



Mekong Infrastructure Tracker



STIMSON



The Asia Foundation

2020 Annual Report

Executive Summary

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The Mekong Infrastructure Tracker is a comprehensive, free online platform that provides accessible data on infrastructure across all stages of development throughout the five countries of the Mekong Region. The Tracker is a resource for government officials, private developers, academic researchers, civil society, and other stakeholders to track, monitor, and quantify the development of energy, transportation, and water infrastructure assets and the social, economic, and ecological changes that this infrastructure brings to Southeast Asia.

The Tracker consists of online interactive tools and resources which help fill an existing knowledge gap about the type and scale of the infrastructure boom in the Mekong region and builds a community of stakeholders who can utilize this data to support a more sustainable future for the Mekong region. The Mekong Infrastructure Tracker is hosted by the Stimson Center and is part of the five-year Mekong Safeguards Activity (2018 – 2023), which is supported by the United States Agency for International Development (USAID) and implemented by The Asia Foundation. The Tracker harnesses the power of data transparency across two analytical tools: the Mekong Infrastructure Tracker Dashboard and the Project Impact Screener.

The Dashboard enables policymakers, government regulators, infrastructure developers, researchers, and the general public to grasp the type and scale of the infrastructure boom in the Mekong region. Users can browse through descriptive data on more than 6000 infrastructure projects in the tracker's power generation, linear infrastructure (roads, rails, and waterways), and industrial zones (airports, special economic zones, and other zones of industrial and economic activity) databases. Stakeholders can use the Tracker Dashboard to explore trends such as how solar power generation has been deployed over time or track how outside partners like China, Japan, and Thailand invest in different types of infrastructure across location. The Tracker also allows users to contribute and update data through a verification process.

Executive Summary

The Project Impact Screener helps consider the environmental and socio-economic risks to and impacts from infrastructure. Interactive GIS layers (i.e. critical bio-diversity habitats, sea-level rise, geological information, and socio-economic indicators, etc.) will reveal current and future risks that are of interest to all stakeholders. To promote timely updates and build local buy-in and ownership of the datasets, the Tracker will also allow users to submit their own data and layers for review and inclusion if they pass verification by the Tracker's development team. Users can explore linkages between power plants, transportation routes, and the development of industrial zones. The Project Impact Screener can also generate reports on the infrastructure datasets and the other GIS layers within zones of interest.

In addition to the data and analytical tools, the Mekong Infrastructure Tracker also houses reference materials for promoting best policy and planning practices such as strategic environment assessment, environmental and social impact assessments, environmental monitoring and compliance, and economic instruments. Country profiles on each of the five Lower Mekong countries provides context on national infrastructure needs, policy priorities and targets, and projected investment as well as snapshot profiles of key projects.

The Tracker was officially launched on May 27, 2020 and is accessible to all interested users at www.stimson.org/project/mekong-infrastructure. All data referenced in this report is accessible through that portal, unless otherwise noted.

This annual report summarizes the state of the Tracker's data, suite of tools and other resources, and user engagement since launch and outlines commitments to expand on these tools in 2021.



Data Overview: Power Generation

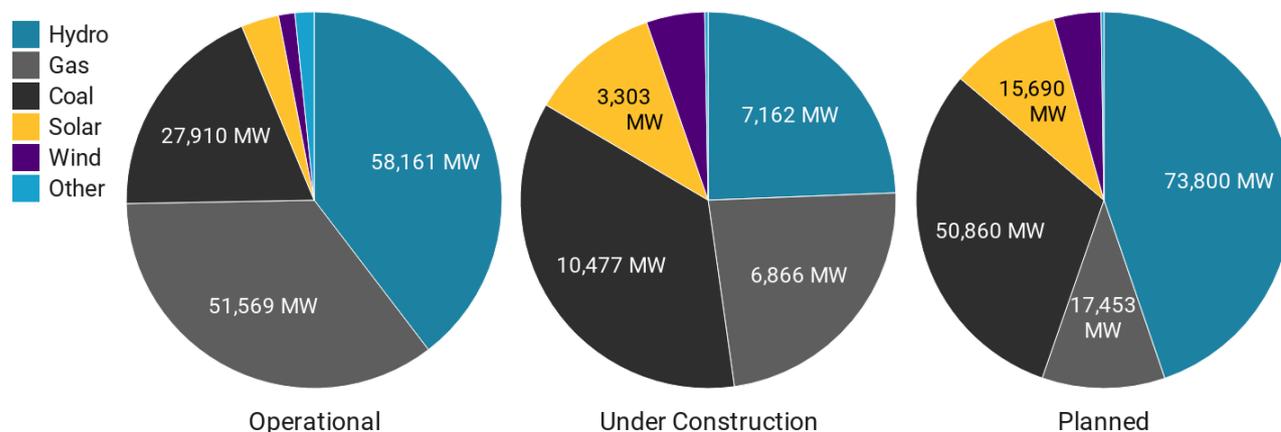
The Power Generation Dataset was launched in May 2020 and includes 1,766 individual power generation projects.

Power Generation by Type and Status

	Operational	Under Construction	Planned	Unknown
Hydropower	58,161 MW	7,162 MW	73,800 MW	109 MW
Coal	27,910 MW	10,477 MW	50,860 MW	673 MW
Natural Gas	51,569 MW	6,866 MW	17,453 MW	2,134 MW
Solar	4,764 MW	3,303 MW	15,690 MW	545 MW
Wind	2,066 MW	1,476 MW	6,721 MW	341 MW
Biomass	726 MW	0	0	850 MW
Oil	974 MW	0	0	0
Mixed Fossil Fuel	559 MW	0	400	0
Waste	150 MW	85 MW	0	246 MW

Data Overview: Power Generation

Mekong Region Power Mix



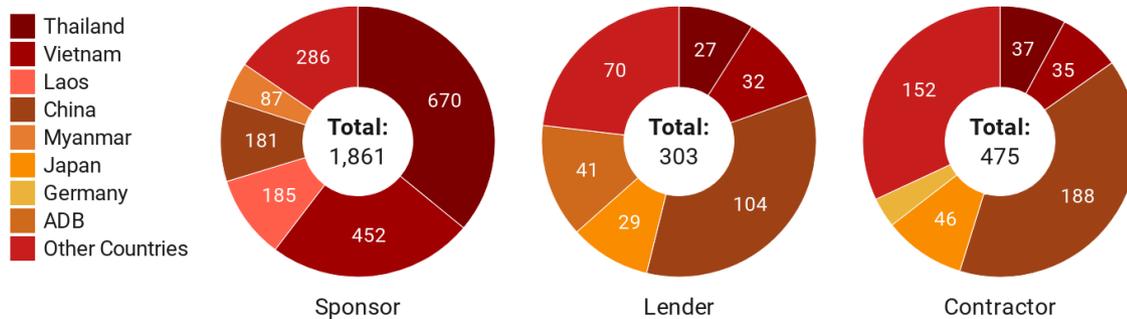
These pie charts show the power mix in the Mekong region across three statuses: operational as of 2020; under construction; and planned.

Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 12/2/2020 • Created with Datawrapper

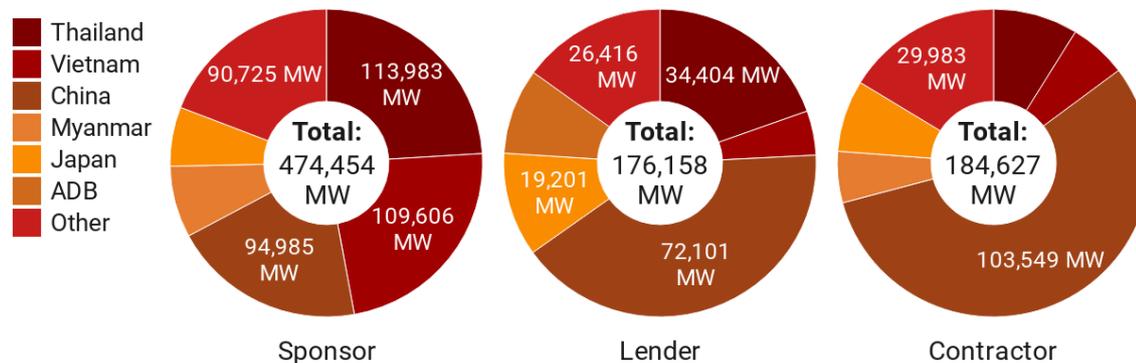
- The Tracker shows that Thailand has the most installed capacity (54,700 MW), but it is closely followed by Vietnam (48,706 MW). Vietnam's installed capacity may surpass that of Thailand by the end of 2020 with thousands of megawatts of new solar projects coming online in southern Vietnam.
- Hydropower is currently the largest individual contributor to the region's installed power mix in 2020 (40%) and comprises 45% of all proposed projects in the Tracker dataset. However, coal forms the largest portion of projects currently under construction (35%).
- Myanmar has over 63,000 MW of proposed power generation projects in planning phases of development, and two-thirds of this is solely hydropower.
- The Mekong Infrastructure Tracker also has 32,715 MW of coal and hydropower projects which have been canceled, and 4,898 MW of projects which have an unknown status. Most of the unknown projects are small-scale biomass projects in Thailand.

Data Overview: Power Generation

Country Involvement in Mekong Power Sector, by Projects



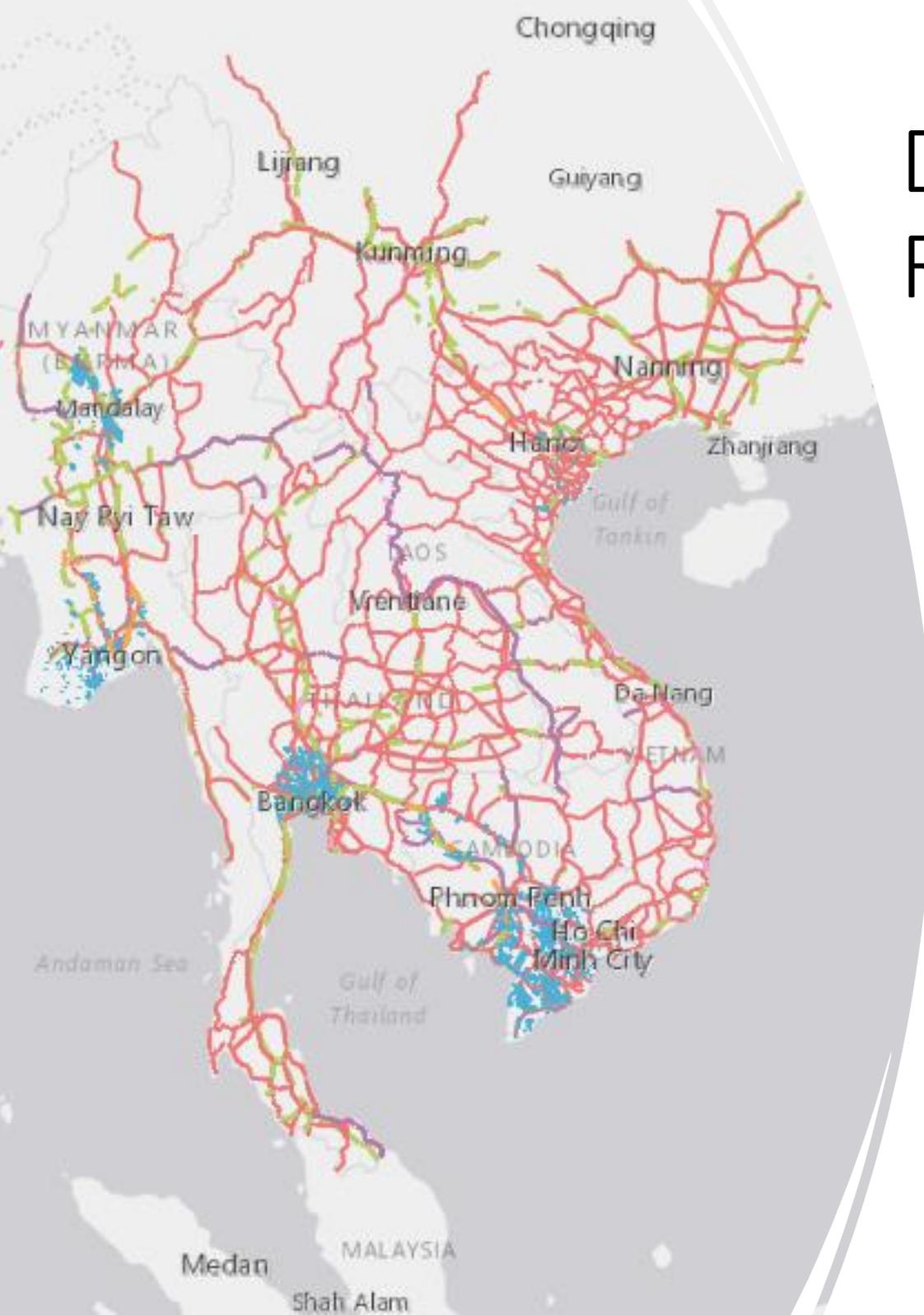
Country Involvement in Mekong Power Sector, by Capacity



This chart shows how companies from the top 6 countries are involved in the Mekong region's power sector in terms of installed power generation capacity (megawatts).

Created with Datawrapper

- The Mekong Infrastructure Tracker indicates that companies from Thailand, Vietnam, Laos, China, and Myanmar are invested in the most individual projects across all project statuses. In terms of installed power generation capacity, Thailand, Vietnam, China, and Myanmar are in the lead followed by Japan.
- Chinese companies are involved in more projects as contractors (188) than as direct project developers (181). While information about project finance is less complete, the dataset currently shows that China is the largest individual financier of power development projects around the region.
- Thailand is involved in sponsoring the largest number of projects (670), and the corresponding installed capacity of these projects is 113,983 MW. This is nearly 500 more projects but only approximately 20,000 MW more than China, indicating that China is involved in sponsoring larger projects on average.



Data Overview: Road, Rail, & Waterways

The Road, Rail, and Waterways dataset was launched in May 2020 and includes 2,503 lines representing various types of linear connectivity throughout the Mekong Region.

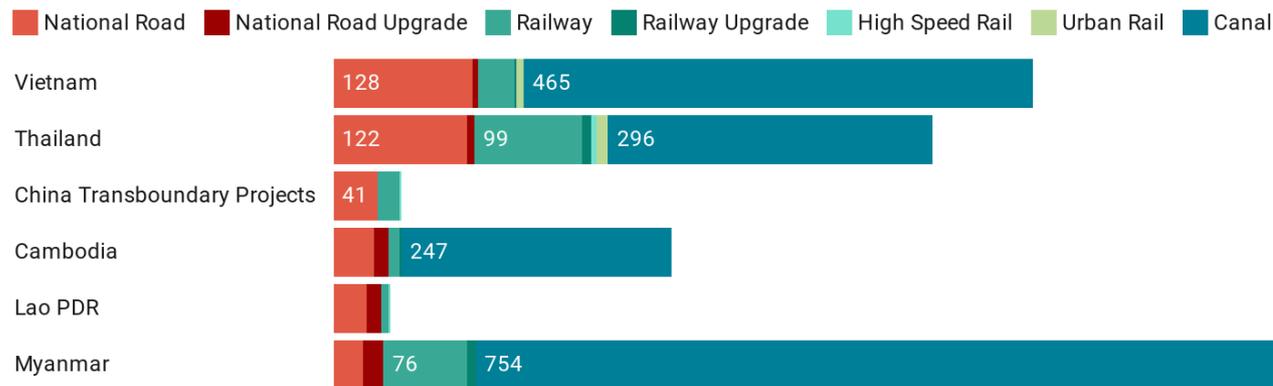
The Mekong Infrastructure Tracker does not incorporate all types of linear infrastructure: local and provincial roads are not included in this dataset. Some projects cross national borders, and in most cases are split into separate segments for purposes of tracking infrastructure inside individual countries. The canals dataset incorporates projects used for transportation, irrigation, and multipurpose waterways.

