Energy Transition Strategies

Vietnam’s Low-Carbon Development Pathway

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A Report of the CSIS Energy Security and Climate Change Program
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Acknowledgments

The authors would like to acknowledge the work and insights of the people who wrote papers that we commissioned or participated in our workshops. We would like to especially thank the following people who wrote papers:

Le Thai Ha & David Dapice, Fulbright School of Public Policy & Harvard University

Rachel Ross & Evan Scandling, Allotrope Partners

Ha Son, Center for Energy and Green Growth Research

Du Huynh, Indiana University

Andrew Scott, Overseas Development Institute

This report is made possible by generous support from BP.
About the Project

Energy Transitions: Low-Carbon Pathways for Growth and Sustainability examines how developing countries are balancing their development priorities—particularly, an ever-growing demand for energy—with the mounting need for carbon mitigation. Through case studies of Vietnam, Ethiopia, and the Indian state of Gujarat, the project explores the complementarities between development and low-carbon transitions within the sectors of electricity generation and access, transport, and industry. Furthermore, it explicitly recognizes the inherent challenges and opportunities of a low-carbon transition in an environment that prioritizes economic growth and rapid urbanization.

By understanding successful examples of growth and mitigation, the project will highlight where and how government, industry, and society can create positive feedback loops for stronger climate action and improved development outcomes. Additionally, each sector in each country is comprised of a unique combination of political, economic, and social actors, which necessitate policy innovations specific to their context. The project will draw policy priorities from these specific case studies and challenge the misplaced notion that growth and climate action are incompatible.

This report is based on a workshop that the Energy Security and Climate Change Program hosted in March 2020, for which we commissioned five papers and invited a number of experts to discuss past success stories and the path forward for Vietnam.
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Key Findings

Over the past two decades, Vietnam’s economic growth has been remarkable, and with that growth has come increased energy use and more greenhouse gas emissions. Our goal in this project was to examine the extent to which economic growth and decarbonization (or avoiding carbon) could co-exist; on a macro scale, Vietnam’s experience would suggest that this is difficult, at least at early stages of development. On closer inspection, however, there is more to the story. Although it is true that Vietnam’s economic growth has been very energy- and carbon-intensive, there are also instances where the country has made great progress, either in achieving lower-carbon outcomes or in avoiding higher-carbon pathways.

For instance, Vietnam powered a rapidly growing economy and achieved universal electrification by first investing heavily in hydroelectricity, then in coal-fired generation. Despite this partial reliance on coal, Vietnam has provided good mobility in big cities with less congestion and air pollution than is seen elsewhere; it has improved access to cleaner cooking fuels, thus improving air quality (albeit at the expense of more emissions); it has reduced the energy intensity of heavy industry (if only slowly); and it has managed to attract significant investment in renewable power. In other words, there are two sides to Vietnam’s economic story: a carbon-intensive one, and a low-carbon one.

Vietnam’s energy successes have different origins. Some have emerged from strong and technically competent institutions, others from political commitment. Outcomes like increased power supply and electrification were high-level political priorities backed by capable institutions and supported by ample resources. Other outcomes have been market-driven: the penetration of clean cooking fuels tracks with rising income levels, for instance, and the relatively positive mobility outcomes have persisted despite failures in planning. In other cases, Vietnam has benefited from dynamics beyond its borders: it exploited the falling costs in renewable energy to attract foreign capital, both because local institutions had created space for such an opening and because foreign companies and civil society nudged the government in that direction.

All of these forces, internal and external, are present in the success stories discussed throughout this report. In the rapid expansion of its power supply, Vietnam adopted many of the practices of its closest neighbors—such as relying on coal generation—while slowly implementing the market reforms recommended by institutions like the World Bank. Vietnam’s strong institutional capacity allowed it to plan for this dramatic increase in
supply, while reforms to the structure of its power sector improved the financial ability of its state-owned utility, EVN, to make the necessary investments under that plan. Access to foreign investment, particularly from China and Japan in the field of coal generation, also helped underpin the scale and pace of expansion.

At the same time, Vietnam expanded access to electricity throughout the country to nearly every village and household. Vietnam reached near-universal access by extending its national grid, rather than through the off-grid solutions often touted as leapfrog opportunities for developing countries. Investments in grid infrastructure were made possible thanks to detailed planning, the stable financial position of EVN, and a political commitment to sustainable development through energy access.

