

Project Report Format

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1. INTRODUCTION

1.1 Project Overview

Solar power works by converting energy from the sun into power. There are two forms of energy generated from the sun for our use – electricity and heat. Solar power forecasting is the process of gathering and analysing data in order to predict solar power generation on various time horizons. Solar power forecasts are used for efficient management of the electric grid and for power trading

Solar panels are usually made from silicon installed in a metal panel frame with a glass casing. When photons, or particles of light, hit the thin layer of silicon on the top of a solar panel, they knock electrons off the silicon atoms

1.2 Purpose

Clean Energy Generation: Solar panels produce clean, renewable energy without emitting greenhouse gases or other pollutants. This helps reduce reliance on fossil fuels and mitigates the environmental impact of electricity generation

Environmental Benefits: Solar power helps mitigate the environmental impact of electricity generation, reducing air and water pollution, as well as the consumption of natural resources.

2. LITERATURE SURVEY

2.1 Existing problem

Solar power works by converting energy from the sun into power. There are two forms of energy generated from the sun for our use – electricity and heat. Solar power forecasting is the process of gathering and analysing data in order to predict solar power generation on various time horizons. Solar power forecasts are used for efficient management of the electric grid and for power trading

2.2 References

U.S. Department of Energy (DOE) - Solar Energy: The DOE's website provides a wealth of information on solar energy, including forecasting, grid integration, and research reports.

National Renewable Energy Laboratory (NREL): NREL is a leading institution for research on renewable energy technologies, including solar. They often publish research papers and reports related to solar energy forecasting.

Intergovernmental Panel on Climate Change (IPCC): The IPCC's reports on climate change often include sections on renewable energy sources and their importance in mitigating climate change.

Electric Power Research Institute (EPRI): EPRI conducts research on a wide range of energy-related topics, including solar power forecasting and grid management.

Academic Journals: Scholarly journals in fields like energy, meteorology, and environmental science often publish research papers on solar power forecasting. Journals such as "Solar Energy," "Renewable Energy," and "Energy Forecasting and Social Change" can be good sources for in-depth research.

Industry Reports: Reports from industry associations and organizations involved in the renewable energy sector, such as the Solar Energy Industries Association (SEIA), can provide insights into the latest developments in solar power forecasting and grid integration.

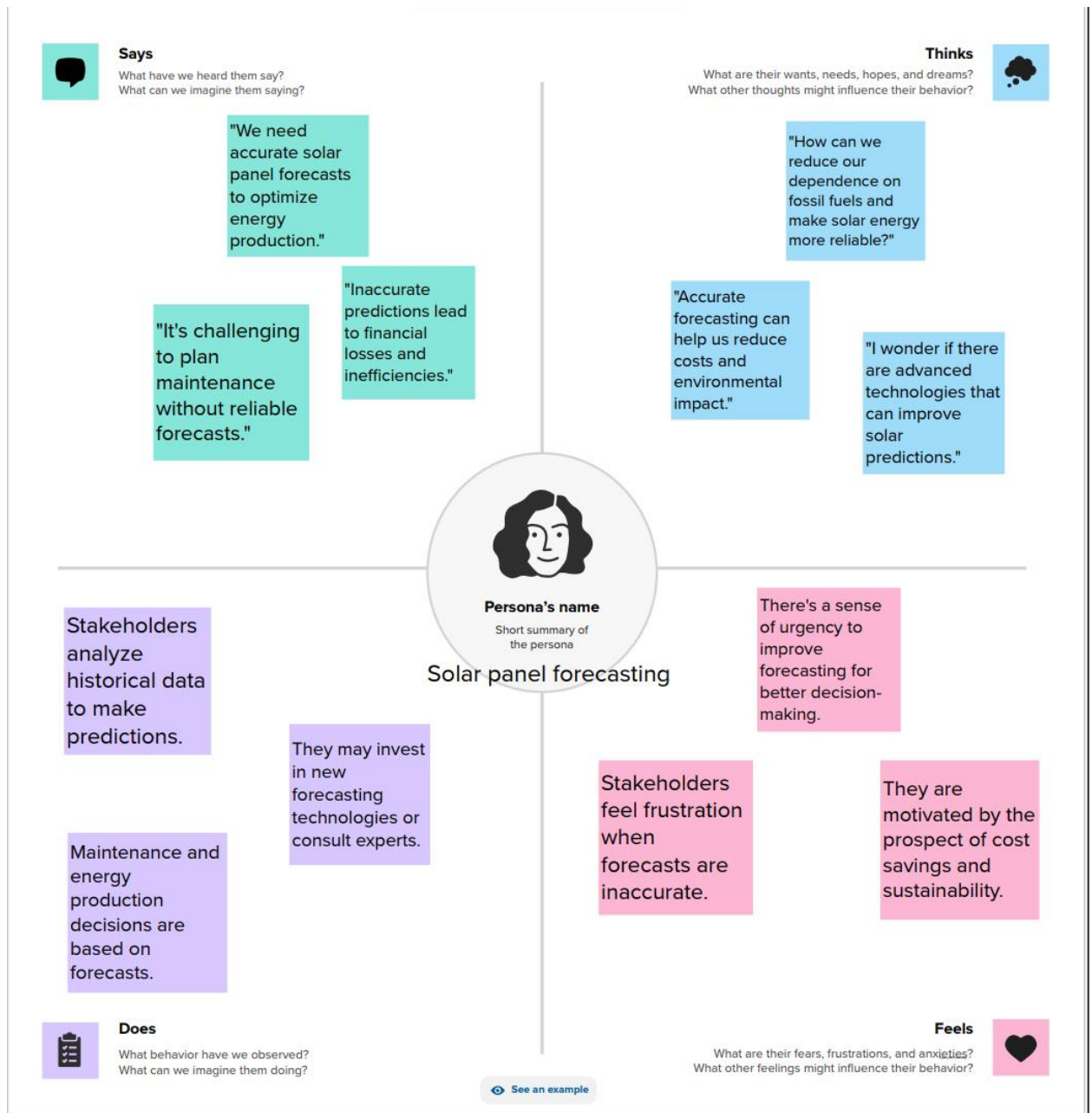
2.3 Problem Statement Definition

Solar-powered Weather Station: Develop a solarpowered weather station that measures and records temperature, humidity, and solar radiation. Students can analyze the data collected and study the impact of solar energy on weather patterns.

