



# Laos' hydropower development and cross-border power trade in the Lower Mekong Basin: A discourse analysis

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**Abstract:** Increasing demands for energy to boost the Mekong economies have attracted the keen interest of riparian countries for hydropower development. This is evidenced by extensive investment in hydropower projects across the region over the last few decades. Drawing on interviews with key stakeholders, including officials from Ministry of Energy and Mines, Ministry of Natural Resources and Environment, Ministry of Agriculture and Forestry, private sector actors, civil society organisations and academics, as well as secondary data from public and policy resources, this paper aims to examine how the government of Laos' (GoL) decisions in hydropower development are influenced by regional energy dynamics, and how these shape the country's future energy development. The paper argues that the GoL's decisions on hydropower development are highly dilemmatic, given the current limited institutional capacity in hydropower governance and the accelerating evolution of alternative energy in neighbouring countries. While uncertainty in power markets is recognised, this places greater pressure on new hydropower projects as to how much power could be sufficiently produced and exported. The paper calls for GoL's policy considerations on the development and planning of alternative energy to secure the sustainable and equitable use of water resources as stipulated in the 1995 Mekong Agreement.

**Keywords:** energy, hydropower development, Lao PDR, Lower Mekong Basin, power trade

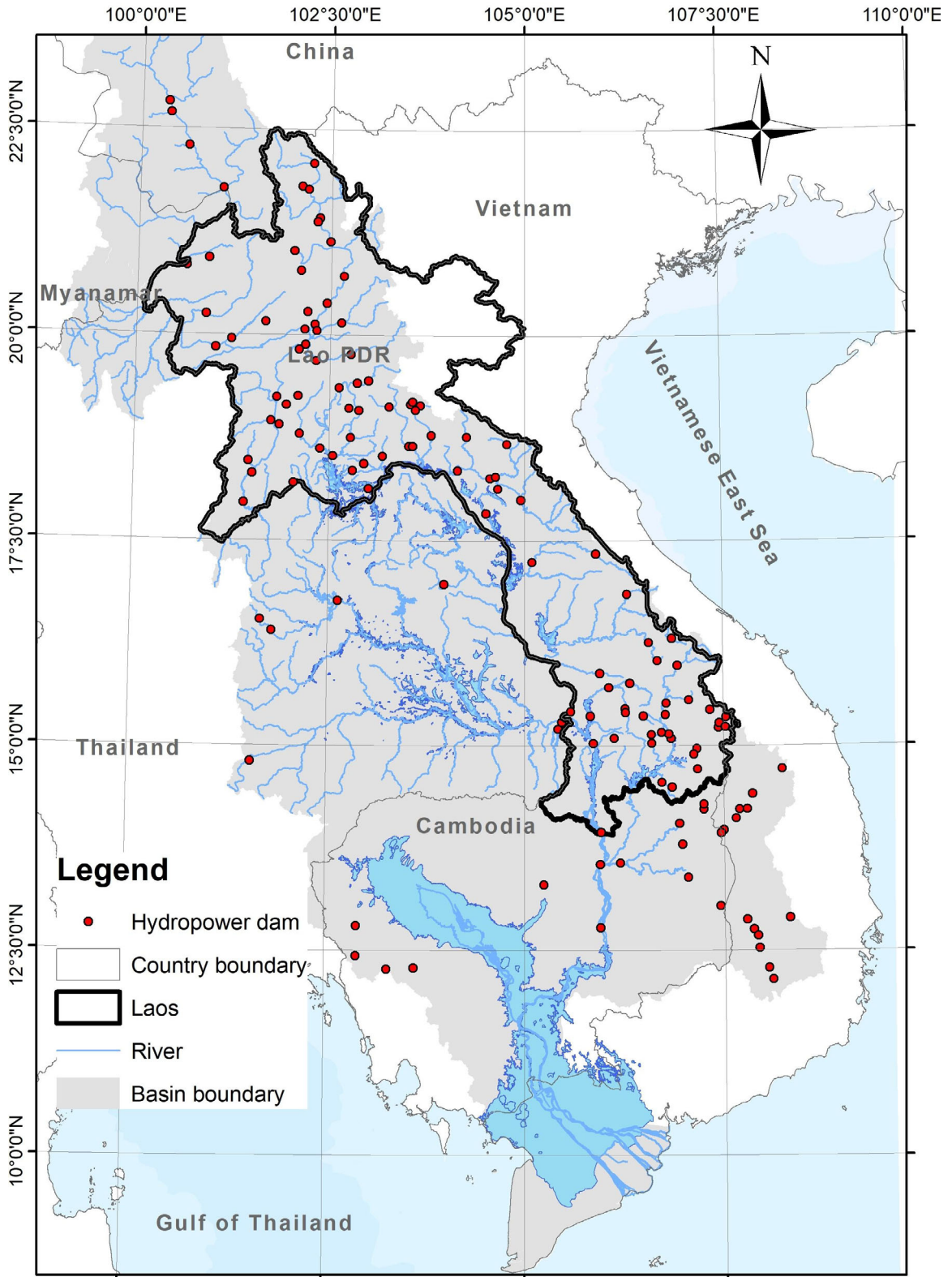
## Introduction

The last few decades have witnessed the substantial growth of Mekong economies. This is mostly apparent from the increased expansion of regional energy markets (Smits, 2012; Ahmed *et al.*, 2017) and the 'regionalisation of the Mekong hydropower development' (Chattranond, 2018). The 'regionalisation' process in the Mekong represents the accelerating development of hydropower dams which have already been operated, are being built and planned in both tributary and mainstream channels spanning from upstream to downstream stretches of the Mekong River (Fig. 1).

