DEPARTMENT OF SCIENCE AND TECHNOLOGY
Philippine Nuclear Research Institute

No Need to Reinvent the Wheel:

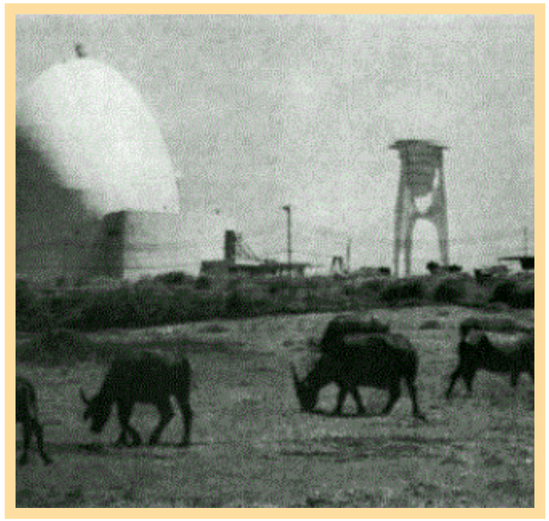
The Philippines' Strategic Use of International Licensing Expertise and Challenges to Crafting a new Nuclear law

Dr. Carlo A. Arcilla
Director, Philippine Nuclear Research Institute

info@pnri.dost.gov.ph

www.pnri.dost.gov.ph

History of Nuclear Energy Development in the country



The Philippine Atomic Energy Commission (PAEC) was created in 1958, 4 years after the creation of the US Atomic Energy Commission (AEC).

PAEC's functions:

development and **regulation** of nuclear energy

The Philippines operated a research reactor, which was donated by the United States under the Atoms for Peace Program

The 1-MW open pool general-purpose Philippine Research Reactor-1 (PRR-1) housed at the PNRI compound in Quezon City achieved its first criticality in August 1963.

The Philippines built its first and only nuclear power plant during the peak of the global energy crisis in the 1970's

BATAAN NUCLEAR POWER PLANT

621 MW Westinghouse PWR

Built at cost of US$ 2.3 billion

Completely built, but mothballed nearly 40 years ago, mainly due to "safety reasons"-- not 1 watt produced

3 exact operating models for more than 30 years – Korea, Slovenia, and Brazil

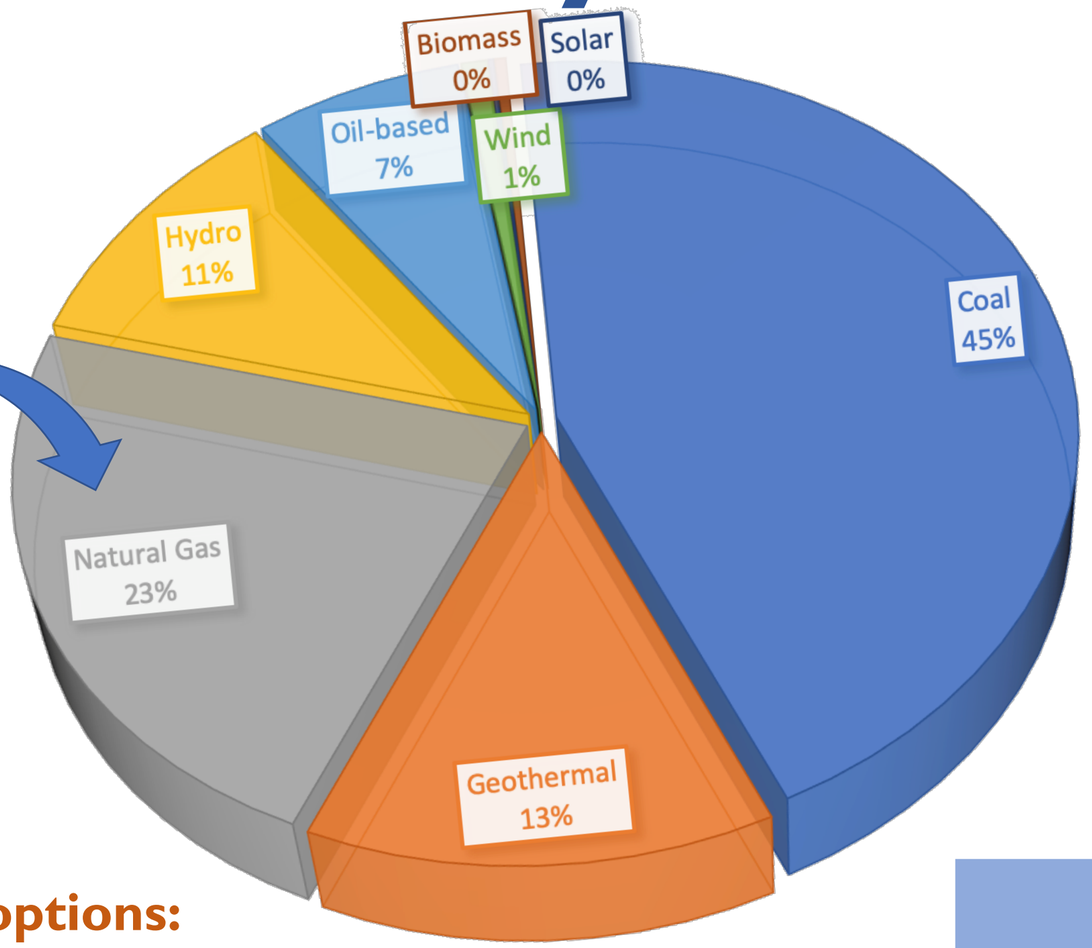
Situated close to (or on) a "dormant" volcano and a fault – the recurring WRONG reason given why the plant was mothballed

