

# ARE CONSUMERS UPENDING THE UTILITY BUSINESS MODEL?

AN AMERICAN PERSPECTIVE

PRESENTED BY

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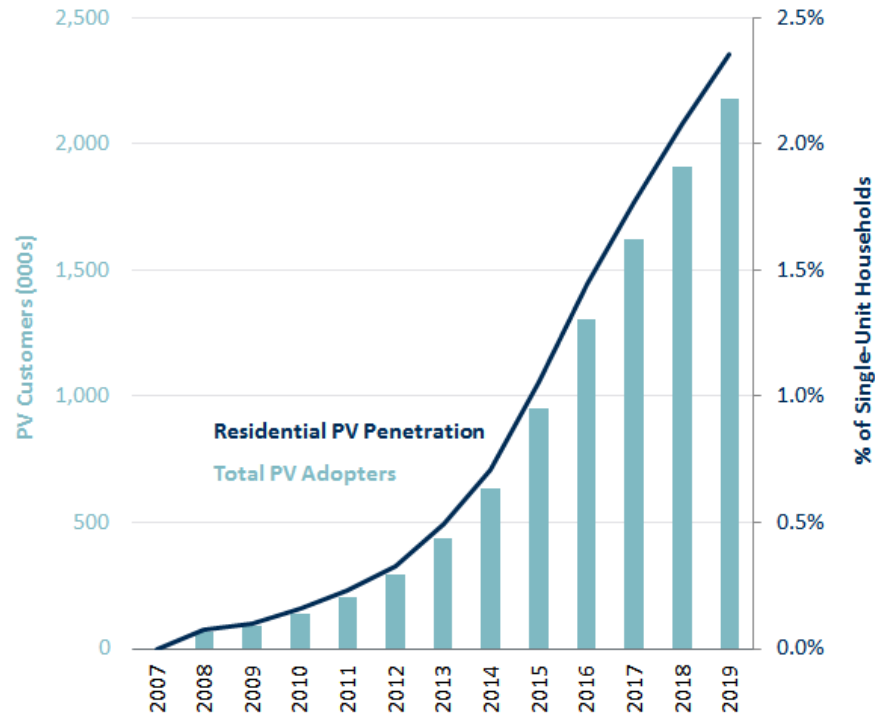
Florence School of Regulation