Linear Infrastructure Dataset, by Type and Status

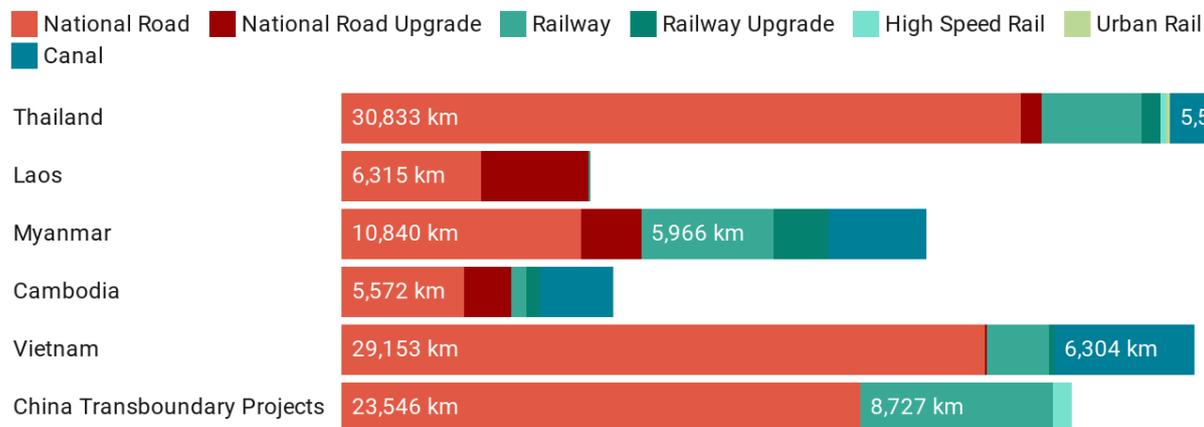
	Operational	Under Construction	Planned
Canal	1765 projects	6 projects	2 projects
National Road	375 projects	8 projects	5 projects
National Road Upgrade	46 projects	7 projects	1 projects
Railway	205 projects	3 projects	38 projects
Railway Upgrade	15 projects	N/A	3 projects
High Speed Rail	2 projects	4 projects	2 projects
Urban Rail	9 projects	4 projects	3 projects

Data Overview: Road, Rail, and Waterways

Linear Infrastructure by Location and Project Type



Linear Infrastructure by Location and Project Length

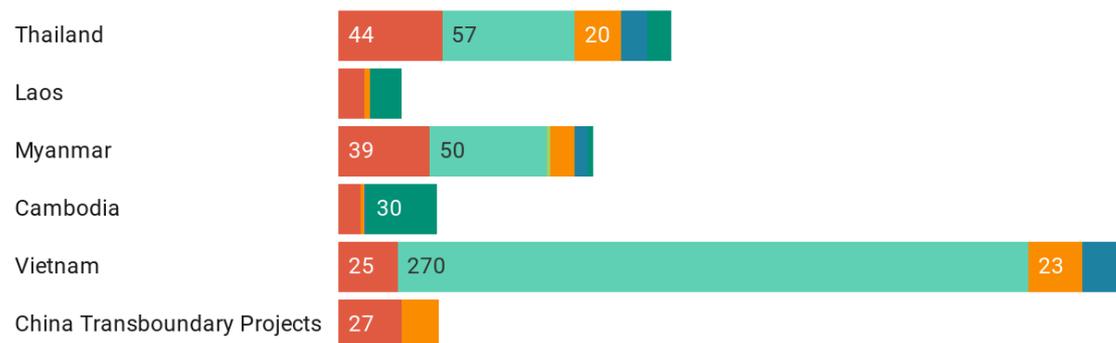


- 884 of the linear infrastructure projects are in Myanmar, 639 in Vietnam, 547 in Thailand, 309 in Cambodia, and 52 in Laos. There are also 61 projects located in the southwestern provinces of China, although only transboundary projects are included in this dataset.
- In terms of numbers, canals outdistance all other data points by a significant margin and represent 71% of the total dataset. However, most of the canals are relatively short with an average length of only 11.2 kilometers.
- National roads encompass 106,258 km, more than half of the total length included in the dataset.
- The vast majority (96%) of the road, rail, and waterway projects included in the Tracker are operational. This is in part due to the methodology: in order to include projects, there must be sufficient locational data on a project to include it in the Mekong Infrastructure Tracker. This is easy to do for existing projects but can be complicated for projects which are under construction or planned, which do not always have detailed route information available.

Data Overview: Industrial Spaces

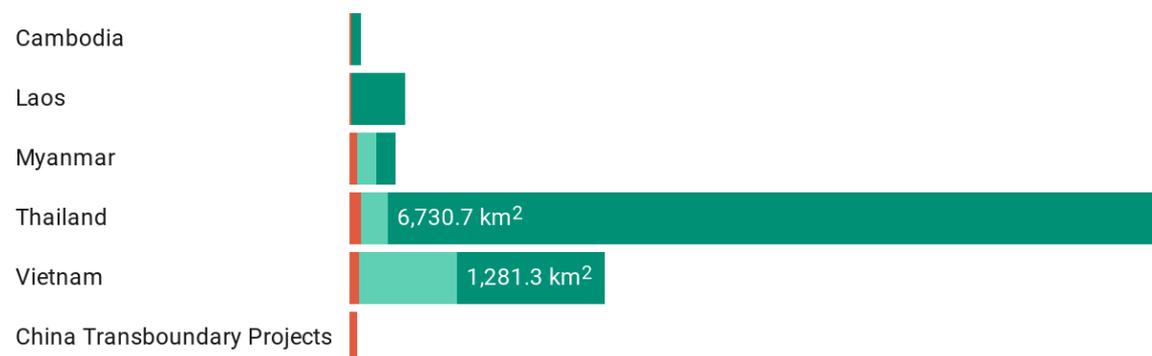
Industrial Spaces in the Mekong

■ Airport
 ■ Industrial Zone
 ■ Cross-border Economic Zone
 ■ Railway Station
 ■ Sea/Inland Port
 ■ Special Economic Zone



Industrial Spaces in the Mekong, by Area

■ Airport
 ■ Industrial Zone
 ■ Cross-border Economic Zone
 ■ Railway Station
 ■ Sea/Inland Port
 ■ Special Economic Zone

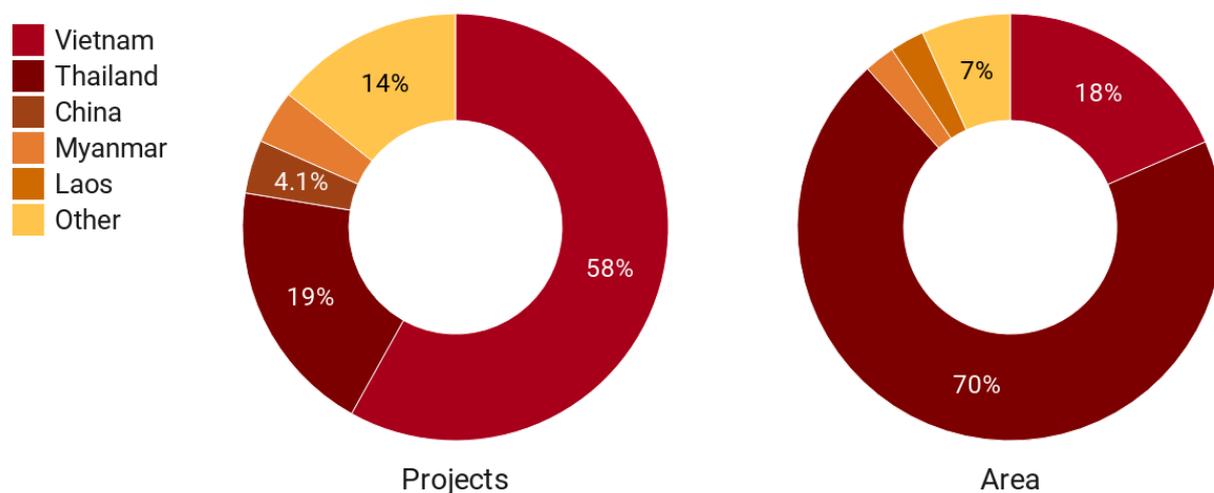


- Vietnam has the most industrial spaces mapped in the Tracker (337). This is more than twice those in Thailand (142), and significantly more than Myanmar (109), Cambodia (42), and Laos (27). Many of Vietnam's industrial zones are clustered around Hanoi and Ho Chi Minh City.
- Thailand has set aside the most physical space for its industrial zones, with over 7,050 square kilometers. The vast majority of this (6730 sq km, or 95% of Thailand's total area for industrial spaces) is for ten special economic zones.
- Industrial zones tend to be situated near the capitals and other major cities: Hanoi, Bangkok, Yangon, Ho Chi Minh City, and Mandalay have the highest concentrations. Outside of these urban areas, industrial zones are clustered along major arteries of travel including the Mekong River in southern Vietnam, Asian Highway 19 in Thailand, and National Road 1A in Vietnam.
- The vast majority (91%) of industrial spaces in the Tracker are already operational adding future projects will require blueprints, maps, or other data which is not always public knowledge.

Data Overview: Industrial Spaces

Development of Industrial Spaces by Country

Involvement of companies from key countries sponsoring industrial spaces in the Greater Mekong Subregion



This chart shows how companies from the top 5 countries involved in the Mekong region's power sector in terms of industrial space project numbers and area. Unsurprisingly, the five Mekong countries are most involved.

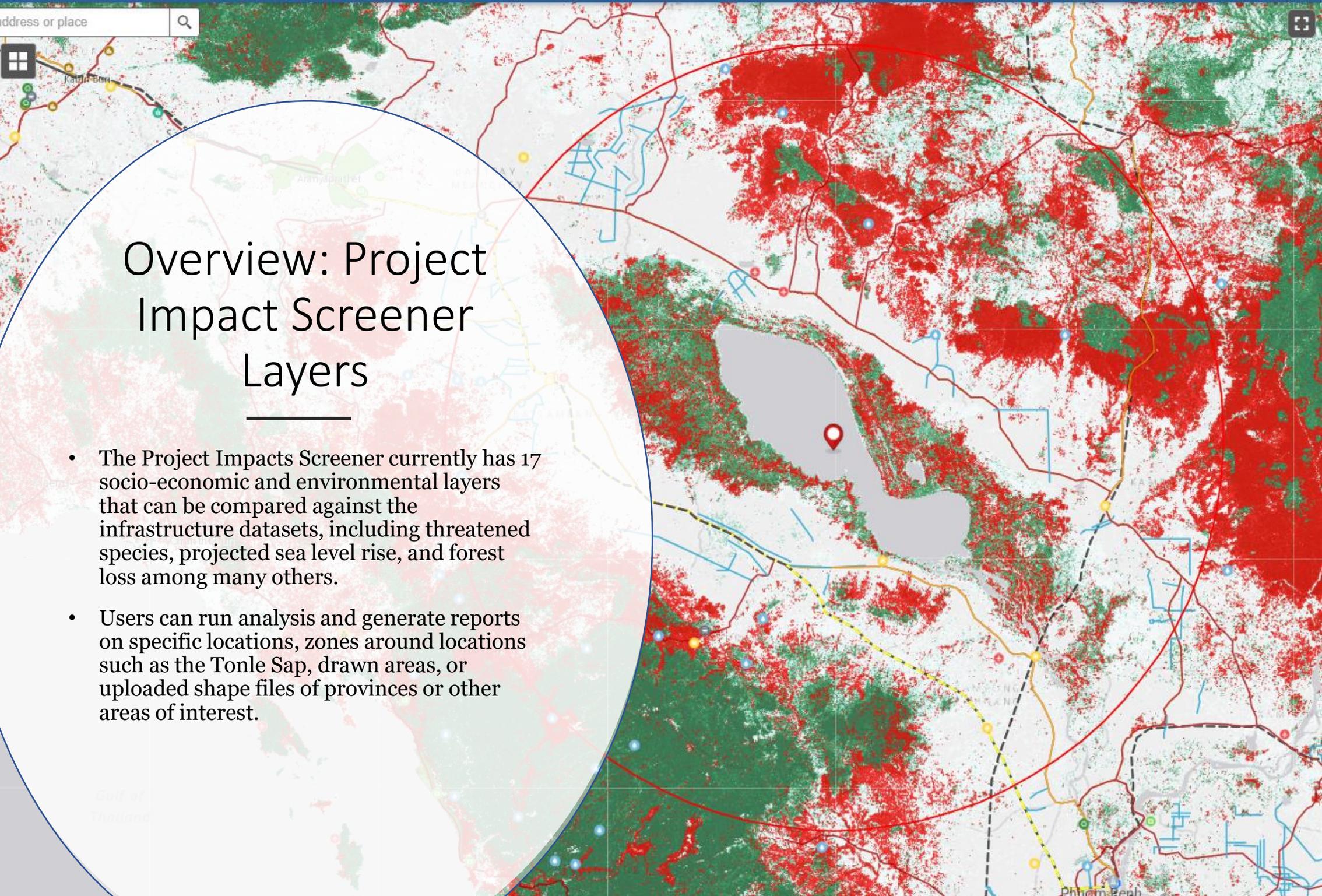
Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 12/2/2020 • Created with Datawrapper

- While a plethora of multinational companies invest in or make use of the facilities in industrial zones, most developers or sponsor companies of industrial spaces come from the five Lower Mekong countries. Companies from Cambodia, Laos, Myanmar, Thailand, and Vietnam are involved in sponsoring 321 of the 370 projects for which the Mekong Infrastructure Tracker includes sponsor data.
- There are some gaps in the data set. Sponsorship data is not available for most airports and railway stations, but is available for most industrial zones, special economic zones, and some sea/inland ports. In terms of project numbers, this gap appears large, as sponsorship details are only known for approximately half of the total projects in the dataset. However, sponsorship information is available for almost 98% of the area because sponsorship data is available for most large SEZs and industrial zones.
- Excluding the five Lower Mekong countries, the top countries with companies sponsoring industrial spaces are China (15 projects, 231 sq km), Japan (8 projects, 161 sq km), and Singapore (6 projects, 42 sq km).



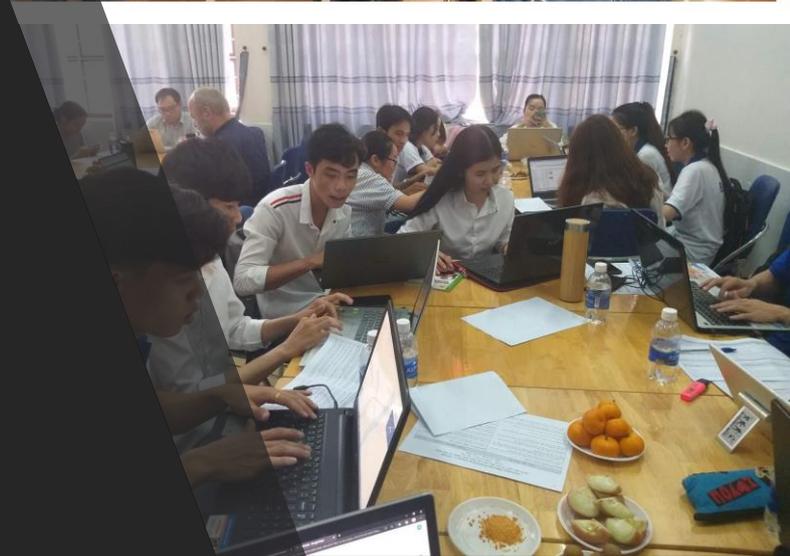
Overview: Project Impact Screener Layers

- The Project Impacts Screener currently has 17 socio-economic and environmental layers that can be compared against the infrastructure datasets, including threatened species, projected sea level rise, and forest loss among many others.
- Users can run analysis and generate reports on specific locations, zones around locations such as the Tonle Sap, drawn areas, or uploaded shape files of provinces or other areas of interest.



