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International collaboration on the energy transition in Vietnam

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Abstract

Many developing countries, including Vietnam, are striving to transform their energy systems into more sustainable ones. They are leveraging initiatives like the Just Energy Transition Partnership (JETP) with the G7. Although Vietnam's participation in the JETP is a vital step in its journey towards clean energy, it also faces certain implementation challenges.

This address will delve into Vietnam's energy transition journey, considering five key perspectives: international cooperation, governance structures, considerations of justice and equity, technology solutions, and innovative financing methods. International partnerships are crucial to share knowledge, bear costs, and reap benefits. However, larger agreements sometimes face limitations, and more focused coalitions can assist in overcoming these.

Vietnam's Power Development Plan 8 (PDP8) provides a roadmap for the future but will require adjustments and input from different stakeholders to ensure its effectiveness. A just transition demands consideration of several facets of justice, including solutions that are specific to Vietnam and take into account vulnerable communities and workers affected by the transition. Adopting a comprehensive approach that combines foundational research, new technologies, and deployable solutions can spur innovation. Likewise, legal frameworks encouraging private investment can accelerate the transition.

In conclusion, while Vietnam's energy transition is progressing, there is still a long way to go. Recommendations include boosting stakeholder engagement, refining the mix of planning and market mechanisms, conducting assessments to ensure equity, investing in applicable technologies, and creating supportive legal and financial structures. Strengthened collaborations, both at multilateral and bilateral levels, can aid Vietnam in its journey towards a sustainable and prosperous energy future.

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1. Introduction

Dear esteemed guests, esteemed colleagues, ladies and gentlemen,

Today, we gather here at the International Centre for Interdisciplinary Science and Education (ICISE) in Quy Nhon, united in the mission to discuss environmental challenges and explore solutions to address them. Our gathering not only marks the 50th anniversary of the scientific cooperation between France and Vietnam but also the 51th anniversary of the United Nations Environment Programme, an initiative born out of the Stockholm conference in 1972.

As we commence, I wish to pay homage to a concept that has brought us together in this pursuit, that is 'ecodevelopment,' and acknowledge the vision of my PhD grandfather, the scholar who introduced this concept half a century ago from: Professor Ignacy Sachs.

Ecodevelopment, as defined by Sachs, is a development strategy based on the judicious use of local resources and traditional know-how. It's particularly relevant to isolated rural areas of the developing world, allowing them to navigate a path between predatory growth and stagnation. It proposes that countries like India or Brazil in 1970 can overcome environmental issues and get out of poverty. They should develop based on their local resources transformed by appropriate technologies, use judicious economic planning, and focus on benefits to the poor farmers.

Many of us are familiar with the concept of Sustainable Development, but Ecodevelopment may not ring as familiar. Ecodevelopment was politically canceled during the era of the Washington consensus and globalization. Despite this, the core question that ecodevelopment aimed to answer are as relevant today as they were fifty years ago. How can a poorer country develop given today's environmental constraints?

Today I will examine this question applied to the problem of the energy transition in Vietnam, a subject I have been studying at the Centre International de Recherche sur l'Environnement et le Développement in Paris, and at the Vietnam Initiative for Energy Transition in Hanoi.

I will share perspectives on Vietnam's energy transition through five lenses. These five questions, born from the idea of ecodevelopment, will organize our analysis today:

1. International cooperation on environment and development. How can the North and the South cooperate to solve environmental issues?
2. The tension between strategic planning and market mechanisms. How can we balance them to achieve our goal?

3. The multidimensional concept of justice. How can we ensure a fair distribution of the costs and benefits of the change, both within countries and between developed and developing nations?
4. Science and technology solutions. How can we leverage innovation to drive the transition?
5. Financial and legal solutions. How can we mobilize financial resources effectively?

Viewing the just energy transition through these multiple lenses can ensure a more holistic understanding and navigate our path with greater clarity and purpose. So, let's embark on this intellectual journey together.

2. Vietnam's energy transition

2.1. Vietnam takes from ecodevelopment and sustainable development ideas

As Vietnam pursues its energy transition, we can gain insights from the intellectual journeys of ecodevelopment and sustainable development:

Ecodevelopment highlights the need for self-reliance and judicious use of local resources, which resonates with Vietnam as a developing country aiming to harness abundant renewable energy potential.

Sustainable development stresses aligning economic growth with environmental sustainability, in line with Vietnam's vision of transitioning to clean energy to fuel development.

The energy transition recognizes the urgency of shifting to renewable sources and efficient technologies - an aspiration now embraced in Vietnam's commitments under the JETP and PDP8.

