Article

Geopolitics of Laos Renewable Energy and the Development of Water Energy for the Integrated Southeast Asia's Electricity

Journal of Asian Social Science Research
2024, Vol. 6, No. 1: 61-86
https://cassr.net/jassr/

Bevita Sari
Universitas Pertamina, Indonesia

Ramaldy Krisna Indradipradana*
Universitas Pertamina, Indonesia

Abstract

This research explains the geopolitics of renewable energy from Laos as a country that has potential in water-based energy (hydropower) in the Southeast Asia region, with the main focus analyzing the mapping of the geopolitics of Laos renewable energy in the development of hydropower energy in Southeast Asia. The authors use the concept of Renewable Energy Geopolitics, which aims to map the geographic and technical characteristics of renewable energy systems and analyze energy relations between countries. The research method used is descriptive qualitative with literature study techniques in data collection. This research shows that Laos is taking advantage of competitive market conditions, thereby triggering investment in the water-based energy sector. Laos also focuses on producing water-based energy by implementing decentralization policies and community involvement in national development to minimize energy poverty, as well as organizing cooperation in technology to produce water-based energy with developed countries both from inside and outside the region.

Keywords

Laos, geopolitics, renewable energy, hydropower, Southeast Asia

* Corresponding author:
Ramaldy Krisna Indradipradana
Universitas Pertamina, Jalan Teuku Nyak Arief, RT.7/RW.8, Simprug, Kebayoran Lama, Jakarta Selatan, DKI Jakarta, 12220.
Email: indradipradana21@gmail.com

Introduction

Laos is the only country in the middle of the Southeast Asian peninsula with the status of a land-locked country. The land-locked country terminology refers to the definition contained in the 1982 UN Convention on the Law of the Sea that a land-locked country is a country that has no direct access to the sea (Seno-Alday 2021; Latifah et al. 2021). Even though its sovereign territory does not have seas (see Figure 1; Utami 2021), Laos has the ambition to develop its water-based energy (hydropower) to become the "battery of Southeast Asia".AEC Based on the International Hydropower Association (2023), Laos is estimated to have a hydropower potential of 26.5 GW, which results in Laos becoming one of the countries with the richest water resources in Southeast Asia. With its geographical location covering most of the Mekong River, Laos takes advantage of this by seeking the development of water-based energy and introducing itself as a land-linked country (Aqua Media International 2021). In addition, Laos has a high annual average rainfall, which is one of the driving factors in the development of hydropower energy in Laos. Also, Laos's low population density shows that Laos's hydropower energy potential is technically more significant when compared with the energy consumption of people in the country (Sakudo 2023).

Figure 1 Laos Map

Even though it has abundant water resource potential, Laos remains the least developed country (LDC) in 2011-2015. Based on the National Human Development Report (2017), Laos only obtained a Gross National Income (GNP) per capita of 1815 USD in 2015. Therefore, Laos launched the 8th Five-year National Socio-Economic Development Plan (NSEDP) for the 2016-2020. The launch of the NSEDP shows that the development of Laos' hydropower energy is one of the government's national development priorities, which is the hope of increasing Laos' GNP to double the 2016 threshold and raising the country's status by 2026, regardless of the Human Assets Index (HAI) and Economic Vulnerability Index (EVI) indicators (MPI & UNDP 2017). Thus, Laos' efforts to develop the economy continue, including developing hydropower energy as a crucial milestone in sustainable development.

According to reports from the Ministry of Planning and Investment (MPI) and UNDP (2017), Laos has long collaborated with China to build infrastructure in the hydropower energy sector through financial assistance. Financial assistance from China to Laos has resulted in this country having increasingly massive debts and creating a more profitable relationship of dependency for China. However, financial assistance from China resulted in the Nam Ou hydroelectric power plant (PLTA) project in Laos being built by the Power Construction Corporation of China under China's Belt and Road Initiative scheme. China has disbursed investment funds of US$2.8 billion by the agreement, allowing China to run the dam for 29 years. China's dam operation is in line with statements from the Laotian government, which revealed that the country could not manage and operate electricity due to large foreign debts. Not only that, but the Laotian government also said that funds, technology, and labour from China positively impacted the country (Sakudo 2023).

Apart from that, Laos needs efforts to widen its cooperation ties with other countries to minimize large debts and realize the country's ambition to become the largest hydropower exporting country in Asia.

In this case, several cooperation arrangements have been carried out by Laos both bilaterally and multilaterally, focusing on the Mekong River Sub-region. Cooperation between Laos and Thailand is one of them; where this cooperation occurred after the agreement to extend the Memorandum of Understanding (MoU) in 1993. This MoU included the purchase of electricity with a capacity of 9000 MW from Laos to meet Thailand's energy demand (Wartherby 2022). Meanwhile, Laos has also established bilateral cooperative relations with Vietnam and Cambodia. The signing of this bilateral agreement between Laos and Vietnam has set energy exports from Laos of more than 8,000 MW to Vietnam in 2030. Furthermore, the first phase of the MoU has also been agreed upon by Laos and Cambodia, which stipulates the export of electrical energy from Laos to Cambodia of 2.4 GW by 2024 (International Hydropower Association 2023).

