

**SUBJECT: SYMPOSIUM ON SCIENCE AT PAUL (PAAL
AFRICA UNDERGROUND LABORATORY)**

PAAL, SOUTH AFRICA

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RWANDA

Outline:

- Introduction
- Necessity to develop nuclear power programme
- Overview on nuclear power programme in East African Region block (EAC)
- Center for nuclear science and technology prior to nuclear power plant; case of Rwanda
- Conclusion

Introduction

- Dr Joram Ndayishimye
- Former student at AIMS South Africa, Stellenbosch University, and iThemba LABS respectively.
- Worked at iThemba LABS and the University of the Western Cape (UWC)
- Now working at Rwanda Atomic Energy Board (RAEB)
- Special thanks to Prof S.M Wyngaardt, Dr Elena Lawrie, Prof. R. Newman, Dr R. Nchodu, Prof D. Marshall, Prof R. Madjoe,...

Necessity to develop nuclear power programme

Climate change and energy:

- Rapid increase of global emission of greenhouse gases (GHG) since the start of industrial revolution.
- Production and use of energy currently account for around two thirds of total GHG emission.
- Electricity generation accounts for one third of the energy related emissions.
- Challenges and opportunities of reducing emissions while simultaneously supplying energy for economic and social development.

Why Consider Nuclear Energy to Produce Electric Power?



1.5°C Challenge

TODAY

70%

of electricity comes from **burning fossil fuels**



2050

≈ 80%

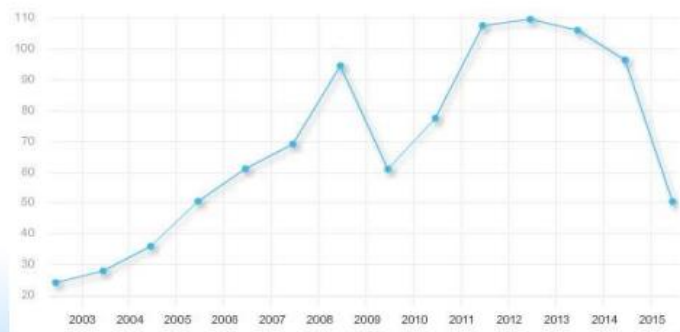
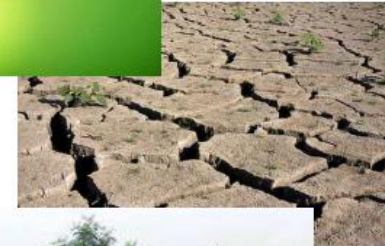
of electricity will need to be **low carbon**



Why Consider Nuclear Energy to Produce Electric Power?



- Energy security
- Volatile fossil fuel prices
- Demand for clean energy
- Climate change

