



## Three scenarios for coal power in Vietnam

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# Three scenarios for coal power in Vietnam

Minh Ha-Duong<sup>1</sup>

2019-06-22

**Abstract:** This note offers three narratives about the future of coal based electricity generation in Vietnam. “Blazing up” corresponds to the power development plan 7 revised and updated as of March 2019. “Closed window” tells what we think would happen under pure market forces. “Coal peak” tells what could happen if the State continues to steer the electricity system into the energy transition, decisively and without imposing high costs to stakeholders.

## The problem: stranded assets and coal exit trajectories

A global analysis of 6,685 coal plants<sup>1</sup> finds that it is now cheaper to build new renewable generation than to run 35 percent of coal plants worldwide. For those companies, holding on to coal power plants assets is not economically interesting, even if they are fully amortized. This is already happening: American utilities Xcel in Colorado<sup>2</sup> and NIPSCO in Indiana<sup>3</sup> are retiring coal-fired power plant to build new capacity based on renewable energy sources with storage.

The same report concludes that by 2030, renewables beat out most of today’s existing and planned coal-fired generation in Vietnam, the average plant age at retirement will be 13 years, and this creates a 11.7 billion stranded assets risk. Based on investors’ reaction to Genco 3’s initial public offering, it is clear that markets do not see a very profitable future for Vietnamese generation companies holding lots of coal assets.

## Narratives

We name the three stories “Blazing up”, “Closed window” and “Coal peak”. The first one corresponds to the power development plan 7 revised and updated as of March 2019. The second story tells what we think would happen under pure market forces. The third story tells what could happen if the State continues to steer the electricity system into

the energy transition, decisively and without imposing high costs to stakeholders.

**Blazing up:** Coal power generation units come online according to the “Expected” date listed in<sup>4</sup>. The plan to procure a fleet of Build-Operate-Transfer projects goes on with small acceptable delays, foreign investors are satisfied by the 12% internal rate of return allowed in their Power Purchase Agreements<sup>5</sup>. The government interprets “No new coal” policy to mean that projects lacking an investor as of 2019 are not pursued, and no new projects are registered beyond those existing in PDP7A. Units are decommissioned after 40 years.

**Closed window:** Investors recognize that the economic window to build new coal generation projects in Vietnam is closed. Only already permitted coal power generation units with a scheduled completion in or before 2025 are kept. The government terminates all other projects on the basis of Circular 43<sup>6</sup>, bringing relief to investors who were struggling to obtain financing and the administrative and the social licenses to operate. It is realized after 2035 that operating coal power plants is losing money, so EVN decommissions the plants as soon as the BOT investor transfers them back to the State. Subcritical units cease operations after 20 years, the others after 24 years. Exit from coal is complete by 2050.

**Coal peak:** The pilot renewable energy auctions for solar and wind in 2020 reveal that

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# Coal power generation capacity in Vietnam

Three scenarios for PDP8

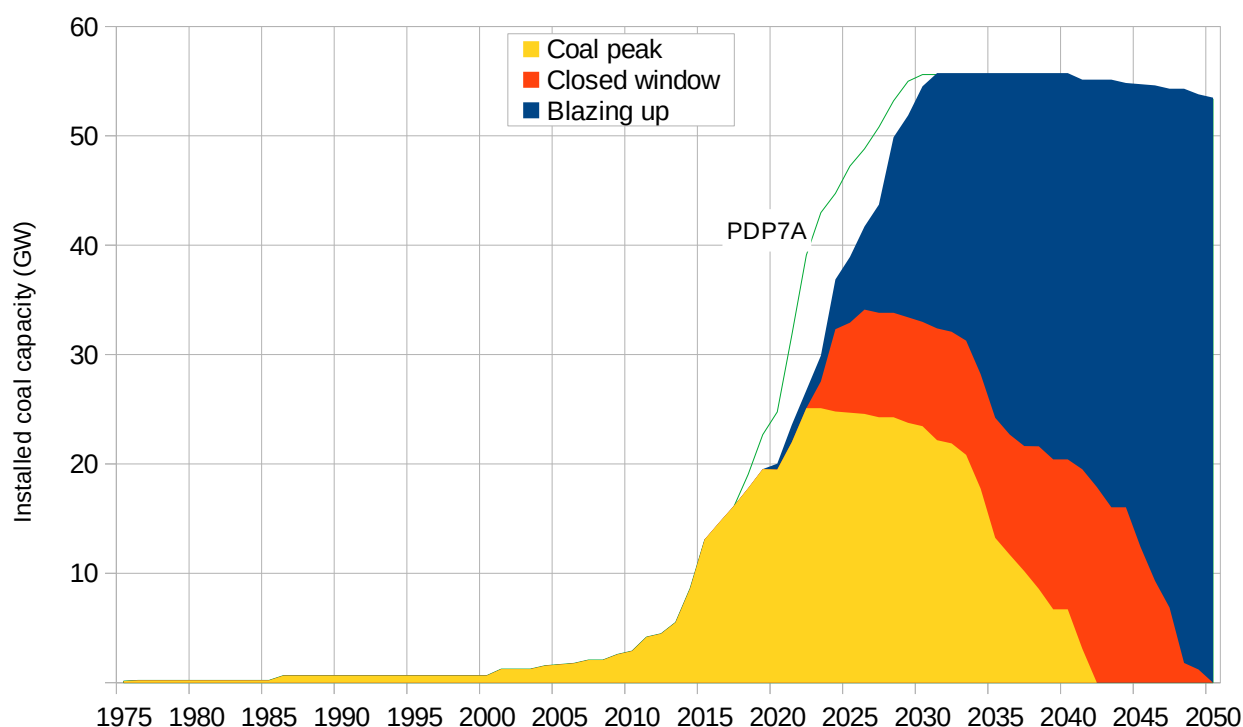


Figure 1: Three trajectories for coal power generation capacity in Vietnam.

