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Dataset of wind power projects in Vietnam, 2022-05

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Abstract

This dataset is an historical list of wind power projects in Vietnam, updated 2022-05-04. The list contains 548 records, among which 360 refer to active projects. It includes the generation capacity, the project's location at the commune level, its stage classified on the Preliminary / Development / Implementation / Operation / Decommission scale, and whether it is onshore, nearshore or offshore. The sample includes all 146 projects with a Power Purchase Agreement as reported by EVN on 2021-11-02, of which 84 are in Operation projects. No wind project was allowed to start commercial operations between 2021-11-01 and the 2022-05-04. Project investment costs are available for 215 projects. We obtained the dataset by reviewing only public sources: national power development plan updates, provincial investment plans decisions ; the press and the professional literature. This dataset can be used for energy system research and modelling, for policy analysis at the provincial and national levels, and to better understand the market conditions. It provides an inspirational example of how fast it is possible to switch to renewable energy on a national scale. Climate change mitigation requires more stories like this one.

Keywords

Wind power; Vietnam; Investment cost; Energy transition

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Specifications Table

Subject	Economics, Econometrics and Finance (General) Energy Engineering and Power Technology
Specific subject area	Economics of Renewable Energy; Wind power
Type of data	Table.
How data were acquired	Data was acquired by desk research from open public sources.
Data format	Open Document Spreadsheet
Parameters for data collection	Past and present wind power projects with generation capacity greater than 1 MWp located in Vietnam including islands and offshore.
Description of data collection	Data collection is a desk-based process started in August 2019 with an exhaustive literature review, periodically updated based on releases from the national energy administration.
Data source location	Hanoi, Vietnam
Data accessibility	Repository name: Zenodo Data identification number: DOI 10.5281/zenodo.3698080 (latest version of the dataset) Direct URL to data: https://zenodo.org/record/6517279 (version described in this manuscript)
Related research article	Ha-Duong, Minh. 2023-06-01. "Technology costs for the first wave of wind farms in Vietnam: Paying extra for better wind nearshore". Energy for Sustainable Development 74, pp. 309–313. doi: 10.1016/j.esd.2023.04.010. eprint: https://hal.science/hal-03127371.

Value of the Data

The dataset documents the history of the Vietnam wind power sector. Its value is:

- It provides an inspirational example of how fast it is possible to switch to renewable energy on a national scale. Climate change mitigation requires more stories like this one.
- Researchers can use this dataset to study renewable energy economics and technical change.
- Policymakers everywhere can examine the structure of this dataset to design elements of their national renewable energy information system.
- Policymakers in Vietnam can use this dataset for grid development and investment planning at the provincial and national levels, for example to organize auctions.
- Business analysts have a strong interest in datasets like this one to understand the market.
- This dataset is unique because it is much more complete and up to date than those available from commercial energy data providers. It is free to use, under a permissive license. And it is more comprehensive than electricity network operators lists since it includes projects of historical interest that never materialized.

Data Description

The dataset is formatted in one table with 548 records. Each corresponds to a wind power project at some point recognized by the local or national authorities. The following fields describe the records:

Status

- Zoned (120 records) There are historical records. They have no identified investor / project holder, but have an estimated capacity in some official documents.
- Normal (360 records) records describe active projects proceeding normally. They presumably have an investor, even if its identity is not available.
- Ghosted (58 records) when there was a named investor, but we presume abandon since we did not find evidence of recent project activity. The project may have been sold to another investor and appear elsewhere in the table.
- Delayed (7 records) when a source affirms the project is delayed.
- Canceled (3 records) when a source affirms that the project's investment certificate is canceled.

Project Stages

Records that are in Normal status are further qualified with a Project Stage. The project lifecycle model comprises five stages (Trần Tuấn Anh 2019; Aurélien Agut et al. 2016, chap. 2):

A – Preliminary development (194 records, 52240,9 MW). An identified project holder has signed an exclusivity MoU. Activities are site selection, wind measurement, pre-feasibility study.

B – Development (53 records, 5 514 MW). Projects which don't have a PPA yet but are conducting development activities such as feasibility study, technical design, land clearance. This stage seeks to include all projects integrated into the national Power Development Plan. Most project holders obtain their provincial Decision on Investment shortly after being integrated in the PDP. The dataset includes 53 records (5 514 MW) which is more than the 3 569.5 MW of projects in the PDP without PPA.

C – Implementation (58 records, 3 397.4 MW). The dataset is aligned with the 58 projects in the PDP having a power purchase agreement (Ngô 2021, app. 2) but not connected to the grid by October 2022.

The groundbreaking ceremony took place, but this is not a sufficient sign that a project's implementation is still active. Activities are detailed design, financing, construction, training operators, commissioning, testing, trial runs.
D – Operation (91 records, 4 862.4 MW). After the Commercial Operation Date. The dataset includes the 84 projects listed in (Ngô 2021, app. 3) as having commercial operational delivery by the end of October 2021, plus the four projects which completed the formalities since. The dataset splits the Bac Lieu project in two records, since the first and the second phases were economically and technically very distinct. The dataset also records the wind components in the minigrids on the Phú Quý (6 MW) and the Bạch Long Vĩ (1 MW) islands.