Why nuclear power for the Philippines NOW?

- Extremely expensive electricity rates (highest in Asia) especially per capita
- Energy security – 50% of electricity comes from coal which is 90% imported from Indonesia
- Depleting Malampaya gas field supplying 20% of Philippine energy
- Provide baseload backup for intermittent renewables

PHL Electricity Mix

The current energy mix is composed of coal (47%), natural gas (22%), renewable energy (hydro, geothermal, wind, solar) (24%), and oil-based (6.2%) with current energy capacity at 23GW



Malampaya gas running out in 5 years

Best replacement options: Liquefied Natural Gas (LNG) along with Nuclear Energy

Why Nuclear ?

A median Filipino family pays more than 10-15% of its monthly income for electricity! In many countries, less than 1%!

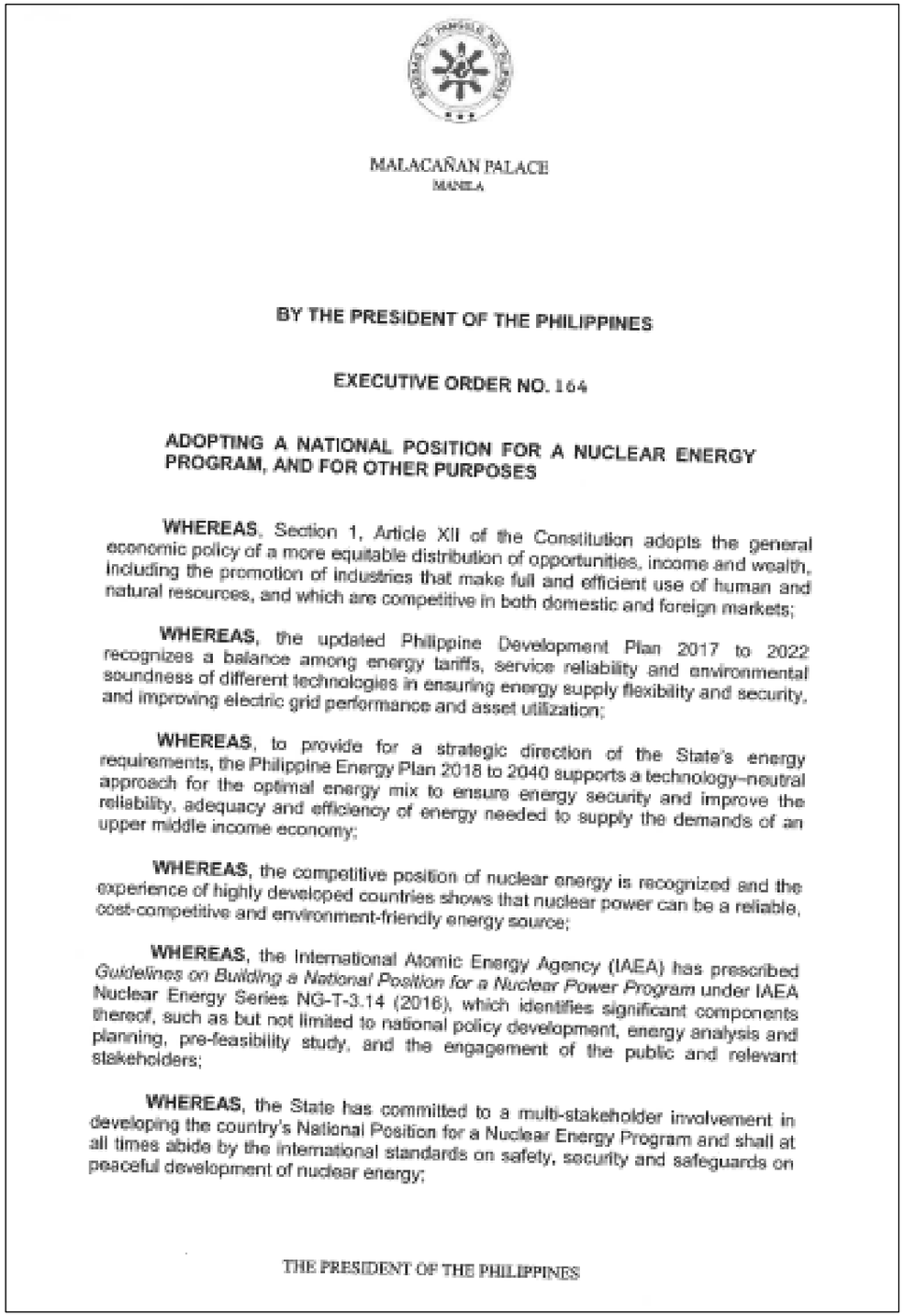
High electricity costs **could be** reason why 79% of PHL population supports nuclear power (DOE Survey, May 2019

Nuclear is competitive with gas and coal but small volume favors energy security

NATIONAL POSITION ON NUCLEAR ENERGY

First requirement of a country embarking on a nuclear power program

- The most significant government action on nuclear since the construction and stoppage of the Bataan Nuclear power plant in the 1980's



MALACAÑAN PALACE
MANILA

BY THE PRESIDENT OF THE PHILIPPINES

EXECUTIVE ORDER NO. 164

ADOPTING A NATIONAL POSITION FOR A NUCLEAR ENERGY PROGRAM, AND FOR OTHER PURPOSES

WHEREAS, Section 1, Article XII of the Constitution adopts the general economic policy of a more equitable distribution of opportunities, income and wealth, including the promotion of industries that make full and efficient use of human and natural resources, and which are competitive in both domestic and foreign markets;