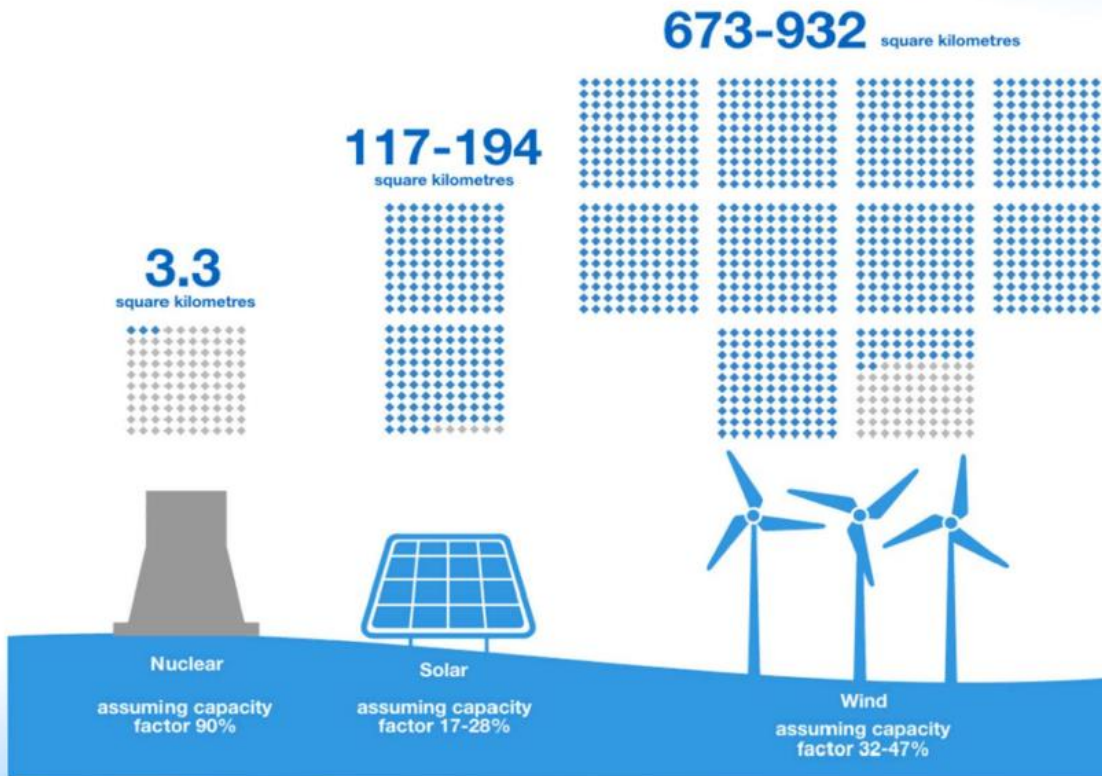


OPEC Oil Basket Price History
http://www.opec.org/opec_web/en/data_graphs/40.htm

Why Consider Nuclear Energy to Produce Electric Power?



For 1GW you need...



EAST AFRICAN COMMUNITY

-  Republic of Burundi
-  Democratic Republic of the Congo
-  Republic of Kenya
-  Republic of Rwanda
-  Federal Republic of Somalia
-  Republic of South Sudan
-  United Republic of Tanzania
-  Republic of Uganda



The East African Community

now has 8 Partner States and spans from the Indian Ocean to the Atlantic Ocean

Overview on nuclear power programme in East African Region block (EAC)

❖ **The Democratic Republic of Congo (DRC):**

- First African country to acquire a research reactor – TRICO I on June 6, 1959. It was fully operational between June 1959 and June 1970. It was then shut down and dismantled, but has not yet been decommissioned.
- TRICO-II is a 1 MW TRIGA Mark II operational research reactor in Kinshasa since 1972. But, since November 2004, it has been in an extended shutdown condition.
- The country is now considering to bring the reactor back into operation.

The Republic of Kenya

- ❖ Since 2019, a Nuclear Power and Energy Agency (NuPEA) was established. It's a state corporation under the Ministry of Energy and Petroleum. The agency is mandated to develop the necessary infrastructure for the establishment of nuclear power programme in Kenya.
- ❖ In the same year 2019, a regulatory body referred to as Kenya Nuclear Regulatory Authority (KNRA) was established.
- ❖ Konza Technopolis as a site to host Kenya's research reactor and projected to be operational by 2030.

The United Republic of Tanzania (URT)

- ❖ In 2003, Tanzania Atomic Energy Commission (TAEC) was established. It has a mandate to promote, regulate and control peaceful use of nuclear science and technology for socio-economic development in the country.
- ❖ Since early 2010's, the URT has embarked on the establishment of Research Reactor. In this perspective, a pre-feasibility study was conducted in 2016
- ❖ A nuclear programme was established in three universities (UDSM, NM-AIST, and UDOM) for the required human capacity development.

The Republic of Uganda

- ❖ The Atomic Energy Act of 2008 established the Atomic Energy Council as the regulator and the Nuclear Energy Department within the Ministry of Energy and Mineral Development as a promotor for peaceful use of atomic energy in Uganda.
- ❖ In that respect, the 2023 Energy Policy has set a strategic objective to establish atomic energy research facilities.
- ❖ Potential sites have been identified with one of Soroti University to host the Center for Nuclear Science and Technology.
- ❖ Some key activities such as a feasibility study, strategic environment assessment, and a preliminary design study are underway.

The Republic of Burundi

- ❖ Burundi has signed its first Country Programme Framework with the International Atomic Energy Agency (IAEA), and later on in 2019 a bill was presented in parliament for peaceful use of nuclear energy and ionizing radiation for socio-economic development.
- ❖ In July 2023, the republic of Burundi and IAEA signed a Memorandum of Cooperation (MoC) on peaceful use of nuclear technology.
- ❖ In this respect, it was agreed on creation of a joint coordination committee with exchanges of experts and of scientific and technical information and supply of equipment, materials, and components.

South Sudan and Somalia

- ❖ There is no program related to nuclear applications developments known in South Sudan and Somalia
- ❖ In June 2011, Sudan's Ministry of electricity and Dams signed a contract with an international consultancy company to undertake pre-feasibility studies for a nuclear power plant and this did not consider of course South Sudan.