Lao PDR (hereafter as Laos) is a landlocked country in the Lower Mekong Basin, with 23.2% of population living below the national poverty line (Zhong and Hao, 2017). Hydropower development is positioned as one of the

key means to promote economic growth and generate revenue, while relying on abundant water resources (contributing 43% of the basin run-off; Beilfuss and Tran, 2014). The country's mountainous topography offers a significant amount of water catchment (Asian Development Bank (ADB), 2019). In the reform agenda in 1986, the government of Laos (GoL) asserts that hydropower (apart from the agriculture and forestry production sectors) will serve as a driving force for the national economic growth (Menon and Warr, 2013; Middleton, 2017; Geheb and Suhardiman, 2019). Hydropower development forms an integral part of the country's National Growth and Poverty Eradication Strategy to eliminate poverty until 2020 (Zhong and Hao, 2017).

Energy plays a pivotal role in supporting economic growth in the Mekong region, especially



**Figure 1.** The Mekong River Basin and hydropower dams in Laos (marked by dark lines) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

Thailand and Vietnam. Significant attention has been devoted to hydropower development and narratives revolving around cross-border energy trade as well as externalities/risks associated with hydropower construction (Simpson, 2007). While these concerns have widely appeared in public debates, there remains poor understanding of how the prevailing hydropower development process is shaped by the state's political decisions and evolving energy dynamics in the Mekong region. Drawing on the case study of Laos, this paper aims to address this knowledge gap by linking critical discourses behind the state-led hydropower development with cross-border power deals, and how these are translated into the national energy development strategies, and vice versa.

Narratives of cross-border power deals need to be examined in relation to the transboundary dynamics in the Mekong region. The concept 'transboundary commons' appears largely in the field of environmental governance, defining how common resources such as water are governed across geographical contexts and national borders (Green *et al.*, 2013; Linell *et al.*, 2019; Hirsch, 2020; Miller *et al.*, 2020). Transboundary commons involve approaches and efforts to address accumulating environmental problems and cross-border impacts of climate change, while embracing specific sets of relationships that value common resources across borders or between countries and the need to govern it in a sustainable manner (Miller, 2019).

This paper perceives power as a common pool resource (e.g. water for hydropower generation and the ecosystem surrounding it) transformed into an economic commodity (e.g. electricity), produced and exported across spatial scales. In this light, building cross-border power networks resembles the construction of new geographies that would (re)arrange the existing spatial configurations and transform the way the transboundary common (in this case the Mekong River) is being managed, from distribution of benefits and costs based on the natural flow regime to distribution based on economic decisions and power relationships. 'Circuits of power', as conceptualised by Swyngedouw (2006), constitute how these new geographies change the socio-environmental linkages and thus who benefits and lost from

the river. Marks and Zhang (2019) also discuss these socio-environmental linkages to reflect how the current management of the river has resulted in unequal and unjust development across the different countries along the Mekong River. It is worth mentioning that power is not akin to the natural flows of the Mekong watercourse that move from upstream to downstream. Transmitted along built networks, it transforms water as a common good into economic commodity (electricity), reduces socio-environmental linkages into merely seller-buyer relations and scatters laterally across riversides.

Drawing on the qualitative analysis of interviews with key stakeholders and discourses from public and scientific resources, the paper argues that the GoL's policy decisions on hydropower development are highly dilemmatic (both externally and internally) as driven by its limited capacity in hydropower governance and the emerging self-reliance of neighbouring countries on alternative energy, with the latter being obscured from Laos' present and future hydropower development trajectory. While much uncertainty in the power markets is recognised, this would place heavy pressure on energy production for consumption and export under existing and/or newly constructed projects.

The paper is structured as follows. The next section outlines key concepts in relation to hydropower development and the regional power trade. The research methods section discusses how the discourse analysis was applied for the study, and how the collected data were analysed. Following this, the results and discussion address Laos' hydropower development policies, while emphasising on how they shape Laos' future energy development trajectory. The concluding section presents the implications of Lao hydropower development strategy in the context of alternative renewable energy evolution in the region.

### **Regional power trade in the hydropower development context**

A large body of literature has recently presented intriguing narratives of hydropower development and transnational implications it holds in support of state economy. Hydropower dams are built across continents. In the Amazon

(or Brazil in particular), expanding hydropower stations has continued, transforming it into the 'new hydroelectric frontier'. Large hydropower projects have also been found in large river basins in Congo (e.g. Inga I, II and III dams) that aim to produce a large amount of energy for export (Winemiller *et al.*, 2016). The accelerating development of large-scale hydropower dam projects in the Mekong embraces untold complex narratives. In this paper, we capture these narratives by examining how the hydropower development processes would expand power trade partnerships among riparian countries, and how they shape the energy landscapes in the region.

