



Nuclear power in Africa, an asset for climate and sustainable development

I'm delighted "to be back" in Kenya – and with my friend Erik Ohaga, who I invited to Helsinki for Les Entretiens Européens conference in 2019 on "A new electric era with the new nuclear".

He explained the benefits of nuclear power for a Kenya interested in diversifying its energy mix, which until now has given priority to geothermal energy and wind power. It also wants to be less dependent on Ethiopia, a major hydraulic power in the region which exports much of its production to its neighbours.

This interest in nuclear power is shared by many of Africa's countries, which are facing unprecedented challenges linked to their development and the impacts of the global crisis, from which it has suffered badly, particularly the climate crisis.

A worsening of the fractures between the West and Africa

Because you are the ones who are bearing the brunt of the losses and damage caused by global warming – some of which will be irreparable. And yet you're not responsible for it, since Africa emits just 4% of all greenhouse gas emissions.

COP 27 has ended without any commitment, from either the United States or Europe to reduce their emissions... but with the promise to create a dedicated facility and a specific fund with some millions dollars only, to compensate the countries most impacted by the climate change they will keep provoking.

But first, what will this new promise be worth after that of 2009 in Copenhagen, renewed at COP 21 in Paris, and reiterated in Glasgow last year, to dedicate 100 billion per year for financing long term investments to vulnerable countries still not fulfilled 12 years later?

And second, I warn about the conditions that will be put on African countries so that they can receive part of the fund. In what form? Loans or financing for leverage? If they are loans, you will have to repay at a high price. However, you are already over-indebted in dollars while your currencies are depreciating rapidly with very high inflation! It will be good for the United States! But for Africa? And if it is financing for leverage effects, be careful that it is not a bluff! Because the cost of capital will be very expensive for Africa countries, otherwise the investors expected to "save" Africa will not come! Too many risks!!

I stress in this regard the failure of the project for a global financial alliance of investors that the former central banker Mac Carney tried to set up in 2021 in the run-up to COP 27, aimed at attracting private investors to limit global warming.

The developed states are facing a global crisis of their own making. Its climate, health, economic, financial, energy and geopolitical aspects are all intertwined. The measures they propose for overcoming it will not only cause, according to the United Nations, temperatures to rise by 2.8 °C over the course of the 21st century but will also deepen the divide between developed countries on the one hand and poor countries on the other. They will cripple the economies of many African countries, because there is no comparison between the means implemented here compared with there!

Take the example of the health crisis. It has hit Africa the hardest¹ and increased inequalities in access to essential goods, such as education, health, electricity and water. I should point out that 640 million Africans do not have access to electricity, and 40% are also affected by water shortages, often the same people. Yet between and within our two continents, thousands of billions of euros have been announced in Europe, for just a few hundred billion dollars in Africa.

Moreover, the special drawing rights (SDRs) allocated by the IMF to help countries in serious difficulties from balance of payments deficits, are grossly inadequate for Africa (235 billion). And the "generosity" shown by the EU countries in "donating" part of their SDRs (65 billion,

which they will not use anyway) is quite simply insufficient, almost condescending, given your massive needs.

On top of this, geopolitical tension is threatening to carve the world, once again, into power blocs, under pressure from the United States and China, which are competing for global supremacy.

The "collateral" damage in African countries is and will be enormous! And they will have to choose their sides!

A desert valley between your potential and the reality of your development

Can Africa use this global systemic shock to its advantage, to build its economy on its own strengths and allow endogenous and sustainable development? Your countries have enormous strengths and an enormous energy potential – with gas and oil, hydropower in the centre, coal in the east, biomass in rural areas, sunshine everywhere, the sea... in addition to uranium in 34 countries. But between this potential and the reality of production and consumption lies a desert valley!

According to the IAEA, the average electrification rate is 43%, and some 33 out of 54 African countries sit below the 20% electrification threshold (including Niger – 16% – where France has been mining uranium for decades). The electricity consumption of an average African inhabitant represents about 200 kWh/year, compared to 7,000 in Europe and 13,000 in the United States. And things are likely to get worse in a context of population growth, where demand is growing faster than supply.

In the opinion of the African Bank of Development (AfDB), Africa needs to double its generation capacity (to 320 GWh), make 130 million new grid connections and 75 million off-grid connections, provide 150 million households with clean cooking solutions, and invest between 60 and 90 billion dollars each year to meet its targets for universal access to electricity by 2030. A gigantic challenge!

