

A grayscale photograph of a boat on a river with mountains in the background. The boat is in the lower left foreground, moving towards the right. The water is in the middle ground, and the mountains are in the background under a hazy sky.

Letters from the MEKONG

A CALL FOR STRATEGIC, BASIN-WIDE ENERGY PLANNING IN LAOS

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ON THE COVER: Slow boat near the confluence of the Nam Ou and Mekong Rivers in northern Laos.



Sinohydro Dam on the Nam Khan River, which is a tributary to the Mekong River

EXECUTIVE SUMMARY

This issue brief—the third in Stimson’s “Letters from the Mekong” series—continues to challenge the prevailing narrative that the current rapid pace of dam construction on the Mekong River in mainland Southeast Asia will continue until the entire river is turned into a series of reservoirs. Certainly, the construction of even a few large dams will severely impact food security in the world’s most productive freshwater fishery and sharply reduce the delivery of nutrient-rich sediment needed to sustain agriculture, especially in Cambodia and Vietnam’s Mekong Delta. However, our team’s extensive research over a number of years, including site visits and meetings with regional policymakers, provides compelling evidence that not all of the planned dams will be built due to rising political and financial risks, including questions about the validity of current supply and demand projections in the greater Mekong region. As a consequence, we have concluded that it is not yet too late for the adoption of a new approach that optimizes the inescapable “nexus” tradeoffs among energy, export revenues, food security, and fresh water and protects the core ecology of the river system for the benefit of future generations.

In particular, through a continued examination of rising risks and local and regional responses to those risks, we believe that Laos and Cambodia will fall far short of current plans for more than 100 dams on the Mekong mainstream and tributaries. This reality will have particular implications for Laos, which seeks to become the “Battery of Southeast Asia” by setting the export of hydropower to regional markets as its top economic development priority.

In the case of Laos in particular, the reluctant recognition that its dream of damming the Mekong are in jeopardy may cause a reconsideration of its development policy options. Fewer Lao dams will mean that national revenue targets will not be met. Already the government has begun to make overtures for US and other donor assistance in managing the optimization of its hydropower resources. This is not surprising since Lao decision makers depend almost entirely on outside developers to build out its planned portfolio of dams under commercial build-own-operate-transfer (BOOT) concessions for export to neighboring countries. All of these dams are being constructed in a one-off, project-by-project manner with no prior input from the intergovernmental Mekong River Commission (MRC) or neighboring countries, and hence there is little practical opportunity for synergistic planning that could optimize the benefits of water usage on a basin-wide scale.

Because planners cannot see past the next project, it is impossible to determine to what extent the targets for the final power output of either Laos or the basin as a whole are achievable. Further, critical red lines of risk tolerance, particularly toward the environmental and social risks that impede dam construction, are unidentifiable because the government has little stake invested in the projects and derives few resources from the BOOT process to mitigate risk.

By 2020 roughly 30% of the Mekong basin’s power potential in Laos will be tapped by existing dams and those currently under construction. Beyond 2020 the prospect for completing the remaining 70 plus dams planned or under study by the Lao Ministry of Energy and Mines is unknowable. As Lao officials begin to realize they will not necessarily meet their development goals, there will still be time to transition to a basin-wide, strategic energy plan that meets projected revenue goals while minimizing impacts on key environmental flows through a combination of fewer dams and other non-hydropower sources of clean energy generation.

A key pillar of support for a strategic energy plan is investing in a national power grid that can provide reliable export of electricity to regional markets and meet domestic electrification needs. Laos currently has no national grid, which limits its ability to negotiate for favorable prices in regional energy trade. An effective national power grid would provide flexibility to dynamic swings in regional demand and assist Laos in managing a gradually rising excess in hydropower supply. The Asian Development Bank (ADB) has already scoped the design and funding package of a “backbone” grid, with an estimated cost of \$400 million, about one-fifth the cost of the pending Pak Beng dam on the Mekong mainstream.

The Lao government currently lacks the capacity and resources to implement a strategic, basin-wide energy plan. While much of the traditional official development assistance is shifting away from Laos to Myanmar and other parts of the region, a recent warming in the US-Laos relationship has opened the door to discussion of system-scale power optimization and improving stakeholder engagement. By our assessment, US assistance to date is of high quality but low frequency which limits outcomes. To usher in an effective basin-wide energy strategy, the US should dedicate more resources, promote investment in the national power grid, and utilize its leadership in the region to marshal support from other Western donors and regional states like Vietnam. To attract the right kind of energy planning support, the government of Laos should better articulate its actual needs. Investment in a national power grid would be a step in the right direction.

FIVE TRENDS AND FACTORS IN THE NEW NARRATIVE FOR MEKONG HYDROPOWER

Stimson’s October 2015 *New Narrative* report identified five emerging trends and factors that are altering the opportunities for development in the Mekong region:

- Unrelenting criticism from inside and outside the region has successfully reframed the hydropower discussion, forcing developers to go on the defensive and raising international awareness.
- The Mekong River Commission’s stringent and objective technical analysis of projects that substantiated the criticisms of activists and other experts.
- These pressures had tangible impact on the behavior of dam developers for Xayaburi and Don Sahong, making it clear that developers are responsive to civil society.
- As awareness of the growing political and financial risks of Mekong hydropower projects continues to rise among financial institutions and developers, questions emerge about whether all of the proposed projects will gain enough financial and political support to move forward.
- Donor community concerns about the impact of mainstream Mekong dams on food security and livelihoods have grown rather than diminished, fostering greater interest in improving the review process and investing in more sustainable alternative development opportunities for the region.

The full report can be found at [HTTP://WWW.STIMSON.ORG/CONTENT/LETTERS-MEKONG-TIME-NEW-NARRATIVE-MEKONG-HYDROPOWER](http://www.stimson.org/content/letters-mekong-time-new-narrative-mekong-hydropower).

REVISITING STIMSON'S NEW NARRATIVE FOR MEKONG HYDROPOWER DEVELOPMENT

Plans for hydropower development on the Mekong River and its tributaries have long been mired in controversy. The Mekong is second only to the Amazon in biodiversity and aquatic productivity, and more than 60 million people in Laos, Thailand, Cambodia, and Vietnam depend on the river in some manner for their food security and livelihoods. Millions of the region's poorest people depend directly on the river for subsistence fishing and farming. As a transboundary river shared by six countries with differing and often incompatible interests, competing plans for the river's development are a significant threat to the region's hard-earned peace and stability.

The existing inter-governmental basin management organization, the Mekong River Commission (MRC), has a limited mandate and has thus far been unable to effectively resolve disputes over the first two dams proposed for the mainstream in Laos, the Xayaburi and the Don Sahong. At the same time, China has already completed the construction of seven mega-dams on its stretches of the upper Mekong and Laos has embarked on an ambitious plan to generate about 24 GW of hydropower capacity from nine dams on the mainstream and more than 100 dams on tributaries inside its portion of the watershed.

Within this context, it is widely assumed by many Mekong watchers that the Xayaburi and Don Sahong dams are the first of many mainstream projects to move forward, progressively destroying vital ecosystem services and negatively impacting the environment of both local communities and neighboring riparian countries. Our October 2015 report *Time for a New Narrative on Mekong Hydropower* challenged this pessimistic view, highlighting emerging recognition of the financial and political risks that the dams pose among policy-makers and developers and identifying five key factors which challenge the dominant narrative of inevitability. As these manifest over time, the need for a more sustainable development trajectory becomes increasingly more apparent to those directly involved with the hydropower planning process.

This report further develops this theme and explores alternative approaches that would help Laos in particular to more effectively and sustainably achieve its development and revenue export goals with much less impact on the environment and well-being of its own people and downstream neighbors.

Beyond the direct political and financial risks of numerous uncoordinated dam projects on the mainstream and major tributaries in the Lower Mekong Basin, a few additional regional factors are beginning to disrupt the terrain for investment in large hydropower dams and could impact Laos's development plans.

The first is the emergence of Myanmar as a competitor for energy sector investment in mainland Southeast Asia. Myanmar has 100 GW of hydropower potential which is magnitudes more than even the highest estimates of Laos's hydropower potential. As Myanmar pursues a national plan for energy development, interest and funding are shifting there from other parts of the region in response. Myanmar is also making progress on governance, global integration, and democratization, all of which may make it a politically appealing investment location for multinational investment banks and Western donors. These projects will compete strongly for financing that may previously have flowed towards projects in Laos.