WHEREAS, the updated Philippine Development Plan 2017 to 2022 recognizes a balance among energy tariffs, service reliability and environmental soundness of different technologies in ensuring energy supply flexibility and security, and improving electric grid performance and asset utilization;

WHEREAS, to provide for a strategic direction of the State's energy requirements, the Philippine Energy Plan 2018 to 2040 supports a technology-neutral approach for the optimal energy mix to ensure energy security and improve the reliability, adequacy and efficiency of energy needed to supply the demands of an upper middle income economy;

WHEREAS, the competitive position of nuclear energy is recognized and the experience of highly developed countries shows that nuclear power can be a reliable, cost-competitive and environment-friendly energy source;

WHEREAS, the International Atomic Energy Agency (IAEA) has prescribed *Guidelines on Building a National Position for a Nuclear Power Program* under IAEA Nuclear Energy Series NG-T-3.14 (2016), which identifies significant components thereof, such as but not limited to national policy development, energy analysis and planning, pre-feasibility study, and the engagement of the public and relevant stakeholders;

WHEREAS, the State has committed to a multi-stakeholder involvement in developing the country's National Position for a Nuclear Energy Program and shall at all times abide by the international standards on safety, security and safeguards on peaceful development of nuclear energy;

THE PRESIDENT OF THE PHILIPPINES

PRESIDENTS WANT NUCLEAR POWER

GMANETWORK.COM

Duterte hopes next administration will look into use of nuclear power

"We're not yet dito sa nuclear level but I hope the next administration would at least explore n...