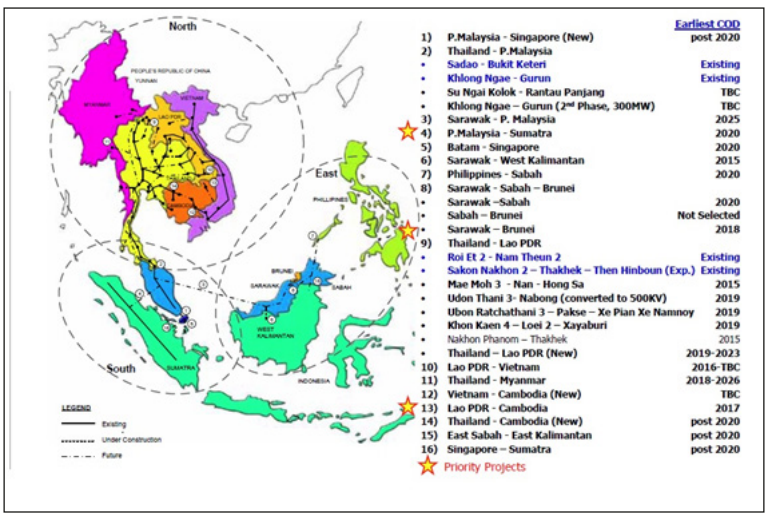
Laos' abundant potential and hydropower energy reserves mean that the country needs to expand its cooperation into an agenda that integrates the Southeast Asian region in the energy sector. In this case, the Association of Southeast Asian Nations (ASEAN), as a regional organization in Southeast Asia, has a strategic plan for its member countries, which can provide direction for forming cooperation in developing the energy sector in the region. The ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 is a series of rules related to policies to support the implementation of cooperation in the energy sector multilaterally to achieve the goals of regional integration and connectivity in Southeast Asia (ASEAN Center for Energy 2022). APAEC's existence is a blueprint for implementing better cooperation to realize improvements in energy security, accessibility, affordability, and sustainability within the ASEAN Economic Community (AEC) (AEC Council Minister Indonesia 2020).

Laos is actively participating in one of APAEC's initiatives for the 2016-2025 period, namely the ASEAN Power Grid (APG) 2016-2025 scheme. ASEAN member countries work together to realize a shared vision and implement plans to develop the electricity network in the region (Pranadi 2016; ASEAN Centre for Energy 2020, 2022, 2023). The active participation and collaboration among ASEAN members

is essential in making the APG scheme successful. The collaboration in the APG will make it easier for member countries to create a more efficient, sustainable, and integrated electricity system in Southeast Asia (Sneddon & Fox 2012).

Figure 2 shows how the electricity system network in Southeast Asia is interconnected, which indicates the success of APG implementation. The success of APG implementation can have a mutual impact and support for MEA implementation. In the APG context, increased integration in the economic sector can assist with efficiency in energy trade and distribution of energy resources in the region. On the other hand, the development of regional electricity networks guided by APG can also assist in the economic integration process in the MEA (Shi & Malik 2013). As one of the APAEC and MEA initiatives, APG aims to encourage cooperation and integration in the Southeast Asia region. These two schemes focus on cross-sector cooperation and synergy between many regional initiatives that can strengthen economic integration in Southeast Asia (ASEAN Center for Energy 2022).

Figure 2 Electric Power Interconnection in the Southeast Asia Region



The ASEAN Power Grid (APG) scheme for 2016-2025 provides space for Laos to export its hydropower production to several ASEAN member countries. In addition, Laos is implementing its strategy of focusing on energy exports by trading excess hydropower production to regional markets. Therefore, Laos is one of the largest countries exporting water-based electrical energy in Southeast Asia (Llamosas & Sovacool 2021; Tran & Suhardiman 2020). Laos's active participation in ASEAN in the APG scheme includes developing, tracking, verifying, and guaranteeing long-term hydropower reserves to trigger the growth of renewable energy in Southeast Asia (Aqua Media International 2021). As the country that produces the largest hydroelectric power plant (PLTA) in Southeast Asia, Laos is taking significant steps to develop the geopolitics of renewable energy by exploring multilateral cooperation in Southeast Asia.

This research explains the relationship between the geopolitical mapping of Laos' renewable energy and hydropower potential development in Southeast Asia's electricity integration. To do this, we in this study used qualitative research methods. Qualitative methods aim to define, explore, and understand the meaning of social problems (Miles et al. 2014). This research has secondary data originating from internet sources. Therefore, we used internet-based research techniques to collect data. This data collection technique makes it easier for the authors to collect information and data from many highly credible agencies (Moleong 2007). We collected data from several journal articles, government reports, and news articles, which they used to complete this research.

We used several keywords in searching on internet sites, including renewable energy, geopolitics, Laos, and hydropower. Many journal articles appeared after entering these keywords on search sites. In this case, we reviewed the title and abstract and paid attention to the year the journal article was published and the data in the journal article is related to renewable energy and hydropower in Laos. We also chose government reports from research results such as ASEAN, ASEAN Center of Energy, AIIB, UNDP, IEA, USAID, and World Bank. After the review, we analyzed the data by reading

government reports regarding Laos' renewable energy, hydropower, energy cooperation with Vietnam, and renewable energy challenges in Southeast Asia. Not only that, we also used data from news articles sourced from Asian Power, Aqua Media International, Mongabay, Water Power Magazine, and Vietnamplus related to Laos hydropower, Laotian energy trade, and the development of Southeast Asian renewable energy.

Those studies undoubtedly have contributed to the understanding of Laos' renewable energy. However, it seems they have missed studying this issue from the perspective of geopolitics which is very significant for better understanding Laos' renewable energy in ASEAN. Therefore, this research analyses the relationship between the geopolitical mapping of Laos' renewable energy and hydropower potential development in Southeast Asia's electricity integration.