However, Vietnam also differs in key ways:

- Globalization and market liberalization contradict ecodevelopment's emphasis on endogenous development and planning. Yet strategic planning remains valuable in guiding Vietnam's transition.
- Sustainable development focused more on win-win solutions and quantified targets, which Vietnam now embraces through its SDGs and quantified energy transition goals.
- Vietnam benefits from cheaper renewable technologies developed elsewhere, but still needs to build expertise and industrial capacity to utilize these solutions.

2.2. Past energy transition

Compared to sustainable development, the transition concept recognizes that the present situation is unacceptable and should be changed urgently. The energy transition also carries the idea that societies have done it in the past. The primary energy source has moved from traditional biofuels to coal, crude oil, and natural gas. This paints a clear trend from more carbon-intensive fuels to less, with a logical next step into carbon-free renewable energy.

The energy transition projects sustainability's three pillars as an energy trilemma. It asserts that policies must satisfy three goals at the same time: *Energy Security* is the capacity to meet current and future energy demand reliably, with resilience to external shocks. *Energy Equity* is the ability to provide universal access to reliable, affordable, and abundant energy for domestic and commercial use. *Energy Sustainability* avoids environmental harm and climate change impacts.

Vietnam's energy equity performance is satisfying. Energy security was ensured under the PDP7 during 2010-2020, but the economic growth rate challenges it constantly. Energy sustainability deteriorated during the last ten years. Vietnam is at the dawn of its energy transition.

2.3. A JETP $15.5 billion deal with G7+

Vietnam's journey towards a sustainable energy sector picked up pace at COP26, with negotiations leading to the signing of the Just Energy Transition Partnership (JETP) agreement in Brussels on December 14, 2022. This deal sees the G7+ countries, and Vietnam united in a shared commitment: to pivot towards a net-zero trajectory for our power sector development.

The JETP is a collective commitment by rich countries to support a developing country to pivot towards a net-zero trajectory. Besides Vietnam, G7+ countries also signed JETPs with South Africa, Indonesia, Senegal and more may come.

The JETP Vietnam commitment takes the form of a financial pledge, with G7+ countries to mobilize a substantial $15.5 billion, split equally between public and private sectors. From the public sector, $7.75 billion will be offered at terms more attractive than those found on private capital markets. The remaining half will be raised by the "Glasgow Financial Alliance for Net Zero (GFANZ)," a consortium of private financial institutions.

In return, Vietnam commits to significant milestones in our energy sector. CO_2 emissions from our power sector will peak at 170 Mt in 2030, substantially reducing from the projected initial 240 Mt in 2035. By 2030, we commit to limiting our coal power capacity to 30.2 GW,

down from a previously projected 37 GW. In addition, we envision that by 2030, renewable sources, including hydroelectricity, will provide at least 47% of our electricity production.

Vietnam's participation in the Just Energy Transition Partnership (JETP) marks an important first step. The commitments by both Vietnam and international partners demonstrate willingness for bold collaborative action.

Seven months after this declaration, we've seen both triumphs and trials. Our Power Development Plan 8 is aligned with our sustainability goals, setting a clear and promising roadmap for the future. However, there is not much time left to prepare and discuss the Resource Mobilization Plan, due in November 2023. On a positive note, the renewable energy sector, though facing initial hiccups, is regaining hope, becoming a more central player than ever in our energy landscape.

3. Cooperation, trade, and aid to solve environmental issues

The transition to a sustainable energy future is a global endeavor that hinges on partnerships. From bilateral cooperation to multilateral agreements, these alliances facilitate technology sharing, financial assistance, and trade. International cooperation is the bedrock of our success.

3.1. Bilateral cooperation

Vietnam's energy sector has enjoyed bilateral cooperation with various development partners worldwide. To the west, France, Germany, Denmark, the UK, the US, and the EU have been dynamic collaborators. The East includes active contributions from Japan, South Korea, and China. The fruits of bilateral cooperation are evident in several aspects, best illustrated by examples from France and the EU:

- *Capacity Building*: France has fostered talent in the Vietnamese energy sector through special education programs based in Vietnam and study grants for France. An essential outcome of this partnership is the fantastic group of Vietnamese professionals it has nurtured, comprising scientists, engineers, policymakers, and business leaders. A salient example is the University of Science and Technology of Hanoi, housed within the Vietnam Academy of Science and Technology. The Clean Energy and Sustainable Development lab, which I helped start at the University of Science and Technology of Hanoi, shows the results of our cooperation with France. Further capacity-building initiatives include seminars, workshops, summer schools, study visits, and expert exchanges.