The second major factor is the ongoing economic slowdown in China. Prior to the Xi administration, Chinese policy banks such as China's Export Import Bank and China Development Bank were given political mandates to support projects abroad in strategic sectors. With slowing growth, the Chinese government's concern over its rising stock of non-performing loans is growing. This has prompted greater consideration of risks by both regulators and investors. The end result may be a drop in loans for risky hydropower projects. Anecdotal evidence shows this is already happening: China Export Import Bank has put a hold on loans for six hydropower projects in Myanmar until a final decision is made on the controversial Myitsone Dam.⁷ In Laos, Chinese developers are postponing the construction of some tributary dams due to the inability of Chinese banks to follow up on funding commitments.⁸

A third major factor is the emergence of rising standards regarding environmental governance in the region. The policy conversation concerning tradeoffs between development and environmental protection has significantly shifted in Myanmar and Cambodia in recent years, as concerns over natural resource management and access, land issues, and conservation have become linked to questions of political legitimacy. In both cases, these public pressures and electoral processes led to a push for new laws: Myanmar published improved Environmental Impact Assessment (EIA) Procedures in 2016,⁹ and Cambodia is working on a draft EIA law and Environmental Code to streamline enforcement.¹⁰ As these improvements begin to have on-the-ground impacts addressing challenges in Myanmar and Cambodia, awareness of these shifts may travel across borders. While Laos is not similarly subject to public pressure because it is an authoritarian regime with limited civil society movements, widespread public discontent could pose a challenge in the future.

The final factor is the severe drought in 2016, which highlighted the need for a more coordinated approach to water management throughout the basin. Food security and livelihoods throughout the region have been deeply affected, particularly in Vietnam's Mekong Delta, which produces more than half of Vietnam's rice crop and up to 90% of its rice exports. The Delta was hit by the worst drought in 90 years of data collection, with up to half of its rice paddy affected by encroaching salinization due to a drop in freshwater flow.¹¹ In Thailand the 2016 drought prompted the government to announce intensive irrigation plans to draw water from the Mekong tributary system when domestic reservoirs ran dry.¹² This announcement stirred regional controversy as the diversion of water was done without consulting Vietnam or Cambodia.

In theory, strategically planned and operated dams have the ability to provide water in times of drought or hold back water to provide flood control. However, nearly all of the Lower Mekong dams are so-called "run-of-river" dams designed to be operated

7 Interview with officials from the State Power Investment Corporation, Kunming, China, October 2015.

8 Private conversation with hydropower developer, Phnom Penh, Cambodia, October 2015.

9 Htoo Thant, "New environmental impact rules released," *The Myanmar Times*, January 15, 2016.

10 Interview with members of Vishnu Law Group, the private firm responsible for coordinating the draft law consultation meetings, Phnom Penh, Cambodia, October 2015.

11 Agence France Presse, "Vietnam hit by worst drought in 90 years," *Channel News Asia*, March 1, 2016.

12 "Thailand plans steps worth \$285 million to help drought-hit rice farmers," *Business Insider*, February 26, 2016; and Tan Hui Yee, "Drought hit Thailand taps Mekong water," *Straits Times*, February 20, 2016.

exclusively for electricity generation with no functionality for regulating river flow. Their reservoir volume is only adequate to operate a few days or at most a week or two without replenishment, and so drought relief requires cooperation with upstream storage dams in China. The current lack of coordination in the Mekong hampers the region's ability to effectively respond to drought or floods.

The damage of the El Nino-induced drought is just an example of what will happen in the future if regional cooperation does not improve. Policy-makers are responding: Cambodia and Vietnam have amplified their calls for increased regional coordination and requested assistance from China upstream for upstream water release. Even the Lao government is recognizing that its current approach for damming the Mekong will face future challenges and needs to evolve. The following section demonstrates how the lack of coordinated planning for hydropower development in Laos exposes risk and makes a case for a broader strategic approach to energy development that more effectively optimizes the use of water, energy, and food resources in Laos.



ABOVE: Severe drought cripples Mekong Delta rice fields in April 2016.

A CALL FOR BASIN-WIDE STRATEGIC ENERGY PLANNING IN LAOS

Due to limited planning capacity and over-dependence on partnerships with foreign lenders, investors, and developers, energy infrastructure in Laos is highly inefficient and mostly constructed for the benefit of neighboring countries. Both hydropower dams and transmission lines are now being financed and built by the foreign private sector, especially Thai developers, Thai state-owned banks, the Electrical Generating Authority of Thailand (EGAT), and Chinese state-owned banks and state-owned enterprises.

This is a far cry from the original scheme of the Mekong Committee established following World War II, whose planning for mainstream dams and large tributaries was carried out under the framework of an existing 1923 convention on the development of hydraulic power affecting one or more states. The convention was signed by Thailand and by France, speaking for the three French colonies of Indochina. The system of dams was designed to strike a balance between regional needs for power generation, flood control, and irrigation for agriculture. The plan was to construct a gigantic Tennessee Valley Authority type project in the Lower Mekong, with the dams and network of transmission lines as property of the Mekong Committee.⁷ However, these plans were first suspended and then abandoned during the Vietnam War.

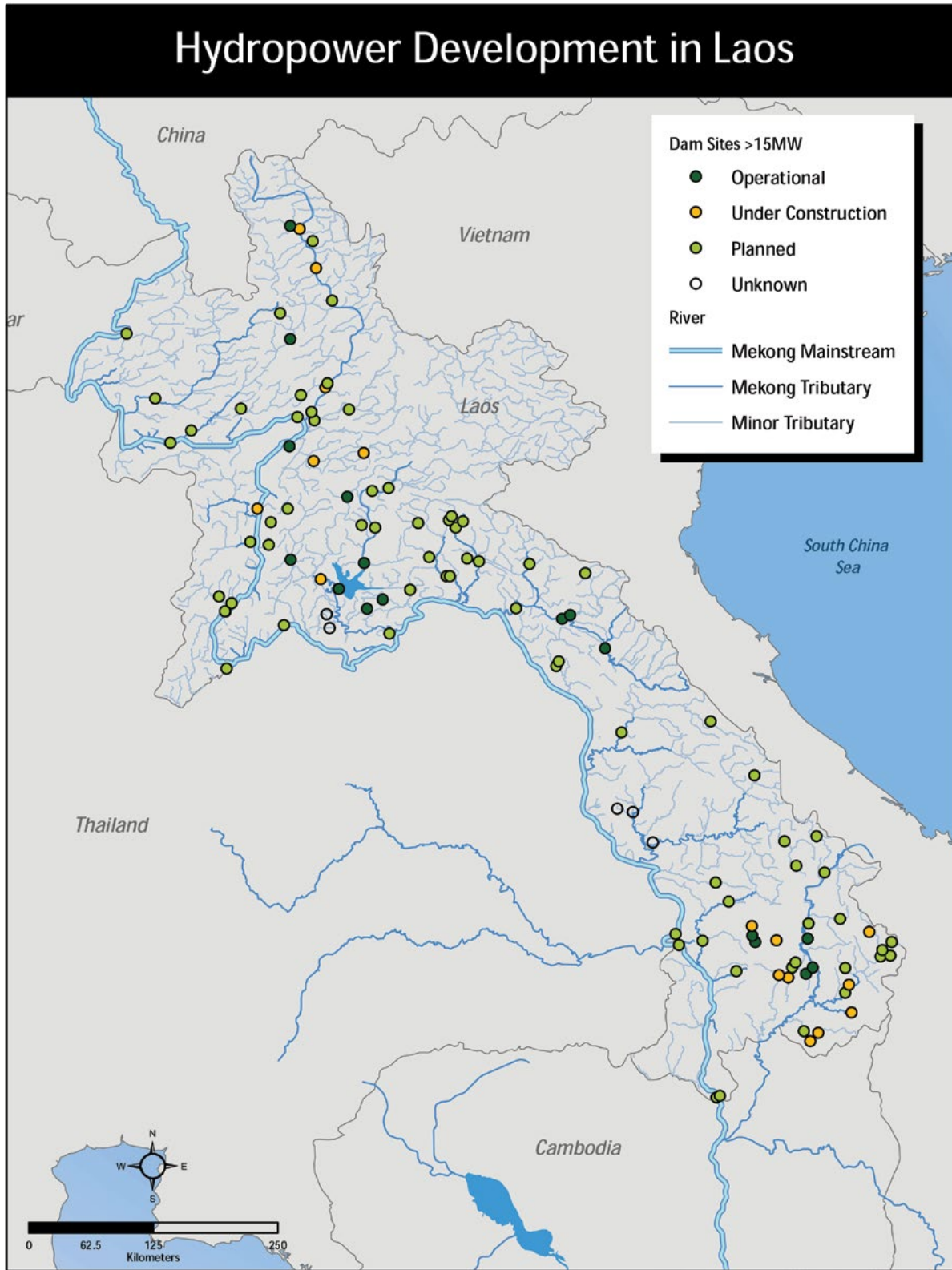
Hydropower development in the region remained stalled for decades. Laos largely stood still economically in the 1980s and early 1990s as a consequence of counterproductive socialist-style development policies, the collapse of the Soviet Union, and an unfavorable environment for development assistance from the World Bank, the ADB, as well as Japan and most Western donor countries. In the late 1980s, following the example of Chinese and Vietnamese economic liberalization measures, the Lao government adopted a New Economic Mechanism and embarked on a hydropower development program based mainly on private sector investment in Build-Own-Operate-Transfer (BOOT) dam projects.