It is in this context that nuclear power can and must be a solution

A solution among others, because you will need all your sources to produce, transform your raw materials on site (mines and agriculture), feed and care for yourselves, and respond suitably to the needs of your industrial sectors, countries and populations.

Thirty four African countries possess uranium, which represents 20% of the world's reserves. At present, only South Africa, Niger and Namibia have mines, and nuclear expertise is still very limited on the continent. But all these countries are reflecting on their nuclear future. And they're right to do so. Europe chose nuclear power in 1958, and it brought industrialisation and prosperity. Africa is entitled to the same, it's your turn! You want to be free to exploit your resources, not simply supply uranium for others... an uranium that is in fact sold at very low prices on the world market.

Egypt, Ghana, Kenya, Morocco, Niger, Nigeria and Sudan are already committed, while Algeria, Tunisia, Uganda and

² The closure of borders, the halt in trade and the fall in commodity prices have had a knock-on effect on local production, with losses estimated at between 37 and 79 billion dollars according to the AfDB, including 5 billion in the agricultural sector. The decrease in diaspora money (minus 35% on average) and prudence on the part of investors have caused a recession of 2.9% to 5% according to the World Bank. Yet the population continues to grow, threatening 50% of jobs, causing a 50 million increase in poor people and creating a precarious situation for populations, the majority of whom depend on the informal sector. Cf. Les Entretiens Eurafricains : "Crossed perspectives on the global crisis" - Paris - September 2020 - www.entretiens-europeens.org

Zambia are considering the nuclear option. South Africa has an operational power plant north of Cape Town. Five other countries could follow in its footsteps and have power plants by 2035.

Of course, nuclear power generation must meet many conditions. It's a commodity unlike any other. It's an essential public good that requires public policies and guarantees in terms of security and political stability... and last but not least, social acceptance.

Nuclear power, a public good and a challenge for political stability

To refuse nuclear power to Africa in the name of safety and political instability, to demand a "100% solar Africa" in the name of the climate (an argument heard often in Europe) is irresponsible! I am not saying we should ignore the governance issues – but if you commit to nuclear power, it will be for a hundred years! And within the framework of international cooperation and the IAEA, which ensures respect for safety standards, it's an opportunity to increase political stability in Africa, which is in crucial need of this decarbonised energy for development. (I might also add that the sun will not produce solar energy alone – you need photovoltaic panels (produced in China) and lots of water to wash them when they're covered in laterite or sand!)

Nuclear power is a forward-looking technology, it is safe and sustainable, and of course free of carbon. Innovations keep on coming. You will be able to choose between large power plants or SMRs, better suited to urban and rural development. You may also invest in the fourth-generation technologies, which produce less waste. Waste that we know how to manage. France reprocesses it and will dispose what cannot be recycled deep underground with a very good project, COGEO. Finland and Sweden will soon be opening their own geological disposal centres. A solution supported unanimously by the scientific community.



Benefits out of proportion to the costs

As for the costs of nuclear power, investments in the construction of power plants, in the transport and distribution networks, and in radioactive waste management centres and research institutes are hefty and long-term investments. But they must always be weighed against the benefits (of which there are many: continuous, cheap electricity supply, environmental protection, public health and even aerospace). It takes about 9 billion dollars to build a 1,000 megawatt nuclear power plant in Africa. Many governments are not in a position to raise such sums. Hence the need to establish public/private partnerships - "contract for difference" (CfD) or Regulated Asset Base (RAB) - to develop international cooperation to finance



them, and to acquire the necessary expertise through local training initiatives.

Different PPP models exist worldwide, it will be a question of determining which are most appropriate. And of finding ways of working with international financial institutions and developing the necessary cooperation with nuclear countries.

Financial institutions impose their criteria. The AfDB has pledged 12 billion dollars of its own resources over the next five years for electricity projects, but not yet nuclear projects. Maybe the criteria need to change!

A European model not to follow

In West Africa, the eleventh European fund focused its support on renewables and efficiency (as if the problem in Africa was first and foremost one of reducing its consumption, before even beginning production!). It insists too on the regulation and integration of a regional market to stimulate the private sector on the pretext of attracting capital. But when you look at its results, is Europe really in a position to impose its own models and give lessons? Its energy mix is 70% fossil fuel, Germany has had to reopen its coal-fired power stations after deciding to close its nuclear power plants – and we're continuing to flood the continent with polluting second-hand cars and electronic waste. Europe is no longer in a position to promote nuclear power, despite being a former leader in this field and disseminating it throughout the world.