Geopolitics of Renewable Energy

In this research, we use the geopolitical concept of renewable energy as a framework for thinking. Geopolitics relates to the relationship between geographic location, space, and power (Verlaan 2012). Meanwhile, the focus of the geopolitical concept of renewable energy centres on how the geographical and technical characteristics of the renewable energy system build ties between countries in the energy sector. The geopolitics of renewable energy can carry out studies on situations that are likely to occur in the future, both in the energy market sector, actors, regional integration, and technology.

First, there is a shift from the non-renewable energy market to renewable energy, which is more competitive due to the abundant availability of renewable energy. The majority of countries in the world have several types of renewable energy sources, and countries that have rich renewable energy resources and processing capabilities no longer rely entirely on energy supplies from abroad, especially countries that produce fossil energy. The world's new attention to the abundant supply of renewable energy can significantly benefit the country in developing renewable energy and exporting it to consumer

countries on the global agenda in the energy transition, making them new producing countries. Apart from that, with the encouragement of the energy transition effect from one country to its neighbouring countries, countries can establish mutually beneficial cooperation between countries in the energy sector. Thus, the geopolitics of renewable energy can rebuild the game between producer, transit, and consumer countries and each country's strategic realities or interests in the political field (Scholten 2018).

Second, energy production is increasingly decentralized by and for a more diverse set of domestic actors, enabling new cooperation models and local use (Scholten 2018). Developing a renewable energy project aims to minimize national carbon emissions and impacts the country's economic and social sectors. The focus of renewable energy projects on areas where these sources originate will spread the impact on opening up employment opportunities for communities in the surrounding environment. Apart from that, the active participation of domestic companies will revive the country's economy. Not only that, increasing living in society, decreasing energy imports, and developing domestic companies can become secondary goals for a country in the geopolitics of renewable energy (Scholten 2018).

Third, relationships that provide mutual benefits for each country's involvement with the decline in demand for fossil energy and the development of clean technology from industrial countries to renewable energy technology are likely to occur in the future (Scholten 2018). This favourable relationship occurs because the demand for fossil energy from developing countries has decreased, resulting in developed countries being encouraged to develop technology in renewable energy. However, the geopolitical implementation of renewable energy will be complex for developing countries because these countries must avoid the trap of condemning new resources. However, this then gives rise to cooperation that provides mutual benefits for countries with abundant renewable energy sources and industrial countries in developing renewable technology (Scholten 2018).

Fourth, it is related to the electrification of renewable energy systems. So far, many applications in the electrification trade have been carried out with renewable energy sources. The implication is that regionalization occurs between countries in a region in the energy sector. In addition, the existence of integration of regional electrification will build a better cooperative relationship with a more straightforward resolution of long-distance losses and a strategic emphasis on a sustainable supply of services and commodities in the region due to the abundant availability of renewable energy and the tight situation in managerial on renewable energy electrification integration projects. Additionally, the unification of regional electability has excellent potential as a geopolitical tool for countries with abundant renewable energy sources (Scholten 2018).

Competitive Energy Market Development

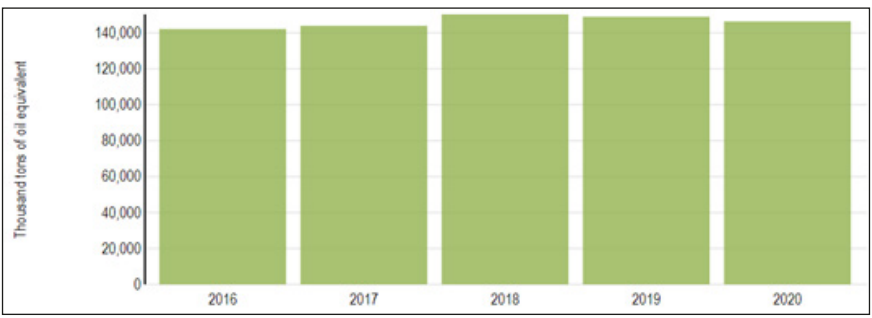
The Southeast Asia region is a region that still has a high level of dependence on the use of fossil energy to fulfil its national energy needs. Nevertheless, ASEAN member countries have remained firm in their commitment to sustainable energy. These countries also agreed that developing renewable energy and energy efficiency is essential to minimizing fossil energy dependency, strengthening energy security, and reducing greenhouse gas emissions (ASEAN Center for Energy 2020). In this case, ASEAN proposes that its member countries strengthen their policies in developing renewable energy and energy efficiency beyond existing national targets (ASEAN Secretariat 2020). The energy transition in Southeast Asia has caused new movements in the region's energy market sector.

Southeast Asian countries tend to store natural resources from one type of renewable energy: solar, wind, biomass, or water. The ASEAN member countries through which the Mekong River passes, such as Thailand, Cambodia, Vietnam, and Laos, contain sufficient potential in water-based energy resources to be optimized and consumed in their national energy sector and can even cause these countries to become energy exporting countries. Maximum use of

this potential can trigger an energy transition in Southeast Asia and minimize fossil energy use in this region. With the government's understanding of the potential of its renewable energy resources driven by policy and intensive in the transition to renewable energy, the government can create a sizeable renewable energy market in this region. The decreasing trend in the use of fossil energy in this region has given rise to countries producing renewable energy and developing both cooperation and trade in renewable energy.