By contrast, Vietnam’s increase in access to clean fuels and cooking technologies has largely been a story of decentralized market actors satisfying the growing demand for these products. In 2000, only 13 percent of the Vietnamese population primarily used clean fuels and cooking technology, a figure that has risen to 64 percent today thanks to rising incomes and well-distributed economic growth. In particular, the shift from biofuels to the use of liquified petroleum gas has improved indoor pollution and general quality of life for millions of Vietnamese people.

Meanwhile, Vietnam’s recent progress in scaling up renewable power generation reflects a confluence of factors, both domestic and international: private actors and policy innovations on the domestic front, and development actors and market trends internationally. Following the lead of many countries in the early stages of renewable penetration, in 2017, Vietnamese authorities announced a generous Feed-in-Tariff (FiT) for solar power; by mid-2020, more than 5,000MW) of utility-scale solar farms and approximately 750 MW of rooftop solar projects were operating nationwide. Also, another innovative pilot mechanism for up to 1,000 MW Direct Power Purchase Agreements for industrial energy users is expected to launch this year, following successful cooperation efforts between local and multinational businesses, Vietnamese regulators, and international development partners. The rapid growth of Vietnam’s solar sector speaks to the pent-up demand of large energy users for cleaner sources of electricity, the willingness of government stakeholders to create a conducive environment, and strong interest from investors to play a significant role in the country’s low carbon transition.

On certain metrics, Vietnam’s industrial energy intensity is among the highest in the Asia-Pacific, and like many countries, it has struggled to monitor energy efficiency and to implement its initiatives. In recent years, however, Vietnam has worked alongside development agencies to create a robust framework for energy efficiency policy, and these efforts are paying off. Since drafting the National Strategic Program on Energy Savings and Effective Use in 2006, Vietnam has been addressing the implementation challenges of data collection, bureaucratic accountability, and the political and economic power of industrial actors—especially state-owned enterprises. While this is yet to translate into meaningful electricity conservation, the pieces are in place for future success.

Finally, Vietnam had enjoyed relatively good urban mobility, low congestion, and decent air pollution in its major cities, thanks to an urban culture of high motorbike use and multi-purpose neighborhoods. However, car ownership rates are increasing as Vietnamese
incomes rise, and various attempts to build a robust public transport network have fallen short. Both air pollution and congestion levels have recently reached alarming levels and only show signs of worsening. Vietnamese city officials have created a series of forward-looking master plans for cleaner urban growth and public transport infrastructure, which benefit from the able assistance of a range of multilateral development banks and foreign investors. It is too early to determine the success of such plans, but it is likely here, too, that Vietnam’s low-carbon trajectory will be determined by the institutional capacity of its local bureaucracy and the innovations of the global climate community.
Backdrop: Vietnam in Context

Vietnam's economic trajectory has been remarkable. As the World Bank put it: “To any external observer, Vietnam is a major development success story. One of the world's poorest countries at the onset of the reforms, it has, in a single generation, leapfrogged to middle-income status, while achieving social outcomes typically seen at much higher incomes.”

Vietnam’s real GDP growth has been among the world’s highest in the past decade. It has reduced poverty faster than its peers, and its poverty level is lower than that of richer countries. Its economy has succeeded in attracting foreign direct investment (FDI), and its inward FDI stock is three times greater than those of Thailand, Indonesia, Malaysia, or the Philippines (as a share of GDP). Vietnam has one of the region’s most export-oriented economies: exports and imports together exceed 200 percent of GDP, far above other countries in the region (120 to 130 percent for Thailand and Malaysia and around 40 percent for India, Indonesia, and China). Furthermore, Vietnam has a strong and growing manufacturing base, although its manufacturing sector is lower as a share of GDP than many of its peers due to low value-added in its exports.

As if often the case, this economic transformation has been accompanied by urbanization. From 2000 to 2020, Vietnam’s urban population nearly doubled, with Hanoi and Ho Chi Minh City absorbing over 40 percent of that increase. Nonetheless, the country is still majority rural, and is expected to remain so until the late 2030s. By then, six cities will have a population greater than one million; the combined population of Hanoi and Ho Chi Minh City alone is expected to grow by 45 percent by 2035. The

challenge, therefore, will be to manage the growth of the two largest cities, to manage the expansion of second-tier cities, and to offer economic opportunity to the sizable proportion of the population that will continue to reside outside cities.