PROPOSED
PhilATOM Bill

Purpose: to create the

Philippine Atomic Energy Regulatory Authority

to fill in the gaps of the 1968 legislation

To enhance nuclear safety, nuclear security and safeguards

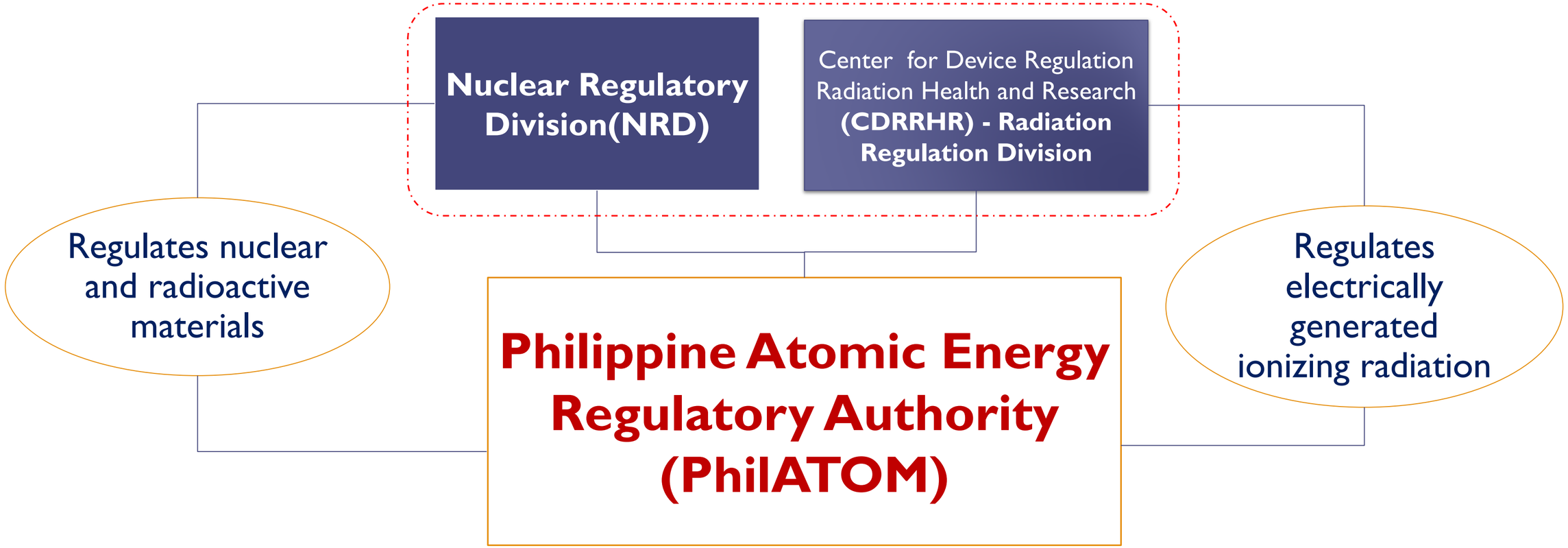
to fulfill the country's obligations to the

International legal instruments

APPROVED APPROVED

Passed the third reading in the House of Representatives on 22 November 2023

Creation of an Independent Regulatory Body



To synchronize all regulatory activities on ionizing radiation under one organization