Every operational Lao dam above 120 MW is a foreign-invested and/or internationally financed project built primarily for the export of electricity to a neighboring country. This is true even for Laos's first hydropower dam, the 155 MW Nam Ngum dam that began generating electricity in 1971 and was built by Japanese contractors under UN auspices with financing from 10 international donors, including the US, Japan, ADB and others. Although this dam provided all the electricity consumed in the Lao capital, Vientiane, it also exported 65-80 percent of its output to Thailand.⁸

With the exception of the highly controversial Nam Theun-2 dam project, since the mid-1980s there has been a general shift in Laos away from projects funded by the World Bank, ADB, and other sources of concessional loans with below market interest and long repayment terms towards so-called “public-private” or totally private projects financed by commercial banks or state-owned lenders, often from Thai and Chinese developers and

7 Dante Augusto Caponera, National and International Law Administration. Kluwer Law International, 2003.

8 Southeast Asia Technology Co. et al., “Study of Large Dams and Recommended Practices: Final Report,” Asian Development Bank, September 2002, at p. 2-17.



Map courtesy of Allison Carr, using the data set “Greater Mekong Subregion hydropower dams” taken from <https://maphubs.com>.

banks.⁹ Most of the dams constructed in Laos are profit-oriented investments backed by commercial banks or state-owned export-import banks that provide loans to support the export of equipment or services to the projects. For instance, the Xayaburi dam project has been largely financed by the four largest Thai banks backed by a 29-year Power Purchase Agreement (PPA) for 95 percent of the electricity generated by the project.

This shift to commercial opportunity projects backed mostly by non-concessional loans from foreign private and state-owned development banks has greatly weakened the potential for synergistic projects that could be designed to optimize the energy-food-water nexus on a basin-wide scale.

SUMMARY DATA FOR LAO DAMS >15 MW			
STATUS	NUMBER OF PROJECTS	TOTAL CAPACITY (MW)	PERCENT OF TOTAL DAMS
Completed	29	3328.95	14.51%
Currently under construction	26	4145	18.07%
To begin construction prior 2020	9	1487	6.48%
To begin construction after 2020	24	3816.9	16.64%
Feasibility study approved	13	1973.9	8.60%
Under feasibility study	39	8192	35.70%
TOTAL	140	22943.75	100.00%

Under the current arrangement, the Lao government seeks short-term benefits from the exploitation of its hydropower potential through a project-by-project approach to development rather than a long-term, coordinated strategy based on balancing the tradeoffs among energy, revenues, the environment, food security and livelihoods on a basin scale.

Despite the lack of a coordinated strategy, thus far this project-by-project approach has been effective in attracting developers and investors to sign MOUs and concession agreements with the Lao government for most of the 100+ potential dam sites. Currently 29 large dam projects (>15MW) are completed with 26 more currently under construction. Yet the process is unbalanced because it injudiciously facilitates the current needs of investors, which are narrow, relatively short-term, and driven by the bottom line, over the current and future needs of the state, which are broad and diffuse and

*Source: Laos Ministry of Energy and mines website. The website also lists 270 projects with capacity less than 15 MW for a combined total of 1826 MW.

9 Francois Molle, Tira Foran, Mira Kakonen (Eds.), *Contested Waterscapes in the Mekong Region: Hydropower, Livelihoods and Governance*. Earthscan, 2009 (London, Sterling, VA; In Association with the International Institute for Environment and Development), p. 33-36.

ultimately require an optimization of tradeoffs between energy generation, changes to environmental flow, and effects on livelihoods.

As river basin development continues, the level of cumulative risk—whether from political, financial, environmental, or social arenas—inevitably increases over time. More dams equate to more risks to be managed. As basin development proceeds, countries with effective governance institutions follow a learning curve in response to the increase of risk. For example, if previously built projects generate lower revenues or incur higher than expected maintenance costs, decision makers will become less enthusiastic about future dams. If environmental flows, such as fish spawning and migration or sediment transfer, are affected to the extent that costs are borne directly by the local population, a government whose legitimacy depends on popular support and credibility will seek to ensure that future projects have better outcomes or are not built at all. Likewise, the cost of resettlement of people displaced by projects also tends to increase over time as government programs respond more adequately to the actual welfare needs of resettled peoples.

The cumulative risk and increases in the costs of tools necessary to manage that risk translates into an outcome in which the damming of rivers rarely reaches its expected potential. According to The Nature Conservancy, river basin development rarely builds out to 100% of all proposed dams, often completing development at a rate of 40-70%. Although this rate might be viewed as only partially complete by a country that is in the midst of constructing hydropower, it is actually comparable to what is seen in fully exploited river basins around the globe.¹⁰

In the poorest and least developed countries, and in countries like China and India which have taken an extremely rapid approach to hydropower development, these growing risks usually are not immediately understood by the leaders who see their legitimacy as dependent on broad measures of economic progress such as increasing large infrastructure projects and accelerating GDP growth. In Laos, Cambodia and Myanmar, for instance, dam projects generally are structured as concessions, with development rights granted to foreign developers who finance and build the projects and own and operate them over a period of decades for profit. The host government contributes little or no capital to the project, but benefits from a share of revenues from the sale of the electricity, primarily to neighboring countries, and taxes.

In countries, where the project-by-project approach dominates, the government's calculation of risk is a tricky task as the state is held hostage by the decisions of foreign developers and banks, who hold major leverage over the terms of their investments. In other words, the actual timeline for the development of the Mekong basin is largely determined less by the government—which still must give the necessary approvals before construction can begin—than by the developers, who need to gain the necessary financing. Therefore, it is difficult for the government to determine when the next dam will be built let alone when its broad energy plans will be fully realized.

Without an accurate plan, decision makers cannot effectively optimize the aggregate output of the basin, and thus cannot determine a future flow of revenue, which contributes to into a national economic development plan. The future is defined by uncertain estimations

10 Dr. Jeff Opperman, Dr. Gunther Grill, and Dr. Joergg Hartman, *The Power of Rivers: Finding balance between energy and conservation in hydropower development*, The Nature Conservancy, 2015, p.21.

and proxies. According to one senior engineer at the Mekong River Commission, Laos is likely to only build 5 of the 9 proposed mainstream dams: Pak Beng, Xayaburi, Pak Lai, Sanakham, and Don Sahong which account for roughly 50% of the power generation capacity under the current plan.¹¹ What if 50% is the final power generation outcome for the entire basin? The Lao government would only gain revenue from 12 GW instead of the anticipated 24 GW. This outcome leaves much to be desired in a country strapped for income to stimulate economic growth and stave off macroeconomic challenges.

Further, with the project-by-project approach, future risks are only revealed as the process unfolds. Critical red lines for tolerance of environmental, social, and political risk, if the governments even have them, can only be vaguely defined and estimated. For example, the effect of fish and sediment mitigation is guesswork at best because environmental assessors do not have enough information to accurately determine cumulative impacts and interactions between future projects and the dams currently under construction. Without a plan from which adequate and reliable data can be derived, decision makers cannot assign values to the negative impacts, or tradeoffs, brought forward by the damming process.

