



NUCLEAR REGULATORY AUTHORITY, GHANA

DEVELOPMENT OF REGULATORY INFRASTRUCTURE FOR NUCLEAR POWER PROGRAMME IN GHANA

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"Ensuring the protection of people and the environment from radiation hazards."

ORDER OF PRESENTATION

- **INTRODUCTION**
- **NUCLEAR REGULATION IN GHANA**
- **HUMAN RESOURCE & COMPETENCE DEVELOPMENT**
- **REGULATION DEVELOPMENT**
- **COLLABORATION WITH OTHER INSTITUTIONS**
- **INTERNATIONAL COOPERATION**

INTRODUCTION



GHANA'S CURRENT POWER POSITION

Current^{ly} situation

- ❖ Installed Capacity – 4662.5 MW
Peak
- ❖ Demand- 2,525.0 MW
- ✓ Hydro (36%)
- ✓ Thermal (63.9%)
- ✓ Solar (<0.01%)

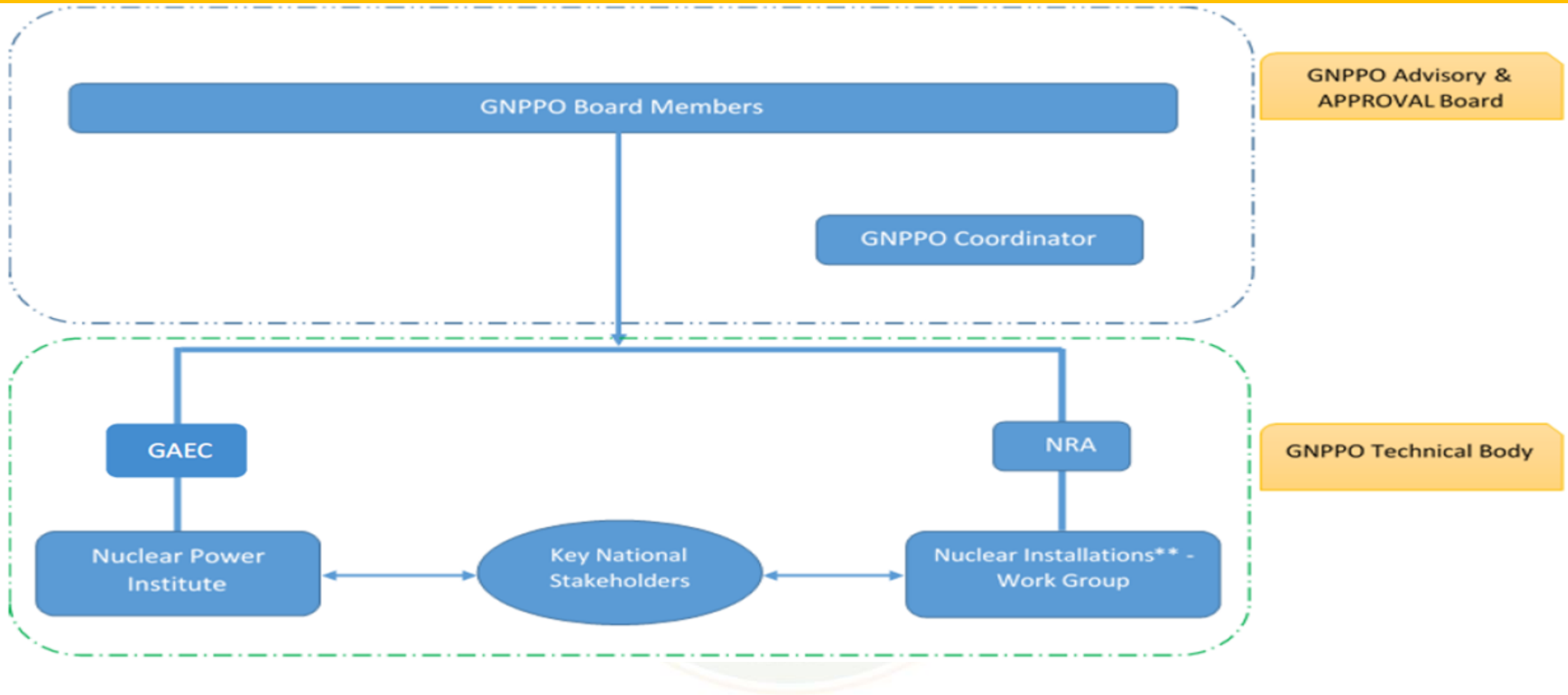


Fig. 3: Organogram of Ghana Nuclear Power Programme Organisation (GNPPO)