Vietnam’s economic success, and the societal shift it has produced, has been fueled by energy. Vietnam’s energy consumption has grown by about 9 percent a year over the past two decades, one of the fastest growth rates in the world.\(^8\) Vietnam’s per capita energy consumption is on the high end relative to its income, although where Vietnam sits depends on whether one uses dollars at exchange rates or in purchasing power parity terms.\(^9\) More energy use has meant more energy-related CO\(_2\) emissions, and these have risen by a similar amount.\(^10\) Fossil fuels have provided 80 percent of the country’s energy needs, although there have been several shifts in the composition of that energy: in 2014, coal became the largest single energy source, overtaking oil, while the market share of natural gas has steadily decreased since the mid-2000s. Non-hydro renewable energy accounted for just 0.1 percent of primary energy in 2018.

Alongside this rapid increase in energy consumption has been a corresponding increase in energy access. Vietnam achieved universal electrification in 2017, and it accomplished this at a much lower income level than its peers.\(^11\) The country also has a good record when it comes to clean cooking fuels, such as LPG: although there is still a sizable proportion of the population that lacks access to such fuels, penetration (at 64 percent in 2018) is similar to China (also 64 percent), and higher than in India (49 percent) or the Philippines (46 percent).\(^12\) Of course, as in other places, reliability and affordability remain concerns, especially when it comes to electricity in remote regions.

The other side to this energy story is CO\(_2\) emissions. The country’s emissions have risen in tandem with energy supply, despite the relative shift from oil and gas to coal.\(^13\) Around 60 percent of the country’s emissions come from coal, 30 percent from oil, and 10 percent from gas. Over 50 percent of the emissions are due to industry, while 20 percent are due to transportation and the remainder comes chiefly from buildings (mostly the residential sector).\(^14\) The country’s per capita emissions are a bit higher than the average in Asia (excluding China), but less than half the global average.\(^15\)


\(^13\) The CO\(_2\) intensity of primary energy has gone up based on data from the International Energy Agency, but not based on data from the BP Statistical Review of World Energy. The difference is that the IEA data includes biomass in its primary energy numbers, and hence, the total includes some non-carbon energy, which affects the calculation.


\(^15\) Ibid.
Graph 1: Vietnam’s Economic and Energy Indicators

<table>
<thead>
<tr>
<th>Population</th>
<th>Real GDP</th>
<th>Energy use</th>
<th>CO₂ emissions</th>
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<td>+42%</td>
<td>+581%</td>
<td>+1,408%</td>
<td>+1,499%</td>
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Graph 2: Vietnam’s Energy Demand

- Coal: 50% share
- Oil: 26% share
- Hydro: 14% share
- Gas: 9% share
- Other: 1% share

Graph 3: Vietnam’s CO₂ Emissions from Fuel Combustion (in 2017)

- By Emitting Source
- By End Use Sector
- By Source Fuel


Note: The difference between “emitting source” and “end use sector” is that the emissions from the power sector have been allocated to the various end uses in proportion to their electricity consumption.
Vietnam is also one of the countries most vulnerable to climate change. Agriculture is still the primary livelihood for nearly half of Vietnam's labor force, and it comprises almost a quarter of its GDP; however, Vietnam's agricultural heartland, the Mekong Delta, is susceptible to rising floods and falling rice yields due to climate change. Meanwhile, Vietnam's vast coastline is exposed to rising sea levels and an increase in tropical storms. Temperatures in Vietnam rose by about 0.26°C per decade from 1971 to 2010, twice the global average, and by 2050, more than 20 million people—about a quarter of its population—will live on land below the high-tide line, as sea levels rise. Ho Chi Minh City, Vietnam's economic center, will be especially vulnerable to rising seas and more frequent typhoons, and the IMF predicts overall economic growth could fall by 10 percent, on average.

In response to these concerns, Vietnam has announced an ambitious climate strategy, enshrined in the 2008 National Target Program to Respond to Climate Change, the 2011 National Climate Change Strategy, the Vietnam National Green Growth Strategy, and the 2015 National Determined Contribution (NDC) for the global Paris Agreement. In its NDC, Vietnam pledged to reduce its greenhouse gas emissions by 25 percent from a business-as-usual trajectory by 2030—conditional on international support—and its emissions intensity per unit of GDP by 30 percent, versus 2010. Its pledged mitigation activities focused on improving energy efficiency, increasing renewable energy use, and improving the sustainability of its agricultural and forestry practices. However, the group Climate Action Tracker rates its NDC as “Critically Insufficient” in meeting the Paris Agreement targets, and several sources note Vietnam's commitment to coal-fired power generation, in particular, as being inconsistent with global climate goals.

