Viewpoint: The climate and economic benefits of nuclear power

The European Union puts it bluntly: We must reduce the level of CO2 emissions and we need to start doing it right now. While some EU Member States are more advanced in achieving their climate and energy goals, others are lagging behind, writes Yves Desbazeille, director general of Foratom.

Strengthening Nuclear Security With a Sustainable CPPNM Regime

In late 2015, investigators discovered chilling surveillance video in the possession of a suspected terrorist alleged to have been involved in the November 2015 attacks in Paris.

The Islamic State took credit for those attacks, and the video footage suggested it had been watching a high-ranking Belgian nuclear official who had access to secure areas of a Belgian nuclear research facility.
Nuclear Security Workshop for Scientists, Technicians and Engineers

BEIS-sponsored Nuclear Security Culture Programme in partnership with the African Centre for Science and International Security (AFRICSIS) presents:

Nuclear Security Workshop for Scientists, Technicians and Engineers

Accra, Ghana

10-12 September 2019

The Nuclear Security Culture Consortium, sponsored by the UK Department for Business, Energy & Industrial Strategy (BEIS) is holding a workshop on nuclear security for scientists, technicians and engineers. This three-day workshop outlines the risks to nuclear and radiological material and information, as well as examining the practical steps that can be taken to enhance security.

The workshop draws from academia, industry, and the regulator. Based on best practice, as well as IAEA guidance, the workshop will include interactive lectures, group activities, real-life case studies and a tabletop exercise. View or download the flyer here.
Workshop Programme

The workshop will deliver material on the following topics: nuclear threats posed by non-state actors; risks and responsibilities in the academic sector; radiological security risks; alternative technologies; proliferation; export controls; cybersecurity; insider threats; and nuclear security culture.

Application Process

The workshop is relevant to individuals working on nuclear issues at universities and research institutes – especially those working with sensitive nuclear information or sensitive nuclear materials. Ideally, participants will have a basic knowledge of nuclear security and have some level of accountability for this at their organisation. Participants will be drawn from across the Economic Community of West African States (ECOWAS).

The workshop is offered free of charge and there is funding to support travel, accommodation and visa costs for all participants accepted. The deadline for applications is June 30, 2019, but candidates are encouraged to apply as early as possible. Successful applicants will be notified by July 15, 2019.

Applications must include:

1. A completed online form
2. A resume or CV
3. A letter of interest
4. A nomination or support letter from an applicant’s organization
Tanzanian Prime Minister inaugurates the Joint Meeting of SADC Nuclear Regulators Network and the Steering Committee of Project MC 5.01/15B

The Prime Minister of Tanzania Hon. Kassim Majaliwa officially inaugurated the Second Joint Meeting of SADC’s Nuclear Regulators Network and the fifth Steering Committee of the Project “Support to Southern African States in Nuclear Safety and Safeguards” (Project MC 5.01/15 B). Mr. Majaliwa greeted the 40 plus participants coming from 16 countries and international organizations from Africa, Europe and Central Asia, who gathered at the city of Arusha, headquarters of the Tanzanian Atomic Energy Commission (TAEC). The Prime Minister thanked ISTC for choosing the United Republic of Tanzania to host “this special event.” “Similarly, I wish to extend my deep appreciation to the EU for the continuous support in ensuring that the nuclear safety, security and safeguards in the region are reinforced”, the prime minister stressed. He also
How extensive is the interest in nuclear power in Africa?

At the moment, in Africa only South Africa has nuclear power, and it has had it since 1994. It’s well established there, but there are other countries that are now interested. Egypt is fairly well advanced, and also Nigeria, while Ghana, Kenya, Morocco, Niger, Sudan and Uganda have all expressed interest and are at different stages of doing studies to understand the implications of introducing nuclear power. These are all Member States of the International Atomic Energy Agency, which in resolutions discussed and adopted during the IAEA General Conference requested its Secretariat to provide support for Members who request it. All these countries have requested support to introduce nuclear power.

How does the Agency assist such countries?