OTHER ORGANISATIONS OF GNPPPO

- **Environmental Protection Agency**
- **National Security Council Secretariat**
- **Ministry of Environment, Science, Technology and Innovation (MESTI)**
- **Volta River Authority/Bui**
- **Customs Division of Ghana Revenue Authority**
- **Ministry of Finance and Economic Planning**
- **Association of Ghana Industries**
- **Graduate School of Nuclear and Allied Sciences, University of Ghana**
- **Ghana Grid Company Limited**
- **Ministry of Education**
- **Kwame Nkrumah University of Science and Technology**
- **University of Cape Coast**
- **Energy Commission**
- **Ministry of Trade & Industry**
- **Institute of Industrial Research, Council for Scientific and Industrial Research**
- **Information Services Department**
- **Nuclear Power Ghana (NPG)**

THE THREE MAIN PLAYERS AND THEIR FUNCTIONS

- **Owner/Operator – Government of Ghana represented by Nuclear Power Ghana**
- **Technical Support Organisation – Ghana Atomic Energy Commission**
- **Regulator: Nuclear Regulatory Authority, Ghana**



Fig. 4: Roadmap for first Nuclear Power Plant in Ghana

NUCLEAR REGULATION IN GHANA



GHANA'S NUCLEAR REGULATORY HISTORY

- 1952 - Radioactive Sr for experiment in University College of Gold Coast
- 1958 - Physics Department- UG measurement of fallouts for MoD
- 1960 - National Research Council formed Health Physics and Radioisotope Unit
- 1963 - GAEC established by Act 204
- 1993 - RPB and start of Regulatory activities (LI 1559)
- 2007 – Prof. Adjei Bekoe Committee
- 2015 - NRA Act
- 2016 - NRA established

OVERVIEW OF NUCLEAR LAW

- **The Nuclear Regulatory Authority Act, 2015 (Act 895) established the Nuclear Regulatory Authority (NRA) as the competent authority for nuclear regulation in Ghana**
- **The Scope of the Law:**
 - **regulations and management of activities and practices for the peaceful use of nuclear energy and radiation;**
 - **management of radioactive waste resulting from civilian applications in Ghana;**
 - **management of spent fuel resulting from the operation of civilian nuclear reactors in Ghana**