The success stories discussed at the CSIS workshop were rarely, if ever, motivated by climate change, even if climate concerns were an attractive co-benefit. The goals that drove policy were local development, attracting foreign investment and expertise, supporting new industries, and reducing the economic and social costs of carbon-intensive industry. The confluence of global market forces, local policy entrepreneurs, market competition, bureaucratic capabilities, and multilateral coordination is present in each of the success stories identified by local and regional experts for this project. These stories include: expanding electricity supply to meet growing demand, ensuring universal access to electricity, improving access to clean cooking, encouraging renewable energy sources for electricity, improving energy efficiency for heavy industry, and reducing the economic and social costs of carbon-intensive industry.

and maintaining high levels of mobility with limited congestion and relatively low (though rising) levels of air pollution.
Success Story #1: Power Supply Expansion

What Was the Success?

Electricity demand has grown by 12 percent annually from 1998 to 2018, with a tenfold increase over 20 years—rising from under 22 terawatt hours (TWh) in 1998 to 213 TWh in 2018. On a per-capita basis, the average Vietnamese citizen consumed 2,213 kWh in 2018, versus 276 kWh in 1998. Insufficient access to electricity, which often hampers development in other countries, has not been a major issue in Vietnam.

How Did It Happen?

The expansion in power generation capacity was due to government policy, planning, and reform. First, the state created a strong institution with a mandate to supply electricity, which was accomplished in 1994 by merging three regional power companies to create Electricity of Vietnam (EVN). This created a national grid where the north of the country—which had surplus capacity—was connected to the center and south, thus promoting rural electrification as well as meeting growing urban demand.

Later, the 2004 Electricity Law introduced private competition into the power sector, and these ongoing market reforms have taken the pressure off EVN to meet all additional electricity demand.

Second, electrification has enjoyed political support, backed by strong institutions, at least on a technical level. As a World Bank paper recently noted:

Vietnam’s power sector plans benefit from a strong technical planning culture, with a high degree of compliance as the plans are treated as authoritative.

. . . Vietnam has a clearly identified entity with functional responsibility and technical competence to produce least cost power generation master plans . . .

EVN and its subsidiaries treat the plans as mandatory government directions for

investment decisions. Plans thus lead to timely initiation of power procurement to minimize the possibility of power shortages.24

Third, Vietnam has attracted significant capital in power generation: EVN has borrowed heavily to boost its generation capacity, and the country has also attracted private and foreign capital. According to a tally by the World Bank, EVN borrowed $25.5 billion from 2010 to 2017, mostly from international financial institutions and bilateral agreements ($10.1 billion), domestic commercial sources ($9 billion), and foreign commercial sources ($6.4 billion).25 Foreign private investment in power generation was meager until 2016 ($8 billion from 1990 to 2016, per the World Bank), but there was a big spike in 2017, when “[foreign direct investment] in power generation was around US$8.4 billion (23 percent of total FDI in 2017), which is more than was raised in total during the last decade.”26

The ability to attract capital has rested on being willing to compensate investors for risk. For instance, the coal-fired Mong Duong 2 plant was anchored by a 25-year Power Purchase Agreement (PPA) with EVN, along with a similarly termed long-term coal supply contract with Vinacomin, the state-owned coal company. More importantly, “[the] PPA includes a capacity payment denominated in U.S. Dollars and a fuel pass-through that protects the project from fluctuations in coal prices.”27 This is essentially a government guarantee of international private investments in Vietnam’s coal and gas sector.28

What Comes Next?

This capacity expansion has, however, undermined EVN’s finances. Most of EVN’s plants are financed by debt rather than cash flow, and retail tariffs—which increase periodically but barely enough to offset inflation—mostly cover operational expenses but not capital payback.29 Even so, “EVN’s financial position has variously swung from periods of loss to profitability, based on internal and external factors,” including fuel costs, tariff rates, exchange rate fluctuations, and others.30 Given the sharp increase in demand, Vietnam is confronted with tariffs that are too low to provide incentives for energy efficiency (more on that later) but also not high enough to allow EVN to recoup its investments in power generation.

