

# The G20's Energy Infrastructure Plans for Africa: What is Missing?

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## Abstract

At their Seoul, South Korea Summit in November 2010, the G20 adopted a Multi-Year Action Plan on Development which aims to promote economic growth, particularly in about 80 low-income countries (LICs). Infrastructure development is at the top of the nine-point agenda. A G20-mandated High Level Panel (HLP) on Infrastructure, working in close cooperation with Multilateral Development Banks (MDBs), submitted its report and final recommendations to the French G20 Summit in November 2011. In order to close Africa's energy infrastructure gap, the panel emphasises large-scale public-private partnership (PPP) projects in order to promote economic growth and regional integration. The panel asserts that new investments into the continent's energy sector are long overdue. This is true. However, this article takes issue with the HLP's call for delivering solutions with an entire focus on large-scale, centralised energy infrastructure projects. The recommendations don't sufficiently interrogate the feasibility and potential impacts; more attention should be given to modular and more flexibly deployable renewable energy technologies that can reduce poverty and minimise financial risk while maintaining a small carbon footprint.

- The HLP's project selection criteria led to the proposal for bulky, capital-intensive energy projects – four of which are in Africa. These project proposals ignore important realities such as poverty and income inequalities, as well as the need to promote sustainable development in light of Africa's vulnerability to the impacts of climate change.
- Large, long-term energy infrastructure investments in resource dependent African countries with high levels of economic uncertainty and without a significant revenue collection base to cover expenses pose a real challenge. If not handled with care, using public resources (including equity investments, loans, and guarantees by MDBs) to leverage private investment could create an enormous additional debt burden in these countries.
- The history of PPPs – particularly in Africa – has demonstrated that when private capital is injected into bulky long-term infrastructure projects, private investors seldom invest in reaching the poor with affordable services. The challenge of universal access is left to poorly funded governments and under-financed utilities to solve. Large power projects tend to solve the problem of large, commercial and government users but leave smaller users – including small- and medium-sized enterprises – under-serviced or not serviced at all.
- Given the complexities of financing large infrastructure projects and the challenge of cost recovery, modular and scalable renewable energy options should receive more attention. The key is to take these niche businesses and mainstream them. Entirely new types of enterprises and connectivity schemes would be possible to allow both large and small enterprises a role in the delivery of power and energy access. This approach would be far more efficient and egalitarian, in terms of accommodating needs, identifying innovative financing solutions and recovering costs, than centralised and highly bureaucratic utilities.
- The HLP's commitment to conventional solutions obscures the possibility of other alternatives. Even though the alternatives present challenges in terms of replication, cost, and scale, the G20 summit in Mexico in June 2012 should re-cast the criteria for selecting and financing energy projects to highlight modular, renewable energy solutions.

## Introduction

At the G20 Summit in 2010, the G20 Leaders adopted the G20's Seoul Development Consensus for Shared Growth and a Development Action Plan (DAP) which featured infrastructure development as the highest priority for stimulating growth and development.

The G20 appointed an HLP for Infrastructure comprised of a high-profile 17-member team. The HLP was specifically tasked to examine ways in which infrastructure investments can be catalysed using public and private sector funds.<sup>1</sup> The panel's primary concern was catalysing growth and investment in LICs and, secondarily, middle-income countries (MICs) in Africa and Asia.

The HLP submitted its report and final recommendations to the French G20 Summit in November 2011. During the preparation of its report, the panel worked in close cooperation with the MDB Working Group on Infrastructure, which comprised the World Bank, regional development banks and the European Investment Bank. The HLP was asked to help the MDB Working Group prepare an Action Plan for delivery to the French Summit. Both the HLP report and the MDB Working Group's Infrastructure Action Plan identify key priorities for fostering the development of infrastructure in various sectors: energy, transportation, and water and sewage.<sup>2</sup>

In the case of power generation, the HLP's priority projects, as per recommendation by MDBs, gravitate toward large infrastructure investments, such as high-voltage transmission-line developments in West, East and Central Africa as well as large-scale hydropower projects like the Grand Inga Dam, which rely on PPPs to unlock (see Box 1). This paper examines the feasibility and potential impacts of these projects in the context of LICs. It explores the potential of the Sub-Saharan African (SSA) region to deliver such solutions, and looks at whether alternative ideas should merit more attention from the HLP and MDBs.