procuring electricity from domestic renewable sources is more competitive than the price<sup>5</sup> given to foreign companies to build and operate plants running on imported coal – the BOT program is not cost-efficient. In the same year, power shortages impress that this program has not been effective either to provide energy security. Investors who are not committed yet leave ship, seeing that coal assets will lose profitability shortly: no new coal plant starts construction after 2019, and none is commissioned after the end of 2022. The 13<sup>th</sup> National Congress in January 2021 adapts the Asian concept of ecological civilization as a key goal for Vietnamese society, and directs the country to accelerate the energy transition. MONRE imposes stricter pollution control norms, MOF raises fossil fuel taxes and import duties. The National Assembly votes a 2021 Renewable Energy Law, it enacts Renewable Portfolio Standards also for BOT plants. In application, Prime Ministers orders MOIT to submit a coal exit plan to be integrated in PDP8 revision. Coal power plants cannot operate profitably after 2035, they are

decommissioned at 20 years. The coal exit is complete before 2045.

## Trajectories

We simulated the trajectories corresponding to these narratives using a table of coal power generation units in Vietnam, according to the March 2019 report by EVN<sup>4</sup>. The thin line above the Blazing Up scenario represents PDP7A coal generation capacity objectives formulated in 2016. The capacity gap in 2020 compared to the plan has been partially filled by overachieving the solar PV capacity objectives. In terms of area under the curves on the 2020 – 2050 interval –roughly proportional to greenhouse gases emissions– the Closed Window scenario is 45% of the Blazing Up scenario, and the Coal Peak 27%.

## Comparison with other scenarios

We reviewed existing studies on Vietnam power system development, to understand how our scenarios compare to their visions about the future of coal in the country. Figure

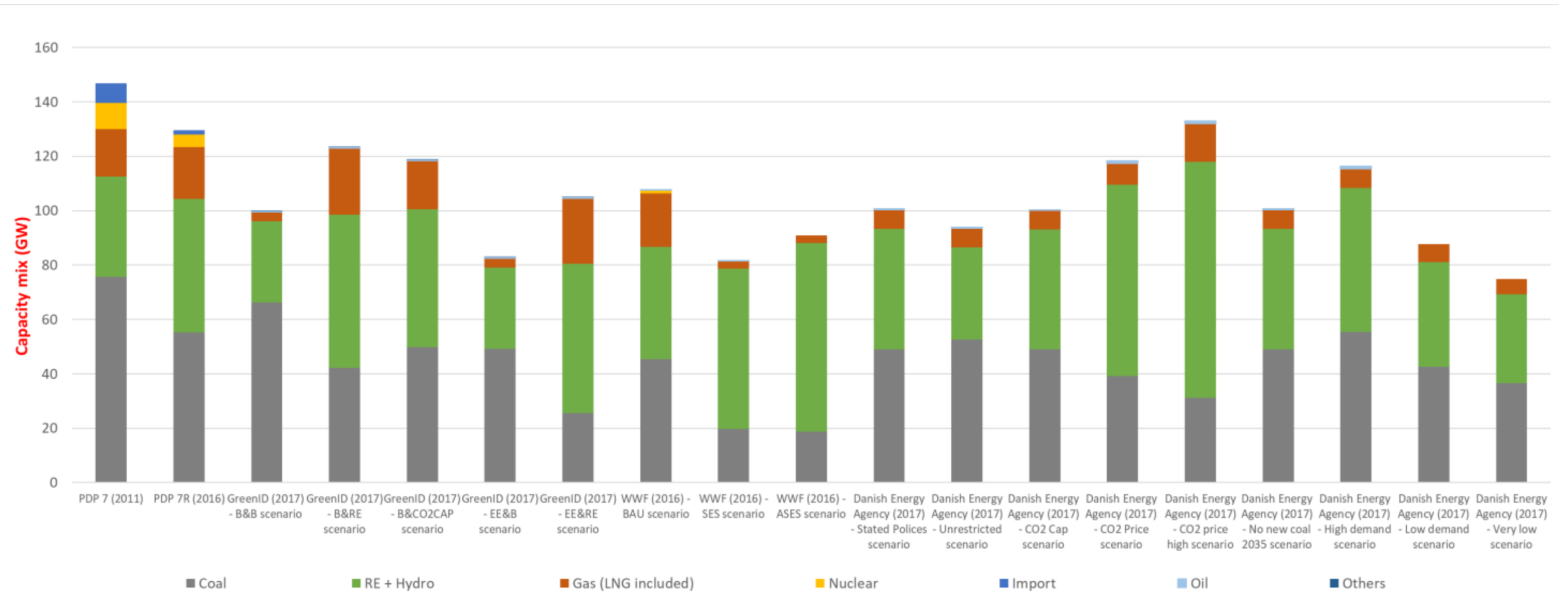


Figure 2: Capacity mix (MW) by fuel type in 2030 in existing scenarios

2 below plots the capacity mix by 2030 for 19 scenarios reviewed, belonging to 5 studies.