Cross-border power trade has been highly used in the literature of energy development (Watcharejyothin and Shrestha, 2009; Chang and Li, 2013; Saroha and Verma, 2013). Sharing a relatively similar connotation with 'transborder' (Stich and Massier, 2016), the concept denotes geo-political linkages and relevant decision-making processes for the formulation and operation of transnational power deals. It is also implied in the common understanding that hydropower plants, by themselves, are transnational projects (Hensengerth, 2015). In the Mekong region, in relation to the spatial flows of energy transmission, it is important to note that hydropower development is closely linked to resource exploitation at the expense of *in situ* and transboundary (mobile) commons that need a sound governance approach (Miller *et al.*, 2020; Yong, 2020).

Recent studies provide salient evidence of cross-border power trading mechanisms implemented through regional energy transmission partnerships, for instance, the South Asian Association for Regional Cooperation (including Bangladesh, Bhutan Nepal, India, Pakistan, The Maldives and Sri Lanka) (Saroha and Verma, 2013), Gulf Cooperation Council (Kuwait, Saudi Arabia, Bahrain, Oman, Qatar, United Arab Emirates) (Fraser and Al-Asaad, 2008) or the Association of Southeast Asian Nations (Chang and Li, 2013; Stich and Massier, 2016; International Energy Agency, 2019). Critical narratives of cross-border power trade have recently emerged behind the political intention of the Greater Mekong Subregion (GMS) to operate transnational energy networks. Composed of Thailand, Vietnam, Laos, Cambodia, Myanmar

and Yunnan province of China, the GMS countries are endowed with vast hydropower resources to be expendable for exploitation (Yong, 2020). In this study, we narrow down the scope of cross-border power trade in the context of the Lower Mekong region by examining the power trading schemes that Laos has developed with its partners to serve the state's economic interest (Watcharejyothin and Shrestha, 2009).

The paper contributes to the current discussion on regional power trade, hydropower development and transboundary water governance in two ways. First, it shows the close interlinkages between hydropower development plans and regional power trade discussions and negotiations, and how the latter took place within the context of transboundary water governance, but not limited to it. Second, it links the ongoing discussions surrounding power trade, hydropower development and impact assessment with potential role of alternative energy (e.g. wind and solar), and how the latter exhibits future pathways for regional energy development. This is evidenced by the reframing of energy structures and relevant market reforms to support power-based industrialisation and securing the sustainable development of energy systems in the long term (Do and Sharma, 2011; International Energy Agency, 2016; Chaiyapa *et al.*, 2018). These momentums, however, exhibit a contested landscape associated with the evolution of alternative energy (solar, wind) *vis-à-vis* the accelerating development of hydropower pushed by riparian countries (e.g. Laos) to meet energy demands (Nguyen, 2015; Le, 2016). This paper will draw further inquiries into what types of energy should be prioritised to meet this end and mitigate negative environmental impacts induced by hydropower projects in the Mekong region.

## Research methods

The study deployed the qualitative discourse analysis to examine how Laos' hydropower development plays a significant role in the country's national socio-economic development agenda and the broader energy development context in the Mekong region. Discourse analysis contributes to analysing 'direct relationship

between what is being said (discourse) and what is being done (action) that together form discursive events' (Nurse-Bray *et al.* (2010: 367). The approach has been applied in environmental policy research (Feindt and Oels, 2005; Nurse-Bray *et al.*, 2010), and is found appropriate to analyse the contemporary hydropower development discourses in this study. Employing this approach, we conducted semi-structured interviews with key stakeholders who work across central government and international agencies in Laos and have important roles in hydropower and energy sectors (Appendix I). The aim is to examine their perspectives about Laos' hydropower development policies, narratives around cross-border power trade between the Mekong nations (e.g. power trade between Laos and Thailand), and the ways these dynamics shape Laos' energy development strategy in the long term. During the interviews, except that the respondents could speak English, communications were undertaken in Laotian language and orally translated into English by a research assistant. The data collection was undertaken from September 2018 to February 2019.

The study aims to link hydropower development in Laos with the changing nature of energy development in the region (e.g. Thailand's energy development plan, evolution of alternative energy (wind, solar) in Vietnam and governance arrangements in place for hydropower construction in the context of climate change), and how these shape Laos' future energy development trajectories. Our findings from key stakeholder interviews were complemented by the extensive literature review of hydropower development in the Mekong region and in Laos over the past decades. To this end, policy documents in the Mekong countries, social media and scientific reports relevant to hydropower development, energy sources and cross-border power trade were synthesised and analysed.

The NVivo software was applied to conduct qualitative discourse analysis. We adopted Chaiyapa *et al.*'s (2018) approach to implement the thematic coding that aimed to categorise relevant discourse fragments that came together under common themes. Open coding, axial coding and selective coding were carried out to support the thematic analysis (Neuman, 2011). The analysis of collected data (empirical and

secondary data) provides important insights into how Laos' contemporary hydropower development agenda comes to terms with the regional energy markets, and how this process shapes the national future development strategies.

## Results and discussion

### *Laos' hydropower development and the GMS's power networks*

For Laos, hydropower dams have become the country's development symbol. Hydropower development is not only at the centre of the country's economic development and state's national policy and strategies, it is also represented as the national emblem as they are reflected through everyday-life practices of the country, such as bank notes and public advertisements (Chattranond, 2018). Many believed that hydropower would create economic growth, and bring development and prosperity to the country (Electricité du Laos (EdL), 2004). The National Green Growth Strategy of Laos PDR asserts that the hydropower energy is the primary sector that contributes substantially to the national economic growth (Lao PDR, 2018).

