THE NATIONAL BUREAU of ASIAN RESEARCH

POLICY Q&A

AN INTERVIEW WITH BRIAN EYLER AND COURTNEY WEATHERBY

The Role for Hydropower in the Greater Mekong Subregion's Power Sector

Published: OCTOBER 4, 2017

The Greater Mekong Subregion (GMS), which comprises Myanmar, Thailand, Cambodia, Laos, Vietnam, and China's Yunnan Province and Guangxi Zhuang Autonomous Region, has experienced remarkable economic growth in the past decade. Accompanying this trend is an increasing demand for energy, which is projected to rise approximately 80% by 2040. As a result, policymakers are turning to the Mekong River, one of the region's most abundant resources, to power their countries' growing economies and expand energy access.

To explore the role of hydropower in the subregion, NBR spoke with Brian Eyler and Courtney Weatherby of the Stimson Center about their recent report "Letters from the Mekong: Mekong Power Shift—Emerging Trends in the GMS Power Sector." In this Q&A, they comment on key issues and findings presented in the report and explain the complexities of the region's power sector.

What role has hydropower played in policymaking in the GMS? How has this resource benefited less-developed economies such as Laos?

Hydropower development is and has been a key element of national power planning in Vietnam, Laos, and Cambodia. Less-developed countries like Laos and Cambodia have limited domestic access to coal, oil, and natural gas resources, so hydropower serves as a driver of both rural electrification and economic development. Laos in particular depends on income from hydropower sales abroad, and the government's long-term development plan is to become the "battery of Southeast Asia" by exporting excess hydroelectricity to high-demand centers in Thailand and Vietnam.

Hydropower in the GMS has also become increasingly controversial due to the transboundary nature of the Mekong River and the challenge of managing a shared resource when all the riparian countries utilize the river in different and often competing ways. All countries in the region are developing hydropower to some extent in their respective parts of the Mekong Basin. To provide a

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brief summary of a few GMS countries, China has built six mega dams on its reaches of the river in Yunnan Province and has plans to complete thirteen more by 2030. As the most upstream country, China's minimal provision of information to downstream countries and lack of transboundary cooperation has painted it as an irresponsible upstream stakeholder. Laos has plans for nine mainstream dams and more than one hundred tributary dams. Fifty of these are already completed or under construction, including two on the mainstream. Cambodia has plans for two mainstream dams and numerous tributary projects.

However, Cambodia, Thailand, and Laos all rely on migratory fisheries for protein and food security, and the Mekong Delta plays a key role in Vietnam's agricultural economy. Fisheries and agriculture are tied to the uninterrupted flow and natural seasonal cycles of the Mekong River, so the construction of dams that cut off these flows and cycles is an issue of serious concern to many stakeholders downstream.

Could you elaborate on some of the benefits and challenges policymakers must consider when implementing hydropower projects?

Analyzing the benefits and costs of hydropower is extremely complex, because supporters and opponents disagree on a number of basic assumptions. Supporters emphasize the fact that hydropower is renewable, utilizes locally available resources, and can contribute to the electricity supply with minimal carbon emissions and at a competitive price point. Within this framework, hydropower provides cheap electricity that raises living standards and attracts foreign investment to drive local economic growth. Hydropower does so without the air pollution and other climate issues associated with fossil fuel plants and at a historically cheaper price than alternatives like solar or wind. Most governments prefer large-scale hydropower development to meet base-load needs in urbanizing and industrializing areas.

Opponents recognize that large-scale hydropower may be renewable because it relies on the water cycle, but argue that it is not necessarily sustainable because it delivers significant, permanent environmental and social impacts downstream to key biodiversity hotspots. Dams disrupt the natural flow of the river, a free-flowing ecosystem that provides fish, water, and sediment distribution that local communities have relied on for centuries.

Dams often also force communities to relocate as a result of the dam's construction and inundation footprint. Critics point to the significant divergence between who benefits (urban elites, foreign investors, and large power markets) and who bears the costs for these hydropower projects (local villagers, downstream communities, downstream countries, and the environment). More evidence is emerging on how mega dams actually have a significant carbon footprint over their lifespan, primarily due to methane emissions resulting from the breakdown of carbon-rich plants inundated by dam reservoirs. The loss of carbon absorption from forests previously covering the reservoir area and the production of concrete used to construct the dams also contribute to carbon emissions. Further, externalities resulting from dams, if properly accounted for, would likely make large-scale hydropower projects a noncompetitive form of energy production. This is particularly true for the Mekong Basin.

Ultimately, the reality in many countries is that hydropower currently is the most affordable option for providing power. However, there are significant opportunities to improve the way that projects are developed to reduce impacts, such as opening projects to a more transparent bidding process or undertaking more local consultations and studies about impacts early on in the process. Countries should better explore and consider alternative sites for dams and varying designs or operational methods that would limit or mitigate impacts. Considering how multiple

dams affect a landscape, there are ways to improve coordination between different dams in a cascade or reconsider how hydropower fits into the broader energy mix in order to support a diversified market and more sustainably meet growing energy demand.

Breakthroughs in technology and lower costs have reshaped the outlook for renewable energy in many countries. What impact could the integration of renewables such as wind and solar have on national plans for hydropower?

