

# Power Potential and Pitfalls on the Congo: Developing Africa's Cleanest and Largest Hydropower Opportunity

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*News Analysis by Peter Fairley*

\*An updated link to Peter Bosshard's blog post has been added to this article.

*NEW DEVELOPMENT: A Reuters news story confirms that the DRC government is pulling out of Westcor in favor of the Billiton-financed project. That story is linked [here](#).*

The Congo River has the potential to power a continent. In power and ecological wealth, Africa's Congo River and the rainforests it drains stand second only to the Amazon. In regularity, the Congo is unrivalled. Because its tributaries straddle the equator, the Congo is inundated with rain water in all

seasons. At its July/August low point the river eases to a still raging 30,000 cubic meters per second on average. In 1905, the 'driest' year in recorded history, the Congo bottomed out at a mighty 21,400 m<sup>3</sup>/sec, nearly double the Mississippi's average flow. This consistent power translates into a hydropower potential that knows no equal in scale and sustainability, concentrating at a natural pinch point 225 kilometers upstream from Kinshasa, the capital of the Democratic Republic of Congo (DRC). There above a 15-kilometer stretch of cascading falls and rapids lies the site of the Inga Dams and, in the view of power engineers, the energetic promise of more than one continent. Until now, however, this promise has been unrealized.

An estimated 370,000 gigawatt-hours of energy flow through the Inga Dams every year, exceeding the hydropower generation of Canada (where hydro engineers flooded tens of thousands of square kilometers in British Columbia, Quebec and Newfoundland to make Canada the world's hydropower leader). The question is whether Inga's potential can be harnessed amidst the flood of violence and corruption that surrounds and infuses the DRC. Inga's installations currently capture only a fraction of its potential. Just 1,775 megawatts of power generating capacity has been installed at Inga—about three percent of Canada's installed capacity—and the DRC government acknowledges that only a fraction of Inga's turbines currently operate.

The DRC desperately needs energy to grow. This mineral-rich expanse the size of Western Europe is Africa's fourth most populous country but also one of its poorest. The International Monetary Fund estimates the DRC's gross domestic product per capita at \$171 – placing it last among the 180 countries studied last year. That's lower in real terms than when the DRC threw off colonial rule by Belgium in 1960. In addition to myriad social and political challenges, economic growth is thwarted by a dearth of reliable electricity. The DRC's mining-rich eastern Katanga province and Kinshasa province

already suffer a net shortfall of 1,400 megawatts that holds back growth.

Inadequate access to energy is the single largest impediment to economic growth across Africa according to a World Bank study released in November (2009), [Africa's Infrastructure: A Time for Transformation](#). As the report notes, the generation capacity of the 48 countries of sub-Saharan Africa is equivalent to that of Spain, which has one-twentieth the population. In all, inadequate electricity, water, roads and communications systems cut economic growth every year by 2 percentage points across sub-Saharan Africa. Of the \$93 billion investment in infrastructure needed annually over the next decade, almost half is needed to address the continent's power supply crisis. And the DRC's investment shortfall is particularly severe. The state power utility, the Société Nationale d'Électricité (SNEL), delivers electricity to just 7% of the DRC's 68 million people.

Revitalizing and extending the hydropower works at Inga is the centerpiece of plans by the government in Kinshasa, SNEL and numerous international partners who aim to re-energize the DRC, underpin its economic future and secure its tenuous democracy. Yet, after a decade of struggle amidst ongoing violence, political divisions and mismanagement, dividends are elusive and frustration is rising.

### **By Africa, For Africa**

International cooperation to squeeze more power from Inga got underway in 2002. The DRC was just emerging from five years of turmoil that began with the 1997 overthrow of Mobutu Sese Seko, the corrupt Western-installed dictator that dominated the country for three decades. Congolese rebel leader Laurent Kabila unseated Mobutu with help from Rwanda and Uganda, but these neighbors invaded the following year. Forces from Angola, Namibia and Zimbabwe came to Kabila's defence, turning the DRC into an international

battleground until 2002 when Joseph Kabila, appointed president in 2001 following his father's assassination, secured a peace deal that brought some stability and spurred an international effort to rebuild the DRC's infrastructure.