In the early 1990s, the ADB initiated the GMS. This initiative provides a regional space for regional cooperation (Yu, 2003), facilitates the evolution of new electricity systems across the region (Baird and Quastel, 2015) and promotes the engagement of private sectors in hydropower development. Next to huge hydropower potentials of about 26 500 MW (Greacen and Palettu, 2007), the geographical location within the hub of the GMS is convenient for Laos to open up and build its national energy market, while relying on bilateral trade agreements in the energy sector with neighbouring countries (Foran *et al.*, 2010; Jusi, 2011). This advantage would expectedly turn Laos from a landlocked into a landlinked country (Chattranond, 2018). Hydropower investments would be economically vital for Laos (Käkönen and Kaisti, 2012) and deployed as a 'structural measure' to enhance regional economic integration (Suhardiman and Giordano, 2014).

The GMS initiative marks a significant milestone for Laos' hydropower development sector. Given the mandate to access low-cost and

sustainable electricity supply in rural areas (Bambawale *et al.*, 2011) and increase power trade across the GMS markets, the GoL has signed a number of inter-governmental Memorandum of Understanding (MOUs) with the GMS member countries. For instance, in 1993 Laos signed a power trade agreement with Thai government to supply 1500 MW to Thailand and Vietnamese government for the sale of 1500 WM to 2000 MW by the year 2000 (EdL, 2004). The power trade between Laos and these countries, however, has encountered a temporary instability in the late 1990s (due to the Asian financial crisis in 1997), causing a significant decrease in power demands from its partner countries (International Rivers, 2008; Phomsoupha, 2009). The revitalisation of the regional economy in the later years opened up new market opportunities, whereby the countries are in greater demand for energy to boost their national economy. Following this, in 2007 the GoL continuously committed the sales of 7000 MW, 5000 MW and 1500 MW of electricity to Thailand, Vietnam and Cambodia until 2020 (Zhong and Hao, 2017). These have provided important leverage for the expansion of cross-border power transmission networks and the signing of power trade agreements between partner countries (ADB, 2012) (Fig. 2). These suggest that the hydropower energy export by the GoL characterises the 'regionalisation policies' in the Mekong (Käkönen and Kaisti, 2012), while also legitimises dams as key contributors to its economic development (Rousseau, 2019).

Mainstream hydropower dams have attracted the GoL's particular attention regarding their capacity to produce a massive amount of energy for domestic consumption (mainly for industry development and rural electrification) and export (Zhong and Hao, 2017). Beyond 2017 hydropower would dominate export-oriented capacity (ADB, 2019). Particularly, by 2020, the completion of 12 mainstream hydropower dams in the Mekong River would produce about 8100 MW out of its 20 000 MW of potential capacity (Table 1), generating about 70% of export revenue (\$2.6 billion/year) (International Centre for Environmental Management (ICEM), 2010). Our interview with the Department of Energy Business of Ministry of Energy and Mines (MEM) suggested that Laos is making substantial efforts to produce and export

power to neighbouring countries. These strategic goals have been accompanied by the formulation of various forms of collaborative partnerships (e.g. the independent power producers (IPP) model) between the GoL and dam developers (Middleton *et al.*, 2015). Narratives revolving around the power trades between Laos and its traditional partner (Thailand), and the ways the national governments work through bilateral deals will be addressed in the following section.

#### *Power trade discourses between Laos and Thailand*

The rapidly changing economic and demographic structures, population growth and development in the lower mekong basin over the past two decades are the key drivers for the increased consumption of hydropower energy (Grumbine *et al.*, 2012; Suhardiman *et al.*, 2014). Between the 1990s and the early 2000s, Laos had witnessed an accelerating transition from a state-led to more private ownership in hydropower development (Middleton *et al.*, 2015; Chattranond, 2018), which is guided through several working models. For instance, the build–operate–transfer (BOT) model involves the private sector dealing with financing, design, construction and operation of a public infrastructure project for a 20–50-year concession period (Levy, 1996). Undertaken under the BOT scheme, the Nam Theun 2 Hydropower Project built in 2005, attracted the shared capital investment from multiple stakeholders such as Electricité du France (40%), Electric Generation Public Company in Thailand (35%) and the GoL (25%). The project is considered as a flagship to produce power and export across borders (Baird and Quastel, 2015).

Of particular significance in collaborative partnerships in hydropower development are narratives surrounding bilateral cooperation and trade of energy, especially the cross-border energy deals between Laos and Thailand. There is an important rationale behind this. Thailand depends largely on power import (particularly fossil fuels), to meet growing energy demands (Aroonrat and Wongwiswes, 2015). However, the country has encountered public opposition to the fossil fuels (e.g. oil and gas) for power



**Figure 2.** Transmission network of the Lao PDR. *Source:* Asian Development Bank, 2019. [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**Table 1.** Laos' estimated electricity generating capacity (MW)

Item	2011 (%)	2015 (%)	2020 (%)	2025 (%)
Electricity for domestic market	579 (23)	1103 (33)	1954 (24)	2448 (22)
Electricity for export markets (Thailand, Vietnam)	1987 (77)	2261 (67)	6209 (76)	8925 (78)
Total	2566 (100)	3364 (100)	8163 (100)	11 373 (100)

Source: Adapted from Asian Development Bank, 2013.

generation and civil resistance in building hydropower projects due to negative environmental problems they cause (e.g. the Pak Mun dam) (Watcharejyothin and Shrestha, 2009; Matthews, 2012). To deal with this, Thailand has invested in a significant number of hydropower dams in Laos (Table 2). The first power trade agreement, for instance, was marked by the commission of Theun-Hinboun hydropower that Laos started in 1972. ADB provided funding support for the construction of this project (Lamphayphan *et al.*, 2015).