Project phase name

Projects are usually divided into a small number of phases. The name is in Vietnamese. The name is usually unambiguously defined from the official documents. For projects with a complicated life story, aliases and former project names are optionally mentioned between parenthesis. This field is the key record identifier and used to sort the table alphabetically.

Project Owner

The name is in Vietnamese, or in English for foreign companies (with country code between parenthesis). Projects are oftentimes legally owned by a special purpose vehicle company (SPV). The interesting information is who own the SPV. We record the name investors, parent companies or parent group.
Warning: projects shares are routinely sold and we did not seek to follow the market for project ownership.

Project location fields

Field names ấp, Xã, Huyện means Hamlet, Commune, and District / Town. All these fields are multi-valued, as many projects extend over several communes.
Tỉnh means Province. Vùng means Region. Both fields are always non-empty and univalued, as official documents are usually organized by Province and Region.
The Location type can be Onshore (346 records), Intertidal (126 records), Offshore (49 records). This is a fuzzy categorization. Legally, the Feed-in tariff recognized only onshore/offshore categories. Intertidal projects benefited from the Offshore tariff, there is no "far offshore" projects operational in the database.

Project characteristics fields

Capacity (MWp). This is the sum of installed turbines nameplate capacities, as built.
Connection plan. Future iterations of the dataset may include a description of the length and voltage of the connection line, but for now. this is a free-text field with less than 100 records covered.
Turbines. Future iterations of the dataset may include the number, brand and type of machines, but for now, it is a free-text field with less than 100 records covered.
Investment. It is available for 215 records, which allows econometric research. Investment is normally quoted in billion VND and obtained from the official Investment Certificate. The original certificate was not always available for download, in many instances we used the number quoted in the press. Investment numbers for projects at the Preliminary stage are aspirational: their wind measurement campaign is ongoing and they do not have an investment certificate. We were not able to find

investment in VND for all cases and there are still 18 investments given in US dollars – only one for an operational project.
The dataset records the following project milestones dates: Exclusivity MoU, Decision on Investment, Groundbreaking event, Expected COD, Actual COD. They are available for less than 100 records. The Purchasing Power Agreement signature date, the Power Plan addition date, and financial events are not recorded in this dataset.

Data pedigree fields

The housekeeping fields Date and By allow tracing who last modified the record and when. In this version the 'Project stage' is up to date for Operational projects. Records classified at the Implementation are those with a power purchase agreement. They are in a variety of situations, from the four projects build which did not complete testing on time to obtain the COD certificate, to frozen projects quietly waiting better economic visibility to start reinvesting.
A Note field provides for additional comments.
The next ten fields allow tracing the information to specific official sources, as discussed in the next section.
The next eights fields allow to trace other sources used.

Experimental Design, Materials, and Methods

Material and methods

The dataset was assembled by desk research. We used only public sources, no confidential insider information. The Bibliography section lists a sample of our sources. The complete list of sources is within the dataset. Each record includes one or several links to the information source(s). We organize our sources into three categories: Technical reports, News and Official documents.

- The initial collection phase relied on technical reports such as (Tuong Do 2019b; GIZ 2016). These provide historical information on the early projects. Few of those were built. Wikipedia is not a source but an outlet : our research team contributes to updating pages.
- We updated and extended the initial dataset by scraping the News archives of the Vietnam Clean Energy Association and the Vietnam Energy Association. We also used the archives from the Ministry of Industry and Trade's, from Provincial People's Committees and from other local organizations. News outlets like these are quasi-official information sources, they disseminate publicly and sometimes contextualize the press releases from the developers and from the authorities. They particularly inform about groundbreaking events, provincial plans and Investment Certificates.
- National and sometimes provincial authorities publish official Directives and Letters. The national documents list authorized projects, those included in the national Power Development Plan, e.g. (Trịnh Đình Dũng 2020b; Hoàng Quốc Vượng 2020; Đặng Hoàng An 2020). The provincial documents tend to list projects earlier in the development cycle, before they are included in the Plan, e.g. (Võ Ngoc Thành 2020; Hoàng Quốc Vượng 2012).

Coverage

On 2 November 2021, EVN Letter 6742 (Ngô 2021) listed the FIT period results. EVN signed a power purchase agreement (PPA) with 146 wind projects. By the end of October 2021, 84 achieved commercial

operational delivery (COD), representing a 3 980 MW generation capacity. Of those, 69 (3 655 MW) were completed in full, and 15 (325 MW) in part. 62 projects (3 479 MW) did not achieve COD. Of those, 4 (178 MW) are connected to the grid, but did not complete the testing on time to obtain their COD certificate.