The second problem is the excessive reliance on coal. This is explained by two factors. First, there is a growing recognition that hydropower, which in 2017 was still the country’s largest single source of electricity,31 faces diminishing returns as the country’s potential gets developed. Second, natural gas was seen as a solution for a while, and some of the

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29. Lee and Gerner, “Learning from Power Sector Reform.”
30. Ibid.
first power plants with foreign investors were for natural gas.\textsuperscript{32} But gas use in power generation has stayed flat from 2010 to 2017, mirroring the plateau in gas production (in 2018, gas production was just 6 percent higher than in 2010).\textsuperscript{33} Meanwhile, long-standing plans to develop a liquefied natural gas import facility have yet to materialize (although a facility is reportedly under construction).\textsuperscript{34} In order to limit local air pollution and carbon dioxide emissions, the country needs to develop compelling alternatives, which will be discussed below.


Success Story #2: Near Universal Electricity Access and Growing Consumption

What Was the Success?

Vietnam has achieved near universal access to electricity, reaching this milestone ahead of many of its peers. Between 1990 and 2010 the proportion of the population with access to electricity increased from about 14 percent to over 98 percent. Increased access has also meant increased use: in the 1990s, electricity consumption barely sufficed for basic functions, while in 2018, it was enough for high-power appliances like air conditioners.\(^{35}\) In 2012–2013, Vietnam ranked 113th out of 144 countries for the quality of its electricity supply in a World Economic Forum index; by 2019, it ranked 62nd.\(^{36}\) Business losses due to outages, reported in World Bank Enterprise Surveys, fell from 3.6 percent of sales in 2009 to 0.4 percent of sales in 2015.\(^{37}\)

Graph 4: Change in Electricity Consumption per Capita and Electricity Access from 2000-2018

35. Lee and Gerner, “Learning from Power Sector Reform.”
How Did It Happen?

Vietnam reached its electrification goals almost exclusively by extending the national grid. In the 1990s, much of the improvement came through informal and unregulated local initiatives to build distribution networks connected to the national grid. These became regulated in 2001, as authorities realized the need for technical standardization across the grid and for harmonization of consumer tariffs. Until the 2000s, when the government began prioritizing rural electrification, many villages relied on off-grid power supply. However, by 2009, only 51 of Vietnam’s 9,000 communes relied on off-grid power, and by 2016, all villages were connected to the grid. This rapid expansion of grid connections was made possible by broader reforms to Vietnam’s power sector, as well as by the institutionalization described earlier. Importantly, EVN, with strong government backing, saw electrification not only as a social equity issue, but a means to facilitate productive activity and economic growth.

What Comes Next?

Many households are still unable to consume enough electricity to meet basic needs. In Vietnam’s 2014 Living Standards Survey, the proportion of households stating their electricity consumption was not enough to meet their needs was just 2.7 percent, but a quarter of households consume less than 50kWh of electricity a month and 13 percent consume less than 30kWh—what is seen as a subsistence level of electricity consumption. Moreover, the average Vietnamese household spent the equivalent of US$156 on electricity, which, for the bottom 40 percent of income-earners, is over 10 percent of their income. These inequalities in electricity consumption and affordability are reflected in the ownership of electrical appliances. Unsurprisingly, ownership of all household appliances is lowest among the poorest in Vietnam; however, this is rapidly changing. One Asian Development Bank analysis, for example, forecasts that the number of television sets will increase from 20 million in 2010 to 53 million by 2050, the number of computers from 4 million to 37 million, and the number of air conditioners from 9 million to 43 million.

Discussants at the March CSIS workshop emphasized the impact of air conditioners (ACs) on electricity demand. ACs have a disproportionate effect on demand because both ownership and usage rise with income growth. By 2050, the ADB estimates that AC units will account for 70 percent of total household electricity demand, which will increase eight-fold over the same period. The efficiency of these appliances will be critical. While the efficiency of new units improves over time, people often keep older units or sell them. Therefore, more stringent efficiency standards will need to be complemented by recycling initiatives to take older appliances off the market.

#infrastructure.