Presented as a common sense, the bilateral power trade seeks to bring about benefits for those involved. In this study, it is expected that signed power contracts would bring substantial revenue for the GoL and large benefits for Thailand regarding lower energy system cost, better environment quality and greater diversification of energy sources (Watcharejyothin and Shrestha, 2009) and ensure the energy security for the region (Simpson, 2007). Interviewees indicated that the trade supports energy demands and supply between the two countries (especially during peak loads), which often increases significantly in the dry season. Despite these efforts, there are three factors that would challenge this collaborative partnership. They include: (i) Thailand's restructuring in energy development policy, (ii) Thailand's power purchase suspension from Laos' hydropower dams and (iii) deficiencies in Laos' effective hydropower governance. The following sections will address these points in more details.

#### *Thailand's alternative energy development plan*

Thailand depends substantially on energy import (International Energy Agency, 2016). In recent years, the national government has, however, given preference to alternative energy development (e.g. solar energy) (Chimres and Wongwises, 2016) and formulated energy liberalisation policies

(Aunphattanasilp, 2018). These have provided opportunities for private sectors to engage in the national energy industry. Directed by the Energy Efficiency Development Plan and its commitment to reduce greenhouse gas emissions by 20–25% by 2030, Thailand is pushing forward with an alternative energy development plan (AEDP) and considering intensive investment in other sources of energy (Ministry of Energy, 2015; Chaiyapa *et al.*, 2018).

Table 3 demonstrates that solar and wind energy would occupy a priority position in the AEDP future. Among others, these sources are expected to increase from 2000 MW in the first period (2012–2021) to 6000 MW in the second period (2015–2036) and from 1200 to 3002 MW, respectively. The geographical location of Thailand (along the Earth equator) provides an explicit advantage to ensure the sustainable supply of these types of energy across the country (Chaiyapa *et al.*, 2018) (Fig. 3). Having said this, the small-scale hydropower projects still account for a relatively large proportion in the energy plan (17% in the second period), which aims to provide electricity for rural areas (Aroonrat and Wongwises, 2015). An important point can be made in this regard. The shift towards energy diversification via the AEDP in Thailand presents a caveat for the potential interruption of the hydropower power trade agreement between the country and Laos. This would complicate the long-term hydropower development of the latter that is largely secured by bilateral power trades.

#### *Narratives around Thailand's power purchase decisions and the development of regional power grid*

The restructured power development plan and relevant politics in the Thai power sector present critical challenges for Lao hydropower development. Following this, the suspension of

**Table 2.** Thailand's power purchase from Laos

Project	Contract term (years)	Signed date (MOU)	Signed date (PPA)	Beginning date	Generation power (MW)	(%)
COD (Commercial Operation Date)						100
1. Theun-Hinboun	25	15 June 1994	19 June 1996	March 1998	220	10
2. Houayho	30	15 January 1996	24 June 1997	September 1999	126	6
3. Nam Theun 2	25	24 February 1994	08 November 2003	April 2010	948	45
4. Nam Ngum 2	27	25 April 2005	26 May 2006	March 2011	597	29
5. Expanded Theun-Hinboun	27	25 October 2007	22 December 2007	December 2012	220	10
Total					2111	39
Signed PPA (Power Purchase Agreement) and under construction						100
1. Hongsa Lignite	25	13 May 2009	02 April 2010	Unit 1: June 2015 Unit 2: November 2015 Unit 3: March 2016	1473	48
2. Xayaburi	29	05 July 2010	29 October 2011	October 2019	1220	40
3. Xe Pian-Xe Namnoy	27	16 August 2010	06 February 2013	January 2019	354	12
Total					3047	56
Signed MOU (Memorandum of Understanding) and prepared to sign PPA						100
1. Nam-Ngiep 1	27	12 July 2011		January 2019	269	100
Total					269	5
Grand total					5427	100

Source: Adapted from Ministry of Energy of Thailand, 2016.

power purchase from Lao hydropower projects has been announced. As Thailand aims to meet its projected energy needs, this results in halting of the power purchase from the Lao dams (International Rivers, 2011). Discourse analysis suggested that the announced delay of power purchase has had impacts on hydropower dams in Laos, for instance, the Xayaburi dam and the Pak Beng dam. It was noted that the signature of the Power Purchase Agreement for the dams by Electricity Generating Authority of Thailand (EGAT) has been delayed until the Power Development Plan review is completed (International Rivers, 2018). Interviews with central government officials in Laos revealed that the two countries would resume a meeting in 2026 to negotiate over the power deals. The expected outcomes from this bilateral negotiation, however, remain uncertain. This is despite

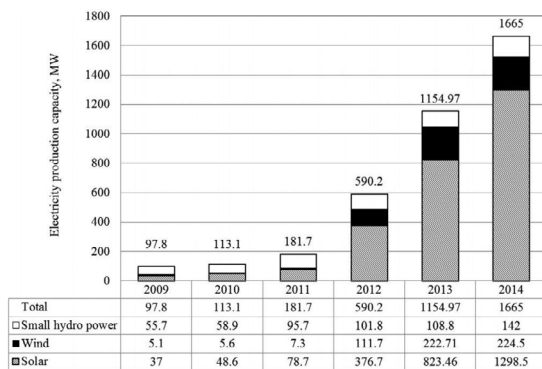
the fact that Xayaburi dam has already begun its operation in late October 2019.

