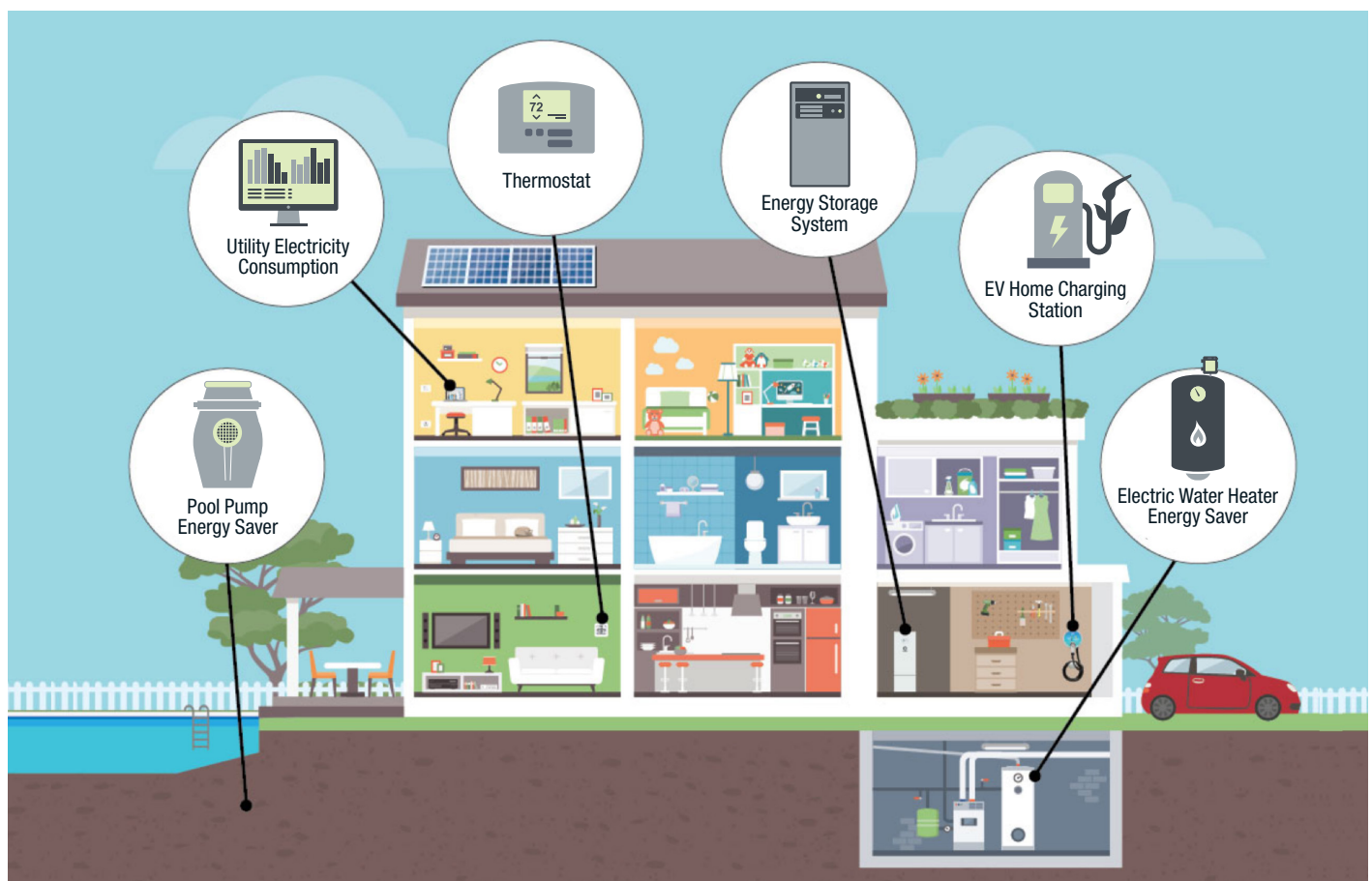


The San Diego Smart Home Study

Orchestrating Smart Home Loads in Harmony with the Grid

The vision of a smart grid is based on central and distributed energy resources (DERs) dynamically interacting to create smart homes and smart loads that respond to price signals to effectively balance energy supply and demand. The San Diego Smart Home Study aims to demonstrate exactly this vision, through orchestrating the smart home loads in harmony with the grid, towards mutual benefit.



THE STUDY

Single-family residences have become the front line in a market transformation that includes the proliferation of distributed energy resources such as solar roofs, smart thermostats, electric vehicle (EV) charging stations and storage. However, the vast majority of these distributed energy resources (DERs) currently operate independently from each other, causing adverse impacts on the distribution grid such as two-way power flows and steep late-day increases in system load. The San Diego Smart Home Study objectives are to show customers, utilities and energy service companies how to automatically optimize the operation of distributed energy resources to maximize customer and grid benefits.

