Large Hydropower Dams Are Not the Answer: Time to Rethink Africa's Energy Infrastructure

The electrification rates of Africa are appalling: the lowest in the world, with as little as 1 per cent access in some rural areas. The average electrification rates in sub-Saharan Africa range from 16 per cent in rural areas to about 59 per cent in urban areas. Out of a continental population of 1.25 billion, more than 600 million people ¬have no access to modern energy. This is a major cause for concern.

Over the past half-century, successive African governments have been aware of the need to improve infrastructure and to extend access to electricity, and have made numerous efforts to address these deficiencies. In 2012, African heads of states adopted the Programme of Infrastructure Development for Africa (PIDA), an initiative to address infrastructure services gaps in energy, transport, water, and information and communication technology. After a priority action plan was developed to prioritise projects and speed up implementation, 52 projects were selected, among them 13 large hydro projects. The prioritised hydro projects would increase installed generation capacity by a combined 15,000MW, at a cost of USD 30 billion. The priority action plan intended to deliver the prioritised projects by 2020. Today, with three years left, it is unlikely that this goal will be met.

In light of the controversy and scepticism surrounding large hydro dams, NGO International Rivers carried out an analysis of eleven of the PIDA hydro projects, assessing how the projects are structured and their potential for alleviating the energy crisis in Africa at a reasonable economic and financial cost, while promoting social welfare and environmental sustainability. [1] This article shares some of the report's findings, and outlines important considerations about the role of large hydro dams in Africa's energy future.

Climate change and large hydropower dams

On the one hand, PIDA hydropower projects ignore the risks posed by climate change. The 2014–2016 drought spell in eastern and southern Africa resulted in a decline in the water volumes held in many large dams, leading to reduced power generation. Many hydropower plants failed to produce their firm capacities (a measure of their ability to contribute effectively to system reliability) and some in Tanzania had to be shut down because of lack of adequate water. The Zambezi basin was particularly affected. Usable water levels in the Kariba Dam, on the Zambezi between Zambia and Zimbabwe, dropped to 14 per cent. Both Zambia and Zimbabwe experienced low power generation, to the extent that industry outputs and jobs were lost in Zambia.

In 2012, International Rivers commissioned the noted hydrologist Richard Beilfuss to carry out a study on the climate change risks for both existing and planned hydropower projects in southern Africa. [2] Among other findings, Beilfuss warned that the dams on the Zambezi River would be unable to meet energy needs as the global temperatures increased and rainfall amounts dropped in the basin. While assessments of the potential impact of climate change on dams and water resources had been carried out before, the Beilfuss study was a worthwhile addition to a growing chorus and provided a robust analysis of the issue. He concluded that the Zambezi Basin was extremely vulnerable to climate fluctuations. Under these predictions, the proposed Batoka Gorge Dam in

Zambia/Zimbabwe would lose as much as 32 per cent of firm power during years of drought. The current reliance on hydropower is thus unsustainable and attention needs to be redirected to alternative energy technologies.

Moreover, recent studies also provide evidence that tropical dams produce large amounts of methane, thereby contributing to greenhouse gas emissions. In a 2017 study, tropical ecologist Claire Salisbury shows that all dams worldwide do emit some greenhouse gases. [3] This work debunks previous justifications for including hydropower dams under climate funding initiatives. There is now irrefutable evidence that methane and other greenhouse gases are unintended by-products of large dams.

Large hydro dams service urban areas and industry

In order to reach the millions of Africans who do not have access to electricity, the geographical distribution of electricity needs to be increased to the rural areas where they reside. This is also where large hydropower projects fail, as they have limited ability to distribute power widely. Their access is restricted to grid-connected consumers, mainly those in urban centres and large industries ¬– most of which are extractive industries. **In 2008, mining companies consumed more electricity than the whole population of sub-Saharan Africa.** In the case of the Inga 3 Dam project that is planned for construction on the Congo River in the Democratic Republic of Congo (DRC), 55 per cent of its generation capacity of 4800MW is destined for export to South Africa, a country whose economy is highly dominated by the mining industry, 30 percent for the copper mines in Katanga Province, and the rest for the capital of Kinshasa. Thus, this mega dam will not have any meaningful impact on increasing access to electricity in DRC. By focusing on large dams and hydropower, the continent is missing the opportunity to develop other sources of energy that can improve access to other types of off-grid energy technologies. In its 2015 report “Speaking Truth to Power” [4], NGO Oxfam noted that two-thirds of energy investment in Africa is devoted to producing energy for export, and that tackling the continent’s energy poverty will have less to do with the ambitious expansion of electricity generation capacity and more to do with delivering ambitious energy services to the rural areas.

No one has cracked the resettlement and compensation issues

One of the most contentious concerns associated with the construction of large hydropower dams has been the displacement of communities that depend on rivers. This sore issue led to the establishment of the World Commission on Dams (WCD) in the late 1990s. Because riverine communities pay the price but don’t reap the benefits of these investments, the WCD found that dams “can effectively take a resource from one group and allocate it to another”.

