Sunrise and sunset –
Accelerating coal phase-down and green energy deployment in Vietnam:
A political economy analysis

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August 2023

This report was prepared with financial support by the World Resource Institute (WRI). The report does not reflect official positions from the organization.

Acknowledgements

We extend our sincere gratitude to five anonymous interviewees for generously sharing expertise, experiences, and perspectives, thereby enriching our understanding of the subject matter. We also thank UNDP Vietnam for providing detailed comments on a draft version of this policy brief. Lastly, our study benefitted from helpful discussions at a closed-door online workshop with stakeholders from across Asia organized together by the Green Finance & Development Center of the Fanhai International School of Finance at Fudan University and the Centre for Sustainable Finance at SOAS, University of London on 3 August 2023.

The development of the report has been financially supported by the World Resources Institute (WRI).

This brief is produced by the Green Finance & Development Center of the Fanhai International School of Finance (FISF) at Fudan University, Shanghai, P.R. China.
The brief aims to provide a comprehensive political economic analysis of the barriers and the drivers for Vietnam's potential coal phase-out and renewable scale-up to encourage discussion and debate. The findings, interpretations, and recommendations expressed in this paper are entirely those of the author(s) and should not be attributed in any manner to FISF or Fudan University, to its affiliated organizations, or to members of its Board of Executive Directors.

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Please quote as:

Florian Wengel, Christoph Nedopil, and Ulrich Volz (2023): "Sunrise and sunset –

Accelerating coal phase -down and green energy expansion in Vietnam

A political economy analysis", Green Finance & Development Center, FISF Fudan University, Shanghai, China and Centre for Sustainable Finance, SOAS University of London, London

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Title picture: Le Mont Sam (Nui Sam) haut de 230 m est à 6 Km de Chau Doc by Jean-Pierre Dalbera

Report background, purpose, and methodology

This policy brief provides insights into the political economy underlying Vietnam's energy transition and coal phase down. It seeks to identify key barriers and drivers for the green transition of coal-fired power plants and a faster expansion of green electricity in Vietnam. This policy brief is intended to inform a wide array of stakeholders in Vietnam, China and beyond about the persisting obstacles of coal phase down in Vietnam. Recommendations are provided that highlight how obstacles can be overcome and how the transition to clean power in Vietnam can be accelerated.

The brief is written against the backdrop of a global coal fleet that is still growing despite the worsening economics of coal: newly installed renewable power has lower costs than the cheapest coal-fired option (IRENA, 2022b). In 2021, five Asian countries (China, India, Vietnam, Indonesia and Japan) were responsible for 80% of the world's planned new coal plants with a combined capacity of over 300 GW and 75% of the existing global coal capacity (Ray et al., 2021). Although the economics do not stack up and most of these planned new coal projects are projected to be financially unviable, many of the new coal projects are still implemented for non-financial reasons driven by political economy factors and due to challenges in mobilizing the higher initial capital expenditures for renewable energies. It is thus vital to analyse and understand the context and factors impeding coal phase down in economies whose energy systems still rely to a large degree on coal.

This brief calls for greater attention to political economy in tackling climate change. Political economy analysis is critical for climate and energy policy, as these require systemic transformations involving an array of different actors, uncertainty, and complexity. Political economy factors shape domestic climate governance, and a careful political economy analysis can reveal a nuanced picture of why obstacles persist (Worker & Palmer, 2020).

This policy brief draws on relevant literature, government and publicly available data, and interviews to support the analysis and arguments. The authors interviewed five Vietnamese experts from academia, think tanks, international organisation, and private sector firms in the period of April to June 2023. The political economy analysis is conducted using the *actors, objectives, and contexts (AOC)* methodology developed by Jakob et al. (2020). Applying the framework includes four basic steps: i) identifying the societal and political *actors* most relevant for the formulation, implementation and enforcement of energy and climate policies; ii) spelling out these actors' underlying *objectives*; iii) assessing the economic, institutional, discursive and environmental *context* which determines how certain objectives matter for certain societal actors; and iv) analysing the dynamic *interactions* among these factors leading to aggregate policy outcomes. The AOC framework has been further complemented by the practically oriented framework developed by Worker & Palmer (2020) to assess the political economy of climate change governance.

Abbreviations

ADB Asian Development Bank
AOC Actors, objectives, and contexts
ASEAN Association of Southeast Asian Nations
BOT Build-operate-transfer
CCUS Carbon capture, usage and storage
CO2 Carbon dioxide
COP262021 United Nations Climate Change Conference
CPV Communist Party of Vietnam
EE Energy efficiency
ETM Energy Transition Mechanism
ETS Emissions Trading Scheme
EVN Vietnam Electricity
FDI Foreign direct investment
FI Financial institution
FiTs Feed-in-tariffs
FX Foreign exchange
GFANZ Glasgow Financial Alliance for Net Zero
GHG Greenhouse gases
IPG International Partners Group
IPPs Independent power producers
JETP Just Energy Transition Partnership
LCOE Levelised cost of energy
LNG Liquefied natural gas
MoIT Vietnam's Ministry of Industry and Trade
NDC Nationally Determined Contribution
NGOs Non-Governmental Organizations
PDP Power Development Plan
PPA Power purchase agreement
PV Photovoltaics
RE Renewable energy
SOE State-owned enterprise
VWEM Vietnam Wholesale Electricity Market
WHO World Health Organization

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Executive Summary

Thanks to the rapid expansion of renewable power sources, Vietnam's installed power generation capacity has enjoyed vigorous growth after 2019. The addition of previously unused solar and wind power has diversified Vietnam's power mix that has been historically dominated by hydro and coal power. Since the Vietnamese economy and its power demand will further grow throughout the next decades, the country needs to further scale up power generation, transmission and storage capacity. One option would be to scale up coal-fired power generation but the continued operation and expansion of coal-fired power stations runs against the country's target to mitigate climate change and achieve carbon neutrality by 2050.

Vietnam's Power Development Plan VIII (PDP8) heralds a new era for the generation of electricity in one of the world's fastest-growing economies. To meet future growth in electricity demand while transitioning towards a carbon neutral economy, Vietnam endeavours to expand the capacity of renewable energy (RE) sources massively and develop other low carbon energy sources towards 2050. Despite growing concerns regarding the future economic viability of coal-fired power stations and their negative externalities, Vietnam still plans to construct a (downsized) pipeline of coal power stations until 2030. Subsequently, between 2030 and 2050 Vietnam aspires to gradually refurbish and phase out the entire fleet of coal-fired power stations, conditional on international support.

Political economy factors have shaped decision making in Vietnam's energy sector. These factors reveal a nuanced picture of the obstacles and drivers of early coal phase out. Our analysis illustrates how different political economy factors are influencing the energy transition in Vietnam away from fossil fuels.

The four main barriers to accelerated coal phase out and the energy transition in the context of Vietnam are:

- Fluctuating RE installations require a reconfiguration of Vietnam's grid infrastructure. Today's **insufficient power storage and transmission infrastructure** cannot handle large fluxes of intermittent RE and cannot solve regional imbalances in RE generated electricity. This constrains further expansion of RE and cements coal dependency. An increasing share of RE could destabilize power transmission and interrupt supply without an updated transmission system and smartly located storage capacity.
- Additional RE generation capacity in Vietnam is expected to be mainly financed by private capital. **Investing in RE** in Vietnam is currently however not attractive for private investors due to high investment risks resulting from a monopolized distribution market, low and regulated retail electricity prices, coal subsidies, regulatory ambiguity and immaturity, and the current lack of incentive mechanisms.
- **Expected financial losses** provoke resistance to coal phase down. Accelerated decomissioning of coal plants could entail high compensation costs for the Vietnamese state. Investors and operators of existing coal plants advocate against early coal phase out to safeguard cash flows.
- Vietnam's energy establishment clings to **vested interests** in the coal sector. Entanglements between regulating and regulated entities and deficient reporting duties by energy state owned enterprises (SOEs) pave the way for individual profits along the coal supply chain. In terms of mentality, the energy establishment continues to see coal power as a guarantee for a reliable electricity supply**. Reservations vis-à-vis RE** persist and the energy establishment is sceptical that international partners will live up to financial commitments.

The four main drivers for an accelerated transition to a net-zero energy system are:

- **Growing risk of coal financing in Vietnam might allow for more green energy financing to meet growing electricity needs:** These challenge the expansion of coal power in Vietnam and highlight the need to transition to other energy sources. An increasing number of financial institutions (FIs) are refusing to finance coal-fired power plants due to climate related risks attached to coal financing. Chinese FIs are constrained by China's moratorium on ceasing funding for the construction of new overseas coal power stations.
- **The phase-down of coal and the decarbonisation of the energy sector is key to achieve Vietnam's net-zero carbon commitment by 2050.** Vietnam is bound to international climate commitments such as the Paris Agreement and the Global Coal to Clean Power Transition Statement.
- **Vietnam aspires to establish a power system independent from global suppliers**. Vietnam is reliant on imports from other Asian countries for a significant portion of its demand of thermal power stations. RE sources allow Vietnam to be less susceptible to shifts in international commodity supplies and prices.
- **Greening the energy system can attract more international investors with global exports:** The accelerated pace and ambition of decarbonizing of the global economy and an increasing demand for low-carbon products incentivizes Vietnam to decarbonize its energy system and economy. Transitioning the economy to net-zero, establishing an effective domestic emissions trading system (ETS), strengthening competitiveness in net-zero aligned sectors such as RE equipment manufacturing or rare earths mining and processing, and building green industrial clusters provide **opportunities for higher foreign direct investment (FDI) in Vietnam and increased exports**, particularly when new carbon border adjustment mechanisms in the European Union and elsewhere will create tariffs for emission intensive products.

A detailed understanding of the political economy of Vietnam's energy transition is crucial to formulate an effective strategy to accelerate and implement the transition to clean energy. Based on our political economy analysis, we formulate a set of proposed actions for an accelerated clean energy transition in Vietnam:

1 Clarify legal and policy framework for the decommissioning of old coal plants

2 Reconsider the economic and technological rationale behind the construction of new coal power plants until 2030

3 Introduce regulations and policies to minimize investment risks for renewable energies and power transmission

4 Introduce region-specific electricity tariffs and a steady tariff increase to reach and maintain a level similar to the ASEAN average

5 Develop and implement holistic and coordinated energy sector reforms as well as effective oversight and monitoring

6 Advance net-zero solutions outside the power sector (e.g., transport)

7 Provide the committed international assistance to Vietnam's energy transition through funding, expertise, and partnerships

执行摘要 (Executive Summary Chinese)

由于可再生能源的迅速扩张，越南自 2019 年以来的安装发电容量得到了强劲增长。之前未加充分使用的太阳能和风能的增加，使得历史上主要由水电和煤电主导的越南电力结构变得更加多样化。由于越南经济和电力需求在未来几十年将进一步增长，该国需要进一步扩大发电、输电和储能能力。其中一个选项是继续扩大燃煤发电，但燃煤电站的持续运营和扩展与该国在 2050 年前减缓气候变化、实现碳中和目标之间存在冲突。

越南的第八个电力发展计划（PDP8）为全球增长最快的经济体之一的电力生产开启了新时代。为了满足未来电力需求的增长，并向碳中和经济过渡，越南努力大规模扩展可再生能源（RE）产能，并朝着低碳化的 2050 年迈进。尽管对燃煤电站未来经济可行性及其负面外部性的担忧日益增加，越南仍计划在 2030 年前建设一系列（规模较小的）煤电站。随后，在 2030 年到 2050 年之间，越南计划逐步替代和淘汰全部煤电机组，前提是得到国际支持。

政治经济因素塑造了越南能源部门的决策。这些因素揭示了越南早期退出燃煤的障碍和推动因素的微妙权衡。本政策简报的分析阐述了不同的政治经济因素如何影响了越南能源转型，推动其远离化石燃料。

在越南的背景下，导致过早退出煤炭和能源转型面临的四个主要障碍是：

- 波动的可再生能源装机需要升级越南的电网基础设施。当下，储能系统和输配电设施的发展较为有限，无法处理可再生能源发电的大幅波动，也无法解决可再生能源发电的区域不平衡问题。这限制了可再生能源发电的进一步扩张，并巩固了对煤电的依赖。如果没有充足的储能容量以及能够容纳更多可再生能源发电的输电体系，可再生能源发电的继续增加可能会破坏越南输电系统的可靠性并导致供电中断。
- 越南新增可再生能源发电装机容量预计主要由私人资本投资。然而，由于国有企业垄断的市场、极低和受监管的零售电价、监管不确定性和不成熟性，以及缺乏足够的激励机制，目前在越南投资可再生能源对私人投资者来说并不具有吸引力。越南金融机构的有限气候融资能力增加了对外部资金的依赖。
- 预期的潜在财务损失引发了对煤电削减的抵抗。提前停用煤电厂可能会造成高额赔偿成本。现有煤电厂的投资者和运营商主张不提前淘汰煤炭，以维护现金流。
- 越南的能源机构，包括工业和贸易部（MoIT）以及越南电力公司（EVN），在煤炭领域存在既得利益。监管与受监管实体之间的交织，以及能源国有企业（SOEs）的不充分报告和披露，为私人利益和煤炭供应链上的政治权益寻租创造了有利条件。从心态角度来看，部分能源机构仍将煤电视为稳定电力供应的保障，对可再生能源持有保留态度。