Coal is still dominant in term of installed capacity in the previous PDP 7 (2011) and current planning PDP 7R (2016). By 2030, we observed that the group of scenarios with highest installed capacity on coal is with 75.7 GW in the PDP 7 (2011) and 55 GW in the PDP 7 revised (2016). The “Blazing up” scenario is very close to the latter, by definition.

The “Closed Window” scenario reaching 33 GW of coal generation capacity in 2030. This is close to Vietnam Energy Outlook 2017<sup>8</sup> scenarios “CO2 price high”. While it is natural to see where our scenario fit in the variety of trajectories from the Outlook 2017, our scenario was designed independently based on the free market forces drivers. The coincidence of our “Closed window” scenario with the Outlook 2017 scenario driven by a CO2 shadow price increasing to 40 USD/t in 2030, then 45 USD/t in 2035 – 2050, can be interpreted as follows: Vietnam is a small open economy. Its infrastructure building is influenced by international market conditions. In international market there are forces against coal power generation. The effective magnitude of these forces is coherent with the magnitude of the shadow price.

The group of scenarios with target on RE is situated at the lowest range of coal installed capacity with 18.7 GW (WWF 2016 - ASES) and 19.8 GW (WWF 2016 – SES), also including GreenID (2017) EE & RE scenario. The “Coal peak” scenario is close to the latter, it mostly updates it based on the same fundamental idea: only coal plants already under construction go forward.

In conclusion, which scenario will come out closest to reality depends more on policy and investment choices than on chance, so one can not say that any scenario is more *probable* than another. These trajectories are not forecasts, only narrative tools to support the policy discussion.

### Acknowledgements

This note presents these scenarios for coal power in Vietnam constructed by VIET as part of a larger study on the engineering and economic implications of alternative power development plans for Vietnam, conducted with two other think tanks: Agora Energiewende (Berlin) and Institute for Sustainable Future (Sydney). The author acknowledges research assistance from Minh-Quan Tong and Hoang Nguyen, VIET data officers for Tables 2 and 3. Figure 2 is by Hoang Anh Tran and Nguyen Trinh Hoang Anh, VIET analysts. We thank all reviewers inside and outside VIET.

## Sources cited

1. Gray, M., Ljungwadh, S., Watson, L. & Kok, I. *Powering down coal. Navigating the economic and financial risks in the last years of coal power.* (Carbon Tracker Initiative, 2018).
2. Pyper, J. Xcel to Replace 2 Colorado Coal Units With Renewables and Storage. *gtm: GreenTechMedia* (2018). Available at: <https://www.greentechmedia.com/articles/read/xcel-retire-coal-renewable-energy-storage>. (Accessed: 5th June 2019)
3. Walton, R. NiSource subsidiary announces plan to end coal use within 10 years. *Utility Dive* (2018). Available at: <https://www.utilitydive.com/news/nisource-subsidiary-announces-plan-to-end-coal-use-within-10-years/532876/>. (Accessed: 5th June 2019)
4. Hoang Quoc Vuong. *Progress of implementing some key power source projects in PDP VII revised - Tình hình thực hiện các dự án điện trong Quy hoạch điện VII điều chỉnh.* (MOIT, EREA, 2019).
5. Cao Quoc Hung. *Circular 56/2014/TT-BCT on method of determination of electricity generation costs, sequence of inspection of power purchase agreement (PPA).* 50 (Ministry of Industry and Trade, 2014).
6. Trần Tuấn Anh. *Circular 43/2016/TT-BCT on Commitments for Project Development and Mechanism of Handling Electrical Factory Projects Not Performing a Practice Progress.* 11 (Ministry of Industry and Trade, 2016).
7. Tran, H. A., Nguen Trinh Hoang Anh & Ha-Duong, M. A critical review of energy scenarios in Vietnam: Low-carbon options and policy implications. (2019).
8. MOIT. *Vietnam Energy Outlook Report 2017.* 78 (2017).

## Supplementary material: data tables

Table 1: Coal power installed capacities (in MW) at key planning years for the three scenarios

| Year | Blazing up | Closed window | Coal peak |
|------|------------|---------------|-----------|
| 2000 | 645        | 645           | 645       |
| 2005 | 1 655      | 1 655         | 1 655     |
| 2010 | 2 889      | 2 889         | 2 889     |
| 2015 | 13 103     | 13 103        | 13 103    |
| 2020 | 20 032     | 19 482        | 19 482    |
| 2025 | 38 937     | 32 917        | 24 687    |
| 2030 | 54 537     | 32 993        | 23 453    |
| 2035 | 55 737     | 24 225        | 13 239    |
| 2040 | 55 737     | 20 415        | 6 710     |
| 2045 | 54 727     | 12 430        | 0         |
| 2050 | 53 493     | 0             | 0         |

Table 2 (on next page) defines which plants gets to be build when, in the scenarios.