Activities in 2020

- **Introductory Workshops**
 - Throughout 2020, the Stimson Center held **44 virtual engagement sessions** to introduce the Mekong Infrastructure Tracker to a wide range of government and non-government stakeholders.
 - Introductory workshops provided background on the project goals, data collection processes, and an overview on how to use the Tracker tools to support research.
 - Over 1000 people from 25 countries learned how to use the tools and resources contained within the Tracker to support research and policymaking.
- **Hackathons**
 - Hackathons convene researchers over half-day workshops to help fill in metadata gaps, provide updates, and add new projects to various datasets. In the last quarter of 2020, more than 60 people joined hackathons in Cambodia and Vietnam to help fill. This resulted in data updates for more than 140 projects.
- **Output Workshops**
 - Two output workshops were held in the last quarter of 2020, where participants from Thailand and around the region learned how to effectively run searches, clean data, and create visualizations using the Mekong Infrastructure Tracker and other data tools.
- **Facebook Group**
 - In June, the Stimson Center created a [Facebook Group for the Mekong Infrastructure Tracker](#) to share updates to the data sets and tools and promote discussion on regional infrastructure development. As of the end of 2020, 2020, the group has 450 members who receive updates on the Tracker, share relevant news, and discuss regional infrastructure trends and developments.



Cambodia in the Tracker

- With falling poverty rates and high economic growth, Cambodia reached lower middle-income status in 2015 and aspires to attain upper middle-income status by 2030.¹ Upward growth needs to be supported through further energy and transport infrastructure investments, which have been developing rapidly but from a low starting point. A significant investment gap remains, and a much larger proportion of GDP spent on infrastructure is needed.
- The Mekong Infrastructure Tracker has data on the following projects in Cambodia:
 - 108 power generation plants
 - 309 linear infrastructure projects
 - 42 industrial zones



Capital	Phnom Penh
Area	181,030 km ²
Population	15,288,489 (2019 est.)
GDP	USD 26.730 billion
GDP Growth Rate Projections	-1.0 to 2.5% in 2020, usually around 7.0% annually
Inequality (Gini Coefficient)	36.6 (medium)
Human Development Index	0.581
Income Status	Lower middle-income
World Bank Ease of Doing Business Ranking	134 out of 190

Cambodia Energy Profile

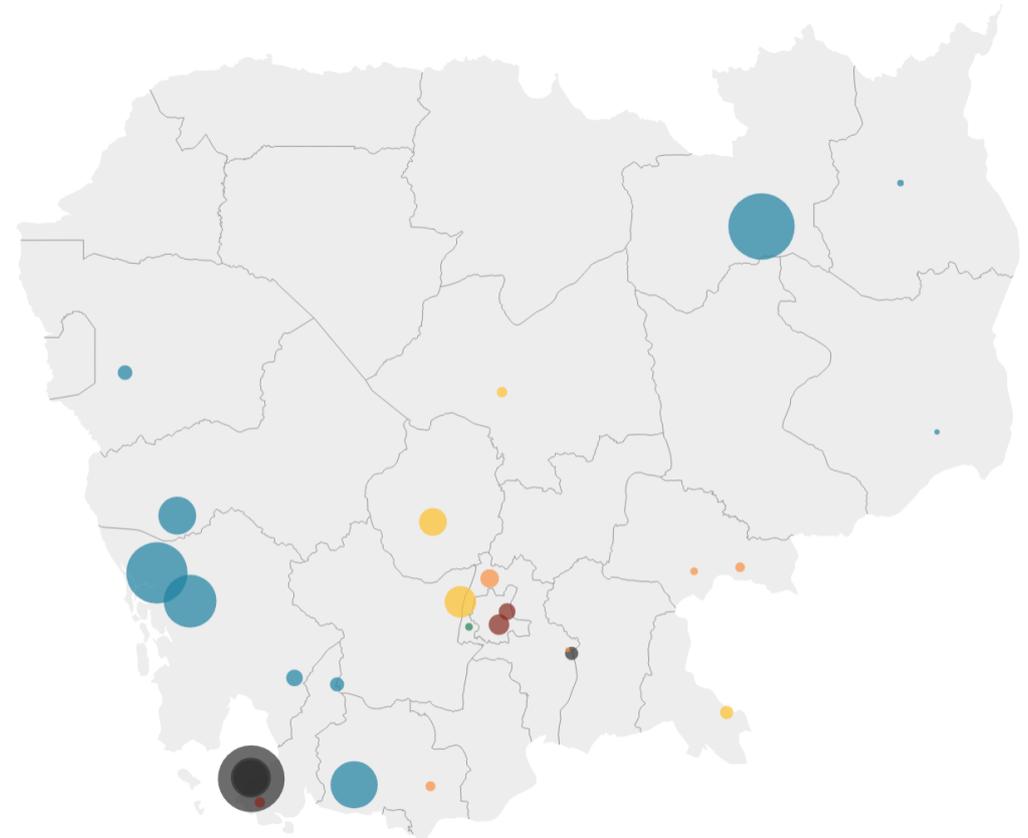
- The Mekong Infrastructure Tracker shows that Cambodia has project-level data on:
 - 30 operational power plants as of 2020
 - 8 projects currently under construction
 - 68 projects proposed for future development
- Cambodia has 2236 MW of installed power generation capacity; 1341 MW (60%) of which comes from hydropower dams, 650 MW (29%) from coal, and 239 MW (11%) from solar, waste, and biomass.
- Cambodia has historically imported up to a quarter of its electricity from neighboring countries, but the Tracker does not reflect power purchases from neighboring countries. The future of Cambodia's electricity trade will continue to be significant: in response to hydropower inefficiencies and shortages during drought in 2019, Cambodia has recently signed MOUs to import 2400 MW from thermal plants in Laos and 200 MW from the Don Sahong Dam in Laos.²
- Cambodia's largest solar plant, Kampong Speu Solar Farm, has an installed capacity of 80 MW.

Installed Power Generation in Cambodia, 2020

Operational power plants by type and generating capacity

Type of Power Generation

■ Biomass ■ Coal ■ Hydro ■ Oil ■ Solar ■ Waste



Cambodia has 27 operational power plants currently providing electricity to the national grid. They are all displayed on this map, with colors indicating the type of power plant and size of the circle correlating with installed capacity.

Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 10/30/2020 · Map data: © OSM · Created with Datawrapper

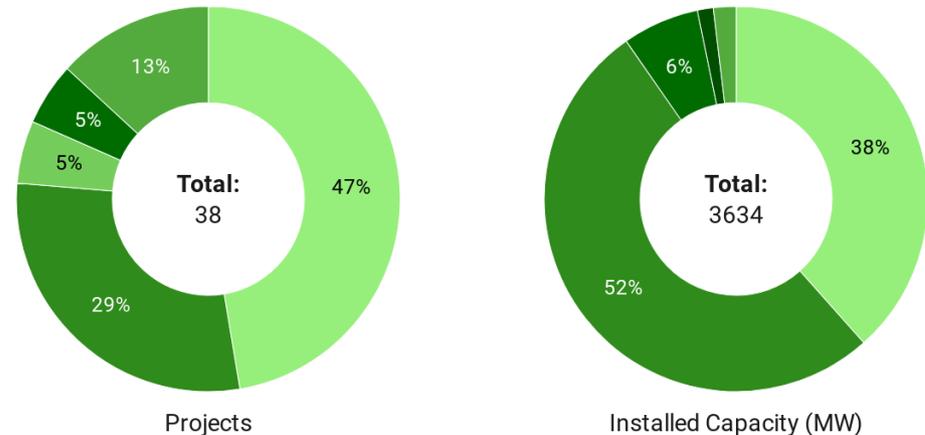
Cambodia Energy Profile

- Chinese companies play an important role in Cambodia's power sector. The 11 projects in which Chinese companies are involved account for 52% of Cambodia's total installed capacity.
 - Chinese companies are contractors for at least 40% of Cambodia's operational power projects.
 - China's role will likely continue to be important in the future, as Chinese companies have confirmed involvement in 75% of the Cambodian power plants currently under construction and 26% of the projects that are in planning phases.
- Cambodian companies are sponsors/developers of 47% of all operational power projects in Cambodia.
- Companies from Singapore, Finland, Japan, Malaysia, and Thailand are responsible for 9 projects with a total installed capacity of 353 MW.
- Project lending has come from financial institutions located in China, Japan, Sweden, and from the ADB.

Power Development in Cambodia by Sponsor Country

This chart shows the role that individual countries play in Cambodia's power sector, coding by the host country of the companies involved in Cambodian energy projects.

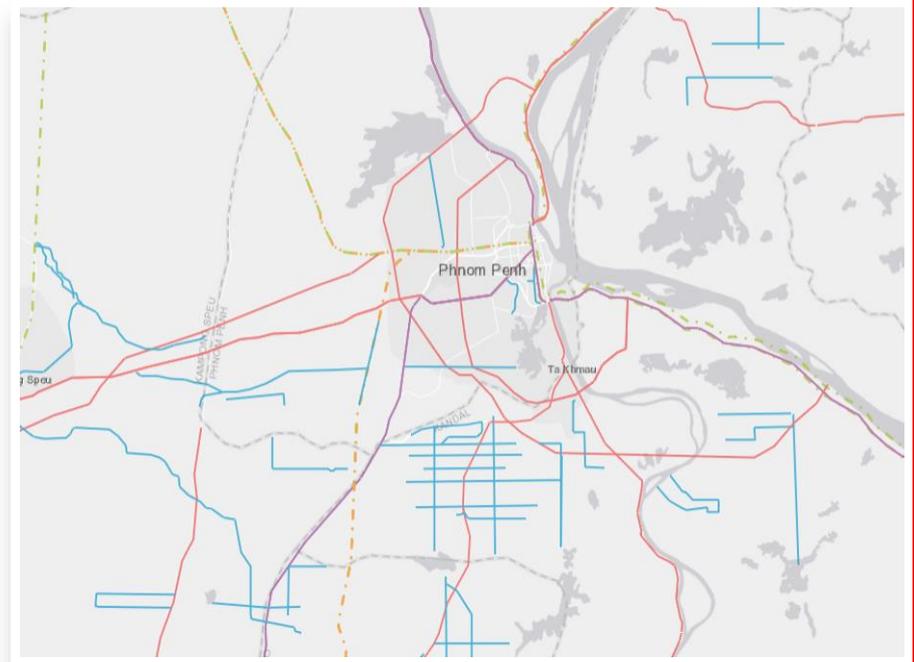
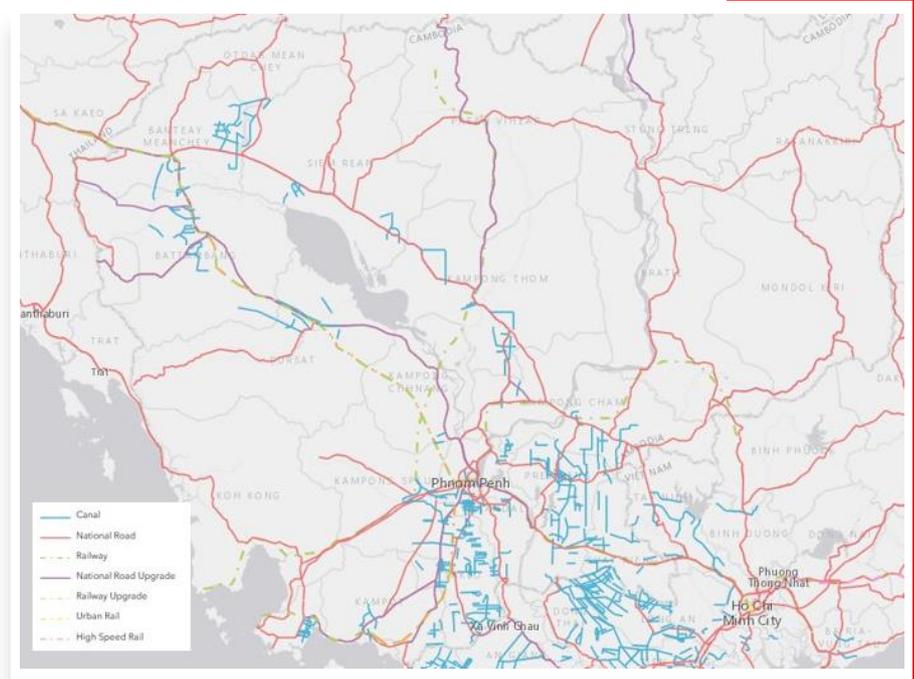
Legend: Cambodia (light green), China (dark green), Japan (medium green), Malaysia (medium-dark green), Finland (dark green), Other (medium green)



Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 12/23/2020 · Created with Datawrapper

Linear Infrastructure in Cambodia

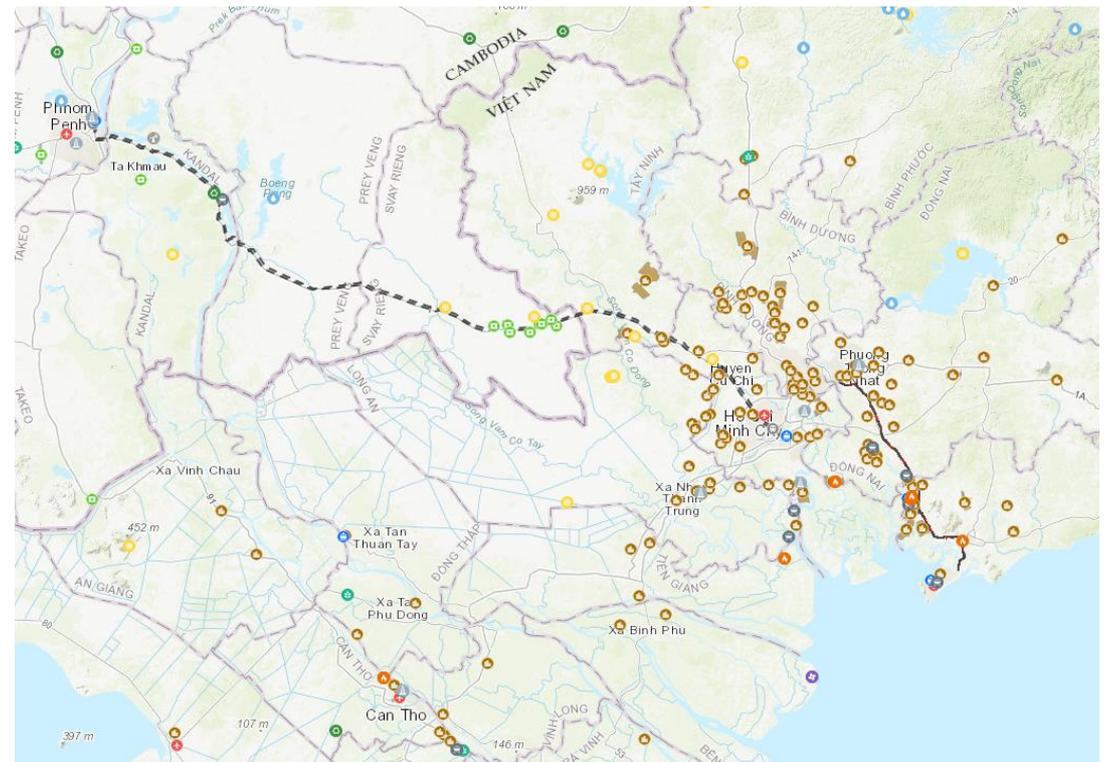
- Cambodia's location between Laos, Thailand, and Vietnam makes it a central and critical part of the Greater Mekong Subregion's Southern Economic Corridor, which aims to connect southern Thailand through Cambodia and Laos to coastal regions in Vietnam.³ A major road and rail route is being developed and expanded over portions of existing routes to connect Bangkok to Ho Chi Minh City via Phnom Penh, but more investment is needed to complete critical segments of these projects.
- The Mekong Infrastructure Tracker includes project-level data on the following:
 - 8006 km of national roads
 - 2637 km of railways
 - 3352 km of canals.



