USE CASE — ELECTRIC VEHICLE CHARGING

Financial impact of integrating and optimizing EV charging stations for a California hospital

HOMER Grid

Challenge

A California hospital wanted to determine if adding solar and energy storage would decrease its annual electricity costs for charging electric ambulances, as well as reduce carbon emissions of its energy generation. Additionally, the hospital needed to determine the battery capacity required and the optimal charging strategy.

The hospital expected 20 charging sessions per day on average, with a total of 10 electric vehicle (EV) charging stations.

Available space for solar photovoltaic (PV) allowed a maximum system capacity of 2,000 kilowatts (kW). To minimize energy costs and reduce the hospital's carbon footprint, the analysis evaluated the optimum storage capacity needed for overnight charging.

Solution

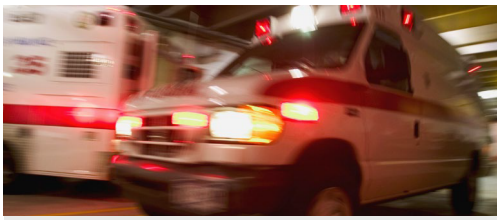
UL conducted a feasibility study using HOMER® Grid modeling software to analyze the financial impact of solar-plus-storage for the planned electric vehicle fleet.

Using HOMER Grid, UL's experts modeled Pacific Gas & Electric (PG&E) electric rates for customers with a maximum demand of 1,000 kW or more and a net energy metering (NEM) tariff.

HOMER Grid's model included:

- Solar resource generation data
- Battery optimization based on the software's managed fleet overnight charging schedule
- Financial impacts of construction costs
- PV 2000 kW; energy storage 100 kW/120 kWh

The software model also evaluated ongoing operation and maintenance, including energy storage capacity degradation and replacement strategies to determine the internal rate of return (IRR).



Impact

Analysis conducted by UL's HOMER Grid provided the hospital with expected financial results for a solar-plus-storage system for its forecasted EV fleet.

Results

- Optimal EV charging strategy – managed fleet overnight
- System design optimized for the lowest net present cost (NPC)
- Payback – 11 years
- Significant cost savings generated by solar PV and energy storage

Financial results	
Simple payback	**10.8 years**
Return on investment	**5.25%**
Internal rate of return	**7.87%**
Net present value	**$699,568**
Capital investment	**$3.57M**
Annualized savings	**$330,015**

UL modeled numerous factors to determine the optimal size and configuration of the battery energy storage co-located with on-site solar generation. HOMER Grid's optimization algorithm finds the most effective dispatch strategy to charge the battery for energy cost reduction. The software also considers rate structure — a critical factor when evaluating the best option to minimize utility costs.

Why UL and HOMER Grid are right for you

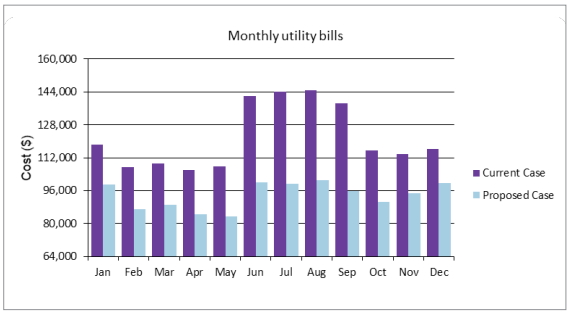
Only HOMER Grid combines economics, engineering and multiple value streams in one model, then rapidly performs complex calculations to find the least-cost solution. Robust capabilities include EV charging, demand response programs, incentives, resilience and reliability. UL's expertise and long-standing independent engineering reputation combined with HOMER software's unmatched energy storage modeling delivers accurate modeling, design, economic evaluation and optimization. You can license the software to perform your own modeling, or we can do it for you.

Modeling results

HOMER Grid analyzes technical and financial information side-by-side, enabling the selection of least-cost systems. Sample screenshots below illustrate the results of critical parameters modeled.

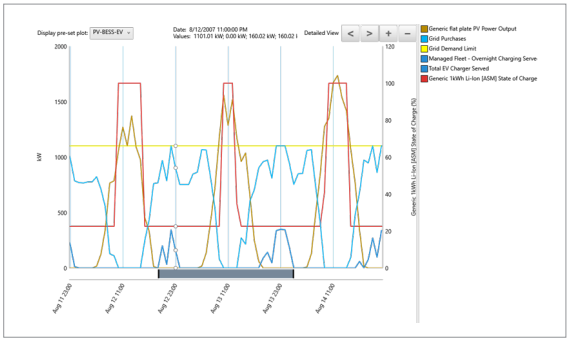
Utility cost savings

The graph illustrates monthly utility cost savings. The proposed system shows significant savings.



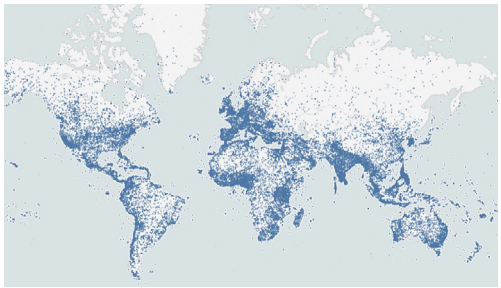
Dispatch strategy

HOMER Grid modeling results show the dispatch of solar PV and energy storage to meet the EV charging load.



Energy cost savings

	Consumption charge	Demand charge	Fixed rate	Total
Base case	$932,454	$316,386	$214,666	$1.46M
Proposed case	$636,746	$273,558	$214,666	$1.12M
Annual savings	**$295,708**	**$42,829**	**$0.00**	**$338,537**



Map shows the locations of more than 250,000 projects analyzed by HOMER software in 190+ countries.

To request a demonstration, please contact sales@homerenergy.com
For more information, visit UL.com/HOMERsoftware

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