

**Sudan Country Profile -
Human Resource
Development (HRD) for the
first Nuclear Power Program.**

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Abstract



- Sudan has been decided to prepare a strategy plan for the first nuclear power plant for various reasons like production electricity and increase the national industries besides the capabilities to do the scientific and research activities. Sudan has been started to establish and develop a master plan for the human resource development and makes a comprehensive realistic assessment about the organizational, educational and industrial capabilities and determines the requirements for developing the quality and quantity of human resources needed. The national nuclear regulatory authority has been started to update all legislation and regulations and also reviews and evaluates the international agreements and conventions related to the nuclear energy.



- In this profile we used the methodology of the international atomic energy agency to assess and evaluate the capacity building in Sudan. The expected outcomes from this profile are identified the gaps regarding the strengthening the national infrastructure and nuclear regulatory framework and issuing regulations to met the requirements for safety and security of the nuclear power plant. The availability of the human resources skills are important for effectively monitors the activities of the companies and facilities involved in nuclear power plant. The new nuclear law and the new national policy of the nuclear program are now under the process of approval.

Introduction:



- Introduction of a Nuclear Power Programmes requires the establishment of an independent and competent nuclear regulatory body for ensuring nuclear safety and security. It is now widely recommended to have one regulatory body in each state to regulate both nuclear and radiological applications. The nuclear regulatory body should be established by a nuclear law with clear authority, responsibilities and functions. The main activities carried by a nuclear regulatory authority include licensing, inspection and enforcement.



- The regulatory body should also be empowered to make relevant information available to the public in a timely manner. Transparency and public information on legal framework is useful to strengthen the public acceptance of a nuclear programme. Finally, and for effective regulatory performance a formal cooperation should be established between the nuclear regulatory body with its stakeholders as well as with other regulatory bodies concerning siting, construction, commissioning, operation and decommissioning of a nuclear power plant.

Objectives of HRD Strategy:



- To develop and maintain national human resources to successfully manage, operate, maintain, and regulate nuclear power facilities.
- To provide the decision makers with the necessary requirements on human resources.
- To identify and evaluate the required competencies during the different phases of the project.

Legislative and regulatory infrastructures:

Legislative Framework:



- Two acts – one under the ministry of health (MOH) (in 1971) and another one under the Ministry of Science & Technology (MOST) (1996) are concerned with regulating the use of ionizing radiation; however both of these two acts are incomplete and overlapping. The Act of 1996 was qualified as the dominant act (over the 1971 Act) by a legal Opinion of the Ministry of Justice.
- The two acts mentioned above did not establish an independent regulatory body, as the ministry of health is a major user of ionizing radiation and Sudan Atomic Energy Commission (SAEC) of Ministry of Science and Technology (MOST) is a promoter, a user and a consultant body regarding the peaceful use of nuclear technology in the country.



- The SAEC Act of 1996 empowers the board of the corporation with some
- Regulatory functions which are conducted by Radiation protection Technical Committee (RPTC) on behalf of SAEC.
- In January 2010 (RPTC) was upscaled to the Sudanese Nuclear & Radiological Regulatory Authority (SNRRA) by a ministerial decree as an independent authority separated from (SAEC) the former regulator.
- A Director General of SNRRA was appointed.



- The current regulatory activities involving supervision of medical and Industrial applications in addition to use of ionizing radiation in research and education
- Nuclear Law has been drafted since 2012 and sent to the IAEA for review 2013, more comments are provided by the legal affairs of the IAEA, the draft was been modified according to their recommendations and then, the draft moved to the ministry of justice to be in accordance with the legal system in Sudan . Currently the Nuclear Law is in the final stage of approval.

CURRENT CAPABILITIES:



- The current institutional capabilities of organizations related to the NPP include: Universities, Sudan Atomic Energy Commission (SAEC), Radiation Protection Technical Committee (RPTC), National Electricity Corporation (NEC) and the General Directorate of Energy Affairs (GDEA).

Universities in Sudan:



- There are more than forty universities established by public and private sectors
- Universities deliver undergraduate and postgraduate studies in different disciplines, including science, engineering and other supportive fields such as computer sciences, physics, chemistry, Nuclear and geological sciences.
- Nuclear Physics courses are taught in several of the national universities.
- Undergraduate programme in nuclear engineering started in 2009 at Sudan University for Science and Technology
- Sudan has lately witnessed a great increase of graduates in Science, Engineering & Technology.
- Courses leading to Master degree in Radiation Protection, Medical Physics and Nuclear Science and Technology at Sudan Academy of Sciences (SAS).

Capabilities of major stakeholders of Sudan nuclear power programme:



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- **These stakeholders are:**
 - Water Resources and Electricity
 - Sudan Atomic Energy Commission
 - Sudan Nuclear & Radiological Regulatory Authority
 - Ministry of Energy and Mining
 - Public
 - Non Governmental Organizations
- **Ministry of Environment**

Capabilities of Sudan Atomic Energy Commission (SAEC) Sudanese Nuclear & Radiological Regulatory Authority (SNRRA):

- The SAEC staff about 190 researchers and technologist .they runs training courses and on- job training in the various nuclear related fields, mostly with IAEA support.
- SAEC runs (under SAS) Master programmers on:
 - Radiation Protection.
 - Medical Physics
 - Nuclear Science & Technology.
- The SAEC has a well established NDT Training Centre.
- SAEC is planning to establish research reactors
- The research reactors are expected to play an important role in the training of human resources for the NPP.

Staffing of the Sudanese Nuclear & Radiological Regulatory Authority



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- Currently there are 30 regulators assigned to the SNRRA, A plan to recruit additional staff in a multidisciplinary approach to serve under the Nuclear Safety Directorate.
- Most of the current training opportunities are provided by IAEA, AAEA, KINS through FNRBA & ANNuR.
- Training of regulatory staff in all regulatory functions (regulations & guidance preparation, licensing, review and assessment, inspections) is highly considered.

International Cooperation:



- Sudan is exclusively committed to the peaceful applications of nuclear energy.
- Sudan will satisfy the necessary legal framework for the successful implementation of its NPP.
- Sudan looks forward to the cooperation of the international community, particularly with IAEA for the successful implementation of its HRD programmes.

Recommendation :



- Issuance of Nuclear law
- Provision of financial resources
- Human resources (Staffing & Qualifications)
- Training & retraining (particularly in the area of regulatory control of nuclear facilities)