## The HLP's Project Selection Criteria and Proposed Large-Scale Projects

Although it is appropriate that the G20, the HLP and MDBs made infrastructure development in Africa (and especially LICs) a high priority, the criteria for selecting their list of "exemplary" infrastructure projects are not comprehensive or adequate. The six project selection criteria of the HLP and MDBs are as follows:

1. The projects must be able to support regional integration and cooperation.
2. The projects need political support and must be part of a country or region's development plans.
3. The projects have to be transformational and promote economic growth.
4. The maturity of the projects must be considered.
5. There must be in-country institutional capacity to manage and implement projects.
6. The projects must be attractive to the private sector.

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<sup>1</sup> For an overview of the composition of the HLP and the decision making processes involved see: Alexander, N (2011). Beyond the Public Eye: High-Level Panel on Infrastructure to Unveil its for G20 Leaders, Heinrich Boell Foundation North America. Available at: [http://www.boell.org/web/group\\_of\\_20-843.html](http://www.boell.org/web/group_of_20-843.html).

<sup>2</sup> Both reports are available at: [http://www.boell.org/web/group\\_of\\_20-638.html](http://www.boell.org/web/group_of_20-638.html).

The HLP and MDBs focused almost entirely on massive capital and carbon-intensive regional infrastructure as the solution to development. Bulky, centralised infrastructure projects, which have long timescales not only for construction and implementation but also for producing investor returns, have significant challenges and risks.

Box 1

**MDBs' Exemplary Recommendations  
for Investments in Africa's Infrastructure to the HLP**

**Energy**

- West Africa Power Pool (WAPP): a 1 400 km transmission line inter-connecting four countries: Cote d'Ivoire, Liberia, Sierra Leone, and Guinea;
- East Africa Power Pool (EAPP) connecting the power systems of Ethiopia and Kenya;
- Inga hydropower and transmission in the Democratic Republic of Congo (DRC): the dam could double the capacity of the world's largest hydropower project (Three Gorges Dam) and facilitate the integration of the regional power pools in Africa. Construction of associated transmission lines would allow power to reach 16 countries in the Central and Southern Africa Power Pools;
- Scaling-up solar energy in the Middle East/North Africa (MENA) for export to European markets (Desertec). One concentrated solar power (CSP) plant is under construction in Morocco; others are envisioned in Algeria, Egypt, Jordan, Morocco, and Tunisia.

**Transportation**

- North-South Corridor which integrates trade-facilitation infrastructure in East and Southern Africa;
- Railways between Isaka, Tanzania and Kigali, Rwanda.

Such projects can become stranded assets ("white elephants") which impose long-term debt burdens on governments when political and commercial risks materialise. The G20 infrastructure initiative is aimed at promoting regional economic and political integration, but as noted in an African Development Bank report, power generation is always a "raw deal".<sup>3</sup>

It is assumed that power connectivity through a regional pool is sufficient to promote regional trade and development. However, regional development in turn must be supported by policies that ensure economic diversification and strengthen human capital formation. This is to make sure that large-scale power investments can be sustained without being undermined by short-term boom and bust cycles of the commodities trade.

Domestic sources of financing, even in resource-rich countries with significant resource rents, tend to be gobbled up by budgetary priorities and the demand to service high debt burdens, leaving these countries with a financing gap. A conundrum prevails, given the context of economic uncertainty and

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<sup>3</sup> African Development Bank (2011). Central Africa: Regional Integration Strategy Paper, 2011-2015. Available at: <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/RISP%20CENTRAL%20AFRICA-ECCAS%20English%20FINAL.pdf>. The paper provides a comprehensive set of challenges for this region's economic development.

the question of whether investments will result in sufficient increases in the levels of growth in individual incomes and national Gross Domestic Product (GDP) to justify the high upfront capital costs of major infrastructure projects.