在越南的背景下，加速过渡到净零能源系统的四个主要推动因素是：

- 在动员煤电厂投资资金方面存在困难，这对越南煤电扩张构成了挑战，强调了向其他能源来源转型的必要性。越来越多的国内外金融机构拒绝出资支持煤电厂，原因是对气候的认识不断提高，与煤炭融资相关的气候风险增加。中国停止对新建海外煤电站的资金支持进一步降低了资助煤炭扩张的机会。

- 越南受到国际气候承诺的约束，如《巴黎协定》和《全球煤炭向清洁能源过渡声明》。逐步减少煤炭使用和实现能源部门脱碳是实现越南 2050 年净零碳承诺的关键。越南还开始与邻国进行谈判，以加强区域清洁能源合作。
- 越南立志建立一个独立于全球供应商的电力系统。越南在热电站需求的相当一部分中依赖其他亚洲国家的进口。可再生能源使越南能够较少受国际大宗商品供应和价格波动的影响。
- 全球经济脱碳的加速步伐和对低碳产品的需求增加，激励越南进行能源体系和经济的脱碳。发展零碳经济，建立有效的国内排放交易体系（ETS），加强与净零碳一致领域（如可再生能源设备制造或稀土）的竞争力，以及建立绿色产业集群，将为越南吸引更多外国直接投资（FDI）和增加出口提供机会，尤其是当新的碳边境调整机制（CBAM）对排放密集产品征收关税时。

深入了解越南能源转型的政治经济状况对于制定有效的战略，加速并实施向清洁能源的过渡至关重要。基于政治经济分析，本政策简报制定了一系列旨在加速越南清洁能源转型的建议行动：

1. 明确淘汰煤电厂的法律和政策框架；
2. 重新考虑所有新建煤电厂在 2030 年之前的经济和技术基础；
3. 引入规定和政策，以最小化投资风险，吸引投资流向电网基础设施和可再生能源领域；
4. 引入地区特定电价，并稳步提高电价，使其达到并维持东盟平均电价水平；
5. 制定和实施整体的、相互协调的能源部门改革，以及有效的监督和监测机制；
6. 推动在能源部门之外实施净零解决方案（例如交通领域）；
7. 通过资金、专业知识和伙伴关系为越南的能源转型提供有效援助

1. Introduction

With the release of the Eighth National Power Development Plan (PDP8) in May 2023, Vietnam has initiated the phase-down of coal-fired power. After more than two years of uncertainty and political impasse, the PDP8 was approved on May 15, 2023 (see Box 1). International developments, such as negotiations around a new climate agreement between Vietnam and international partners, and the complexity of the required reforms caused significant delays in issuing the policy plan that sets out Vietnam's energy transition vision until 2030. Since 2020, dozens of PDP8 draft versions with notable differences across each revision were circulated for public comment. The slow process of formulating a coherent and sustainable plan for Vietnam's energy transition displays the complexity underlying the political economy of energy transitions. According to PDP8, Vietnam will not develop new coal-fired power plants after 2030. Coal-fired power plants of 20 years or older should switch to using biomass or ammonia and those older than 40 years that fail to switch should be shut down.

Vietnam traditionally relies on hydropower, coal and, on burning natural gas from offshore fields. By 2010, the demand for electricity was on the verge of surpassing the available supply, with no suitable locations remaining for the construction of large dams and sluggish development of offshore natural gas. In response, energy planners introduced Power Development Plan 7 (PDP7) in 2011, seeking to address the increasing electricity demand primarily through investments in coal-fired power plants. In line with PDP7, Vietnam constructed the majority of its coal plants in the 2010s. Coal-fired power generation has played an important role in the process of industrialization in Vietnam.

Vietnam's energy needs are projected to further increase due to expected population growth and growth of energy intense manufacturing sectors, urbanisation and industrialisation. Prior to the Covid-19 pandemic, Vietnam's gross domestic product grew at an average annual rate of more than 6% for a quarter-century. Economic growth was mainly driven by an energy intensive manufacturing sector. Vietnam faces a rapidly growing demand for energy as its economy continues to grow. The Government of Vietnam expects power consumption to grow 10-12% annually through 2030, one of the fastest power consumption growth rates in Asia.

While Vietnam must find ways to increase energy supply, it must also tackle issues of climate change. Vietnam with its long and densely populated coastline is vulnerable to the impacts of climate change with potential devastating effects on the country's economy and society. Ho Chi Minh City, Vietnam's business and financial hub is among the most vulnerable cities to rising sea levels globally. Vietnam's Mekong delta, which accounts for 50% of the country's rice production and 90% of rice exports, is threatened by floods and droughts (Nguyen, 2023). Saline water intrusion is caused by sea level rise and land subsidence caused by human interference in the wider basin (e.g. dam building) and the delta itself (e.g. groundwater extraction).

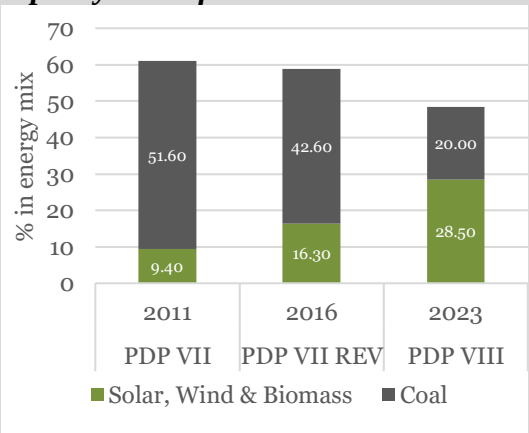
The decarbonisation of the power system, more specifically the phase down of coal-fired power generation, has major priority in Vietnam's mitigation efforts. CO2 emissions in the power system accounted for around 45% of Vietnam's total national CO2 emissions (Ritchie et al., 2020). To achieve the 1.5°C target set in the Paris agreement would imply no additional coal development and even reducing the lifespans of operating plants to 20 years (Bauer et al., 2021). Vietnam updated its Nationally Determined Contribution (NDC) in 2020

and again in 2022, with the latter (theoretically) fully consistent with Vietnam's climate commitments made at COP26, which includes net-zero by 2050.

Box 1: Vietnam's National Power Development Plan VIII (PDP8)

Power Development Plans (PDPs) are Vietnam's primary energy planning instrument. The Vietnamese government releases the long-stalled plans once a decade and provides high-level political guidelines for the power sector for a period of ten years and a vision for a period of 30 years. PDPs map out the overall development of the power sector including the most suitable energy sources and the required electricity transmission grid structure to meet future demand at reasonable prices. The plans provide comfort to power market participants and give details on the pipeline of individual power plants; they do however not present specific policies used to implement the energy direction set out in the plans.

Figure 1: 2030 targets of installed capacity share for coal and renewables



Source: Government of Vietnam. Note: PDP VII REV stands for the revised Power Development Plan 7 published in 2016.

The PDP8 covers the period of 2021-2030 with a vision to 2050. It was the first power plan that had to integrate Vietnam's commitment to achieve net-zero emissions by 2050. The PDP8 was originally to be issued in early 2021 but has undergone roughly ten rounds of revision since the first draft in mid-2020, with notable differences across each revision. The revisions caused a two-year delay in the final issuance of the PDP8. This does however not indicate a backtracking on Vietnam's goal of net-zero. It is rather a symbol for the country's determination to orchestrate a feasible and just energy transition while retaining energy security in the context of sustained growth in energy demand over the next decades.

PDP8 aims towards a share of RE (solar, wind, biomass) of 28.5% in 2030 (Figure 1). This is a steep increase compared to the RE targets for 2030 set in PDP7 in 2011 (9.4%) and the revised PDP7 in 2016 (16.3%). Respectively, the target for coal-generated power has diminished significantly from above 51% to 20%.

Vietnam's debate vis-à-vis the role of coal-fired power generation has undergone major shifts in recent years. At COP26 in 2021, Vietnam pledged to achieve carbon neutrality by 2050. As a first target towards carbon neutrality, power sector emissions should peak in 2030. Global events such as the Covid-19 pandemic and the war in Ukraine and related turbulences in supply chains, energy markets and fuel prices have changed Vietnam's discourse about the importance of energy independence and about the future configuration of its energy system. Moreover, in December 2022, Vietnam agreed on a Just Energy Transition Partnership (JETP) with an International Partners Group, which has committed to mobilize an initial $15.5 billion of public and private finance over the next three to five years to support Vietnam's energy transition (see Box 2). These developments have paved the way for a gradual coal power phase-out in Vietnam.

Box 2: The Just Energy Transition Partnership (JETP) with Vietnam

On 14 December 2022, Vietnam and an International Partners Group (IPG)[1] jointly declared a Just Energy Transition Partnership (JETP) for Vietnam. The partnership envisages mobilising an initial amount of at least $15.5 billion for climate investments for the next three to five years to help Vietnam reduce coal power generation and accelerate the energy transition. IPG members will mobilise $7.75 billion of public sector finance, grants and preferential loans from governments, state-owned banks, and multilateral development banks. This public sector funding is expected to mobilize an additional $7.75 billion in private sector investment and financing with the support of the private financial institutions consortium Glasgow Financial Alliance for Net Zero (GFANZ).

Vietnam will publish a JETP Resource Mobilisation Plan by November 2023 to facilitate private finance mobilisation through an improved pipeline of RE, EE and power grid investment opportunities and improved regulatory frameworks. Technical details of the JETP such as interest rates of loans or conditions on fund commitments are still to be negotiated.

The JETP support is focusing on three main guiding targets:

Areas	***JETP targets***	***PDP8 target***
GHG emissions reductions	**1.** Peak power sector GHG emissions at 170 MtCO2e in 2030 instead of 240 MtCO2e in 2035	Power sector GHG emissions should stay below 204-250 MtCO2e by 2030 with the target to reach peak emissions of no more than 170 MtCO2e by 2030 if JETP commitments are made.
Coal phase out	**2.** Limit installed coal power capacity by 2030 to 30.2 GW from a projected 37 GW	The total capacity of coal-fired power plants in 2030 will be about 30.2 GW.
RE expansion	**3.** Increase the share of renewable sources including wind, solar and hydroelectricity power to at least 47% of the country's electricity generation in 2030	The share of RE in electricity generation should be scaled up to 30.9-39.2% by 2030, toward the target of 47% if JETP commitments are made.

Vietnam's NDC commitments at the highest emissions reduction level are conditional on international support. The Prime Minister announced the commitments at COP26 with conditions of international financial and technical support. The JETP Political Declaration is similarly conditional which is reflected in PDP8. The PDP8 states that the full materialisation of JETP commitments would allow Vietnam to move towards JETP targets.

In terms of coal phase out, the PDP8 seems to be aligned with JETP *prima facie*; however, the PDP8 pipeline of new coal-fired power plants would add 13 GW to the existing 25 GW coal power capacity until 2030, largely exceeding the JETP target of 30.2 GW. If the 11

[1] The International Partners Group comprises the European Union (EU) and Great Britain, who are coordinating the JETP with Vietnam, as well as Canada, Denmark, France, Germany, Japan, Italy, Norway and the United States.

coal units in the PDP8 pipeline are constructed, around 8 GW of currently operational coal power plants would need to be converted or phased out by 2030 to stay aligned with the JETP. It is worth to mention that the JETP is not a binding international agreement.

A consensus exists regarding the necessity to phase down coal power and scale up RE among Vietnamese stakeholders. Different stakeholders acknowledge that coal power is one of the major sources of carbon emissions in Vietnam, whose lock-in effect is the highest of all sectors. Despite this view, considerable technological, financial and institutional constraints impede the rapid transition to clean power. Coal phase down must therefore be put in the context of Vietnam, an emerging market economy with future high to moderate economic growth rates.

Vietnam plans to rely further on coal-fired power generation to cover the required baseload in the next decades until 2050 but is committed to promote continuously a reasonable increase in renewables. While other countries in the region, such as Indonesia or the Philippines, discuss the possibility of early retirements of operational coal power plants (considering their excessive coal capacity), Vietnam's discussions on coal power phase-out have been mainly circled around downsizing and repurposing the pipeline of new coal plants. An immediate decommissioning of inefficient coal power plants has not been announced yet. Financing the phase-down of coal power plants will require cheap loans if not substantial grants to deal with the costs, but no IPG member has given any indication of funds for repurposing or transitioning any coal power plant.