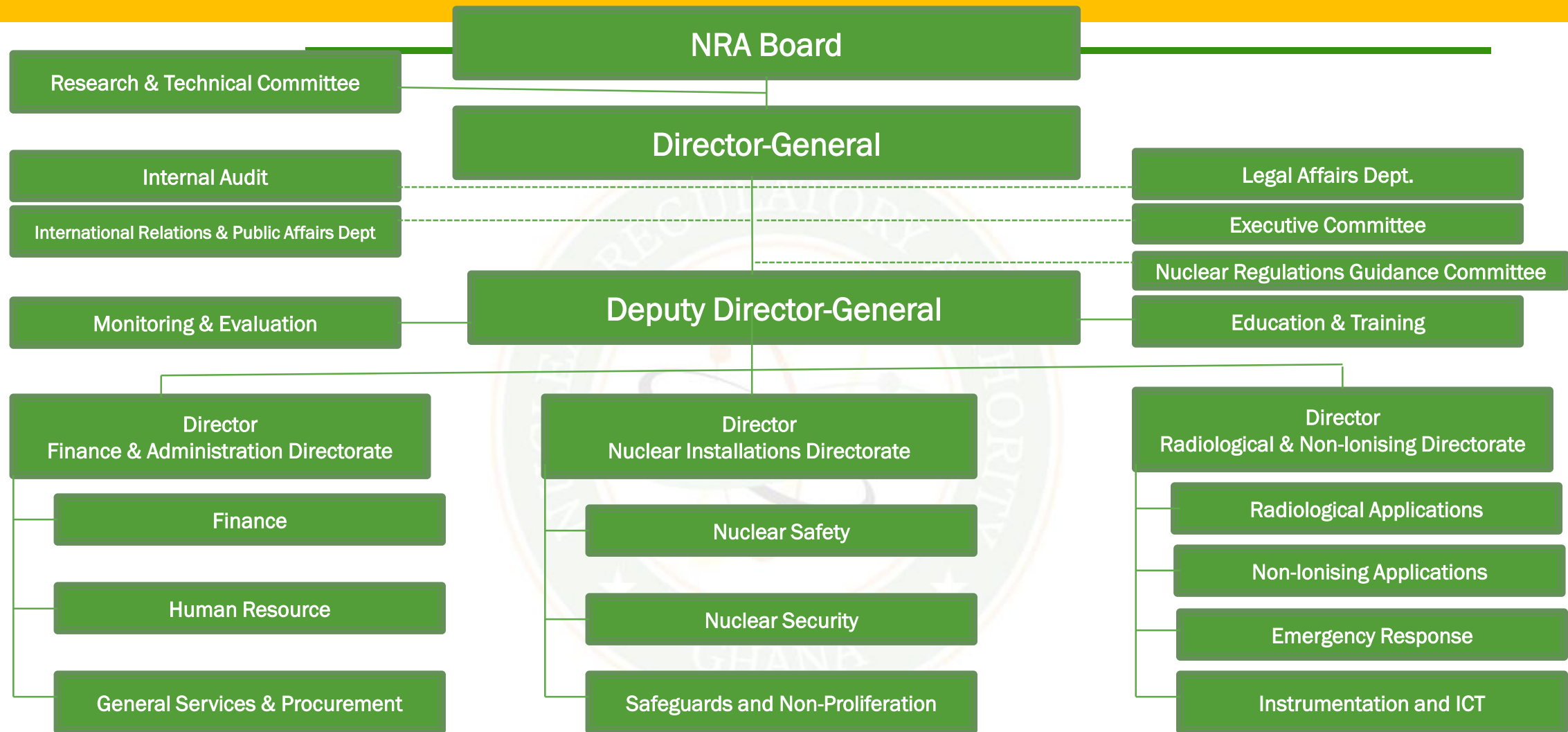


Fig. 5: Organogram of NRA

Functions of NRA (1/2)

- **Facilitate the development of national policies in**
 - **Nuclear safety and research**
 - **Security of nuclear and radioactive materials, associated facilities and activities**
 - **Implementation of international obligations in nuclear field**
- **Issue, modify, suspend or revoke authorisation, and determine conditions for authorisation**

Functions of NRA (2/2)

- **Public awareness creation on nuclear and radiation matters**
- **Establish and maintain a national register of radiation sources and of persons authorised to carry out any activity or practice related to a source of radiation**
- **Collaborate with agencies responsible for emergency, security and environment to establish plans and procedures for coping with radiological, abnormal occurrence, and development of environmental impact assessments**
- **Exchange information and co-operate with regulatory authorities of other countries and relevant international organisations on matters of nuclear safety, nuclear security and safeguards**