That being said, one should not underestimate the importance of critical infrastructure: good roads, irrigation, water and sanitation, and power generation. Domestic, regional and international finance should compete to address these backlogs. However, given limited resources within Africa, and especially SSA, managing such a large outlay of capital is of vital strategic importance to the future sustainability of these countries.

The situation is urgent: electricity prices are higher than those of developed economies, power supply is unreliable and the need for back-up power by households, industry, and public facilities makes electricity supply a very expensive proposition, limiting levels of market development.

### **Africa's Energy Demand and Power Supply Situation**

Africa's energy demand is expected to grow annually by 5% until 2040, according to a new Programme for Infrastructure Development (PIDA) report released by the African Union Commission.<sup>4</sup> This rate of growth would increase the continent's demand for generating capacity by five or six times – from 125 to 700 gigawatts (GW). South Africa has nearly a third of the region's installed capacity – about 40 GW out of the 125 GW. Installed capacity for SSA is around 68 GW, with 25% of the capacity being non-functional due to the deterioration of old plants and the lack of proper maintenance.<sup>5</sup> By 2040 the continent's per capita electricity consumption is expected to rise from 612 kWh to 1 757 kWh. For the last three decades, efforts to expand capacity have floundered for many different reasons, with political risk being the major hindrance.

Outside of South Africa, hydropower provides 70% of all electricity to SSA. However, less than 30% of the SSA population has access to electricity or is connected to the grid. Part of the challenge is that the majority of the SSA population lives in rural areas, where accessibility is a challenge due to geography, poor road networks and population density. SSA is the only region in the world where per capita consumption of electricity, for ordinary citizens, is falling compared to other developing regions.<sup>6</sup> This highlights the fact that consumption is dominated by intensive energy users rather than ordinary consumers.

Power generation, especially in SSA, is plagued with the problems of high infrastructure costs, sub-optimal tariffs, tariff subsidisation (close to 30%), and low levels of tariff recovery from consumers – all of which dim the attractiveness of new investments. In general, the demand for power sector investments is four to five times higher than demand for other types of infrastructure investment (e.g.

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<sup>4</sup> See their 2011 sector study on energy, available at: <http://www.trademarksa.org/news/au-nepad-draft-pida-reports-published>. PIDA falls under the New Economic Partnership for African Development (NEPAD), the executing agency of which is the African Development Bank.

<sup>5</sup> Eberhard, A, Rosnes, O, Shkaratan, M and Vennemo, H (2011). Africa's Power Infrastructure: Investment, Integration and Efficiency, Washington DC: The World Bank. Available at: [http://publications.worldbank.org/index.php?main\\_page=product\\_info&products\\_id=23889](http://publications.worldbank.org/index.php?main_page=product_info&products_id=23889).

<sup>6</sup> Ibid.

telecoms).<sup>7</sup> Currently, demand is largely driven by the extractive industries sector and populations in major cities whose incomes have grown in the last decade because of a commodities boom.

In any case, in SSA, affluent households that are connected to the grid are the only ones that can afford to pay for electricity.<sup>8</sup> Poor urban households that cannot afford high connection charges are reliant on wood, charcoal, kerosene and gas, and rural households have limited grid access. Poor households are vulnerable to external price shocks because of oil and gas price increases. So even in the proposed haven of large power projects, energy poverty is likely to continue. Households that don't have grid-connected electricity or intermittent connectivity are largely still reliant on increasingly expensive fossil fuels like kerosene, gas and diesel for electricity, cooking or heating purposes. Their cost rises are corrosive on incomes, subjecting households to inflationary stresses.

### **Why Large, Long-Term Energy Infrastructure Investments Pose a Challenge in Africa**

The World Bank and the IMF predict a sustained GDP growth rate for Africa, as a whole, at around 5–7%, allowing for variations among countries and regions.<sup>9</sup> Most of this growth will be driven by the resource hunger of emerging economies, such as China and India.<sup>10</sup>

Revenues from resource rents and taxes should, ideally, sustain long-term economic prospects through investments in social and trade-related infrastructure, which helps to meet basic needs and provide public goods, such as electricity.