Itron is striving to provide the missing link between smart homes and the smart grid, through applying distributed intelligence and cloud computing to deliver optimized operation approach for behind the meter DERs and intelligent loads. As part of this effort, Itron is serving as the lead technologist for the research study being conducted by the Smart Home Consortium through funding provided by the California Energy Commission's EPIC Program. The San Diego Smart Home Consortium is comprised of Alternative Energy Systems Consulting, the Oxygen Initiative, the Center for Sustainable Energy®, and Itron.

The study is set in the San Diego area of SDG&E territory across 100 homes both inland and coastal. The aim is to evaluate customer responsiveness – in terms of net load – to specific electricity price signals by providing customers with tools and platforms to easily control a wide range of DERs and simultaneously optimize bill savings, comfort/lifestyle preferences, and grid benefits. To accomplish this, Itron is installing the company's Residential Distributed Energy Resource Management System (RDERMS) solution to communicate with and control behind-the-meter DERs that include; solar PV, electric vehicles, battery storage, pool pumps, electric water heaters, and air conditioners (smart thermostats). Itron's RDERMS is a novel energy management solution that provides appeal to the grid and consumers alike:

GRID APPEAL

Greater reliability: Large-scale deployment of RDERMS systems across a service territory would increase grid reliability by optimizing the electricity usage across millions of homes. This would improve reliability on multiple feeders and reduce the risks associated with single-points-of-failure such as large battery storage farms.

Increased safety: With RDERMS, the duck curve can be flattened. This reduces utilities' reliance on a large number of fossil fuel plants ramping up in the evening hours, which minimizes the risk of catastrophic plant failure.

Sustainability goals: RDERMS contributes to meeting renewable portfolio standards by intelligently using the residential market and an increasingly electrified transportation system to strategically absorb the electricity produced by distributed renewables. Meeting renewable portfolio standards will in turn contribute to reduced GHG emissions, thereby slowing climate change.

CONSUMER APPEAL

Reduced cost: RDERMS optimizes customer net load and electricity costs based on time-of-use or dynamic electricity rates, thus yielding maximum cost savings for customers. RDERMS incorporates predictive algorithms to project consumption, generation and comfort level which allows the optimization to be transparent to the users.

Enhanced convenience through automation: RDERMS not only appeals to consumers by reducing electricity costs, but also maximizes the benefits of home renewable technology investments such as solar systems, electric vehicles and battery storage. It also integrates easily as part of home automation hence providing additional incentive for users to adopt the solution.

Project website

<https://smarthomestudy.com/>

Project sponsor

California Energy Commission – EPIC research funding

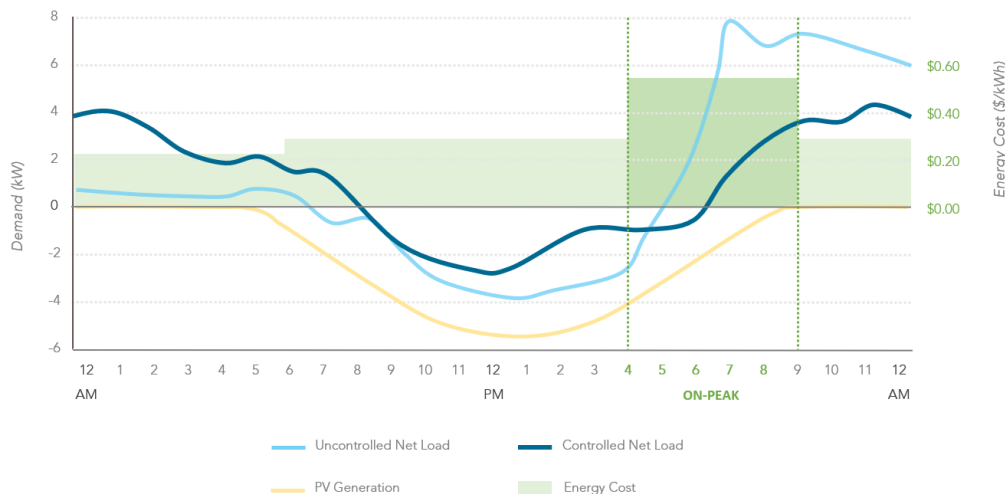
Project partners

The Smart Home Consortium

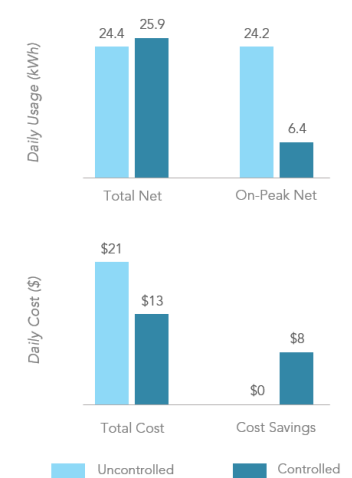
Host utility

San Diego Gas & Electric

Optimization and Control of DER Loads



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