As seen in Figure 3, the production of renewable energy in Southeast Asia has fluctuated. From 2016 to 2020, renewable energy production has consistently increased yearly, except during the COVID-19 pandemic. Loads from renewable energy, such as solar power, wind, and hydro energy, are increasingly growing in Southeast Asia. Production of renewable energy mostly takes place in the electricity generation sector. In this case, several countries, such as Indonesia, Thailand, Malaysia, Vietnam, and Laos, have experienced a significant increase in connectivity to renewable electricity generation (ASEAN Center for Energy 2020). Not only that, in expanding the renewable energy market in this region, Laos is also trying to accelerate hydropower development, which is an integral element in the country's national growth strategy and poverty alleviation to reduce the poverty rate by 2020 (Fawthrop 2021).

Figure 3 Renewable Energy Production in Southeast Power Interconnection in Southeast Asia



Laos has the potential for hydropower generation of around 26,500 megawatts (MW), but Laos' utilization is only around 8%. In 2020, Laos was the 12th largest country in the world in exporting electricity. Meanwhile, Laos could become one of Southeast Asia's largest electricity exporters if its hydro energy potential is fully utilized (Malahayati 2020). In 2020, electricity will be the most exported commodity by Laos. The countries that are Laos' main destinations for exporting electricity include Thailand, Cambodia, Vietnam, and Malaysia (The Observatory of Economic Complexity 2022).

The existence of Laos' hydropower potential has resulted in foreign investors being interested in investing in hydropower projects in Laos. One of them is the Nam Theun 2 hydropower development project. This hydropower project is a Nam Theun 2 Power Company (NTPC) project with the Laos government, where 27 parties are sponsoring the project, including the World Bank Group and the Asian Development Bank (World Bank 2019b). Apart from that, Electricité de France (EDF), which is France's largest company in the energy sector, has also poured funds into investing and has shares in this project. Not only that, EGAT International Company Limited (EGATi), which is a subsidiary of the Electricity Generating Authority of Thailand (EGAT), has also invested capital in hydropower projects in Laos, including the Nam Theun 2 Hydroelectric Power Plant and the Xayaburi Hydroelectric Power Plant (Phomsoupha 2009).

Through its energy sector agenda, Laos seeks to develop the potential of its country's hydropower energy in the regional energy market by establishing bilateral and multilateral international cooperative relations, especially in integrating energy markets in Southeast Asia. In the ASEAN Power Grid scheme phase 1 in the 2016-2020 period, Laos has expanded the market for renewable energy by building cooperation with ASEAN member countries. One of the collaborations is the Lao PDR – Thailand – Malaysia –

Singapore Power Integration Project (LTMS-PIP). In this project, Laos becomes an energy-producing country that sells hydropower energy to Malaysia and Singapore via Thailand (Andrew-Speed 2016). Based on a report from the ASEAN Center for Energy (2023), Laos has exported 265.73 GWh of its hydropower energy to Thailand and Singapore as of April 30, 2023. This cooperative relationship is a trial study in multilateral cooperation in the 2016-2025 APG scheme on developing the renewable energy market in Southeast Asia.

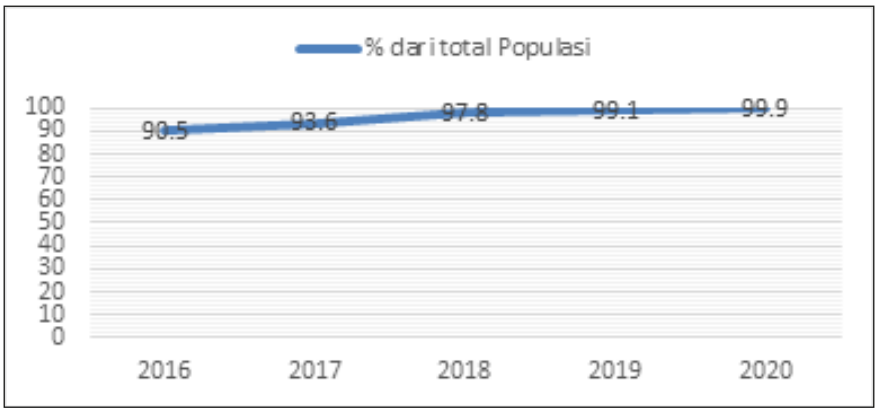
Development of Energy Production and Actors Involved

Renewable energy production has a decentralized mechanism in a region that aims to minimize energy poverty and encourage domestic development. In this process, the Lao government can empower the community to develop the infrastructure sector and produce renewable energy by providing employment opportunities, thereby increasing the income of several regions in the country (Runde et al. 2022). The agenda for electricity integration in Southeast Asia aims to achieve the Sustainable Development Goals target, one of which is to open a universal path to modern energy for the ASEAN community. Most ASEAN member countries hope to achieve a 100% electrification rate by 2030 (ASEAN Secretariat 2020). By reviewing the scale of the increase in the population's access to electricity, it is possible to see that the welfare of the people in Laos is increasing. This increase in community welfare is in line with the main objectives of Laos in the 8th National Socio-Economic Development Plan (2016-2020), which prioritizes the energy sector, especially hydropower energy, to maintain stability in the use of electricity in the country and to alleviate poverty.

Figure 4 shows that there was an increase in the number of people who could access electricity in 2016-2020. The Lao government is prioritizing the development of hydropower, aiming to meet domestic needs and expand renewable energy in Southeast Asia, which is quite promising. The abundance of hydropower potential and its development provide many benefits for Laos. The presence

of hydropower-based electricity in Laos has become a major part of economic output, government revenues, and exports (Runde et al. 2022). Not only that, but the construction of this hydroelectric power plant will also overcome the problem of access to electricity and provide job opportunities for the local community.

