

Using the Network Map Renewables Project Feasibility Calculator

Overview

The Network Map Renewables Project Feasibility Calculator is a web-based tool designed to provide a preliminary assessment of the financial and environmental viability of renewable energy projects. It allows users to input various parameters related to their project and generates key metrics such as Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, and Carbon Offset.

General Workflow

1. **Initial Setup:** Upon loading the web page, default values for energy type-specific parameters such as capacity and production rates are automatically set based on predefined constants.
2. **Selecting Energy Type:** When a user selects an energy type, the form defaults to the specific characteristics of the chosen type, adjusting input fields such as capacity and production rates.
3. **Including Battery Options:** If the user opts to include battery storage, additional input fields become visible to specify battery capacity and efficiency.

Detailed User Interactions

1. **Scenario Management:** Users can input a scenario name. If the name already exists, the form prompts for confirmation to overwrite the existing scenario.
2. **Dynamic Form Adjustments:** Selection of certain options dynamically alters other parts of the form. For instance, choosing the energy type might change available generation profiles and hide or show certain form fields like battery options.
3. **Historical Data Fetching:** Changing the generation profile triggers a request to fetch historical data, which is then used to adjust graphical representations such as area charts.

Calculations and Outputs

1. **Financial Calculations:** Upon submission, the form executes calculations such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period based on user inputs and fetched data.
2. **Visual Data Representation:** Results from the calculations are used to update various charts and graphs, providing a visual interpretation of the data, including a detailed cash flow waterfall chart.
3. **Result Analysis:** The calculator also estimates environmental impact by calculating the carbon offset of the project, which is displayed alongside financial metrics.

Data Management

1. **Importing Data:** Users can import scenario data through a file upload, allowing for the re-use and continuation of previously saved scenarios.
2. **Exporting Data:** Users have the option to export both location and scenario data, facilitating data analysis or sharing outside of the calculator.
3. **CSV Data Storage:** It's important to note that user-uploaded CSV data is not stored by the calculator. Running a scenario multiple times with the same CSV file may produce different results each time. Users should save their input data externally to ensure reproducibility of results.
4. **Local Storage:** The calculator utilizes the browser's local storage to save scenario data, allowing users to return to their work even after closing the browser or navigating away from the page.

Interactive Map Features

1. **Map Interaction:** Users can interact with a map to select locations, view project details, and update scenarios based on geographical data. Right-clicking on a site location marker allows the user to remove it from the map.
2. **Marker Management:** Dynamic markers on the map represent different projects. Users can add, move, or remove these markers as part of scenario management. To remove a marker, right-click on the desired location and select 'Remove'.
3. **Location-based Scenarios:** The calculator allows for the creation and management of scenarios specific to each location, enabling users to assess the feasibility of projects in different geographical contexts.

Inputs and Descriptions

The following table provides a comprehensive list of the inputs required by the Renewable Energy Project Feasibility Calculator, along with their descriptions:

Input	Description
Project Location	The geographical location of the renewable energy project.
Project Name	A unique identifier for the project.
Scenario Name	A name given to a specific set of input parameters and assumptions for a project.
Energy Type	The type of renewable energy technology being considered (e.g., solar, wind, hydro, biomass, battery storage).
Generation Profile	Historical or simulated energy generation data for the selected energy type and location.
User Generation Profile (CSV Upload)	An option for users to upload their own generation profile data in CSV format.
Capacity (kW)	The nameplate capacity of the renewable energy system in kilowatts (kW).
Include Battery	A checkbox indicating whether the system includes battery storage.
Battery Capacity (kWh)	The capacity of the battery storage system in kilowatt-hours (kWh).
Battery Round-Trip Efficiency (%)	The percentage of energy that can be successfully stored and discharged from the battery system.
Inverter Capacity (kW)	The maximum power output of the inverter in kilowatts (kW).
Battery Configuration	The placement of the battery system in relation to the energy meter (Behind-the-Meter or Front-of-the-Meter).
Battery Replacement Cost (currency)	The cost of replacing the battery system at the end of its useful life.
Battery Replacement Interval (years)	The number of years after which the battery system is expected to require replacement.
Energy Purchase Price (currency/kWh)	The price at which energy is purchased from the grid when the renewable system is not generating sufficient energy.

