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Concerns about methane plague Brazil's Belo Monte dam

Aside from displacing people, the eco-benefits of hydropower are also in question

In tropical areas such as the Amazon, research indicates that hydropower's climate impact can be just as bad as fossil fuels. Environmentalists add that smaller hydroelectric projects may not be any better.

After final approval this June, Brazil has started construction on Belo Monte Dam, a controversial project which would power the world's third-largest hydroelectric plant.

International Rivers, an environmental organization, claims that the Belo Monte dam complex, in Pará state near the Amazon delta, would divert nearly the entire flow of the Xingu River along a 62-mile stretch, creating a 100,000-hectare lake where rainforests currently grow, and displacing 40,000 people.

When completed, the Belo Monte project is expected to have a capacity of 11,000 megawatts, putting it behind China's Three Gorges Dam (22,500 MW) and the Itaipú Dam (14,000 MW) along the border between Brazil and Paraguay.

Indigenous leader Sheyla Yakarepi says she's not sure where her people would go

But scientists say dams, especially those in the tropics, actually produce so much methane that they may not be any "cleaner" than power from fossil fuel sources.

And while the Belo Monte project has been receiving the lion's share of attention, in a country that gets more than two-thirds of its power from dams, smaller projects are increasingly an environmental concern.

Displaced populations

The Xingu River, 2,000 kilometers (1,243 miles) long, flows strong and wide when it reaches the city of Altamira.

Just beyond, along a 100-km curve known as the Volta Grande, or Big Bend, the Brazilian government has started work on a giant lake and canal system, which will direct water to the Belo Monte power plant.

According to biologist Renata Pinheiro, who works with the non-governmental organization Xingu Vivo, 80 percent of the water will be diverted from the Big Bend region.

That means a lot less water for the Juruna indigenous people who live there – a fact that concerns Sheyla Yakarepi, a Juruna leader.

"We will lose our river and its navigational capacity," Yakarepi told Deutsche Welle.

In Altamira, a city of around 100,000, many of the residents will be forced to move – particularly those who live in poorer neighborhoods – some in shacks already built on stilts over the water. Studies suggest that up to a third of the urban area will be flooded.

The dam would flood stretches of the river also used for human subsistence

'Methane factory'

Research suggests that the biological conditions unique in the tropics may prevent hydropower from being any cleaner than electricity derived from fossil fuels.

Philip Fearnside at the National Institute for Amazon Research in Manaus explains the biological process behind this.

The photosynthesis performed by trees takes carbon dioxide out of the atmosphere, storing it in woody mass, Fearnside explained. "And then if it rots on the bottom of the reservoir, it goes back (into the atmosphere) as methane."

"Hydroelectric dams do emit significant amounts of greenhouse gases … [such a dam] is what I call a methane factory," Fearnside told Deutsche Welle.

Teresa Rosa Cativo, secretary of the environment for Pará state, said she was aware of the research institute's findings on methane production, adding to local voices concerned about the dam project.

Norte Energia, the consortium building Belo Monte, also said it was aware of the problem of methane, which is a far more potent greenhouse gas than carbon dioxide, but indicated that this complication was being dealt with.

Spokesperson Joao Pimental said the company planned to reduce these emission by striping the organic material from the part of the river that will be affected by the dam.

"With this action, we will mitigate this impact," Pimental told Deutsche Welle.

Contentious approval

The Belo Monte project was tainted with controversy, even before provisional approval of an environmental permit in April 2010.


The Brazilian Environmental Institute granted final approval for the project in JunePinheiro of Xingu Vivo called Brazilian President Dilma Rousseff's approval of the project a "betrayal" of her popular roots and a "huge deception."
The Inter-American Commission on Human Rights has asked the Roussef administration to stop construction on the dam "to protect the rights of local indigenous communities," demanding serious environmental studies and meaningful consultations with indigenous groups.

Rousseff's administration says it will not heed that request.

Spawning other projects

Many people believe more dams will be built around the Belo Monte complex, as it's expected to have an efficiency of only around 41 percent – low in comparison with other Brazilian hydropower plants.

Pinheiro thinks the dam will work for "only for a few months," per year, adding that "there's no legal instrument by now that really proves the government will do just one dam."

Fearnside estimates that a pair of dams on the Xingu River would emit "an average of 11.2 million tons of carbon-equivalent per year." That's more than the annual emissions of the entire city of Sao Paolo and about four times the amount of greenhouse gas emissions from equivalent fossil fuel production.

By Fearnside's calculations, it would take 41 years for those dams to break even in terms of global warming, or for the dams to produce enough energy to pay off its carbon "debt."

Which means that "dams like these are not green energy or clean energy," Fearnside said.

Size does matter

As construction commences on the Belo Monte mega-project, a proposed network of smaller hydroelectric plants also has champions in the Brazilian legislature, with Rousseff – who was the former mines and energy minister – acting as a key proponent.

Though most attention has focused on Belo Monte, there are more than 200 other dam projects planned in Brazil, according to the National Electric Energy Agency (ANEEL).

But experts, environmental activists and indigenous groups warn that the combined impacts of numerous small hydroelectric dams could be more damaging than a large dam.

The factors that harm a river habitat with large hydropower projects are also at play in small projects: interrupted water flow, barriers to animal movement, water loss from evaporation, and loss of biodiversity from the sacrificed portion of a river.

In addition to the range of environmental problems that large hydro projects cause, small installations often operate in shallower water, and can become easily clogged with silt or overloaded with nutrients.

Methane generation occurs more easily in shallow reservoirs, which are known to be potent emitters.  The Belo Monte dam will displace 40,000 people, including bank settlements

ANEEL says 81 of the 200 smaller projects throughout Brazil would produce around 1,340 MW – about 1 percent of Brazil's total capacity, which for 2010 was 112,400 Megawatts.

Mounting opposition

In the Juruena basin, in northwest Mato Grosso, plans for 83 hydroelectric dams have been registered – the first step in the approval process.

But the federal electric agency suspended 30 of those projects in early July in order to pursue environmental impact studies.

Marcello Salazar, a local organizer and activist in Altamira, says that even if the government proceeds with the construction of this wave of hydroelectric projects, it should conduct thorough environmental research and respect the rights of everyone affected.

And if environmental groups can pressure the government to take a second look before proceeding on the small dams, they feel there may be hope to reexamine the bigger ones.

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