

Fuel Cell Data Center: Renewably Powering the Internet

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Background

The ever expanding modern internet is stored on huge banks of hard drives called data centers. With the massive growth of data storage needs, a modern engineering challenge is to reduce the carbon footprint of data centers by powering them greenly.

Goal

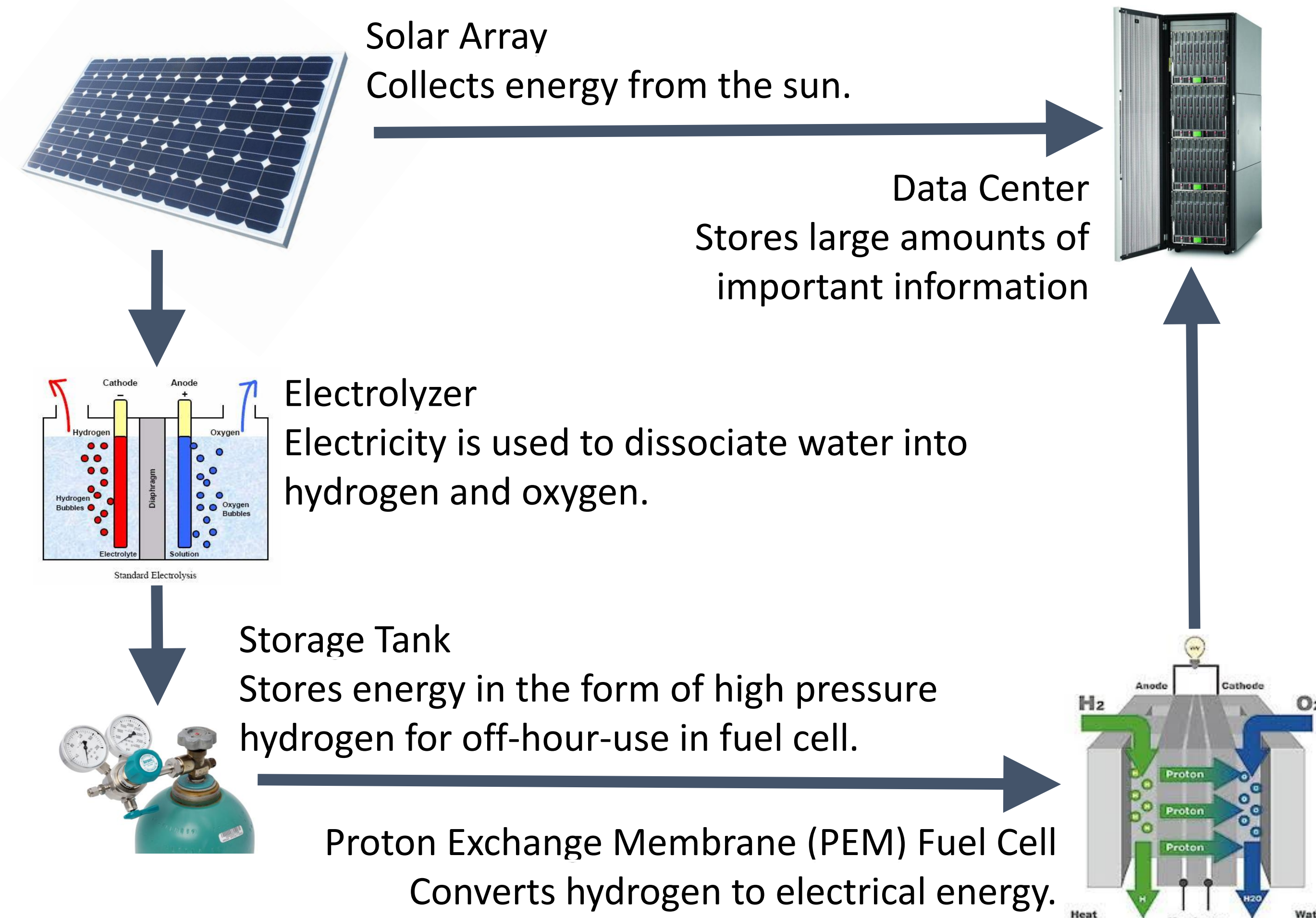
Create a renewable energy model capable of continuously powering a data center using experimentally derived data.