- *Technical Assistance*: This aspect involves providing expert knowledge to tackle specific challenges, such as constructing a national energy data and statistics information system and promoting rooftop solar systems in Hanoi households. Much of this help is focused on creating laws based on international examples, like building a plan to buy renewable energy through auctions.
- *Official Development Assistance (ODA):* This type of assistance involves financing from official sectors primarily aimed at economic development and welfare enhancement in developing countries, with a grant element of at least 25 percent. The EU's program that pledged 400 million euros in non-repayable budget support is an exemplary case of ODA. Initiated in 2015, the program proposed to disburse 22 million euros of the remaining 142 million euros in the current year.
- *Other Official Flows*: Besides ODA, development agencies offer loans at superior rates than the market, assisting in infrastructural development for economic growth at a manageable capital cost. The French Development Agency (AFD), in 2021, granted a 70 million euro credit to the Electricity of Vietnam (EVN) to augment the capacity of the Hoa Binh hydropower plant. Further, AFD approved a 100 million euro credit to the Bank for Investment and Development of Vietnam (BIDV) to boost green investments centered on renewable energy and energy efficiency.

3.2. Multilateral agreements

Multilateral agreements, like the Paris Climate Agreement, provide a gateway for Vietnam to tap into global knowledge networks, collaborate in research programs, and gain access to funding, all targeted toward clean energy goals.

For instance, Vietnam has made strides in this direction, with Prime Minister Pham Minh Chinh pledging in Glasgow on November 1, 2021, that the country will achieve net-zero greenhouse gas emissions by 2050. Furthermore, Vietnam has committed to the Global Coal to Clean Power Transition Statement, a promise to transition away from unabated coal power generation within this decade and cease issuing new permits for such projects. Vietnam is also part of the US and EU-led Global Methane Pledge, aiming for a 30% reduction in global Methane emissions by 2030. These commitments demonstrate Vietnam's resolve toward sustainable energy practices.

However, the effectiveness of multilateral agreements is limited by the lack of enforcement with a binding international law. An example is the Clean Development Mechanism (CDM), a Kyoto Protocol provision aimed at reducing greenhouse gas emissions. Without a powerful

overseer, the global market for certificates that prove reduced emissions has been flooded with low-quality ones, undermining the system's trustworthiness and effectiveness.

In response to these challenges, there has been renewed interest in small coalition approaches, a model where a handful of countries take the lead in addressing environmental issues. The G20 has outlined the concept of 'Country Platforms.' These are voluntary initiatives at the national level that promote cooperation among development partners. They are based on shared strategic visions and priorities for implementing the Sustainable Development Goals by 2030.

Vietnam actively participates in two platforms: the Vietnam Energy Partnership Group (VEPG), affiliated with the MOIT, and the broader Just Energy Transition Partnership (JETP). These platforms have mainly involved Western development partners, but Vietnam's multilateral energy cooperation extends to ASEAN and other Asia-Pacific countries.

ASEAN cooperation is especially significant as the potential creation of a regional electricity super grid could substantially reduce electricity costs and enhance network stability. These initiatives highlight the immense value and potential benefits of active participation in multilateral agreements for Vietnam's energy transition.

3.3. Scientific cooperation to addressing environmental challenges

Scientists bear significant responsibilities in tackling environmental issues, with their roles extending across various domains.

- *Sounding the Alarm*: Historically, scientists have been instrumental in detecting and managing environmental crises. For instance, their efforts in understanding and controlling transboundary air pollution during the 1970s significantly reduced its adverse impacts. Moreover, the detection of ozone layer depletion led to the Montreal Protocol in the 1980s, setting a global precedent for international environmental cooperation. In 1990, the Intergovernmental Panel on Climate Change (IPCC) rallied for a global climate change treaty, culminating in signing of the agreement in Rio in 1992. Today, scientists are raising the alarm over the multifaceted environmental sustainability crisis, which encompasses climate change and other Anthropocene challenges like water scarcity, biodiversity loss, soil degradation, desertification, and marine plastic pollution.
- *Stabilizing Diplomatic Discussions*: In conjunction with legal experts, scientists provide a rational and factual grounding to diplomatic negotiations. When governments accept reports from the Intergovernmental Panel on Climate Change (IPCC), they ensure

that discussions about climate change at the United Nations Framework Convention on Climate Change (UNFCCC) conferences are based on undeniable facts.

- *Bringing Solutions*: Scientists are crucial in proposing technical and institutional solutions to environmental issues. The Montreal Protocol, for instance, enacted a global ban on the production, use, and trade of ozone-depleting substances, with a grace period for developing countries. The challenge of preserving the climate, however, requires even more intricate technical and institutional arrangements. It is critical to cooperate in sharing scientific knowledge to find solutions for the energy transition as urgently as we did to find a vaccine during the Covid-19 crisis.

In summary, international partnerships are essential levers to accelerate innovation, share risks, mobilize finance, and build capacity for Vietnam's energy transition. Strengthening cooperation across various levels — bilateral, multilateral, intellectual— can maximize the benefits of a global effort toward a sustainable energy future. It can only be recommended to foster collaboration among scientists, lawyers, and policymakers from all countries.