Solar energy is nothing but the radiant energy emitted by Sun. We may convert this solar energy into electricity either directly using photovoltaic (PV), or indirectly using concentrated solar power (CSP) with the help of lenses or mirrors and tracking systems to focus a large area of sunlight. This solar energy is mainly useful in solar street lights, auto solar irrigation systems, traafc junction signal lighting, et

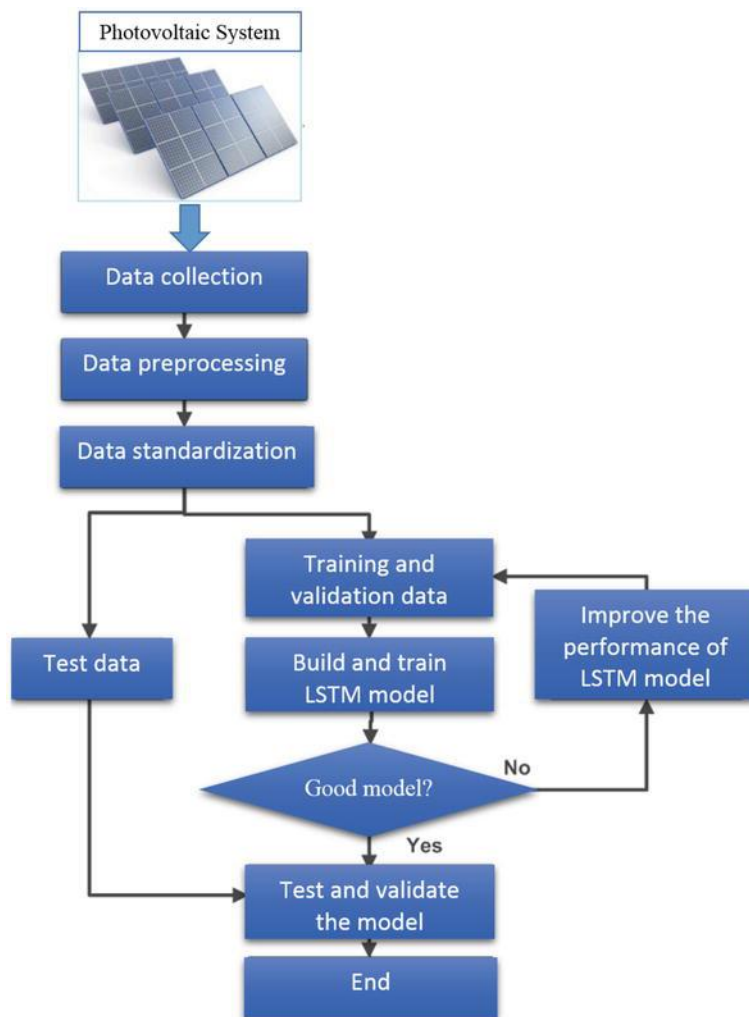
3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



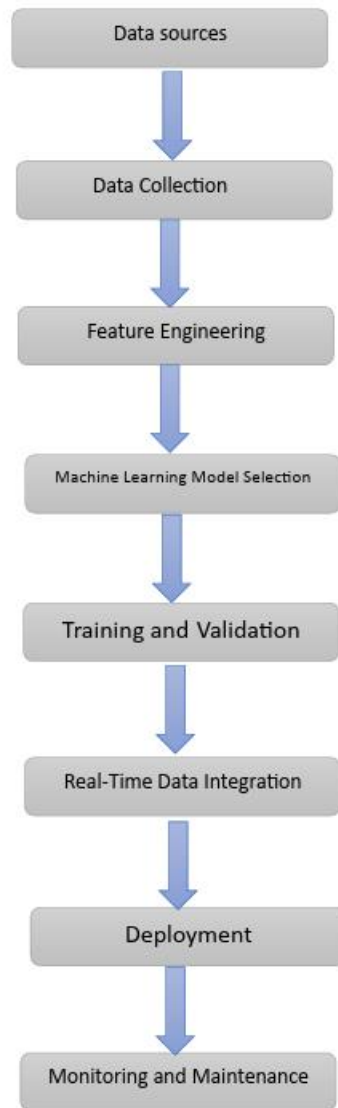
3.2 Ideation & Brainstorming

5.1 Data Flow Diagrams & User Stories



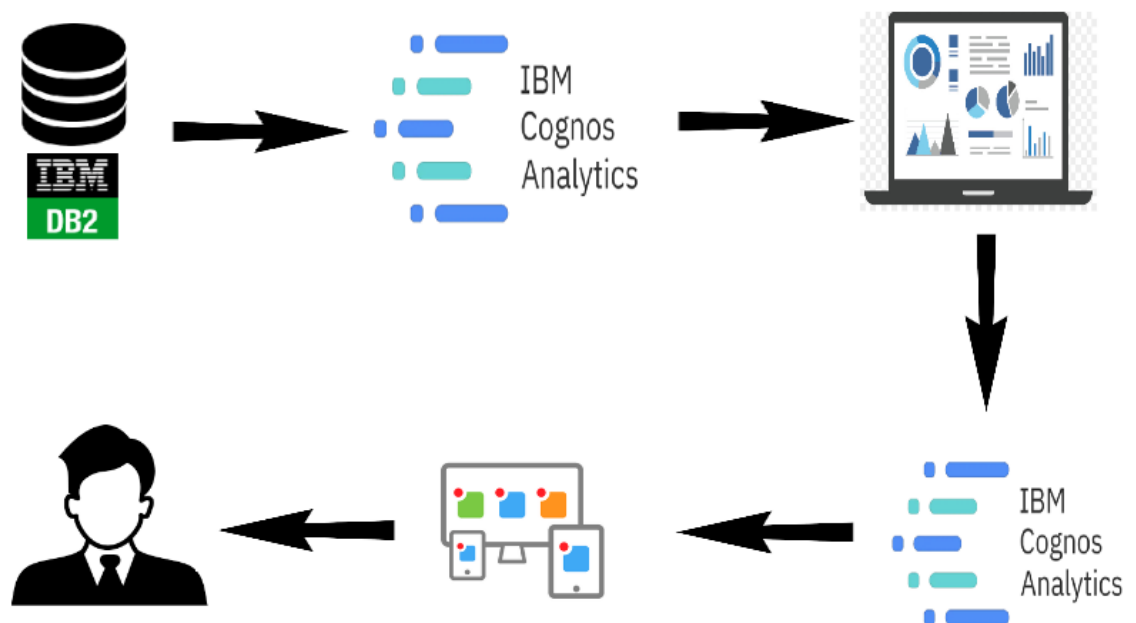
5.2 Solution Architecture

Solution Architecture:



6. PROJECT PLANNING & SCHEDULING

6.1 Technical Architecture



6.2 Sprint Planning & Estimation

Sprint Planning and Estimation are essential activities in Agile software development, particularly in the Scrum framework. These processes help teams determine what work to complete in the upcoming sprint and how much work can be accomplished within that sprint. Here's an overview of these two critical aspects:

Sprint Planning: Sprint planning is a meeting that takes place at the beginning of each sprint, which is typically a short time frame, often two to four weeks in duration. During this meeting, the Scrum team, which includes the product owner, Scrum master, and development team, collaboratively plan and define the work to be completed in the upcoming sprint.

Key activities in sprint planning include:

1. **Product Backlog Review:** The product owner presents the highest-priority items from the product backlog, which are the user stories or features that need to be addressed in the upcoming sprint.
2. **Sprint Goal:** The team, with input from the product owner, defines a clear goal for the sprint. This goal helps keep the team focused on what needs to be achieved.
3. **Task Selection:** The development team selects a subset of the product backlog items that they believe they can complete within the sprint. These items are referred to as the sprint backlog.
4. **Definition of Done:** The team agrees on the criteria that define when a task or user story is considered completed. This ensures a shared understanding of what "done" means.

5. **Estimation:** The team estimates the effort required to complete each task or user story. This often involves using story points or other relative sizing techniques.

Sprint planning helps the team create a clear plan for the work to be done during the sprint and ensures that everyone understands the scope and objectives.

Estimation: Estimation is the process of assigning a numerical value to user stories or tasks to indicate the effort or complexity involved in completing them. The goal of estimation is to provide a way to prioritize and plan work and to help the team understand how much they can commit to in a sprint.

Common estimation methods in Agile include:

1. **Story Points:** Story points are a relative measure of the effort required to complete a user story. The team assigns story points to each user story based on its complexity and size. Story points are often used to estimate the sprint capacity.
2. **Planning Poker:** In planning poker, team members individually estimate the effort for a user story and then discuss their estimates as a group until a consensus is reached.
3. **T-Shirt Sizing:** A simplified form of estimation where user stories are assigned sizes like "small," "medium," or "large" to indicate their relative complexity.
4. **Ideal Days:** Some teams estimate user stories in ideal days, which represent the amount of effort required if there were no interruptions or distractions.

6.3 Sprint Delivery Schedule

A **Sprint Delivery Schedule** is a critical part of Agile project management, particularly in the Scrum framework. It outlines the timeline and sequence for delivering the increments of work produced during individual sprints. Here's how it works:

1. **Sprint Planning:** The development team, along with the product owner and Scrum master, decides which user stories or tasks will be completed during the upcoming sprint. This selection is based on the team's capacity and the prioritized items from the product backlog.
2. **Sprint Duration:** The team decides on the sprint duration. Sprints typically last two to four weeks, with the most common duration being two weeks. The shorter duration allows for more frequent deliveries and better adaptability.
3. **Work Commitment:** During the sprint planning meeting, the team commits to completing the selected user stories or tasks within the defined sprint duration. This commitment is a key aspect of the Sprint Delivery Schedule.
4. **Daily Standups:** Throughout the sprint, the development team holds daily standup meetings to track progress, identify and address obstacles, and ensure the sprint work is on track.
5. **Incremental Development:** During the sprint, the development team works on the user stories or tasks committed to in the sprint backlog. They incrementally develop and test these items, making them potentially shippable at any time.
6. **Review and Retrospective:** At the end of the sprint, there are two critical events:
 - **Sprint Review:** The team demonstrates the completed work to stakeholders, including the product owner, and gathers feedback. This review is an opportunity to validate the

work's adherence to acceptance criteria and to discuss any changes or refinements to the product backlog.

- **Sprint Retrospective:** The team holds a retrospective meeting to reflect on the sprint and identify improvements for the next sprint. This helps enhance the team's performance over time.

7. **Delivery of Increments:** While not always shipping to end-users, the sprint delivery schedule ensures that at the end of each sprint, there is a potentially shippable increment of the product. It could be an internal release or deployment to a staging environment for testing and further integration.
8. **Product Backlog Refinement:** As part of the Sprint Delivery Schedule, the product owner continues to refine and prioritize the product backlog, ensuring that the most valuable items are ready for selection in upcoming sprints.
9. **Repeat:** The Sprint Delivery Schedule is an iterative process, with new sprints beginning as soon as the previous one ends. This cyclical approach ensures that the product is continually developed, improved, and adapted based on feedback and changing requirements.