The Agency in 2007 developed the Milestones approach and produced a publication which was updated in 2015. This comprises three phases, each with 19 infrastructure issues which a country needs to address, to make sure that the nuclear infrastructure is properly planned and coordinated in
order to result in a safe nuclear power plant (NPP) and safe operation if a plant is constructed. Phase 1 involves a number of studies to ensure the country fully understands its obligations for nuclear power development. Undertaking the studies, developing the nuclear infrastructure and constructing a nuclear power plant takes 10-15 years, but it will need managing at least for 100 years – 60 years of operation and possible extension, and then the decommissioning period. Beyond that there is continuing management of radioactive waste.

No country can go into this lightly and lots of studies are needed up front – not just energy planning studies, but also studies on the financial implications. Are there sufficient resources and the capability to continue education and training? A legal and regulatory framework for the country is also needed to be able to manage the nuclear programme.

The IAEA recommends these studies be conducted before any commitment is made to go ahead with a programme, so that the implications are fully understood. In Phase 1, a Pre-Feasibility Study will help a country answer the key question: why nuclear?

**What about the other phases in the Milestones approach?**

Phase 2 involves preparatory work for the contracting and construction of a NPP after a policy decision has been taken. This phase will see the establishment of key organisations as well as the legal and regulatory frameworks. Phase 3 includes activities to contact the vendor, to obtain site and construction licences and to construct the first NPP. Each phase ends with the completion of a specific milestone, at which the progress of the development effort can be assessed and a decision can be made to move to the next phase.

Milestone 1 means a country is ready to make a knowledgeable commitment to a nuclear power programme. Milestone 2 means it
is ready to invite bids or negotiate a contract for the first NPP. Milestone 3 signals a readiness to commission and operate the first NPP.

Which countries have already started on this journey?

Egypt is in early Phase 3, having signed contracts, but has not yet started construction. Nigeria is in Phase 2; it has already made a decision to go ahead and started to talk to possible vendors. Other African countries who have started on this journey – Ghana, Kenya, Morocco, Niger and Sudan – are still in Phase 1 and are undertaking pre-feasibility studies in order to provide a comprehensive report to the government about whether they should go ahead with a nuclear programme, suspend it for a few years, or stop it altogether. Some other African countries, such as Algeria, Senegal, Tunisia, Uganda and Zambia, have also expressed interest in nuclear power and have started preliminary studies.

The Milestones approach is supported by a methodology which enables the Agency to provide advice about what needs to be done.

This includes peer review services, in particular the Integrated Nuclear Infrastructure Review (INIR) service, through which the IAEA assists the country in reviewing the development of its nuclear infrastructure. Drawing on this review and the national action plan that the country develops to address the findings, the IAEA together with the country develops a country-specific integrated work plan. This work plan identifies capacity-building workshops and expert missions that the Agency can facilitate and support, with its own and external experts, to assist the newcomer states in addressing gaps in their nuclear infrastructure. The Agency also encourages the countries to host follow-up reviews to track their progress in closing the gaps.

Could you describe the INIR review process?
An Integrated Nuclear Infrastructure Review involves a team of about ten people – a mix of Agency and external experts – who are familiar with the development of nuclear infrastructure. The team reviews a country’s progress based on a self-evaluation report. We ask the country to use the methodology we have produced to make an evaluation of where they think they are with respect to infrastructure issues. This is given to the experts, who go through it along with all the supporting documentation. The team then visits the country and over a period of 4-5 days holds discussions on any gaps that have been identified. This takes place at a fairly high level. We look to meet with senior representatives of government and other organisations, for example the ministries of energy, finance and environment, regulatory bodies, organisations involved with the monitoring of radiation and radioactive sources, as well as the potential nuclear power plant operator, which is often the operator of existing electricity plants.

It is not enough to just speak with the ministry of energy – we need to speak to all those who might be involved in taking a decision about whether or not to build a NPP. It really must be a national decision. Although it is led by the government, it should also involve all the relevant ministries and other supporting organisations. The country should decide collectively that this is the right decision.

After the discussions, we write up a report identifying any gaps in the 19 infrastructure issues. After the report is finalised, a few months later, our deputy director general formally hands over a copy to the president or prime minister. An INIR is a very high-level review, requested by the government, and the response is back to the government.