The Legal Pyramid

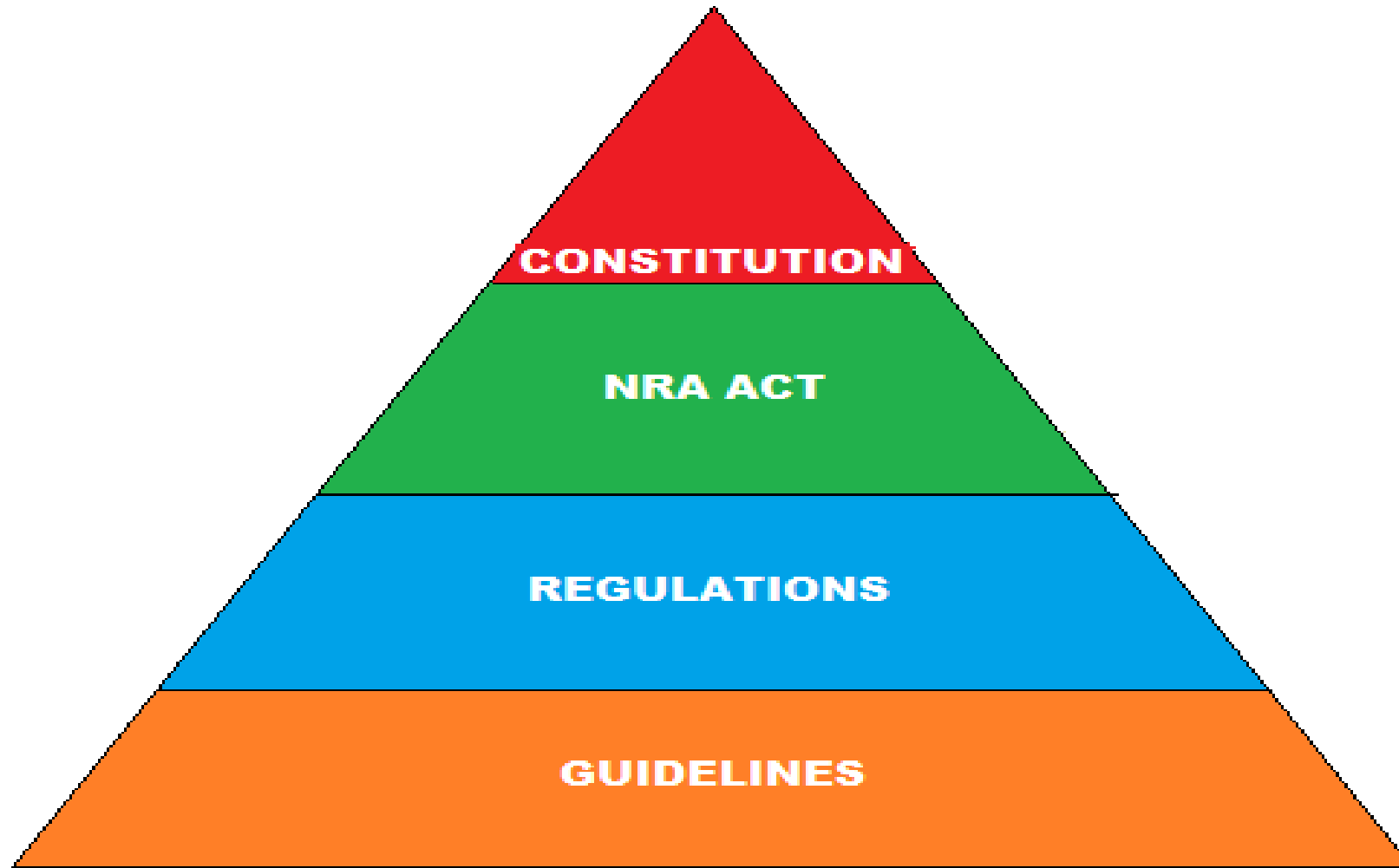


Fig. 6: Legal Hierarchy

REGULATORY APPROACH & STRATEGY

- **The NRA has adopted a hybrid approach between prescriptive and performance approaches to regulatory infrastructure development**
- **The hybrid is adopted to optimize the number of staff and the roles to ensure effective use of experiences of other regulatory bodies in similar roles**
- **The NRA has a Regulatory Strategy which is currently being reviewed after two years of implementation**
- **The review is focused on the revisions in the structure of regulations to be developed at different stages of the nuclear power programme**

