

CEC-500-2020-038: Complete and Low-Cost Retail Automated Transactive Energy System (RATES)

PROJECT DESCRIPTION

What is the purpose of this project?

This research project demonstrated a **Retail Automated Transactive Energy System (RATES)** for a decentralized energy market interfaced with customers, a distribution operator, a load-serving entity, and a wholesale market.

RATES was developed with the goal to maximize the potential for residential and small commercial customers to self-manage their electricity use to save money as California achieves its 100 percent clean energy and electrification goals by 2045.

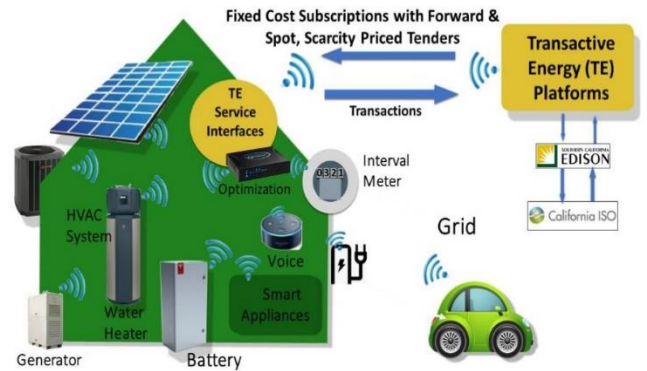


Figure 1: RATES High-Level Overview

TECHNOLOGY

How is the technology and how does it work?

The proposed solution includes an innovative retail tariff with real-time, actionable prices and bill stability. The solution also offers a platform to communicate the price offers to customers so that operation of their electrical devices can be automated for their benefit.

Essentially, RATES uses a simple, innovative tariff. The tariff offers electric customers “subscriptions” for fixed hourly kW of electricity shaped to their historical usage at a fixed monthly cost. The monthly cost is based on their current tariff. If the customer uses more or less kW in an hour than subscribed, RATES automatically sells back kW or buys more kW at real-time tendered prices that vary with supply, demand, and other grid conditions.

The tariff also protects customers and suppliers from volatile bills, fairly allocates costs among customer classes, and supports investments in clean generation, storage, and energy efficiency.

RESULTS

What are the project results?

In this project, the team completed the design of RATES, and:

- Installed RATES in about 100 homes on an SCE distribution circuit.
- Implemented a subscription transactive tariff and obtained CPUC tariff approval.
- Adapted the TeMix transactive energy platform to support RATES.
- Adapted Universal Devices’ low-cost energy management system and software to support RATES.

CONCLUSION

What was concluded from this project?

The RATES project achieved what was expected and met the goals of the project by demonstrating its feasibility. As importantly, the project showed that low-cost, off-the-shelf, and even existing customer IoT devices, Photovoltaics, and electric vehicles can be leveraged and incorporated into RATES.

Validating the core principles and concepts of RATES has spawned independent projects, including using dynamic variable prices provided by RATES. In addition, SCE is examining an extension of this project to continue research objectives that may not have been addressed in the original scope.