The College of New Jersey


# Solar Panel Sustainability Proposal
# Phase II. Proposal

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# 1. Introduction

The use of solar panels has grown significantly in recent years, as more individuals and businesses seek to reduce their carbon footprint and transition to sustainable energy sources. This trend has highlighted the need for reliable data and analysis to support decision-making around the use of solar panels. The purpose of this database proposal is to create a comprehensive tool that will provide data and insights into the use of solar panels, and help users reason about an important sustainability challenge.

The proposed database will store a wide range of data related to solar panels, including performance metrics, energy output, and cost. It will be designed to support multiple user types, including citizens, business owners, and municipality managers, and will offer a user-friendly interface that is simple and easy to use.

With this database, users will be able to explore questions such as the most effective solar panel models, which have the highest energy output, and the cost of installation and maintenance. They will also be able to analyze the impact of solar panels on the environment and the economic benefits of using them.

The proposed database will be a valuable resource for anyone interested in solar panel technology, including researchers, policymakers, businesses, and individual consumers. By providing reliable and up-to-date data, it will support proposals for positive change, and contribute to a more sustainable future for all.

## 2. Sustainability issues and Stakeholders

Solar panels are a promising solution to a range of sustainability issues, offering a clean and renewable source of energy that can reduce greenhouse gas emissions and decrease dependence on fossil fuels. By harnessing the power of the sun, solar panels can help mitigate the impact of climate change, reduce air pollution, and promote a more sustainable energy future.

One of the primary sustainability issues that solar panels can help address is climate change. The burning of fossil fuels for energy is a major contributor to greenhouse gas emissions, which are the leading cause of climate change. By using solar panels to generate electricity, individuals, and businesses can reduce their carbon footprint and help mitigate the effects of climate change.

In addition, solar panels can help reduce air pollution, which has significant health and environmental impacts. Burning fossil fuels for energy is a major contributor to air pollution, which can cause respiratory and cardiovascular problems, among other health issues. By using solar panels, individuals and businesses can reduce their reliance on fossil fuels and decrease the amount of air pollution generated by energy production.

Another sustainability issue that solar panels can help address is energy security. Fossil fuels are a finite resource, and their supply is subject to political and economic instability. By using solar panels to generate energy, individuals, and businesses can

decrease their dependence on fossil fuels and promote a more secure and resilient energy future.

## 3. The Data

The group will gather a range of data related to solar panels and their impact on sustainability. This may include data on the production and use of solar panels, as well as data on energy usage and emissions. The database may also include information on government policies and incentives related to solar panel adoption, as well as data on the economic and social impacts of solar panel use.

## 4. The Questions

With this data, the group will explore a range of sustainability questions related to solar panels. Some potential questions include:

- What is the current adoption rate of solar panels, and how is this changing over time?
- What are the economic and social impacts of solar panel adoption, both at the individual and community levels?
- What policies and incentives are in place to promote solar panel adoption, and how effective are these?

- How can solar panels be used to reduce greenhouse gas emissions and mitigate the effects of climate change?
- What are the barriers to solar panel adoption, and how can these be addressed?
- These questions, and others, will help the group identify key sustainability challenges related to solar panels, and develop proposals for positive change.

## 5. The Data Analysis

The data gathered for the database can help identify sustainability problems and opportunities for positive change related to solar panels. For example, analysis of adoption rates and trends can identify areas where greater outreach and education may be needed to promote solar panel adoption. Analysis of economic and social impacts can help identify opportunities for job creation and economic development related to solar panel production and installation. Analysis of emissions data can help identify areas where solar panel adoption can have the greatest impact on reducing greenhouse gas emissions.

Overall, the database will provide a valuable tool for identifying and addressing sustainability challenges related to solar panels, and for promoting positive change.

## 6. Access Levels

Having different types of users with different levels of access is an important requirement for the proposed sustainability database. This feature will allow the

database to have multiple user roles, each with different permissions and levels of access to the information stored in the database. For example, citizens may need access to information about solar panel installations in their area, as well as data on energy savings and the environmental benefits of solar power. Business owners may need more detailed information about the costs and benefits of solar panel installations, while municipal managers may need access to data on solar panel usage and trends across the entire region. By providing different levels of access to different user groups, the proposed database can ensure that users are only able to access the information that is relevant to their needs and interests.

## 7. Example Use Cases

**Example Case 1: Municipality Member Evaluates Solar Energy**

Actors: Municipality Member

Trigger: Municipality member needs to evaluate the feasibility of implementing solar energy in the municipality.

Preconditions: The member has access to the database and understands the basic functionalities.

Steps:

1. The municipality member logs into the database with their account credentials.

2. The municipality member navigates to the solar energy section of the database.
3. The municipality member selects "Municipality Energy Needs" query.
4. The database returns the current energy consumption of the municipality.
5. The municipality member selects "Solar Energy Potential" query.
6. The database returns the estimated solar energy potential of the municipality.
7. The municipality member selects "Solar Energy Costs" query.
8. The database returns the estimated costs associated with implementing solar energy in the municipality.
9. The municipality member reviews the data and analyzes the feasibility of implementing solar energy in the municipality.
10. The municipality member uses the data to create a proposal to present to the municipality board.

Postconditions: Municipality member is able to make an informed decision about implementing solar energy in the municipality.

**Example Case 2: Accessing Solar Panel Information as a Citizen User**

Primary Actor: Citizen user

Preconditions: The user has access to the database and has entered their login credentials.

Steps:

1. The user logs in to the database with their unique login credentials.
2. The user navigates to the "Solar Panels" section of the database.
3. The user searches for information about solar panel systems that are suitable for residential use.
4. The user filters the search results by location and available incentives.
5. The user reviews the results and selects a solar panel system that meets their needs.
6. The user views detailed information about the selected solar panel system, including its technical specifications, cost, and available financing options.
7. The user is able to contact an installer or supplier of the solar panel system directly through the database.

Post-Conditions: The user is able to access the desired solar panel information and make informed decisions for their household.

**Example Case 3: Accessing Solar Panel Incentive Programs as a Business Owner**

Primary Actor: Business owner

Preconditions: The user has access to the database and has entered their login credentials.

Steps:

1. The user logs in to the database with their unique login credentials.
2. The user navigates to the "Incentive Programs" section of the database.
3. The user searches for incentive programs related to solar panel installation for small businesses in their area.
4. The user reviews the search results and selects a program that meets their needs.
5. The user reads through the eligibility criteria and gathers the required documentation.
6. The user applies for the incentive program through the database.
7. The user is able to track the status of their application and receive notifications about the application outcome through the database.

Post-Conditions: The user is able to view available incentive programs and apply for them if they meet the eligibility criteria.

Note: These use cases are just examples and can be modified or expanded based on the specific requirements of the proposed database and the needs of its users.

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