41. Ibid.
**Success Story #3: Access to Clean Fuels and Technologies for Cooking**

**What Was the Success?**

As with electrification, Vietnam has succeeded in providing access to clean fuels and technologies for cooking to many of its citizens. By 2018, 64 percent of Vietnam’s population had access to clean fuels, compared to 13 percent in 2000 (which is roughly in line with the global average of 63 percent).\(^{42}\)

**How Did It Happen?**

Vietnam’s success in clean cooking has involved switching from wood to liquified petroleum gas (LPG). LPG was first introduced to Vietnam in 1993, and by 2016, 63 percent of households were using it as their primary cooking fuel. However, access to LPG remains uneven: some provinces report LPG penetration of over 90 percent and others below 15 percent, a discrepancy that is correlated with income.\(^{43}\) In fact, income seems to have been a primary driver of increased LPG access—more so than any deliberate policy—and there has been no focus on clean cooking as there was on electrification, with LPG being mostly driven by private actors in a decentralized manner.\(^{44}\)

**What Comes Next?**

The challenge is to reach the 30 million or so people who do not yet have access to clean fuels and technologies for cooking. Many of these underserved populations inhabit areas that are hard to reach due to their remote location and low connectivity. Redistribution policies that bring these areas out of poverty—such as cash transfers or subsidies—will help, as will increasing the availability and reliability of refilling centers. Finally, as with electricity, subsidies could be provided for households below the poverty line, in a fashion similar to the policies of countries like India and Indonesia, which are providing financial incentives for lower-income areas to consume more LPG.

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44. Ibid.
Success Story #4: Encouraging Renewable Energy Investment

What Was the Success?

In 2017, the Government of Vietnam approved Decision 11, the country’s first legal instrument governing the development of solar power. The framework offered a generous feed-in-tariff (FiT) for new solar farms starting operations by June 30, 2019. More than 17,000 MW of capacity was proposed, far more than the 850 MW targeted by the Ministry of Industry and Trade. By December 16, 2019, 135 solar power projects with a total capacity of over 8,000 MW were approved, and by mid-2020 5,000 MW had achieved commercial operation, so much so that this capacity was straining the transmission system: even the first 5,000 MW licensed about twice as much as could be transmitted and used. Decision 11, and the ensuing Decision 13, also stimulated a major boom in Vietnam’s rooftop solar market; approximately 750 MW of rooftop solar systems were brought online in the 18-month period of January 2019 to July 2020. Market experts project that Vietnam will reach 1,000 MW of rooftop solar by the end of 2020. Vietnam is also preparing to pilot a Direct Power Purchase Agreement (DPPA) mechanism, expected to launch later in 2020, to allow industrial companies to procure up to 1,000 MW of renewable energy directly from off-site solar and wind generators.

How Did It Happen?

The success in attracting investment in renewable energy appears to be due to the confluence of several factors, some global, others specific to Vietnam. The global factors are well known: the costs of solar and wind generation have fallen sharply over the past decade, and it is now easier to justify their development on a stand-alone economic basis. There is also a global shift towards private companies procuring renewable energy

directly from project developers.\textsuperscript{49} In Vietnam, approximately two-thirds of rooftop solar installations to date have been for commercial or industrial facilities, a sign that industry can play a leading role in deploying renewable energy.\textsuperscript{50}

In terms of local factors, besides the generous FiT, the government’s openness to enabling more opportunities for private electricity transactions has allowed this market growth. A number of technical assistance programs have encouraged the government to consider innovative models that unlock private clean energy investment. For example, the pilot DDPA program was aided by a collaborative initiative known as the Clean Energy Investment Accelerator (CEIA).\textsuperscript{51} Jointly led by the World Resources Institute, the U.S. National Renewable Energy Laboratory, and Allotrope Partners, CEIA facilitates public-private collaboration to deploy clean energy at scale. Working with the U.S. Agency for International Development’s V-LEEP program, CEIA and over two dozen major companies released a “DPPA Declaration” in November 2017 at the Asia-Pacific Economic Cooperation (APEC) Summit in Vietnam, calling for off-site renewable energy procurement options.\textsuperscript{52} For the next two years, USAID V-LEEP led close consultations with the Electricity Regulatory Authority of Vietnam (ERAV), culminating in Proposal No.544/TTr-BCT and the Draft DPPA Decision, proposing to allow a pilot program at scale. This continuous support, coupled with a government openness to innovative new mechanisms, has been essential in unlocking this new option for private renewable energy transactions.