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1

```
8. <!DOCTYPE html>
9. <html lang="en">
10.
11. <head>
12.   <meta charset="utf-8">
13.   <meta content="width=device-width, initial-scale=1.0" name="viewport">
14.
15.   <title>HeroBiz Bootstrap Template - Home 1</title>
16.   <meta content="" name="description">
17.   <meta content="" name="keywords">
18.
19.   <!-- Favicons -->
20.   <link href="assets/img/favicon.png" rel="icon">
21.   <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">
22.
23.   <!-- Google Fonts -->
24.   <link rel="preconnect" href="https://fonts.googleapis.com">
25.   <link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
26.   <link
href="https://fonts.googleapis.com/css2?family=Open+Sans:ital,wght@0,300;0,400;0,500;0,600;0,700;1,300;1,400;1,500;1,600;1,700&family=Poppins:ital,wght@0,300;0,400;0,500;0,600;0,700;1,300;1,400;1,500;1,600;1,700&family=Source+Sans+Pro:ital,wght@0,300;0,400;0,600;0,700;1,300;1,400;1,600;1,700&display=swap"
rel="stylesheet">
27.
28.   <!-- Vendor CSS Files -->
```

```

29. <link href="assets/vendor/bootstrap/css/bootstrap.min.css"
rel="stylesheet">
30. <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css"
rel="stylesheet">
31. <link href="assets/vendor/aos/aos.css" rel="stylesheet">
32. <link href="assets/vendor/glightbox/css/glightbox.min.css"
rel="stylesheet">
33. <link href="assets/vendor/swiper/swiper-bundle.min.css"
rel="stylesheet">
34.
35. <!-- Variables CSS Files. Uncomment your preferred color scheme -->
36. <link href="assets/css/variables.css" rel="stylesheet">
37. <!-- <link href="assets/css/variables-blue.css" rel="stylesheet"> -->
38. <!-- <link href="assets/css/variables-green.css" rel="stylesheet"> -->
39. <!-- <link href="assets/css/variables-orange.css" rel="stylesheet"> -->
40. <!-- <link href="assets/css/variables-purple.css" rel="stylesheet"> -->
41. <!-- <link href="assets/css/variables-red.css" rel="stylesheet"> -->
42. <!-- <link href="assets/css/variables-pink.css" rel="stylesheet"> -->
43.
44. <!-- Template Main CSS File -->
45. <link href="assets/css/main.css" rel="stylesheet">
46.
47. <!-- =====
48. * Template Name: HeroBiz
49. * Updated: Sep 18 2023 with Bootstrap v5.3.2
50. * Template URL: https://bootstrapmade.com/herobiz-bootstrap-business-
template/
51. * Author: BootstrapMade.com
52. * License: https://bootstrapmade.com/license/
53. ===== -->
54. </head>
55.
56. <body>
57.
58. <!-- ===== Header ===== -->
59. <header id="header" class="header fixed-top" data-scrollto-offset="0">
60.   <div class="container-fluid d-flex align-items-center justify-content-
between">
61.
62.     <a href="index.html" class="logo d-flex align-items-center scrollto
me-auto me-lg-0">
63.       <!-- Uncomment the line below if you also wish to use an image
logo -->
64.       <!--  -->
65.       <h1>HeroBiz<span>.</span></h1>

```

```

66.     </a>
67.
68.     <nav id="navbar" class="navbar">
69.         <ul>
70.
71.             <li class="dropdown"><a href="#"><span>Home</span> <i class="bi
bi-chevron-down dropdown-indicator"></i></a>
72.
73.             </li>
74.
75.
76.             <li><a class="nav-link scrollto"
href="index.html#services">Dashboard</a></li>
77.             <li><a class="nav-link scrollto"
href="index.html#portfolio">Story</a></li>
78.             <li><a class="nav-link scrollto"
href="index.html#team">Report</a></li>
79.
80.             </li>
81.
82.             </li>
83.             <li><a class="nav-link scrollto"
href="index.html#contact">Contact</a></li>
84.         </ul>
85.         <i class="bi bi-list mobile-nav-toggle d-none"></i>
86.     </nav><!-- .navbar -->
87.
88.     <a class="btn-getstarted scrollto" href="index.html#about">Get
Started</a>
89.
90. </div>
91. </header><!-- End Header -->
92.
93. <section id="hero-animated" class="hero-animated d-flex align-items-
center">
94.     <div class="container d-flex flex-column justify-content-center align-
items-center text-center position-relative" data-aos="zoom-out">
95.         
96.         <h2>Welcome to <span>Solar Panel Forecasting </span></h2>
97.         <p>Solar panels, sometimes also called photovoltaics collect energy
from the Sun in the form of sunlight and convert it into electricity that can
be used to power homes or businesses. These panels can be used to supplement
a building's electricity or provide power at remote locations..</p>

```

```

98.     <div class="d-flex">
99.         <a href="#about" class="btn-get-started scrollto">Get Started</a>
100.         <a href="https://www.youtube.com/watch?v=LXb3EKWsInQ"
class="lightbox btn-watch-video d-flex align-items-center"><i class="bi bi-
play-circle"></i><span>Watch Video</span></a>
101.     </div>
102. </div>
103. </section>
104.
105. <main id="main">
106.     <!-- ===== Services Section ===== -->
107.     <section id="services" class="services">
108.         <div class="container" data-aos="fade-up">
109.             <div class="section-header">
110.                 <h2>Dashboard</h2>
111.             </div>
112.             <div class="row gy-5">
113.
114.                 <iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.
my_folders%2FDashboard&closeWindowOnLastView=true&ui_appbar=false&
;ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&am
p;subView=model0000018b6107d11c_00000003" width="1250" height="800"
frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
115.                 </div>
116.
117.             </div>
118.         </section><!-- End Services Section -->
119.
120.
121.
122.     </div>
123. </section><!-- End F.A.Q Section -->
124.
125.     <!-- ===== Portfolio Section ===== -->
126.     <section id="portfolio" class="portfolio" data-aos="fade-up">
127.
128.         <div class="container">
129.
130.             <div class="section-header">
131.                 <h2>Story</h2>
132.
133.             </div>
134.

```

```

135.         </div>
136.
137.         <div class="row gy-5">
138.
139.             <iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_f
olders%2FStory&closeWindowOnLastView=true&ui_appbar=false&ui_navb
ar=false&shareMode=embedded&action=view&sceneId=model0000018b6118
baac_00000002&sceneTime=0" width="1250" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
140.
141.         </div>
142.
143.     </div>
144. </section><!-- End Portfolio Section -->
145.
146. <!-- ===== Team Section ===== -->
147. <section id="team" class="team">
148.     <div class="container" data-aos="fade-up">
149.
150.         <div class="section-header">
151.             <h2>Report</h2>
152.
153.         </div>
154.
155.         <div class="row gy-5">
156.
157.             <iframe
src="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FSolar%2Brepor
t&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&
shareMode=embedded&action=edit" width="1250" height="800" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
158.
159.
160.         </div>
161.     </section><!-- End Team Section -->
162.
163.
164.
165. <!-- ===== Contact Section ===== -->
166. <section id="contact" class="contact">
167.     <div class="container">
168.
169.         <div class="section-header">
170.             <h2>Contact Us</h2>