**When did the Agency begin INIR missions?**

We started this in 2009. Jordan was the first country and to date we have done 27 reviews in 20 different countries.
including Ghana, Kenya, Morocco, Niger, Nigeria and Sudan.

Egypt has requested its first INIR mission in 2019, while Kenya and Ghana recently requested follow-up INIR missions.

Egypt has taken its decision, signed a contract and is in discussion with the Russian state nuclear corporation Rosatom on the nuclear power plant. Egypt is putting in place the institutions it needs including a regulatory framework and a regulator that is independent of the commercial aspect of nuclear power. Egypt is also developing the regulations to be able to license a NPP and the necessary legislation. The plant operator has been identified. Egypt is in early Phase 3, and has requested an INIR Phase 2 mission.

Phase 2 also includes site characterisation and issuing a site licence, as well as a site environmental impact assessment, as authorisation from the environmental ministry is needed. Some countries combine that function into one ministry but most keep it separate. There will be protocols outlining relations between the nuclear regulator and the environmental regulator.

How many of these African countries already have nuclear research facilities and how important are these for development of a nuclear power programme?

Algeria, Egypt, Ghana, Morocco and Nigeria already operate nuclear research reactors, and thus will have developed some nuclear infrastructure that can form the basis of what is needed for a nuclear power programme, for example, a nuclear regulatory body and some regulations, a nuclear safeguards regime, and an emergency planning and preparedness framework. However, the scale of this infrastructure will need to be increased for a nuclear power programme. It is not necessary for a country to first start with a research reactor programme – it is possible to go directly for a nuclear power programme.

Does Africa face specific problems in developing nuclear
One of the key factors in African countries is the size and strength of the electricity grid. From a safety perspective, we recommend that the capacity of the NPP should not be more than about 10% of the total capacity. Most nuclear power reactors on commercial offer today are around 1000MWe (small, medium sized or modular reactor (SMR) technology is advancing, but is not yet commercially available), so the total capacity of the country’s grid should be about 10,000MWe. This is for safety reasons, so that if the NPP shuts down unexpectedly, it does not cause the whole grid to collapse.

Also, the grid should be strong enough always to be able to provide power to the nuclear reactors to ensure continued cooling of the fuel, etc. Nuclear power plants are very dependent on having power coming into the system as well.

In Africa, many countries do not have 10,000MWe and this is one of the issues they face. So, in West Africa for example they are looking at whether there are opportunities for a regional NPP and whether the regional electricity network is properly interconnected and stable enough. In Nigeria, the grid is probably large enough, but countries such as Ghana and Niger may need to consider a regional project. So, the Agency encourages these countries to consider the possible opportunities for regional cooperation. There is the West African Power Pool and the Southern African Power Pool as well as an East African Power Pool around Kenya. These power pools are currently looking to see how they can strengthen connections between countries to improve the security of supply of electricity to each country.

What about finance?

Finance is also a big issue. The Milestones approach talks about funding — the funds you need to develop the infrastructure of a country. For example, it is necessary to
establish a nuclear regulatory authority with competent staff and to develop regulations. This needs to be done prior to the application for nuclear licences and the start of construction of the first NPP. The funds for this will not come from the owner-operator of the NPP, but from the state. It is also essential to have a competent nuclear operator, which will be responsible for safety, and there may be a need for additional transmission lines and other transmission infrastructure.

As to the finance required to build the NPP, countries need to work with the vendor country or funding partners to see what sort of options are available, such as build-own operate (BOO) and power purchase agreements.

Most of the African countries are looking at financing models for reactors, but finding funds for the development of the infrastructure is the first challenge.

Just developing the infrastructure requires hundreds of millions of dollars. This is a substantial amount for some countries.

Is technology an issue?

Some of the countries are looking at various options – from regional grids to using smaller NPPs, maybe 600MWe.

SMR technology, which would be more suitable for smaller electrical grids, is not yet commercially available but some countries are looking with great interest at the potential vendors of this technology. However, with such reactors, there is no operating experience or protocols and so customers are very cautious about this.

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