According to (H. C. Nguyễn 2022) issued in January 2022, 11.921 MW were authorized, 146 projects (8 171,475 MW) signed a power purchase agreement. By 31/10/221, 84 projects (3 980,265 MW) obtained the COD certificate, of which 15 only partially (325,15 MW COD, 1 0131,10 MW non-COD).

According to (Nguyễn Hồng Diên 2022) issued in July 2022, 4.126 MW of wind power had entered into operation and are benefiting from FIT according to Decisions of the Prime Minister. In addition, 62 wind power projects with total capacity of 3.479 MW have entered into power purchase agreement with EVN but do not have electricity sale price due to expired FIT. Some other projects are in the middle of implementation process.

The draft power development plan (MOIT 2022, para. II.1.1.c) reference 5709 issued in September 2022 recognizes that 188 projects (11.741MW) were allowed under the power development plan 7, of which 146 projects (8.171,48 MW) signed a power purchase agreement with EVN. By 31/10/2022, 88 projects (4 119.8 MW) achieved commercial operating delivery. Over 99% of projects, 187 (1 .621 MW) are located in the Center and the South.

This dataset includes projects listed in MOIT 2020 letters 1931, 3299, 7201, 7408 and 10052. This ensures that it was exhaustive at that date regarding projects at the B - Development, C - Implementation and D – Operation stages. The dataset was further updated with EVN Letter 6742/EVN-TTD (Ngô 2021).

At the end of 2020 the national energy authorities froze the instruction of new wind energy projects for the short term. At the same time, the national energy authorities asked provinces for lists of wind power projects to be considered in the long-term planning. Only the list from Binh Dinh province Letter 6826/UBND-KT is included in the dataset. While the dataset lists 163 projects at the A – Preliminary stage, we have no reason to believe it is exhaustive at this level.

The dataset has name, capacity and location for the 146 projects with a PPA. The investment amount is available for 90/91 records at stage D - Operation, 52/58 records at stage C - Implementation, 21/53 records at stage B – Development.

Qualitative historical description of the sector

This section reuses material from (Ha-Duong et al. 2022).

The sample is quasi cross-sectional: it describes a wave of projects implemented synchronously. This is somewhat atypical. In many countries, renewable energy sources have entered the market over a long period, ten years or more. Expansion of wind power in Vietnam fits better a step function than an exponential. After fifteen years of trials with negligible installed capacities, 4 GW were delivered in October 2021 (Do et al. 2021).

The Bạch Long Vĩ island hybrid diesel + wind project inaugurated on 30 October 2004 was a false start, not appropriate to the local capacities at the time. Vietnam's first high-capacity wind farm, 30 MW, was inaugurated in the central province of Bình Thuận on 18 April 2012. The next two projects – the Phú Quý island hybrid grid with 6 MW and the nearshore Bạc Liêu phase 1 with 16 MW – both completed in 2013. These three pioneer projects had their lot of technical trouble: one turbine of the Phú Quý system broke down unrepaired; the wind farm in Bình Thuận had acute thermal management issues; the construction of Bac Liêu phase 2 stalled for years. No new capacity was added in 2014 or 2015. The 83 MW Bạc Liêu phase 2 finally completed in 2016. That year also delivered the 24 MW Phú Lạc project

in Bình Thuậnh province. The following year, the 30 MW Hướng Linh 2 project in the Quảng Trị province connected. In 2018, the total installed wind power capacity in Vietnam reached 228 MW.
Then Government's Decision 39 (X. P. Nguyễn 2018) raised the Feed-in tariff for wind power projects in Vietnam. From 78 USD / MWh since 2011, it jumped to 85 USD / MWh for onshore wind power projects and 98 USD / MWh for offshore wind power projects (Nguyễn Xuân Phúc 2018). The new electricity tariff applies to a part or whole of the grid-connected wind power projects with commercial operation date before 1 November 2021. The tariff will apply for 20 years from the date of commercial operation. Already operating projects will benefit from the tariffs retroactively from 1 November 2018 for the signed power purchase agreement's remaining period.
On 19 March 2020, Letter 1931 noted: "only nine wind power projects with a capacity of 350 MW have been put into operation so far" and "Total capacity of wind power projects already added to the Planning is approximately 4 800 MW" (Hoàng Quốc Vượng 2020). Following up, Decision 795 approved the addition of 6 924 MW of wind power projects to the Electricity Masterplan VII (Trịnh Đình Dũng 2020b). Overall there was about 11 000 MW of wind power projects in Vietnam on the starting line to beat the November 2021 deadline.
Letter 10052 issued at the end of 2020 identified the second wave of about 6 500 MW of wind power projects proposed for inclusion into the next electricity masterplan (Đặng Hoàng An 2020). However, as of January 2021, that wave has not been approved by the Prime Minister. These projects would have no chance to deliver before November 2021.

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Competing Interests

HDM research visit at VIET SE received financial support from the European Climate Foundation. The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article. The authors have no financial relation with the Wind Energy business.

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