As a result of this fundamental finding, lenders and development banks developed mitigation policies, guidelines and safeguards – but to date there is still no proven effective model of a fair and just resettlement and compensation process. In spite of the awareness and recommendations wrought by the WCD, the problems of human displacement and resettlement persist. Communities that were displaced by the Kariba dam (located in the Kariba Gorge of the Zambezi river basin between Zambia and Zimbabwe, built in 1955), and many other dams on the continent, continue to struggle for just compensation, decades after the projects were completed.

In addition to those physically displaced by dam construction and reservoirs, many more people living downstream are economically disadvantaged through reduced fishing and other water-based economic activities. A stark example of this is Kenya’s Lake Turkana, which gets 90 per cent of its

water from the Omo River that flows down from Ethiopia. With Ethiopia's construction of the Gibe III Dam and establishment of large irrigated sugarcane plantations, Omo flows into Lake Turkana have been drastically reduced. This has had a devastating effect on the livelihoods of hundreds of thousands of people who rely on it for fishing. In another example, the planned Mphanda Nkuwa Dam on the Zambezi River in Mozambique would further jeopardise the country's thriving prawn industry in the Zambezi delta.

Economics of large dams: The numbers do not add up

An advisory report by the Dutch Sustainability Unit hosted by the Netherlands Commission for Environmental Assessment shows that social and environmental effects of large hydro projects are often underestimated, while the economic and financial benefits are overestimated. [5] Mega dams costs are known to spiral out of control, creating massive debt burdens for host countries. The report also confirms that governments and business have a bias towards large dams as a way to acquire access to finance. Businesses prefer these large infrastructure projects because the large amounts of capital and length of the projects compel the states to carry the risks, while the private financiers take much less risk. This also makes large hydro projects a magnet for corruption. In the end, citizens are burdened with generational debts and yet they are not involved in the decision-making.

The establishment of the Clean Development Mechanism, carbon offset projects financed under the Kyoto Protocol, an international agreement linked to the United Nations Framework Convention on Climate Change, has further favoured large dam infrastructure at the expense of alternative energy sources. [6]

Another aspect of the economics of large hydropower is that the promise of cheap electricity tends to be an illusion. Once projects are completed, with cost and time overruns, tariffs generally rise above the initially predicted levels as investors seek to recoup their costs. In Uganda, the consumer cost of electricity increased significantly after the Bujugali hydro project came online, with the result that many people could not afford it. They resorted to using electricity only for lighting and continued to use firewood and charcoal for cooking. This is disheartening when so many public resources were expended on the project.

Energy Transformation

Infrastructure strategies can play a significant role in delivering energy to the continent of Africa. To address the energy crisis while promoting inclusive access to energy that takes into account climate change impacts and all the other concerns raised above, African states need to ask several questions. What kind of infrastructure do we need? And does it meet our own development goals? Decision-makers need to deliberately target infrastructure, which respects social and environmental concerns, for servicing the majority of people who need the energy and to define milestones to assess progress.

Worldwide, there is a growing recognition that grid-connected mega-infrastructure such as large hydro dams, while attractive for scaling-up national and regional generation, are slow to come online and far too expensive for most African nations. A 2016 report "Lights Power Action: Electrifying Africa" [7] by the Africa Progress Panel affirms what International River's study found: PIDA's energy and infrastructure model fails to acknowledge the historically poor performance of large dams in Africa. This is certainly the time to rethink the future of Africa's energy infrastructure.

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https://www.internationalrivers.org/blogs/266/large-hydropower-dams-are-not-the-answer-time-to-rethink-africa%E2%80%99s-energy-infrastructure

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(1) International Rivers 2015: Right Priorities for Africa's Power Sector: An Evaluation of Dams Under the Programme of Infrastructure Development for Africa (PIDA), Pretoria. https://www.internationalrivers.org/resources/right-priorities-for-africa-s-power-sector-9150
(2) Beilfuss R. 2012: A Risky Climate for Southern Africa: An Assessment of Hydro Dams on the Zambezi River. Available at: http://www.internationalrivers.org/node7673
(3) Salisbury C. 2017: Counterintuitive. Global Hydropower Will Add to Climate Change, Mongabay Series: Amazon Infrastructure, Mekong dams. Available at: https://news.mongabay.com/2017/02/counterintuitive-global-hydropower-boom-will-add-to-climate-change
(4) Horgath R & Granoff I. 2015: Speaking Truth to Power: Why Energy Distribution More Than Generation is Africa's Poverty Reduction Challenge; Working paper 418, Oxfam. https://policy-practice.oxfamamerica.org/static/media/files/FINAL_speakingpowertotruth_SH.pdf
(5) The Dutch Sustainability Unit 2017: Better Decision-Making About Large Dams with a View to Sustainable Development. Available at: http://api.commissiemer.nl/docs/os/i71/i7199/7199_revised_advice_on_better_decision-making_about_large_dams_1june2017.pdf
(6) International Rivers, Failed Mechanism: Hundreds of Hydros Expose Serious Flaws in the CDM, 2007, https://www.internationalrivers.org/resources/failed-mechanism-hundreds-of-hydros-expose-serious-flaws-in-the-cdm-3844
(7) Africa Progress Panel 2016: Lights Power Action: Electrifying Africa. Available at: http://www.africaprogresspanel.org