As lower prices for solar and wind technologies become a reality in the Mekong region, we anticipate that these non-hydro renewable electricity sources will start to make up larger portions of national energy portfolios. Our conversations with energy planners in the region have usually revealed two concerns about non-hydro renewable energy: first, it is cost-prohibitive compared with fossil fuels or hydropower; and, second, the variable nature of non-hydro renewable energy makes it unreliable.

Consideration of the historical costs of non-hydro renewables supports the first point, but the renewable energy market is shifting rapidly. Between 2009 and 2016, purchase prices dropped approximately 80% for solar power and 65% for wind. Much of this rapid price drop comes from overproduction in China, evolving national policies that better support grid purchase of solar and wind power, and the emergence of better financing terms to support non-hydro renewables.

The recentness of this price drop means that there are few case studies available for policymakers who are interested in solar and wind technology but want to see that it has been successful in other developing countries before deploying large-scale projects domestically. Once there is a clear verdict on the profitability and reliability of record-setting low-priced solar projects in Chile, Dubai, and nearby India, power planners in the Mekong and other regions will respond accordingly. Investor interest in solar and wind potential in Laos, Cambodia, and Vietnam is already on the rise. This price drop provides a great opportunity for energy planners in Mekong countries to reconsider their future and replace the most damaging dams with other, more sustainable forms of energy generation.

The second concern about reliability in relation to power grids is understandable given the low levels of existing electricity infrastructure throughout the GMS. At a time when Laos, Cambodia, and Myanmar are still significantly expanding their grids and learning effective techniques for grid management, anything that might destabilize a grid is likely viewed as problematic. However, there are many case studies from Europe and the United States about how grids operators have effectively managed variable solar and wind percentages of 30% or higher via operational changes. As most lower Mekong countries will likely be integrating smaller percentages of non-hydro renewables—for instance, 10% or less—grid stability is unlikely to prove a significant near-term challenge. In the long term, capacity building and sharing of lessons learned from the United States and Europe will be key for this, as will investment in smart-grid and metering technology. Eventually storage innovation will likely put an end to the problem of non-hydro renewable reliability.

Several countries in the GMS have the potential to become energy exporters as a result of the abundant availability of renewable and hydropower resources. What barriers exist to realizing this potential?

The main barrier for energy trade in the Mekong region is a lack of sufficient electricity infrastructure. China has excess capacity in Yunnan Province but currently is far from having the transmission infrastructure in place to sell to far-off demand centers

in Bangkok or Ho Chi Minh City. Laos, while aiming to become the "battery of Southeast Asia" through hydropower exports, has limited funds to build out transmission on its own. As a result, it relies on foreign dam developers who generally construct lines connecting specific projects into Thailand's electricity grid. This underprioritizes the development of a national grid in Laos that would support regional energy trade. Cambodia is still expanding its national grid to link with rural areas and has limited connections with Laos and Thailand.

Power connectivity in the region is constrained by both a lack of financial resources and concern over the political sensitivities involved with high levels of energy trade. Unlike its neighbors, China has significant financial resources available to construct a regional grid. The World Bank, Asian Development Bank, and many private investors have also expressed interest in the contributions to economic growth and profits to be made through regional energy trade. It is therefore increasingly likely that this infrastructure gap will be addressed within the next decade, albeit in perhaps a piecemeal manner that lacks a grand vision.

Linking the region's power infrastructure is politically challenging. The GMS has a history of rivalries and mistrust, and current regimes are sensitive to concerns of sovereignty and dependence on neighbors. Smaller countries like Laos and Cambodia are worried that higher degrees of interdependence would allow larger neighbors to influence domestic grid management.

Energy planners in Thailand recognize limits to their domestic energy resources and actively plan to invest in import-oriented energy projects in Laos and Myanmar. In contrast, planners in Vietnam take more of a do-it-yourself approach that prioritizes buying coal from the international market over importing electricity from neighboring countries with which relations are sometimes thorny. Most energy planners tend to lean toward Vietnam's approach due to energy security concerns. In the near-term, bilateral trade agreements will likely compose the first steps toward regional energy trade. If these political issues can be worked out through the creation of a regional power-pool arrangement or multilateral trade agreements, the GMS could pursue a more coordinated infrastructure buildout that would be more efficient and sustainable for all.

How can increasing international cooperation and public-private partnerships aid in achieving energy and economic targets in Laos and the GMS more broadly?

Capacity building and financial assistance will be key for helping GMS countries reach their energy and economic targets. Lessons learned from developed countries' experiences transitioning to national energy portfolios with significant amounts of solar and wind as well as making minor operational adjustments to grid management that better accommodate renewables will serve as useful case studies for GMS energy planners.

For countries in the Mekong region, which are just beginning to deploy these resources, early adoption of new management techniques and modern transmission technologies will help avoid a costly transfer down the road. Equally important is making a compelling financial case for why renewable technologies are good investments. Developed countries with decades of experience investing in renewables have different financing mechanisms, loan terms, and purchase-agreement terms than many GMS countries. Bringing case studies of economically profitable projects and clear analysis of which policies helped make these projects successful will be key in convincing local energy planners that non-hydro renewables are viable alternatives to current energy plans.

The international community possesses the significant human, technological, and financial resources that Mekong region countries (except for

China) do not have at their disposal to aid in this transition. Some support could come as aid from government agencies or loans from multinational development banks, but the private sector should play a major role in scaling up investment in non-hydro renewables. ◈