The Lao government has a dual interest in maximizing power generation to meet revenue targets and minimizing political, social, and environmental risks related to individual hydropower projects and basin development overall. Without coordination, the inherent conflict between these interests cannot be rationally reconciled. Going full steam ahead with the project-by-project approach to hydropower development will only cause social and environmental risks to be borne at a more rapid rate, translating into political risk for decision makers. Also, if Laos's dams are not sited in a strategic manner that considers both coordination and tradeoffs at a basin scale, the resultant future will be suboptimal for energy production but could still negatively impact many or all of the critical environmental flows to the river basin, creating a mess for future generations in Laos and upsetting the balance of regional security.

In other words, the project-by-project approach in Laos has created a situation that is likely to fall far short of revenue goals while at the same time lays ruin to downstream agricultural outputs and fish catches in Vietnam and Cambodia. However, by 2020 only 30% of the basin's potential will have been tapped according to the current development plan. All other things being equal, there is still time to transition from the project-by-project approach to a strategic basin-scale approach to energy development in Laos.¹²

11 Interview with MRC senior hydropower engineer, Phnom Penh, Cambodia, November 2015.

12 But other factors are involved, especially that there is not a one-for-one relationship between the number of dams and the proportion of the river system's total environmental services that are degraded.

THE NATURE CONSERVANCY'S HYDROPOWER BY DESIGN APPROACH TO SYSTEM-SCALE ENERGY PLANNING

The Nature Conservancy's Hydropower by Design (HbD) approach to system-scale energy planning is one method that could be a valuable resource for decision makers in Laos. It looks at an entire system, e.g. a river basin, and the impacts that individual projects will have both upstream and downstream on a variety of vectors, including fisheries, agriculture, energy production, etc. HbD has already been applied to basin development in Brazil, Columbia, and Mexico. HbD works to:

- Identify and avoid the most damaging hydropower dam sites and direct development toward sites that will have lower impacts through upstream system-scale planning;
- minimize impacts and restore key river functions through better design and operation of individual dams;
- and offset those impacts that cannot be avoided, minimized, or restored by investing in compensation such as protection and management of nearby rivers that provide similar benefits.

Read more at [HTTP://WWW.NATURE.ORG/MEDIA/FRESHWATER/POWER-OF-RIVERS-REPORT.PDF](http://www.nature.org/media/freshwater/power-of-rivers-report.pdf)

IS LAOS BUILDING TOO MANY DAMS?

Laos has chosen this opportunistic, project-by-project approach due to financial and capacity constraints and the belief that developing hydropower primarily for export will help meet revenue needs in ways that the domestic energy market could not. Laos's plans for development are entirely premised on the concept that it can sell the vast majority of its 24 GW of potential hydropower electricity to neighbors.

Two potential complications arise: the first is uncertainty whether the anticipated level demand for imported hydropower from Laos will be there in the future, and the second is whether the necessary infrastructure and policies will be in place to handle demand side shocks. Economic benefits from hydropower projects are premised on the assumption that they will be competitive in the long-term, as most projects have lifespans of fifty years or more. However, regional demand dynamics are shifting.

Myanmar, which currently imports electricity via its border with Laos, is working on a strategic energy plan to develop its 100 GW of hydropower potential alongside its significant natural gas deposits, oil reserves, and solar potential. In the longer term Myanmar will likely become a primary competitor in the regional energy market rather than a purchaser of Lao hydropower. This is particularly true for Thailand, which shares a long border with Myanmar and is already exploring PPAs for a large number of projects along the Salween River.

Thailand has the highest electricity use per capita in mainland Southeast Asia and is currently the primary purchaser of Lao hydropower. Thailand's investment in hydropower projects in Laos and Myanmar is primarily driven by a push for diversification away from natural gas and is premised on expectations that Thailand's energy demand will continue to rise. However, Thai authorities have a history of wildly overestimating the necessary reserve, with reserve margins in the 2015 Power Development Plan as high as 39% higher than projected demand for some years.¹³ Thailand can save significant amounts of energy consumption through 2036, as by adopting and implementing better energy efficiency standards. Major studies identify a potential savings between 9 and 27% of total energy consumption compared to a business-as-usual scenario.¹⁴ If Thailand stringently implements energy savings measures, overall energy demand would significantly diminish and would impact demand for future imports from Laos.

Cambodia imports approximately 37% of its electricity and depends largely on imported diesel fuel to run generators domestically. Electricity prices are among the highest in ASEAN: urban residents pay up to 25 c/kWh in Phnom Penh while until 2012 rural residents paid up to 80 c/kWh.¹⁵ Despite the high prices, demand has risen 20% annually

13 Paritta Wangkiat, "Critics say emissions vow 'a pipe dream,'" *Bangkok Post*, December 5, 2015.

14 Savings of 9 and 24% are referenced in Asian Development Bank, *Energy Efficiency Developments and Potential Energy Savings in the Greater Mekong Subregion*, 2015, p. 49; the 27% savings scenario includes more ambitious energy efficiency measures and is laid out in WWF (World Wide Fund for Nature), *Thailand Power Sector Vision 2050*, May 2016, p. 138.

15 Kongchheng Poch and Savong Tuy, "Cambodia's Electricity Sector in the Context of Regional Electricity Market Integration," from *Energy Market Integration in East Asia: Theories, Electricity Sector and Subsidies*, Wu, Y., X. Shi, and F. Kimura (eds.), ERIA Research Project Report 2011-17, Jakarta: ERIA, pp.141-172, found on p. 141.



*Electricity transmission
lines in northern Vietnam*

since 2010, putting pressure on the government to build out supply.¹⁶ Cambodia should be a potential buyer of Lao hydropower, but concerns about energy security and dependency have pushed many decision-makers to prefer domestic hydropower and the potential development of offshore natural gas deposits over imports from Laos.¹⁷

Considering these regional energy trends, Vietnam stands out as potentially the largest future market for electricity from Laos. Primarily due to industrial development, Vietnam's electricity consumption has steadily increased by 10-12% per year over the last decade, putting significant pressure on the national grid.¹⁸ As one of the world's fastest growing economies, Vietnam's year-on-year energy growth is estimated to increase by 7-10% through 2030. This projection does not account for any additional stimulative effect of the Trans-Pacific Partnership or the impacts from an increased shift of manufacturing and other heavily energy-intensive industries out of China.¹⁹ Vietnam's current per-capita electricity use is only one third that of China, a sign there is significant unmet demand.

The continuation of Vietnam's current rate of GDP growth will require further investments in generation and will force major shifts in Vietnam's domestic market. Previously, Vietnam had been a net exporter of energy through selling to Cambodia and exporting its significant coal reserves. Exports peaked in 2006 and began shrinking due to rising domestic demand, and Vietnam started transitioning from a net coal exporter to a net coal importer in 2015, two years earlier than originally anticipated.²⁰ While current electricity trade with Laos is limited due to a lack of infrastructure and pricing differences, Vietnam will likely be a significant market for electricity produced in Laos in the future as Vietnam's economic growth leads to willingness to pay more for imported electricity.

Vietnam has planned for this expected demand growth in its Power Development Plan VII, which was updated in March 2016 to account for slight changes in anticipated demand growth but anticipates that the economy will be consuming 129,500 MW of energy demand by 2030.²¹ The updated plan includes concerns about market pressures and climate change impacts by providing more resources for renewable energy, nuclear energy, and eliminating 23 GW of proposed coal power plants. However, coal will still play a major role, growing from 28% of national energy generation in 2014 to more than 50% in 2030.²²

16 WWF, *Cambodia Power Sector Vision*, May 2016, p.5.

17 Private conversation with officials from Cambodia's Ministry of Environment, Phnom Penh, Cambodia, October 2015.

18 Statistics here taken from Oxford Business Group, "[Vietnam to augment power generation](#)," April 30, 2016.

19 Interview with World Bank official, Hanoi, Vietnam, March 2016.

20 Vu Trong Khanh, "[Vietnam coal imports poised for possible early start](#)," Wall Street Journal, August 14, 2014.

21 Doan Phac Le, *Vietnam Presentation at the Technical Meeting on Country Nuclear Power Profiles*, International Atomic Energy Association, Vienna, Austria, May 10-13, 2016, slide 18.