The DRC government identified restoration of its war-ravaged electrical system as an early priority for national recovery. The World Bank stepped up to support the rehabilitation of the power stations installed under Mobutu to generate electricity from the water flowing into the Inga Dams. The original 1972 station known as Inga 1 was completely dysfunctional and Inga 2, added in 1982, was badly neglected. So too were the transmission lines to distribute their power within the DRC and export customers as far away as South Africa. Power output was barely a third of Inga 1 and 2's original capacity according to the World Bank.

Meanwhile a made-in-Africa program took shape to realize Inga's further potential under the encouragement of the [African Union](#) and its [New Partnership for Africa's Development](#). A key goal was to interconnect Africa's power systems as a means to expand access to electricity and reduce its cost. Inga quickly emerged as a spotlight project for NEPAD.

Adding a third set of turbines to draw another 3,500 MW of power from Inga, tripling its generating capacity, and to build new transmission lines within DRC and southern Africa was the ambitious goal. Fellow members of the [Southern African Development Community](#) – South Africa, Angola, Botswana and Namibia – partnered with the DRC to share the cost and the power. By 2004 the five country's national utilities had partnered to establish a Botswana-based operation called the Western Power Corridor Company (Westcor). They signed up Pat Naidoo, the top transmission expert for South African utility Eskom to be CEO, with a mandate to establish the feasibility and then build 'Inga 3' and its accompanying transmission lines.



Power experts have long argued Africa needs to support large capital-intensive energy projects and, as a result, bringing in Westcor was a move toward regional interdevelopment. It was also a move that was likely to profit not only Westcor's members but African consumers as well. The river's steady flow would guarantee Westcor's power generation at a cost of just 5 cents per kilowatt-hour (cts/kWh). That is a fraction of Africa's 18 cts/kWh average for grid-supplied power and the 40 cts/kWh firms pay for backup generators during all-too-frequent blackouts. It also beats the cost of other large-scale renewable power generating options according to recent [cost estimates used by South Africa's energy regulator](#). For example, wind and solar power are pegged at 12 cts/kWh and 21 cts/kWh respectively.

Power demand from South Africa, the region's economic giant, would underpin financing for the \$8-billion scheme. Westcor promised the DRC \$500 million per year in royalties for use of the Congo, and profits split equally among the partners—the DRC included. "We're actually building a cash machine here," is how Naidoo described Inga 3 in a [July 2009 talk to the South African Institute of Electrical Engineers](#). "The cash flows are substantial and massive and there's plenty of energy for all," said Naidoo.

Best of all, it was a by-Africa, for-Africa model of development. Modular installation of the hydro turbines, one 220-250 MW turbine at a time, meant that African banks could finance the installation, avoiding delays that come

with international financing.

## **Complex Currents**

Westcor's implementation has slid, however, as other forces at play threaten to wreck its vision of African unity through the sharing of Congolese hydropower. Joseph Kabila's election in 2006 has yet to secure his universal legitimacy, particularly in the eastern regions bordering Rwanda and Uganda that are marked by persistent sexual violence and killings according to NGOs such as Human Rights Watch and Doctors Without Borders. The World Bank categorizes the DRC as a 'fragile' state. Mismanagement is rife. And international developers eager to exploit the DRC's mineral wealth (and need electricity to do so) also feed political divisions and corruption.

