Data Article


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A R T I C L E   I N F O

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A B S T R A C T

The data are related to the research article “Structural estimation of switching costs for peaking power plants,” https://doi.org/10.1016/j.ejor.2019.03.031. Fleten et al., 2019 We display the operating status of peaking power plants as they were reported annually to the United States Energy Information Administration during 2001–2009. Operating status can either be operating, on standby, or retired. Changes in operating status allow us to infer shutdowns, startups, and retirements. We also derive annual profitability indicators.

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1. Data

The following data items are included in the data table in the accompanying spreadsheet.

- year
- ngen (plant identifier)
- status (OP – operating, SB – shutdown, RE - retired)
- outgoing status (OP – operating, SB – shutdown, RE - retired)
- status change (shutdown, startup, retirement)
- heat rate (MMBtu/MWh)
- summer capacity (MW)
- age (years)
- fuel type (NG = natural gas, DFO = oil)
- state
- region (PJM, ISO-NE, NYISO)
- profitability indicator ($/kW/year)

The sample includes simple cycle combustion turbines (CT) located in Connecticut, Delaware, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Vermont, Virginia, Washington D.C., and West Virginia. The data set contains 8189 plant-year observations on 1121 individual plants. Fig. 1 displays transitions in the “status” variable.
2. Experimental design, materials and methods

Preprocessing of the data consists of matching generator names/ID numbers between the various databases. The main data items are (i) status changes, and, (ii) profitability indicators for peaking power plants in the United States. The primary data source is Form 860 collected and disseminated by the Energy Information Administration (hereafter EIA) [2]. These data are supplemented by electricity prices (PJM, NYISO, ISO-NE websites) [3–5], fuel prices (EIA) [6,7], heat rates (US EPA CEMS data) [8], and nonfuel costs (EIA AEO supplemental data) [9].

The possible values for the status variable in EIA860 are:

- OP – operating,
- SB – shutdown (mothballed, in cold standby), and,
- RE – retired.

We define a shutdown to occur when a plant moves from state OP to state SB. We define a startup to occur when a plant moves from state SB to state OP. We define a retirement to occur when a plant moves from state SB to state RE. Other possible (non)transitions include OP to OP and SB to SB.

The spark spread on day $n$ is equal to the value of electricity generated minus the cost to generate the electricity.

$$S_n = P_e^n - H^* P_f^n - V$$

(1)

Where,

- $S_n =$ spark spread on day $n$ in units of $$/MWh,
- $P_e^n =$ day $n$ electricity price in units of $$/MWh,
- $H =$ heat rate in units of MMBtu/MWh,
- $P_f^n =$ day $n$ fuel price in units of $$/MMBtu, and
- $V =$ nonfuel variable O&M (operations and maintenance) costs.

For each generator we calculate daily spark spread, then sum the positive spreads over the days of the year ($T_t$) to obtain an annual profitability indicator for year $t$, $X_t$, in units of $$/kW/year.

$$X_t = \sum_{n=1}^{T_t} \max(S_n, 0)^* \left( \frac{16}{1000} \right)$$

(2)

The profitability indicator is the theoretical annual profit per unit of generating capacity. The max function captures the optionality of the plant. We assume that the plant would not run on days for
which the spread is negative. 16 is the number of hours is the peak period for one day and 1000 converts MW to kW.

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Transparency document

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2019.104034.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.104034.

References