MANAGEMENT SYSTEM OF NRA

- **NRA Management System is being patterned after requirements in IAEA Safety Standard GSR-Part 2**
- **Committee constituted to draft IMS Manual for NRA**
- **NRA Management seeks to ensure that authorised persons operate their facilities at all times in a safe, secured and safeguarded manner**
- **NRA seeks to be open and transparent in its development and implementation of regulations and decisions**
- **The Board of NRA ensures prudent management of resources and implementation of functions conferred by Act 895**



HUMAN RESOURCE & COMPETENCE DEVELOPMENT

STAFFING AND CAPACITY POLICY

- **In building capacity through staffing, NRA ensures that**
 - ✓ **the right persons are in the right roles**
 - ✓ **competent and sustainable workforce are developed**
 - ✓ **succession planning and knowledge transfer strategies are developed**
 - ✓ **Staff are motivated appropriately**

Manpower Requirements for the NRA

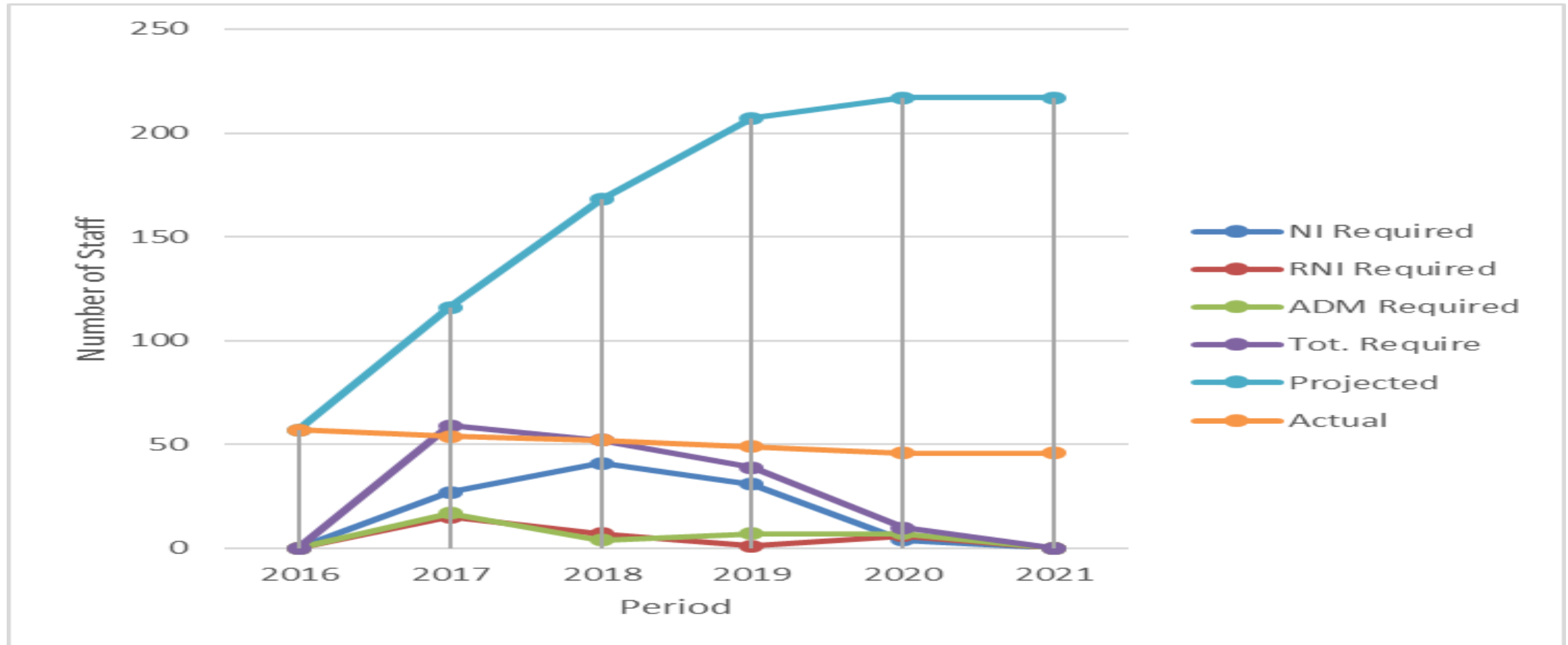


Fig. 7: NRA Staffing Projection

Human Resource Development (1/2)