4. Governance: Plan Versus Market

The question of how to steer the energy transition through strategic planning, market mechanisms, or a combination of both is central to governance. Strategic planning provides a long-term vision, while market mechanisms drive innovation and efficiency. Government regulations and incentives complement market mechanisms, and active control ensures adaptability to evolving conditions.

4.1. Strategic planning

Strategic planning provides a long-term vision, allowing governments to set goals and outline the pathways to achieve them. It's illustrated in Vietnam's PDP8, where it set explicit targets for different power sources in 2030 and 2050. This planning form can evaluate policy options, estimate resource needs, and identify infrastructure requirements, thus focusing activities toward a defined objective.

However, the PDP8's preparation illustrates the inherent difficulties of strategic planning. It can underestimate uncertainties, such as the fossil fuel prices volatility, and fail to consider deep transformative scenarios. One of the missions of strategic planning is to consider contingencies, and think in advance. At the inception of the plan, it would have been interesting to ask “what if we adopt the net-zero goal?”, “what if the price of fossil fuels is multiplied by ten due to a war in eastern Europe?” and “what if the renewable energy sector

vastly exceeds the targets?". Asking such questions, and proposing answers, could have been the result of formal more participatory workshops with the experts.

Thus, while strategic planning is essential, it must be improved upon. This involves integrating comprehensive data and complete modeling, ensuring flexibility to adapt to changing conditions, broadening the scope of scenarios explored, and promoting stakeholder engagement.

4.2. Market Mechanisms and Competition

Market mechanisms and competition have proven to be effective drivers of innovation and efficiency, essential for scaling clean technologies. The power of market competition is well demonstrated in Vietnam's renewable energy auctions and Build-Operate-Transfer (BOT) power plants, which have spurred cost reductions and accelerated the energy transition.

Yet, market mechanisms also have limits, specially for electricity. The network is a natural monopoly for technical reasons. There is no relation between the short term electricity market price and the income required to invest in long-term capacity development. National critical interests and environmental externalities are not part of the market, leading to an underprovision of domestic clean energy. Information asymmetry between regulators and firms hampers effective regulation. Therefore, while markets allocate resources efficiently, they require government intervention to address their imperfections.

Government interventions, including emission standards, pollution taxes, and regulations, can align market outcomes with sustainability goals. This combination of market mechanisms and regulation is necessary for Vietnam to continue accelerating its clean energy transition at the lowest cost while addressing social and environmental impacts.

4.3. Government Regulations and Incentives: towards an active governance

Market mechanisms alone cannot adequately internalize environmental externalities such as pollution and greenhouse gas emissions. Therefore, government intervention through regulations and incentives is crucial to accelerate emission reductions and steer investments toward sustainability.

The PDP8 in Vietnam aims to guide the market by specifying renewable energy and energy efficiency targets. In addition, regulations such as emissions standards, performance-based mandates like renewable energy targets, and incentives like feed-in tariffs and innovation funding can help shift investments towards cleaner technologies with positive societal impacts.

However, while these measures are necessary, they must be complemented by market mechanisms to be truly effective. Moreover, policy consistency, credibility, and active governance are critical for the success of Vietnam's clean energy transition. This underscores the need for a comprehensive policy mix that can drive the low-carbon transition.

The rapidly changing energy landscape calls for a dynamic approach to governance. Active governance involves continually adjusting policies, plans, and regulations to meet evolving conditions and stakeholder needs.

The PDP8 in Vietnam aims to incorporate elements of active governance. It employs a monitoring committee to adapt the plan regularly. It explores more market liberalization and innovative finance solutions to facilitate dynamic energy procurement.

However, governments need robust analytical capabilities, strong stakeholder engagement mechanisms, and efficient implementation systems for active governance to work effectively. Willingness to experiment with policy and technology pilots, learning from these initiatives, and then scale up successful approaches through revised plans and regulations are also vital.

In summary, navigating a prosperous and just energy transition requires a delicate balance of strategic planning, market mechanisms, and adaptive governance. As Vietnam continues its energy transition journey, the next steps are to prepare a Resource Monitoring Plan for the JETP, in parallel with the PDP8 implementation plan, and all the ongoing activities to promote energy savings, rooftop solar, and build the electricity market. There are ample opportunities for international collaborations and stakeholder engagement.

5. Justice in the energy transition

A just transition seeks to distribute the burdens and benefits of change equitably. Considering workers in fossil fuel industries, communities in energy poverty, and nations impacted by climate change and barriers to development, justice must be rooted in fairness, inclusivity, and respect for human dignity. Understanding justice through different perspectives enriches our understanding and helps us create an inclusive transition.