However, the “boom and bust” economic cycles of resource-dependent countries are hard to predict, which creates uncertainty for major infrastructure investments. Put differently: governments simply don't know how long the resource bonanza will last. Economic and infrastructure planning under such conditions is challenging.

Yet, with economic growth comes the demand for energy, including from mines, industry, and large public investments – not to mention those who are energy poor. Energy surpluses may supply the grid as food surpluses fill silos with grain. However, this does not guarantee access, as access to energy and food is a function of the extent, nature and quality of public infrastructure services as well as the ability of vulnerable groups to pay for the services. Poverty and income inequality within and between countries is a key limiting factor in achieving long-term and affordable solutions. This is particularly the

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<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> International Monetary Fund (2012). Global Recovery Stalls, Downside Risks Intensify, World Economic Outlook Update. Available at: <http://www.imf.org/external/pubs/ft/weo/2012/update/01/pdf/0112.pdf>.

<sup>10</sup> Some of these infrastructure backlogs on the back of the resource exploitation boom are being dealt with in innovative ways. For instance, China's infrastructure development programme in Africa – the building of roads, dams, hydropower, ports etc. – is tied to mineral exploitation deals. In the last decade more hydropower was unlocked through Chinese financing than traditional Western-based sources of financing. China's investment helped install 9 GW of additional power generation capacity, including ten major hydro-projects in Africa. Ironically, this is an approach that is primarily governed by state-to-state deals rather than strictly PPPs, which the HLP is advocating. It is an interesting model per se. As long as mines have something to dig out and export back to China, the portion of rents that would have accrued to a national fiscus are deducted from the commodity sales of minerals taken back to China through what are termed “resources for infrastructure” deals facilitated via China's Ex-Im Bank and China's other development banks. African countries get new roads, electricity pylons and so on, but it is a pretty uneven development even within the borders of a nation state, because it is so tied to the extractive industries. See Brautigam, D. (2011). *The Dragon's Gift: The Real Story of China in Africa*, Great Britain: Oxford University Press.

case in the SSA context, where 70% of the population lives on less than USD2 per day and there is a low level of revenue generation.<sup>11</sup>

The capacity for infrastructure development is connected to the rate and extent of income accumulation at individual, sub-national and national levels. In turn, income and revenue accumulation patterns are largely generated from natural resources, agricultural production and remittances from the African diaspora.<sup>12</sup> These patterns will tell us the long-term capability of affording large-scale infrastructure investments in poor parts of SSA.

Making large, long-term infrastructure investments without a large and stable revenue base poses a real challenge. Recognising this, the HLP and MDBs are focusing on using public resources (not only domestic revenues, but also investments and guarantees by MDBs) to leverage private investment. Unless these institutions invest wisely, the scale of investments and guarantees could create an enormous debt burden for SSA. This is especially the case if risks – political, commercial, demand, exchange rate – materialise and guarantees are called. When this happens, government guarantees become actual liabilities instead of “contingent liabilities”.

### **The Gaps in the HLP’s Analysis and Recommendations**

In addition to the obstacles that Africa’s uncertain economic environment may put in the way of long-term energy investments, the HLP’s analysis of and recommendations for the promotion of infrastructure development in Africa are questionable on several fronts.

The HLP’s approach is to leverage public funds and guarantees through national governments and have the MDBs play a big role in the implementation of PPPs to “crowd in” private investments. The assumption is that if managerial and capacity issues relating to project preparation and implementation can be improved and the commercial and political risks can be dealt with, these projects will be bankable.

It is not as if the HLP’s approach regarding the use of the PPP model has not been tried before. The wave of PPPs in infrastructure in developing countries around the world in the last 20 years has left many private investors disillusioned and the public outraged at soaring prices.