The delay in the cross-border power trade between Laos and Thailand, however, may create a necessitated 'pause' for other strategic considerations to be taken. Particularly, this enables the two countries to formulate strategies for their future energy development. On the one hand, the delay would enable the Thai government to promote the wider adoption of other sources of energy, particularly solar and wind, as envisioned in the AEDP (Boyle, 2018). On the other hand, this would offer opportunities for the GoL to shift their attention to other further-distance markets such as Malaysia, and Singapore (International Hydropower Association, 2018). Unlike the cross-border power trade arrangements that have been smoothly implemented in South Asia, particularly among

**Table 3.** The alternative energy development plans of Thailand (MW)

Policy	Alternative energy development plan (2012–2021)	Alternative energy development plan (2015–2036)
Renewable energy in total energy consumption	25% by 2021 (%)	30% by 2036 (%)
Solar	2000 (25)	6000 (32)
Wind	1200 (15)	3002 (16)
Hydropower	324 (4)	3282 (17)
Biomass	3630 (46)	5570 (29)
Biogas	600 (8)	680 (4)
Waste	160 (2)	500 (3)
Total	7914 (100)	19 034 (100)

Sources: Adapted from Sutabutr, 2012; Ministry of Energy, 2015; Chaiyapa *et al.*, 2018.



**Figure 3.** Total electricity production capacity by renewable energy in Thailand between 2009 and 2014.  
Source: Chimres and Wongwises, 2016.

Bangladesh, India, and Pakistan (Timilsina, 2018), these divergent energy policies could stave off the two governments from fulfilling the power trade arrangements.

Another assumption, however, could be drawn. As Thailand aims to become a power trading hub in Southeast Asia (Chang and Li, 2013; The Straits Times, 2019), this could catalyse the process of hydropower development. EGAT has planned to extend a high-voltage grid across the national territory (International Energy Agency, 2016). Such efforts are reflected in a statement by the Director General of Thailand's Energy Policy and Planning Office as quoted by The Straits Times (2019):

We are trying to move quickly to become the center of the region's power grid. We already have the capacity and the infrastructure to support the vision to become the regional hub.

Nonetheless, we argue that such move is not free from potential power struggles, as other neighbouring countries (e.g. China and Vietnam) might also take interest in the planning and development of the region's central power grid, thus complicating the whole process of developing such grid, not only in terms of who will finance its construction, but also who will be in charge of its regulation and management afterwards. Overall, these suggest some important implications. If Thailand is successful in developing this regional power grid, this would increase the power purchase from Lao hydropower projects and resell it to the Mekong countries and other markets (e.g. Malaysia, Cambodia, Myanmar). This would lead to a shift in the perspective that long-term power trades between the two countries would be essential. Recognising potential competitive advantages and shared benefits in this regard enables the two countries to expedite further investment in hydropower projects in the Mekong mainstream. Another scenario might unfold, while Thailand's move is blocked or confronted by other countries (e.g. China and Vietnam), it is also seeking to play a key role in the development of this regional power grid, including its regulation and management later on. Here, who finances, regulates and manages the regional power grid becomes a highly political issue, bearing in mind that key countries would prioritise electricity sale from certain hydropower dams, depending on the companies which operate it (e.g. Chinese/Vietnamese/Thai companies), thus pushing the technical and economic viability of such grid systems for Laos into the background. Consequently, this will bring the overall discussion on regional power grid into geopolitical arena, involving different countries competing for power and influence in the region. This will also put Laos in a very difficult position, as its economic dependency would leave it very little decision making and bargaining power *vis-à-vis* Thailand, China and Vietnam, to push for its own economic agenda and strengthen its position in regional energy markets. There is, of course, a possibility for

Laos to also use Thailand–China–Vietnam competing roles into its advantages. However, past and current experience shows Laos' inability to foster it. As said by a senior water resources management expert with close connection to EdL and MEM:

As a country, key government officials in Laos are divided between those who favor relationships with respectively China, Thailand, and Vietnam, making it hard for the country to act in unity, unless the decision comes from the very top level. (Interview notes, February 2019)

#### *Deficiencies in effective hydropower governance*

While a flurry of hydropower dams is built in Laos at an accelerating rate, institutional systems subject to monitor and evaluate the performance of hydropower construction are not in place. There is wide divergence in what has been stated in policy documents and what has occurred on the ground (Jusi, 2006). While private hydropower investors have demonstrated their limited commitment to environmental reviews and human livelihood safeguards (Grumbine *et al.*, 2012), limited institutional capacity of in-charge government agencies has been observed in warranting the compliance of hydropower developers to set rules (e.g. environmental issues) during the process of hydropower dam construction on the ground.