Vietnam plans to build new coal plants this decade, but concluding financing arrangements seems challenging. Many international development banks exited financing coal plants, and by 2020, only a few South Korean, Japanese and Chinese lenders would consider backing new ventures in Vietnam. Difficulties in arranging finance resulted in most projects falling behind schedule and others being cancelled.

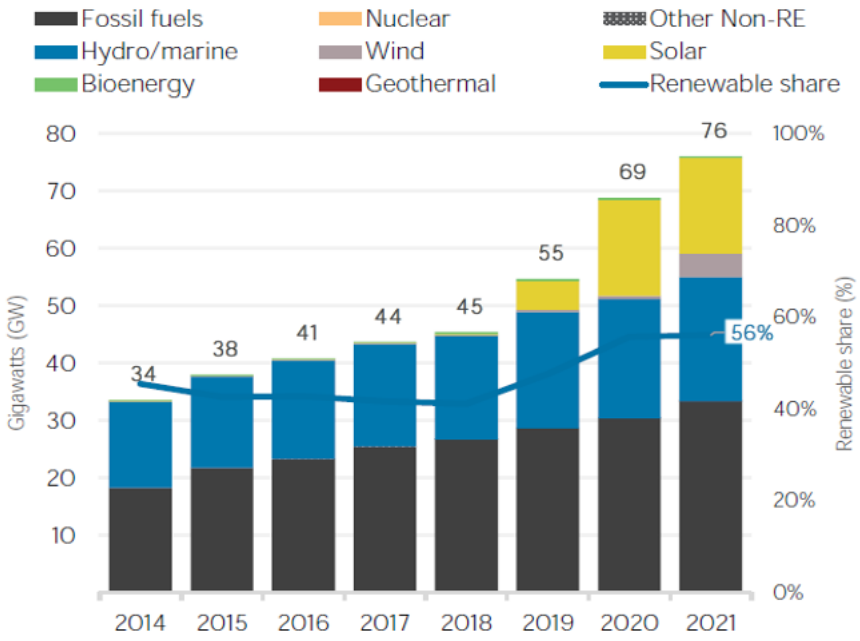
The phase down of coal-fired power stations in Asia has received increasing attention over the last years. Important international coal phase down initiatives were established in recent years. It is worth to mention the Energy Transition Mechanism (ETM) developed by the Asian Development Bank (ADB). The ETM is a scalable, collaborative initiative that brings together public and private investments to finance country-specific ETM funds to retire coal power assets on an earlier schedule than if they remained with their current owners. Despite ADB's efforts, the government of Vietnam has not yet agreed to establish an ETM fund in Vietnam. An ETM fund could play a leading role in Vietnam's coal phase down in the future.

Furthermore, multiple insightful studies were conducted to facilitate global coal phase down. Nedopil et al. (2022), for instance review, global, regional and national initiatives for facilitating the early retirement of coal-fired power plants and draws lessons for financing a just transition and ensuring energy security. Our policy brief should complement the existing literature with a focus on the political economy aspects regarding the acceleration of coal phase-down and renewables deployment in Vietnam. Our brief draws on valuable insights provided by peer-reviewed studies on the phasing out of coal power in Vietnam by Dorband et al. (2020) and Do & Burke (2023).

2. Vietnam's Energy Sector

Power Mix

Figure 2: Installed capacity for power generation in Vietnam by source



Source: IRENA Vietnam Energy Profile.
Note: The renewable share includes hydro, wind, solar and bioenergy.

Over the past decade, Vietnam has achieved a significant increase in energy supply and power generation capacity to meet the country's increasing power demand. The total capacity of installed and operational electricity generation in Vietnam has nearly quadrupled from 20 GW in 2010 to 76 GW in 2021 (Electricity and Renewable Energy Authority in Viet Nam (EREA) & Danish Energy Agency (DEA), 2022). In spite of the expansion, Vietnam's per capita total energy supply in 2019 (979 kgOE) remained lower than the average of ASEAN nations (1,053 kgOE) (Institute of Energy, 2021). To narrow this gap and to meet rapidly growing energy demand, projections anticipate that Vietnam's net power capacity will exceed 100 GW in the 2030s (Fitch Solutions, 2023). Scaling up power capacity provides Vietnam with the opportunity to realize its decarbonisation goals by transforming the country's energy mix.

Vietnam's installed capacity for power generation has historically been dominated by fossil fuels (i.e. coal and natural gas) and hydroelectric power, as seen in Figure 2. For many years, the growth of the power industry relied mostly on additional coal and hydroelectric power. However, since 2018, there has been a lack of noteworthy progress in enhancing hydroelectric power capacity, while coal capacity has continued to expand. In terms of actual power generation, coal surpassed hydropower as the primary source for electricity generation in 2018 and is now the most prominent energy source. The reliance on coal grew from a share in the total energy generation mix of 17% in 2010 to 46% in 2020 (BP p.l.c., 2022).

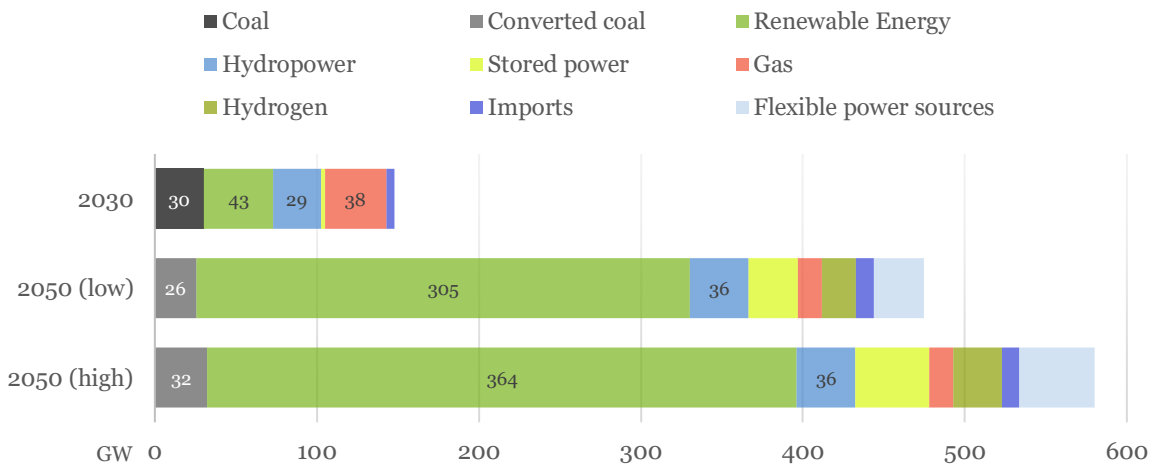
The installation of approximately 16 GW of new solar power, of which 8 GW in utility scale solar and 8 GW in rooftop solar, plus 4 GW of new wind power has led to a

considerable increase in Vietnam's electricity generation capacity since 2019. These variable RE sources accounted for 29% of the total installed capacity and 40% of the peak load in 2021. This is a remarkable increase in RE capacity from a negligible figure three years earlier. For the first time in 2019, the share of hydropower, wind, and solar in total installed capacity exceeded 50%. Despite the recent growth of renewable sources in installed capacity, Vietnam is still predominantly relying on fossil fuels for power generation to date.

Vietnam plans to expand the use of coal for electricity production to reach a peak of 30 GW in 2030, followed by a gradual refurbishment of coal-fired power stations and increasing reliance on renewable power sources (Figure 3). The PDP8 lays out the pathway towards the refurbishment and continued operation of the entire thermal power fleet through co-firing with biomass, green H2 and green NH3, plus carbon capture, usage and storage (CCUS) applications. The PDP8 prescribes power plant operators to convert coal plants to alternative fuels when they reach a lifetime of 20 years once alternative fuels become cost-effective and feasible. If the fuel conversion of operational power stations is not undertaken or technically not feasible, coal-fired power plants should cease operations after the completion of an economic lifetime of 40 years. By 2050, unabated coal-fired power stations will be eliminated from Vietnam's energy mix, but there are expectations of continued coal consumption combined with CCUS.

Wind, solar and biomass will be significantly scaled up, accounting for around 63% of total capacity in 2050 – if technology capabilities and costs allow. To achieve the clean energy capacity target, Vietnam will need installed capacity of more than 60 GW of onshore wind, 70 GW of offshore wind and 168 GW of solar power by 2050 (Decision: Approving the National Electricity Development Plan for the Period of 2021-2030, with a Vision to 2050, 2023). Gas is poised to become one of Vietnam's primary power sources by 2030. However, while considered important as an energy source during the transition, no new gas plants can be built after 2035 and gas will serve mainly as a backup energy source with a low significance in the overall energy mix in the long term. Although subject to volatility, the remaining potential of around 7 GW of hydropower is planned to be exploited by 2050.

Figure 3: Projected installed capacity for electricity generation in Vietnam by source in GW, PDP8



Source: Vietnam's National Power Development Plan 8 (PDP8). Note: Renewable Energy includes wind, solar and biomass. The PDP8 provides a range of projected power capacity

by source in 2050; *2050 (low)* refers to the lower limit, *2050 (high)* refers to the upper limit of that range.

Vietnam's coal power plants

Vietnam is one of the world's top 10 coal producers and one of the world's top 20 coal consumers (BP, 2022). Coal is Vietnam's largest indigenous energy resource, with proven reserves estimated to be of the order of more than 3.5 billion tons (U.S. Energy Information Administration (EIA), 2023). In 2022, Vietnam had the second largest installed coal power capacity in ASEAN, behind only Indonesia (Global Energy Monitor, 2023b). Despite large coal reserves, domestic coal extraction could not keep pace with the demand of the rapidly expanding coal plant fleet, and Vietnam has turned into a net importer of coal since 2015 (BP p.l.c., 2022). Expanding the extraction of Vietnam's abundant coal reserves is difficult since many coal deposits are located in densely populated areas.

Vietnam has a fleet of over 70 operational coal-fired units across 25 power stations with a capacity of around 25 GW (Figure 4) (Electricity Vietnam (EVN), 2019; Global Energy Monitor, 2023b). About two-thirds of the operating and planned coal power units are state-owned, of which 62% are operated by Electricity of Vietnam (EVN) (Global Energy Monitor, 2023a). The private owners of the remaining coal power plants are Vietnamese, Taiwanese, Chinese, Malaysian, South Korean, and Japanese investment holding conglomerates and heavy industry and energy corporations. Many coal plants are jointly owned by up to four different private companies. Vietnam's coal fleet is young; three in four plants were commissioned in the past nine years. Privately owned coal units are on average significantly younger than state-owned units are. For full amortization of a coal plant investment, the plants would need to run around 25-40 years. The average remaining plant lifetime is 32 years. Vietnam's coal power plants re predominantly "not the best in class": three in five are classified as subcritical or less efficient (Global Energy Monitor, 2023b), with negative impacts on air pollution and conversion efficiency. The coal power stations are located geographically dispersed with a concentration in the coastal areas in the northern part of the country.

An ambitious expansion of coal-fired power was the centrepiece of Vietnam's previous long-range power development plans (PDPs). In line with the plans, domestic power generation from coal increased twofold between 2015 and 2022 (Global Energy Monitor, 2023b; Institute of Energy, 2021). In 2021, Vietnam had 24 GW of new coal-fired power plants under construction or in planning (Ray et al., 2021). Today, 11 new coal-fired thermal power plants are in the pipeline: Six projects with a combined capacity reaching 6 GW are under construction and five projects with a combined capacity of 7 GW are in the investment preparation but face difficulties in both capital arrangement and implementation (Vietnam Investment Review, 2022).

Despite the recent boom in coal capacity, Vietnam aspires to depart from its coal centred power development strategy. This aspiration has been manifested in Vietnam signing the Global Coal to Clean Power Transition Statement at COP 26 in 2021, and hence committing to cease issuance of new permits and construction of new unabated coal-fired power generation projects. In its national PDP8, Vietnam consequently announced in 2023 that half of the previously foreseen power units that were in the pipeline would be completely written off. The PDP8 further stipulates that only the 12 coal-fired thermal projects currently under construction and already included in the revised PDP7 will be connected to the grid and one of them will be fully converted to LNG. Projects that could not yet secure funding are

subject to a one-year long deadline to finalize capital arrangements. If the deadline cannot be met, the projects must be terminated. Vietnam does not intend to develop new coal-fired power projects. As mentioned, PDP8 puts a stop to new coal-fired power plants after 2030.

Figure 4: Location of coal-fired power plants in Vietnam

Source: Global Energy Monitor (2023). Note: Coal power units in Vietnam as of April 2023. This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of any international frontiers and boundaries, or to the name of any city, area, or territory.