- **An HR Department sees to HRD with active participation of Management**
- **NRA is focusing on preservation of nuclear knowledge as a top priority and is set to ensure that knowledge and skills of the experienced nuclear professionals are transferred effectively to the younger generation**
- **NRA considers its employees as the most valuable asset and firmly believes that enhancing their knowledge and skills is an investment for the future of the Authority**
- **Basic Professional Training Course (BPTC) held in May and June 2018 to provide Level 1 Training on Nuclear Safety, Regulatory Control and Radiation Safety**

Human Resource Development (2/2)

- **NRA is conducting TNA for its employees based on the IAEA four-quadrant competency model given in TECDOC-1254 and TECDOC-1794**
- **Fig. 8 below presents the Recruitment and Training process of NRA**
- **NRA currently has 52 staff including non-technical staff; 18 involved in nuclear installations**
- **School of Nuclear and Allied Sciences (SNAS) trains relevant personnel to aid NRA recruitment efforts**

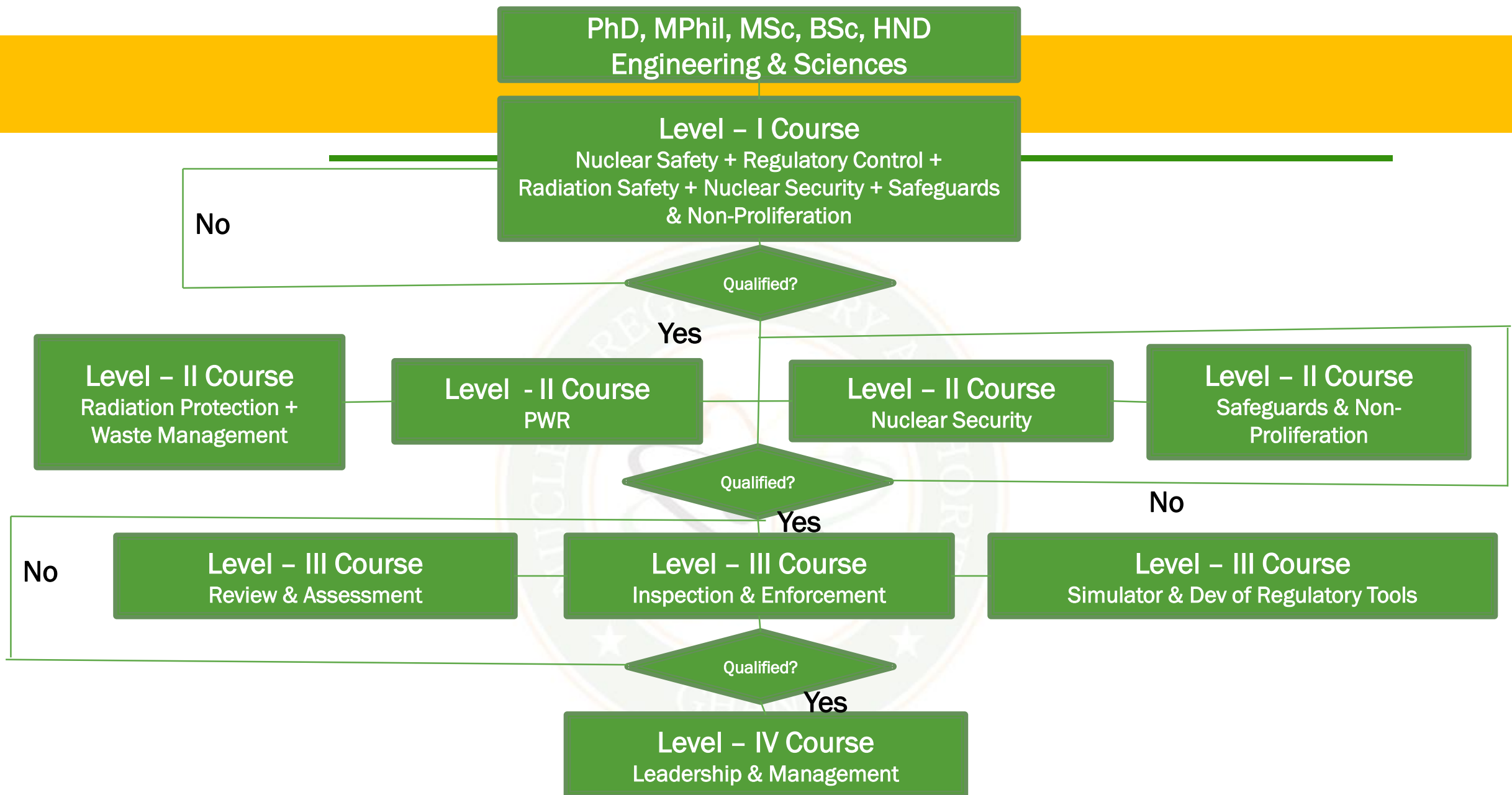


Fig 8: Recruitment and Training Process of NRA

The logo of the Nuclear Regulatory Authority, Ghana, is a circular emblem. It features a central atomic symbol with a grey nucleus and three elliptical orbits in green, yellow, and grey. The text "NUCLEAR REGULATORY AUTHORITY" is written in a circle around the top, and "GHANA" is at the bottom. Two white stars are positioned on the left and right sides of the emblem.

REGULATION DEVELOPMENT

REQUIRED REGULATIONS

- **The NRA is responsible for development of regulations and associated guidelines**
- **Stakeholders are involved adequately (Fig. 9)**
- **An Action Plan based on Act 895 has been developed to prepare and promulgate the required regulations, guidelines and procedures**
- **Licensing and Guidance During Construction and Operating Phases of a Nuclear Facility has been approved by the Board**
- **The draft regulations undergoing review and those yet to be drafted are presented below**