22 Current figures taken from Ministry of Industry and Trade (MOIT), General Directorate of Energy, "[Vietnam Energy Policy](#)," August 2015, slide 7. Analysis of Power Development Plan VII projections taken from Nguy Thi Khanh, "[Vietnam needs a 21st century electricity plan](#)," *RenewEconomy*, May 23, 2016.

These updated energy plans are primarily focused on meeting demand growth with domestic resources, and fail to fully account for regional trade opportunities. In principle, Vietnam has a MOU with Laos dating from 2008 to purchase 5,000 MW of electricity from Laos by 2020.²³ However, while the revised PDP VII includes imports, they are only ever projected to meet 2.4% of demand in 2020 before falling to 1.2% by 2030.²⁴ At the peak, the plans only include an estimated 860 MW from Laos in 2020.²⁵ This is almost negligible considering Laos's significant hydropower potential and the relative affordability of its export pricing, and shows that the PDP VII failed to fully account for the potential for importing hydropower, even the 5,000 MW that Vietnam committed to buying in the 2008 MOU. Vietnam's energy prices are estimated to rise to 9.2 c/kWh by 2020 due to the higher cost of using imported coal and accounting for improvements to environmental impact mitigation. This would not only make imports from Laos affordable at 6-7 c/kWh but could also support electricity produced by solar generation, which currently hits around 7.2c/kWh in Vietnam.²⁶ As Vietnam grows its total energy supply, purchasing power from Electricite du Laos (EDL) could potentially help supply much-needed energy at economically feasible costs and have a lower environmental cost than Vietnam's anticipated investment in additional coal plants.

23 Xaypaseuth Phomsoupha, "Hydropower Development Plans and Progress in Lao PDR," *HydroNepal*, Issue No. 4, January 2009.

24 Doan Phac Le, slide 20.

25 MOIT, slide 13.

26 Private conversation with World Bank official, Hanoi, Vietnam, March 2016.

MAKING THE CASE FOR A LAO NATIONAL POWER GRID

The main obstacle to Laos selling electricity to Vietnam or further afield is the lack of a reliable and built-out national grid infrastructure that would support a flexible response to demand fluctuations from neighboring countries and support integration of intermittent solar and wind projects on a larger scale. As of 2016, Laos has limited interconnections with all of its neighbors, but—with the exception of Thailand—most of these lines are low-efficiency. Laos's lack of high-voltage transmission lines is due to a lack of funds rather than a lack of interest.²⁷ In order for Laos to effectively export electricity to its neighbors, these lines will need significant upgrades.

The infrastructure problem has become widely recognized among Lao officials, who not only seek greater flexibility but also struggle to predict or maximize revenues from the current sale of power. While Laos' domestic electrification rate has improved significantly in the last decade, electricity demand in Laos remains fairly low. As of 2013 the per-capita annual average was only 500 kWh/year, compared to per-capita use of 1,306 kWh in Vietnam, 2,472 in Thailand, and 3,762 in China.²⁸

Despite the significant scope for domestic household and industrial rates in electricity use to rise, Lao officials are struggling to decide how best to effectively deploy an anticipated surplus of electricity starting in 2017. The anticipated excess results partly from project power purchasing agreements, which send the majority of the power abroad but allots 5% to Laos for domestic use. By 2017, the aggregate 5% contributions from the 30 dams already completed in Laos will have created an excess capacity of 3-4 GW of power.²⁹ Without a more efficient transmission system and sales approach linking to export markets, this excess will not be economically productive because there will be no market for it.

The unchecked proliferation of small hydropower projects (<15 MW) has also contributed to the excess supply. Currently the Lao Ministry of Energy and Mines website lists 240 small projects under construction or under feasibility study combining for a total of 1,826 MW in generative capacity, or about 8% of the Mekong basin's total potential. Unlike large dams, for which approval is required at the national level in Laos, small hydropower projects are only subject to the approval of provincial governments. This makes for easier financing but also makes it easy to skirt environmental impact assessments and other key regulatory standards. The lax central control over small hydropower also suggests that the Ministry of Energy and Mines has only accounted for a portion of these projects.

To support improved management of electricity inputs and revenue, the central Lao government decreed in 2013 that for future concession agreements, Electricite du Laos (EDL) would begin playing a role as the sole purchaser and seller of power generated

27 Private conversations with Ministry of Energy and Mines officials, Vientiane, Laos, August 2014 and March 2016.

28 Laos per capita kWh figures are taken from Intelligent Energy Systems, *Alternatives for Power Generation in the Greater Mekong Subregion: Volume 3, Power Sector Vision for the Lao People's Democratic Republic*, March 20, 2016, p. 10. Data for other countries is from the World Bank, *Electric power consumption (kWh per capita)*, 2014.

29 Interview with World Bank energy experts, March 2016.

Existing Lao power system in 2013

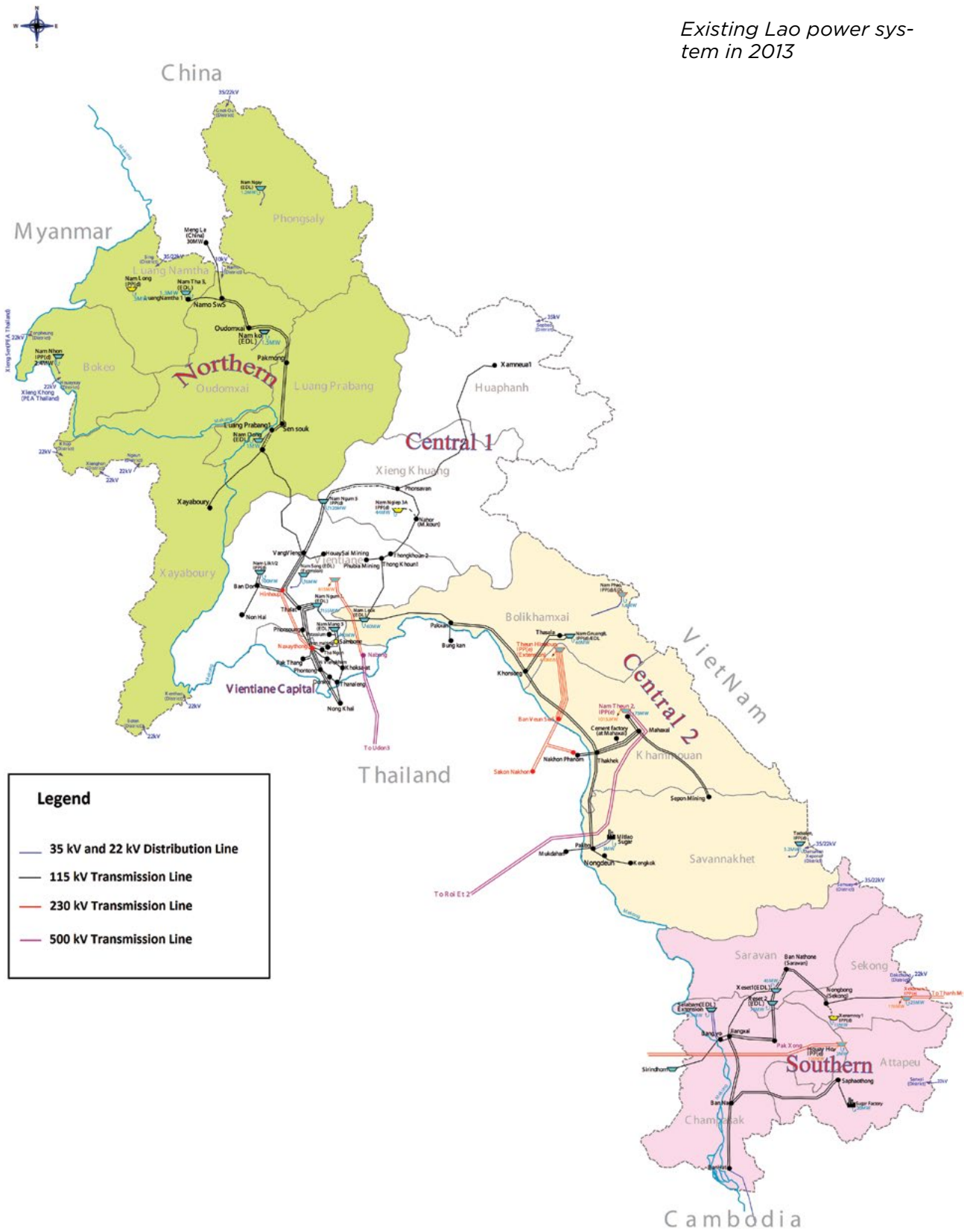


Image taken from Electricite du Laos, Technical Department, Power System Planning Office, Long-Term Power Development Plan 2012-2020: Existing Power System Diagram in 2013, as of May 31, 2013.

from individual projects. Before the decree, it was common practice for electric utilities in Thailand and Vietnam to sign independent power purchasing agreements with individual projects, constructing transmission lines directly across the border to connect with foreign grids. In many cases, the ADB, the World Bank, and Japan's aid agency have financed the mostly 500 kV (kilovolt) transmission links from the Lao substation to the first substation in the neighboring country. Under the previous arrangement, the Lao government was responsible for maintaining the lines, roads, and other infrastructure to these projects, but since power was sold directly from the project developer to the market abroad, the government was not generating enough revenue for upkeep.