Since the waning days of its latest war, DRC officials have cut a series of side deals with international suitors, starting with a 2001 deal with German industrial firm Siemens promising \$960 million to restore power flows from Inga 1 & 2 in exchange for access to the DRC's diamond resources. That deal had fallen by the wayside by 2005 when Canadian mining firm MagIndustries signed a deal with SNEL to rehabilitate turbines in exchange for power for present and future mining operations. One turbine was ultimately refurbished but SNEL dropped the broader deal after inquiries by DRC parliamentarians revealed that it represented a "stealth privatization" of Inga at unfavorable terms for the DRC (equivalent to paying 26.5% interest on financing for the Inga 1 & 2 upgrades).

Other players have encouraged the DRC to look beyond modular upgrades such as Inga 3 to a far larger opportunity, with far greater environmental impacts. Known as Grand Inga, the idea is to dam the Congo upstream of the existing dams, flooding the adjacent Bundi Valley with enough water to generate up to 39,000 MW of power. Such an installation would produce

nearly double the output of China's recently completed Three Gorges hydroelectric project, the world's largest to date. In 2002 French utility Electricité de France calculated how to finance the \$80-billion-plus effort: by traversing the Sahara with the world's longest power line, thus harnessing Congo's flow to supply Europeans hungry for power.

One Inga side deal ultimately grew into a direct challenge to Westcor: [a 2007 agreement with multinational mining giant BHP Billiton](#) to supply up to 2,000 MW from Inga 3 for an aluminum smelter that Billiton proposes to build on DRC's Atlantic coast. The company confirms that a "pre-feasibility study" for the hydropower project, funded by Billiton, has been completed. "The future of the aluminium smelter project hinges on progress being made on the Inga 3 project and it is still very early days," said Illtud Harri, a London-based spokesperson for BHP Billiton, in an email exchange with *Earthzine*.

Billiton's offer gave the DRC an alternate anchor client for Inga 3's power, emboldening the DRC government to consider building Inga 3 on its own. Last summer the tensions within the Westcor's partnership blew open after two years of speculation and confusion. Naidoo, during his talk with South Africa's electrical engineers in Johannesburg last July, vented his frustration in comments reported by South African [engineering](#) and [energy](#) publications.

“We are in mid-flight now – and our partner, the DRC government, is starting to change the mandate on Inga 3. They are basically taking the foundation from under our feet,” said Naidoo, according to Johannesburg-based



magazine *WATTnow*. Naidoo did not respond to requests for comment, but news reports since last summer suggest that the DRC is trying to restructure Westcor.

Progress on Inga 1 & 2, meanwhile, is almost as slow. Since the World Bank approved \$167 million in emergency support for the DRC's electricity system in 2002, further funding has materialized from the World Bank itself and other lenders, such as the European Investment Bank and the African Development Bank, with the aim to rebuild Inga 1 & 2, strengthen or add power lines, and extend power distribution to 250,000 additional people in Kinshasa (for a 0.4% increase in the DRC's electrification rate). But real change on the ground is thin. To date only two of Inga's turbines have been refurbished, and power output remains at barely 40% of the original capacity—little improved over 2002.

According to the World Bank that stasis represents an achievement of sorts, because post-war economic growth has boosted demand for power and placed more strain on the DRC's "already-overloaded network." But stasis is of little solace to the rural communities throughout the DRC – including those which surround Inga itself – that are deforesting their lands in search of energy as buzzing power lines overhead carry the Congo's power away from their region.

## **Governance Unrealized**

Explanations for the electrical short-circuit in the DRC's recovery share blame between external forces—including development lenders such as the World Bank—and the DRC elite who wield political power and manage its institutions. With regards to the latter, slow progress on Inga is seen as a symptom of management that is at best incompetent and short-sighted and, at worst, self-interested and corrupt.

Consider *WATTnow* editor Paddy Hartdegen's September 2009 editorial, accusing the DRC of spurning its African partners. Hartdegen writes that the DRC, "has chosen to grab whatever money is on offer now and who cares about relationships, regional development or a long term future." The magazine's article on the reversal was illustrated by a fanciful piece of art showing the DRC's Westcor partner countries literally hung out to dry.