Chinese banks and companies are involved in the financing, operation and/or construction of nearly 20 coal-fired power units in Vietnam (Zhou et al., 2022). China is a major financier for coal power in Vietnam. Vietnam has received 44% of its financing for new coal power stations from Chinese banks (Fitch Solutions, 2023). The other coal funding has come mainly from South Korean, Japanese or local Vietnamese banks. Despite China's considerable engagement in Vietnam's coal industry, the pipeline of Chinese overseas coal projects is declining following China's announcements to stop funding coal projects abroad (Senlen et al., 2022). The last China-backed coal plant came online in 2021 (Duyen Hai-2) (Suarez & Wang, 2022). In international comparison, Vietnam removed the highest number of coal projects backed by China. Six GW across six Chinese backed coal projects with estimated lifetime carbon dioxide emissions of nearly 600 MtCO2 were cancelled in recent years. At least three of Vietnam's five new power plants that are currently still subject to

financing negotiations are backed by China (Suarez & Wang, 2022). Chinese institutions can hence exert direct influence on the number of newly constructed coal plants in Vietnam.

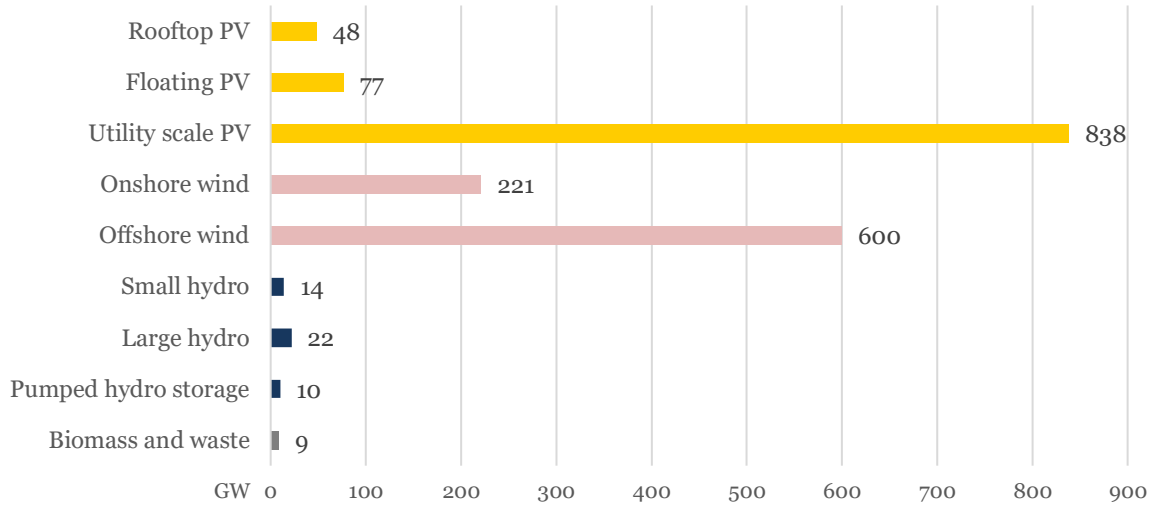
Renewables development

While Vietnam has experienced a substantial increase in solar power plants connected to the grid in recent years, the country still houses a vast potential for deployment of RE technologies at declining costs, especially solar photovoltaic and wind power. High solar irradiation levels for solar power development and high wind speeds at offshore and near-shore coastal regions provide tailwinds for growth. The government has set a target to increase the share of RE (solar and wind) in the country's electricity mix from below 5% in 2020 to 28.5% by 2030 and up to 65% by 2045. Nevertheless, after the spikes in new RE capacity in 2020 and 2021, the expiration of attractive investment incentive mechanisms has led to a halt in the construction of new RE stations since late 2021.

Vietnam is close to fully utilizing its potential for large-scale and medium-scale hydropower but there is still untapped potential for small-scale hydro (Figure 5). Currently, hydropower still plays a bigger role in the energy mix than solar or wind, accounting for 50% of the country's total installed capacity (IRENA, 2022a). There are over 400 hydropower plants in operation in Vietnam, ranging from large-scale hydroelectric dams to small-scale run-of-river projects. Many hydropower plants were constructed by Chinese developers and with Chinese equipment. The share of hydropower in Vietnam's energy mix is gradually being eroded by the rapid increase of thermal and renewable power sources. The Vietnamese government attempts to reduce dependence on hydropower due to its volatile nature during arid summer months.

Vietnam has recently experienced a significant increase in the deployment of solar energy, with the total installed capacity reaching over 16.5 GW by the end of 2021. Vietnam's Ministry of Industry and Trade (MoIT) estimates that solar power technical potential in Vietnam is well above 900 GW (Electricity and Renewable Energy Authority in Viet Nam (EREA) & Danish Energy Agency (DEA), 2022), as shown in Figure 5, which is more than 50 times Vietnam's current total installed capacity. In 2021, Vietnam recorded the ninth highest national installed photovoltaic capacity in the world (IRENA, 2022b). Due to challenges of grid overload and integration, Vietnam does not plan additional large-scale utility scale solar farms up to 2030. However, there is untapped potential for rooftop solar photovoltaics (PV) stations that can be integrated into the network more easily. Consequently, the government has set a target of 50% coverage of residential and office buildings by 2030 in the PDP8. Solar power is expected to be the cheapest resource in Vietnam's future energy system.

Figure 5: Theoretical total renewable energy potential in Vietnam by source in Gigawatt (GW)



Source: Vietnam Energy Outlook Report 2021 and PDP8.

After solar energy, onshore and offshore wind power are expected to play the largest role among RE technologies (Figure 5). The long coastline of 3,260 km and mountainous regions provide Vietnam with a large potential for wind power. Wind will be the growth and priority area for clean energy in Vietnam in the coming years. Offshore wind is particularly interesting as it is more reliable than other forms of RE. In recent years, the deployment of wind energy in Vietnam has been increasing rapidly, with the country's total installed wind capacity reaching over 800 MW by the end of 2021. This is a significant increase from just 140 MW in 2015. While near shore winds power stations have been built over the last years, Vietnam has not yet developed any offshore wind parks.

Financing sources for clean energy projects in Vietnam are diverse. RE financing has been mainly provided by the private sector. Local banks, particularly the big state owned banks, and banks from other Asian countries (such as Thai or Chinese banks) have provided finance to RE projects. China's outbound investment in RE projects rose, but compared with the investment in fossil energy and electricity, there is still much room for the development and growth of China's outbound investment in RE (Greenovation Hub (G:HUB) & Tsinghua University PBC School of Finance, 2020).

3 Political Economy Analysis

3.1 Vietnam's energy system: Stakeholders and decision-making

The transition to net-zero energy systems requires broad support from multiple stakeholders. Based on our analysis, we highlight first main stakeholders that are subject to coal reliance due to their operations, revenues or engagements, and second main stakeholders that have actively contributed to an acceleration of Vietnam's energy transition. This simplified stakeholder mapping[2] is helpful to understand the decision making process in the

[2] There are other relevant stakeholders not listed individually in this brief, such as the Ministry of Finance (MoF) who has a say in all matters related to the state budget or state guarantees, or the Ministry of Transport (MoT) and Ministry of Commerce (MoC) who

energy system and factors underlying Vietnam's political economy around coal, and to address the barriers to Vietnam's coal phase-down more purposefully.

Coal reliant stakeholders

Vietnam's state-controlled energy sector has been heavily influenced by the country's so-called energy establishment. This energy establishment encompasses four dominant players: The MoIT and the three state-owned energy companies Vietnam Electricity (EVN), PetroVietnam and Vinacomin (see Table 1). The energy establishment is reliant on coal in terms of revenues, power, and jobs.

Table 1: Vietnam's energy establishment

Actor	Role & Responsibilities
Ministry of Industry and Trade (MoIT)	MoIT is responsible to monitor the progress of power supply and consumption, power generation and grid projects to determine or adjust the project progress according to the actual needs of economic and social development. MoIT has the mandate to remove obstacles in the energy investment process, organize international bidding to select investors of power projects and promote projects to operate efficiently according to approved schedules. MoIT guides the formulation, evaluation and approval of new power plants. The inhouse think tank Institute of Energy bears the responsibility to draft Vietnam's power development plans and power and energy policies. MoIT also houses the Electricity Regulatory Authority of Vietnam, which regulates the power market, monitors implementation of power projects and determines the national electricity tariff. MoIT plays an important role in the energy sector on the consumption side since it regulates industry.
Vietnam Electricity EVN	Vietnam's three mainly state-owned energy enterprises directly operate and manage the supply side of the energy sector, including fuel extraction and procurement, generation, transmission and distribution and retail of electricity. They are overseen by the commission for the management of state capital (CMSC). Under current electricity regulations in Vietnam, EVN has a statutory monopoly over the transmission, distribution, wholesale and retail of electricity and is also the sole offtaker in the market. EVN is expected to still play a key role in Vietnam's power market after the forthcoming liberalisation of Vietnam's wholesale and retail electricity markets, e.g. in implementing new forms of direct power purchase agreements (PPA) for RE generators. EVN's Genco 1-3 subsidiaries are the country's largest power producers (although with a shrinking share) with a total operating capacity of around 30 GW as of end-2020 and own more than 13,000 MW of coal-fired power sources (EVN, 2022). EVN's is entrusted with the mission of ensuring a sufficient power supply for national socioeconomic growth and to meet customer demand.
PetroVietnam and Vinacomi	PetroVietnam is responsible for exploring and developing oil and gas reserves in Vietnam. The company also operates refineries and petrochemical plants to process crude oil into various petroleum products. PetroVietnam oversees the production, distribution, and utilization of natural gas resources in Vietnam,

are both important as regulators of the transport and commercial activities respectively, hence affecting the energy demand side. Important stakeholders are also financiers from other Asian countries, such as China, Malaysia, or Korea.

Actor	Role & Responsibilities
	which includes the management of gas pipelines and liquefied natural gas (LNG) terminals. Vinacomin is responsible for coal mining and production in Vietnam. It operates coalmines; both open-pit and underground, to extract coal for various purposes, including electricity generation, industrial use, and export. Vinacomin also engages in the exploration and extraction of various minerals, such rare earths. Vinacomin sells coal to SoEs at prices below world market prices. To make sufficient money to operate, Vinacomin occasionally seeks PM permission to export some coal for which it can charge world market prices. Both companies own and operate power generation facilities, including several coal-fired power plants. Vinacomin owns and runs some coal power plants that it supplies with coal itself.

Vietnam's energy establishment possesses extended coal know how, while general expertise about alternative clean energy sources is still limited. Due to their ultimate responsibility to guarantee reliant power supply at affordable prices, MoIT and the energy companies have positioned themselves more conservatively in the PDP8 drafting, showing hesitance regarding ambitious RE targets and arguing for a retardation of coal phase down in Vietnam. The experience of a destabilized national power grid in recent years has caused uncertainties in the ranks of MoIT and the energy companies that are now apprehensive of the possible implications of a larger share of fluctuating renewables in the country's energy mix. MoIT is also working with investors to find investment capital for the five coal plants in Vietnam's coal pipeline that have not secured funding yet.

The phase-down of coal and the general exit from fossil fuels would affect mining and extraction companies, predominantly the big SOEs PetroVietnam and Vinacomin but also smaller private ventures. So far, all state-owned energy companies struggle to capitalize on the huge growth potential of the electricity sector and in particular the RE potential due to financial constraints, missing expertise and a mentality favouring fossil fuel. Mining of rare minerals is currently gaining momentum and can help mining companies to transition to business areas with a growth perspective. The energy transition poses a threat to the existence of those mining and extraction companies that fail to explore new business opportunities that are aligned with a sustainable energy sector.

Stakeholders fostering the energy transition

While the resistance against accelerated coal phase down is concentrated in Vietnam's energy establishment, stakeholders advocating in favour of a rapid and ambitious energy transition are more diverse. The clean energy visionaries that play a leading role in Vietnam are summarized in Table 2.

Table 2: Clean energy visionaries advocating for the energy transition in Vietnam

Actor	Role & Responsibilities
Politburo of the Communist Party of Vietnam (CPV)	The Politburo of the CPV is the highest decision-making body and directs the general orientation of the government. It is a leading organ on Party affairs and engages in long-term strategic planning for the party and the country. It sets priorities, establishes development goals (including energy related goals), and guides the implementation of policies to achieve socio-economic progress, political stability, and national security. The General Secretary of the Central

Actor	Role & Responsibilities
	Committee of the CPV, the country's leader, is the first-ranked member of the Politburo.
Prime minister	The Prime Minister is the head of government of Vietnam and responsible for leading the government and overseeing its operations. They propose and advocate for policy initiatives and ensure their implementation across different government ministries and agencies. The Prime Minister is involved in economic planning, development, and management. The Prime Minister decides proposals on price setting for various energy fuels, including coal, and gives permission to SOEs to export fuels. They represent Vietnam on the international stage and engage in diplomatic activities.
Local environmental NGOs	Environmental Non-Governmental Organizations (NGOs) in Vietnam play a crucial role in advocating for environmental and climate conservation and sustainability. They engage in lobbying efforts and awareness-raising activities, particular on the local level, to mobilize public support and influence government decisions in favour of environmental and climate protection. Vietnam's environmental NGOs have heavily emphasized the topic of energy transition in the last years. The NGOs conduct research and analysis on various topics related to climate change.
International partners	The international partner group, development banks and donor agencies have traditionally played an important role in Vietnam in terms of financing and investment (particular in the energy sector), technology transfer and capacity building, and knowledge exchange and research cooperation, in recent years with a particular focus on climate change mitigation and adaptation efforts. Their primary objective is to achieve climate neutrality for Vietnam, while also unlocking major business opportunities for multinational companies from this energy transition, including for the banking consortium GFANZ and manufacturers and operators of offshore wind farms.