Figure 4 Proportion of Population with Access to Electricity in Laos (2016-2020)



Therefore, Laos implements Integrated Water Resources Management (IWRM) to develop its hydropower potential. Implementing IWRM policies requires strengthening relations between water, land, the environment, and sustainable development (Jusi 2010). Implementing IWRM aligns water resources management's social, economic, and environmental sectors. This policy also creates space for the community, local government, and policymakers to participate actively in the planning, management, and supervision of hydropower projects (Jusi 2010).

Apart from that, Laos is also decentralizing by developing the Xekaman 3 dam. This hydropower project is not far from the border between the tributary of the Xe Kaman River, Sekong province, Laos, and the South Nam Pagnou River, Vietnam (Hobo Maps 2023). The construction of this dam was successful in 2013 with

a contract agreement between Xekaman 3 Power Ltd. Co. and the Laotian government. Viet-Lao Power Joint Stock Company is the majority shareholder in the project, with 85%, while Electricite du Laos (EdL) has 15%. Vietnam Development Bank (VDB) and the International Finance Cooperation of World Bank Group (IFC) have invested 607 million USD in the Xekaman 3 hydropower project (ASEAN Infrastructure Investment Bank 2023). In November 2016, Xekaman 3 Power Ltd. Co, Vietnam Electricity (EVN), and Electricite du Laos (EdL) agreed on a sale and purchase agreement which resulted in Vietnam successfully exporting hydropower via transmission lines integrated into Vietnam's national grid amounting to 250MW (Hobo Maps 2023).

In 2017, the Lao government earned $180 million in revenue from selling and purchasing Xekaman 3 hydropower energy products, which aims to overcome poverty and manage the environment in line with priority programs (Hobo Maps 2023). In this case, the Laotian government allocates most of its income to several sectors: health, education, energy, and agriculture. In addition, families who are allowed to return to the dam area will earn double their income. This double income can be seen from increased household savings rates from 21% in 2006 to 99.6% in 2017. The relocated community will get employment opportunities and better village infrastructure, including 1330 houses, 270 km of paved roads, 17 elementary schools, 16 kindergartens, and 2 health centres, as well as improvements to regional hospitals (World Bank 2019a).

Development of Cooperation in the Field of Technology

Renewable energy development also requires various sophisticated technologies to produce, store, and distribute this energy. In this case, Laos has established cooperative relations with other countries in developing technology to utilize the country's hydropower energy. Laos tends to establish this cooperative relationship with developed countries collaborating with ASEAN (Runde et al. 2022). One of the collaboration programs launched is The Regional Southeast

Asia Smart Power Program. The U.S. Agency for International Development (USAID) runs this program to support energy security in Southeast Asia, encourage the trade sector, and facilitate the greater integration of regional powers. In this case, USAID is building cooperative relationships with many parties in Southeast Asia, including Électricité du Laos (EdL), to advance performance and electricity trade and also network integration through the development of assessments on strengthening resilience, support in pilot projects, and training in demand-side management (USAID 2023).

Laos has built bilateral cooperation with several countries in the hydropower technology sector. One of the cooperation relations between Laos in implementing this hydropower project involves China. In this case, China has close relations with Laos in the cooperation sector, especially in developing hydropower projects in Laos. Power Construction Corporation of China (Power China) is the party that supplies the technology and expertise needed to develop hydropower and supports the financial sector with Chinese investment funds in hydropower projects (Fawthrop 2021).

Apart from that, Laos also collaborates with ASEAN member countries, namely Vietnam. The involvement of companies such as PetroVietnam Power Corporation (PV Power) and SCI in hydropower projects includes technology transfer and experience in hydropower development (Runde et al. 2022). The Nam Sam 3 dam project is a collaboration between Laos and Vietnam. SCI E&C (part of the SCI Group Vietnam company) supplied three 52 MW Francis turbines in 2019 at the Nam Sam 3 hydropower plant. This cooperation agreement includes a complete set of electromechanical equipment and technical services in monitoring, installation, and commissioning. This agreement also means that energy results from the Nam Sam 3 Hydroelectric Power Plant will be distributed to Vietnam in 2023 (Water Power Magazine 2021). This collaboration has helped Laos develop hydropower potential, transfer technology, and obtain data support to develop more massive and complex projects.

Moreover, cooperative relations are also established between Laos and multinational companies. ANDRITZ Hydro is one of the companies with a representative office in the capital city of Vientiane. ANDRITZ Hydro has been in Laos since 2016 and created history in 2019 by building the Xayaburi dam (Kedsadasak & Königshofer 2023). Laos's collaboration with this company started from research and development to the completion of engineering, procurement, and construction of electro-mechanical equipment and projects. With its advanced equipment, ANDRITZ contributes to the safe and sustainable development of hydropower in Laos. ANDRITZ also operates the Nam Theun 1, Houay Kapheu, and Nam Kong 3 dams (Kedsadasak & Königshofer 2023).

Development of Regional Electrification

In Southeast Asia, Laos has rich energy resources, including oil, natural gas, and coal. In this region, the condition of energy geopolitics is still related to contestation in the availability of access and management of fossil energy sources (Sakudo 2023). However, most ASEAN member countries are developing and, therefore, still depend on energy imports, especially oil and natural gas, for their economic activities. This results in these countries being vulnerable to price changes, global energy availability, and vulnerability to geopolitics related to stability in the central producing countries (Malahayati 2020). Energy security in this context has become a fundamental factor in the dynamics that occur in regional energy geopolitics. Issues related to contestation in water areas with abundant natural resources, such as the South China Sea, have become the root of tensions and conflicts stemming from claims involving some countries in the region (Malahayati 2020).