5.1. Justice is a multifaceted concept.

At this point, I want to dive deeper into the theme of justice within the context of the Just Energy Transition Partnership (JETP). To frame this discussion, I will borrow the framework

offered by Wang and Lo (2021), who identified five distinct perspectives on the idea of a just transition:

1) Labor-oriented concept. This perspective traces the idea back to the 1970s, when heavily polluting industries in the United States began their inevitable decline. Rather than resisting environmental regulations, the Oil, Chemical, and Atomic Workers Union (OCAW) sought ways to support workers through retraining and community support programs. This perspective helps us understand that just transitions can facilitate conversations about managing the social implications of necessary environmental changes and the potential of creating green jobs.

2) Integrated Framework for Justice. This perspective views the just energy transition as a fusion of environmental, climate, and energy justice. Environmental justice recognizes that disadvantaged communities often bear the brunt of environmental degradation. Climate justice highlights the unequal distribution of past, present, and future responsibilities concerning climate change. Energy justice tackles energy poverty and the trade-offs between energy, CO2 emissions, and development.

3) Theory of socio-technical transitions. This perspective perceives the energy transition as a socio-technical shift, where niche innovations can destabilize the socio-technical landscape and even alter the prevailing socio-technical regime.

4) Governance strategy. This perspective focuses on the institutional structures, governance, and social relations that underpin the energy transition. It highlights the importance of coalition-building, effort-sharing, and understanding the tension between the urgency to act and the need for inclusive decision-making processes.

5) Public perception. This perspective concerns public perceptions, acceptance, and support of low-carbon energy projects and policies. Research in this area often aims to uncover the factors influencing stakeholders' attitudes.

Each perspective provides a unique lens to understand the nuances of the term' justice' in JETP, demonstrating that the term is not merely a buzzword but a multifaceted concept that embodies different meanings for different people. This multiplicity is not a hindrance but an asset. It enables us to unite under a common cause and collectively navigate the intricacies of a just

5.2. Justice in South Africa JETP

The value of these perspectives is demonstrated vividly in the case of South Africa. This country's energy transition faces considerable challenge: the national electricity company is

in deep financial and governance trouble, the power generation system is coal-based, the power plants are very old and not well maintained. The power outages have officially reached the level of "national catastrophe".

However, South Africa was the first to sign a JETP, so it is case with the most experience to look at. It offers five critical insights:

1. Inclusive representation is critical. The President chaired South Africa's Presidential Climate Commission (PCC). It includes ten ministers and 21 members from all sectors of society, including environmental activists, community leaders and trade union representatives.
2. With insufficient stakeholder engagement, transparency and accessibility, it is difficult to ensure equity and gain implementation support. Meaningful engagement of marginalized communities posed a challenge due to preexisting mistrust and lack of access. Transparency was hindered by lack of coordination among government agencies and stakeholders' representatives, in the context of a JETP implementation plan prepared urgently.
3. Key policies must align with the country's climate commitments, particularly in the energy sector. However, policy implementation was slowed by bureaucracy and competing priorities.
4. The just transition can serve as the foundation for a broad governance coalition, bringing together disparate organizations, each playing a critical role in advancing the movement. However, this coalition faced challenges in coordination and access to resources.
5. Participatory governance models, including community advisory boards and multi-stakeholder roundtables, helped incorporate diverse voices in decision-making. However, these forums required significant capacity building and proper resourcing to be effective.

Country platforms are country-specific and require a localized approach. Justice, a concept rooted in social sciences, is as much a social construct as it is technical. South Africa's approach to participatory governance takes its root in the experience of truth and reconciliation commissions, which allowed the country to deal with what happened under apartheid.

The context in Vietnam is very different, rooted in the experience of the independence war. Article 9 of 1992 constitution states that : *"The Vietnam Fatherland Front and its member*

organizations constitute the political base of people's power. The Front [...] supervises the activity of State organs, elected representatives, and State officials and employees." In other words, civil society is represented by the VFF mass organizations like the Vietnam Youth Union, the Vietnam Women Union, or the Vietnam Union of Science and Technology Associations.

5.3. Justice in Vietnam's JETP

The definition of Justice in Vietnam's JETP is best approached as multi-faceted concept. Article 24, paragraph e, of the declaration emphasizes the labor-oriented view of a just transition and at the same time shows a deep concern for the distributional perspective nationally and internationally.

To ensure a just energy transition, it is crucial to prioritize including vulnerable communities, workers in transitioning industries, and regions affected by the energy transition. This can be achieved by developing and implementing comprehensive social and labor policies that support affected individuals, ensure fair employment opportunities in the renewable energy sector, and address energy poverty. Conducting thorough impact assessments can help identify and address potential inequities and promote a fair and inclusive transition.

However, the JETP ties in with the more difficult question of the "common but differentiated responsibility." The rich countries have to act first against climate change, as agreed in the Climate Convention. Developed countries have used the lion's share of the planet's carbon budget. Is it fair to ask Vietnam to constrain its power system development not to use coal now?