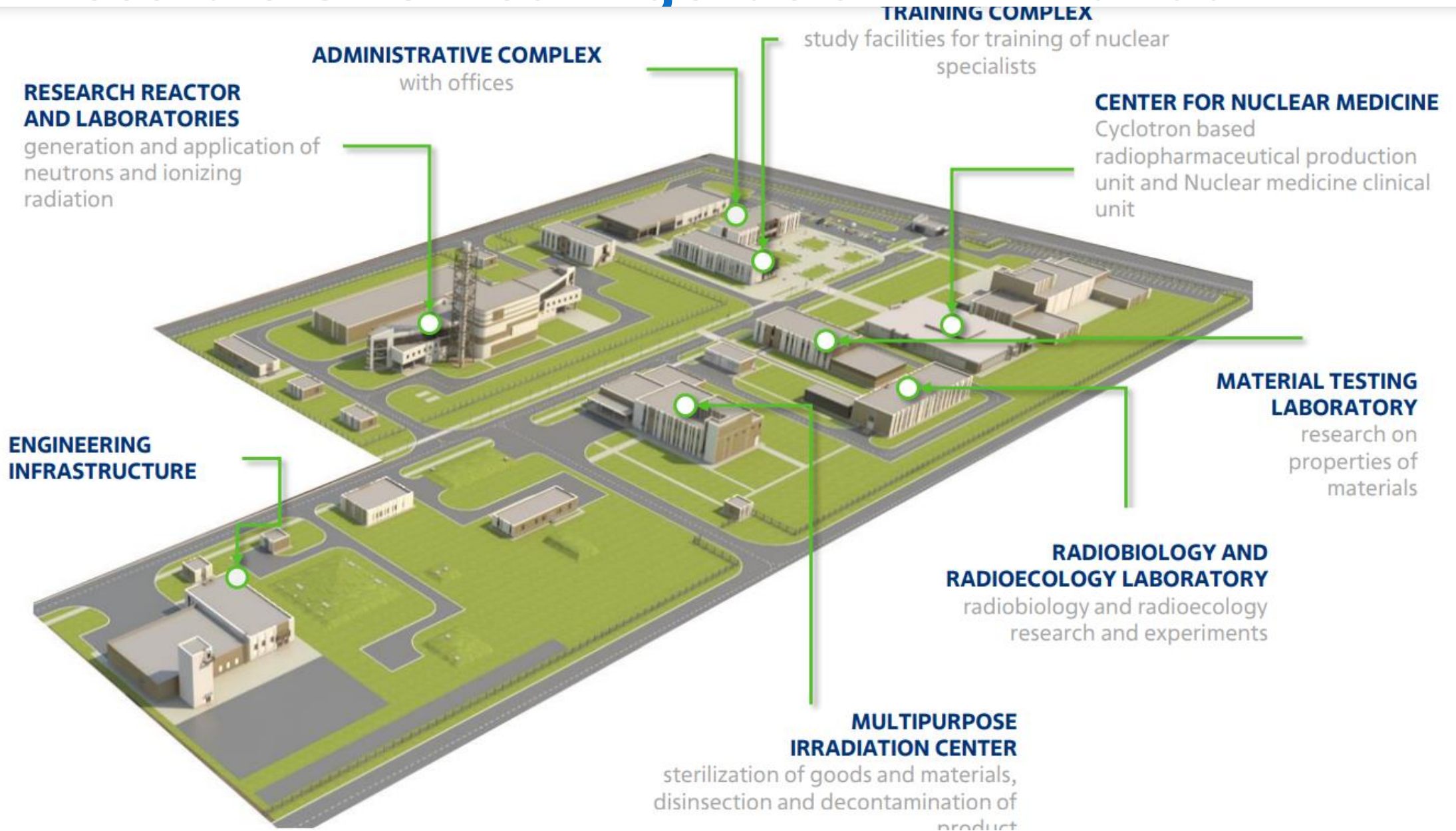
The Republic of Rwanda

- ❖ In December 2020, Rwanda Atomic Energy Board (RAEB) was established with principal mission to promote peaceful use of atomic energy for sustainable socio-economic development.
- ❖ The country's vision 2050 projects a total capacity energy around 3788 MW with a least 60% from clean and renewable energy sources.
- ❖ In addition, Rwanda looks forward to expanding the provision of a better healthcare and develop medical tourism with specialized medical facilities including those of nuclear medicine.
- ❖ In this perspective, Rwanda is considering to establish a Centre of Nuclear Science and Technology (CNST) with a research reactor. Feasibility study for this project is underway.

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Possible CNST configuration in Rwanda



Conclusion

- ❖ Most of the member states in the EAC block are embarking on peaceful use of nuclear power programme for socio-economic development.
- ❖ Centre for nuclear science and technology projects with research reactors to be implemented prior to development of nuclear power plants.
- ❖ Several opportunities with nuclear science and applications will be available soon in EAC region.
- ❖ The project to acquire a CNST is underway in Rwanda.