

Cost Effective Ways of Implementing Nuclear Power Programme in African Countries

Abraham Aderoju^a, Kwang Sik Choi^b

Korea Advanced Institute of Science and Technology^a

Korea Institute of Nuclear Safety (Adjunct Professor at KAIST)^b

1. Introduction

1.1 Energy Poverty

Energy Poverty is a term for a lack of access to electricity, heat or other forms of power. This more than often refers to the situation of peoples in the developing world [1].

According to the records of the International Energy Agency (IEA), a detailed country-by-country database estimated that in 2009 the number of people without access to electricity was 1.4 billion or 20% of the world's population. Some 85% of those people live in rural areas [2].

According to [4], current forecasts suggest the world will see an increase in global energy consumption of over 50% by 2030 with 70% of this growth in demand expected to come from developing countries. There is therefore the need to seek for a way of meeting this need within the timeframe and doing so at an affordable price or rather with the most efficient allocation of resources.

Nuclear energy can play a role in providing increased access to affordable energy in many parts of the world. There are growing concerns all over the world about energy security. This is partially due to the instability in the price of fossil fuel and to the political instability of most of the oil rich regions of the world.

There arises therefore a need for means of meeting the increasingly growing energy demands of the nations while cutting down on the release of greenhouse gases into the atmosphere.

1.2 The African Situation

Presently, the only country on the African continent that has operational nuclear power plants is South Africa. South Africa has two nuclear power plants – Koeberg- 1 and Koeberg-2. Koeberg-1 started operation in 1984 and Koeberg-2 in 1985. Both are 900 MW(e) PWRs.

The remaining nations across Africa are dependent largely on either hydro power plants, thermal or gas or a combination of both. However, there has been an increase in interest in nuclear electricity in a number of African countries.

The list includes countries like Algeria, Egypt, Nigeria, Namibia, e.tc. These are countries whose economies are still growing fast and hence are characterized by a foreseeable increase in electricity demand to drive the factors of production.

1.3 Objective of this Paper

The purpose of this paper is to explore the efficient means of building nuclear power plants and associated infra structure in African countries. The concept adopted in this paper to achieve efficient allocation of resources is sharing of infrastructural items. The paper lists examples of sharing arrangement on the African continent for other purposes other than nuclear power programme. This is an attempt to justify the workability of the concept for nuclear power programme.

Mention has also been made of similar sharing arrangement in other countries for the purpose of nuclear power programme. The factors that will enhance the success of sharing concept in African countries have also been highlighted.

2. Proposed Idea

2.1 The Way Forward

Nuclear energy has not been without its own challenges even to the most developed countries of the world in terms of the financial burden on the local economy. It is therefore only natural that it may appear far from the reach of the developing world if some novel approach is not adopted.

One novel idea developing countries can adopt is by pooling resources together towards achieving this common end. This kind of symbiotic relationship is feasible and as studies have shown is even in place in some places around the world.

However, because the nuclear power programme is an integral endeavour which encompasses the nuclear power plant and the supporting infrastructure, it is proposed that the countries can team together whether on a regional or bilateral level to build joint infrastructure for the mutual benefit of all concerned.

Sharing can be done in respect of any or a combination of the some infrastructural areas depending on feasibility. The essence of this is cost

saving and mutual benefit for all parties. As long as this condition is satisfied, then the sharing is worthwhile.

2.2 Government

Established regulatory bodies are in place in many of the African countries and they have over the years performed creditably well in the regulation of the use of radiation sources for industrial and medical purposes. However the need will arise for their capabilities to be enhanced to regulate more complex practice like the nuclear power plants.

Research and development is another avenue with a potential for cooperation. A nuclear power programme will be well supported and nurtured to maturity in any importing nation in the presence of requisite infrastructures for R&D such as:

- i. Standardization and calibration laboratories
- ii. Institutions for higher education
- iii. Special training centres
- iv. Scientific and professional associations

The grid system is another viable area where sharing can be considered. This especially becomes expedient for countries with small and low performance grid as is found in many African countries. The peculiar natures of nuclear power plants require that for safe operation, its power rating should not be more than 10% of the total grid generating capacity.

2.3 Utility

Nuclear power plants are usually operated by utility companies which could either be state owned or owned by private investors. Whichever is the case, utilities from neighboring countries considering introducing nuclear energy into their energy mix may on a number of issues synergize to save costs and maximize benefits.

Other facilities that could jointly be developed by utilities in neighbouring and cooperating countries are:

- i. Waste disposal facilities
- ii. Centralized heavy duty transport and material handling infrastructure
- iii. Emergency response

2.4 Cases of Infrastructure Sharing Outside of Africa

Below are instances of sharing of infrastructural items which are related to nuclear power programme development. They are:

- sharing of the electrical grid system between the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden).

- sharing of operation services in the Nuclear Power Plants of Brazil and Argentina.
- IAEA regional project on cooperation in Nuclear Power Management in Latin America. (Argentina, Brazil, Cuba & Mexico).

4.5 Cases of Infrastructure Sharing in Africa

There are also cases of sharing arrangement on the African Continent albeit for other purposes other than nuclear power programme development. These include:

- The West African Gas Pipeline Project (WAGPP).
- The West African Power Pool (WAPP).

3. Conclusion

The feasibility of the sharing arrangement being proposed in this paper lies on the willingness of the parties involved to cooperate. They will be ready to sacrifice individualism and if need be a sense of national pride or feeling of superiority for sustainable energy supply at a very affordable price.

The issue of a long term commitment to agreements reached is also an important factor.

Lastly, if this sharing arrangement is ever going to assume a meaningful dimension, a uniform approach should be adopted in areas such as choice of design, vendor(s) and contract type.

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