We acknowledge that developing countries, especially in Europe, took the lead in developing solar and wind power technology. Today German and Danish consumers pay electricity four times the price of Vietnamese consumers. After European countries drove the prices down, Vietnam benefited from the second-mover advantage when installing PV and wind farms in 2020.

Rich nations recognized this was not enough at the Copenhagen COP in 2009 and pledged to bring $100 billion annually to less wealthy countries to help them adapt to and mitigate climate change. Although this pledge was not met, the JETP renewed the opportunity to finance the energy transition in the South, and accelerate technology transfer.

6. Energy transition science and technology

The pursuit of science and technology solutions for our energy transition is a journey of exploration and innovation, ranging from frontier-pushing fundamental research to emerging, high-promise concepts and, ultimately, to established, ready-to-deploy technologies. This section organizes these solutions based on their current maturity level, reflecting the continuous evolution and advancement in the energy sector.

6.1. Push the frontiers with fundamental research

At the cutting edge of scientific inquiry, we find a host of transformative energy solutions. Although these concepts hold potential, they currently reside primarily in laboratories, demanding significant leaps in knowledge and innovation for commercial deployment. These frontiers of research encompass:

- *Ocean Energies*: This involves harnessing energy from tides, waves, and ocean thermal energy conversion (OTEC). Ocean thermal energy conversion uses the temperature difference between the surface ocean and the deep ocean. While the potential of tidal and wave energy in Vietnam might be limited compared to its solar and wind resources, OTEC could be a promising avenue, especially for island nations within the ASEAN region.
- *Fusion Energy*: Often heralded as the 'Holy Grail' of clean energy, fusion represents a zero-emission, potentially significant energy source. Despite the challenge of achieving controlled, sustained fusion reactions, advances in superconductor technology have spurred many startups to join the race, pushing the boundaries of physics in the process.
- *Geologic Hydrogen*: Also known as 'White Hydrogen,' this naturally occurring gas, sometimes found with fossil fuel deposits, is another exciting frontier. The search for geologic hydrogen, a carbon-free energy carrier, is an emerging field that warrants significant research. We need to know where to find it and how much can be commercially available.

6.2. Deliver the promises for low-carbon energy technologies

In the intermediate stage of technology maturity, we find promising solutions that have proven their worth in labs and now face the challenge of market deployment. They need to prove their commercial viability, reliability, and scalability. These solutions include:

- *New Nuclear Energy:* Nuclear power is a zero-carbon energy source with substantial power output, but it carries lingering concerns about safety, waste management, and high upfront costs. While Vietnam has removed nuclear power projects from its recent Power Development Plan (PDP8), the land allocated for these projects is preserved. This allows room for consideration of small modular reactors, an emerging trend in nuclear technology, once they reach commercialization.
- *Green Hydrogen/Ammonia:* This technology refers to the production of hydrogen through carbon-free methods. One vision for Vietnam's 2050 power sector is the conversion of its 60 GW of coal and gas thermal power plants to use green hydrogen and ammonia, produced by an impressive 240 GW of offshore wind power. In the near term, green hydrogen can be utilized in sectors such as fertilizer and steel production. However, realizing this vision requires robust infrastructural development, regulatory support, and, crucially, cost reductions through technological advancements.
- *Carbon Capture, Utilization, and Storage (CCUS)*: Despite being a critical bridge technology, CCUS faces several challenges on its path to full potential. Vietnam, with its continued reliance on fossil fuel energy sources, notably coal, stands to benefit from CCUS technology. It can aid the country in achieving its emission reduction targets by capturing CO2 from large point sources, like coal power plants. The captured CO2 can then be utilized in various industrial applications or stored underground, especially in depleted offshore oil and gas fields. However, to be competitive, CCUS needs a high carbon price, a supportive legal framework, and continuous research.

6.3. Deploy smart electrification

Lastly, on the mature end of the technology spectrum, we have solutions ready for wide-scale deployment, although they can still benefit from further technological advancements to improve efficiency, performance, and market adoption. These solutions include:

- *Solar Cells*: Despite substantial improvements in solar cell efficiency, there is room for growth, particularly concerning new materials and manufacturing processes. Vietnam can be a significant player in this sector, considering its domestic market and industrial capacity for producing solar wafers, panels, and systems. The country needs to invest in research to enhance solar cell efficiency further and explore integrating solar power plants into existing structures, such as floating on lakes or over canals, and creating smart grid systems.

