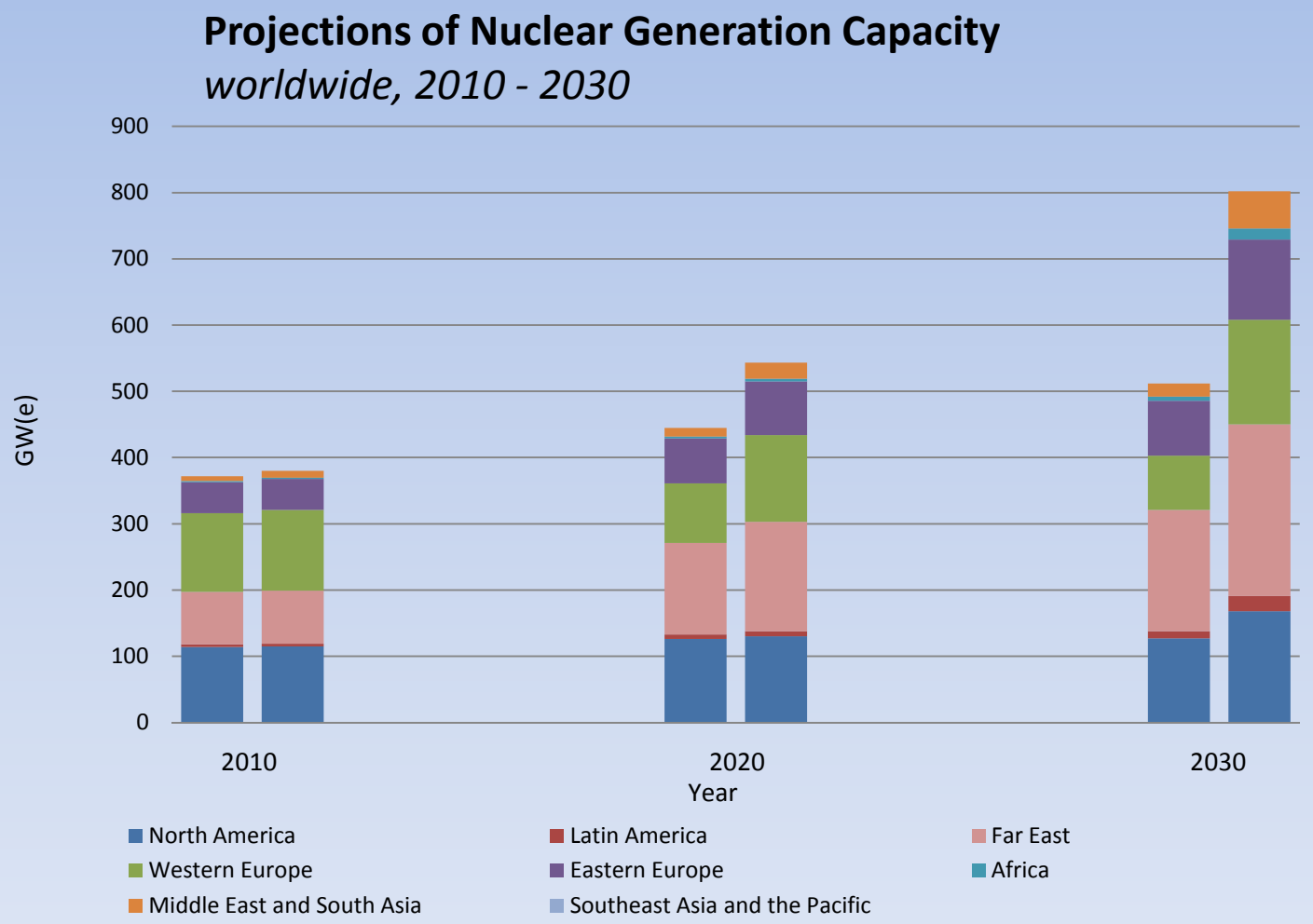
Growth Projections for Nuclear Power Generation

- The IAEA has developed projections for installed global nuclear power capacity by 2030.
- Projections suggest that nuclear power generation capacity could increase by 40% under the low projection or could more than double under the high projection by 2030.

Growth Projections for Nuclear Power Generation



*Data from IAEA Annual Report: Energy, Electricity, and Nuclear Power Estimates for the Period up to 2030; 2009 Edition

Nuclear Power in the Long Term

- Significant interest globally in the development of nuclear energy
  - Countries with existing nuclear programs
  - New Entrant Countries
- Interest driven by several factors
  - Growing Energy Demand
  - Energy Security
  - Volatility in Price of Fossil Fuels
  - Global Environmental Concerns
  - Potential Use for Non-Electricity Generation Applications
- Current fleet of large LWRs are of limited utility for long term sustainability of nuclear energy.
  - Large Base-Load Generation not Supported in Several Markets
  - High Capital Cost
  - Fuel Cycle

Nuclear Power in the Long Term

- Growing interest in new and innovative technologies.
  - Generation IV Systems (GFR, LFR, MSR, SFR, SCWR, VHTR)
    - Highly Economical
    - Enhanced Safety
    - Minimal Waste
    - Proliferation Resistant
  - Other innovative nuclear design concepts being introduced
    - Fission/Fusion
    - Accelerator Driven Systems
- Given increased interest in the international community, important to ensure harmonization of regulatory requirements.

Multinational Design Evaluation Program

- The Multinational Design Evaluation Program (MDEP) is a multinational initiative to develop innovative approaches to leverage the resources and knowledge of mature, experienced national regulatory authorities who will be tasked with the regulatory design review of new reactor plant designs.