ASEANTOM

ASEAN CAMBODIA 2022
ASEAN A.C.T.: Addressing Challenges Together

ACTIVITIES

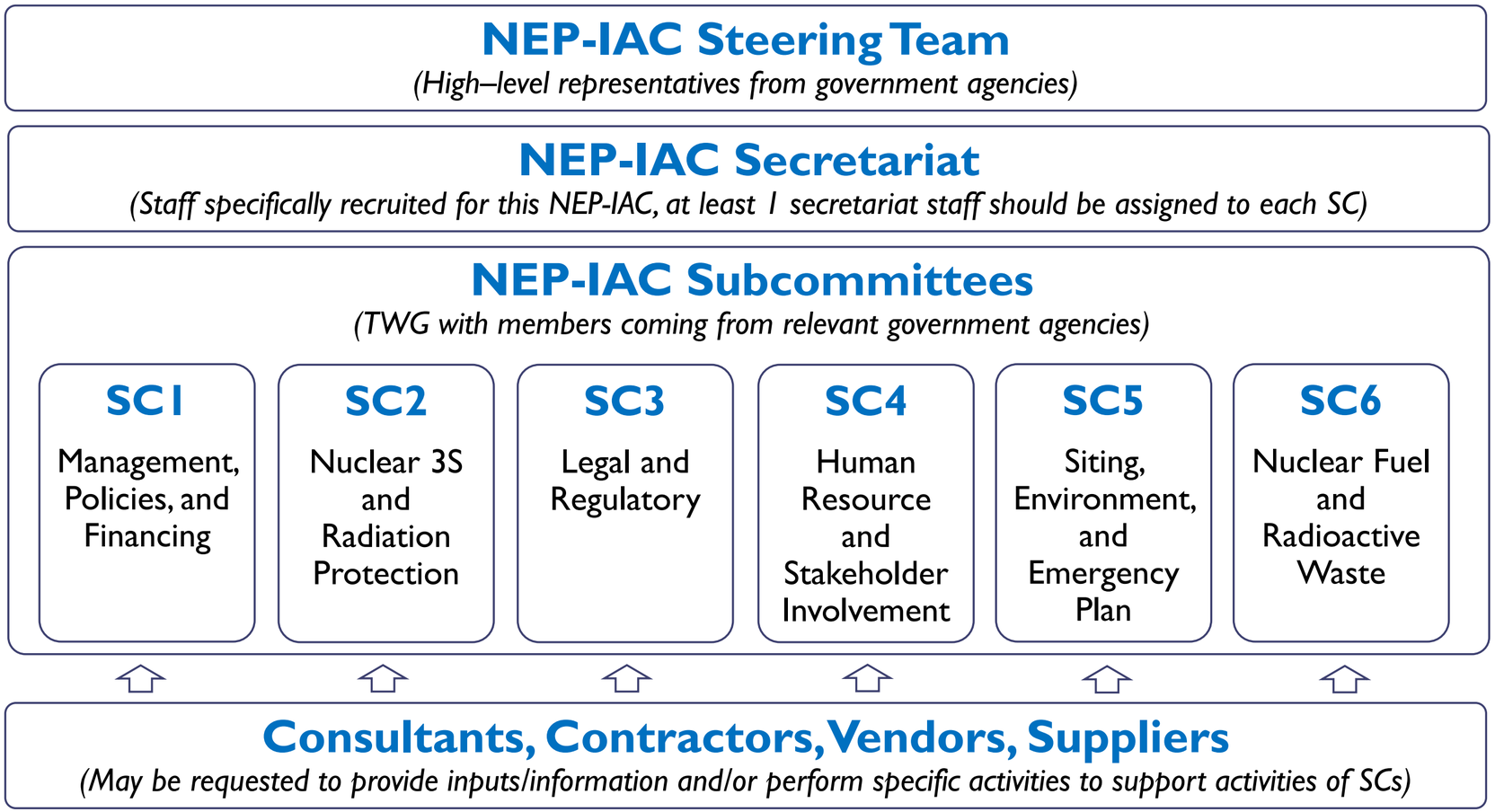
Integrated Nuclear Infrastructure Review

- Identification of the 19 infrastructure issues outlined the following cornerstones:
  - **Policy**
  - **Legislative Framework**
  - **Public Acceptability**
  - **Alignment with International Standards**

Integrated Work Plan

- A total of 19 activities were identified for the years; 10 activities for 2020, 9 activities for 2021.
- The largest part of the activities relates to the
  - **National Position**
  - **Legal and Regulatory Framework**
  - **Human Resource Development**
  - **Stakeholders Involvement**