However, privatisation of infrastructure or growth in PPPs in SSA in the last decade or so have been fairly confined to a few countries on the continent. Most of private-sector growth or PPPs have been in the telecommunications sector. There is still a huge backlog of under-investment in water and sanitation, power generation, transport and other infrastructures.<sup>13</sup> Nonetheless, the promotion of PPPs by the HLP without caution or taking into account negative experiences from elsewhere in the world needs

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<sup>11</sup> See World Development Indicators. Available at: <http://data.worldbank.org/topic/poverty>.

<sup>12</sup> See McKinsey Global Institute (2010). *Lions on the Move: The Progress and Potential of African Economies*. It provides an assessment of Africa’s economies as increasingly being supported by diversification beyond just trade in commodities and other resources. Available at:

[http://www.mckinsey.com/Insights/MGI/Research/Productivity\\_Competitiveness\\_and\\_Growth/Lions\\_on\\_the\\_move](http://www.mckinsey.com/Insights/MGI/Research/Productivity_Competitiveness_and_Growth/Lions_on_the_move)

<sup>13</sup> McDonald, D.A & Ruiters, G (2012). *Alternatives to privatization: public options for essential services in the global south*, Cape Town: HSR Press. Available at: <http://www.hsrbpress.ac.za/product.php?productid=2287>. This book contains some relevant examples of failures in Africa and other parts of the world.

reflection, so that these mistakes are not made in Africa. Options other than PPPs should also be explored, such as cooperative systems or community ownership models.<sup>14</sup>

Often, PPPs leave the issue of universal access to poorly funded governments and under-financed utilities to solve. Large power projects tend to address the needs of big users but leave smaller users under-serviced or not serviced at all. The history of PPPs – particularly in water and electricity – shows that investors frequently raise tariffs for services, but fail to follow up on commitments to expand networks to unserved or under-served areas. Generally, in cases where governments don't have strong negotiating power and administrative capabilities, private vendors can construct deals to their advantage, where their rewards are often greater than those which public funds, or the public in general, are able to extract from PPP concessions.<sup>15</sup>

Large infrastructure projects that are poorly managed by the public sector are also prone to other social and economic risks. PPPs can increase the debt burdens, particularly since the lack of national capability to negotiate risk allocation in PPP contracts can also result in the nationalisation of risks and privatisation of profits.

Further, PPPs are a fertile ground for rent-seeking from corrupt officials and private vendors who can extract high rents that undermine the sustainability of these projects. In political economies where elites have a material interest in these ventures, PPPs tend to be overtly promoted and other solutions countered, underplayed or undermined. PPPs are often pushed through with very little public consultation and debate – as South Africa's ongoing public dispute around the introduction of tolling fees for major highways in the country's economic hub, the Gauteng Province, demonstrates. This example also shows that although there was no public approval, the fact that the contract with private vendors had already been signed meant that the financing obligations were the liability of the state and in turn the tax-payer. The corruption scandal involving companies and an official in the Lesotho Highlands Water Project (LHWP) that supplies bulk water to the Gauteng Province of South Africa is another example that demonstrates what can go wrong.<sup>16</sup>

These examples are not to suggest that PPPs for renewable energy projects will not be prone to the same problems or challenges. Rather, they offer a warning that without good governance, mega projects can simply crowd in investments as part of a rent-seeking strategy by domestic elites and unscrupulous private vendors. The economic and social consequences would thus be borne by third parties – the taxpayers and the most vulnerable.

While the HLP report acknowledges the importance of transparency in the construction sector and recognises the Construction Sector Transparency Initiative (CoST), neither the panel nor the G20 have shown clear commitment to scale up finance for this initiative; nor have they called on all companies involved in infrastructure projects to join it.

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<sup>14</sup> These are probably better suited for the modular-type and small-scale models being promoted in this paper.

<sup>15</sup> McDonald & Ruiters, Alternatives to privatisation.

<sup>16</sup> On 23 July, the World Bank announced that it would debar from further bank contracts the Canadian firm Acres International, for three years. The company had been convicted of bribing the head of the LHWP in September 2002.