The Politburo of the Communist Party of Vietnam has positioned itself clearly in favour of the transition to clean energy when issuing Resolution No. 55 in 2020. Resolution No. 55 takes a stand for the prioritisation of fast and sustainable energy development in Vietnam. It also makes the case for improved conditions for the private sector in the energy sector by eliminating subsidies, monopolies, opaqueness and unfair competition in the energy sector.

The incumbent Prime Minister of Vietnam has undertaken several initiatives to promote RE. Most important is his announcement of Vietnam's zero carbon pledge during the COP26 conference. Recognizing the need for comprehensive reforms in the power sector, the Prime Minister has encouraged the government to adopt measures that facilitate an effective transition to a RE system. The Prime Minister has been a strong advocate for the inclusion of additional wind projects in the PDP8. In line with these efforts, the Prime Minister vowed to halt the development of new coal-powered plants and has approved the withdrawal of coal plant proposals submitted by provinces. The Prime Minister has overall demonstrated a firm commitment to environmental and climate protection.

Table 3: Positions of key stakeholders in Vietnam's green energy transition

Prolonging status quo		Stakeholder		Accelerating green transition
Has manifested coal power expansion until 2030 by defining coal project pipeline in PDP8	Highlights need for coal for reliable power supply, sceptical about int. fin. support for RE	**MoIT**	Introduced investment incentivizes for solar and wind power	Drafted PDP8 with increased RE ambitions conditional on international support
Has struggled to adjust grid infrastructure to accommodate more variable RE	Lacks financial means to enhance the grid and scale up RE and power storage	**EVN**	Views RE, e.g. offshore wind power, and CCUS as business opportunities	Cooperated with NGOs on green initiatives such as "one million green roofs" in Ho Chi Minh City
Fear that energy transition threatens business model	Want to sustain individual profits and secure jobs for employees	**PetroVietnam & Vinacomin**		
Expressed backing of coal power expansion in Resolution 55	Eschews regular electricity price increases and reduction of coal subsidies	**Politburo of the CPV**		Opened the door to RE in Vietnam with Resolution 55
	Has to work towards compromises between dif. factions	**Prime Minister**		Works towards achieving Vietnam's NDC and net-zero pledge
		Local environmental NGOs	Highlight the negative externalities caused by fossil fuel burning	Mobilize public support and influence gov. decisions in favour of RE
		International partners	Ceased funding for coal, want to unlock business opportunities for multinational companies	Have promised funding for transition and pushed Vietnam to increase RE targets

Note: MoIT - Ministry of Industry and Trade; EVN – Vietnam Electricity; CPV – Communist Party of Vietnam; NGO – Nongovernmental organization. Source: compiled by the authors.

Environmental NGOs and international partners have advocated for ambitious clean energy targets in the PDP8. They emphasize the high vulnerability of Vietnam's economy and society to climate change. Civil society organisations in Vietnam have long been carrying out awareness-raising activities in favour of the energy transition. They are however facing growing obstacles to conduct effective advocacy work (Wischermann, 2023). International partners, headed by the European Union and the United Kingdom, are committed to lowering global emissions and therefore support Vietnam's energy transition financially and with capacity building. In the PDP8, Vietnam acknowledges that if the JETP is implemented fully and substantially as agreed, RE can be the source of close to 50% of the country's total electricity generation by 2030 (Box 2).

Table 5 describes how the key stakeholders position themselves with respect to a change of Vietnam's energy system away from coal towards renewables. The table shows that many stakeholders are subject to conflicting interests and objectives.

3.2 Barriers to a phase-down of coal

Political and institutional

Vietnam's coal phase-down high-level statements seem disconnected from agency actions. The highest level of political decision makers and Vietnam's negotiators on the international stage are officially promoting coal phase down, but the energy establishment in ministerial departments and the state utility seems reluctant to advance significantly the coal phase down roadmap. The MoIT thinks that it is not realistic to reach sufficient levels of affordable alternative energy sources that could be absorbed by the grid until 2030 to shut down coal plants in the near future. In an environment of current and expected future power shortage, the energy establishment is rather focusing on exploring the potential of fuel conversion and in the long-term CCUS technologies. EVN has often held the view that change from the status quo may compromise the objective of stable energy supply and provoke power shortages. After experiencing grid instabilities under the recent renewable feed-in-tariffs (FiTs) regimes, some officials now appear to favour the status quo, with concerns about potential penalty in the case of power shortage due to grid overload or related problems (Do & Burke, 2023).

Regulated, extremely low electricity and coal prices represent a form of indirect and significant subsidy for fossil fuels and coal. The average electricity price has been flat and even on a downward trend in the past decades when correcting for inflation. The Party's efforts to keep tariffs low have resulted in substantial indirect subsidies for coal (Parry et al., 2021). The price of thermal coal paid by coal-consuming SOEs is subject to dialogues between different ministries, particularly MoIT and the Ministry of Finance (MoF), and state owned energy company Vinacomin and subject to approval by the Prime Minister. As a result, domestic coal prices for thermal power, steel and cement production are artificially low, around 30% lower than import prices. The majority of coal plants and especially the older ones owned by SoEs are supplied by domestic coal at prices lower than world market prices. This keeps the cost of power artificially cheap and represents an indirect subsidy. It is unclear whether and how the government will address these indirect fossil fuel subsidies and how the electricity tariffs are expected to evolve. There is also a limited political will to address external environmental costs associated with thermal power plants through fiscal instruments (Dusík & Kirsch-Wood, 2019).

Regulatory capture, such as bribes for licences, land clearance, and to ensure connection to the national power grid, affect Vietnam's energy mix. This might derail policy

implementation and divert resources to unwanted projects and developers. Based on 30 interviews with different stakeholders in Vietnam conducted in 2018, Dorband et al. (2020) find that due to close personal ties, the regulating and regulated entities share strong, also personal, interests. The corruption-prone process poses an additional hurdle for smaller, non-fossil IPPs, but gives an advantage to, particularly state-affiliated, investors in thermal coal. One of the main reasons why the regulation and reform of Vietnam's energy SOEs like EVN and Vinacomin are weak and prolonged is the presence of a "revolving door" phenomenon. This refers to the frequent exchange of senior personnel between the MoIT, its SOEs, and their subsidiaries along the electricity supply chain.

Opposition to reducing coal usage is also driven by vested interests connected to SOEs. One example of vested interests is featured by subsidiaries of the energy SOEs that transport imported coal from abroad. To secure the massive investments required to operate bulk carriers, the subsidiaries had to get into long term contracts with power plants. The early decommissioning of coal-fired power plants will affect the financial viability of such subsidiary companies. Furthermore, officials in the coal sector benefit from political favours and privileges, which hinders the phasing down of coal. "Invested groups" that revolve around fossil fuels have a vested interest in maintaining the current situation, and managers at EVN are resistant to relinquishing their power. Corruption is facilitated by a low quality of reporting and a lax enforcement of disclosure duties by the energy SOEs towards the government. The lack of transparencies along the coal supply chain gives rise to streams of (mostly individual) profits and political rents (Dorband et al., 2020).

Coal power continues to be seen as a guarantee for low electricity prices and reliable electricity supply. An export-oriented, energy intensive manufacturing sector has been the driving force behind Vietnam's rapid economic growth. Hence, low electricity prices have major government priority and are seen as an instrument to maintain economic growth and political stability, avoid social disquiet and retain power. The current policy-making paradigm views affordable electricity as a prerequisite for a competitive economy. Although energy tariffs affect FDI decisions, Vietnam's policy makers might overstate their importance. Many foreign enterprises are primarily attracted to invest in Vietnam by the relatively well-educated yet still low-cost workforce (German Chambers of Commerce Abroad (AHKs), 2022). Also, only a marginal part of FDI in Vietnam has been invested in highly energy intensive industries. Furthermore, power demand projections in PDPs have historically been consistently inflated compared to actual demand increases. The inflated power demand estimations induce decision makers to remain committed to coal generated power.

Policy makers in the MoIT and the Party see little political leeway to increase electricity prices from their current low (and often subsidized) levels. Society and businesses have grown accustomed to artificially low electricity prices and are resistant to reasonable tariff adjustments that could provide funds for enhanced grid infrastructure. Vietnam's energy establishment perceives coal as a reliable and cheap energy source and is concerned that deep changes in the system and the market that are required to adapt the power grid to RE variability cannot be addressed in the near future. The energy establishment is sceptical that IPG members and international financiers will live up to the JETP pledges. It is particularly these sceptics in different ministries, such as the Ministry of Security, Ministry of Finance, and in (parts of) MoIT, in the energy SOEs, as well as in the National Assembly who oppose the net-zero goal and the energy transition. Decision makers fear a rise in energy prices and power shortage if RE sources and private developers play a larger role. As long as sufficient and stable alternative energy sources are not available to meet demand, coal power plants in Vietnam will not be shut down.

Vietnam's energy establishment propagates the narrative of clean coal. Many Vietnamese energy experts say that the solution to electricity supply issues is so-called "clean coal". EVN thinks that coal-fired thermal power technology is progressively modern since coal-fired thermal power plants have invested in "eco-friendly" treatment technology and since environmental protection in the process of operating coal-fired thermal power plants is implemented increasingly effectively in Vietnam (Electricity Vietnam (EVN), 2019). In 2017, analysts from the International Energy Agency found Hanoi's energy establishment so committed to coal that the focus of the IEA report shifted away from clean energy and towards encouraging Vietnam's energy managers to invest in high-efficiency (supercritical) boilers and carbon sequestration to dissuade them from constructing cheaper, yet more environmentally harmful coal power plants (Brown, 2020). It must be noted that "clean coal" reduces air pollution and thus improves health outcomes, but it does not significantly lower carbon emissions compared to subcritical coal or those without environmental technologies.

Vietnam has experienced serious delays in the adoption of energy policies (e.g. in the finalisation of the PDP8) due to disagreements between different ministries. The MoIT had to adjust the draft for the PDP8 fundamentally after the Prime Minister announced Vietnam's carbon neutrality goal and Vietnam finalized the negotiations with international partners on the JETP. This gives the impression of internal disagreement and misalignment between different government agencies, causing significant delays in finalising important policy document such as the PDP8. Diverging positions and internal politics within government offices have resulted in misaligned policies that have failed to address the challenges in energy system regulation, design, and operation in a holistic manner.

Political resistance slows market reforms in the power sector and transforming SOEs into joint-stock companies. The government has signalled that it intends to retain 100% ownership in SOEs operating in priority sectors, including fossil fuel exploration and exploitation. The reluctance to liberalize the market is related to the concerns about potential threats to national security in the case of private (potentially foreign owned) energy companies playing a significant role in the power sector. This concern is a major reason why the grid infrastructure has long been monopolized by EVN. Since SOEs lack the financial capacity and ambition for significant investments in RE development, the continued dominance of coal reliant SOEs and a marginalized role of private companies might hold back RE development and preserve the dominant role of coal.

Currently applied calculation methods and underlying economic assumptions indicate that grid parity is not yet available in Vietnam for RE sources. According to the Energy Outlook Report 2021, evaluating the costs of generated electricity by levelized cost of energy (LCOE), coal- and gas-fired power plants were still on average cheapest in 2020. However, the underlying methods for calculating LCOE, which are considered as key indicators in Vietnam's energy bidding system, are flawed. Cost calculations are biased in favour of fossil fuels and neglect the risk of asset stranding, carbon costs and social costs. Operation and maintenance costs, such as coal imports at increasing international prices as well as repair services, are not considered. Adverse environmental and public health effects are also disregarded. The authorities do not test the bids' compliance with minimum environmental standards (Dorband et al., 2020). As a consequence, subcritical coal facilities, fuelled with lower-quality domestic coal, and often using cheaper, but less durable equipment, may appear to decision-makers to be the most cost-effective capacity additions. This is one reason why coal-fired power plants are preferred over technologies that face higher upfront but low operation costs, such as renewables (ibid.).

Only around the year 2030, the LCOE of the best sites for utility-scale PV and onshore wind can compete with the LCOE of coal and gas-fired technologies under current calculation methodologies (see above). The Energy Outlook Report 2021 concludes that in the long term towards 2050, electricity generation from all forms of solar PV, onshore wind power, and some offshore wind sites will become cheaper than thermal technologies. These predictions seem to have influenced energy planners in Vietnam who adapted a timeline for coal phase out that reflects the grid parity predictions for RE. According to alternative calculation methods, new renewables have started to outcompete existing coal units in Vietnam in 2022 (Ray et al., 2021). The consideration of externalities in cost calculations is gradually becoming more prominent, primarily due to evolving environmental tax regulations and the upcoming implementation of the domestic Emissions Trading Scheme (ETS) (starting in 2028). In any case, declining LCOE in wind and PV power generation present attractive alternatives to coal-based power generation in Vietnam.

