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Role of Transactive Energy

I may have submitted this improperly on January 17. Just in case, here it is again.

Additional submitted attachment is included below.

Comments for the CEC 2020 Load Management Rule making proceedings, January 16, 2020

The goal of the 2020 Load Management Rule making proceeding is to form the foundation for a system that automates the creation of hourly and sub-hourly costs or signals that can be used by end-use automation to provide real-time demand flexibility on the grid.

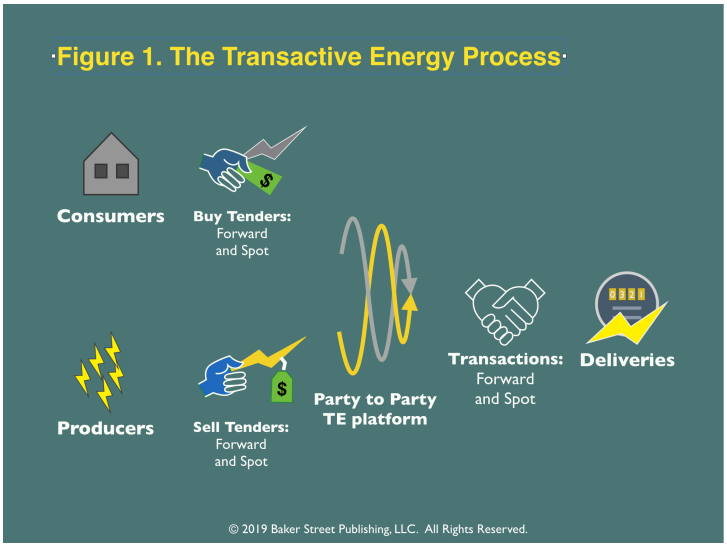
My recommendation to the Commissioners is that you use the Transactive Energy (TE) business model as the framework for your efforts. The TE model is based on four important principles:

1. There are two products: energy and transport. Energy and transport are linked, nevertheless, there are separate markets for each.

2. All parties act autonomously. Consumers make behind the meter decisions in a way that maximizes their welfare.

3. Forward tenders and transactions are used to coordinate investment decisions and to manage risk. A long-term contract is an example of a forward transaction. Subscriptions are a form of forward transaction that can be used by consumers to manage risk and volatility.

4. Spot tenders and transactions are used to coordinate operating decisions.



The process is sketched in Figure 1. Producers offer spot and forward tenders to sell energy or transport. Consumers offer spot and forward tenders to buy energy and transport. (A tender is an offer to buy or sell something at a specified price.) All parties meet on a party-to-party TE platform where spot and forward transactions are recorded. Delivery is made in accordance with transactions.

There is nothing new about the TE model. It is the model followed by virtually all decentralized markets from tomatoes to airplanes. What is new is the application to electric power. This is enabled by the digital transformation that is impacting all markets, i.e., elastic Cloud computing, Big Data, artificial intelligence (AI), and the Internet of Things (IoT.)

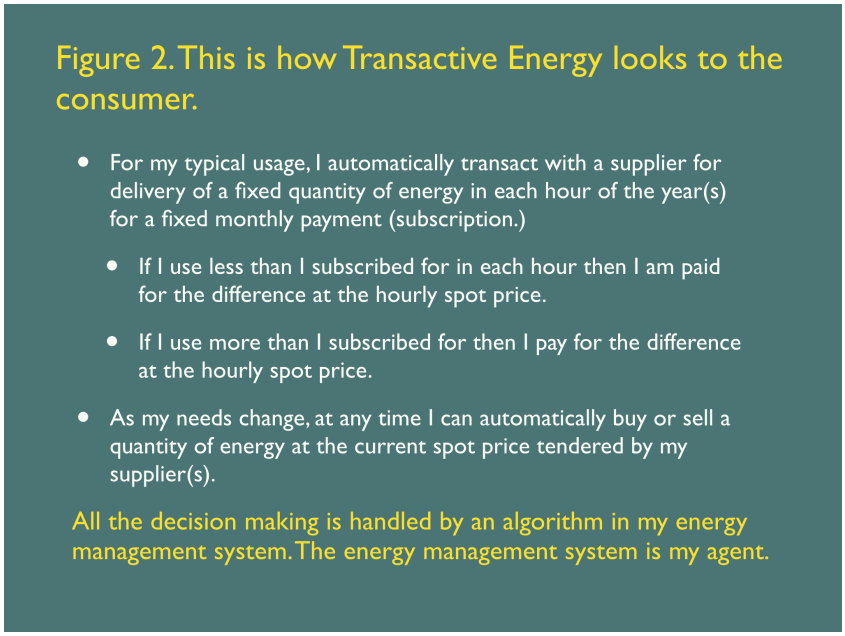
The TE model provides customers with the prices (signals) that they need to invest in storage and load shifting devices like batteries and home automation. It also provides the right signals for customers to operate their devices in a way that maximizes their welfare while at the same time contributing to the general social welfare.

Customers need to know forward prices in order to optimize storage and load shifting. A battery owner needs to know how prices are going to change over the next 24 hours or longer in order to decide, Do I charge now or wait? Do I discharge the energy in my battery now or do I wait? Will prices go up or down?

With the TE model customers reduce their uncertainty by using subscriptions (forward transactions.) Just as a producer uses future contracts to reduce uncertainty and volatility, the customer uses subscriptions to reduce uncertainty

and volatility. The length of the subscriptions is a decision. It can be for the next 24 hours or for the next year. The subscriptions can be modified hourly or shorter intervals.

See Figure 2 for a description of how the system looks to the customer.



The TE business model has been implemented for over 100 residential customers at Southern California Edison under a California Energy Commission grant, A Complete and Low-cost Retail Automated Transactive Energy System (RATES.) I encourage the Working Group to use the lessons learned from the RATES project in the current rule making proceedings.

Thank you for the opportunity to participate in this process.

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Principal Investigator, Load Management Strategy Testing Model, EPRI Project 1485, final report, May 1982