The regulatory change gives EDL an increasingly important role in the market, positioning EDL to aggregate power from a variety of inputs—including micro-hydro as well as larger projects intended for export—and sell it across the border in a system-to-system transfer.³⁰ As this policy is more widely implemented, EDL will be positioned as a central player with potential to wrest control of the pricing process away from importing countries in order to provide the key revenue flows necessary to maintain infrastructure around dams and support expansion of the national grid.

Yet this change came with inadequate preparation as EDL lacks the critical capacity and negotiating power to be an effective regulatory body. Since Laos itself has only fractional investments in most export-oriented projects and provides little or no value added, the hard currency earnings are significant primarily in comparison with the small size of total government revenues. In financial parlance, Laos is a “market-taker,” not a “market-maker”. The lack of a domestically built-out distribution system requires dependence on neighboring countries' grids for transmitting electricity, and will inhibit EDL's ability to effectively negotiate sale prices with neighboring markets. Since Laos currently lacks such infrastructure, purchasing prices from domestic projects and selling prices to export markets remain at a near parity, and EDL must continue to be supported by the Lao government through subsidies to maintain viability.

Despite the construction of scores of dam projects and rising power production and exports, Laos's electricity distribution infrastructure is poor. Laos does not have a national electric grid. EDL's transmission network is fragmented into largely unconnected its sub-grids.³¹ The Lao grids also sell and buy power over low voltage connections along geographically convenient parts of country's borders with Cambodia, China's Yunnan Province and Thailand, plus several cross-border 220 kV connections to the Thai grid also transmit electricity to high demand areas in Laos. In addition, Laos and Vietnam have just completed a project linking the Lao Xekaman-1 dam to Pleiku, Vietnam over a 220 kV transmission line.³² The Lao government has not prioritized funding to connect the sub-grids. Applications for funding from the Asian Development Bank to connect the Lao and Vietnam grids have largely reached a standstill over the failure for both Laos and Vietnam to meet environmental and social safeguards.

30 Email interview with World Bank Official, September 2016.

31 Dandu V.S.N. Raju and M Manoj Kumar, “Laos expands the grid,” *Transmission & Distribution*, Nov. 25, 2013; ADB, Evaluation Study: Energy Sector in the Lao People's Democratic Republic. Reference Number: SAP: LAO 2010-42, October 2010pp. ii, 4

32 Vietnam Energy online, “Pleiku's 500 kV Transformers Ready to Receive Power from Laos,” June 16, 2016.

Because EDL lacks the investment and capacity to develop a national grid to support rural electrification and more efficient system-to-system transfers, project operators must front the initial capital expenses for transmission infrastructure. As a result, Laos's power grid is currently being built out in a hodgepodge fashion using an uncoordinated mix of equipment, technologies, and standards. When dam projects are turned over to the Lao government after the concession agreement expires, developers will likely seek compensation for their investment in transmission infrastructure.³³ It is unclear whether the Lao government will have the funds to provide this compensation or has built this future outlay of expenditure into its calculation of net national revenues.

The weakness of Laos's existing patchwork of small grids is why the ADB's number one bilateral investment project for Laos is the "Design and Funding of a Background Grid for the Lao PDR." The project would involve "completing the north-south 500 kV line in the Lao PDR, to enable the Lao national grid to transmit power across the country and provide high value-added services from its hydropower plants to neighbors in the Greater Mekong Subregion (GMS)." The project summary states that the 500 kV line will make it possible for Laos to more efficiently supply power to surrounding export markets and rural areas while supporting the development of a regional electrical power grid.³⁴



ABOVE: Nam Ou tributary dam and connecting transmission lines.

33 Presentation by DFDL Legal and Tax at HydroAsia conference, Vientiane, Laos, March 3, 2016.

34 ADB GMS Secretariat, *Regional Investment Framework: Pipeline of Potential Projects (2013–2022)*, Vientiane, Laos, Dec. 10-11 2013, p. 30.

Without a modernized hybrid or full national grid, the series of dedicated high voltage lines to Thailand from Thai and other foreign invested dams cannot be used to support Laos's economic growth except for associated hard currency revenues. All other things being equal, a slowdown of Thai demand would seriously impact Laos's ability to import necessary goods and service its already high debt. Recently Laos had only had enough hard currency to support two months' worth of imports.

The design of a Lao national electric power grid could take two different forms: 1) a 500 kV trunk line connecting existing and planned sub-grids; or 2) a fully built-out grid designed to eliminate most electricity imports and meet projected future demand for mining and light industry. Investments in other renewable power generation sources could be oriented to plug into the grid. The cost-benefit ratio for a hybrid system of north-south 500 kV trunk lines linking four upgraded area grids or a fully developed national grid should be very favorable. The ADB prioritizes the design and funding of a "backbone" grid, with an estimated cost of \$400 million.³⁵ This amounts to the cost one medium-sized dam of 100 MW or about one fifth of the cost of the pending Pak Beng dam.

Of equal note, the ADB's second priority investment in Laos's energy infrastructure is a reconsideration of a plan to connect the Thai and Vietnamese markets via Laos, as part of the ADB's larger and slow-moving scheme for a regional power market. This would support power sharing and better integrate Laos into the regional market, reducing the need for each country to maintain high power reserves, lowering costs, and building more confidence in the plans for a regional power market.³⁶ Early steps have been made towards grid integration, including the September 2016 MOU for Laos to export energy to Malaysia via Thailand, but implementation has been slow.³⁷

The likelihood that not all of the planned dams may go forward opens up a new opportunity for Laos to reconsider its current commitment to all nine of its planned Mekong dams and explore a more environmentally sustainable and less regionally divisive strategy for achieving its revenue and economic development objectives with both ODA donors and commercial developers. One of the most important advantages of a regional power grid is that as an ADB-led project, it could be largely financed from concessional loans—i.e., with below-market interest rates, delays in interest payments until the project is completed, and long repayment periods.

Given that all development decisions are political as well as financial and economic, a hybrid or full national electric power grid would also increase both feasibility and attractiveness of true renewable energy. At present solar and wind depend mostly on local initiative, as EDL cannot provide the needed back-up power to many parts of the country. The fact that the grid project would be a central government project benefitting the state-owned utility would make the grid politically attractive and also increase the political attractiveness of non-hydro renewables that could rely on EDL-supplied power as backup.

35 Ibid.

36 Ibid.

37 CK Tan, "Laos, Malaysia, and Thailand kick off ASEAN multilateral power trading," *Nikkei Asian Review*, September 23, 2016.

A critical part of this alternative is that it supports the Lao government's goal of exploiting its valuable hydropower potential for large export revenues with fewer dams and accordingly lower environmental and social costs. Laos's emphasis on maximizing its export revenue is a major stumbling block towards gaining agreement by the Lao government to cut back the number of mainstream projects or even hold construction until further study can be done. A preliminary study by the ADB found that if Laos had a national grid, it could sell a combination of baseload and peaking power from existing and planned dams on Mekong tributaries and receive export revenue on par with what could be gained from building the nine mainstream dams. This would require upgrading the older dams on the tributaries and linking them into the national grid, but would give Laos the short-term revenues that it desires without further disrupting the river.³⁸

Given the already growing concerns about a redirection of investor interest to Myanmar and Vietnam, the best way to influence Lao policymakers would be to provide persuasive evidence that multinational and bilateral ODA donors are ready and willing to support the concept. The ADB has already declared its interest.