Previous design of renewable power incentives has created positive and negative investment shocks. Despite the effectiveness of certain reforms to increase needed power capacity by attracting investment and developing RE in Vietnam, the reforms resulted in negative side effects. The reactions of markets to investment incentives surpassed energy planners' expectations. This provoked that ill-conceived and mismanaged renewables policy resulted in an uncontrolled boom in the installation of grid-tied solar and wind-generation capacity in only a few months (solar and wind capacity additions in 2019-2021 reached 20 GW, see Figure 2). The rapid capacity addition overloaded parts of Vietnam's electricity grid and caused curtailment of up to 80% of power output for some RE operators. Many developers missed the deadline to apply for FiTs and were unprepared for the lack in appraising a successive subsidy scheme, resulting in many RE power plants lying idle before managing to negotiate an acceptable deal with EVN. Former FiTs also did not reflect the location of planned power stations, which resulted in significant regional energy imbalances. These negative side effects have caused a reputational damage for RE and provoked a vacuum in RE incentives, which slowed down further RE development.

Economic and financial

International investors of existing coal plants, including those from China, are interested in securing returns on their investment and are generally not interested in accelerated phasing down of coal. There is great uncertainty around the handling of stranded assets and potential compensation payments in the case of accelerated decommissioning of coal-fired power plants in Vietnam. In this atmosphere, coal investors are advocating against early coal phase out to safeguard cash flows.

Stranded assets could pose a financial burden on the Vietnamese State. Several of the coal plants projects in the PDP8 pipeline are currently in the construction phase; however, they encounter challenges in securing financing and/or contracting for subsequent stages. The non-completion of these projects, resulting in stranded assets, could pose a financial burden on the State, particularly if guarantees were provided to financiers. Naturally, this scenario is highly undesirable, prompting the Vietnamese government to persist in extending project timelines until 2030, rather than accepting some projects as stranded assets at this stage.

The dominance of SOEs in power supply (from generation to retail) leads to low competition and low incentives for RE investments. Vietnam's state-owned energy utility company EVN holds a dominant position in the power market, overshadowing private power producers. The state maintains a monopoly in the construction and operation of large-scale power plants. Due to prevailing price signals, technologies, and regulations, major players in the energy sector lack the motivation to alter their established business models. The presence

of long-term fixed contracts for coal power plant output has hindered the ability of solar and wind power to compete directly. Renewable projects face high investment risks while certain larger thermal power projects are categorized as public-private partnership projects with additional build-operate-transfer (BOT) arrangements.

EVN must balance a cost mismatch between electricity retail tariffs and generation and transmission costs, which entails serious financing constraints. The government tightly controls Vietnam's electricity retail tariffs, and EVN cannot adjust prices independently. Concerns related to inflationary pressure and about socio-economic impacts hinder regular adjustments in electricity prices; this was particularly the case during the Covid-19 pandemic. Electricity retail tariffs in Vietnam are significantly lower than in neighbouring economies and can barely cover generation and particularly transmission costs. Consequently, over the past years, EVN's financial performance has deteriorated with repeated losses and a rising debt pile (Vu, 2021). EVN was established as a holding company with several strategic business units. The envisaged equitisation of Vietnam's SOEs is advancing slowly due to a lack of investor appetite to become shareholders. Given EVN's reliance on volatile hydropower sources, its high exposure to foreign-currency denominated debt and the fact that the Vietnamese government does not inject capital directly into EVN might provoke further deterioration of EVN's financial profile in coming years. As a result, EVN holds back on capital spending (e.g., to expand the distribution network) and uses cash to pay down debt. In the climate of low retail tariffs and high indebtedness, EVN has little incentive and means to mobilize capital for grid enhancement because new infrastructure might not yield much or any profit.

Most generation capacity additions are expected to come primarily from international independent power producers (IPPs). At present, infrastructure projects in Vietnam are largely driven by government funding or financial assistance from bilateral and multilateral agencies. However, the limited government budget and fiscal capacity to meet project financing requirements have posed risks to the realisation of the project pipeline. The government has acknowledged this and is aiming to increase funding from private investors. IPPs, however, face high investment risks and a market for energy service contracting that is not yet sufficiently developed. IPPs depend on EVN for PPAs, grid connection and payments for electricity sold. Standard PPAs are negotiated in a time-consuming case-by-case approach with one cost component reflecting the technology used and another specific to the plants involved.

For IPPs, BOT is the most reliable investment strategy due to the reluctance of the Ministry of Finance (MoF) to issue government guarantees for large RE projects (Dorband et al., 2020). Due to higher sovereign debt burdens, the Vietnamese government is not willing to provide further substantial guarantees. Accordingly, the lack of government guarantees for RE increases risk premiums for investors and often renders RE more expensive than coal in terms of capital costs. Solar PV and wind PPAs furthermore face bankability problems, as EVN does not offer take-or-pay provisions (Do & Burke, 2023).

In the monopolized distribution market, EVN prioritizes paying and avoiding curtailment for SOEs rather than IPPs, particularly as it remains highly indebted. International investors are furthermore constrained by the existing regulatory frameworks, a low capacity of power transmission grid, and exchange rate volatility. Financing the energy transition in Vietnam ultimately depends on investors' confidence that power prices will be high enough to assure a profit (Dorband et al., 2020).

Vietnam's financial system, an important supporting industry for the energy transition, remains immature and lending short-sighted. The financial system is characterized by

limited means to raise capital. Vietnam's financial infrastructure and the regulatory and supervisory framework are still weak and deficient, with a primary focus on short-term lending and backing by collateral rather than project finance (Dang & Taghizadeh-Hesary, 2019). The short-term nature of deposits in Vietnam limits sources for long-term funding which prevents commercial banks from financing the energy sector. Vietnam's local capital market remains relatively underdeveloped with a low level of liquidity in the stock market and cumbersome procedures for bond issuance. Vietnam's financial system also faces challenges in robust financial structuring as well as in the deployment of the necessary in-house technical expertise in credit appraisal for the RE sector. Ultimately, limited climate finance capacity and ambition of Vietnam's financial institution increase the reliance on external funding sources.

At the same time, foreign exchange (FX) rate fluctuations negatively affect the ability of Vietnamese financial institutions to provide long-term funding. While external funds might be available to support the green energy transition (e.g., through JETP), funding is typically provided in USD (or EUR). However, higher exchange rate volatility due to Western market central bank interest rate increases, as well as broader economic uncertainty, increases FX risks particularly for long-term loans. Accordingly, financial institutions can only provide shorter-term loans. Many domestic enterprises including SMEs fail to obtain financing for projects that have a payback period exceeding one to two years, e.g. energy efficiency projects. Domestic commercial banks provide limited loan maturity options, typically capped at a maximum of two years.

Social

The government and coal mining companies are concerned about layoffs of coal workers that might not be easily deployable in other industries. Vietnam has a large coal extraction sector with nearly two dozen operating mines and a significant coal power sector with around 25 operational coal power stations. Thousands of jobs in the mining sector, power generation sector, and in related services may be affected by a full coal phase-out in Vietnam (International Labour Organization, 2022). This effect might however not be immediate in the mining sector because domestic coal reserves could be utilized in alternative ways, hence substituting coal imports. Furthermore, the energy substitution can create new jobs including unskilled jobs in, for example collecting, transporting, and processing biomass, or skilled jobs in operating battery storage or RE plants etc. However, the location of new jobs and investments does not necessarily coincide with the location of existing jobs and energy production (Do & Burke, 2023).

Although Vietnam's civil society organisations participated in public consultations for the PDP8, they have faced growing intimidation by the authorities in recent years. Domestic NGOs involved in environmental protection, land rights, energy policy, and related areas are discouraged to continue their activities. Civil society leaders and a transparent and independent press are yet instrumental in building public support for radical change to Vietnam's economy. A weakened anti coal civil society and a lack of policy transparency might slow down the energy transition because citizens lack information on the long-term benefits of transitioning the energy system.

An increase in electricity tariffs faces opposition of the population because trust in the government and EVN is low due to operational inefficiencies and the lack of transparency on how revenues are spent (Dorband et al., 2020). A 3% increase of the electricity tariff in the first months of 2023 combined with frequent scheduled power cuts in Northern Vietnam sparked social discontent in Vietnam's population mirrored by local

newspaper headlines and social media posts sharply criticising the government's and EVN's power management. Power cuts are particular frequent in summer when hydropower and coal power that dominate power production in Northern Vietnam underperform. The population is concerned that phasing out coal power would make electricity supply less reliable and adds to pressure to increase retail electricity prices given the high capital investments required for the expansion of alternative energy sources. This creates an environment that induces hesitancy rather than bold steps to advance the energy transition.

Technological

An insufficient transmission infrastructure that cannot handle large fluxes of intermittent RE constrains the further expansion of RE in Vietnam. Planning and investments in the grid and transmission infrastructure has lagged the addition of power generation capacity. Consequently, the boom in the installation of grid-tied solar and wind-generation capacity has overloaded parts of Vietnam's electricity grid with unsafe capacity utilisation levels on power lines and substations in several provinces. A big share of RE could destabilize the transmission system and interrupt supply if the transmission system is not updated to absorb RE generated power. Therefore, many RE plants, particularly in the Southern regions, must temporarily cut significant shares of up to 60-80% of their power output. Insufficient grid capacity has been hampering efforts to integrate more renewables generation (mostly from utility scale solar PV) since 2020. The MoIT announced in 2022 that the addition of wind and solar power into the power dispatch must be restricted due to a lack of input facilities to the national grid (Fitch Solutions, 2023). In the next years up to 2030, EVN seeks to extend and enhance the transmission grid substantially. The currently insufficient grid capacity will result in a limited expansion of RE in this decade; but after 2030, an updated transmission network should revive RE development.

Regional imbalances in RE power generation and power consumption complicate the energy transition. Most RE facilities in Vietnam are concentrated in the South and the Centre of the country where the load is low. Due to the largely mountainous terrain in Vietnam's North, which constraints solar and onshore wind power installations, offshore wind power located in Northern parts of the country could contribute to supplying clean energy to the large power consumption hubs in the North. Only the upgrade of the transmission grid will allow transferring large amounts of RE power to Vietnam's populous and more industrialized North that constitutes a major load centre. However, the upgrade of the transmission grid faces several challenges. First, installing the required new power superhighways in the form of high-voltage direct current electric power transmission systems is costly and investment capital difficult to attract. A second aspect to consider is the substantial challenge associated with on-land high voltage transmission, particularly in terms of the extensive land requirements and the potential impact on affected areas. Nevertheless, delays in the extension of the transmission grid and offshore wind will threaten Vietnam's energy transition and might lead to a reprioritization of coal power plants because the planning of regionally balanced supply between North, South and Central Vietnam is easier if serviced by a few large power stations rather than multiple fluctuating RE installations (Dorband et al., 2020).

Vietnam has limited expertise to manage and extend the electricity grid and foster storage solutions and alternative power sources. By 2030 alone, an additional 16,000km of interregional transmission lines is deemed necessary (Decision: Approving the National Electricity Development Plan for the Period of 2021-2030, with a Vision to 2050, 2023). There is a pressing need to establish substantial energy storage capacity over the medium to long term, starting from a nearly non-existent level at present. Without storage solutions, RE

cannot provide reliability in the power system and fossil fuel based base load will be furthermore required. As stated in the PDP8, the aim is to develop stored hydropower with a capacity of approximately 2.4 GW by 2030. Moreover, the coal phase down can only be realized if gas-fired power plants can guarantee sufficient base load during the transition what requires the development of liquefied natural gas (LNG) import infrastructure. In order to modernize the power system, it will furthermore be essential to invest in dispatchable power supply (Do & Burke, 2023). Vietnam is confronted with a shortage of expertise in grid management and alternative power generation, which hampers the enhancement of grid capacity and hinders the progress of RE initiatives. Significant information asymmetries and uncertainty about technical parameters and data of RE grid integration potential persist.

Legal

To date, Vietnam's power market has been only partly liberalized. Major international organisations have long promoted a wider liberalization of Vietnam's electricity market and have supported the drafting of a competitive power market roadmap. In the past, Vietnam's power sector was characterized by a vertically integrated power supply chain encompassing power generation, transmission, distribution, and customer services. This has contributed to less favourable conditions for RE investors in Vietnam's energy sector. The still partly monopolistic nature of the sector has resulted in a lack of competition and has hindered the attraction of private RE investment and foreign direct investment (Dang & Taghizadeh-Hesary, 2019). Reforms are introduced to allow for competition in the power generation and wholesale markets. A part of the generation capacity is already traded in the Vietnam Wholesale Electricity Market (VWEM) (but not all RE plants with 20-year FiTs). Many investors would welcome participation of solar PV and wind power in the VWEM if appropriate regulations were issued, including the ability to sell from storage capacity (currently there is no market for ancillary services). Vietnam's power retail market is still monopolized but the country is planning to introduce reforms to allow competition in the power retail market starting from 2024.