Table 3 (on page following table 2) lists plants already operating, already canceled, and those announced in the PDP7A as contingent on the renewable energy not meeting their objectives.

| Unit                                       |                                                        | Sponsor                                                        | Capacity (MW) | Status mid 2019 | PDP7A | Blazing up | Closed window | Coal peak |
|--------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------|---------------|-----------------|-------|------------|---------------|-----------|
| Duyen Hai-3 Extension                      |                                                        | Electricity of Vietnam                                         | 660           | 4 construction  | 2019  | 2019       | 2019          | 2019      |
| Vinh Tan-4 extension                       |                                                        | Electricity of Vietnam                                         | 600           | 4 construction  | 2019  | 2019       | 2019          | 2019      |
| Duyen Hai-2 Unit 1                         |                                                        | Janakuasa SDN BHD                                              | 600           | 4 construction  | 2021  | 2021       | 2021          | 2021      |
| Hai Duong Unit 1                           |                                                        | JAKS Resources, China Power Engineering Consulting Group       | 600           | 4 construction  | 2020  | 2021       | 2021          | 2021      |
| Hai Duong Unit 2                           |                                                        | JAKS Resources, China Power Engineering Consulting Group       | 600           | 4 construction  | 2021  | 2021       | 2021          | 2021      |
| Song Hau-1 Unit 1                          |                                                        | PetroVietnam Power Corp                                        | 600           | 4 construction  | never | 2021       | 2021          | 2021      |
| Song Hau-1 Unit 2                          |                                                        | PetroVietnam Power Corp                                        | 600           | 4 construction  | never | 2021       | 2021          | 2021      |
| Thai Binh-2 Unit 1                         |                                                        | PetroVietnam Power Corp                                        | 600           | 4 construction  | 2017  | 2021       | 2021          | 2021      |
| Duyen Hai-2 Unit 2                         |                                                        | Janakuasa SDN BHD                                              | 600           | 4 construction  | 2021  | 2022       | 2022          | 2022      |
| Na Duong 2                                 |                                                        | TKV                                                            | 110           | 4 construction  | 2019  | 2022       | 2022          | 2022      |
| Nghi Son-2 Unit 1                          |                                                        | Korean Electric Power Corporation and Marubeni Group           | 600           | 4 construction  | 2021  | 2022       | 2022          | 2022      |
| Nghi Son-2 Unit 2                          |                                                        | Korean Electric Power Corporation and Marubeni Group           | 600           | 4 construction  | 2022  | 2022       | 2022          | 2022      |
| Thai Binh-2 Unit 2                         |                                                        | PetroVietnam Power Corp                                        | 600           | 4 construction  | 2018  | 2022       | 2022          | 2022      |
| Long Phu-1 Unit 1                          |                                                        | PetroVietnam Power Corp                                        | 600           | 4 construction  | 2018  | 2023       | 2023          | never     |
| Long Phu-1 Unit 2                          |                                                        | PetroVietnam Power Corp                                        | 600           | 4 construction  | 2019  | 2024       | 2024          | never     |
| Quang Trach-1 Unit 1                       |                                                        | Electricity of Vietnam                                         | 600           | 3 permitted     | 2021  | 2022       | 2022          | 2022      |
| Quang Trach-1 Unit 2                       |                                                        | Electricity of Vietnam                                         | 600           | 3 permitted     | 2022  | 2023       | 2023          | never     |
| Van Phong-1 Unit 1                         |                                                        | Sumitomo Corporation                                           | 660           | 3 permitted     | 2022  | 2023       | 2023          | never     |
| Vung Ang-2 Unit 1                          |                                                        | OneEnergy Co.                                                  | 600           | 3 permitted     | 2021  | 2023       | 2023          | never     |
| Cong Thanh power station Unit 1            |                                                        | Cong Thanh Thermal Power Joint Stock Company                   | 300           | 3 permitted     | 2020  | 2024       | 2024          | never     |
| Cong Thanh power station Unit 2            |                                                        | Cong Thanh Thermal Power Joint Stock Company                   | 300           | 3 permitted     | 2020  | 2024       | 2024          | never     |
| Nam Dinh-1 Unit 1                          |                                                        | Taekwang Vina Industry Joint Stock Company, First National Ope | 600           | 3 permitted     | 2021  | 2024       | 2024          | never     |
| Song Hau-2 Unit 1                          |                                                        | Toyo Engineering & construction                                | 1000          | 3 permitted     | 2021  | 2024       | 2024          | never     |
| Song Hau-2 Unit 2                          |                                                        | Toyo Engineering & construction                                | 1000          | 3 permitted     | 2022  | 2024       | 2024          | never     |
| Van Phong-1 Unit 2                         |                                                        | Sumitomo Corporation                                           | 660           | 3 permitted     | 2023  | 2024       | 2024          | never     |