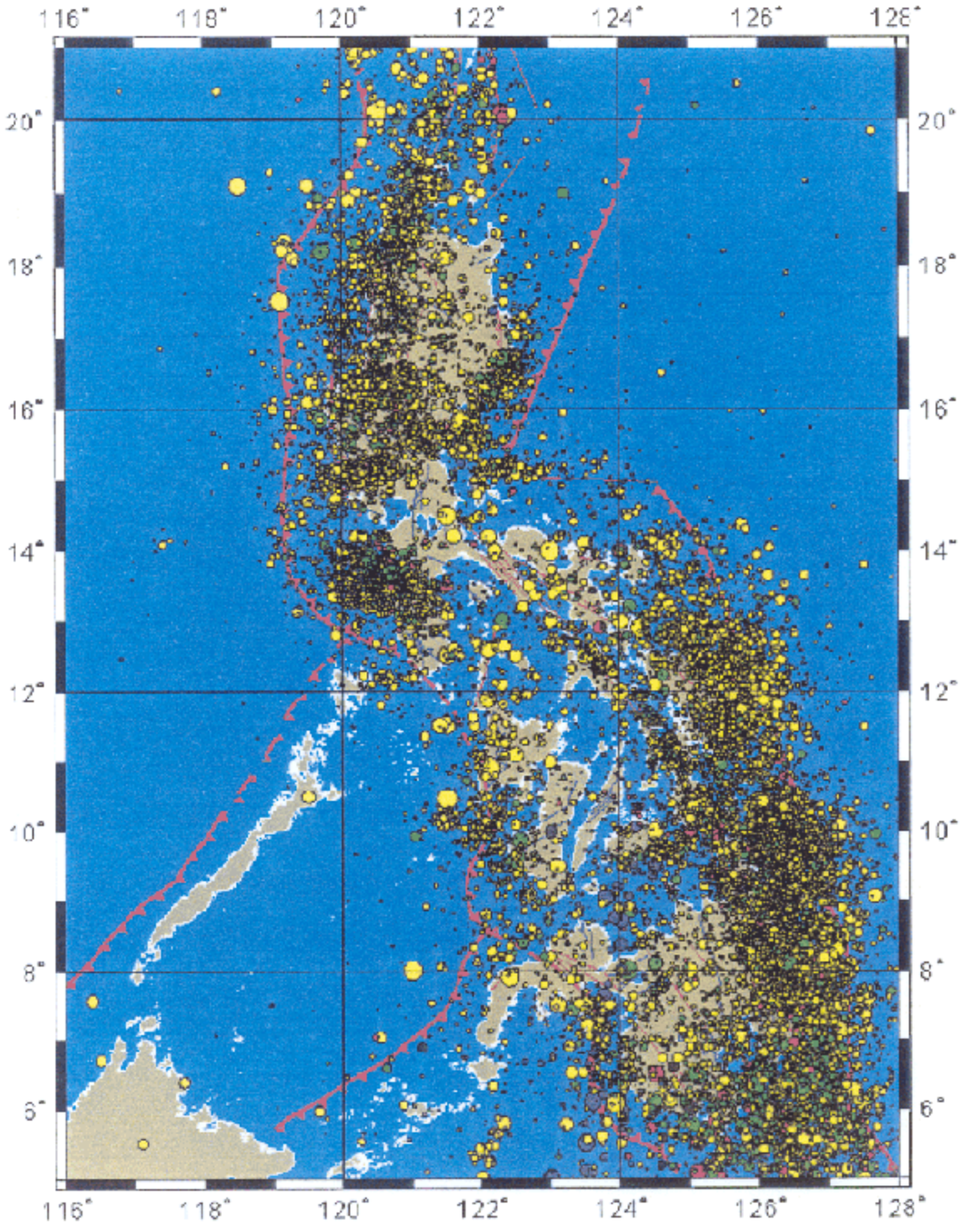
Nuclear Energy Program Interagency Committee NEP-IAC STRUCTURE E.O. 116, 2020



Currently in Congress

- Nuclear Liability Law, taking into account, among others, the Convention for Supplementary Compensation, providing for a litigation-free compensation for victims
- Questions on what comprises a “nuclear accident” and what are dose levels to declare such (e.g., Fukushima issue wherein the ambient doses are already low)

Can the Philippine geology SAFELY host nuclear power plants?