Include FCAS Revenue	A checkbox indicating whether revenue from Frequency Control Ancillary Services (FCAS) should be considered in the financial calculations.
Annual FCAS Revenue (currency)	The estimated annual revenue generated from participating in FCAS markets.
Battery Operation	The mode of operation for the battery system (Coordinated with Energy Source or Independent Operation).
Battery Tariff (currency/kWh)	The price at which energy is sold to the grid from the battery system under the Independent Operation mode.
Electricity Rate (currency/kWh)	The price per kilowatt-hour (kWh) of electricity consumed from the grid.
Feed-in Tariff (currency/kWh)	The price received for each kilowatt-hour (kWh) of excess energy exported to the grid.
Discount Rate (%)	The rate used to convert future cash flows into their present value.
System Lifespan (years)	The expected number of years the renewable energy system will operate.
Weighted Average Cost of Capital (WACC) (%)	The average rate of return required by investors in the project, considering the proportions of debt and equity financing.
Initial Investment (currency)	The upfront capital cost of the renewable energy system.
Annual Operation & Maintenance Costs (% of Initial Investment)	The yearly costs associated with operating and maintaining the system, expressed as a percentage of the initial investment.
Inflation Rate (%)	The expected annual rate of increase in prices over the project lifetime.
Energy Yield (kWh/kW/year)	The estimated annual energy output per kilowatt (kW) of installed capacity.
Cost of Capital (%)	The weighted average cost of debt and equity financing for the project.
Escalation Rate (%)	The annual rate of increase in electricity prices and other relevant costs.
Decommissioning Cost (% of Initial Investment)	The estimated cost of dismantling and removing the renewable energy system at the end of its lifespan, expressed as a percentage of the initial investment.

Outputs and Descriptions

The Renewable Energy Project Feasibility Calculator generates the following key outputs:

Output	Description
Net Present Value (NPV)	The sum of all future cash flows (both positive and negative) discounted to their present value. A positive NPV indicates that the project is expected to be profitable.
Internal Rate of Return (IRR)	The discount rate at which the NPV of the project is equal to zero. It represents the expected annual rate of return on the investment.

Payback Period	The number of years required for the cumulative discounted cash flows to equal the initial investment. It measures the time taken for the project to break even.
Carbon Offset (kg CO2/year)	The estimated annual reduction in carbon dioxide emissions achieved by the renewable energy project, expressed in kilograms of CO2 per year.

In addition to these key outputs, the calculator provides visual representations of the data through various charts and graphs, including:

- A cash flow waterfall chart displaying the cumulative discounted cash flows over the project lifetime.
- An area chart showing the historical or simulated energy generation profile for the selected location and energy type.
- A line chart illustrating the relationship between the discount rate and the NPV of the project.
- A donut chart comparing the project's carbon offset contribution to a specific target or benchmark.

These visual elements help users better understand the financial and environmental implications of their renewable energy project.

Financial Calculations

The Renewable Energy Project Feasibility Calculator performs several key financial calculations to assess the viability of a project. The primary metrics calculated are Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period.

Net Present Value (NPV)

NPV is the sum of all future cash flows (both inflows and outflows) discounted to their present value. It is calculated using the following formula:

$$NPV = \sum_{t=0}^T \frac{C_t}{(1+r)^t}$$

Where:

- C_t = net cash flow (inflow minus outflow) at time t
- r = discount rate (Calculator Input: "Discount Rate (%)")
- T = project lifetime (Calculator Input: "System Lifespan (years)")

A positive NPV indicates that the project is expected to be profitable, while a negative NPV suggests that the project may not be economically viable.

Internal Rate of Return (IRR)

IRR is the discount rate at which the NPV of a project is equal to zero. It represents the expected annual rate of return on the investment. The IRR is calculated by solving the following equation for IRR:

$$0 = \sum_{t=0}^T \frac{C_t}{(1+IRR)^t}$$

A higher IRR indicates a more attractive investment opportunity.

Payback Period

The Payback Period is the number of years required for the cumulative discounted cash flows to equal the initial investment. It is calculated by finding the value of n that satisfies the following condition:

$$\text{If } \sum_{t=0}^n \frac{C_t}{(1+r)^t} \geq \text{Initial Investment, then Payback Period} = n$$

Where:

- C_t = net cash flow (inflow minus outflow) at time t
- r = discount rate (Calculator Input: "Discount Rate (%)")
- Initial Investment = upfront capital cost (Calculator Input: "Initial Investment (currency)")

A shorter Payback Period indicates that the project will recover its initial costs more quickly, which may be attractive to investors.