Linear Infrastructure in Cambodia

Project Spotlight:

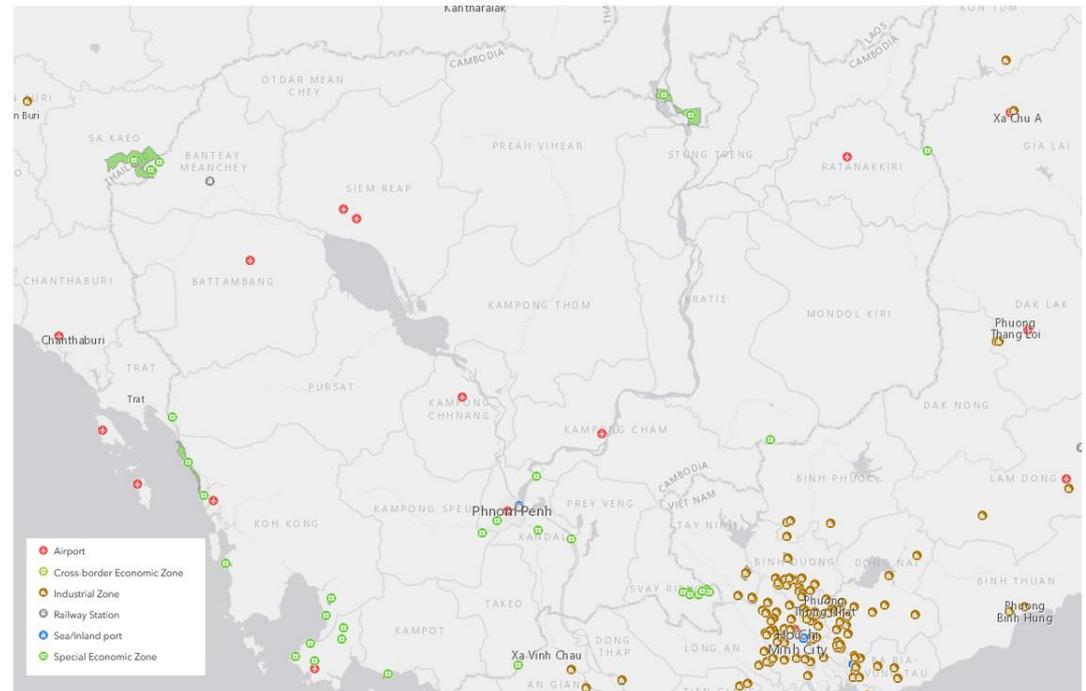
- Cambodia's Ministry of Public Works and Vietnam's Ministry of Transport announced a proposal for the Phnom Penh-Ho Chi Minh railway plan in early 2018.⁴ The railway would cross the border at Bavet city in Cambodia's Svay Rieng province, entering the town of Moc Bai on the Vietnamese side.
- The railway could potentially position Bavet as an "international border gateway", facilitating the trade of manufactured goods produced in the nearby Svay Rieng special economic zone.⁵ It would also increase Cambodian access to Chinese markets, as an estimated 40% of Chinese goods bound for Cambodia travel through Vietnam.
- A feasibility study is ongoing as of 2020.⁶ While attracting and securing investment is still an ongoing process and the project is in early stages of development, if built, the railway would significantly boost connectivity in the Mekong River Delta region.



Project Name	Phnom Penh-Ho Chi Minh City Rail Link
Subtype	Railway
Current Status	Planned
Length	281 kilometers
Year of Completion	Project still under study

Industrial Spaces in Cambodia

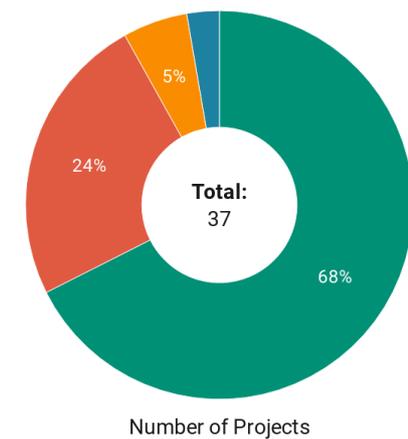
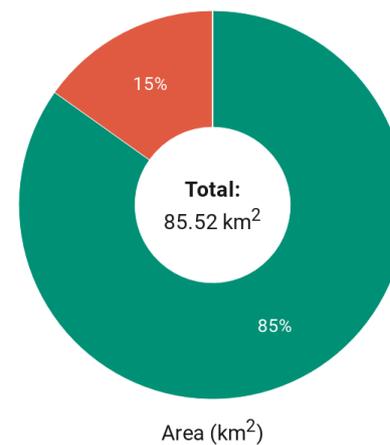
- Industry has risen to make up 34% of Cambodia's GDP as of 2019, according to the World Bank.⁷
- Over 25% of the labor force is employed in industry, with most households participating in participating in garment production, construction and general manufacturing.⁸
- The Mekong Infrastructure Tracker includes project-level data on the following industrial zones:
 - 25 special economic zones
 - 1 port
 - 2 railway stations
 - 9 airports
- Currently, Cambodia has 25 special economic zones totaling more than 75 square kilometers with cluster areas near the Thai border in the northwest, near the Vietnamese border in Svay Rieng Province, in Sihanoukville and in Phnom Penh.



Industrial Zones in Cambodia

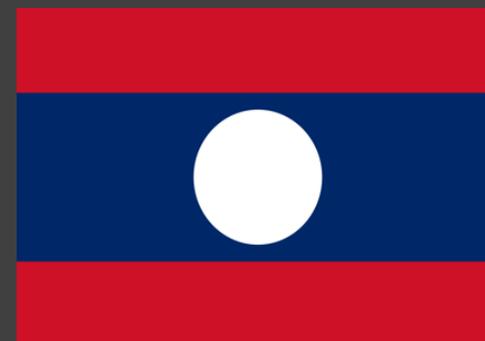
These donuts compare types of industrial zones in Cambodia by area covered and by number of zones.

■ Special Economic Zone ■ Airport ■ Railway Station ■ Sea/Inland Port



Lao PDR in the Tracker

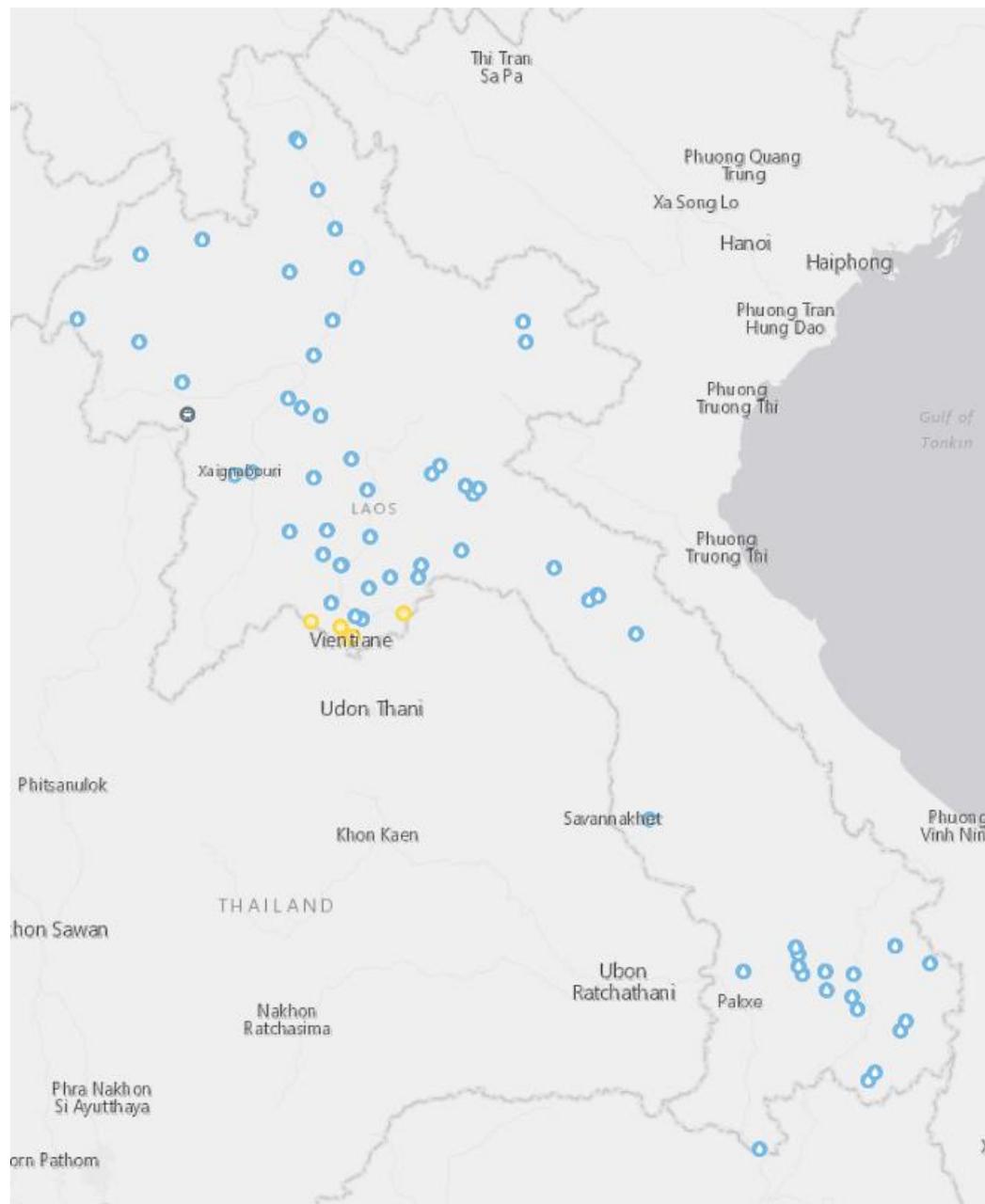
- Upgrading infrastructure is a key part of Lao PDR's strategy to graduate from Least Developed Country status, a milestone which policymakers hope to achieve by the mid-2020s.⁹ National planners aim to make Lao PDR into the Battery of Southeast Asia by exporting electricity have led to the buildout of dozens of large-scale hydroelectric dams, including 9 planned for the mainstream of the transboundary Mekong River.
- As the only country bordering all the other Mekong countries, Lao PDR has a strategy to transform from a land-locked to a land-linked nation with other stronger economies.¹⁰ Infrastructure stock has been growing rapidly in Lao PDR, while gaps in coverage remain and the quality of infrastructure still needs to be improved.¹¹
- The Mekong Infrastructure Tracker has data on the following projects in Lao PDR:
 - 422 power generation plants
 - 52 linear infrastructure projects
 - 27 industrial zones



Capital	Vientiane
Area	237,950 km ²
Population	7,062,000 (2019 est.)
GDP	USD 17.95 billion (2018)
GDP Growth Rate Projections	-1.8 to 1% in 2020, usually around 6.8% annually
Inequality (Gini Coefficient)	41.1 (medium)
Human Development Index	0.64
Income Status	Lower middle-income
World Bank Ease of Doing Business Ranking	154 out of 190

Lao PDR Energy Profile

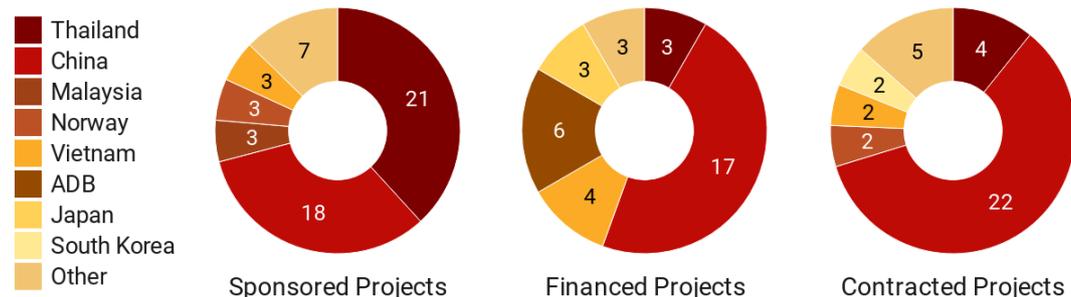
- Lao PDR has capitalized on its estimated 26,000 MW of technical hydropower potential and aims to become the Battery of Southeast Asia by exporting electricity to neighboring markets. A massive investment program increased the installed capacity in the system from only 640 MW in 2000 to around 10,056 MW by the end of 2020. The Mekong Infrastructure Tracker shows that Lao PDR has project-level data on:
 - 77 operational power plants
 - 47 projects currently under construction
 - 286 projects proposed for future development
- The Mekong Infrastructure Tracker shows that most power generation in Lao PDR is supplied from 67 hydropower dams totaling 8,136 MW in generation capacity. The remaining power is produced by the Hongsa coal plant (1,878 MW), a few biomass plants, and some solar projects.



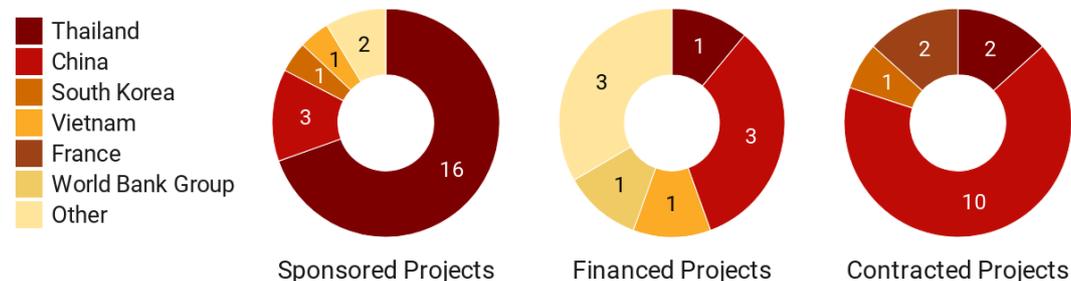
Lao PDR Energy Profile

- The government of Lao PDR or its representative in the form of the utility company Electricite du Laos participates as a minor shareholder for any project which is signed as a concession.¹² 63 of 77 operational power plants have a Lao company as a shareholder/sponsor of the project.
- Companies from more than 20 countries are investing in Laos, and their relative roles differ significantly across project status.
- Looking at operational power plants, companies from Thailand and China are most deeply involved in developing projects in Laos, followed by Malaysia, Norway, Vietnam, Japan, South Korea, and the Asian Development Bank.
- These trends are similar for projects currently under construction, but Thai companies play a larger role in projects further down the pipeline with involvement in approximately 45% of all planned projects.
- Companies from China, South Korea, Vietnam, France, and the World Bank Group are also involved in projects currently under development.