A commission of the DRC Senate [issued a report last September on mining sector revenues](#) that shows how wide of the mark government administration can be. They found that the government received just \$92 million of the \$450 million it was due from this key industry, thanks to under-invoicing, tax evasion, smuggling, fraudulent contracts and poor accounting. Of nearly \$75 million in taxes due, for example, officials booked just \$814,042. Kinshasa-based newspaper *Le Potentiel* quoted Senator Henri-Thomas Lokondo, a commission member, calling the report evidence of "systematic fraud."

Some observers see mismanagement as secondary, challenging the export-driven Inga expansion proposals as an extension of the European imperialism that has left such deep scars in Africa. Anders Lustgarten with the Brussels-based NGO [Counter Balance](#), which critiques investments by the European Investment Bank, criticizes the power export plans in his November 2009 report, [Conrad's Nightmare: The World's Biggest Dam and Development's Heart of Darkness](#).

Map courtesy of African Energy

Lustgarten tells Earthzine that any hydropower project on the Congo that delivered electrification and poverty reduction would be an “immeasurable service both to human beings and to the ecosystem.” In fact, according to the World Energy Council, an international group of governments and energy producers from 90 nations, Grand Inga could transform Africa’s power supply, providing “access to affordable and clean electricity to more than 500 millions of Africans who today have none.” But that cannot happen if the power is exported to Europe instead.

Lustgarten offers a practical solution to ensure that Inga’s development offers local benefit: Require the contractors selected to execute Inga projects to build domestic power connections and provide cheap energy to Congolese businesses and schools *before* they initiate energy exports as “a kind of loss-leader”.

Hydropower critic International Rivers suggests that the DRC look instead to small-scale renewable power technologies, as an antidote to the risk of energy

diversion and corruption that comes with energy megaprojects.

“Decentralized energy systems based on wind, solar power and micro hydro projects have a better chance of empowering Africa’s rural populations,” writes International Rivers’ policy director Peter Bosshard in [a blog post this fall](#).

The World Bank, in email responses to *Earthzine*, defends its financing of power-exporting transmission lines linked to the Inga upgrades. The development bank says that increasing local energy supplies is a key criterion for its projects, and argues that Inga upgrades will add about 250,000 residents of Kinshasa to the grid as well as some communities around Inga. But it also acknowledges that the impact will be “relatively minor compared to the enormous needs,” nudging up the DRC’s electrification rate by less than 1%.

## **African Unity Stretched**

On first blush Westcor’s Inga 3 project, with its by-Africans-for-Africans model, might seem to escape Lustgarten’s harsh critique. The first 1,000 MW was to stay in the DRC, and the rest would stay in Africa – primarily South Africa.

Even plans to export to South Africa, however, expose domestic political fault lines in the DRC. Naidoo said as much last summer, according to coverage of his July 2009 talk by South African engineering news outlet [EE Publishers](#). DRC president Kabila strongly supports the South African Development Community (SADC) and Westcor’s Inga project, but others are wary. Naidoo says he recognized the divisions while meeting with DRC officials in Kinshasa last summer. “It came home when one said to me: ‘Who is Kabila? He belongs to you – SADC – you are propping him up here’. It’s virtually an anti-SADC type position that is developing in the region.”

What these arguments miss is the very practical benefits of shared power grids. L. Jac Messerschmidt, a former executive at South Africa's Eskom, wrote in response to Naidoo's revelations on Westcor that, whoever is to blame for wrecking Westcor's vision, all players should remember that the region needs a shared southern African power grid to succeed economically. "Without it, the dreams of the region remain in peril," writes [Messerschmidt in a letter to \*EE Publishers\*](#).

That is as true for South Africa and the DRC as it is for the multinational mining companies currently dividing them such as BHP Billiton. "One day the putative smelters will find themselves without backup power when they need it most," writes Messerschmidt. "The benefits of integrated power grids are obvious to those with long memories."

The World Bank's rap sheet seems to be ever expanding. On April 8, the organization...