Environmental Impact Assessment

In addition to the financial metrics, the Renewable Energy Project Feasibility Calculator estimates the environmental impact of the project by calculating the Carbon Offset.

Carbon Offset

The Carbon Offset represents the annual reduction in carbon dioxide emissions achieved by the renewable energy project. It is calculated based on the expected energy generation and the carbon intensity of the displaced energy source (e.g., the regional electricity grid).

$$\text{Carbon Offset (kg CO}_2\text{/year)} = \text{Annual Energy Generation (kWh/year)} \times \text{Carbon Intensity (kg CO}_2\text{/kWh)}$$

Where:

- Annual Energy Generation (kWh/year) = expected yearly energy output of the renewable energy system
- Carbon Intensity (kg CO₂/kWh) = average carbon dioxide emissions per kilowatt-hour of the displaced energy source

The Carbon Offset provides an indication of the project's potential to mitigate greenhouse gas emissions and contribute to environmental sustainability goals.

Feasibility Calculator Disclaimer

The Network Map Renewables Project Feasibility Calculator is a preliminary screening tool intended for informal assessment purposes only. It should not be relied upon to make any investment, financial, or other business decisions. Advanced cash-flow modeling and professional advice are required before proceeding with any renewable energy project.

Users rely on the calculator outputs solely at their own risk. Neither Network Map nor its affiliates shall be liable for any claims or losses of any nature arising from the use of this calculator.

For formal renewable energy project feasibility assessments, financial modeling, project risk analysis, and decision-making, users should engage qualified professional advisors.

We welcome your input and are committed to continuously improving the tool to better serve your renewable energy project assessment needs.

Frequently Asked Questions (FAQs)

What types of renewable energy projects can be assessed using this calculator?

The Network Map Renewables Project Feasibility Calculator can be used to assess the feasibility of various renewable energy technologies, including solar, wind, hydro, biomass, and battery storage projects. The calculator allows users to input specific parameters related to their chosen technology and location.

How accurate are the calculator's outputs?

The accuracy of the calculator's outputs depends on the quality and reliability of the input data provided by the user. The calculator uses industry-standard formulas and assumptions to generate the results. However, it is important to note that the outputs are intended for preliminary assessment purposes only and should not be used as the sole basis for making investment or business decisions.

Can I save my project scenarios for future reference?

Yes, the calculator allows users to save their project scenarios using the browser's local storage feature. This enables users to return to their saved scenarios even after closing the browser or navigating away from the page. However, it is recommended to export the scenario data for backup purposes and to ensure data persistence across different devices or browsers.

How do I interpret the NPV, IRR, and Payback Period results?

A positive NPV indicates that the project is expected to be profitable, while a negative NPV suggests that the project may not be economically viable. A higher IRR indicates a more attractive investment opportunity, as it represents the expected annual rate of return on the investment. The Payback Period measures the time required for the project to recover its initial investment costs; a shorter Payback Period is generally preferred by investors.

Can I compare multiple project scenarios using the calculator?

Yes, the calculator allows users to create and save multiple project scenarios for a given location. By varying the input parameters, users can generate different scenarios and compare their financial and environmental metrics. This feature enables users to assess the sensitivity of the project's feasibility to changes in key assumptions and identify the most promising configurations.

How can I account for uncertainties in the input parameters?

The calculator does not currently provide a built-in sensitivity analysis feature. However, users can manually create multiple scenarios with different input values to assess the impact of uncertainties on the project's feasibility. It is recommended to consult with professional advisors to conduct more comprehensive risk analysis and uncertainty modeling for critical investment decisions.

Is the calculator suitable for use in all countries?

The Network Map Renewables Project Feasibility Calculator is focused on the Australian energy sector although it can be adaptable to different geographical contexts. However, users should be aware that certain inputs, such as electricity rates, feed-in tariffs, and carbon intensity factors, may vary significantly across different countries and regions. It is the responsibility of the user to ensure that the input data is appropriate for their specific location and to interpret the results in the context of the local regulatory and market conditions.

Network Map Renewables



Contact Information

For any questions, feedback, or technical support related to the Network Map Renewables Project Feasibility Calculator, please contact:

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