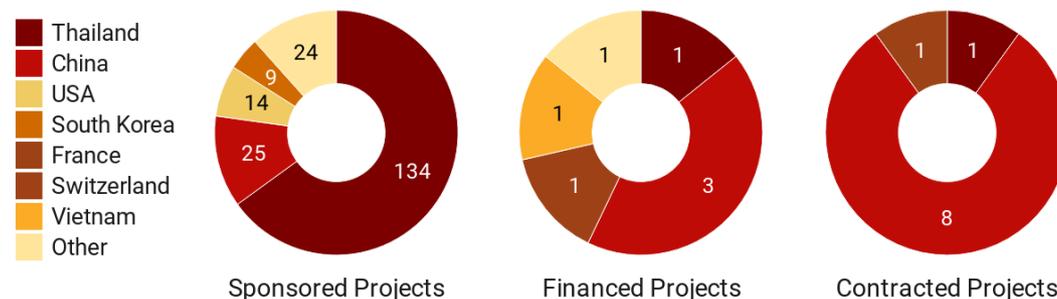
Operational Projects



Projects Under Construction



Planned Projects



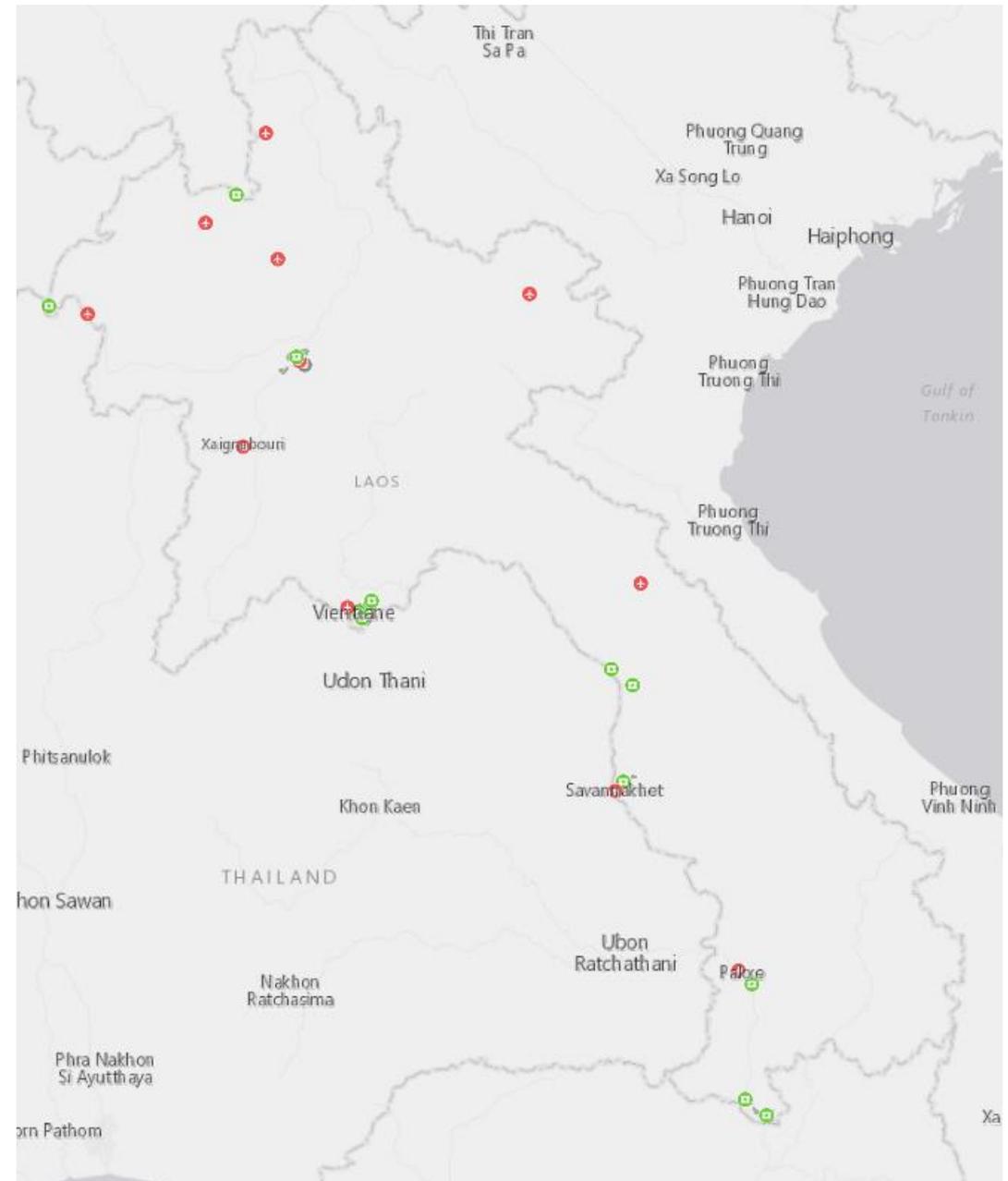
Linear Infrastructure in Lao PDR

- Lao PDR is a landlocked country, but its central location between China, Thailand, Myanmar, Cambodia, and Vietnam means that it plays an important role in regional transit and offers opportunities for it to be developed as a transportation hub.¹³ This is reflected in the Greater Mekong Subregion's economic corridor strategies and the national goal of becoming land linked.¹⁴
- The World Bank Logistics Performance Index (LPI) score for Lao PDR as of 2018 is 2.70, placing it at 82 out of 160 countries globally; this is a significant improvement from 2007.¹⁵
- The Mekong Infrastructure Tracker includes project-level data on the following:
 - 11,292 km of national roads
 - 4,880 km of national road upgrades
 - 1,317 km of railways
 - 446 km of high-speed rail



Industrial Zones in Lao PDR

- Industry plays a prominent role in the Lao economy, rising to 30.9% of GDP as of 2019.¹⁶ While industry's 14.1% share of the labor force is relatively low compared to services (42.2%) and agriculture (31.3%),¹⁷ the Lao PDR's position as a nexus between China and many other fast-growing Southeast Asian nations has incentivized the development of many connectivity-boosting industrial initiatives.
- The Mekong Infrastructure Tracker dataset provides details on 27 industrial projects including 11 airports, 2 railway stations, 14 special economic zones
- To foster industrial development and regional supply chain support, Lao PDR has approved fourteen Special Economic Zones with a total area of 463 square kilometers. These SEZs provide favorable investment conditions to the companies which lease land plots for industrial development and companies which invest in operations inside of those zones. Five of the zones are leased to Chinese companies for ownership and operation, but other countries with full or partial ownership of SEZ leases are Vietnam, Thailand, and Korea.



Myanmar in the Tracker

- Myanmar has embarked on a political, economic, and social transformation since opening up to the outside world in 2011, but a lack of reliable infrastructure and basic infrastructure services continues to constrain economic development.
- The Asian Development Bank estimates that Southeast Asia as a region needs to spend around 6% annually to address the infrastructure gap through 2030.¹⁸ In Myanmar, the annual national budget and private infrastructure investment combined only account for approximately 2.5% of national GDP, leaving a significant gap between expenditures and projected needs.¹⁹ There are a wealth of countries and international financial institutions helping to address Myanmar's infrastructure gap including but not limited to Japan, China, the World Bank, the Asian Development Bank, Germany, the United States, and South Korea.²⁰
- The Mekong Infrastructure Tracker has data on the following projects in Myanmar:
 - 168 power generation plants
 - 883 linear infrastructure projects
 - 109 industrial zones



Capital	Naypyidaw
Area	676,578 km ²
Population	53,582,855 in 2017 census
GDP	USD 76 billion
GDP Growth Rate Projections	1.8% in 2020; usually annual growth hovers around 6% annually
Inequality (Gini Coefficient)	30.7 in 2017
Human Development Index	0.584
Income Status	Lower Middle Income
World Bank Ease of Doing Business Ranking	165 out of 190

Myanmar Energy Profile

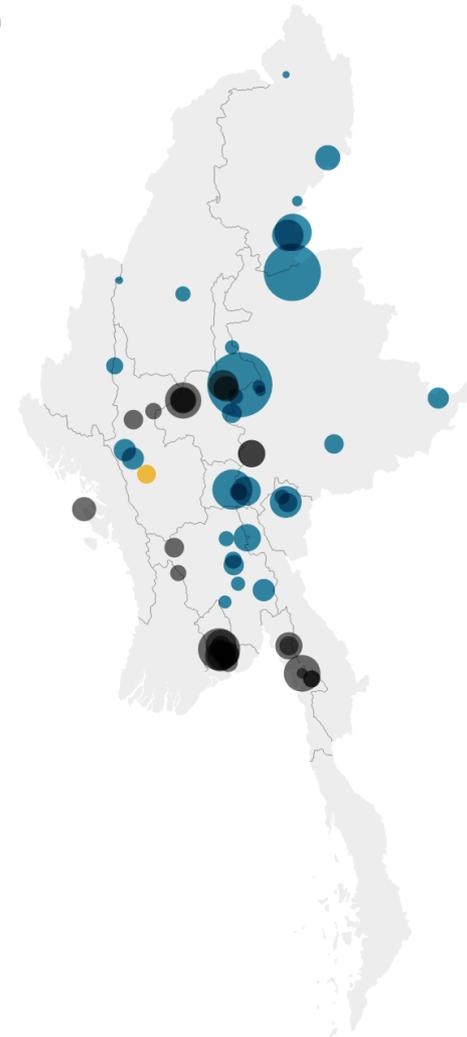
- The Mekong Infrastructure Tracker shows that Myanmar has project-level data on:
 - 62 operational power plants as of 2020
 - 8 power plants currently under construction
 - 86 project proposed for future development
- Myanmar has 6179 MW of installed power generation capacity; 3470 MW (56%) come from hydropower dams, 2497 MW (40%) from natural gas, and 211 MW (3%) from one small grid-connected coal plant, one grid-connected solar plant, and one waste plant.
- Myanmar's technical hydropower potential is massive, and the Mekong Infrastructure Tracker currently records more than 42,000 MW of new proposed hydropower projects.

Installed Power Generation in Myanmar, 2020

Operational power plants by type and generating capacity

Type of Power Generation

- Coal
- Gas
- Hydro
- Solar
- Waste



Myanmar has 62 operational power plants as of 2020. They are all displayed on this map, with color indicating the type of power plant and size of the circle correlating with installed capacity.

Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 11/30/2029 • Created with Datawrapper

Linear Infrastructure in Myanmar

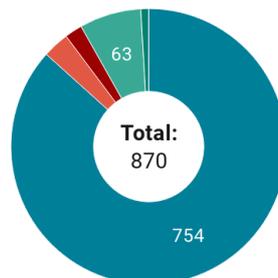
- The Logistics Performance Index ranks Myanmar 137 out of 160, significantly behind all other ASEAN countries.²¹ This is likely due to financing challenges, with spending on transport less than half of the estimated needs.²²
- The Mekong Infrastructure Tracker includes project-level data on 10,987 km of national roads, 9,139 km of railways, and 4,489 km of canals
- In addition to the 870 operational projects, there are project level data for 13 planned linear infrastructure projects and 1 project under construction.
- The Mekong Infrastructure Tracker maps more than 5,966 km of existing rail length in Myanmar, significantly higher than the other lower Mekong countries, but much of this was built during the colonial period and is in dire need of upgrade.

Linear Infrastructure in Myanmar

These charts show linear infrastructure in Myanmar by type, length, and number of projects



Length



Number of Projects



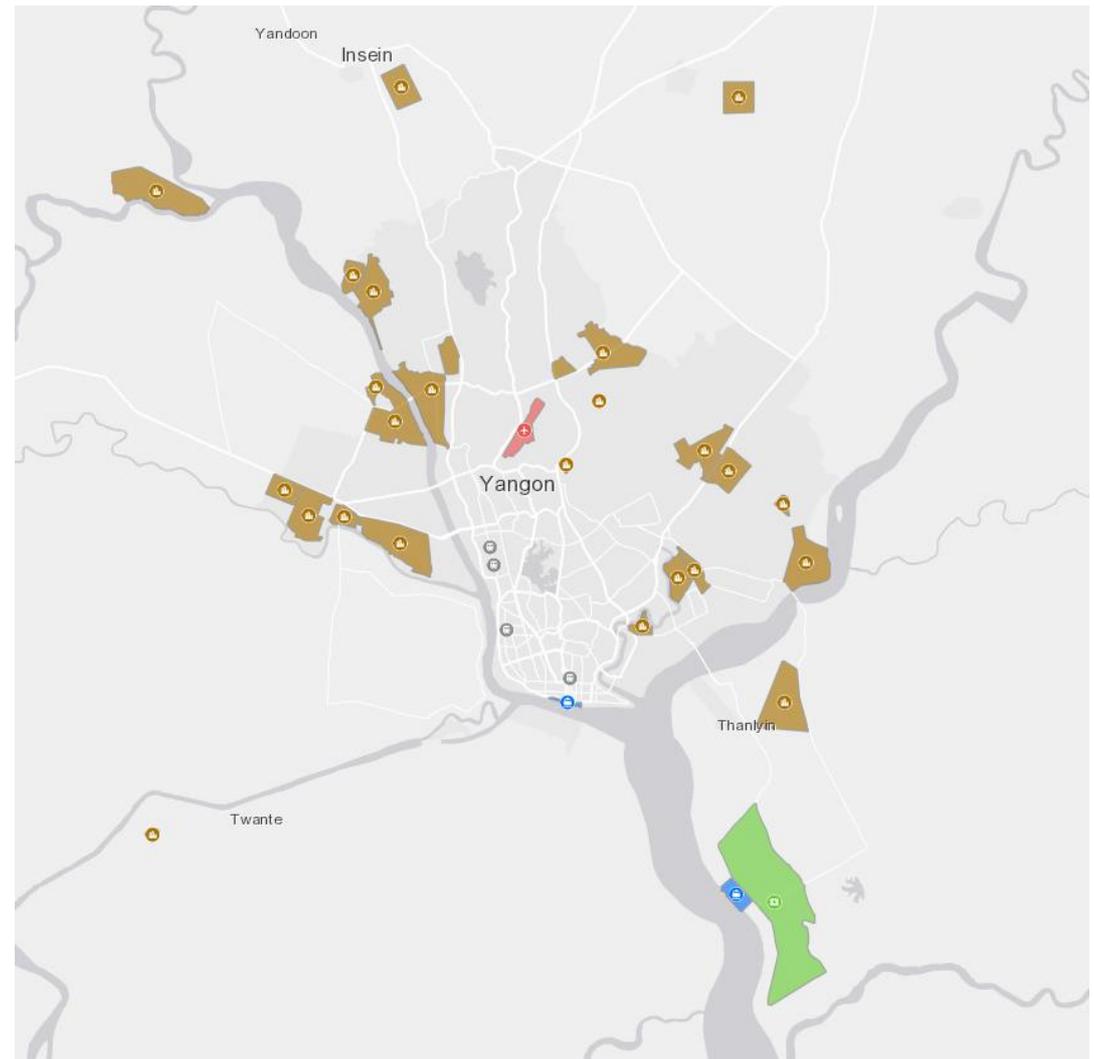
Industrial Zones in Myanmar

- Myanmar's government has taken steps to encourage industrialization after opening in 2011. In 2004, industry only provided approximately 10.5% of national GDP in Myanmar; however, this surpassed 28% by the early 2010s.²³ This has not been matched by a rise in industrial jobs, however. As of 2018, agriculture still provided just under 50% of total employment in Myanmar, followed by services (33.5%) and industry only providing approximately 17% of total employment.²⁴
- The Mekong Infrastructure Tracker contains information on the following industrial spaces in Myanmar:
 - 39 airports
 - 50 industrial zones
 - 11 railway stations
 - 5 ports
 - 3 special economic zones
 - 1 cross-border economic zone
- Myanmar has relatively accessible air transportation, in part because of high dependency on tourism for income. There are currently three large international airports in Mandalay, Naypyidaw, and Yangon, and over 30 additional domestic airports.