| Vung Ang-2 Unit 2                          |                                                        | OneEnergy Co.                                                  | 600           | 3 permitted     | 2022  | 2024       | 2024          | never     |
| Nam Dinh-1 Unit 2                          |                                                        | Taekwang Vina Industry Joint Stock Company, First National Ope | 600           | 3 permitted     | 2022  | 2025       | 2025          | never     |
| Quynh Lap-1 Unit 1                         |                                                        | Vietnam National Coal and Mineral Industries Group             | 600           | 3 permitted     | 2022  | 2026       | 2026          | never     |
| Quynh Lap-1 Unit 2                         |                                                        | Vietnam National Coal and Mineral Industries Group             | 600           | 3 permitted     | 2023  | 2026       | 2026          | never     |
| Duc Giang - Lao Cai Chemical power station | Duc Giang - Lao Cai Chemicals Joint Stock Company      |                                                                | 50            | 2 pre-permit    | never | 2020       | 2020          | 2020      |
| Duc Giang - Lao Cai Chemical power station | Duc Giang - Lao Cai Chemicals Joint Stock Company      |                                                                | 50            | 2 pre-permit    | never | 2020       | 2020          | 2020      |
| Ha Tinh Formosa Plastics Steel Complex p   | Hu'ng Nghiep Formosa Ha Tinh                           |                                                                | 150           | 2 pre-permit    | 2020  | 2020       | 2020          | 2020      |
| Ha Tinh Formosa Plastics Steel Complex p   | Hu'ng Nghiep Formosa Ha Tinh                           |                                                                | 150           | 2 pre-permit    | 2020  | 2020       | 2020          | 2020      |
| Ha Tinh Formosa Plastics Steel Complex p   | Hu'ng Nghiep Formosa Ha Tinh                           |                                                                | 150           | 2 pre-permit    | 2020  | 2020       | 2020          | 2020      |
| Hai Ha CHP power station Phase 1&2 Unit 1  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 50            | 2 pre-permit    | 2019  | 2022       | 2022          | 2022      |
| An Khanh - Bac Giang power station         | An Khanh - Bac Giang Thermolectric Joint Stock Company |                                                                | 650           | 2 pre-permit    | 2023  | 2023       | 2023          | never     |
| Hai Ha CHP power station Phase 1&2 Unit 2  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 50            | 2 pre-permit    | 2019  | 2023       | 2023          | never     |
| Hai Ha CHP power station Phase 1&2 Unit 3  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 50            | 2 pre-permit    | 2019  | 2024       | 2024          | never     |
| Vinh Tan-3 Unit 1                          | OneEnergy, EVN, and Pacific Group                      |                                                                | 660           | 2 pre-permit    | 2022  | 2024       | 2024          | never     |
| Hai Ha CHP power station Phase 1&2 Unit 4  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 150           | 2 pre-permit    | 2022  | 2025       | 2025          | never     |
| Vinh Tan-3 Unit 2                          | OneEnergy, EVN, and Pacific Group                      |                                                                | 660           | 2 pre-permit    | 2023  | 2025       | 2025          | never     |
| Vinh Tan-3 Unit 3                          | OneEnergy, EVN, and Pacific Group                      |                                                                | 660           | 2 pre-permit    | 2023  | 2025       | 2025          | never     |
| Hai Ha CHP power station Phase 1&2 Unit 5  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 150           | 2 pre-permit    | 2022  | 2026       | 2026          | never     |
| Quang Trach-2 unit 1                       | Electricity of Vietnam                                 |                                                                | 600           | 2 pre-permit    | 2028  | 2026       | 2026          | never     |
| Quang Tri-1 Unit 1                         | EGAT International (EGATi)                             |                                                                | 660           | 2 pre-permit    | 2023  | 2026       | 2026          | never     |
| Hai Ha CHP power station Phase 1&2 Unit 6  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 150           | 2 pre-permit    | 2022  | 2027       | never         | never     |
| Quang Tri-1 Unit 2                         | EGAT International (EGATi)                             |                                                                | 660           | 2 pre-permit    | 2024  | 2027       | never         | never     |
| Hai Ha CHP power station Phase 1&2 Unit 7  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 150           | 2 pre-permit    | 2022  | 2028       | never         | never     |
| Hai Ha CHP power station Phase 3&4 Unit 1  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 300           | 2 pre-permit    | 2025  | 2028       | never         | never     |
| Hai Ha CHP power station Phase 3&4 Unit 1  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 300           | 2 pre-permit    | 2028  | 2028       | never         | never     |
| Hai Ha CHP power station Phase 3&4 Unit 1  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 300           | 2 pre-permit    | 2028  | 2028       | never         | never     |
| Hai Ha CHP power station Phase 3&4 Unit 9  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 300           | 2 pre-permit    | 2025  | 2028       | never         | never     |
| Hai Phong-3 Unit 1                         | Vietnam National Coal and Mineral Industries Group     |                                                                | 600           | 2 pre-permit    | 2025  | 2028       | never         | never     |
| Hai Ha CHP power station Phase 1&2 Unit 8  | Texhong Hai Ha Industrial Park Co.                     |                                                                | 150           | 2 pre-permit    | 2022  | 2029       | never         | never     |
| Hai Phong-3 Unit 2                         | Vietnam National Coal and Mineral Industries Group     |                                                                | 600           | 2 pre-permit    | 2026  | 2029       | never         | never     |
| Quang Tri-2 Unit 1                         | Korea Western Power Co                                 |                                                                | 600           | 1 announced     | never | 2024       | 2024          | never     |