The US State Department has supported the concept rhetorically, and has been strengthening its ties with Laos and deepening its technical and human capacity building for the Lao government in order to support to make smart infrastructure development choices. In early February 2015, in Pakse, Laos, the Friends of the Lower Mekong held its first-ever vice-ministerial level meeting with the Lower Mekong governments, dubbed the Extraordinary Friends of the Lower Mekong (XFLM) meeting, at which discussion centered on the river's future and the importance of balancing energy development with the environment, food security, and other uses of water. In a joint statement at the conclusion of the XFLM meeting, the United States, other donor countries, ADB, and the World Bank agreed to collaborate to support development of a national energy grid in Laos. The statement noted that "When completed, this national energy grid will help provide stable, reliable electricity to millions of people throughout the country."³⁹

As long as Lao policymakers believe that they can maximize revenues by prioritizing dam construction, giving priority to the development of an integrated national power grid will remain a difficult sell. On the other hand, if rising political and financial risks for big dam projects and other factors continue to cause a reduction of developer interest as we have observed, the grid concept will become much more attractive while also giving a boost to solar and wind.

38 Personal conversation with ADB official, Manila, the Philippines, September 2014.

39 Office of the Spokesperson, "Fact Sheet: Extraordinary Meeting of the Friends of the Lower Mekong," February 2, 2015.

THE GLOBAL ENERGY TRANSITION AND RENEWABLES: AN OPPORTUNITY FOR LAOS

The global energy transition is playing out at an increasingly rapid rate, making now the right time for the Lao government to integrate other renewable sources such as solar, wind, and biomass into a system-scale energy development plan. In the last five years, the global price of energy from utility solar and wind systems has dropped significantly, with solar panel energy costs decreasing more than 40% from a range of 23 to 50 c/kWh in 2010 to a range of 11 to 28 c/kWh in 2014.⁴⁰ These prices are anticipated to drop further within the next decade, making solar and wind competitive with traditional fossil fuel resources.

Solar and wind power can substitute for hydropower in Laos. Laos is relatively close to the equator and therefore has significant solar radiation averaged at 15.8 MJ/m² per day. This translates to at least 8000 MW of potential.⁴¹ Laos's radiation level is higher than average solar radiation levels in Europe and Japan, where solar is already being deployed at cost.⁴² The high radiation level means that a range of technologies—including photovoltaic cells, solar water heating, and solar drying—are already economically feasible today, and will likely be increasingly competitive in the future as efficiency rates rise.⁴³ Equally notable, southern Laos has an estimated 2,800 MW of “very good” wind potential, although it would only be accessible through grid hookups.⁴⁴

Given Laos's significant potential for wind and solar, the anticipated price decreases for solar and other renewables are an opportunity that the Lao government should not pass up. Experimental pilot projects are already being deployed. The Laos-based energy company Sunlabob has turned a profit successfully deploying micro-scale solar energy systems and water purifiers in small villages throughout Laos over the last ten years through use of a system rental model. In 2015, the Thai company Impact Energy Asia signed an agreement with the Lao government to invest in a 600 MW wind farm in southern Laos, with 95% of the energy anticipated to be sold through the grid to ASEAN markets.⁴⁵ Wind and solar projects are beginning to attract international funding. Private companies like LG have signed MOUs for small plants, the government of South Korea is exploring a 100 MW solar plant on the Nam Ngum 2 Reservoir, and during President Obama's visit to Laos in September 2016 the United States announced financing for a 20 MW solar farm as its first USTDA project in Laos.⁴⁶

While solar, wind, and even biomass are appearing as pilot projects, optimizing Laos's energy potential will require more significant policy shifts. The value of renewables is still not fully recognized in national energy plans, with non-hydropower and non-biomass sources only comprising approximately 10% of total energy by 2030.⁴⁷ Numerous officials within the Ministry of Energy and Mines have indicated that investment in renewables is perceived as less attractive than investment in hydropower partially because investment incentives are still relatively unstructured.⁴⁸



ABOVE: Environmental studies majors attending a WWF Presentation of Solar Technology at National University of Laos.

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- 40 International Renewable Energy Agency, *Renewable Power Generation Costs in 2014*, January 2015, p.75.
- 41 The ADB estimates Laos's solar potential to be 8,812 MW, while the IES study believes potential to be closer to 11,000 MW. Intelligent Energy Systems, *Alternatives for Power Generation in the Greater Mekong Subregion: Power Sector Vision for the Lao People's Democratic Republic*, March 20, 2016; p. 25.
- 42 Department of Alternative Energy Development and Efficiency of the Ministry of Energy in Thailand, Department of Electricity for Lao PDR, and the Solar Energy Research Laboratory in the Department of Physics at Silpakorn University, *Assessment of Solar Energy Potentials for Lao People's Democratic Republic*, April 2007, p.68-69.
- 43 Ibid, p. 69.
- 44 IES, *Power Sector Vision for the Lao People's Democratic Republic*, p. 22.
- 45 Itthi C. Tan, "IEA signs deal for largest ASEAN wind farm in south Laos," *The Nation*, August 9, 2015.
- 46 U.S. Embassy in Laos, "U.S. Funds Study for Solar Plant in Laos," September 7, 2016.
- 47 This is calculated from statistics included in Ministry of Energy and Mines, *Renewable Energy Development Strategy in Lao PDR*, October 2011, p. 14.
- 48 Interviews with officials from the Ministry of Energy and Mines, Vientiane, Laos, February 2016.

OPENING THE DOOR TO EXTERNAL ENGAGEMENT ON LAO HYDROPOWER

The project-by-project approach has delivered an outcome in which the Lao government is unable to determine how much power will ultimately be generated from Mekong hydropower projects, and thus it is unable to determine how much revenue will result from the sale of this power to fuel the country's national development plan. The approach shifts all attention to the needs of individual developers and has failed to generate enough attention or funding support for the development of power distribution services such as a national power grid that would permit efficient pricing levels and distribution in the region and within the country itself. The likelihood of future excess capacity points to a possibility that Laos could have too many dams on its hands, given increases in energy usage efficiencies, the sharp drop in prices of other renewable resources, and other macroeconomic factors affecting the region.

Continuous external engagement is needed to assist Laos in increasing its capacity for water-energy resource management and related governance approaches. Over the last decade, the doors to Lao decision makers were closed to regional stakeholders and even to the traditional donor community for assistance in hydropower management. For instance, the government of Laos gave no recognition to the call from the Mekong River Commission's 2010 strategic environmental assessment for a ten-year moratorium on mainstream dam construction and has never effectively utilized services available from the MRC despite its headquarters being located in Vientiane. The lack of engagement is a contributing factor to the sharp drop in support for the MRC's operations, which cut its organizational capacity to one-third its traditional level and closed its Phnom Penh Secretariat office in 2016. Traditional donors have decreased funding based on their perception that the MRC has been an ineffective platform for transboundary management of the Mekong's shared resources.⁴⁰ Regrettably, the need for deepened and sustained external engagement comes at a time when many of the external development programs and on the ground expertise that has worked and operated in Vientiane for the last few decades are shifting focus to Myanmar.

Although many observers perceive that the door is closing for external development engagement in Laos, our conversations with senior officials in Laos have revealed a renewed interest in external engagement on a suite of issues, including power generation optimization, power distribution management, and public participation in dam resettlement. While civil society and non-government engagement remains highly restricted and risky for participants, a new door might be opening for government to government engagement on energy development. This opportunity for engagement is still narrow and limited to donor governments and major development institutions such as the World Bank and the Asian Development Bank. It is unclear whether this current blend of engagement will convince Laos to shift to a more strategic vision for energy planning in Laos.