\textbf{What Comes Next?}

These developments are only the beginning. For one, it will take time and more deployment to move these solutions from niche to center stage—especially in a country that has long favored plans based on large-scale generation. More importantly, upstream efforts to encourage investment will need to be supplemented by improvements in the grid to offtake and fully use renewable energy. Experience from other countries, including China, has shown that generation often moves faster than transmission, and this also seems to be the case for Vietnam. The government recently approved private investment into grid infrastructure, which could set a precedent for more widespread private sector involvement going forward.\textsuperscript{53} Over time, the country will need to evolve to a more flexible grid, though it is never too soon to start that process.

\begin{itemize}
\item \textsuperscript{51} See https://www.cleanenergyinvest.org/.
\end{itemize}
Success Story #5: Energy Efficiency in Heavy Industry

What Was the Success?

Measuring energy efficiency gains in industry can be difficult, in Vietnam as in other places—especially when it comes to understanding where gains are coming from, as economy-wide measurements can capture shifts in economic activity rather than gains in actual production efficiency. Vietnam’s industrial energy use relative to GDP is among the highest in the world (when GDP is expressed in PPP terms).\(^{54}\) Even so, from 2010 to 2015—the latest year for which we have applicable data—there was a marked improvement across several industries, with gains of upwards of 25 percent for iron and steel.\(^{55}\)

How Did It Happen?

This commitment to energy efficiency comes from the highest levels, and is supported by international donor agencies—especially from the Netherlands, Germany, and Japan—and international institutions.\(^{56}\) Since 2003, there have been a range of circulars, decrees, national programs, and ten-year plans concerning energy efficiency. The most important of these policies was the National Target Program on Energy Savings and Effective Use, launched by the Ministry of Industry and Trade in 2006 (also known as the Vietnam National Energy Efficiency Program, or VNEEP). This was a ten-year plan to reduce energy consumption by 3–5 percent between 2006–2010, and 5–8 percent between 2011–2015, compared to a business-as-usual scenario. The first phase (2006–2010) developed legal frameworks and professional networks, while the second (2011–2015) mandated minimum energy performance standards and energy efficiency labelling. Over time, these initiatives created a foundation for improvements in energy efficiency.

What Comes Next?

Further improvements in energy efficiency face a number of technical and institutional challenges, besides low energy prices. On a technical level, there are the usual problems around data quality, availability, and transparency, as it is hard to finance investments without reliable data.\footnote{Idem; Son, “Clean Industry.”} The institutional challenges stem from overlapping responsibilities and multiple bureaucracies. For example, the VNEEP had to coordinate a Steering Committee comprised of representatives from eleven central line ministries, authorities from provinces and cities, as

Source: World Development Indicators, World Bank (July 1, 2020 update); BP, Statistical Review of World Energy (June 2020). Peers include China, Indonesia, Malaysia, the Philippines, and Thailand. Gross domestic product reported in purchasing power parity (PPP) terms.
well as representatives from the newly-established “Energy Efficiency Centers.”

There is also, as in other places, a clash between improving energy efficiency and setting ambitious targets for economic growth, which incentivizes a “race to the bottom” between provinces.

The other major barrier is that state-owned enterprises—which make up a disproportionate share of energy-intensive industries—are often the most inefficient, energy-intensive, and investment-heavy. They can exert political influence and impede efforts to hold them accountable or to make them more efficient. In part, therefore, progress in energy efficiency will hinge on a broader reform that helps state-owned enterprises become more market-driven and competitive.

58. Luong, “A critical review.”
Success Story #6: Improved Access to Urban Mobility Amidst Rapid Urbanization

What Was the Success?
Vietnam’s cities enjoy relatively good urban mobility and some of the lowest congestion rates in Asia.\textsuperscript{62} This is due to two key factors: first, the near-universal use of motorbikes as the main means of transportation, and second, the fact that many Vietnamese cities are comprised of mixed-use neighborhoods that typically result in shorter commute times. Reliance on public transport remains low, despite decades of plans by both Hanoi and Ho Chi Minh City to rectify the situation.

Graph 6: Vietnam’s Transportation Trajectory

\textbf{How Did It Happen?}
Vietnam is a country of motorbikes. In the 1980s, bicycles were the main mode of urban transport, but by the mid-1990s, one-third of travelers in Hanoi and two-thirds in Ho Chi Minh City were using motorbikes.