| Quang Tri-2 Unit 2                         | Korea Western Power Co                                 |                                                                | 600           | 1 announced     | never | 2024       | 2024          | never     |
| Quang Trach-2 unit 2                       | Electricity of Vietnam                                 |                                                                | 600           | 1 announced     | 2029  | 2026       | 2026          | never     |
| Quynh Lap 2 unit 1                         | BOT                                                    |                                                                | 600           | 1 announced     | 2026  | 2027       | never         | never     |
| Tan Phuoc 1 unit 1                         | Electricity of Vietnam                                 |                                                                | 600           | 1 announced     | 2027  | 2027       | never         | never     |
| Dung Quat Special Economic Zone power st   | J-Power                                                |                                                                | 2400          | 1 announced     | never | 2028       | never         | never     |
| Quynh Lap 2 unit 2                         | BOT                                                    |                                                                | 600           | 1 announced     | 2027  | 2028       | never         | never     |
| Tan Phuoc 1 unit 2                         | Electricity of Vietnam                                 |                                                                | 600           | 1 announced     | 2028  | 2028       | never         | never     |
| Tan Phuoc 2 unit 1                         | Electricity of Vietnam                                 |                                                                | 600           | 1 announced     | 2028  | 2028       | never         | never     |
| Long Phu 2 unit 1                          | BOT                                                    |                                                                | 660           | 1 announced     | 2021  | 2029       | never         | never     |
| Tan Phuoc 2 unit 2                         | Electricity of Vietnam                                 |                                                                | 600           | 1 announced     | 2029  | 2029       | never         | never     |
| Dung Quat Special Economic Zone power st   | J-Power                                                |                                                                | 2000          | 1 announced     | never | 2030       | never         | never     |
| Long Phu 2 unit 2                          | BOT                                                    |                                                                | 660           | 1 announced     | 2021  | 2030       | never         | never     |
| Vung Ang 3 unit 1                          | BOT                                                    |                                                                | 600           | 1 announced     | 2024  | 2031       | never         | never     |
| Vung Ang 3 unit 2                          | BOT                                                    |                                                                | 600           | 1 announced     | 2025  | 2031       | never         | never     |
| Cam Pha 3 Unit 1                           | TKV                                                    |                                                                | 220           | 1 announced     | 2020  | never      | never         | never     |
| Cam Pha 3 Unit 2                           | TKV                                                    |                                                                | 220           | 1 announced     | 2020  | never      | never         | never     |
| Long An 1 unit 1                           | no investor                                            |                                                                | 600           | 1 announced     | 2024  | never      | never         | never     |
| Long An 1 unit 2                           | no investor                                            |                                                                | 600           | 1 announced     | 2025  | never      | never         | never     |
| Long An 2 unit 1                           | no investor                                            |                                                                | 800           | 1 announced     | 2026  | never      | never         | never     |
| Long An 2 unit 2                           | no investor                                            |                                                                | 800           | 1 announced     | 2027  | never      | never         | never     |
| Long Phu 3 unit 1                          | PVN proposed to transfer                               |                                                                | 600           | 1 announced     | 2021  | never      | never         | never     |
| Long Phu 3 unit 2                          | PVN proposed to transfer                               |                                                                | 600           | 1 announced     | 2022  | never      | never         | never     |
| Long Phu 3 unit 3                          | PVN proposed to transfer                               |                                                                | 600           | 1 announced     | 2022  | never      | never         | never     |
| Quang Ninh 3 unit 1                        | no investor                                            |                                                                | 600           | 1 announced     | 2029  | never      | never         | never     |
| Quang Ninh 3 unit 2                        | no investor                                            |                                                                | 600           | 1 announced     | 2030  | never      | never         | never     |
| Dong Nai Formosa Unit 3                    | IPP                                                    |                                                                | 150           | 1 announced     | 2016  | never      | never         | 5 never   |
| Rang Dong cogeneration                     | IPP                                                    |                                                                | 100           | 1 announced     | 2025  | never      | never         | never     |