To illustrate, Laos began in late 2014 to turn to the United States government for assistance for sustainable hydropower development. This is directly linked to a new warming in US-Laos relations, partially resulting from a realization among some elite policymakers in

40 Private conversations with donor officials, Bangkok, Thailand, September 2014.

Laos that the China-Laos relationship is unfairly balanced toward China. This was visible during the leadership transition in Laos in early 2016 when a number of publicly pro-China figures were removed, reportedly over concern that the deals they brokered were unfavorable for Laos. Equally important was the US dialing back former Secretary of State Hillary Clinton's 2012 statement on how Mekong hydropower development would be an erroneous choice for Laos. Starting in 2014 the US sought to engage positively, shifting from criticism and instead offering to deploy US tools for sustainable energy planning in mainland Southeast Asia as part of the Lower Mekong Initiative, a strategic arm of the Obama administration's Rebalance to the Asia-Pacific.

Bringing US hydropower management experience to Laos makes good sense given US experience operating the world's oldest, largest, and most productive hydropower system. Much of the US hydropower system is directly managed by government institutions such as the US Army Corps of Engineers and the US Bureau of Land Reclamation, an aspect which appeals to Laos given the assumption that all dams will become government managed after their BOOT period has ended. Initial inroads were made when the US's Department of Energy and Oak Ridge National Laboratory began providing assistance with system-scale power optimization by promoting coordination between projects and the development of information systems to inform coordinative processes. Further, the US Army Corps of Engineers seeks to train mid-level officials from relevant ministries in Laos on methods related to stakeholder engagement, public participation, and conflict resolution. The training approach, which promotes inclusivity and on-going stakeholder engagement,



ABOVE: President Barack Obama hosting the Young Southeast Asian Leaders Initiative discussion in Laos.

is geared toward the mitigation of short and long term risks at the early stages of the planning process in order to more quickly bring feasible projects to fruition. Both efforts were created in direct response to calls from the Lao government.

US engagement in Laos deepened with President Obama's September 2016 visit to Laos, the first ever visit from a sitting US President. Obama pledged to further support bilateral efforts in sustainable management of hydropower resources in addition to the exploration of alternative energy generation such as solar and wind.⁴¹ In the lead up to Obama's visit, the U.S. Trade and Development Agency committed to fund a feasibility study for a 20 MW solar project, which would be one of the first large-scale non-hydro renewable energy projects in Laos and support the country's goals of diversifying its energy mix.⁴² The Obama visit also facilitated the opening of a country office for General Electric (GE), a global powerhouse in the energy sector, which has pledged technical assistance to the Lao government.

The benefits to US bilateral engagement in Laos are many. It is to Laos's advantage to have a government partner with experience managing a complex hydropower system as a role model. With its deep historical experience in hydropower development and current challenges, including lengthening the lifespan of old dams and adapting to climate change, the US is able to provide the expertise that Laos is looking for. Since the US manages its energy resources with a system-scale approach legally mandated to incorporate tradeoff analyses of key environmental flows and involve a diverse set of stakeholders, this partnership is already exposing Laos to the advantages of a system-scale approach. Furthermore, any form of US engagement on water-energy issues will identify the gaps in existing planning and management capacity and could bring more efficient management techniques to Laos's potential toolbox, should Laos choose to address those gaps.

41 Office of the Press Secretary, "[Fact Sheet: U.S.-Laos Relations](#)," The White House, September 6, 2016.

42 Ibid.

RECOMMENDATIONS

Given the growing recognition among Lao officials of the uncertainties and risks inherent in the current hydropower development trajectory, the time is right for external actors to further engage and present feasible alternatives that would meet Laos's development needs, appeal to decision-makers in Laos, and support better regional optimization of resources. Accordingly, we recommend:

- **The Asian Development Bank, United States, and other donor countries should move forward to provide financial support for a feasibility study and design of the proposed national power grid for Laos.** The backbone grid concept has been a top priority for the ADB for years, but the ADB—in coordination with other donors and multinational development banks—should consider a broader investment to link Laos's sub-grids together and provide smart grid technology for the most efficient deployment of power. This should happen in the near future so that Laos, Thailand, and Vietnam can adjust energy supply, demand, and development plans accordingly.
- **The US State Department should increase funding to support ongoing capacity building activities for system-scale energy planning in Laos.** Current US capacity building programming needs to happen in a more frequent and sustained manner in order to keep pace with hydropower development. With USAID opening an office in Laos in late 2016, the US should take advantage of its on-the-ground presence to increase the amount of engagement on smart infrastructure and sustainable hydropower efforts.
- **The US should widen its approach to engagement by leveraging its regional leadership capabilities to marshal increased support from the external donor community and by positioning the US-Laos relationship toward multi-track engagement.** The US State Department's July 2016 launching of the Sustainable Infrastructure Partnership, a program nested within the Lower Mekong Initiative which seeks to identify training deficiencies among line agencies in the Mekong region and establish a mechanism for coordination among the Friends of the Lower Mekong donor group to streamline external engagement and improve efficiency, is a step in this direction.⁴³ A more efficient utilization and allocation of resources would be achieved through facilitating the inclusion of non-government stakeholders, especially those on the ground in Laos.
- **Regional experts should create a multi-stakeholder managed, "living data" modeling system that explores alternative energy options for Laos by incorporating the full scale of available energy technologies into models.** This has been suggested by a team of researchers at the UC Berkeley Energy and Resources Group, the Harvard Kennedy School, and Fulbright Economics Teaching Program in Vietnam, who through preliminary modeling found that incremental shifts to build out wind, solar, and biomass plants in Laos would meet development and revenue needs while avoiding construction of the most ecologically damaging dams on the mainstream

⁴³ Office of the Spokesperson, "[Lower Mekong Initiative Launches 'Sustainable Infrastructure Partnership'](#)," U.S. Department of State, July 25, 2016.

of the Mekong.⁴⁴ Building out this study through expansion and constant updating of the data set when new studies and models emerge would create a platform for discussion and exploration of models that might have been discounted in previous local, national, or regional power development plans. Political realities would require some coordination with government ministries in each of the Mekong countries to obtain and share data, but providing a freely available model that can crowd-source additions would be useful for not only government officials but investors and developers seeking to explore potential investments, neighboring governments seeking to diversify energy supply, and civil society groups and academics seeking to provide additional policy recommendations.

- **Laos should work with neighboring countries, developers, and ODA development partners to perform a comprehensive cumulative environmental impact assessment on the Laos part of the planned dam cascades on the Mekong and its tributaries.** Lao officials have indicated in private conversations that it plans to do a cumulative EIA before announcing the Pak Beng project, but our team has heard no additional information on this front since 2015. Given indications that only five of the nine potential projects are likely to move forward, it is important to transparently analyze the individual and cumulative impacts of each project to identify which projects would be the most or the least damaging,



ABOVE: Site of the future Pak Beng Dam.

44 David Roberts and Jalel Sager, “Recharging Asia’s Battery: What Obama Should Do in Laos,” *Foreign Affairs*, September 1, 2016.

- **Vietnam should increase its power purchase agreements with Laos.** Vietnam should consider this through two lenses: climate change and as an opportunity to negotiate for better mitigation efforts and strategic placement of dams to optimize water-energy-food nexus tradeoffs. Vietnam has made commitments through the Paris agreement to limit its emissions for climate change, but coal will continue to be a significant portion of its energy supply under PDP VII. Purchasing electricity from Laos could also be used as a replacement for new and increasingly expensive coal power plants.

If Vietnam becomes a major market for Laos hydropower, it could use its market position to influence how Laos strategizes its energy future. Given that power purchase agreements are a major factor in considering the feasibility of an individual hydropower project, a cascade of dams, or other forms of electricity generation, Vietnam could potentially use the PPA process as a bargaining point to ensure the dams that most negatively impact the Mekong delta are not built. Using PPAs in this manner would allow Vietnam to preferentially support purchases from the least damaging projects, projects which have better mitigation efforts, or even non-hydro renewable energy sources.

About the Authors..

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About Stimson

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LETTERS FROM THE MEKONG

This is the executive summary from the second in the *Letters from the Mekong* series of issue briefs from the Mekong Policy Project, a long-term initiative at the Stimson Center that focuses on alternative solutions to transboundary environmental and food security and regional stability impacts arising from proposed hydropower dams on the mainstream and major tributaries of the Lower Mekong River. The Mekong Policy Project seeks to promote further awareness about these impacts and the need for a more coordinated development strategy among regional actors, policy-makers in riparian countries, donor governments to the MRC, and civil society actors. Letters from the Mekong will be published following each research trip that the Southeast Asia team makes to the region and will examine changing trends for hydropower development and perceptions among regional actors.

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