Substantial political and regulatory uncertainties with respect to RE have eroded investor sentiment over the last months. The current lack of a clear legal and financial framework for electricity purchases and sale contracts for RE-generated power exposes private investors to high risk. At the end of 2020 and 2021 respectively, the government ceased accepting applications for FiTs for solar and wind-generated electricity. A widely anticipated revised FiT system was not put in place and no pilot schemes for alternative incentive mechanisms such as an auction scheme have been initiated yet. Consequently, companies interested in selling their electricity to the national grid must engage in individual negotiations with EVN to secure contracts. There is no guarantee that companies can secure contracts via this route, as the government has yet to issue new guidelines for electricity purchases and sale contracts.

Renewable PPAs seem weak due to curtailment issues, termination and arbitration clauses. Guarantees that the power produced will be absorbed by the grid and paid for are insufficient for most international banks or private lenders to provide project finance (Dorband et al., 2020). Regulatory ambiguity and immaturity have a negative impact on the bankability of projects and discourages investors who prefer lower-risk ventures. Potential investors may consequently choose to adopt a cautious approach and postpone their final investment decisions until there is more clarity regarding the procurement framework. The absence of new policy incentives might slow down the required private capital flows into RE projects in Vietnam.

Vietnam still lacks comprehensive legal frameworks accompanying the energy transition, namely for offshore wind parks and the future decommissioning of coal power plants. There is a lack of regulations on marine spatial planning, environmental impact assessment, unclear permitting and licensing procedures and a lack of stable policy and pricing scheme for offshore wind power development (Do & Burke, 2023). A sound legal framework for offshore wind could boost offshore wind capacity in the future. Furthermore, despite the ambition to convert most coal-fired power plants to alternative fuels in the next decades, a certain stock of plants will face closure.

Regulations pertaining to the decommissioning of coal power plants and related matters are pending, which would include compensation mechanisms for privately-owned enterprises that have long-term PPAs with EVN. Under the current legal framework, the government must fulfil contractual obligations warranted in BOT agreements with coal plant operators. Decommissioning privately owned coal-fired power plants is impracticable now due to a lack of related regulation. The incentive for the government to finalize the regulation is low because decommissioned coal power plants would entail significant payments of compensation costs to BOT contractors over a long period considering that many BOT contracts were signed for several decades after 2010. Additionally, there is a need for regulations addressing the management of stranded assets and employees within state-owned coal power enterprises (Do & Burke, 2023). A coherent legal framework will facilitate a coordinated, economically feasible and socially acceptable coal phase-down and avoid major financial turbulences.

3.3 Enablers for a green energy transition and early coal phase-down

Political and institutional

The approval of the PDP8 sends a strong signal to the markets that Vietnam's government is committed to implement the energy transition and decarbonize its economy. The clear policy direction calms down markets and provides a credible roadmap to decarbonisation of the energy system. The Vietnamese government harnessed the opportunity to reconsider environmental and economic impacts of all financially viable power supply options and their associated infrastructure (e.g., power grid upgrades, transport and processing of fuels, management of residual waste, etc.) (Dusík & Kirsch-Wood, 2019). If underpinned by a predictable roadmap for energy prices and a reliable framework for long-term investments, and if the IPG and GFANZ adhere to their JETP promises, PDP8 has the potential to be the decisive driver for Vietnam's clean energy transition.

Vietnam has actively participated in international climate treaties possibly opening doors for more investment. The country is a signatory of the Global Coal to Clean Power Transition Statement endorsing all clauses it contains. The statement calls for rapidly ramping up technologies and policies this decade to achieve a full transition away from unabated coal power generation in the 2040s and ceasing new unabated coal power projects. Furthermore, Vietnam has released an updated NDC under the Paris Agreement in 2022, in which the country increases its unconditional greenhouse gas (GHG) emissions reduction target from 9% to 15.8% by 2030 relative to a business-as-usual scenario from the reference year 2010. Conditionally to international support and financing, through bilateral and multilateral cooperation, Vietnam has set a new emissions reduction target of 43.5% by 2030 (up from 27%). At COP26, Vietnam announced furthermore the commitment to phasing out coal-fired power stations in the 2040s conditional on international support. These commitments and targets at the international level can incentivize Vietnam to decarbonize its energy system. The risk of failure to meet GHG and energy intensity reduction targets, stated in the NDC,

will encourage decision makers in Vietnam to shift away from coal. International agreements provide the global community with a reference framework that facilitates advocacy towards coal phase-down. However, if international finance fails to be disbursed and mobilized effectively, there is a potential danger of a shift towards expanding coal and LNG projects.

Vietnam has started talks with neighbouring countries such as Singapore to strengthen regional clean energy collaboration. This includes initiatives to encourage investment in RE, integration of electricity grids and development of energy research centres. The potential for stronger regional cooperation for power market integrations for Southeast Asia could spur improvements of existing electricity infrastructure and increase investments into the region. The PDP8 envisages a step up of electricity imports from neighbouring countries with high hydropower potential. Furthermore, electricity exports from new offshore wind power farms to Vietnam's neighbouring countries that could be traded at a price higher than Vietnam's low domestic prices could be an attractive source of revenue for EVN. Highly profitable offshore wind farm pilots could accelerate the further expansion of offshore wind power in Vietnam.

Economic and financial

Difficulties in mobilizing investment capital challenges the expansion of coal power in Vietnam. An increasing number of domestic and international financial institutions are refusing to finance coal-fired power plants due to increased climate awareness and climate related risks attached to coal financing. International financing has been the principal source of investment in Vietnam's coal power sector over the last decade. Announcements by major international coal power financiers to cease financing new coal power projects have greatly diminished prospects for new coal power projects in Vietnam (Do & Burke, 2023). The Vietnamese government is now keen to attract more international financing for renewables and the energy transition, as exemplified with the JETP agreement (see Box 2). Considering the currently rather low engagement of international private investors in RE power projects in Vietnam, activating more international investments could be a driver for clean energy in Vietnam.

China's moratorium on ceasing funding for the construction of new overseas coal power stations further reduces opportunities for financing expansion of coal. The withdrawal of coal financiers will not have a direct effect on (early) retirement plans of operational coal power plants, but it will effectively restrict the options for coal power capacity expansion and hence boost the role of renewables. Half of the projects in Vietnam's coal power pipeline could not yet secure financing, most of them are backed by Chinese investors. If no investor agrees to provide funds in the coming months, the coal pipeline will shrink further.

The persistent reliance on imports from other Asian countries for a significant portion of the demand of Vietnam's thermal power station makes fossil fuel generated power less attractive. Vietnam's strategy to expand the use of gas and LNG for power production in the coming years will make the country's energy sector ever more reliant on imported fuels because Vietnam's gas reserves are depleting. Vietnam is expected to start importing gas this year through two long-delayed LNG terminals, with five additional terminals scheduled to begin operations by 2027 (Take, 2023). The increased dependence on fossil imports could be an accelerator for early coal phase-out since commodity imports are deemed politically undesirable. As an importer, Vietnam is susceptible to shifts in international supplies and prices. The Party's Committee on Economics has acknowledged energy security in terms of dependence on fuel imports as a strategic concern. Structural supply bottlenecks and insufficient infrastructure and transport capacity complicate fossil fuel imports. In contrast, RE sources can be produced at constant costs largely independent from international commodity price fluctuations. This has to some degree contributed to RE being viewed as

relevant in order to diversify the generation mix and relieve the pressure on fossil fuel supply (Dorband et al., 2020).

Vietnam's integration in the global economy and growing trade relations incentivize the country to decarbonize. If Vietnam fails to accomplish the necessary decarbonization measures to meet the requirements set, e.g., by the EU through the planned carbon border adjustment mechanism (CBAM), it could encounter obstacles in terms of EU carbon standards affecting certain groups of products intended for export to the EU and various other markets (World Bank Group, 2021). Additionally, the EU's bilateral collaborations with other countries' carbon emission programmes, such as China's, could potentially place Vietnamese exporters in a less competitive position. Vietnam is developing a domestic ETS that aims to encompass sectors such as power generation from thermal plants, steel production, cement manufacturing, and more, starting from 2028. This initiative has the potential to prevent the imposition of CBAM tariffs on EU imports from Vietnam, particularly on products like steel. This could contribute to maintain international competitiveness and incentivize domestic companies to transition to low-carbon business models.

Vietnam's commitment to a green-energy future and coal phase down could persuade global corporations and their suppliers to invest in Vietnam. Vietnam's PV panel and wind tower manufacturing industry has grown strongly in the past five years and offers export opportunities. Vietnam can also benefit from its large reserves of rare earths that are demanded globally for low carbon electronics manufacturing and batteries.

The reduction in prices of RE equipment and Vietnam's generous FiTs have driven the expansion of green electricity over the last years. The government offered a FiT of 9.35 US cents/kWh to solar power developers and a FiT of up to 9.8 US cents/kWh to wind power developers, far higher than Vietnam's electricity retail price of 8.2 US cents/kWh (levelized cost of electricity of coal-based power can be as low as 6 US cents/kWh for certain power plants excluding externalities). These advantageous FiTs have demonstrated that an enormous amount of private capital can be mobilized for RE investments in no time, particularly domestic capital. A well-developed successive policy mechanism that addresses the challenge of grid overload, such as in the form of direct PPAs between power producer and corporate buyers, has the potential to maintain the momentum in Vietnam's energy transition. The installation of roof top PVs is still popular in Vietnam considering a short payback period of currently around 5 years to recover investments.

Social

Increasing environmental consciousness and related local and online public resistance deter the expansion of coal power plants. Vietnam's society has become increasingly conscious that coal burning causes environmental harm through wastewater, ash and slag discharge, air pollution as well as individual and public health problems. The formation of local public resistance has effectively pushed some local Provincial Party Committees to cancel already approved coal-fired power projects and oppose new ones. Protests arise particularly after industrial accidents causing major environmental problems, such as the protests in 2016 by ordinary Vietnamese citizens following the illegal discharging of toxic industrial waste into the ocean by a steel plant. Vietnam-based NGOs have successfully focused their climate change mitigation related advocacy work at the community and province level. Some provincial governments withdrew their support for coal power plants and have subsequently advocated for renewables and gas-fired power additions with the national Party cadre (Dorband et al., 2020).

RE has the potential to increase energy accessibility and affordability for previously unserved communities. Poor and remote communities in Vietnam's tropical and mountainous areas with little access to the national grid can benefit immensely from new energy technologies. Solar panels do not require fuels and make energy more affordable for poor communities in the longer term. The energy transition can hence create new opportunities in disadvantaged areas and improve public sentiment towards RE. A growing domestic RE manufacturing industry leads to the creation of new jobs that are needed for workers that lose jobs in the coal sector.

Environmental

The phase-down of coal is key to achieve Vietnam's net-zero carbon commitment in 2050. Vietnam's absolute carbon emissions and the level of carbon emissions intensity (emissions per unit of GDP) have constantly risen in the last decades (Climate Watch, 2020). The increase is mainly due to the rapid increase in coal power projects. The energy sector will contribute up to 70% of GHG emissions by 2030 (Dusík & Kirsch-Wood, 2019). Considering Vietnam's current energy demand and energy mix, the potential of greenhouse gas emissions reduction in the power sector is enormous. The decarbonisation of the energy system will be further facilitated by Vietnam's Emissions Trading System that is scheduled to be fully operational in 2028. Moreover, Vietnam's energy supply intensity (energy supply per unit of GDP) is more than double the world average (Institute of Energy, 2021). Government action seems to fail to address issues of increasing carbon emissions and energy supply intensity. To achieve low-carbon growth, Vietnam must improve energy saving and transition to green energy technologies that contribute to lowered carbon emissions intensity.

Coal mining and processing and thermal power plants contribute to alarming ambient air pollution, one of Vietnam's main environmental problems. Particularly in the country's two biggest cities, Hanoi and Ho Chi Minh City, over ten million people are exposed to heavily polluted air. The 2022 average PM2.5 concentration in Vietnam was 5.4 times the World Health Organization (WHO) annual air quality guideline value. According to the WHO, up to 60,000 deaths in Vietnam are attributable to air pollution each year. In the past decade, air pollution sources in Vietnam have noticeably increased. Due to lack of financial resources and unclear policies and regulations on atmospheric environment management, it is difficult for the government to supervise and sanction high polluting activities (Li, 2020). Air pollution is caused by Vietnam's reliance on fossil fuels, particularly in the transportation sector. The transition to a fleet of electrified vehicles requires carbon neutral electricity sources, thus enhancing the role of renewables. High and continued air pollution could fuel resistance against coal power plants in an increasingly prosperous and health-conscious Vietnamese society.