The priority in developing Laos hydropower energy focuses on regional integration as a marketing effort to utilize environmentally friendly energy sources. Laos' priorities align with the agenda implemented in the energy transition in the Southeast Asia region through the ASEAN Power Grid 2016-2025 scheme. ASEAN's

strategy and actions in this scheme aim to advance connectivity in the energy sector and market integration in ASEAN and achieve energy security, accessibility, affordability, and sustainability for everyone under the MEA framework (ASEAN Center for Energy 2020). In this integration, Laos seeks to develop the country's hydropower energy potential by becoming a producer country for some projects under the APG scheme.

In this case, Laos has established bilateral cooperative relations with some countries. First, the Laos-Vietnam bilateral cooperation was implemented from 2016 to 2020 with a load of 200 MW. This collaboration exports water-based electrical energy from Laos to Vietnam through 4 dam projects, including Xekaman 3 – Thanh My, Xekaman 1 – Pleiku 2, Nam Mo – Ban Ve, and Luang Prabang – Nihong Quan. The Xekaman 3 PLTA, which has a capacity of 260 MW, has supplied 980 million kWh of electricity to the Vietnamese electricity network in Danang. Meanwhile, the Xekaman 1 hydropower project has a capacity of 322 MW, which will be connected to the electricity network of Pleiku City in Gia Lai Province, Vietnam (Asian Power 2012). With this cooperative step, Laos and Vietnam have contributed significantly to creating electricity integration in ASEAN.

Apart from that, Laos and Vietnam have good relations where the two countries provide mutual support in development in the socio-economic sector and marketing to invest in the renewable energy sector to contribute to the stable and sustainable development of the Southeast Asia region. The existence of cooperative relationships has contributed to alleviating poverty, improving people's living standards, encouraging economic growth, developing relations in the trade and investment sectors, as well as people-to-people exchanges between countries in the Southeast Asia region (Runde et al. 2022). The two countries have also established a close cooperative relationship in harmony in handling every challenge, providing mutual support for economic recovery, and working together to realize the Vision of the ASEAN Community 2025.

Second, bilateral cooperation between Laos and Cambodia, the implementation of this collaboration passes through 1 Laos dam into 2 Cambodian territories, namely Ban Hat – Kampong Sralao and Ban Hat – Stung Treng. The Ban Hat hydropower plant has a capacity of 260 MW and was integrated into the Cambodian electricity network on January 7, 2017 (Vietnamplus 2020). This connected electricity flows between temporary transmitters in Laos and transmitters in Cambodia's Stung Treng and Kampong Sralao provinces. This 195 MW electricity flows from the generator to the border and then to Phnom Penh via a transmission line with a capacity of 230kV. Mega First Cooperation Berhad Malaysia and Electricite du Laos (EdL) have invested 500 million USD in constructing the Ban Hat Hydroelectric Power Plant (Vietnamplus 2020).

Apart from that, the relationship between Laos and Cambodia is quite harmonious. In several meetings, the two countries have agreed to agreements that can strengthen and develop cooperation in the energy sector, both technical and commercial frameworks. This collaboration also includes the exchange of study visits for hydropower projects between the two countries, such as the Ban Hat and Lower Sesan 2 hydropower plants in the future (World Energy 2021). The Directorate General of Electricity of Cambodia, Keo Ratanak, said that the existence of electricity from the Laos hydroelectric power plant has positively impacted increasing renewable energy in Cambodia (World Energy 2021). Thus, this impact allows for the expansion of cooperation between Laos and Cambodia in the APG phase 2 scheme for the 2021-2025 period.

Lastly, the Laos-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) is a multilateral cooperation. This collaboration has been going on since 2018 and is a pilot collaboration in the energy trading sector in Southeast Asia. This collaboration creates opportunities to handle technical, legal, and financial problems that may arise in the multilateral trade sector (ASEAN Center for Energy, 2018). The formation of LTMS-PIP occurred due to the distribution of 100 MW of electricity supply from Laos via Thailand for export to Malaysia and Singapore. The collaboration in electricity trading

began with the Energy Purchase and Wheeling Agreement (EPWA) agreement between Laos, Thailand, and Malaysia in 2017. Since August 2020, LTMS-PIP Phase I has traded 30.2 GWh of electricity. Utility companies from these three countries have agreed to an Additional Agreement for EPWA to expand energy trading capacity from 100 MW to 300 MW for two years, from January 2020 to December 2021 (ASEAN Secretariat 2020).

At the end of 2020, Malaysia, Laos, and Thailand agreed to the Energy Purchase and Wheeling Agreement (EPWA). The agreement includes the purchase of 100 MW of hydroelectric electricity by Malaysia from Laos via the existing transmission network in Thailand (Weatherby 2022). This project is a limited breakthrough in the multilateral trade sector. This view is based on the unidirectional electricity flow in these four countries, which has yet to create an energy market in the region (Weatherby 2022). However, the existence of this project, in particular, has caused many countries to agree to an agreement regarding the preparation of a methodology that can calculate wheeling costs and implement a collaborative approach to develop trade norms and processes (IEA 2019).