| Unit                                           | Sponsor                                            | Capacity (MW) | Status mid 2019 | PDP7A | Blazing up | Closed window | Coal peak |
|------------------------------------------------|----------------------------------------------------|---------------|-----------------|-------|------------|---------------|-----------|
| Long Son Chemical Unit 1                       | IPP (Cogeneration)                                 | 75            | 9 cancelled     | 2017  | never      | never         | never     |
| Long Son Chemical Unit 2                       | IPP (Cogeneration)                                 | 75            | 9 cancelled     | 2018  | never      | never         | never     |
| Long Son Chemical Unit 3                       | IPP (Cogeneration)                                 | 75            | 9 cancelled     | 2018  | never      | never         | never     |
| Luc Nam Unit 1                                 | IPP                                                | 50            | 9 cancelled     | 2022  | never      | never         | never     |
| Ninh Binh Unit 1                               | Ninh Binh Thermal Power JSC                        | 25            | 5 operating     | 1974  | 1974       | 1974          | 1974      |
| Ninh Binh Unit 2                               | Ninh Binh Thermal Power JSC                        | 25            | 5 operating     | 1974  | 1974       | 1974          | 1974      |
| Ninh Binh Unit 3                               | Ninh Binh Thermal Power JSC                        | 25            | 5 operating     | 1974  | 1974       | 1974          | 1974      |
| Ninh Binh Unit 4                               | Ninh Binh Thermal Power JSC                        | 25            | 5 operating     | 1974  | 1974       | 1974          | 1974      |
| Uong Bi power station I Unit 1                 | EVN Genco No 1                                     | 50            | 5 operating     | 1975  | 1975       | 1975          | 1975      |
| Uong Bi power station I Unit 2                 | EVN Genco No 1                                     | 55            | 5 operating     | 1976  | 1976       | 1976          | 1976      |
| Pha Lai-1 power station Unit 1                 | Pha Lai Thermal Power JSC                          | 110           | 5 operating     | 1986  | 1986       | 1986          | 1986      |
| Pha Lai-1 power station Unit 2                 | Pha Lai Thermal Power JSC                          | 110           | 5 operating     | 1986  | 1986       | 1986          | 1986      |
| Pha Lai-1 power station Unit 3                 | Pha Lai Thermal Power JSC                          | 110           | 5 operating     | 1986  | 1986       | 1986          | 1986      |
| Pha Lai-1 power station Unit 4                 | Pha Lai Thermal Power JSC                          | 110           | 5 operating     | 1986  | 1986       | 1986          | 1986      |
| Pha Lai-2 power station Unit 1                 | Pha Lai Thermal Power JSC                          | 300           | 5 operating     | 2001  | 2001       | 2001          | 2001      |
| Pha Lai-2 power station Unit 2                 | Pha Lai Thermal Power JSC                          | 300           | 5 operating     | 2001  | 2001       | 2001          | 2001      |
| Dong Nai Formosa Unit 1                        | Hung Nghiep Formosa                                | 150           | 5 operating     | 2004  | 2004       | 2004          | 2004      |
| Dong Nai Formosa Unit 2                        | Hung Nghiep Formosa                                | 150           | 5 operating     | 2004  | 2004       | 2004          | 2004      |
| Na Duong-1 power station Unit 1                | Vietnam National Coal and Mineral Industries Group | 55            | 5 operating     | 2005  | 2005       | 2005          | 2005      |
| Na Duong-1 power station Unit 2                | Vietnam National Coal and Mineral Industries Group | 55            | 5 operating     | 2005  | 2005       | 2005          | 2005      |
| Cao Ngan power station Unit 1                  | Vietnam National Coal and Mineral Industries Group | 57            | 5 operating     | 2006  | 2006       | 2006          | 2006      |
| Cao Ngan power station Unit 2                  | Vietnam National Coal and Mineral Industries Group | 57            | 5 operating     | 2006  | 2006       | 2006          | 2006      |
| Uong Bi power station I extension              | EVN Genco No 1                                     | 300           | 5 operating     | 2007  | 2007       | 2007          | 2007      |
| Quang Ninh-1 power station Unit 1              | Quang Ninh Thermal Power JSC                       | 300           | 5 operating     | 2009  | 2009       | 2009          | 2009      |
| Son Dong power station Unit 1                  | Vietnam National Coal and Mineral Industries Group | 110           | 5 operating     | 2009  | 2009       | 2009          | 2009      |
| Son Dong power station Unit 2                  | Vietnam National Coal and Mineral Industries Group | 110           | 5 operating     | 2009  | 2009       | 2009          | 2009      |
| Quang Ninh-1 power station Unit 2              | Quang Ninh Thermal Power JSC                       | 300           | 5 operating     | 2010  | 2010       | 2010          | 2010      |
| Cam Pha power station Phase I                  | Vietnam National Coal and Mineral Industries Group | 340           | 5 operating     | 2011  | 2011       | 2011          | 2011      |
| Cam Pha power station Phase II                 | Vietnam National Coal and Mineral Industries Group | 340           | 5 operating     | 2011  | 2011       | 2011          | 2011      |
| Hai Phong-1 Unit 1                             | EVN Genco No 2                                     | 300           | 5 operating     | 2011  | 2011       | 2011          | 2011      |
| Hai Phong-1 Unit 2                             | EVN Genco No 2                                     | 300           | 5 operating     | 2011  | 2011       | 2011          | 2011      |
| Quang Ninh-2 power station Unit 1              | Quang Ninh Thermal Power JSC                       | 300           | 5 operating     | 2012  | 2012       | 2012          | 2012      |
| Hai Phong-2 Unit 3                             | EVN Genco No 2                                     | 300           | 5 operating     | 2013  | 2013       | 2013          | 2013      |
| Mao Khe Unit 1                                 | Vietnam National Coal and Mineral Industries Group | 220           | 5 operating     | 2013  | 2013       | 2013          | 2013      |
| Mao Khe Unit 2                                 | Vietnam National Coal and Mineral Industries Group | 220           | 5 operating     | 2013  | 2013       | 2013          | 2013      |