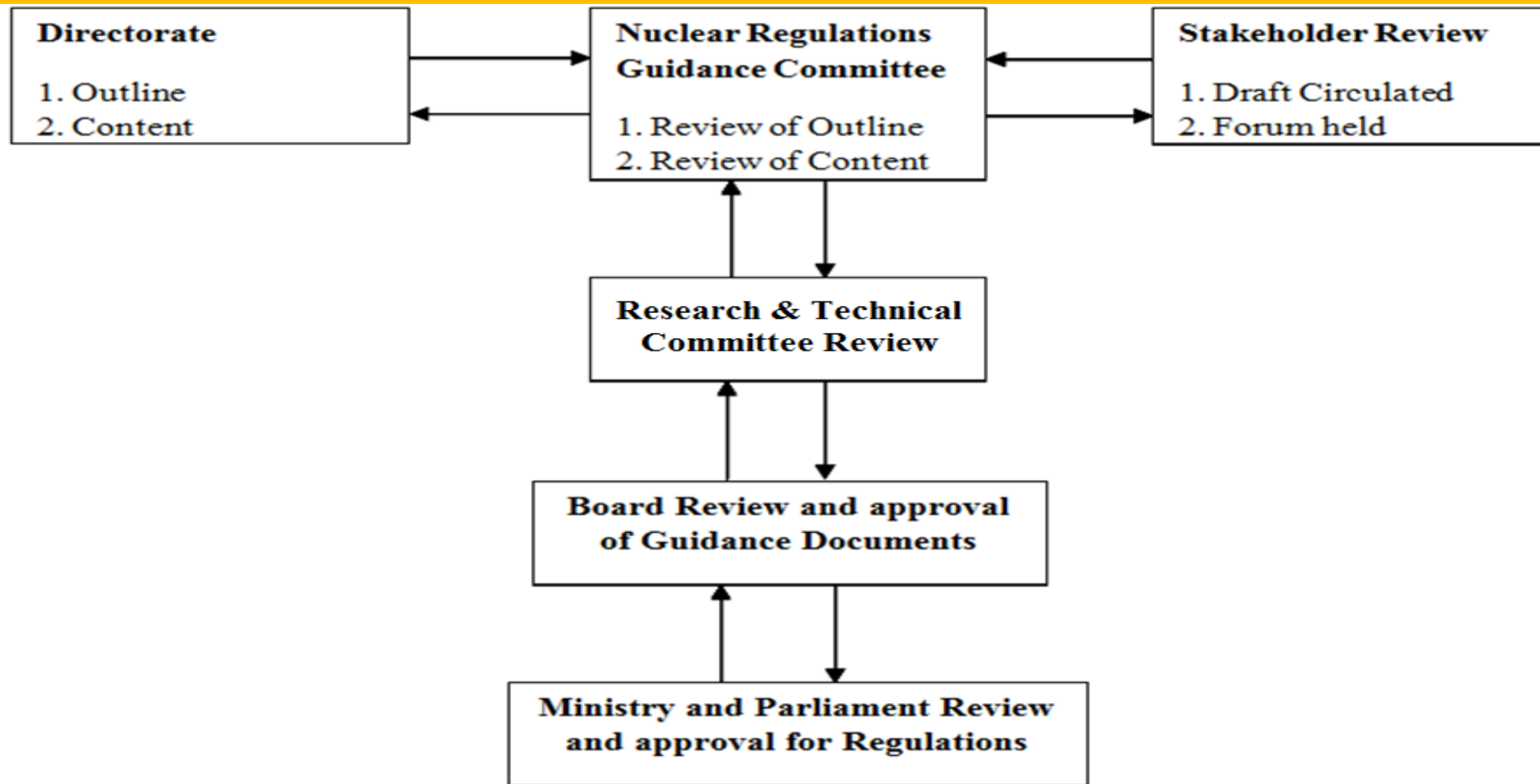


Fig. 9: Process for Review and Approval of Regulations

Draft Regulations Undergoing Review of Stakeholders

- **Draft Radioactive Waste Management**
- **Draft Basic Radiation Control**
- **Draft Safeguards**
- **Draft Siting**
- **Draft Requirements for Technical Services**
- **Draft Regulation on the Security of Radioactive Sources**



Regulations Drafted in 2018 and under internal review

- **Design of Nuclear Installations**
- **Licensing of Nuclear Installations**
- **Physical Protection of Nuclear Installations**
- **Transport Security**
- **Security of Radioactive Sources, Physical Protection of Nuclear Installations, and Transport Security are being combined into Nuclear Security Regulations**

Status of Review for Draft Regulations

Regulation	STATUS
Safeguards	Response received from Ghana Immigration Service, Customs Division of GRA, National Security Coordinator, Ministry of Finance, International Nuclear Safeguards Programme (INSEP) of DOE
Siting	Response received from Volta River Authority, Ghana Immigration Service, Petroleum Commission, Ministry of Finance, University of Ghana, MESTI, UMAT, United States Nuclear Regulatory Commission, IAEA review ongoing
Security of Radioactive Sources	Response received from Customs Division of GRA, Ghana Immigration Service, Petroleum Commission, Ghana Civil Aviation Authority, MESTI, Ghana Ports and Harbours Authority, IAEA, Office of Radiological Security of USDOE
Design	Undergoing internal review
Nuclear Security	Merging of Security of Radioactive Sources, Physical Protection and Transport Security ongoing
Licensing	Fine-tuning for internal review to start

INTERNATIONAL COOPERATION

“nuclear accident anywhere is nuclear accident everywhere”

INTERNATIONAL REGULATORY COOPERATION

- **Obtaining support and training through Ghana's membership of the International Atomic Energy Agency (IAEA)**
- **FNRBA - Ghana Coordinating the TWG5 on Upgrading of Nuclear Safety in Research Reactors**
- **US NRC**
- **US DOE in the area of Nuclear Security (INS, ORS) and Safeguards (INSEP)**
- **EC's INSC for support in 2019 and beyond; and benefitting from ENSTTI Training & Tutoring Programmes**
- **Regulatory Cooperation Forum**