The tragedy of the Xepian–Xenamnoy dam collapse in southern Laos in July 2018, for instance, presents a case in point that illustrates the 'dark side' of Laos' existing hydropower governance system. Before that, the breakage of the reservoir of the Nam Ao Dam in Phaxay district, Xieng Khouang province occurring in September 2017 set a toll that the construction of hydropower projects would involve latent risks (Ingram, 2017). However, all these warnings had not been sufficiently taken into account until the tragic event of Xepian–Xenamnoy hydropower dam took place. While extreme climate events (e.g. heavy precipitations) have been warned (Beilfuss and Tran, 2014), the tragedy revealed the lack of monitoring and incorporating safety principles and risk informed protocols associated with climate

change impacts into hydropower construction (MRC, 2018b). An interview with a senior staff of EdL confirmed that the developer did not comply with international standards, suggesting that the Saddle Dam D collapse was dominantly attributed to technical oversight. He acknowledged that this auxiliary system (i.e. Saddle Dam D) was actually made of clay, which thus failed to withstand heavy rains. These narratives echo Suhardiman *et al.*'s (2011) perspective that there lacks operational coordination among relevant stakeholders in constructing the hydropower dam and the inadequate fulfilment to land–water–environment management policies. This also accords Jusi's (2006) claim that hydropower development decisions in Laos have been made largely on an individual project basis without any reference to any comprehensive plan to achieve development objectives.

The following sections will elaborate on how Laos, given such biased development policies, sustains economic profits from the hydropower sector, and how this navigates its energy development options in the future.

#### *Prospects of Laos' future energy development*

The tragedy of the dam collapse coupled with Thailand's stated suspension in power deals to Laos' hydropower dam projects indicate the need to rethink the GoL's development strategies, centring on hydropower dam construction. The national government proactively deployed its manoeuvres to respond to critiques from mass media and international agencies concerning devastating impacts on surrounding and downstream communities. Evidence suggested that, in the wake of the dam tragedy, the Prime Minister of Laos declared that all current dam projects be reviewed and future ones suspended (The Guardian, 2018). Nonetheless, the GoL also initiated the implementation of the Procedures for Notification, Prior Consultation and Agreement for the construction of the 770 MW Pak Lay dam in the northwestern part of the country (MRC, 2018a) and later also for the Luang Prabang dam in 2019. Construction of other mainstream hydropower projects (e.g. Don Sahong) is currently underway.

In recent years, the GoL has paid greater attention to alternative energy development. It is envisaged that abundant alternative energy

resources such as biomass, solar and wind would make substantial contribution to the national energy production (Lao PDR, 2011; ADB, 2013). Solar energy, for instance, is estimated to produce an output of 14 781 GWh/year, contributing 5–10% of the total generation (Natural Heritage Institute, 2018). Apart from small-scale solar energy systems installed for household consumption in rural areas (Pillai, 2014), the first significant solar project was set up in 2017 to supply power for city dwellers in Vientiane (Organisation for Economic Co-operation and Development (OECD), 2018). A hybrid hydro-solar (floating solar PV (photovoltaic)) power system (i.e. the 290 MW Xe Kaman) has also been recently examined in the upper Xekong basin for installation (Natural Heritage Institute, 2018). While solar energy has received increasing attention, scientific assessment for wind energy development has not been undertaken in the country (Pillai, 2014). There have not been wind turbines installed to generate electricity (Sadettan and Kumar, 2004).

Despite current recognition of potential alternative energy, we argue that Laos would remain largely dependent on hydropower in the long term. This could be attributed to several reasons. First, we argue that the GoL's attempt to hold on to hydropower development with a greater focus on mainstream projects (ICEM, 2010) combined with Thailand's pursuit of a regional power trading plan that aimed to export electricity owing to this existing power grid systems (The Straits Times, 2019) would catalyse the signing of future power purchase agreements between the two countries. Moreover, our interviews with representatives from the Department of Energy Business and EdL suggested that the government views alternative energy (solar and wind) as unreliable, compared to the hydropower energy. As expressed by a senior official from the Department: 'They are not suitable for the heavy industry sectors that demand strong and stable energy supply for operation' (Interview notes, February 2019). Second, an interview with a senior official of the National Institute for Economic Research also revealed that local governments (especially at the provincial level) are not aware of how the alternative energy systems (solar and wind energy) could benefit their local needs. This

could be attributed to insufficient technological equipment, funding support, and human capacity for operation and management of alternative energy sources (ADB, 2013). Priority given to the hydropower sector leads to negligence in formulating policy apparatuses (i.e. laws and regulations) for alternative energy development at the central level. An assessment report from the hybrid hydro-solar power system revealed major barriers during the system implementation, establishment of institutional arrangements for concessional finance and commercialisation of the output (Natural Heritage Institute, 2018). Lastly and surprisingly, there are no agencies responsible for approving such projects (Lao PDR, 2011).

Nevertheless, Laos' hydropower development would be challenged by several externalities. For the most part, the prevailing energy markets entail much uncertainty. An interview with a senior international expert in Mekong hydropower development suggests that developers for large-scale hydropower projects and commercial viability of power have not yet been identified. Accelerating extreme weather conditions (e.g. prolonged droughts) would disrupt the operation of hydropower dams in the dry season (OECD, 2018). Thailand's energy diversification plan (i.e. AEDP) alongside the fast-paced evolution of alternative energy sources in Vietnam (Le, 2016; Urban *et al.*, 2018; International Financial Law Review, 2019) would considerably shift the priority for energy development in the Mekong. Advanced technologies in these sectors would allow for the production of more comparatively efficient, affordable and manageable sources compared to the hydropower energy. These development processes would potentially narrow down the market share of Laos' hydropower energy in these countries.