```

```
171.
172.         </div>
173.
174.     </div>
175.
176.
177.
178.     <div class="container">
179.
180.         <div class="row gy-5 gx-lg-5">
181.
182.             <div class="col-lg-4">
183.
184.                 <div class="info">
185.                     <h3>Get in touch</h3>
186.
187.                     <div class="info-item d-flex">
188.                         <i class="bi bi-geo-alt flex-shrink-0"></i>
189.                         <div>
190.                             <h4>Location:</h4>
191.                             <p>A108 Adam Street, New York, NY 535022</p>
192.                         </div>
193.                     </div><!-- End Info Item -->
194.
195.                     <div class="info-item d-flex">
196.                         <i class="bi bi-envelope flex-shrink-0"></i>
197.                         <div>
198.                             <h4>Email:</h4>
199.                             <p>info@example.com</p>
200.                         </div>
201.                     </div><!-- End Info Item -->
202.
203.                     <div class="info-item d-flex">
204.                         <i class="bi bi-phone flex-shrink-0"></i>
205.                         <div>
206.                             <h4>Call:</h4>
207.                             <p>+1 5589 55488 55</p>
208.                         </div>
209.                     </div><!-- End Info Item -->
210.
211.                 </div>
212.
213.             </div>
214.
215.             <div class="col-lg-8">
```

```

216.         <form action="forms/contact.php" method="post"
role="form" class="php-email-form">
217.             <div class="row">
218.                 <div class="col-md-6 form-group">
219.                     <input type="text" name="name" class="form-
control" id="name" placeholder="Your Name" required>
220.                 </div>
221.                 <div class="col-md-6 form-group mt-3 mt-md-0">
222.                     <input type="email" class="form-control"
name="email" id="email" placeholder="Your Email" required>
223.                 </div>
224.             </div>
225.             <div class="form-group mt-3">
226.                 <input type="text" class="form-control"
name="subject" id="subject" placeholder="Subject" required>
227.             </div>
228.             <div class="form-group mt-3">
229.                 <textarea class="form-control" name="message"
placeholder="Message" required></textarea>
230.             </div>
231.             <div class="my-3">
232.                 <div class="loading">Loading</div>
233.                 <div class="error-message"></div>
234.                 <div class="sent-message">Your message has been
sent. Thank you!</div>
235.             </div>
236.             <div class="text-center"><button type="submit">Send
Message</button></div>
237.         </form>
238.     </div><!-- End Contact Form -->
239.
240. </div>
241.
242. </div>
243. </section><!-- End Contact Section -->
244.
245. </main><!-- End #main -->
246.
247. <!-- ===== Footer ===== -->
248. <footer id="footer" class="footer">
249.
250.     <div class="footer-content">
251.         <div class="container">
252.             <div class="row">
253.

```



```
254.         <div class="col-lg-3 col-md-6">
255.             <div class="footer-info">
256.                 <h3>HeroBiz</h3>
257.                 <p>
258.                     A108 Adam Street <br>
259.                     NY 535022, USA<br><br>
260.                     <strong>Phone:</strong> +1 5589 55488 55<br>
261.                     <strong>Email:</strong> info@example.com<br>
262.                 </p>
263.             </div>
264.         </div>
265.
266.         <div class="col-lg-2 col-md-6 footer-links">
267.             <h4>Useful Links</h4>
268.             <ul>
269.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Home</a></li>
270.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">About us</a></li>
271.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Services</a></li>
272.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Terms of service</a></li>
273.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Privacy policy</a></li>
274.             </ul>
275.         </div>
276.
277.         <div class="col-lg-3 col-md-6 footer-links">
278.             <h4>Our Services</h4>
279.             <ul>
280.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Web Design</a></li>
281.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Web Development</a></li>
282.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Product Management</a></li>
283.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Marketing</a></li>
284.                 <li><i class="bi bi-chevron-right"></i> <a
href="#">Graphic Design</a></li>
285.             </ul>
286.         </div>
287.
288.         <div class="col-lg-4 col-md-6 footer-newsletter">
```

```
289.         <h4>Our Newsletter</h4>
290.         <p>Tamen quem nulla quae legam multos aute sint culpa
legam noster magna</p>
291.         <form action="" method="post">
292.             <input type="email" name="email"><input type="submit"
value="Subscribe">
293.         </form>
294.
295.     </div>
296.
297. </div>
298. </div>
299. </div>
300.
301.     <div class="footer-legal text-center">
302.         <div class="container d-flex flex-column flex-lg-row justify-
content-center justify-content-lg-between align-items-center">
303.
304.             <div class="d-flex flex-column align-items-center align-
items-lg-start">
305.                 <div class="copyright">
306.                     &copy; Copyright <strong><span>HeroBiz</span></strong>.
All Rights Reserved
307.                 </div>
308.                 <div class="credits">
309.                     <!-- All the links in the footer should remain intact. -
-->
310.                     <!-- You can delete the links only if you purchased the
pro version. -->
311.                     <!-- Licensing information:
https://bootstrapmade.com/license/ -->
312.                     <!-- Purchase the pro version with working PHP/AJAX
contact form: https://bootstrapmade.com/herobiz-bootstrap-business-template/
-->
313.                     Designed by <a
href="https://bootstrapmade.com/">BootstrapMade</a>
314.                 </div>
315.             </div>
316.
317.             <div class="social-links order-first order-lg-last mb-3 mb-
lg-0">
318.                 <a href="#" class="twitter"><i class="bi bi-
twitter"></i></a>
319.                 <a href="#" class="facebook"><i class="bi bi-
facebook"></i></a>
```

```

320.         <a href="#" class="instagram"><i class="bi bi-
instagram"></i></a>
321.         <a href="#" class="google-plus"><i class="bi bi-
skype"></i></a>
322.         <a href="#" class="linkedin"><i class="bi bi-
linkedin"></i></a>
323.     </div>
324.
325. </div>
326. </div>
327.
328. </footer><!-- End Footer -->
329.
330.     <a href="#" class="scroll-top d-flex align-items-center justify-
content-center"><i class="bi bi-arrow-up-short"></i></a>
331.
332.     <div id="preloader"></div>
333.
334.     <!-- Vendor JS Files -->
335.     <script
src="assets/vendor/bootstrap/js/bootstrap.bundle.min.js"></script>
336.     <script src="assets/vendor/aos/aos.js"></script>
337.     <script
src="assets/vendor/glightbox/js/glightbox.min.js"></script>
338.     <script src="assets/vendor/isotope-
layout/isotope.pkgd.min.js"></script>
339.     <script src="assets/vendor/swiper/swiper-bundle.min.js"></script>
340.     <script src="assets/vendor/php-email-form/validate.js"></script>
341.
342.     <!-- Template Main JS File -->
343.     <script src="assets/js/main.js"></script>
344.
345. </body>
346.
347. </html>

```

7.2 Feature 2

User-Centric: Features are developed with the end-user in mind. They should align with user requirements and expectations, serving a purpose or providing value to the user.