Conclusion

This research found that Laos, which has abundant hydropower energy resources, has made some efforts to develop energy exports with the geopolitics of renewable energy in electricity integration in Southeast Asia. In its transition to a more competitive energy market, Laos has made efforts to develop its hydropower energy potential by collaborating both multilaterally and bilaterally in the APG phase 1 scheme in the 2016-2020 period. Laos is developing hydropower energy production to alleviate poverty and economic growth. Laos' IWRM policy on decentralizing energy production aims to strengthen the synergistic relationship between the use of water, land, the environment, and sustainable development. EdL, as a national company in Laos, seeks to create jobs and access to electricity for the community in alleviating poverty.

In the geopolitical development of renewable energy in the technology sector, Laos collaborates with developed countries such as the United States and China. Laos also collaborates with Vietnam in developing technology for producing and transmitting hydropower energy, which is exported to Vietnam. Laos' renewable energy geopolitics ultimately feed into the development of electrification in Southeast Asia. Laos prioritizes hydropower energy development for regional integration as an effort to market the use of environmentally friendly energy sources in the energy transition agenda through the 2016-2025 APG scheme. This integration resulted in Laos' development into a producing country in bilateral relations between Laos-Vietnam and Laos-Cambodia and multilateral relations between Laos, Thailand, Malaysia, and Singapore (LTMS-PIP).

Thus, this research concludes that the geopolitics of Laos' renewable energy adapts to Laos' capabilities and ambitions. As an energy-producing country, Laos has actively sought integration in the region. This integration benefits Laos by triggering an influx of investment from this cooperation, thereby increasing state income, which can alleviate poverty in Laos. Also, the geopolitical involvement of Laos' renewable energy in the energy transition agenda and electricity integration in ASEAN can accelerate the development of hydropower potential in Southeast Asia through cooperation in the technology sector and hydropower energy trade in the region.

References

AEC Council Minister Indonesia. 2020. "Masyarakat Ekonomi ASEAN". *AEC-MEA.* Retrieved from https://meaindonesia.ekon.go.id/mea/

Andrew-Speed, P. 2016. "Connecting ASEAN through the Power Grid: Next Steps." *ESI Policy Brief* 11, 1-4.

ASEAN Centre for Energy. 2020. "ASEAN Energy Business Forum (AEBF) 2020." *ASEAN Energy*. Retrieved from https://aseanenergy.org/event/asean-energy-business-forum-aebf-2020/

ASEAN Centre for Energy. 2022. "Support the Development of Regional Blueprint on Energy Cooperation." *ASEAN Energy*. Retrieved from https://accept.aseanenergy.org/work/apaec/

ASEAN Centre for Energy. 2023. "ASEAN Energy Transition and LTMS-PIP: AIMS III Project Team." *ASEAN Energy*. Retrieved from https://caseforsea.org/wp-content/uploads/2023/06/ACE-Presentation_-ASEAN-Powr-Grid_20230627_Ambiyah.pdf

ASEAN Infrastructure Investment Bank. 2023. "Lao PDR: Xekaman Cross-border Hydropower Projects." *AIIB*. Retrieved from https://www.aiib.org/en/projects/details/2023/proposed/Lao-PDR-Xekaman-Cross-border-Hydropower-Projects.html

ASEAN Secretariat. 2020. *ASEAN Sustainable Development Goals Indicators Baseline Report 2020.* Jakarta: ASEAN Secretariat.

Asian Power. 2012. "Laos Hydropower Plant to Join Vietnam's Grid." *Asian Power*. Retrieved from https://asian-power.com/project/in-focus/laos-hydropower-plant-join-vietnams-grid#:~:text=The%20Song%20Da%20Group%20began%20construction%20of%20the,Pleiku%20City%E2%80%99s%20power%20grid%20in%20Gia%20Lai%20Province

Aqua Media International. 2021. "ASEAN Countries Plan Cross Border Trading. Aqua Media International." Retrieved from https://www.hydropower-dams.com/news/asean-countries-plan-cross-border-trading/

Fawthrop, T. 2021. "In Laos, a 'Very Dangerous Dam' Threatens an Ancient World Heritage Site." *Mongabay.* Retrieved from https://news.mongabay.com/2021/12/in-laos-a-very-dangerous-dam-threatens-an-ancient-world-heritage-site/

Hobo Maps. 2023. "Xekaman 3 Dam Hydropower Info." *Hobo Maps*. Retrieved from https://www.hobomaps.com/Xekaman3dam.html

IEA. 2019. "Southeast Asia Energy Outlook 2019. International Energy Agency." Retrieved from https://www.iea.org/reports/southeast-asia-energy-outlook-2019

International Hydropower Association. 2023. “Laos.” *IHA.* Retrieved from https://www.hydropower.org/country-profiles/laos

Jusi, S. 2010. “Openings Towards Integrated Water Resources Management in Lao PDR.” *International Journal of River Basin Management* 7(1): 23-29, https://doi.org/10.1080/15715124.2009.9635367

Kedsadasak, V. & Königshofer, A. 2023. “Laos –The Battery of Southeast Asia.” *ANDRITZ.* Retrieved from https://www.andritz.com/hydro-en/hydronews/hydro-news-asia/laos

Latifah, E., Khamlia, I., & Ramadhan, R. 2021.” Kebebasan Transit bagi Land-Locked: Pelajaran dari Nepal.” *Jurnal IUS Kajian Hukum dan Keadilan* 9(3):574-590, https://doi.org/10.29303/ius.v9i3.891

Llamosas, C., & Sovacool, B. K. 2021. “Transboundary Hydropower in Contested Contexts: Energy Security, Capabilities, and Justice in Comparative Perspective.” *Energy Strategy Reviews* 37(14), https://doi.org/10.1016/j.esr.2021.100698

Malahayati, M. 2020. “Achieving Renewable Energies Utilization Target in South-East Asia: Progress, Challenges, and Recommendations.” *The Electricity Journal* 33(5), https://doi.org/10.1016/j.tej.2020.106736

Miles, M., Huberman, A., & Saldana, J. 2014. *Qualitative Data Analysis: A Methods Sourcebook* Third Edition. California: SAGE.