Objectives

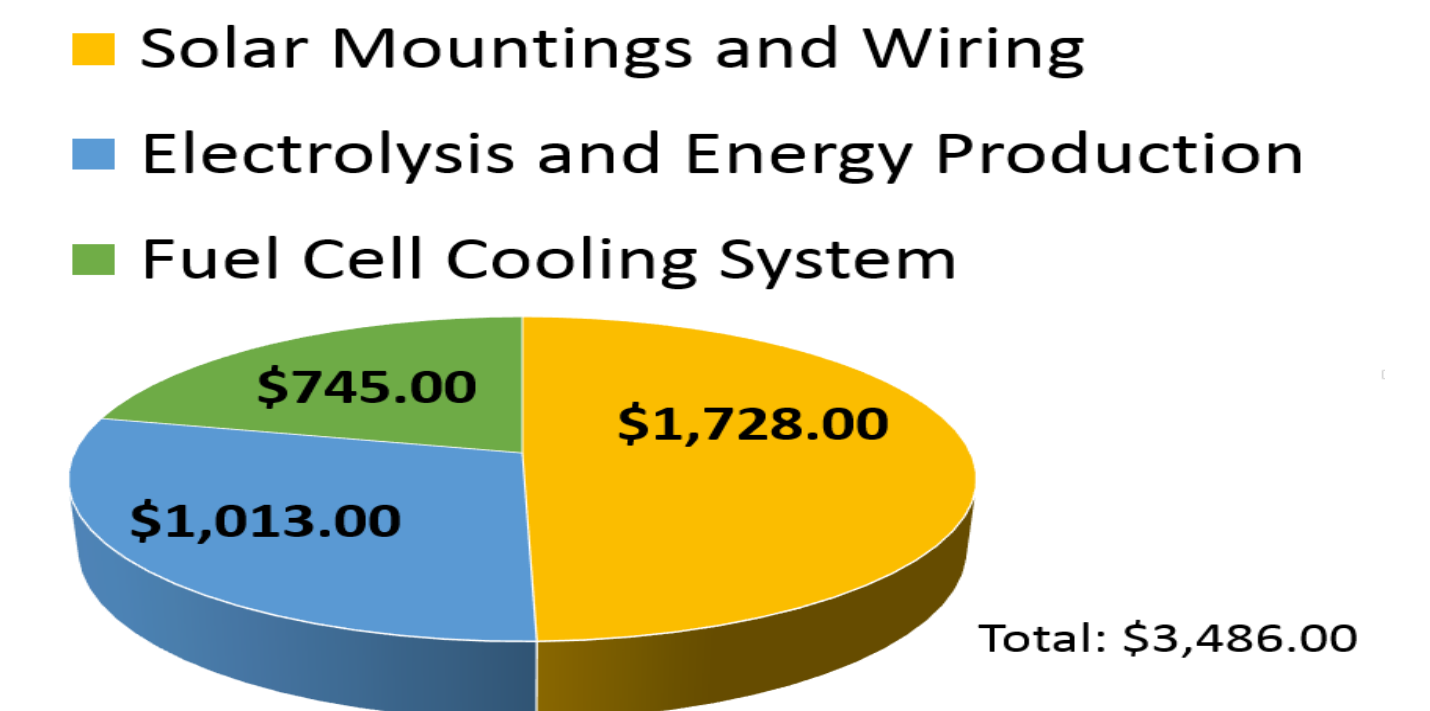
1. Repair key system components and design system interconnects for system integration studies
2. Gather experimental data for model validation from each individual system component
3. Generate a computer model to power a 100 MW data center completely on renewable energy
4. Assess this model and explore real world viability using experimental data and system integration studies

Timeline

Project/Mo.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Modeling	Solar		Fuel Cell		Electrolyzer		Hydrogen Storage		Data Center
Solar	Design Test Bed			Build Test System	Testing				Analyze
Fuel Cell		Design Cooling System		Build Cooling System	System Validation		Testing		Analyze
Electrolyzer	Testing								Analyze
Write-Up	Literature Review						Writing		



Budget



Innovation

Fulfill constant power demands with non-constant renewable energy sources in conjunction with energy storage.

