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Vietnam a model of green development?

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As Vietnam pursues its ambitious goal of transitioning from a middle-income to a higher-income country while simultaneously moving towards a zero-carbon society, it faces a complex set of challenges. This article delves into these challenges, focusing on the technological, infrastructural, financial and collaborative needs of this transition.

I. Technological Challenges: From Catch-Up to Frontier Innovation

Vietnam has enjoyed a second mover advantage in renewable energy technologies. While countries like Germany and other European nations developed the renewable energy technology markets, Vietnam was able to put a feed-in tariff in place and import the technology. However, as the country aims to compete at the technological frontier, it faces more complex challenges.

Wind turbines provide a clear example. Vietnam has the capability to build the low-tech steel towers, as evidenced by a Vietnamese factory constructing steel structures for offshore wind in Taiwan or Korea (see Figure 1). However, the country lacks the high-tech expertise to manufacture the composite blades, which are crucial components of modern wind turbines.

Moreover, Vietnam needs to develop smart energy systems management technology. An intelligent electric grid is a key component of the energy transition. Electric vehicles, for instance, should be able to communicate with the grid, knowing the optimal times to charge their batteries and even provide electricity back to the grid when needed. This technology, while not yet available, illustrates the kind of innovation Vietnam needs to undertake to be at the forefront of the energy transition.

Battery storage is another crucial technology that Vietnam needs to master. It can be used at various levels:

- I. At the project level, such as storing solar farm production for evening use when prices are high.

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*Figure 1: CS wind yard manager in Ba Ria Vung Tau presenting offshore wind towers built for exporting to Jeonnam I project in Korea.
(c) 2024-04 Stuart Livesey, CEO Copenhagen Offshore Partners Vietnam*

2. At the distribution grid level, to compensate for fluctuations in supply and demand, or to provide backup power during emergencies.
3. For decentralized systems in factories or households, particularly when combined with solar rooftops for 24/7 green energy.

However, the current market conditions in Vietnam don't make battery storage profitable, largely due to the absence of necessary market mechanisms. A few years ago, there were discussions about subsidizing or even mandating battery storage for solar and wind power projects, but these ideas were not practical due to the centralized nature of the system and the uncertainty around who would manage the battery systems.

The solution lies in establishing a price system that allows battery system operators to find revenue in the market. This could include contracts for providing emergency power, engaging in price arbitrage, or offering black start capacity to restart the grid in case of a major blackout. Developing such a market-based system, rather than a command-and-control approach, is key to making battery storage economically viable in Vietnam.

2. Infrastructure Needs: Balancing Development and Sustainability

The infrastructure challenge in Vietnam is not just about the energy transition; it's inherently tied to the broader issue of economic development. With electricity demand

growing by 6-8% per year, Vietnam needs to build substantial infrastructure to meet this demand, which requires significant capital investment. The state alone cannot bear this burden, necessitating the involvement of private investors.

When it comes to infrastructure investment, it's crucial to distinguish between electricity transmission (the grid) and production (power plants). The grid, being more strategic and requiring central management, needs to remain under public control to ensure the stability and efficiency of the system. Electricity production, on the other hand, can be more easily left to the private sector, with the government purchasing the electricity through various agreements.

Water energy storage, particularly pumped hydro, is another area where Vietnam has significant potential. The country has plenty of hills and water resources to build pumped hydro storage facilities. However, projects have moved slowly, often due to inefficient capital allocation. For instance, the Bac Ai project has only built the lower dam without the upper dam, meaning the invested capital cannot be utilized until the project is completed. This highlights the need for more efficient project planning and execution.

Vietnam also aspires to develop an offshore wind industry, not just offshore wind farms. This means developing the facilities to install and produce wind turbines domestically, rather than simply importing them. The government wants factories in Vung Tau to produce everything and even export to other countries. This is similar to the approach France took, where it required a high share of national content in its offshore wind farms, leading to a 5-year lag compared to other countries as the industry had to first build factories.

The environmental impact of these infrastructure projects is also a concern. While offshore wind is less problematic, near-shore wind power can potentially affect sensitive coastal areas with high biodiversity. Careful planning and environmental impact assessments are necessary to balance the need for clean energy with the preservation of natural habitats.

3. Funding: Attracting Capital for the Transition

Funding the energy transition is a major challenge for Vietnam. The country needs around \$2 billion per year for the grid and \$10 billion for generation facilities. Domestic public funding, such as EVN investing in the grid and energy storage, can only go so far. The recent fossil fuel crisis has depleted EVN's savings, as it had to bear the brunt of increased fuel prices while the government lowered electricity prices for consumers.

Attracting private capital is therefore crucial. One mechanism is build-operate-transfer (BOT), where assets are owned by foreign companies for a period (usually 25 years) before

being transferred to Vietnam. EVN has experience with this model for thermal plants, but it's unclear if it will be used for renewable energy.