| Nghi Son-1 Unit 1                              | EVN Genco No 1                                     | 300           | 5 operating     | 2013  | 2013       | 2013          | 2013      |
| Hai Phong-2 Unit 4                             | EVN Genco No 2                                     | 300           | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| Nghi Son-1 Unit 2                              | EVN Genco No 1                                     | 300           | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| Nong Son 1                                     | Vietnam National Coal and Mineral Industries Group | 30            | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| Quang Ninh-2 power station Unit 2              | Quang Ninh Thermal Power JSC                       | 300           | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| Uong Bi power station II extension             | EVN Genco No 1                                     | 330           | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| Vinh Tan-2 Unit 1                              | EVN Genco No 3                                     | 622           | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| Vinh Tan-2 Unit 2                              | EVN Genco No 3                                     | 622           | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| Vung Ang-1 Unit 1                              | PetroVietnam Power Corp                            | 600           | 5 operating     | 2014  | 2014       | 2014          | 2014      |
| An Khanh-1 Unit 1                              | An Khanh Electricity JSC                           | 58            | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| An Khanh-1 Unit 2                              | An Khanh Electricity JSC                           | 58            | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Duyen Hai-1 Unit 1                             | Electricity of Vietnam                             | 622           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Duyen Hai-1 Unit 2                             | Electricity of Vietnam                             | 622           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Ha Tinh Formosa Plastics Steel Complex phase 1 | Hu'ng Nghiep Formosa Ha Tinh                       | 150           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Mong Duong-1 Unit 1                            | Electricity of Vietnam                             | 540           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Mong Duong-1 Unit 2                            | Electricity of Vietnam                             | 540           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Mong Duong-2 Unit 1                            | AES-VCM Mong Dong Power Co Ltd                     | 620           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Mong Duong-2 Unit 2                            | AES-VCM Mong Dong Power Co Ltd                     | 620           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Vedan Vietnam Cogeneration power station       | Vedan Vietnam JSC                                  | 60            | 5 operating     | 2016  | 2015       | 2015          | 2015      |
| Vung Ang-1 Unit 2                              | PetroVietnam Power Corp                            | 600           | 5 operating     | 2015  | 2015       | 2015          | 2015      |
| Duyen Hai-3 Unit 1                             | Electricity of Vietnam                             | 622           | 5 operating     | 2016  | 2016       | 2016          | 2016      |
| Duyen Hai-3 Unit 2                             | Electricity of Vietnam                             | 622           | 5 operating     | 2017  | 2016       | 2016          | 2016      |
| Ha Tinh Formosa Plastics Steel Complex phase 2 | Hu'ng Nghiep Formosa Ha Tinh                       | 150           | 5 operating     | 2016  | 2016       | 2016          | 2016      |
| Ha Tinh Formosa Plastics Steel Complex phase 3 | Hu'ng Nghiep Formosa Ha Tinh                       | 150           | 5 operating     | 2016  | 2016       | 2016          | 2016      |
| Thai Binh-1 Unit 1                             | Electricity of Vietnam                             | 300           | 5 operating     | 2017  | 2017       | 2017          | 2017      |
| Thai Binh-1 Unit 2                             | Electricity of Vietnam                             | 300           | 5 operating     | 2017  | 2017       | 2017          | 2017      |
| Thang Long Unit 1                              | Hanoi Export-Import Company                        | 300           | 5 operating     | 2018  | 2017       | 2017          | 2017      |
| Vinh Tan-4 Unit 1                              | Electricity of Vietnam                             | 600           | 5 operating     | 2018  | 2017       | 2017          | 2017      |
| Lee & Man Unit 1                               | Lee & Man Vietnam Paper Limited Company            | 50            | 5 operating     | 2018  | 2018       | 2018          | 2018      |
| Lee & Man Unit 2                               | Lee & Man Vietnam Paper Limited Company            | 75            | 5 operating     | 2018  | 2018       | 2018          | 2018      |
| Thang Long Unit 2                              | Hanoi Export-Import Company                        | 300           | 5 operating     | 2019  | 2018       | 2018          | 2018      |
| Vinh Tan-1 Unit 1                              | China Southern Power Grid, Vinacomin               | 600           | 5 operating     | 2019  | 2018       | 2018          | 2018      |
| Vinh Tan-4 Unit 2                              | Electricity of Vietnam                             | 600           | 5 operating     | 2018  | 2018       | 2018          | 2018      |
| Vinh Tan-1 Unit 2                              | China Southern Power Grid, Vinacomin               | 600           | 5 operating     | 2019  | 2019       | 2019          | 2019      |
| Bac Lieu 1 #2                                  | no investor                                        | 600           | 8 contingent    | never | never      | never         | never     |
| Vung Ang 3 #4                                  | no investor                                        | 600           | 8 contingent    | never | never      | never         | never     |
| Bac Lieu 1 #1                                  | no investor                                        | 600           | 8 contingent    | never | never      | never         | never     |
| Vung Ang 3 #3                                  | no investor                                        | 600           | 8 contingent    | never | never      | never         | never     |