Aside from the question of how the proposed infrastructure projects are eventually financed, there is a whole set of other problems that the HLP has not red-flagged as needing attention and resolution. A 2011 World Bank study into Africa's power infrastructure identified three areas of concern: a) inefficiencies due to the way utilities are managed; b) the under-pricing of electricity, which makes cost recovery and cross-subsidisation difficult; and c) inefficiencies due to poor budget execution – often with under-spending or over-spending.

The report estimates that, due to inefficiency, Africa loses close to USD8–9 billion a year, compared to a total annual expenditure on power infrastructure of USD11–12 billion.<sup>17</sup> This is an area that the HLP did not really focus on in its report; nor did the report demonstrate how this would be avoided in the development of new infrastructure investments.

Another issue that received scant attention by the HLP is the impact of climate change on the continent. Large hydro-projects in particular can be prone to the effects of climate change. There needs to be a better understanding of these effects on the future of hydro-projects and the risk that climate change poses to investment plans now and in the future. This is particularly relevant in the case of Ethiopia,<sup>18</sup> which is currently embarking on one of the largest hydro-projects in Africa. Ethiopia and the DRC can supply 60% of the SSA's power needs - but this does not take into account the effects of climate change. Significantly, Ethiopia has already experienced food insecurity as a consequence of drought and the effects of climate change.

Hydropower prospects may also be hostage to climate change. Drier seasons or periods of chronic drought reduce river and dam water-flow, which in turn affect the availability of generation capacity from hydropower plants.<sup>19</sup> In some areas, it can contribute to increased rainfall and flooding. Ethiopia's adaptation costs to retain sufficient water-flow or manage flooding or overflow through additional infrastructure development will most likely push up the costs of large hydro-projects in the future. If the country does nothing, it risks reducing availability and capacity of power generation for its economy and will have to rely on other sources to secure supply.

This goes to show that projects that have high mitigation potential nonetheless would have to also be screened against a lens of climate change effects.

Lastly, projects such as the Grand Inga Dam, plans for which have been around for more than 40 years, are also highly dependent on trans-border transmission lines and off-take agreements being secured in politically fraught countries and fragile economies. Conflicts in the DRC and high transaction costs have kept the project at abeyance, but the HLP promises to pour resources into project preparation to launch the dam from the drawing boards and into reality.

Regional inter-connectivity has merits if it can be pulled off. Inter-connected transmission lines, within the ambit of a regional power pool, would undoubtedly change the dynamics of regional power supply. Countries with low-cost options could sell to countries with high-cost options and strong economies,

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<sup>17</sup> Eberhard et al., Africa's Power Infrastructure.

<sup>18</sup> Ethiopia plans to build a 10 GW hydro-project, 2 GW of which is already under development.

<sup>19</sup> See You, G.J & Ringler, C (2011). Climate Change Impacts in Ethiopia: Hydro-Economic Modelling Projections, IFPRI Research Brief.

and attain savings of 3 to 10%. For instance, Central Africa would benefit the most from a power-pool arrangement, rather than trying to solve its power supply needs within its national territories.

However, to realise the potential of regional power trade, the volume of investments needed between 2005 and 2015 should total USD41 billion (inclusive of operations and maintenance).<sup>20</sup> This is only for new power-generation capacity and does not include the cost of setting up a regional power-trade scheme which would require investment in new institutions, trained staff and other infrastructure to schedule and manage the timely dispatching of power from one country to another or within specific countries.

This figure is likely to be higher, given current trends in the costs of capital. It is unrealistic to expect such capital will flow freely from foreign shores without countries having to raise the bulk of the funds themselves from their domestic and regional economies. For LICs, this is largely impossible, as government budgets are already tight and highly dependent on aid flows. Besides, countries will have to secure political risk insurance and other forms of guarantees to back their capital-raising efforts for these infrastructure projects.

### **Renewable Energy Solutions Deserve to be Considered More Seriously in the HLP Thinking**

Given the complexities of financing large infrastructure projects and the challenge of cost recovery, it is surprising that modular and scalable renewable options don't receive more attention. As grid connectivity requires very strong grid and transmission capabilities, off-grid renewable energy could be everybody's solution.