Technological

By exploiting Vietnam's huge potential of energy efficiency (EE), the growth in energy demand can be lowered and the energy transition facilitated. The intensity of total primary energy supply per GDP in Vietnam more than doubles the world average (Institute of Energy, 2021). To lower the energy intensity, Vietnam presented the national master plan on EE, saving, and conservation of energy resources in 2019. The master plan expects to achieve savings of 8-10% of national energy consumption, and a 6% power loss reduction through 2030. Improving EE is a top priority for Vietnam, as it seeks to deal with a 10% annual growth rate for energy demand. By adapting conservation techniques, Vietnam would need a lot less new power generation capacity in the decades ahead, which could facilitate early coal

phase-down. What thwarts energy efficient behaviour today are the currently low costs of electricity tariffs that disincentivise utilization of EE measures (Dusík & Kirsch-Wood, 2019).

4 Recommendations

This study finds that Vietnam's barriers to the energy transition are mainly due to technological and financial constraints. Advancing reasonable energy planning, mobilizing investment finance and developing new expertise are key to decarbonize Vietnam's energy sector. To address the core barriers to the decommissioning of coal-fired power plants and to accelerate the energy transition in Vietnam, we recommend the following:

For Vietnamese policymakers:

Recommendation 1: Clarify legal and policy framework for decommissioning of outdated coal plants

Vietnam should clarify the strategy for the refurbishment and gradual and phased retirement of its coal power plant fleet. Otherwise, it may not be possible to refurbish and convert Vietnam's currently operating yet most inefficient and ailing coal plants. The strategy would require the development of several future scenarios reflecting different potential developments in the cost and availability of alternative fuels. Such scenario-based analysis would allow to estimate potential costs required for refitting of coal plants, compensation payments to coal plant operators, and costs for dismantling coal power plants. This analysis would also need to consider the scenario that the conversion of coal power plants does not turn out to be a commercially viable option. Such cost estimations could lay the foundation for continued negotiations with international partners concerning the need for future financial and technical support. The legal framework would need to clarify furthermore how to enforce the rule to shut down coal plants that have passed a lifespan of 40 years and have not been retrofitted. Policy makers should also consider developing a mechanism that ensures that coal operators do not exploit the grace period of 40 years until the very end but convert power stations as soon as economically and logistically feasible. This mechanism could include support to apply available fuel conversion technologies. Existing coal-fired power plants should transition to the role of baseload to operate with decreasing capacity factor towards 2050.

Recommendation 2: Reconsider the economic and technological rationale behind the construction and development of new coal power plants

Vietnam anticipates that coal plants can be converted to and fuelled with alternative fuels in the near future. However, the option to convert coal power plants to commercially viable future technology-based solutions such as ammonia and biomass remains hypothetical, while Vietnam's RE potential is uncontested. Renewables are the lowest-cost option for Vietnam to meet its energy needs. A potentially growing price for carbon in Vietnam's forthcoming emissions trading system will further decrease the price competitiveness of coal generated electricity. This risks that young coal power plants that fail to convert to renewable sources turn into stranded assets if Vietnam enforces decidedly the pathway to decarbonisation. As an increasing number of RE sources become operational, the role and dominance of coal and gas-fired power in the country's energy mix faces inevitable adjustments. This transition will require a comprehensive review of the economic assumptions that have influenced support for projects that lack the capacity for flexible dispatching.

Recommendation 3: Introduce regulations and policies to minimize investment risks and attract investment into grid infrastructure and renewables

The upfront capital-intensive nature of transmission infrastructure (including power storage capacity) and renewables means that it will be key for Vietnam to introduce risk-lowering measures for investors. It is particularly important to address the issue that grid infrastructure investment currently does not offer viable business and revenue models for private investors. These challenges must be addressed in Vietnam's forthcoming JETP Resource Mobilization Plan.

Following the timeline set out in the PDP8, the sequencing of priorities should be as follows:

> **Priority 1**: In the short term, EVN's subsidiaries should scale up grid infrastructure investments and improve related investment conditions for private investors. The investments should make the grid more flexible and efficient to allow for robust grid management when more renewables come online.
>
> **Priority 2**: In the medium term, scale up RE investment and power storage investment in the longer term. It is vital to reduce investment obstacles for investors for RE and introduce policies that make RE investments more lucrative.

Overall, it is essential to create a level playing field for private investors that can bring much-needed capital and know how. To create this level playing field, the following reforms are recommended:

- Make EVN's power generating companies independent rather than keeping them as part of EVN's holding company structure.
- Conduct periodic audits for generation companies to ensure compliance with arrangements put in place to separate EVN's generation and system operation.
- Create a structure that is transparent and equitable for stakeholders; promote transparency in generation contract pricing and transmission and retail tariff setting.
- Introduce updated regulation that allows participation of solar PV and wind power in the VWEM, including the ability to sell power from storage capacity.
- Advance reforms to allow competition in the power retail market.

Concrete measures are needed to render infrastructure and renewables investments more attractive:

- Encourage **joint ventures of international and domestic firms** that have improved access to financing from Vietnamese banks for RE development.
- Introduce **direct PPAs**, particular synthetic corporate PPAs, since this will relieve the power grid while allowing corporate buyers to get access to green electricity.
- Rule out individual negotiations between EVN and power plant operators. An **auction system** in the wholesale market could remedy institutional inefficiencies and ensure equal treatment of all players.
- Minimize fossil fuel subsidies and provide targeted **RE subsidies**.
- Improve the quality and sourcing of **data for RE sub-sectors** to ensure clarity for investors about available locations and infrastructure capabilities.
- Prioritize a swift drafting of a **legal framework for offshore wind power** in Vietnam.
- Explore **de-risking instruments** such as loan guarantees to support RE investments.

- Introduce and **deepen reforms**, such as a national taxonomy for green activities and carbon disclosure standards, to hold private banks and other financial institutions, such as pension funds, accountable for their portfolios.
- Implement **ambitious climate policies** and action to get facilitated access to donor financing.
- Encourage the installation of **smaller power plants** that do not require state guarantees.
- With the current cost of equipment available in the Vietnamese market and prevailing electricity retail tariffs, the implementation of **effective net-metering regulations** could bring significant advantages to numerous households, especially those in the middle-class bracket, as well as small and medium-sized businesses.

Recommendation 4: Introduce region-specific electricity tariffs and steadily increase tariffs to reach and maintain a level similar to the ASEAN average[3]

Electricity tariffs are a crucial variable in Vietnam's energy transition. An adjustment in the retail tariff would stimulate investment, improve the financial burden of the state utility and incentivize to save energy. The current set of low electricity retail tariffs is uniform throughout the country and does not reflect the regional supply-demand (dis)equilibrium. As a consequence, EVN is restricted to commit to capital investment due to constrained profits. A system of regionally differentiated retail tariffs could provide remedy and would allow to integrate social considerations in the energy planning to cushion negative effects on low-income communities and economically least dynamic regions. Higher average electricity tariffs could ensure that EVN's envisaged grid infrastructure investment projects yield profits, what makes it much more likely that they are being implemented. The gradual deregulation of electricity prices and introduction of competitive wholesale and retail electricity markets could attract investors. Electricity prices are also a major lever in terms of energy saving behaviour, both for industrial as well as residential users. An increase in electricity tariffs would have the positive effect to improve Vietnam's high energy efficiency. To leverage social capital to participate in the development of RE, electricity price increases should be accompanied by improved transparency regarding the energy sector, targeted public communication strategies to explain Vietnam's vulnerability to climate change and how RE can contribute to climate change mitigation, and subsidy programs to cushion negative effects for disadvantaged groups.

Recommendation 5: Foster holistic and coordinated energy sector reforms and establish effective oversight and monitoring to facilitate the energy transition towards net-zero emissions

Past energy policies lacked alignment between different government agencies and ministries. To improve policy effectiveness, energy transition policies must be supported by and coordinated among key government and industry stakeholders. Vietnam's power sector needs holistic reforms targeting power system operation strategies, power market and financing regulation and investments in transmission in the short term and electricity storage in the long term. A full transition of Vietnam's power sector will require fundamental structural reforms, such as withdrawing the government as a majority shareholder of the major energy companies. To improve policy alignment and streamline decarbonisation efforts in the energy sector and beyond, Vietnam should designate a single administrative authority competent to

[3] This recommendation only applies if a competitive power retail market is not introduced soon.

ensure that energy reforms are coordinated between different ministries, with the MoIT playing a central role. The designated authority must ensure steady communication and the involvement of all required government players in energy negotiations and planning. On a higher level, it would be advisable to create or designate a body with the mandate to oversee and monitor Vietnam's decarbonisation strategy. This body would be responsible for conducting accurate emission inventories to allow for science-based monitoring of the GHG emission targets formulated in PDP8. This recommendation is aligned with the Vietnamese government's decree on climate change mitigation that proposes to establish integrated governance of all greenhouse gas emissions across the whole economy based on the Paris Agreement commitments.

Recommendation 6: Broaden Vietnam's debate on decarbonisation beyond the composition of the energy mix

The drafting of the PDP8 has attracted most attention and tied public resources in recent years, but it is also important to advance decarbonisation solutions outside the power sector. These future energy related trends can contribute to lowering the growth in energy demand in the future and therefore ease pressure on the power system. Such trends affect particularly the heavily polluting industry sector in Vietnam. Many Vietnamese factories apply technologies that are coming to the end of their lifecycle. It is therefore crucial to incentivize factories to transform now by investing in clean technology. Furthermore, Vietnam has huge room to improve energy efficiency. A high degree of electrification is moreover seen as a realistic cost-efficient pathway towards net-zero in 2050. Transitioning towards a circular economy will decrease the need for newly sourced raw materials and will drive down energy needs and GHG emissions. These topics have not received sufficient public attention in Vietnam yet and should be addressed soon to ensure that the goal of carbon neutrality can be achieved before 2050.

For international financiers and partners:

Recommendation 7: Provide the committed assistance to Vietnam's energy transition through funding, expertise, and partnerships to facilitate coal phase-out and mobilize private capital

International financial flows will significantly affect the speed and scope of Vietnam's energy transition. The achievement of Vietnam's NDC and PDP8 targets relies on the realization of financial commitments. It is therefore essential that JETP commitments are respected and that the pledged funding is provided. Multilateral development banks and development finance institutions should utilize various methods and instruments to mobilize adequate private capital, including grant allocation, local currency debt, facilitation funds, currency hedges, and alternative credit enhancement mechanisms to enable long-term financing. Multilateral development banks should also offer partnership and expertise to address capacity constraints. International partners should initiate conversations with financial institutions regarding their potential involvement in financing Vietnam's coal phase-out.

Recommendations for Chinese stakeholders

China has become an important investor in RE with rich experience in project construction, operation, equipment manufacturing and export, overseas engineering procurement construction, mergers and acquisitions, and research and development. China has also abundant experience in reducing carbon emission intensity. To share this rich experience with Vietnam, China and Vietnam could cooperate on RE expansion and energy efficiency improvements. Some Chinese manufacturers for RE equipment have set up manufacturing capacity in Vietnam to circumvent trade duties. Chinese RE suppliers are well positioned in

the Vietnamese power market and this potential could be further harnessed. However, China faces several obstacles in outbound investment and cooperation in RE. This includes obstacles to arrange project financing as well as trade and technical barriers. To foster energy and climate cooperation, China could consider the following actions:

For Chinese policymakers:

Following Vietnam's flagship JETP arrangement with international partners, China might consider setting up a similar special fund (possibly with other international partners or multilateral financial institutions, such as AIIB or NDB) to support Vietnam and other BRI countries in breaching the funding gap in power transmission infrastructure and RE

Join forces with other international partners to help Vietnam refine the policy and legal frameworks that are needed to implement the PDP8 targets and improve financing conditions for RE projects

Provide capacity building on green finance, including standards that limit investments on polluting, high-carbon industries, and incentives that encourage investments in green industries

Address undue barriers for trade and investment for RE equipment and investments in negotiations with Vietnam

For Chinese banks and investors:

Due to the high risk of asset stranding, end the support for previously agreed but not yet built coal power projects in Vietnam and free up resources to support the development of RE projects

Conduct stress tests on the environmental and climate risks of (coal) power projects in Vietnam

Use the current momentum of divestment from fossil fuels and enhance cooperation with international long-term funds by jointly launching green investment funds with international capital from pension funds, insurance companies, etc. to invest in the expansion of grid infrastructure and RE in Vietnam

Strengthen the blended financing cooperation with multilateral development institutions, particularly in the context of the JETP agreement, where private money should be mobilized, to share their priority creditor status, increase credibility and take advantage of their financing and risk control capabilities to invest in Vietnam

Establish branches in Vietnam to build up capacity and better understand the local Vietnamese market and policy environment to create conducive conditions for structured and project financing

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