To attract the necessary capital (\$10 billion per year), Vietnam needs to offer attractive returns on investment while managing risk. Power purchase agreements (PPAs) are a key tool in this regard. The government needs to strike a balance between providing certainty to investors (e.g., committing to purchase a certain amount of electricity at a certain price) and maintaining flexibility in a changing market.

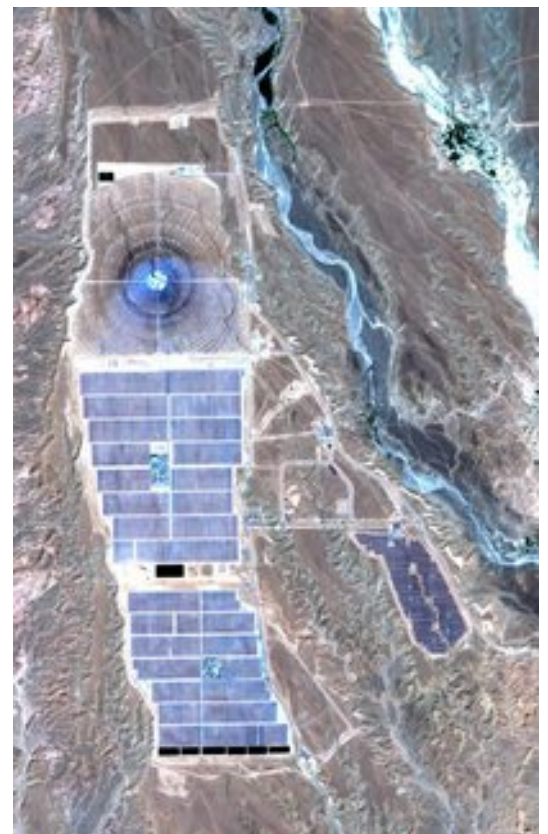
There's a negotiation process between the government and investors. Generation companies would prefer a contract where EVN commits to buying all their electricity at a price indexed to coal or gas prices, with a guaranteed purchase of 85% of their capacity. EVN, on the other hand, wants more flexibility to purchase electricity when needed. Finding the right balance in these negotiations is key to attracting capital while safeguarding the public interest.

4. International Collaborations: Mutual Benefits and Lessons Learned

International collaborations can play a significant role in accelerating Vietnam's energy transition, but only if they provide mutual benefits. The era of charity-based aid or the simplistic division of the world into "rich" and "developing" countries is over. Collaborations that work are those that provide profits to all parties involved.

There are several examples of successful collaborations. Chinese companies setting up solar panel factories in Vietnam to export to America provide jobs, technology transfer, and a source of solar panels for Vietnam's own use. Similarly, General Electric building electric engine cabinets and generators in Hai Phong as part of its global wind turbine supply chain brings investment, employment, and expertise to Vietnam.

Vietnam is also actively collaborating with its neighbors. Electricity connector projects within ASEAN are underway, and Vietnam plans to source hydroelectricity from Laos, which wants to become the "battery of Southeast Asia." These regional collaborations are key to optimizing resource use and ensuring energy security.



*Figure 2: An example of win-win international collaboration: the Noor solar farm in Morocco, built with Spanish expertise.
(c) Wikimedia Commons*

However, it's important to learn from the mixed results of some international collaborations. The Clean Development Mechanism, aimed at reducing emissions in developing countries, has not been very positive from a scientific point of view, though it has moved a lot of money. The Green Climate Fund, despite promises to provide \$100 billion per year for climate action, has not been very successful.

Carbon markets offer another area for international collaboration and learning. There are two types of carbon markets: those related to land use and forestry (often voluntary), and those related to industrial emissions (regulated). The latter is more promising for Vietnam, as companies that emit CO₂ would have to buy emission allowances. Vietnam is looking at the experiences of other countries in setting up such markets.

The political lesson from these international examples is that energy transition is a hot topic in international collaboration, and an area where low and middle-income countries can get some support. However, there are many pitfalls to avoid, and Vietnam needs to be strategic in its collaborations.

5. Conclusion

The energy transition is a generational project, comparable to the journey of economic development. Just as it took Vietnam about 30 years to move from a low-income to a middle-income country, the transition to a high-income, zero-carbon society will likely take another generation.

International cooperation, while important, should gradually decrease in significance as Vietnam develops its own markets, researchers, and engineers. The country has initially adopted a very open development strategy based on foreign direct investment and exports, but it should aim to become more self-reliant and competitive over time.

The ideal outcome would be for Vietnam to become a model for other countries, demonstrating that successful green development is possible. Vietnam has numerous advantages - abundant sunshine, wind, hydro resources, a favorable geographic location, and a culture of hard work and innovation. If Vietnam cannot make the energy transition work, it will be a worrying sign for other countries.

By strategically navigating the challenges of technology, infrastructure, funding, and international collaborations, Vietnam has the potential to not only achieve its own energy transition but to lead the way for other nations. It's an ambition that is well within reach, and one that Vietnam should strive for as it carves its path towards a sustainable, prosperous future.