Off-grid solutions that involve both large renewable energy technology (RET) installations and micro-RETs would be interesting to compare, in terms of financing and affordability, with other modular short-term and long-term options that are non-renewable in nature.

The costs and benefits of decentralised and centralised solutions should be compared: inefficient, centrally managed systems should take into account premium priced electricity during peak periods and the insecurity involved with its supply – because of frequent outages and the unreliability of sources of conventional power (such as coal, oil, gas or diesel) due to lack of foreign exchange to pay for these energy sources or other supply-chain problems.

The need for extended periods of subsidisation of grid-based electricity in order to ensure uptake also has to be factored in. In addition, firms and households that have grid access routinely favour backing up supply through diesel generation. This is one of the reasons energy costs in Africa are high compared to developed economies.

In some West African countries, close to 50% of the electricity market is already penetrated by diesel generators.<sup>21</sup> These countries provide useful insight and examples of how the RET market can be developed. RETs could substitute central electricity supply and autonomous diesel generation. RETs,

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<sup>20</sup> Eberhard et al., Africa's Power Infrastructure.

<sup>21</sup> There are interesting figures of levels of penetration for diesel generators in different parts of SSA. These are quite illuminating, as they point to the potential for renewables to fill the gap. See: Eberhard et al., Africa's Power Infrastructure.

though, will have to demonstrate reliability, ability to attract low-cost capital, and high levels of availability to make them competitive with conventional sources. Generally, trends show that global investments in RETs are growing and that costs of renewables are coming down. In some countries they have already reached grid parity.<sup>22</sup>

Intermediate, leapfrog solutions need to be more seriously considered in the HLP thinking. For example, the World Bank<sup>23</sup> is looking at RETs as a low-cost solution in a proposed PPP scheme with cellphone companies to ensure energy access to rural communities. Cellphone companies support recharging centres by contracting energy service providers who then can enter arrangements to support communities or other small businesses with energy solutions using RETs. The scheme is also looking at a German/Austrian micro-wind turbine technology with a company called Fairwind.<sup>24</sup> Fairwind has developed a low-cost wind turbine that can use waste plastic bottles for blades, which are connected to a small and compact mini-generator to charge phones. Fairwind's challenge is to introduce this type of micro-wind technology on scale before it can bring costs down even further.

In Kenya, other solutions, which use concentrated solar photo-voltaic solutions that support off-grid connections for local communities in self-contained communities, private or public enterprises, are being considered. Here models of cost recovery that are tailored to the specifications of a particular village, town or household economy are evolving.

Kenya has also explored 300 MW on-grid wind power through the Lake Turkana Wind Project (LTWP).<sup>25</sup> Construction is expected to start in imminently.<sup>26</sup> The project will involve erecting 365 wind turbines in an area that has excellent wind resources. One of the main reasons for the development of the wind farm is that Kenya has an over-reliance on hydropower. Hydro sources jeopardise reliable power generation because of seasonal variation and unreliability during dry seasons. Set against emergency thermal sources of power, such as diesel power, the wind farm is touted as the second-least expensive option for Kenya at present.

There are undoubtedly numerous other similar projects where new models to scale-up RETs are being considered.

The proposed large-scale regional infrastructure projects remain politically fraught, and the expectation that they will provide lasting solutions for the benefit of LICs has to be tempered with some realism – at least in the medium term. Such caution is not only required for conventional sources of power but also for new renewables, such as the Desertec project, which is a large transnational RET initiative that the HLP and Europe are working on with MENA to supply electricity from renewables to European grids.<sup>27</sup>

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<sup>22</sup> See REN 21 annual renewables reports and IEA trends for levelised costs of RET sources of energy. REN 21 global reports can be found at [www.ren21.org](http://www.ren21.org) and IEA trends at [www.iea.org](http://www.iea.org).

<sup>23</sup> Personal communications with Mohua Mukherjee, Senior Energy Specialist, World Bank, 13.3.2012.

<sup>24</sup> The initial solution being offered is merely for recharging cell phone batteries, and this will be expanded to include other uses. The key is to implement these first-tier solutions on scale and to expand usage for other devices by driving costs down.