Current Status

1. Install cooling system for PEM Fuel Cell
2. Constructing photovoltaic test bed
3. Running various parameters on model

Next Step

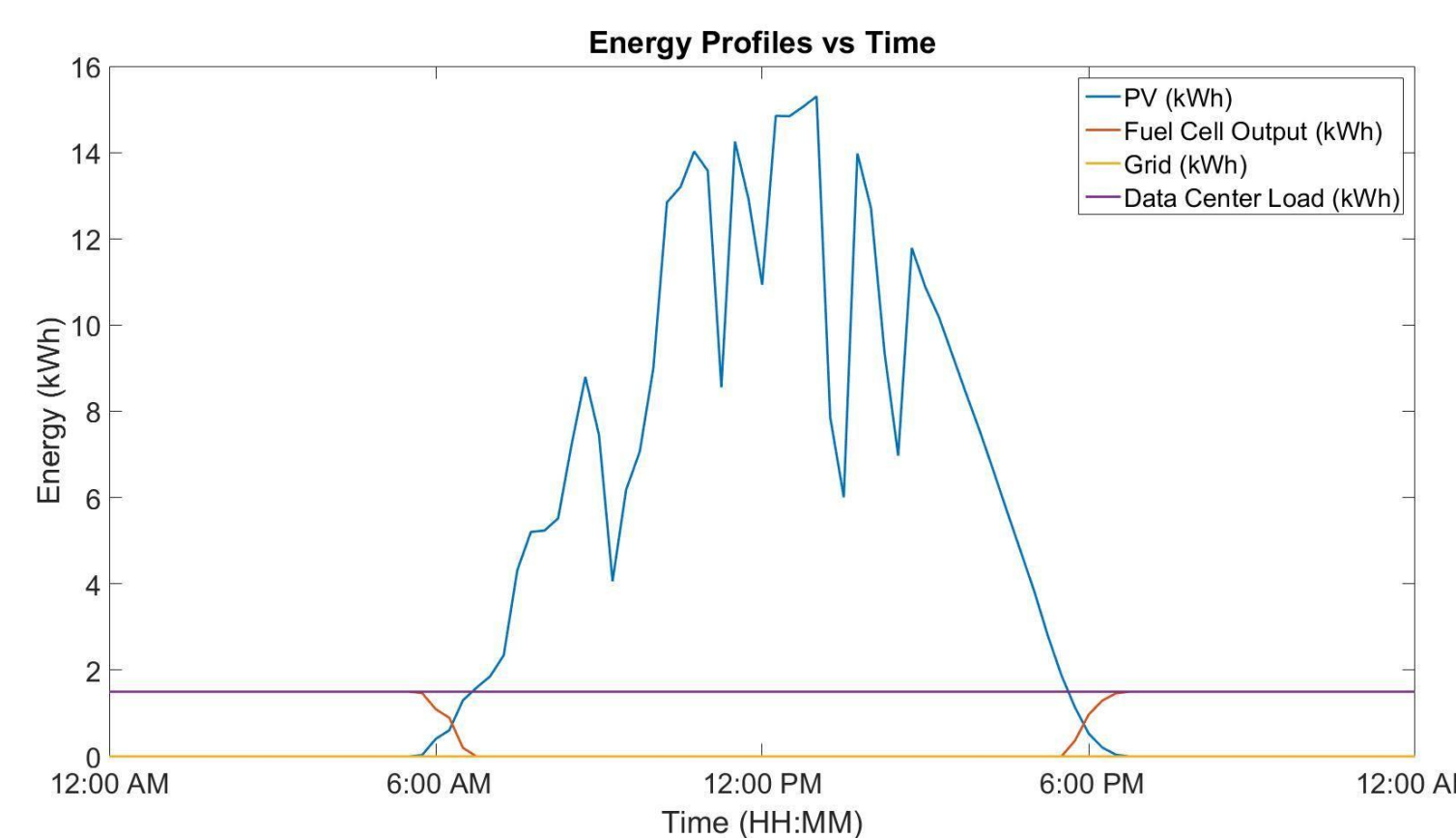
1. Achieve start-up and steady state operation on PEM Fuel Cell
2. Gather load demand profile from data center
3. Determine necessary system integration components and controls scheme