Industrial Zones in Myanmar

- Although the government has had policies for the establishment of industrial zones for decades, Myanmar only enacted laws allowing the establishment of Special Economic Zones (SEZs) starting in 2014, and the government classifies SEZs as either free zones and promotion zones.²⁵ Both are intended to attract and promote international investment and offer varying levels of tax exemptions, customs exemptions, and other benefits not seen elsewhere in the country. There are currently three Special Economic Zones: the Thilawa SEZ (operational as of 2015), the Dawei SEZ (under construction) and the Kyaukphyu SEZ (under construction).
- The Thilawa Industrial Zone is one of only three Special Economic Zones in Myanmar and is supported by Japan through the Japan International Cooperation Agency. It was the first SEZ to commence operation in 2015.²⁶
- Thilawa SEZ is adjacent to the Thilawa Port and is close to many other industrial zones and Yangon. As of 2017, more than 78 firms had located their production facilities, factories, or logistics hubs in Thilawa SEZ.²⁷



Thilawa Industrial Zone near Yangon in the Mekong Infrastructure Tracker

Thailand in the Tracker

- Thailand's national strategy proposes the development of high-quality infrastructure to connect Thailand to the world, solidifying its position as an economic hub of ASEAN and a major connecting point in Asia.
- The Mekong Infrastructure Tracker has data on:
 - 501 power generation plants
 - 2,478 linear infrastructure projects
 - 142 industrial spaces



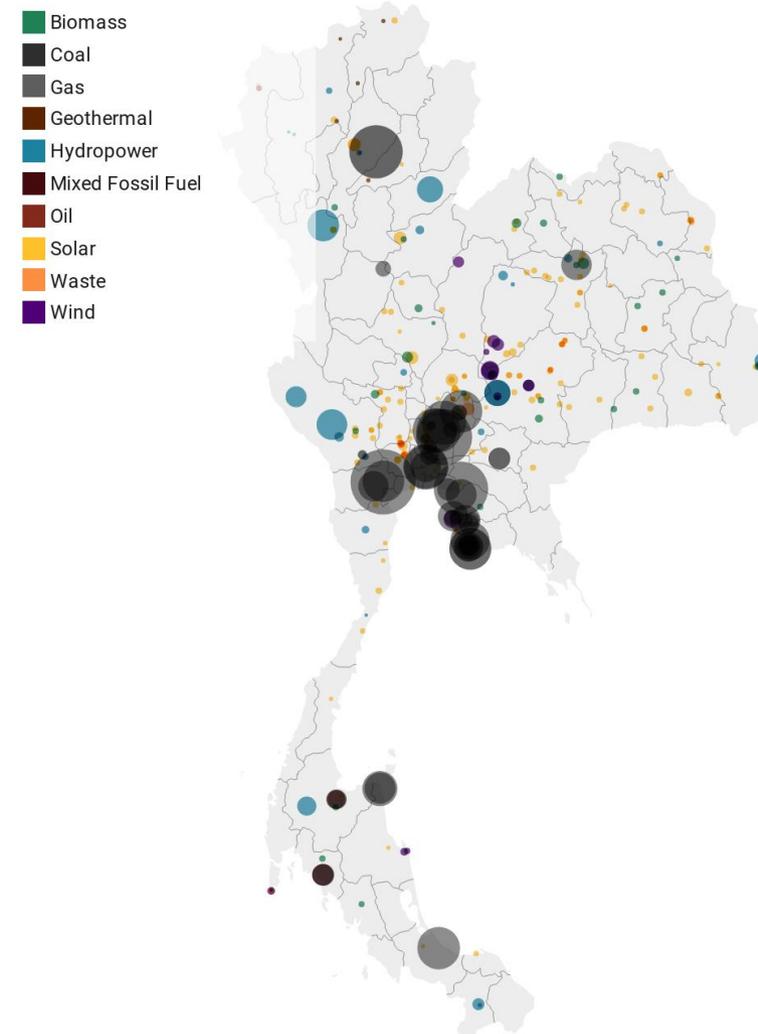
Capital	Bangkok
Area	513,120 km ²
Population	66,558,935 (2019 est.)
GDP	USD 1.390 trillion
GDP Growth Rate Projections	-8.0% in 2020, usually around 4.0% annually
Inequality (Gini Coefficient)	36 (medium)
Human Development Index	0.765
Income Status	Upper Middle Income
World Bank Ease of Doing Business Ranking	21 out of 190

Thailand Energy Profile

- As of 2020, the Mekong Infrastructure Tracker includes project-level data on the following projects in Thailand:
 - 283 operational power plants
 - 26 power plants currently under construction
 - 10 planned power plants
 - 178 power generation assets with unknown status, most of which are small-scale waste and biomass projects
- The Tracker shows a confirmed installed capacity in 2020 of 45,335 MW. Most of this is natural gas (31,915 MW), followed by coal (5,607 MW), hydropower (4,013 MW), and smaller amounts of solar, wind, geothermal, biomass, waste, and oil. Notably, the Tracker does not reflect power purchases from neighboring countries like Laos.
- In terms of project numbers, solar far surpasses other energy types with 156 individual projects around the country. The average size of the power plants is only 10.7 MW, showing that many are small or very small power projects. Coal, gas, and hydropower projects in Thailand are on average significantly larger.

Installed Power Generation in Thailand, 2020

Operational power plants by type and generating capacity



Thailand has 284 operational power plants currently providing electricity to the national grid as of 2020. They are all displayed on this map, with color indicating the type of power plant and size of the circle correlating with installed capacity.

Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 11/16/2020 • Created with Datawrapper

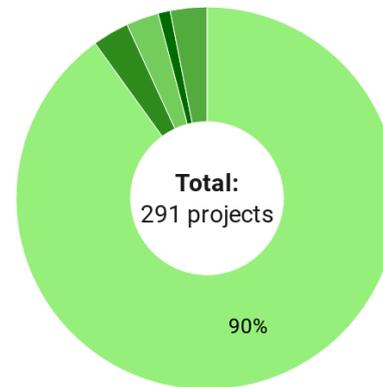
Thailand Energy Profile

- Unlike many of the neighboring countries, Thai companies are primarily responsible for development of the nation's power sector.
- Thai companies are sponsors/developers of 89% of all operational power projects in Thailand. The only other country with substantial involvement is Japan, which has companies involved in 9 power plants and 11% of total installed capacity.
- Companies from Australia, Germany, Austria, Vietnam, China, the United Kingdom, Spain, Switzerland, and Singapore are involved in 20 projects with installed capacity of only 334 MW.
- Most identified lenders are from Thailand and Japan, although the Asian Development Bank has invested in 15 projects with a total capacity of 4,958 MW.
- China is not a major project developer in Thailand, but Chinese companies have been involved as construction contractors.

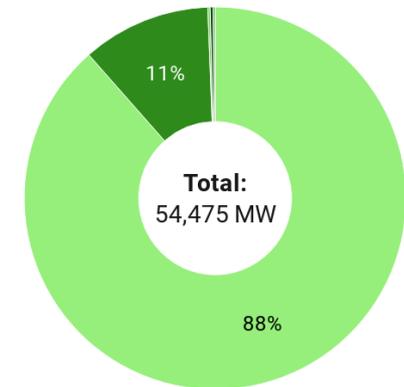
Power Development in Thailand by Sponsor Country

This chart shows the role that individual countries play in Thailand's power sector, coding by the host country of the companies involved in Thai energy projects.

Thailand Japan Spain IFC China Other



Number of Projects

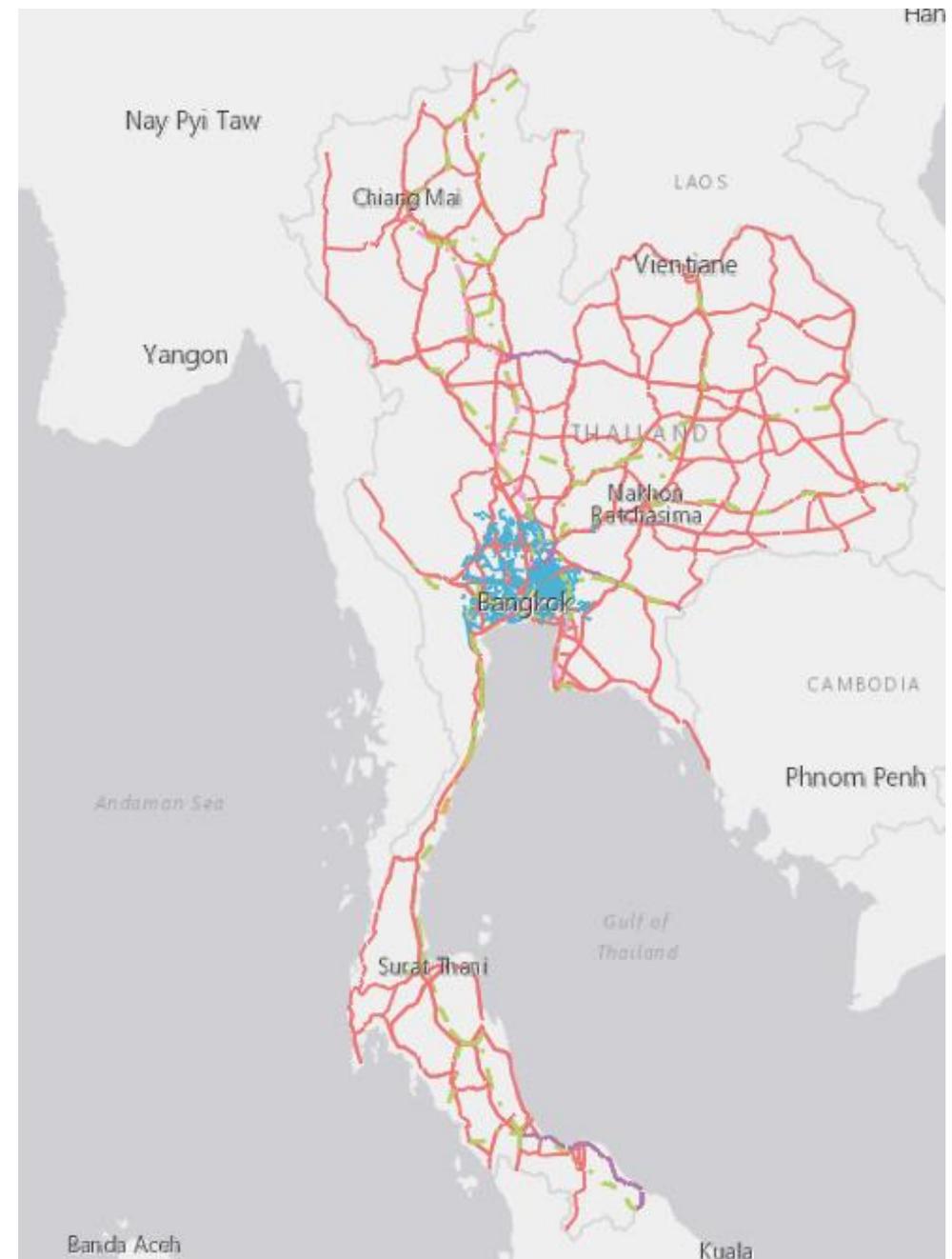


Installed Capacity

Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, 11/25/2020 • Created with Datawrapper

Linear Infrastructure in Thailand

- Thailand's central location in mainland Southeast Asia positions it as a regional facilitator of financial, manufacturing, tourism and service needs. While infrastructure spending is relatively high and Thailand's road network is the most extensive in Southeast Asia, the quality of transport and logistical infrastructure is still insufficient to fully realize the country's potential as a regional hub and further investment is needed.
- Although Thailand's road network is among the most extensive in Asia, there are opportunities to further connect border areas. Thailand's Infrastructure Development Plan (2015-2022) proposes a series of four-lane road networks to link the country's key economic regions and border areas.²⁸
- The Mekong Infrastructure Tracker contains project-level details on more than 2,478 operational roads, railway projects, and canals. They are as follows:
 - 1765 of these are canals
 - 421 are national roads
 - 220 of these are railway lines
 - 46 are national road upgrades
 - 15 are railway upgrades
 - 2 are high-speed rail projects
 - 9 are urban rail projects, primarily around Bangkok



Linear Infrastructure in Thailand

- Thailand has an additional 98 linear infrastructure projects under development, 40 of which are under construction and 58 of which are in planning phases.
 - More than half of the projects under construction are national roads or national road upgrades.
- Thailand's railway network is currently under-invested, and accounts for only approximately 3.7% of travel mode in Thailand.²⁹ The national Office of Transport and Traffic Policy Planning has announced a 20-year plan to improve connectivity that would add over 2,000 km of length to Thailand's railway network.³⁰

Case Study

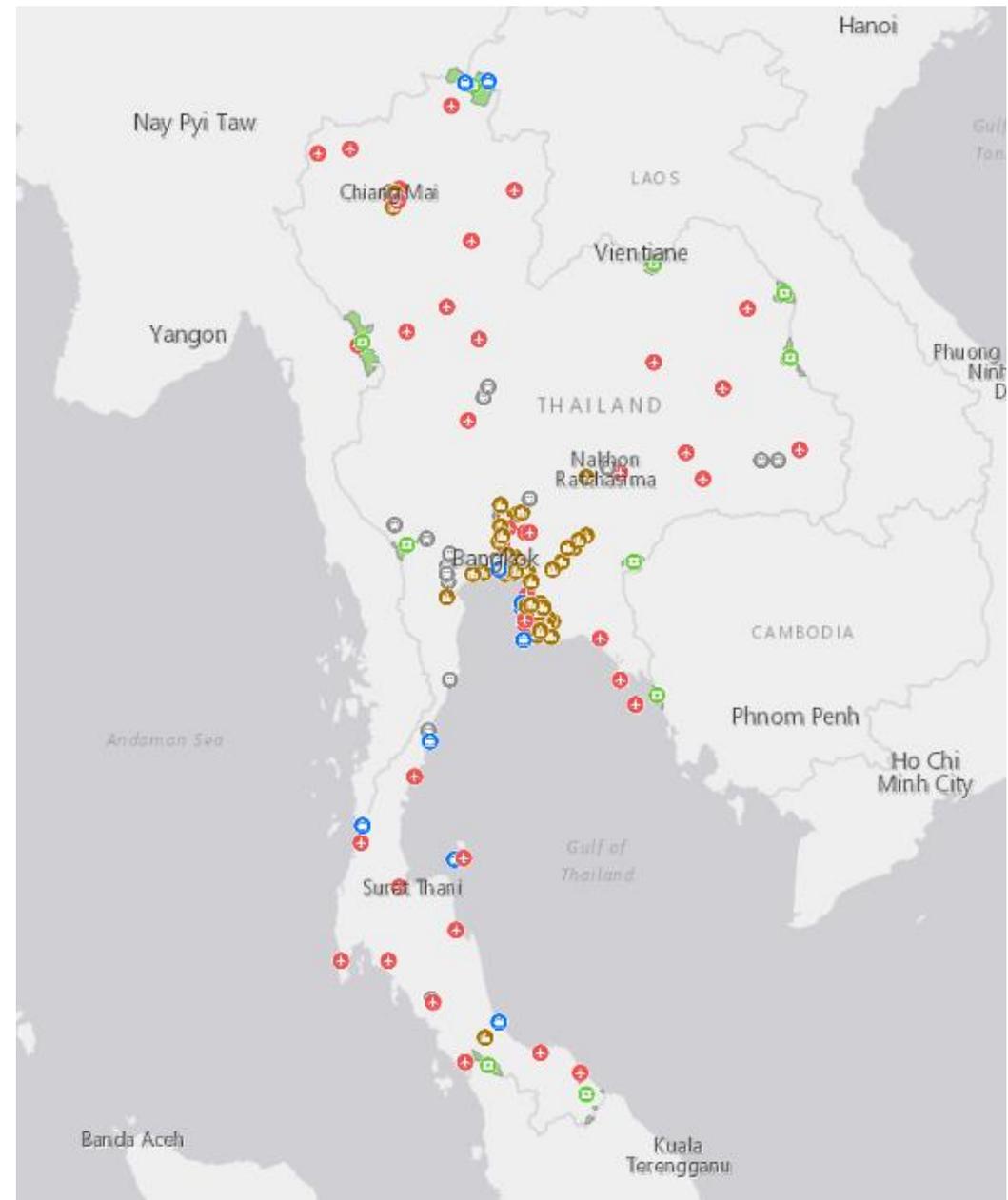
- The Nong Khai–Thanaleng railway link is an international railway link that connects Nong Khai Province, Thailand with Vientiane Prefecture, Laos, and began operations on 5th March 2009.³¹ A USD 6.2 million project financed primarily by Thai loans, the railway link provides the Laotian capital Vientiane connections with three other major ASEAN capitals: Bangkok, Kuala Lumpur and Singapore.³²