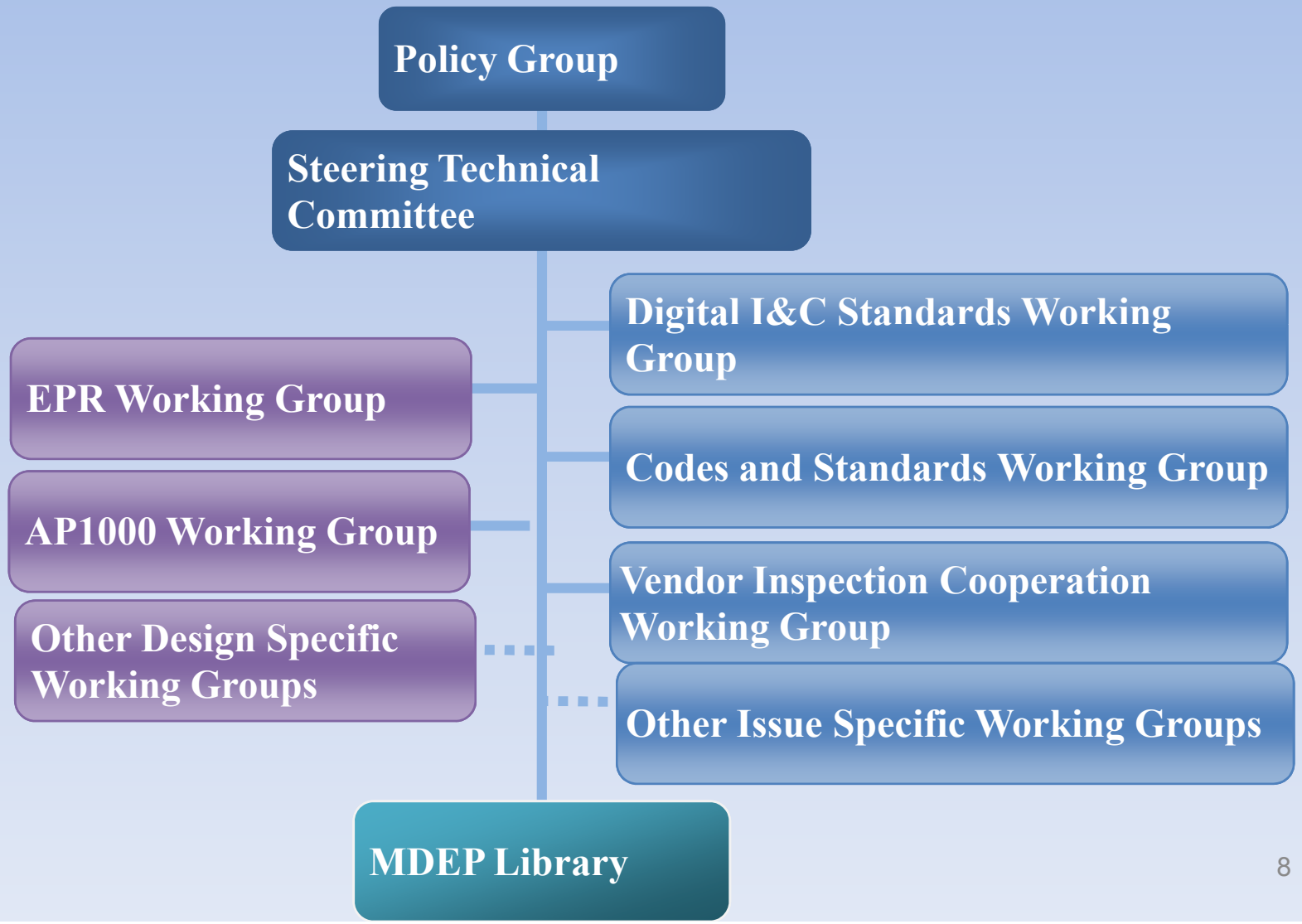
- MDEP Activities:
  - Enhancing multilateral cooperation within existing regulatory framework.
  - Increasing multinational convergence of codes, standards, and safety goals.
  - Implementing MDEP products and regulatory practices to facilitate licensing reviews of new reactors, including those being developed by the Generation IV International Forum.

Multinational Design Evaluation Program

- Current Members: Canada, China, Finland, France, Japan, Korea, Russian Federation, South Africa, the United Kingdom and the United States

- The IAEA takes part in the work of MDEP.

Multinational Design Evaluation Program Structure



Multinational Design Evaluation Program

- MDEP provides mechanisms for regulators to share information and assure safe designs.
- Limited number of designs but all are one technology – LWRs.
- All MDEP members have existing nuclear power plant programs and mature regulatory structures in place.

Advanced Reactor Initiatives

- Advanced reactor technologies:
  - Diverse
  - Limited Or No Operating Experience
  - Limited Or No Relevant Regulatory Structures
  - Significant Interest From Countries That Do Not Currently Have Regulatory Programs

- How can the international community support the development and deployment of safe, proliferation resistant technologies?

NRC Harmonization Activities

- In August 2009 the NRC established a bi-lateral agreement with the South African National Nuclear Regulator (NNR).
  - Activities to include sharing policy and technical issues and information related to HTGRs.
- US/France/Japan tri-lateral agreement on Sodium Fast Reactor technology and regulations.
- NRC enhancing International Coordination for Emerging Nations.
  - Identification of NRC-sponsored cost-free experts at the NEA and IAEA.
- NRC-Sponsored Infrastructure Assistance for Emerging Nations.
  - NRC has a small program to assist countries that don't currently have nuclear power programs.
    - Development of administrative infrastructure (staffing, training, etc.)
    - Development of regulatory requirements

Summary

- As innovative technologies are being developed it is critical to keep regulators involved.
  - How can INPRO support this?
- INPRO can play a key role in developing innovative designs that focus on:
  - Safety
  - Proliferation
  - Harmonized Regulatory Structures