Moleong, L. 2007. *Metode Penelitian Kualitatif*. Bandung: Remaja Rosda Karya.

MPI & UNDP. 2017. “National Human Development Report: Graduation From Least Developed Country Status Lao PDR.” *Ministry of Planning and Investment UNDP.* Retrieved from https://data.opendevelopmentmekong.net/dataset/e35b0031-84e2-41bd-a630-2547fcaa79e7/resource/cba2d518-e10d-4de0-b8c9-82eca521812a/download/5th-nhdr-lao-pdr.pdf

Phomsoupha, X. 2009. "Hydropower Development Plans and Progress in Lao PDR." *Hydro Nepal: Journal of Water, Energy, and Environment* 4:15-17.

Pranadi, A. 2016. "How Electricity Trades Progress in ASEAN." *ASEAN Energy*. Retrieved from https://aseanenergy.org/how-electricity-trades-progress-in-asean/

Runde, D., Bandura, R., & Lee, R. 2022. "Opportunities for Development Cooperation in Lao Strategic Sectors." *Center for Strategic & International Studies*. Retrieved from https://www.csis.org/analysis/opportunities-development-cooperation-lao-strategic-sectors

Sakudo, M. 2023. "Are Laos's Hydropower Ambitions a Chinese 'Debt Trap'?" *Asia Pacific.* Retrieved from https://www.asiapacific.ca/publication/are-laoss-hydropower-ambitions-chinese-debt-trap

Seno-Alday, Sadra. 2021. "How Laos is Becoming Landlockedness and Bolstering Growth", *East Asia Forum,* March 5. Retrieved from https://eastasiaforum.org/2021/03/05/how-laos-is-overcoming-landlockedness-and-bolstering-growth/

Scholten, D. 2018. *The Geopolitics of Renewable*. Cham: Springer

Shi, X. & Malik, C. 2013. "Assessment of ASEAN Energy Cooperation within the ASEAN Economic Community." *ERIA Discussion Paper Series* 37: 1-71.

Sneddon, C. & Fox, C. 2012. "Water, Geopolitics, and Economic Development in the Conceptualization of A Region." *Eurasian Geography and Economics* 53(1):143-160, https://doi.org/10.2747/1539-7216.53.1.143

The Observatory of Economic Complexity. 2022. "Electricity in Laos." *OEC.* Retrieved from https://oec.world/en/profile/bilateral-product/electricity/reporter/lao#:~:text=In%202021%2C%20Laos%20exported%20%241.96B%20in%20Electricity.,%2C%20and%20China%20(%24944k)

Tran, Thong Anh & Diana Suhardiman. 2020. "Laos' Hydropower Development and Cross-Border Power Trade in the Lower Mekong Basin: A Discourse Analysis." *Asia Pacific Viewpoint* 61 (2): 19-235.

USAID. 2023. "USAID Energy Program Signs Agreement with ASEAN Centre for Energy to Advance Regional Clean Energy Priorities. US Agency International Development." Retrieved from https://www.usaid.gov/asia-regional/press-releases/jun-22-2023-usaid-energy-program-signs-agreement-asean-centre-energy-advance-regional-clean-energy-priorities

Utami, S. 2021. "Kondisi Geografis Negara Laos." *Kompas*. Retrieved from https://www.kompas.com/skola/read/2021/12/24/183823169/kondisi-geografis-negara-laos

Verlaan, R. 2012. "Renewable Energy Integration Issues." *The 21st PPA Annual Conference*.

Vietnamplus. 2020. "Lao Hydropower Plant Connected to Cambodia's Grid." *Vietnamplus.* Retrieved from https://en.vietnamplus.vn/lao-hydropower-plant-connected-to-cambodias-grid/167062.vnp

Water Power Magazine. 2021. "Voith to Equip Nam Sam 3 Project, Laos PDR." *Water Power Magazine.* Retrieved from https://www.waterpowermagazine.com/news/newsvoith-to-equip-nam-sam-3-project-loas-pdr-9274849

Weatherby, C. 2022. "Alternative Development Pathways for Thailand's Sustainable Electric Trade with Laos." *STIMSON*. Retrieved from https://www.stimson.org/2022/alternative-development-pathways-for-thailands-sustainable-electricity-trade-with-laos/

World Bank. 2019a. "Powering the Future: the Nam Theun 2 Project in Lao PDR." *World Bank*. Retrieved from https://www.worldbank.org/en/results/2019/05/06/powering-the-future

World Bank. 2019b. “Nam Theun 2 Project Overview.” *World Bank*. Retrieved from https://www.worldbank.org/en/country/lao/brief/nam-theun-2-project-overview-and-update

World Energy. 2021. “Cambodia, Laos Pledge to Boost Energy Sector.” *World Energy*. Retrieved from https://www.world-energy.org/article/21509.html#:~:text=%E2%80%9CThe%20two%20sides%20agreed%20to%20further%20strengthen%20and,Sesan%202%20hydropower%20in%20the%20future%2C%E2%80%9D%20it%20read