# NosTerra Energy Model Data Collection

**Project Overview**

The primary goal of this project is to conduct in-depth research on various types of energy generation, focusing on aspects such as the data elements that calculate Levelized Cost of Energy (LCOE), potential technological developments, and possible impacts caused by policy. A secondary goal is to automate monitoring and update processes. To achieve this there is an emphasis on the quality of data sources and a requirement to document where each data element was found.

**Objectives**

1. Research and document the key data factors for the assigned energy generation type (e.g., Solar, Wind, Hydro).
2. Identify and analyze how upcoming technological developments could impact the key data factors.
3. Investigate current and proposed policies affecting the adoption of the energy type.
4. Investigate current and proposed policies affecting the key data factors of the energy type.
5. Document all data sources and methodologies used.

**Scope of Work**

1. **Key Data Factor Analysis:**
   * Gather data points for a small, medium, and large potential power plant for the assigned energy type.
   * Note any energy specific data points or features necessary to accurately model.
2. **Technological Developments:**
   * Research upcoming technologies and their potential impact on efficiency and cost.
   * Assess the timeline for these technologies to become mainstream.
3. **Policy Research:**
   * Investigate existing policies that support or hinder the adoption of the energy type.
   * Analyze proposed policies and their potential impacts.
4. **Data Documentation:**
   * Compile a comprehensive list of sources for all collected data.
   * Ensure all methodologies are transparent and reproducible.
5. **Automation:**
   * Recommend methods to best automate the continuous refreshing of the collected data.

**Deliverables**

1. Summary report on key data factors for the assigned energy type.
2. Key data factors added to [Github](https://github.com/bowbikes/NosTerraEnergyModel) for the assigned energy type
3. Summary report on upcoming technological developments added to [Github](https://github.com/bowbikes/NosTerraEnergyModel).
4. Policy impact report including current and proposed policies added to [Github](https://github.com/bowbikes/NosTerraEnergyModel).
5. Documented sources and methodologies.

**Timeline**

* **Week 1-2:** Research assigned energy type.
* **Week 3-4:** Compile Key Data Factors.
* **Week 4-5:** Estimate Technological and policy impacts.
* **Week 5-7:** Consult on process automation/refine key data factors.

**Resources**

* *Are there any resources we can offer / that volunteers might bring to the table*

**Support**

There will be weekly meetings focusing on one energy type at a time to ensure we all stay informed and up to date with the model’s progress.

**Key Data Factors**

Each of the following factors should be collected, averaged, or estimated for the three capacity categories of power plant.

The following is a very rough example of a potential 10MW on shore wind farm

|  |  |  |
| --- | --- | --- |
| DATA | Example | Units |
| Construction time | 9mo | Months |
| Land requirements | 200ac | Acres |
| Regulatory hurdles | Mid(NEPA) | (L/M/H) |
| Interconnection challenges | High(remote) | (L/M/H) |
| Capital costs | $20m | $Million |
| Capacity | 10MW | MW |
| Capacity Factor | 45 | % |
| Maintenance and Operation costs – fixed costs | $6,000,000 | $ |
| Variable costs (scale with plant output) | $200 | $/MWh |
| Fuel costs – a specific variable cost | 0 | $/BTU |
| Expected lifetime – std dev(min, max) | 25yr | Years |
| Discount rate for value of future money | 10% | % |
| Potential policy updates and changes | Mid (IRA) | (L/M/H) |
| Storage costs or downtime factor | $10M | $ - (80%) |
| Startup/shutdown costs | $0 | $ |
| Comparable existing generation types and prices | $0.33 | $ |
| Potential revenue | $100M | $M/yr |
| Summer capacity vs winter capacity | 7.3MW-3.4MW | MW |