Project Name	Nong Khai-Thanaleng
Subtype	Railway
Current Status	Operational
Length (km)	7.35344761 km
Country	Laos; Thailand
State/Province	Vientiane [prefecture]; Nong Khai
District	Hadxaifong; Xaysetha; Muang Nong Khai
Main Basin	Mekong-Lancang
Tributary	Mekong Mainstream - Lower

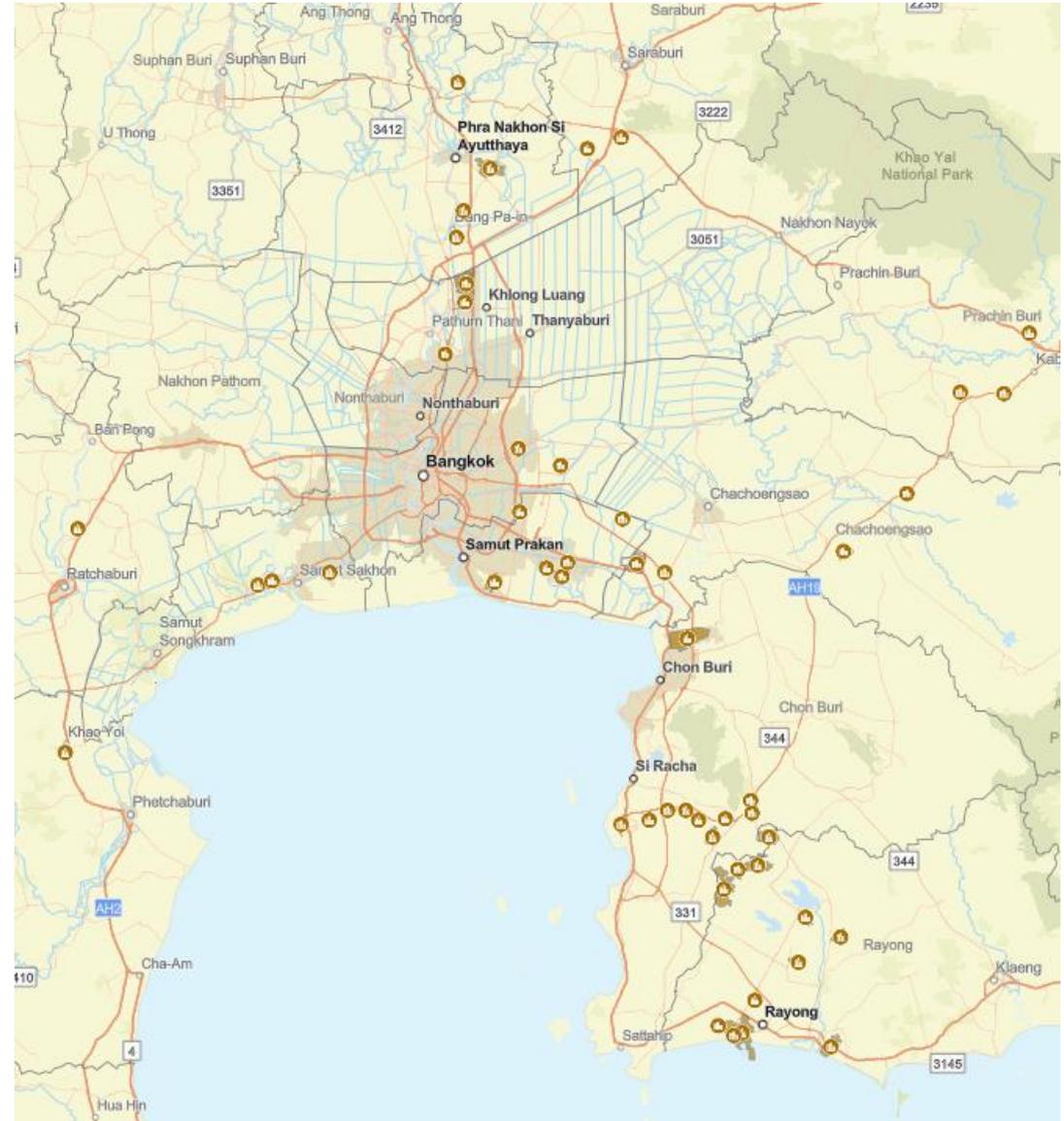
Industrial Zones in Thailand

- Sustained high growth and a rapid decline in poverty allowed Thailand to join the ranks of upper-middle-income countries in 2011. From 1987 to 1996, GDP grew at an average of 9.5% per year, fueled by business-friendly regulations, high domestic demand, and open access to foreign direct investment.³³ Following the Asian Financial Crisis of 1997-1998 and the ensuing political turmoil, growth slowed to an average of 3.9% annually between 2000 - 2014.³⁴
- Thailand has largely transitioned from a primarily agrarian productivity to export-oriented manufacturing economy, but productivity must keep pace with rising wages to maintain economic competitiveness. Low-productivity jobs in the trading and services sectors continue to constitute a large share of the workforce, and the agricultural sector still accounts for 40% of the labor force.³⁵
- The Mekong Infrastructure Tracker has project-level information on the following industrial spaces in Thailand: 51 industrial zones, 44 operational airports, 20 operational railway stations, 11 sea or inland ports, 10 special economic zones



Industrial Zones in Thailand

- Growth and development have largely been centered around Bangkok and its surrounding provinces, while the rest of the country lags far behind in industrial and social development.³⁶
 - Only 3 of the industrial zones identified in the Mekong Infrastructure Tracker are located more than 150 km from Bangkok.
 - Most industrial zones are along major transportation arteries such as ASEAN Highway AH1, AH9, AH 123, and national route 35.
- The Mekong Infrastructure Tracker indicates that domestic Thai companies are responsible for sponsoring and developing almost all of the industrial spaces around the country. There is at least one project with a German investor dating back to the years before the financial crisis,.
- The vast majority of the industrial spaces in the Mekong Infrastructure Tracker are operational, with the notable exception of ten large special economic zones.



Vietnam in the Tracker

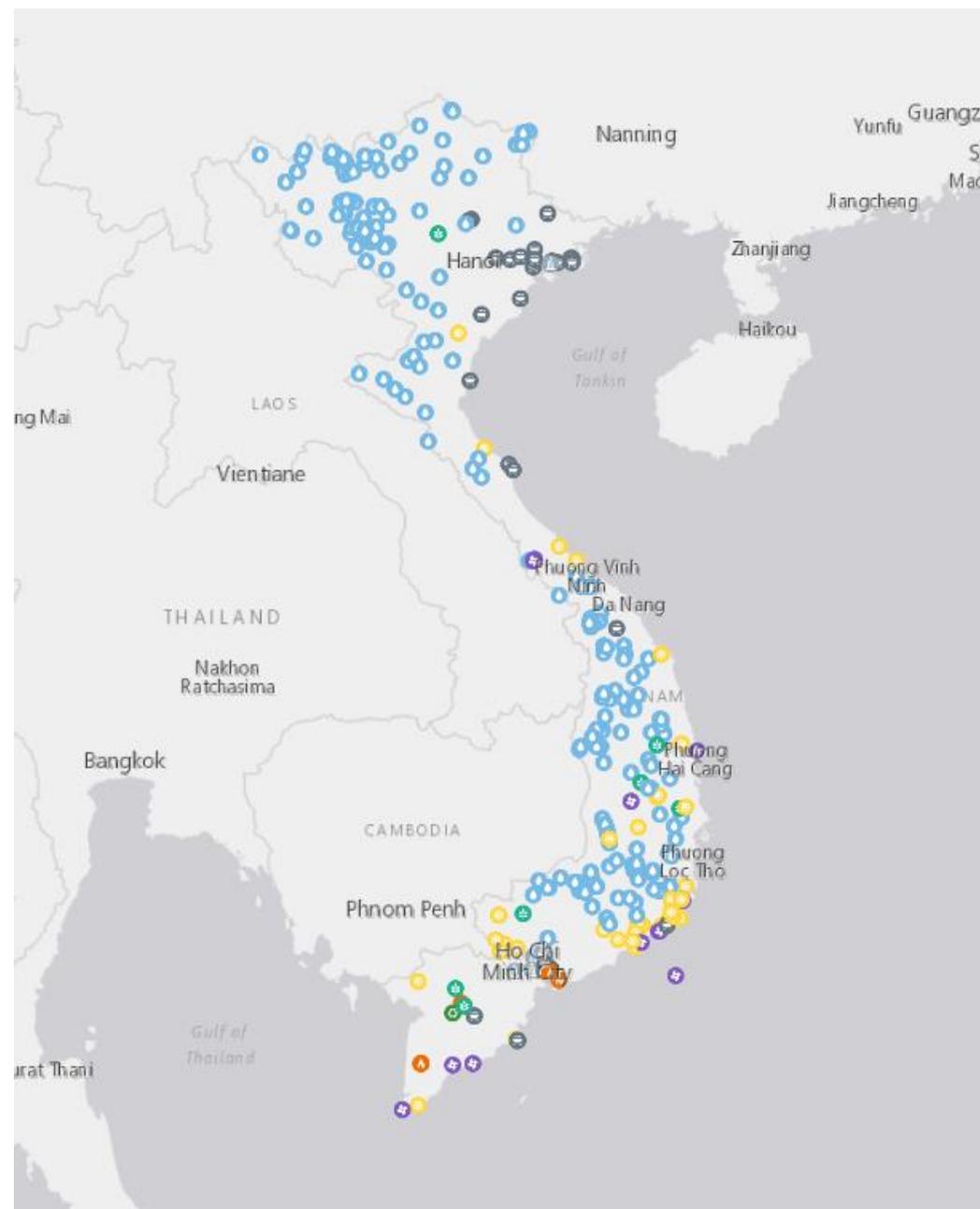
- Vietnam is one of the fastest growing economies in ASEAN and has established strong project development processes to meet an expansive list of needed infrastructure projects. Vietnam actively promotes an export-oriented development growth model, and industrial activity and connectivity is clustered regionally. Northern industrial clusters are tied to economic and commercial activity in China, while southern clusters are more closely tied to Cambodia and Laos. The government has plans for major improvements in linear infrastructure to connect these clusters.
- Vietnam's annual national budget and private infrastructure investment spending are already among the highest in the Mekong region and account for approximately 5.8% of GDP.³⁷ While this high spending rate puts Vietnam on track to meet 83% of projected needs, there is still a \$102 billion spending gap through 2040.³⁸ Energy is by far the largest portion of this, followed by telecommunications and then transportation.
- The Mekong Infrastructure Tracker has data on the following projects in Vietnam: 543 power generation plants, 883 linear infrastructure projects, 109 industrial zones.



Capital	Hanoi
Area	331, 213 km ²
Population	95,540,000 (2018)
GDP	USD \$245.2 billion
GDP Growth Rate Projections	2 to 2.5% in 2020; usually annual growth hovers around 6% annually
Inequality (Gini Coefficient)	35.7 in 2017
Human Development Index	0.693
Income Status	Lower Middle Income
World Bank Ease of Doing Business Ranking	66 out of 190

Vietnam Energy Profile

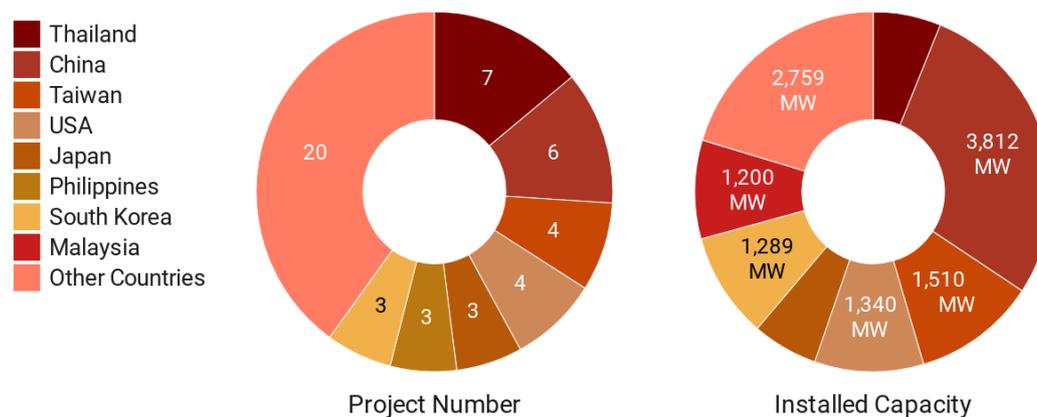
- The Mekong Infrastructure Tracker shows that Vietnam has project-level data on:
 - 339 operational power plants as of 2020
 - 65 power plants currently under construction
 - 116 projects proposed for future development
 - 6 projects with unknown status
 - 17 cancelled projects
- The Tracker shows a confirmed installed capacity in 2020 of 54,639 MW. Vietnam's installed power mix is largely coal (22,703 MW) and hydropower (17,938 MW), with smaller but significant contributions from natural gas (7,606 MW) and solar (4,017 MW), and smaller amounts of wind, biomass, and oil. This is acknowledged to be an undercount, as much of Vietnam's solar power just came online in 2020 and is not yet reflected in the Tracker due to a lack of verifiable public information on project-level details.



Vietnam Energy Profile

- Companies from more than 30 countries are involved in Vietnam's power sector. Unsurprisingly Vietnamese companies play the largest role and are involved in the development, financing, or construction of 88% of all projects in Vietnam in both project numbers (299) and installed capacity (48,171 MW).
- Notably Vietnamese companies were solely responsible for sponsoring many of the projects in the Mekong Infrastructure Tracker's database, with only 23 power generation projects involving both a Vietnamese and foreign company.
- Beyond Vietnamese companies, the top countries in terms of involvement are Thailand, China, Taiwan, the United States, Japan, the Philippines, and South Korea.
- None of these investors is dominant in the sector, as each country has companies involved in seven or fewer projects out of the total.
- China's projects are significantly larger than those of other investors: China's involved in 6 projects, 3 of which are large coal projects of over 1,000 MW each.