The energy crisis it's currently facing is caused partly by the way it has built its electricity market, a liberalised market governed solely by competition rules, without any European industrial policy or sense of community. There is no solidarity! This has had serious adverse effects and caused an explosion in prices.

Until now, the Commission has promoted renewables, which has created a volatile market that discriminates against other sources such as nuclear power, investment in which has been discouraged. And I won't dwell on the "ideological" pressure exerted by the Greens and certain countries, such as Austria, Luxembourg or Germany which has imposed its own system. But let's not be fooled! Germany's economic interests in gas were decisive in the wrong decisions.

Today, it's more difficult with the geopolitical tensions with Russia, and the crisis is forcing us to be realistic. Having just returned from the European Nuclear Energy Forum in Prague, I'm pleased to report that the subject of nuclear power is back on the table. Even the Commission recognises the need for an electricity market reform, although no one can agree! It is important not to forget that nuclear power produces no CO₂, and that replacing



it with intermittent renewable energy, which requires a controllable base, is completely absurd – particularly if this base is gas! We need both nuclear and renewables (EnR) to reduce recourse to fossil fuels, which still account for 76% of the energy mix in Europe (82% in Africa). The question is: in what proportion? Because too many EnR create perverse effects on the market.

Africa must build its inclusive and regulated own energy markets...

Africa must build its own energy markets, and they must be more inclusive and better regulated, because electricity is not a commodity like any other. It's an essential public good that must benefit from public policies, investment support (or guarantees), and incentive-based regulatory frameworks. Regional markets are being set up under the impetus of the institutions, but cooperation is insufficient. It must be stepped up between regions and sub-regions, and internationally too.

... And develop international cooperation

Globally, Africa has emerged from its face-off with Europe. It can count on the IAEA and is multiplying its economic relations and partnerships with China and Russia, which are competing very offensively. China is mining uranium in Namibia and has signed agreements to build power plants in Kenya and Sudan. Russia has signed memoranda of understanding with 18 African countries, including Nigeria, Kenya, Uganda and Zambia, in addition to a contract with Egypt for four VVER reactors at El-Dabaa on the Mediterranean. Its strength lies also in its ability to propose SMRs (including floating nuclear power plants), of interest to Rwanda and Ethiopia.

However, I'm not sure that the Russian strategy, reiterated at the Sochi summit, of delivering turnkey plants is the right strategy for Africa, because it will entail setting up safety authorities and informing populations about the technology so that they better understand it and accept it in their country, and training for nuclear jobs which require high skills. These processes require the active involvement of local stakeholders and governments. They are lengthy, and there will be no "magic wand"

An opportunity for France

France, which has a presence in South Africa, and which masters the entire nuclear cycle, could foster cooperation and contribute its expertise from uranium enrichment to the recycling of spent fuel, thanks to the know-how and experience of its nuclear industry, major French companies such as EDF and Orano, and French institutes and agencies such as the CEA and Andra. The French president has announced the revival of nuclear energy, with the extension of its power plants and the construction of a new EPR fleet. Now that it has built EPRs in China, the United Kingdom, Finland and Flamanville, it must continue its momentum, achieve success at home, and consolidate access to the world market.

Unfortunately, in Europe, the situation is more complicated. The European Union has not yet reached its decision, and Member States that choose nuclear power do not agree for a industrial nuclear sector. They defend their interests which are not the same from country to country, with for example Poland choosing the USA, or Hungary choosing Russia. Euratom, tasked initially with promoting the industrial sector, is no longer assuming its role, the countries that have not chosen nuclear holding down decisions.

Les Entretiens Européens, which I have had the pleasure of hosting for the past 20 years, promote a competitive nuclear industry, one that will allow Europe regain its place as leader and cooperate in a world experiencing a nuclear renaissance. As regards our relationship with Africa, we must change our behaviour – if we transform "development aid" into investment aid, for example, we could support decarbonised electricity infrastructure projects conceived by Africans yourselves, meeting your own sustainable development goals.

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IEK WEEKLY NEWSLETTER



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Dear Member,

The IEK Weekly Newsletters offers a roundup of recent Institution of Engineers of Kenya (IEK) events and upcoming ones, activities by the various committees of IEK and any upcoming developments that affect Engineers and the Built Environment. This newsletter is a roundup of activities in the 1st week of December 2022 (IEK/NL/0023)

29th IEK Convention

From 21st to 25th November 2022, Engineers converged at the Diani Reef Beach Resort and Spa in Diani for the 29th IEK Convention to discuss global climate change and the contribution that



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