116°
118°
120°
122°
124°
126°
128°
20°
18°
16°
14°
12°
10°
8°
6°

Disasters in Philippines

- Typhoons (20 a year – most in the world!)
- Volcanoes
- Tsunami
- Earthquakes
- Floods
- landslides
- Some politicians and oligarchs

SAFETY SAFETY SAFETY

If nuclear is unsafe why does USA have nearly 100 NPP, suppying 20% of its electricity, operating close to 60 years, and given additional 20 year licenses (80 years total!)

What Philippines can learn from American nuclear

- Learn from more than 60 years of SAFE and CLEAN nuclear operations
- Learn regulatory lessons from monitoring nearly 100 privately-owned nuclear power plants
- Adopt technical and safety findings from national laboratories that have kept nuclear operations efficient and safe
- Learn from productive private-government initiatives to make nuclear even more efficient and safe
- Train future manpower (especially technicians) who will operate future Philippine nuclear power plants

US Nuclear Corp Meeting PBBM re micro modular reactor (June 21, 2023)

First time meeting PBBM in Malacanang discussing small modular nuclear reactors — with DOE Secretary Popo Lotilla and DOST USec Donnet Sahagun. American executive of US Nuclear Corp in background

Insights gained from Experienced Nuclear Regulators

Separation of the nuclear regulator from a **promotional** body

- USA – creation of **US NRC** in 1974
- Japan – creation of the Nuclear Regulatory Authority (**NRA**) in 2012, after the Fukushima Accident
- UAE – creation of Federal Authority for Nuclear Regulation (**FANR**) in 2009

Adopting Established Regulations and Standards

- **Siting and Licensing of Nuclear Installations**
  - Adopted NRC Regulations Title 10, Code of Federal Regulations 10 CFR Part 50, 10 CFR Part 100
  - STUK Finland
  - IAEA General and Specific Safety Requirements
- **Licensing of Radiation Facilities**
  - IAEA General Safety Requirements (GSR) and Safety Guides
- **Radiation Protection Standards**
  - 10 CFR Part 20
  - IAEA General Safety Requirements (GSR) Part 3
- **Nuclear Security Regime**
  - Through PNRI-US DOE nuclear security cooperation

Implementation Strategies

On-the-Job Training

- Nine months OJT of PNRI staff at the US Nuclear Regulatory Commission through the IAEA Regular Fellowship program ~ 1990's until 2001

Training Courses and Workshop

- Conducted by the US NRC, US DOE, and through the IAEA, ANSN programs at the Korean Institute of Nuclear Safety (KINS), Korean Institute of Nuclear Non-Proliferation and Control (KINAC)

Technical Assistance

- Improving the legal framework for nuclear safety and strengthening the capabilities of the Regulatory Authority of the Philippines and its TSO – funded by the **European Commission** in 2014-2015

Challenges and Considerations

Cultural and Legal Variations

- Customizing regulatory frameworks to suit the specific cultural and legal context in the Philippines

Resource Constraints

- Limited resources, both in terms of funding and skilled personnel, may hinder the effective implementation of comprehensive nuclear regulations.

Political Stability and Continuity

- Incorporating regulatory structures that are resilient to political changes and establishing bipartisan support.

CHALLENGES TO REGULATORY INDEPENDENCE

Perceived overlapping regulatory coverages: Include Commercial policy into safety Law?

How to fund independent regulatory body without yearly congressional budgetary approval?

Integrate into nuclear law updated Conventions on nuclear (e.g., Physical protection, liability, etc.)

Technical versus legal background of Regulators?

Assuaging public that independence of regulators are ESSENTIAL for safety

Future Prospects

Capacity Building

- Investing in education and training programs, and facilitating knowledge exchange with experienced international experts.

International Cooperation

- Actively participating in international forums, sharing experiences, and aligning regulatory practices with global standards.

Regional Harmonization

- Coordinating with international bodies and neighboring countries to address cross-border implications and harmonize standards.

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Overview of the Proposed Philippine National Nuclear Energy Act

Thank You

for your attention

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