Capacity Expansion Planning Under the Risk of Hurricanes: An Analysis of The US East Coast

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1. **Database Construction For The Florida Energy System**
2. **Database Construction For The North Carolina Energy System**

Section 2 details the data and considerations followed in the construction of the database for the North Carolina Energy System.

* 1. **Technologies**

Tables 2.1 and 2.2 provide a description of the existing and new energy generation technologies considered in our simulations, and Table 2.3 describes the non-energy generation technologies.

**Table 2.1:** Existing Generation Technologies Represented in The Model

|  |  |
| --- | --- |
| **Technology Code** | **Description** (Following EIA 860 Nomenclature) [1] |
| AB\_ST\_EXISTING | Steam Turbine Using Agricultural By-Products |
| BIT\_ST\_EXISTING | Steam Turbine Using Bituminous Coal |
| BLQ\_ST\_EXISTING | Steam Turbine Using Black Liquor |
| DFO\_CC\_EXISTING | Combined Cycle Combustion Turbine Using Petroleum |
| DFO\_GT\_EXISTING | Combustion Turbine Using Petroleum |
| DFO\_IC\_EXISTING | Internal Combustion Engine Using Petroleum |
| LFG\_GT\_EXISTING | Combustion Turbine Using Landfill Gas |
| LFG\_IC\_EXISTING | Internal Combustion Engine Using Landfill Gas |
| MWH\_BA1H\_EXISTING | Battery Storage- 1h |
| MWH\_BA2H\_EXISTING | Battery Storage- 2h |
| NG\_CC\_EXISTING | Combined Cycle Combustion Turbine Using Natural Gas |
| NG\_GT\_EXISTING | Combustion Turbine Using Natural Gas |
| NG\_ST\_EXISTING | Steam Turbine Using Natural Gas |
| NUC\_ST\_EXISTING | Nuclear Turbine |
| OBG\_IC\_EXISTING | Internal Combustion Engine Using Other Biomass Gas |
| SUN\_PV\_EXISTING | Solar Photovoltaic - Utility |
| WAT\_HY\_EXISTING | Conventional Hydroelectric |
| WAT\_PS\_EXISTING | Hydroelectric Pumped Storage |
| WDS\_ST\_EXISTING | Steam Turbine Using Wood Waste |
| WH\_ST\_EXISTING | Steam Turbine Using Waste Heat |
| WND\_WT\_EXISTING | Onshore Wind Turbine |

**Table 2.2:** New Generation Technologies Represented in The Model

|  |  |
| --- | --- |
| **Technology Code** | **Description** |
| BATT\_2H\_NEW | Battery Storage 2h (NREL ATB 2023 Technology) |
| BATT\_4H\_NEW | Battery Storage 4h (NREL ATB 2023 Technology) |
| BATT\_6H\_NEW | Battery Storage 6h (NREL ATB 2023 Technology) |
| BATT\_8H\_NEW | Battery Storage 8h (NREL ATB 2023 Technology) |
| BIOMASS\_CC90\_NEW | Generation From Biomass With 90% Carbon Capture (Technology from NREL ReEDS model Using BECC-mod) |
| BIOMASS\_NEW | Generation From Biomass (NREL ATB 2023 Technology) |
| COAL\_95CC\_NEW | Generation From Coal With 95% Carbon Capture (NREL ATB 2023 Technology) |
| COAL\_99CC\_NEW | Generation From Coal With 99% Carbon Capture (NREL ATB 2023 Technology) |
| COAL\_NEW | Generation From Coal (NREL ATB 2023 Technology) |
| NG\_F-FRAME\_CC\_95CC\_NEW | Combined Cycle Natural Gas Turbine F-Frame With 95 % of Carbon Capture (NREL ATB 2023 Technology) |
| NG\_F-FRAME\_CC\_97CC\_NEW | Combined Cycle Natural Gas Turbine F-Frame With 97 % of Carbon Capture (NREL ATB 2023 Technology) |
| NG\_F-FRAME\_CC\_NEW | Combined Cycle Natural Gas Turbine F-Frame (NREL ATB 2023 Technology) |
| NG\_F-FRAME\_CT\_NEW | Natural Gas Combustion Turbine F-Frame - Simple Cycle (NREL ATB 2023 Technology) |
| NG\_H-FRAME\_CC\_95CC\_NEW | Combined Cycle Natural Gas Turbine H-Frame With 95 % of Carbon Capture (NREL ATB 2023 Technology) |
| NG\_H-FRAME\_CC\_97CC\_NEW | Combined Cycle Natural Gas Turbine H-Frame With 97 % of Carbon Capture (NREL ATB 2023 Technology) |
| NG\_H-FRAME\_CC\_NEW | Combined Cycle Natural Gas Turbine H-Frame (NREL ATB 2023 Technology) |
| NUCLEAR-AP1000\_NEW | Nuclear Generation Using AP1000 PWR (NREL ATB 2023 Technology) |
| NUCLEAR-SMR\_NEW | Small Modular Nuclear Reactor (NREL ATB 2023 Technology) |
| PV-COMMERCIAL\_NEW | Commercial Solar PV (NREL ATB 2023 Technology) |
| PV-RESIDENTIAL\_NEW | Residential Solar PV (NREL ATB 2023 Technology) |
| PV-UTILITY\_NEW | Utility Solar PV (NREL ATB 2023 Technology) |
| WAT\_HY\_NEW | Conventional Hydroelectric (NREL ATB 2023 Technology) |
| WAT\_PS\_NEW | Hydroelectric Pumped Storage (NREL ATB 2023 Technology) |
| WIND-LAND-C8\_NEW | Onshore Wind Turbine Class 8 From NREL ATB 2023 (NREL ATB 2023 Technology) |
| WIND-OFFSHORE-C6\_NEW | Offshore Wind Turbine Class 6 From NREL ATB 2023 (NREL ATB 2023 Technology) |

**Table 2.3:** Non-Generation Technologies Represented in The Model

|  |  |
| --- | --- |
| **Technology Code** | **Description** |
| CO2\_STORAGE | CO2 Storage |
| DISTRIBUTION | Energy Distribution |
| FT\_BIOMASS | Fuel for Generation Technologies That Use Biomass |
| FT\_COAL | Fuel for Generation Technologies That Use Coal |
| FT\_NG | Fuel for Generation Technologies That Use Natural Gas |
| FT\_NUCLEAR | Fuel for Nuclear Generation Technologies |
| FT\_PETROLEUM | Fuel for Generation Technologies That Use Petroleum |
| TRANSMISSION\_INTERREGIONAL | Transmission Between Different Regions |
| TRANSMISSION\_REGIONAL | Transmission In the Same Region |

* 1. **Existing Capacity**

Data from existing generation capacity comes from the EIA-860M reports [1] Figure 2.1 shows the

# **References**

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| [1] | EIA, "Preliminary Monthly Electric Generator Inventory (based on Form EIA-860M as a supplement to Form EIA-860)," February 2023. [Online]. Available: https://www.eia.gov/electricity/data/eia860m/. [Accessed July 2023]. |