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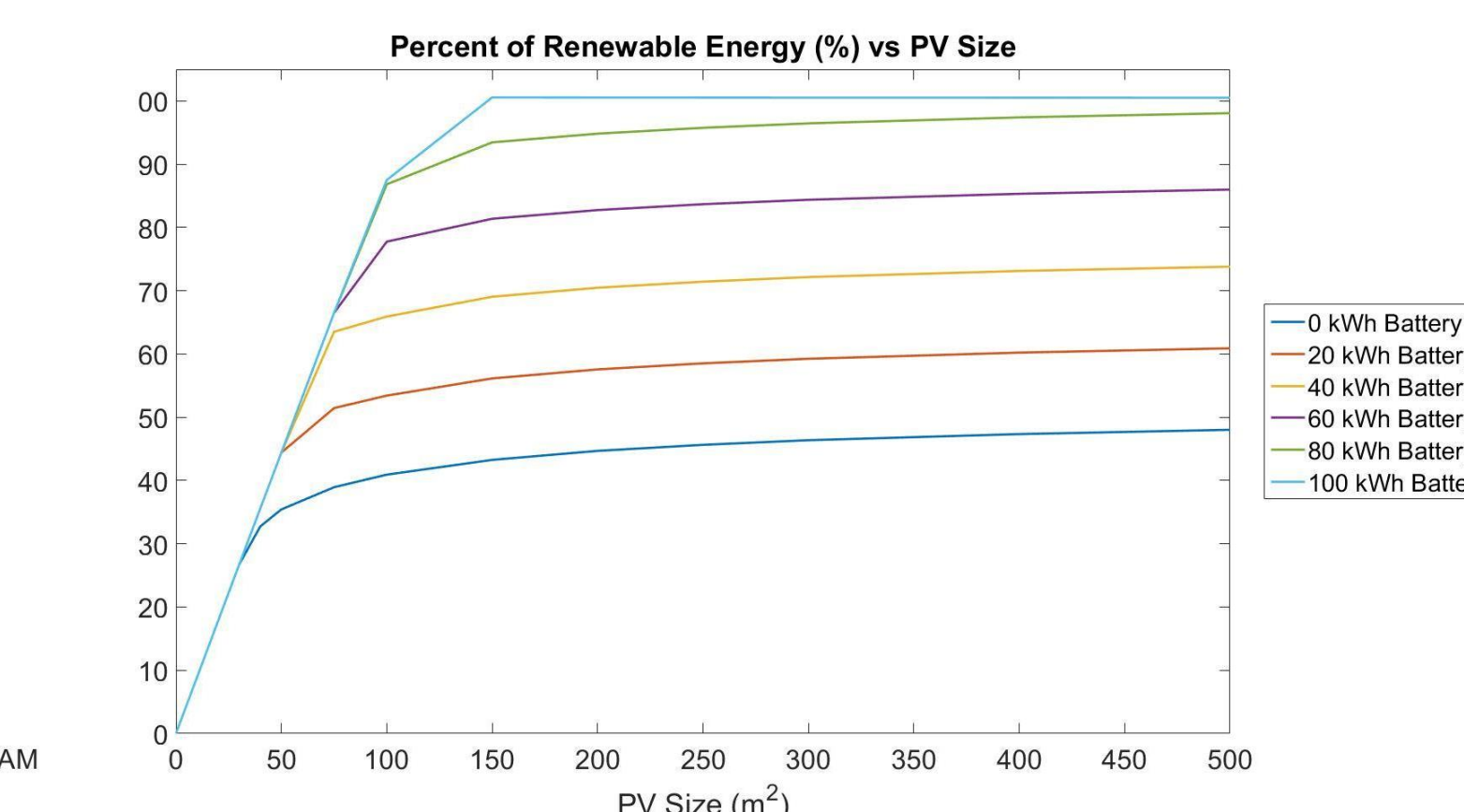
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Renewable Energy Penetration



Providing Consistent Power with Variations in Solar Energy Availability



Photovoltaic Solar Panels and Battery Energy Storage