<sup>25</sup> Only 19% of Kenyans have access to electricity.

<sup>26</sup> *The Guardian*, 28 March 2012.

<sup>27</sup> Desertec is managed by the Desertec Foundation between Europe and MENA. Its vision is to draw power from diverse renewable energy sources, such as solar thermal, wind, hydro and biomass power. A high voltage direct current (HVDC) line possibly running over 1000 km will be built to transmit power between the MENA countries and Europe.

While this project shows that grid-connected RETs can be done on scale, and that scale can be expanded when needed within a regional power pool, the costs and capacity development needed to operate such schemes, as well as political agreements needed to guarantee secure supply over a series of national borders, remain formidable obstacles. Therefore the Desertec initiative stands on the same precipice as the Grand Inga Dam hydropower project in terms of vision and implementation risks.

Large-scale projects always have long lead times. They are also vulnerable to defaults and political risk. So, a power-supply gap remains, which could be filled with modular RET off-grid solutions, even if costs are high initially.

Modular RET solutions hold promise for the future, as costs are coming down and will ably compete with diesel-generation power and, most likely, certain types of conventional technologies. The key is to take these RETs from niche to mainstream solutions. Entirely new types of connectivity schemes could allow both large and small enterprises a role in the delivery of power and energy access. This approach would be far more egalitarian – in terms of accommodating needs, identifying innovative financing solutions, and recovering costs – than that of centralised and highly bureaucratic utilities. However, there will need to be significant investment in know-how and ability to deal with new RETs if this vision of leapfrogging RETs as alternatives to large-scale power generation is to be realised. It is therefore disappointing that the HLP recommendations could not champion an idea that needs to be at the forefront of sustainable solutions.

Modular solutions are designed to be scaled up as needed, and obviate the large upfront capital costs that mega-projects demand. RET risks can be mitigated using the same instruments used in conventional infrastructure projects, e.g. political and commercial risk insurance, securitised infrastructure bonds linked to guarantees via MDBs, etc.<sup>28</sup> However, the level of investment in renewable energy in Africa is still very low compared to worldwide figures – in 2004, renewables investments in Africa stood at USD750 million and rose to USD3.6 billion in 2011, while worldwide investment in the sector increased from USD44 billion in 2004 to USD211 billion in 2011. This discrepancy illustrates both the potential and the gap that needs to be filled.<sup>29</sup> Increased investment would require coordinated international assistance and African governments to begin prioritising RETs as part of their long-term development plans.

## Conclusions

The HLP's approach should be reviewed and RETs more strongly considered. The current commitment to conventional solutions obscures the possibility of other alternatives. Even though renewable energy solutions present challenges in terms of replication, cost, and scale, they should be explored.

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<sup>28</sup> For instance, the Asian Development Bank (ADB) has come up with a guarantee facility for solar power, which is being developed by the Indian government's solar mission. The ADB's approach has helped the government recruit other sources of capital that would not necessarily be available or which would be available at higher costs if the guarantee were not there. A regional RETs development finance facility is a consideration that would be dedicated to pooling funds, expertise and support deployment for different types of grid and off-grid models in Africa. But such an idea requires boldness and innovativeness.

<sup>29</sup> See: <http://www.ifandp.com/article/0015180.html>.

The forthcoming Mexican G20 summit, which will focus on green growth, provides an important opportunity to review the HLP's approach to energy infrastructure development in the context of the broader efforts of the grouping to promote sustainable development.

South Africa currently co-chairs the G20 Development Working Group (DWG) with France and South Korea. South Africa's leadership on the DWG, in terms of shaping the HLP's approach on RET deployment in Africa, could bring about revisions to the HLP's report and the implementation of some of its ideas – particularly as South Africa already has an active national green growth strategy, wherein renewables are a core aspect.

Given the constraints in the physical deployment and management of large infrastructure, as described above, modular and more flexible solutions may be the answer for Africa, considering the continent's financial, technological and governance challenges.

#### **About the author**

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