- *Battery Storage*: The pace of technological advances in battery storage holds the key to addressing the intermittency issue of renewable energy sources, thereby enhancing their reliability and deployment. It's also the deciding factor for electric vehicle adoption. Research in battery chemistry and physics needs to intensify.
- *Electric Vehicles Infrastructure*: Electric Vehicles offer more than just clean transportation; they can serve as mobile energy storage units, thereby playing a crucial role in grid stability. Although private-sector competition can spur innovation, market standards are essential and should be based on engineering science rather than mere industry power plays.
- *Demand Management:* Implementing innovative solutions can optimize electricity use, reduce energy waste, and enhance grid stability. Technologies such as IoT and smart grids can prevent situations like the one in June, where companies in Bac Ninh and Quang Ninh provinces had to resort to costly diesel generators or send workers home due to electricity shortages.

In summary, a single silver-bullet technology will not achieve Vietnam's energy transition. It is a multifaceted challenge requiring a broad, synergistic approach to science, research, and development innovation. It also requires a commitment to creating an enabling environment through effective regulations, incentives, and infrastructure development. But let us ask ourselves: How can we stimulate these promising technologies' rapid advancement and broad deployment? How can we make our contributions to this energy transition? We are all stakeholders in this endeavor. So, let's be bold in our aspirations, innovative approaches, and persistent in our efforts.

7. Business and finance

Meeting Vietnam's capital needs for the power sector requires innovative finance. The JETP's financial pledge and public and private sector contributions can significantly support Vietnam's transition. However, innovative finance goes beyond funding and can involve risk sharing, governance coalitions, and legal frameworks for the green economy.

7.1. The public sector will not finance the PDP8, specially not by debt

The 2023 May 10th draft of PDP8 estimates that the total investment capital needed to implement the plan during the 2021 – 2030 period is 134.7 billion USD, of which 119.8 billion USD for power sources development (12 billion USD per year) and 15.0 billion USD for the transmission grid (1.5 billion USD per year).

After 2031, the investment needs will climb to 18.2-24.2 billion USD per year for generation sources and 1.7-1.9 billion USD per year for the transmission grid.

The numbers from the PDP8 drafts show that the power sector expansion needs 10 to 15 billion USD annually. The JETP pledges to bring in 15.5 billion USD for the next 3-5 years, which is 3.1 to 5.2 billion USD annually. Thus the JETP proposes to finance more than 20%, up to 50% of the sector's capital needs in the 2022 PDP8 draft – a coherent order of magnitude considering the extra investment needed in a PDP8 oriented towards renewable energy. Assuming, for example, an average CAPEX of 1500 USD/kW, the sector would need 15 billion USD to invest 10 GW of installed capacity. That much money can not be called marginal but additional.

It is also the case in South Africa and Indonesia partnerships that JETP finance only a part of the capital needs. There are many good reasons why JETP money should be an additional, but not an overwhelming part of the sector's finance:

- The purpose of JETPs is not to finance the whole power sector development, only to accelerate its reorientation.
- It is a national security risk for a receiving country to allow a single source of foreign capital to finance, therefore, own a significant share of its energy system.
- The G7+ is only a part of the international community. There are many other capital sources: Japan, Korea, China, middle-east countries, and richer ASEAN countries.
- There would need to be more public budget in G7 countries to scale up the JETP model to many more countries if it pledged to finance a higher share of South Africa, Indonesia, and Vietnam's power sector needs. Moreover, international cooperation supports many other sectors beyond energy.

The 7.75 billion USD from the private sector is just a placeholder number based on matching the public sector pledge. However, a higher leverage ratio than 1:1 is in everybody's interest.

7.2. Green bonds are good, private direct investment is better

The JETP is not a pot of money but an international declaration. It only says that G7+ countries and Vietnam want to go somewhere together. The high-level agreement sets an objective and leaves it up to the executive levels of the administrations to implement it. There is no new financial mechanism and no legal commitment. Nobody accepts anything in advance.

The 15.5 billion USD financial pledge seems feasible. Over the next 3 to 5 years, 20 to 50% of Vietnam's energy sector investment can come from G7+ countries. Most investment need is in new renewable energy production sources. Still, Vietnam maintains a strict fiscal discipline, specially against external public debt. How can Vietnam take 7.75 billion USD in concessional energy sector loans from foreign lenders like Japan, World Bank, ADB, AFD, or others in the next 3 to 5 years?

The JETP size and time horizon allow EVN to negotiate green bond emissions to finance the power grid development. The principle of borrowing from the World Bank and ADB to build critical infrastructure is well established. It fits conceptually with the JETP architecture: the public sector constructs the transmission lines, and the private sector invests in the power generation capacities.

The Greece debt crisis illustrates the dangers of innovative finance and creative accounting. The South African electricity disaster highlights the importance of sound management and financing the too big to fail, State-owned utilities. EVN bonds, even if not formally State guaranteed, increase the national debt and should be used only in moderation.