Source: World Urbanization Prospects, UN Population Division; WRI, CAIT Historical Emissions; General Statistics Office of Vietnam; BP Statistical Review of World Energy (June 2019); OICA, Sales Statistics

Chi Minh City had shifted to motorcycles. This rate surpassed 80 percent in both cities within a decade later. The motorbike is the preferred form of transport for several reasons. First, it is affordable. The most common motorcycles in Vietnam cost only $500 to $1,000, and operating costs are equivalent to regularly taking the bus. It is also a highly convenient form of transport for people needing to take multiple trips in a day, or to avoid congestion. Finally, the rapid and often informal development of Vietnam’s cities has led to a proliferation of narrow and long alleys that favor motorcycle use and discourage other means of transportation, including public transport options like the bus.

Vietnam has had little success with either planning cities for greater vehicle ownership or with expanding public transport infrastructure. As the dominant urban cores of Vietnam, Hanoi and Ho Chi Minh City wield considerable power over their urban planning decisions on paper, but the reality is different. For one, the prevalence of Vietnam’s master planning approach from central authorities means that local planners have to work within the confines of a politically-charged process that often delivers a new plan every five years, with little guarantee that the changes will be based on local needs. Furthermore, Vietnam’s overlapping legal system—a combination of French administrative law, Soviet principles, communist central planning norms, and western legal principles for global finance—creates considerable uncertainty in the system.

Much as in many other countries, the urban planning system of Vietnam’s major cities is highly fragmented, with over a dozen regulatory agencies in each city and inadequate integration and coordination mechanisms. Each city relies considerably on foreign direct investment and overseas development assistance, which often means that the projects that get finalized are those that best attract foreign capital, rather than those that meet the greatest need. For example, Ho Chi Minh City’s 2013 transportation master plan included 469 projects requiring a total of US$121 billion, only 5 percent of which was accounted for in the city budget.

**What Comes Next?**

The era of the motorbike, with its ease of mobility, could be coming to an end if proactive measures are not taken. Car ownership is on the rise and various public transport projects are locked in planning stasis, creating conditions for rising congestion and emissions. While the car ownership rate trails that of motorbikes by some margin, it is rising rapidly as incomes rise. The amount of street space required per trip for a car is roughly four times that of a motorbike, and Vietnam’s cities already have very little transport infrastructure relative to their size and populations. Growing car ownership will also add

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63. Ibid.
65. Ibid.
67. Ibid.
69. Huynh and Ibanez, “Vietnam.”
to Vietnam’s pollution problems, not to mention increase its energy security concerns due to greater oil consumption.

Given trends in similar countries, the rise of car ownership appears inevitable. Yet both Hanoi and Ho Chi Minh City have ambitious master plans for mass transit, which, when completed, would together comprise some of the largest mass transit systems in the world. Hanoi hopes to serve 55 percent of urban trips by rail and bus by 2030; for Ho Chi Minh City, this number is 35–45 percent. However, both plans remain in limbo, with capital costs that vastly exceed the financial resources of the cities, construction well behind schedule, and cost overruns of 50 percent or more on lines under construction. Furthermore, the metro line projects in each city are not being managed by just one agency—either donor or investor—but a complex sprawl of development banks, government agencies, and foreign investors. In Ho Chi Minh City, the six planned metro lines are being funded by at least five separate overseas development agencies, and a Bus Rapid Transit System is also being planned by the World Bank. Not only is this inefficient, but in several cases, the development of one project erodes the financial sustainability of another.

Vietnam’s difficulties in urban planning and transport infrastructure reflect many of the issues discussed throughout this report. However, whereas the private sector and foreign investment have often been the driver of reform and progress elsewhere, there are few conceivable channels for such involvement in transport. Few countries have successfully solved the issue of public-private partnerships in public transport, and market participants in urban planning have so far prioritized real estate development over public spaces and transport infrastructure. One promising area has been the growth in ridesharing. Ridesharing in Ho Chi Minh City has increased 9.2 times over three years, from 20.8 million rides in 2016 to 191.5 million in 2019. The ridership in 2019 was equivalent to two thirds of the bus ridership.

Reforms to Vietnam’s governance of urban planning are therefore deeply structural in nature, and largely beyond the scope of this report. The OECD, in its Urban Policy Review, have a series of sensible policy recommendations, including promoting e-bikes and e-scooters, mainstreaming green growth into key urban development policy frameworks, fostering collaborative mechanisms for local governments, and attracting highly trained staff in the public sector.

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70. Huynh, “The Triumph of Market Forces.”
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