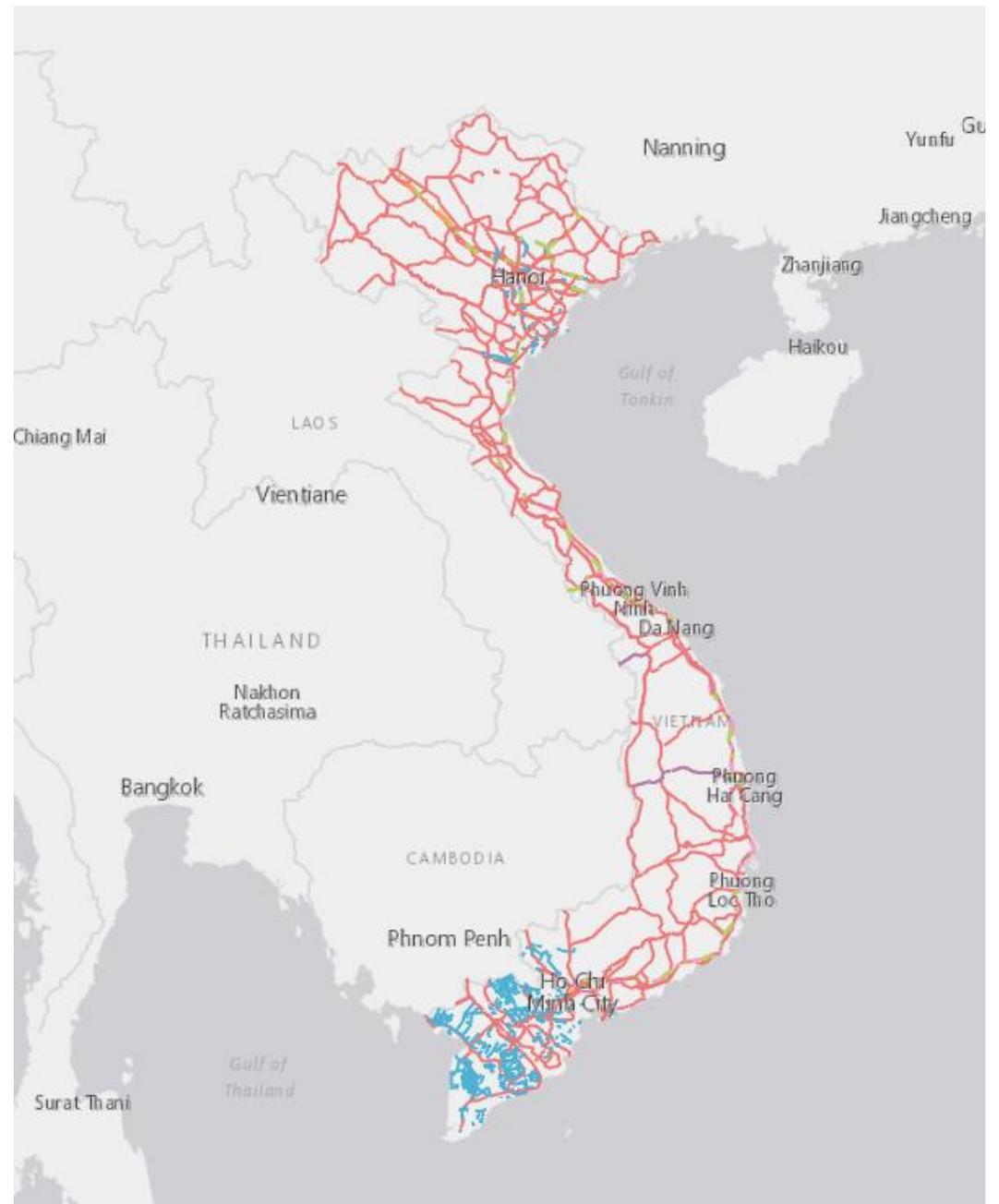
Foreign Involvement in Sponsoring Power Generation Projects in Vietnam



Source: Stimson Mekong Infrastructure Tracker, supported by USAID and The Asia Foundation, December 30, 2020 · Created with Datawrapper

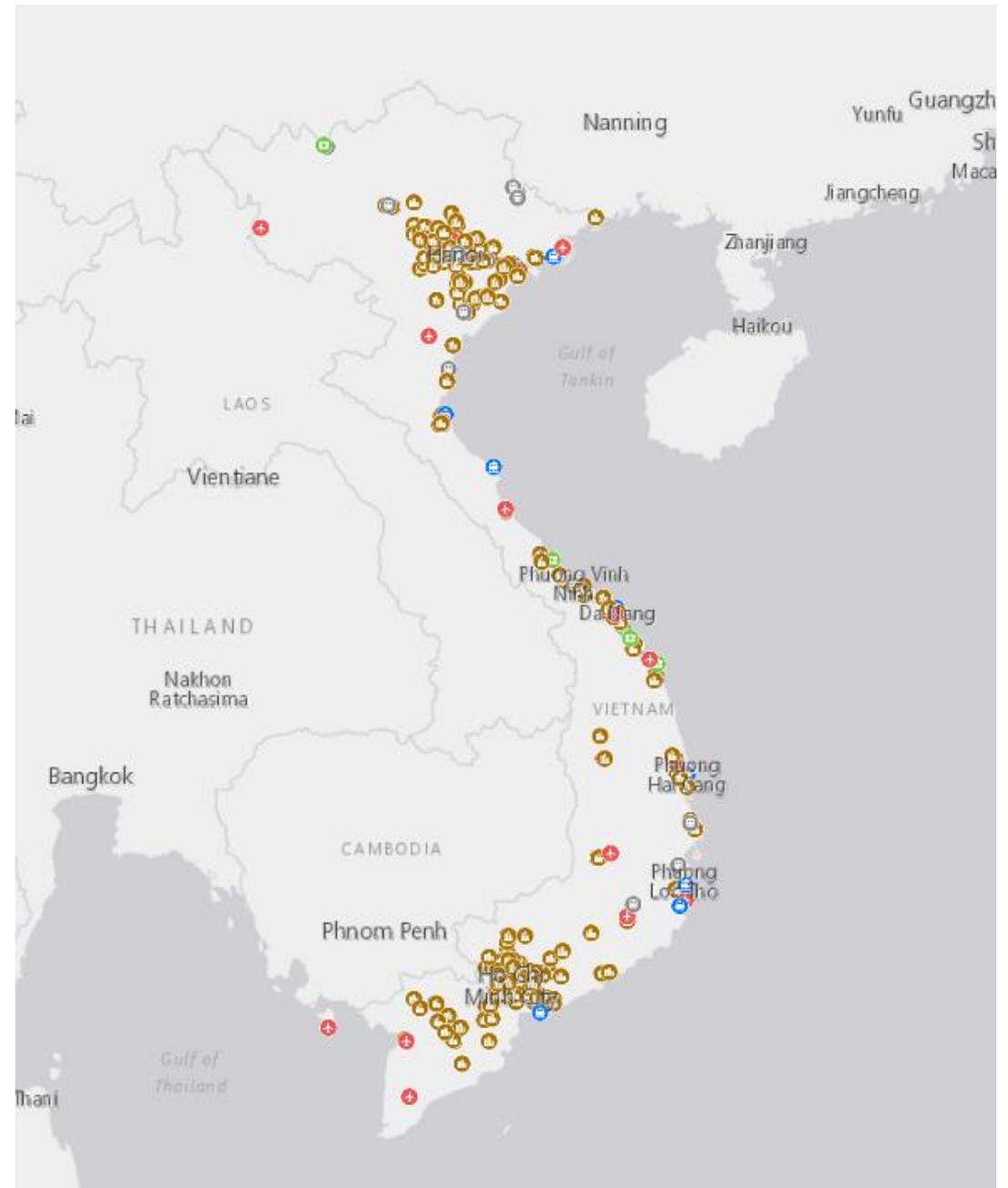
Linear Infrastructure in Vietnam

- The Logistics Performance Index—which ranks countries based on perceptions of efficiency with border clearance and customs, quality of transport infrastructure, and a range of considerations related to shipping—ranks Vietnam 39 out of 160 countries.³⁹ Vietnam's total investment in infrastructure is higher than many of its neighbors and there have been major improvements in recent years to physical connectivity.
- The vast majority of transportation in Vietnam is by road (86-90%), although inland waterways (4.5-7.5%) play a role in the Mekong Delta and some passengers (1-2%) use railway and a smaller percent use airplanes.⁴⁰ Currently, only 20 per cent of Vietnam's national roads are paved and so there is opportunity to improve efficiency by expanding the national highway system.⁴¹
- The Mekong Infrastructure Tracker dataset shows project-level data for Vietnam including 280,000 km of roadways, 2,287 km of railway, 6,303 km of canals..



Industrial Zones in Vietnam

- Vietnam leads the Mekong region in the number and total area of industrial zones, with more than 726 square kilometers composing 257 industrial zones oriented mostly for manufacturing of export products. Vietnam's industrial capacity is focused in the north around Hanoi and in the south near Ho Chi Minh City and the Mekong Delta with most zones opening for business in the decade between 2004 and 2014. The central coastal provinces have also followed suit with the promotion of industrial zones for export processing, but these areas lack the connectivity and clustering benefits that come with industrial activity in the north and south.
- The Mekong Infrastructure Tracker includes project-level details on the following industrial spaces:
 - 25 airports
 - 257 industrial zones
 - 23 railway stations
 - 15 sea/inland ports
 - 3 special economic zones



Industrial Zones in Vietnam

- Vietnam is a coastal country, with approximately 3,200 km of coast and 320 ports, approximately 45 of which are seaports with extensive capacity.⁴² Most of the country's container cargo comes through only two areas: the ports near Saigon, which in 2017 processed approximately two-thirds of the total; and the ports near Hải Phòng, which processed most of the remaining third.⁴³
- Vietnam only has three special economic zones, though they have a total area of 1,154 square kilometers.

Industrial Zone Snapshot

- Quang Nam province has become an important and strategic destination for infrastructure investment in central Vietnam given its importance in facilitating regional trade and proximity to Da Nang, tourist hubs in Hoi An and Hue, and linkages to Lao PDR.⁴⁴ The Chu Lai Open Economic Zone (OEZ) was Vietnam's first coastal Special Economic Zone, which began construction in 2003.⁴⁵ The Zone includes 158 projects worth a total investment value of approximately USD \$3.7 billion, with 33 foreign direct investment (FDI) projects worth USD \$666 million.⁴⁶

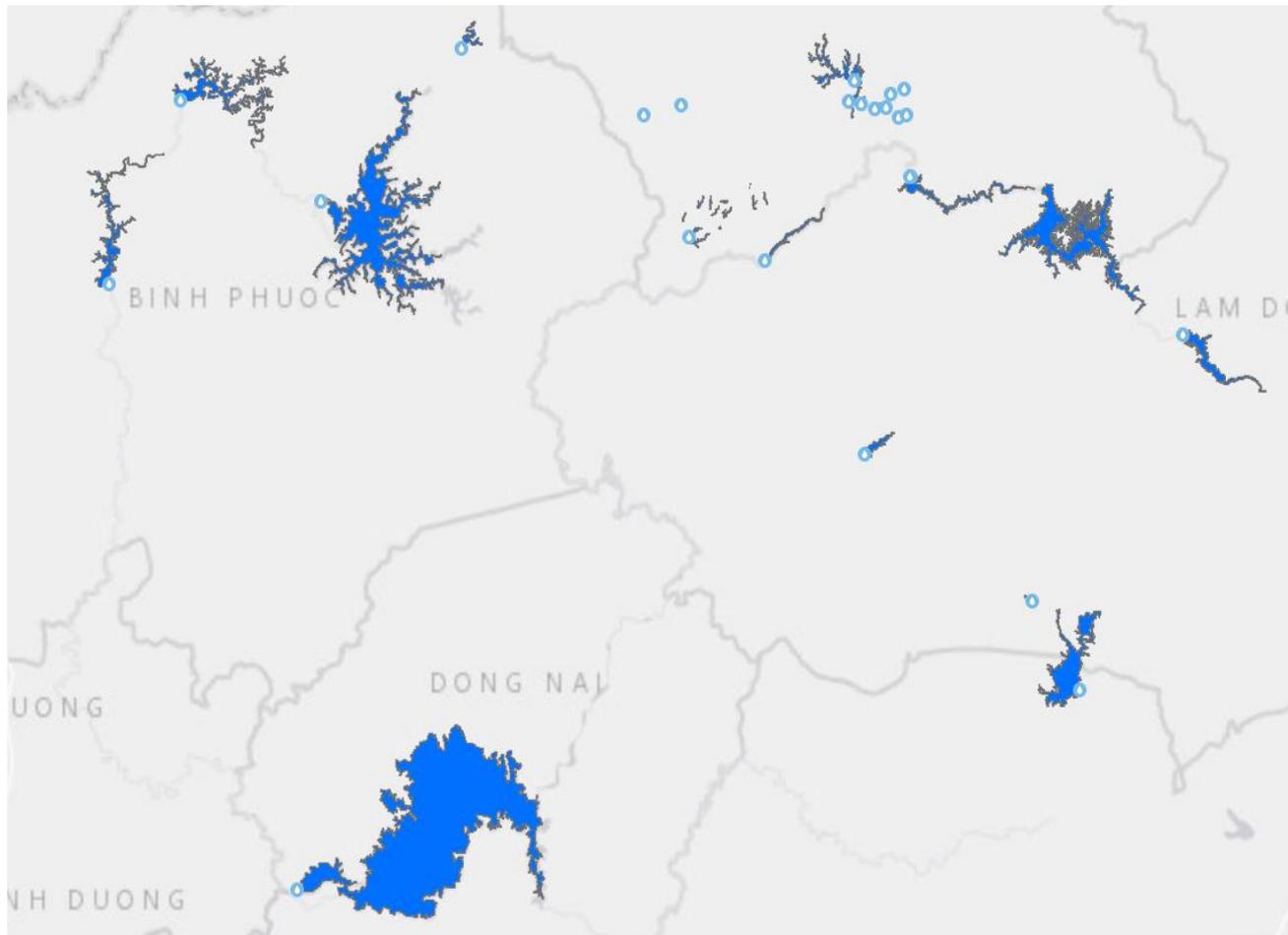


Project Name	Chu Lai Economic Zone
Subtype	Special Economic Zone
Current Status	Operational
Project Development Cycle Stage	Project completion
Year of completion	2008
Area (km2)	1019.694
Sponsor/Developer	Quang Nam Industrial park Infrastructure development Company
Country list for Sponsor/Developer	Vietnam
Country	Vietnam
State/Province	Đà Nẵng; Quảng Nam; Quảng Ngãi
District	Hòa Vang; Ngũ Hành Sơn; Điện Bàn; Duy Xuyên; Hội An; Núi Thành; Phú Ninh; Quế Sơn; Tam Kỳ; Thăng Bình; Bình Sơn
Main Basin	Vietnam Coastal Rivers Quang Binh-Quang Tri-Hue
Tributary	Hue-Danang coastal rivers
Latitude	15.69940796
Longitude	108.4175781

How you can help

- With your help, the descriptive information in the Mekong Infrastructure Tracker datasets can be more robust. Below is a description of needs.
- **Power Generation:**
 - There are gaps in terms of financing data for many of the power plants.
 - For Vietnam, there is a lack of sufficiently detailed information on the location and status of new renewable energy projects which have come online in 2019 and 2020. Both countries include undercounts of solar, wind, and biomass projects.
 - For Thailand there is a significant number of biomass projects with unknown status.
- **Linear Infrastructure:**
 - For most countries there is insufficient detail on the sponsors, developers, and contractors for linear infrastructure projects to draw accurate conclusions on foreign involvement in each sector.
 - For Vietnam, the canal data is currently limited to the Mekong Delta, Saigon River Delta, and the Red River Delta.
- **Industrial Zones:**
 - For most countries, there is insufficient data on the companies involved in financing or constructing industrial spaces to do thorough analysis. There are some gaps in the data on the sponsor/developer companies, particularly for railway stations and airports.
 - For Cambodia, many of the industrial zones are missing years of completion.
 - Myanmar has more than small 400 ports along rivers around the country, and few of these are currently identified in the Tracker.
 - 16 of the 109 industrial zones identified in Myanmar have an unknown project status.

What's Next in 2021?



- The research team will continue to build on the Mekong Infrastructure Tracker team throughout 2021 to add additional data sets, analytical tools, and reference information to the website. These include:
 - A reservoirs spatial dataset
 - A transmission line dataset
 - Individual country profile pages
 - A series of ArcGIS StoryMaps to provide further research and analysis on particular infrastructure projects, regional trends, or opportunities
 - New analytical applications to explore project suitability and deforestation in greater detail
- If you are interested in receiving further training on how to use the tools or getting on the mailing list for future updates, please email Regan Kwan at mekongtracker@stimson.org to get in touch.

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