It is easier to think that most JETP funding will be private. Suppose total investment from G7+ countries in Vietnam's energy sector exceeds 15.5 billion USD by 2028. In that case, the JETP can be regarded as a success, regardless of the public/private ratio. A leverage ratio of public funds greater than 1:1 would be better from everybody's point of view.

7.3. Innovative climate finance need for legal solutions

The JETP timeline is very tight. The urgency imposes to go through the existing toolbox of financial instruments and match projects with public agencies and private companies to assemble a 15-20 billion USD investment plan in six months. While there is no time to deploy classes of financial instruments that are not ready to be used in Vietnam, the action plan may develop the legal framework for financing the energy transition in the future.

Regarding climate diplomacy and Paris Agreement article 6, JETPs are non-market-based actions. That said, the JETP will support Vietnam to "*develop [...] long-term legal framework for the green transition of its economy, including through the use of pricing and regulatory instruments, which will include but is not limited to making improvements to the regulatory framework to facilitate investment into renewable energy and energy efficiency and to strengthen the electricity grid in Việt Nam...*"

A long-term legal framework for the green economy includes carbon markets and emission reduction certificates trading nationally and internationally. Carbon markets are under

MOF and MONRE's responsibility. The declaration does not mention carbon markets or forestry. It prioritizes increasing renewable energy production.

Innovative climate finance is not synonymous with carbon trading. Innovation can pertain to risk sharing between the public and private actors and between the national and multinational actors. JETPs allow development banks to articulate their new role in response to climate change -- see the agenda of Paris's June 2023 Climate Summit.

In summary, the range of financing options is considered in the JETP resource mobilization plan. Besides traditional loans to the government, which have limited potential, they include green bonds, public-private partnerships, impact investment funds, and blended finance approaches. Finance mechanisms should be designed to attract private sector investments in renewable energy projects, promote risk-sharing arrangements, and ensure the equitable distribution of financial benefits. Strengthening the legal and regulatory framework to support innovative finance initiatives will also be essential for their successful implementation.

8. Conclusion: the way forward

To spur success of the Just Energy Transition Partnership, we need to establish legal frameworks that promote renewable energy sales to green electricity-demanding companies and launch public procurement mechanisms for electricity production. Revising regulations to favor the development of small-to-medium rooftop solar for decentralized electricity production and raising electricity prices to ensure EVN's solvency is also essential.

JETP public funding should prioritize investments by the public sector to expand the power grid and enhance system flexibility will encourage private investments in renewable power projects. Private capital can flow towards renewable energy projects, and it would be irrational to limit foreign direct investment the amount mobilized by the public sector.

At this end, I trust that everybody in this room, in the International Centre for Interdisciplinary Science and Education (ICISE), in Quy Nhon and the Binh Dinh province, is now asking itself "*How do I contribute to the just energy transition of Vietnam?*"

Creating industrial clusters for renewable energy technologies, such as solar PV, offshore wind, and smart grid, could be a strategic step in implementing PDP8 and JETP. These centers of excellence will help Vietnam's science and technology compete in global supply chains and speed up technology adoption. To quote the JETP declaration, development partners will support Việt Nam to:

> *f) develop and implement educational, vocational training and re-skilling programmes...*

k) develop the renewable energy industry including but not limited to developing renewable energy hubs, storage battery and renewable energy equipment manufacturing …

l) work towards the establishment of a center of excellence for renewable energy in Việt Nam to share expertise, support the development of skills, technological and regulatory understanding and facilitate voluntary cooperation between Việt Nam and the private sector on technology transfer…

In conclusion, the ecological transition is a complex challenge that requires a reimagined approach to energy, cooperation mechanisms, governance models, and justice. It's a journey towards a secure, sustainable and equitable future. I urge scientists, lawyers, and policymakers from France and Vietnam to seize the opportunity of the day and establish regional centers of excellence. With its rich solar resources and strategic location, Quy Nhon could become one such center on renewable energy. By collaborating, we can expedite the ecological transition, encourage sustainable and inclusive development, and lay the groundwork for a greener future.

That said, many open questions remain. What unique opportunities and challenges does Vietnam face in its energy transition that we have not yet considered? What ideas or perspectives could enrich our discussion? What technologies show the most promise for Vietnam in the near future, and how can we build research capabilities to advance these solutions? What innovative financing models could help crowd in private capital for Vietnam's renewable energy sector, and what legal and regulatory frameworks would facilitate these models?

I thank you for your attention and look forward to our discussion.

References

Ha-Duong, Minh. 2023-05-29. Vietnam's Power Development Plan 8: A bold step towards a net-zero future. Short read published in The Mekong Eye online magazine.

Ha-Duong, Minh. 2023-05. Vietnam's Energy Transition Partnership: a background report. CIRED Working Paper 2023-90. Centre international de recherche sur l'environnement et le développement. (online). 97 pages.

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