The GoL's pursuit of hydropower development holds critical environmental and political implications that could potentially come at odds with the stipulated principles of the 1995 Mekong Agreement that aims to ensure the equitable utilisation of the Mekong River resources among riparian countries (Fox and Sneddon, 2005; Sithirith, 2016). Knock-on effects that plagued the riverine livelihoods of downstream communities have to do with common pool resources including migratory fisheries, fluvial sediments and other riverine

ecosystems (Dugan *et al.*, 2010; Orr *et al.*, 2012; Bravard *et al.*, 2014; Intralawan *et al.*, 2018), and the ways they are governed across scales. Moreover, failures to address these transboundary environmental problems would wage social tensions among riparian states (Pearse-Smith, 2012; Hirsch, 2020).

## Conclusions

Hydropower development in the Mekong region is progressing at a greater rate. Amidst the Mekong countries, Laos has proactively capitalised on hydropower as the major source of revenue for the country. Cross-border power trades that have been secured by a number of MoUs are not only confined within traditional markets (Thailand, Vietnam), but also extended to farther-reaching countries in Southeast Asia (Malaysia, Singapore). However, these processes tend to be dominated by major key players (e.g. China, Thailand and Vietnam), leaving Laos with little decision-making power to direct regional hydropower development into its advantage (both in terms of electricity costs and market guarantee). Not to mention that the accelerating development of alternative sources (e.g. solar and wind energy) across the region (Thailand and Vietnam) in recent years suggest the high uncertainty of potential markets for hydropower energy consumption.

Thailand's disavowal of energy purchase and its energy diversification plan together with Laos' pursuit of hydropower development suggest that the GoL has continued to play a 'risky game'. Several paradoxical implications can be observed. While hydropower dams produce an increasing amount of energy, markets for exporting energy are not secured, both in a short- and long-term period. Laos' hydropower development strategy does not take into account the electricity surplus in China (Yunnan province), which is also seeking to expand energy markets southwards, especially to Thailand and Vietnam. While Thailand has approved the energy diversification plan to reduce over-reliance on hydropower, the GoL remains keen on its conventional hydropower development agenda. This 'business-as-usual' policy may lead not only to the 'regional energy surplus' in upcoming decades, but most

importantly also Laos' weakening position in regional energy markets.

From the policy perspective, this paper suggests that the production and commercialisation of (hydro)power in Laos would imply some transboundary governance challenges. The accelerating hydropower development would expose downstream countries to irreversible adverse transboundary environmental impacts. Together with El Niño effects, this would cause serious droughts and salinity intrusion in the Vietnamese Mekong Delta. Energy should not serve only as a safety net for the national economy; rather, it should embrace the contested nature of geopolitics associated with it (Hirsch, 2016) and policy considerations to guarantee the equitable resource utilisation among the riparian countries in the region.

This paper speaks directly to the concept of 'transboundary commons' as evidenced by analogical discourses of cross-border power transactions between Thailand and Laos, and how the latter has changed socio-environmental linkages embedded in the way the watercourse is being managed and developed, while centring on hydropower development. It defines (hydro) power as a common pool resource transformed into a mere product of political and economic decisions (re)shaped by respective countries' economic interests and power relationships. The cost-benefit analysis out of this raises concerns about cross-border governance of this common pool resource (i.e. power) in the long term. This concerns not only about how one country would benefit, but most importantly how the river's ecosystem and people's livelihoods can be sustained, in particular with regard to local communities living along the river. This resonates with Hirsch's (2020: 10) remark that 'transboundary governance of commons is about much more than conflict management and cooperation among nation states that share a resource or where use of a resource in one nation may impact on resource availability and/or environmental quality in another'. Considering Laos' energy development agenda *vis-à-vis* the long-term energy strategy pursued by the Mekong countries, this paper calls for a broader attention to the vital importance of the alternative energy sources (solar and wind), and the role they play in ensuring the regional energy stability in the future. This transition also

contributes to minimising burdens that the Mekong River has borne and securing the sustainable and equitable use of the river water resources as stipulated in the 1995 Mekong Agreement.

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## APPENDIX I

Key institutions involved in interviews in Laos	Representative agencies
Mekong River Commission	Environment Management Division Planning Division
International agencies	GIZ Oxfam International Union for Conservation of Nature WLE (Water, Land and Ecosystems) Greater Mekong
Ministry of Energy and Mines	Department of Energy Policy and Planning Institute of Renewable Energy Promotion Electricité du Laos (EdL) EdL-Generation Public Company (EdL-Gen)
Ministry of Natural Resource and Environment	Department of Energy Business Department of Natural Resources and Policy Lao National Mekong Committee Secretariat Environmental Impact Assessment and Monitoring Office
Ministry of Agriculture and Forestry	Department of Legislative Division of Fisheries Department of Irrigation Department of Agricultural Land Management
Ministry of Planning and Investment	Department of Investment Promotion
International Financial Institutions	Asian Development Bank World Bank
Other national government institutions	National Institute for Economic Research