Functionality: Each feature represents a piece of functionality within the software. For example, in a word processing application, features might include text formatting, spell checking, and document printing.

Modularity: Software is often built in a modular fashion, with each feature being self-contained and independently developed. This modularity allows for easier maintenance, updates, and scalability.

User Stories: In Agile development, user stories are often used to define features. A user story describes a piece of functionality from the user's perspective, emphasizing the "who," "what," and "why."

Acceptance Criteria: Features are accompanied by acceptance criteria, which outline the conditions that must be met for a feature to be considered complete and functioning as intended.

Backlog: Features may be collected and organized in a product backlog, a prioritized list of features and enhancements that need to be developed. The product owner is typically responsible for managing the backlog.

Prioritization: Features are typically prioritized based on factors such as user value, business goals, technical dependencies, and market demands. This prioritization helps the development team focus on the most important features first.

Release Planning: Features often play a central role in release planning. A software release may include a set of features that are bundled together for deployment.

Iterative Development: In Agile methodologies like Scrum, features are developed incrementally over a series of sprints. Each sprint focuses on implementing a subset of features.

Feedback and Iteration: User feedback and testing may lead to iterations on features, with improvements or changes made in response to user preferences or identified issues.

Documentation: Features may be documented in requirements documents, technical specifications, and user manuals to ensure that all stakeholders have a clear understanding of what the software does.

Quality Assurance: Features go through testing and quality assurance processes to ensure they work correctly and do not introduce defects into the software.

8 PERFORMANCE TESTING

8.1 Performance Metrics

Performance Metrics are measurements used to evaluate the efficiency and effectiveness of systems, processes, or activities. In various domains, including technology, business, and sports, performance metrics help assess and improve performance. Here are some common types of performance metrics and their applications:

1. Technology and IT Performance Metrics:

- **Response Time:** Measures the time it takes for a system to respond to a request or an action. It's crucial for assessing the speed and responsiveness of software applications and websites.
- **Throughput:** Represents the number of transactions or operations a system can handle in a given period. It's important for evaluating the capacity of a network, server, or application.
- **Error Rate:** Tracks the frequency of errors or failures in a system. High error rates can indicate reliability or quality issues.
- **Uptime/Downtime:** Measures the availability of a system or service. Uptime is the time a system is operational, while downtime is when it's unavailable. Uptime is a key metric for assessing reliability.

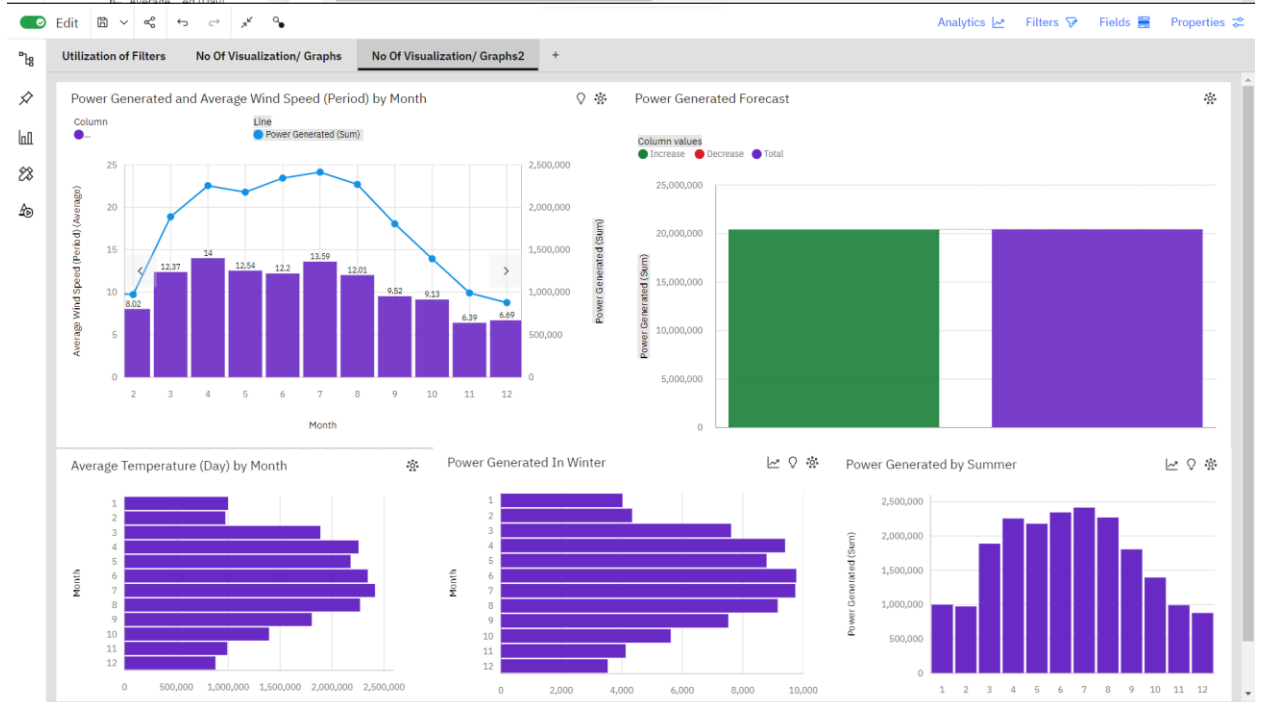
2. Business Performance Metrics:

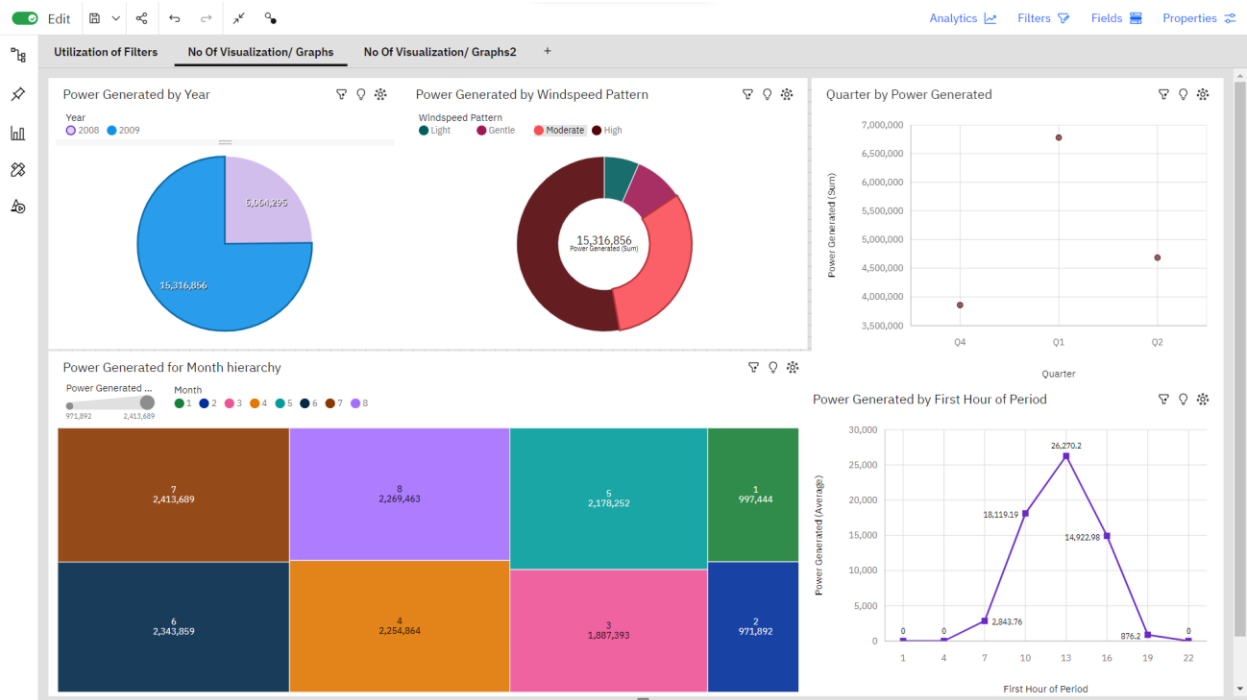
- **Key Performance Indicators (KPIs):** These are specific metrics used to measure the success of a business or a particular aspect of it. Examples include revenue, profit margin, customer retention rate, and market share.
- **Customer Satisfaction:** Assesses the level of satisfaction or happiness among customers. Surveys and feedback are often used to gather data for this metric.

	<ul style="list-style-type: none"> • Employee Productivity: Measures the efficiency and effectiveness of employees in completing tasks or projects. Metrics might include output per employee or project completion time. • Return on Investment (ROI): Evaluates the financial return or profitability of an investment. It's essential for decision-making in areas like marketing, capital projects, and acquisitions.
3.	Financial Performance Metrics: <ul style="list-style-type: none"> • Revenue Growth: Measures the increase in revenue over time. It helps evaluate the growth and financial health of a business. • Profit Margin: Calculates the percentage of profit generated from each sale. A higher profit margin indicates efficiency and profitability. • Earnings Before Interest and Taxes (EBIT): Evaluates a company's operational profitability, excluding interest and taxes. It helps assess the core profitability of the business. • Cash Flow: Tracks the movement of cash into and out of a company. Positive cash flow is vital for a business's liquidity and financial stability.
4.	Project Management Performance Metrics: <ul style="list-style-type: none"> • Schedule Performance: Compares the planned schedule to the actual progress of a project. Metrics like schedule variance and schedule performance index (SPI) are used. • Cost Performance: Evaluates the financial performance of a project. Metrics include cost variance and cost performance index (CPI). • Scope Performance: Assesses whether the project's scope is being delivered as planned. Metrics such as scope creep and scope change rate are relevant. • Quality Metrics: Evaluate the quality of project deliverables, often through defect counts, customer satisfaction, or adherence to quality standards.
5.	Sports and Fitness Performance Metrics: <ul style="list-style-type: none"> • Speed: Measures how quickly a player or athlete can move from one point to another. It's crucial in sports like track and field, soccer, and basketball. • Endurance: Evaluates an athlete's ability to sustain prolonged physical exertion. Metrics might include maximum distance covered in a set time. • Accuracy: Assesses how precise an athlete's movements are, particularly in sports like archery, shooting, or golf. • Strength: Measures an athlete's physical power, often assessed through weightlifting or resistance training.

9 RESULTS

9.1 Output Screenshots





Solar panels are devices that convert light into electricity.

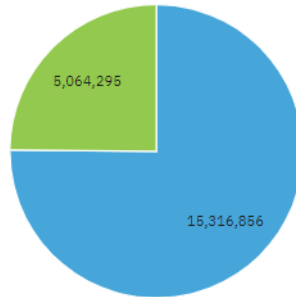
solar photovoltaics for electricity, passive solar design for space heating and cooling, and solar water heating

Solar energy is solar radiation that can generate heat, cause chemical processes or generate electricity

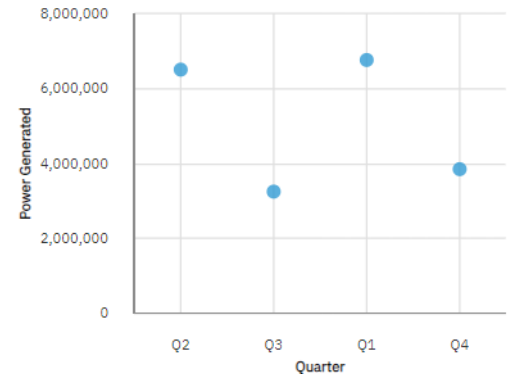
Solar Panel Forecasting Report

Power Generated by Year

Year
● 2009 ● 2008



Quarter by Power Generated



10 ADVANTAGES & DISADVANTAGES

Advantages of Performance Metrics:

1. **Objective Evaluation:** Performance metrics provide an objective and quantifiable way to assess various aspects of performance, reducing bias and subjectivity in evaluation.
2. **Data-Driven Decision Making:** Metrics offer valuable data that can guide decision-making processes, helping organizations and individuals make informed choices.
3. **Goal Setting and Accountability:** Metrics help set clear goals and hold individuals or organizations accountable for achieving those goals.
4. **Continuous Improvement:** By monitoring performance over time, performance metrics enable continuous improvement and help identify areas that need attention.
5. **Efficiency and Effectiveness:** They help optimize efficiency by highlighting areas where resources or efforts can be better allocated to improve effectiveness.
6. **Benchmarking:** Metrics allow organizations to compare their performance with industry standards or competitors, facilitating benchmarking and setting performance targets.
7. **Motivation and Recognition:** Recognizing and rewarding high performance based on metrics can motivate individuals and teams to excel.

Disadvantages of Performance Metrics:

1. **Narrow Focus:** Overemphasis on specific metrics can lead to a narrow focus on those areas, potentially neglecting other important aspects of performance.
2. **Gaming the System:** Some individuals or organizations may manipulate or "game" metrics to show better results without genuinely improving performance.

3. **Unintended Consequences:** Metrics can lead to unintended consequences, such as employees optimizing for the measured outcome at the expense of other essential activities.
4. **Metric Overload:** Too many metrics can overwhelm individuals or organizations, making it difficult to prioritize and act on the most critical data.
5. **Resistance and Stress:** Excessive reliance on metrics can create stress and resistance among employees, as they may feel constant pressure to meet targets.
6. **Inaccuracy:** Metrics are only as good as the data they are based on. Inaccurate or incomplete data can lead to incorrect conclusions.
7. **Complexity:** Developing and maintaining a comprehensive system of performance metrics can be complex and time-consuming.
8. **Short-Term Focus:** Metrics often focus on short-term outcomes, potentially discouraging long-term planning and strategic thinking.

11 CONCLUSION

In conclusion, solar energy technology has both advantages and disadvantages. On the positive side, it is a renewable energy source, does not produce greenhouse gas emissions or other harmful pollutants, and can provide energy independence to households and businesses

However, it's essential to recognize the potential pitfalls associated with performance metrics. These include the risk of a narrow focus, gaming the system, unintended consequences, metric overload, resistance, and inaccuracies. Overreliance on metrics, especially if not carefully chosen and monitored, can lead to stress and short-term thinking.

A balanced and thoughtful approach to performance metrics is crucial. It involves selecting the right metrics that align with overarching goals and values, maintaining data accuracy, and avoiding excessive complexity. It also requires a focus on both short-term and long-term outcomes and a commitment to fostering a culture of continuous improvement.

In practice, the effective use of performance metrics can lead to better decision-making, greater accountability, and the achievement of desired outcomes. However, this success is contingent on the strategic and mindful application of metrics in alignment with the unique needs and objectives of the context in which they are used.

12 FUTURE SCOPE

The future scope of solar panels and solar energy technology is promising and includes several exciting developments and trends:

1. **Increased Efficiency:** Research and development efforts are focused on increasing the efficiency of solar panels. Advanced materials and design innovations aim to capture more sunlight and convert it into electricity more effectively. This will make solar panels even more cost-effective and practical.
2. **Tandem Solar Cells:** Tandem solar cells, which combine multiple layers of solar cells with varying properties, show great promise in increasing efficiency. They can capture a broader spectrum of sunlight, improving overall energy production.

3. **Energy Storage Integration:** The integration of energy storage solutions, such as advanced batteries, with solar panel systems is becoming more common. This enables homeowners and businesses to store excess energy for use during the night or cloudy days, making solar power a more reliable and round-the-clock energy source.
4. **Bifacial Solar Panels:** Bifacial solar panels are designed to capture sunlight from both sides, increasing their energy production. These panels are becoming more widespread and can be used in various applications.
5. **Solar Tracking Systems:** Solar tracking systems that follow the sun's path throughout the day are being employed to maximize energy production. These systems can significantly boost the efficiency of solar panels.
6. **Flexible and Lightweight Solar Panels:** Thin-film and flexible solar panels are gaining popularity due to their lightweight and versatile nature. They can be integrated into various surfaces, such as building materials, vehicles, and portable devices.
7. **Solar Technology in Urban Planning:** Solar panels are increasingly incorporated into urban planning and building design. Solar-integrated buildings and solar roads are becoming a reality, allowing cities to generate their own clean energy.
8. **Smart Grid Integration:** The development of smart grids and microgrids is enhancing the integration of solar power into the broader energy infrastructure. This enables more efficient energy distribution and grid stability.
9. **Hybrid Systems:** Combining solar panels with other renewable energy sources like wind turbines is gaining traction. These hybrid systems offer a more consistent and reliable power supply.
10. **Global Expansion:** The solar energy industry is expanding globally, with countries around the world investing in solar infrastructure. This growth is creating new opportunities in manufacturing, installation, and maintenance.
11. **Innovations in Solar Financing:** Innovative financing options, such as solar leases, power purchase agreements (PPAs), and community solar programs, are making solar energy accessible to a broader range of consumers.
12. **Energy-Positive Buildings:** Advances in solar technology are contributing to the creation of energy-positive buildings, which generate more energy than they consume. This trend is particularly significant in sustainable construction.
13. **Environmental Impact:** As concerns about climate change grow, solar energy's role in reducing greenhouse gas emissions and mitigating environmental impact will become even more critical.

13. APPENDIX Source Code

GitHub

<https://github.com/Aynudeen/Solar-Power-Forecasting.git>

Project Demo Link

<https://drive.google.com/file/d/1U6b3d5kjmPzOKTWDmGdOwEjXaVtbbQht/view?usp=drivesdk>