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THE **Brattle** GROUP

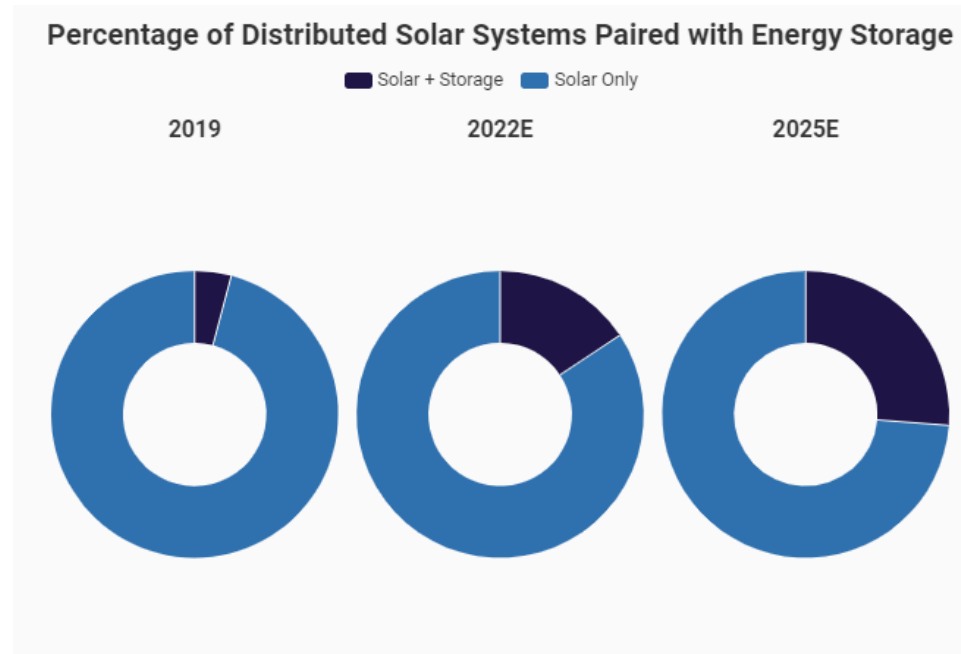


# Tired of paying high electric bills, consumers are turning into prosumers



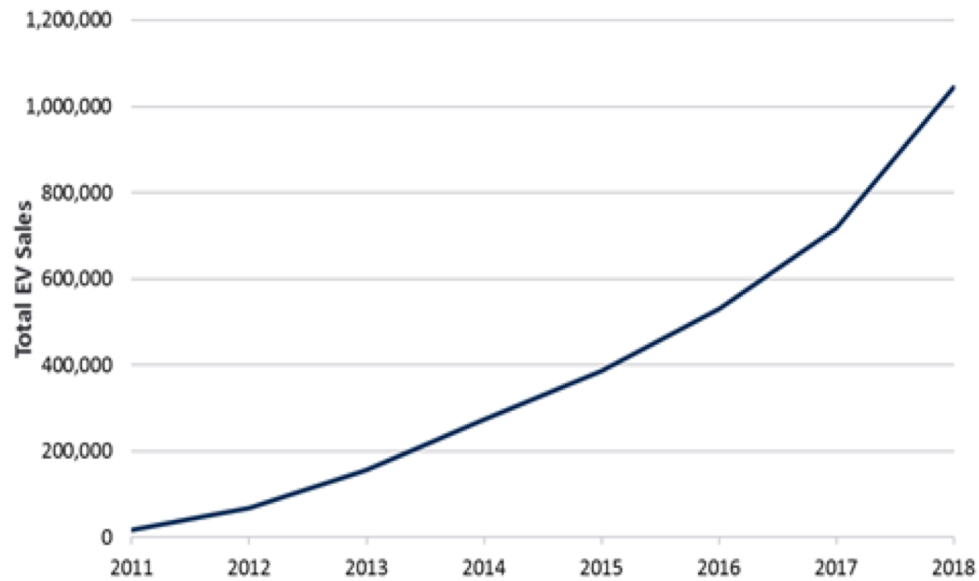
Source: Residential PV adopter counts from Form EIA-861, “Net Metering” data. Residential PV penetration calculated as Residential PV Adopters over total number of single-unit households, using U.S. Census data.

Prosumers are turning into prosumagers. By 2025, more than 25% of all behind-the-meter solar systems will be paired with storage, compared to under 5% in 2019



Source: SEIA/Wood Mackenzie, "U.S. Solar Market Insight 2019 Year-in-Review," <https://www.seia.org/us-solar-market-insight>

# Consumers are also buying electric vehicles (EVs) in increasing numbers

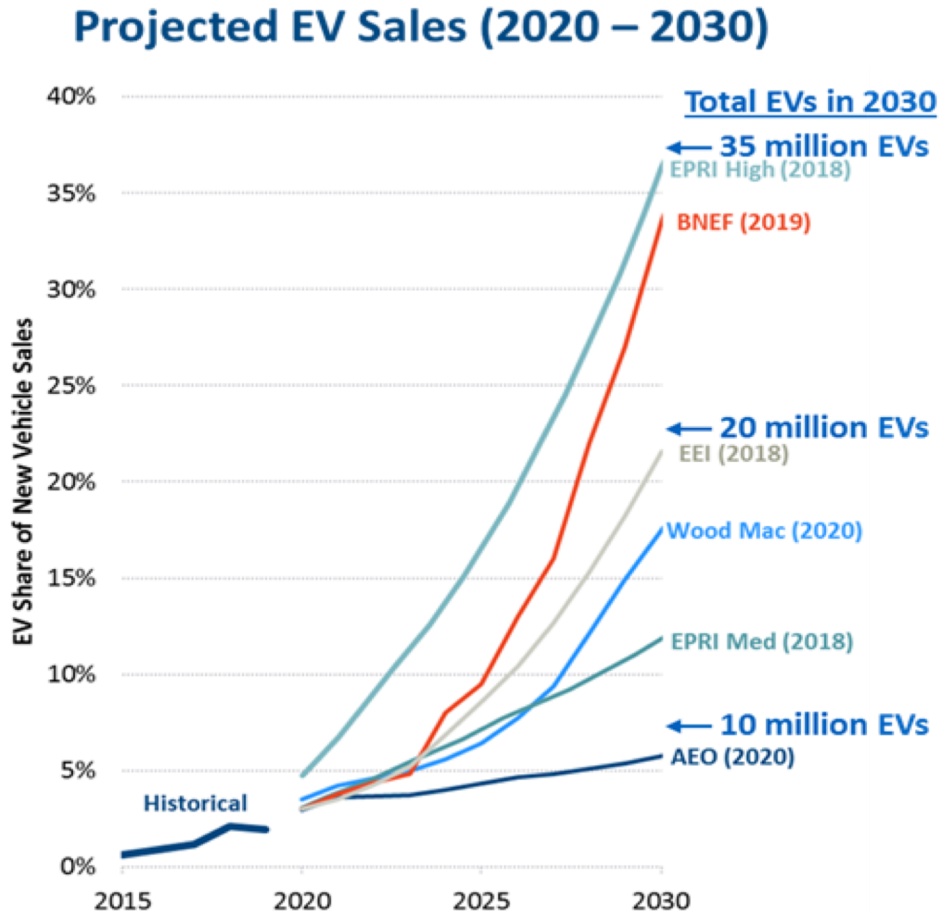


Source: EV sales from Atlas EV Hub





# Most forecasts show exponential EV growth over the next decade



Source: The Brattle Group review of various reports and forecasts

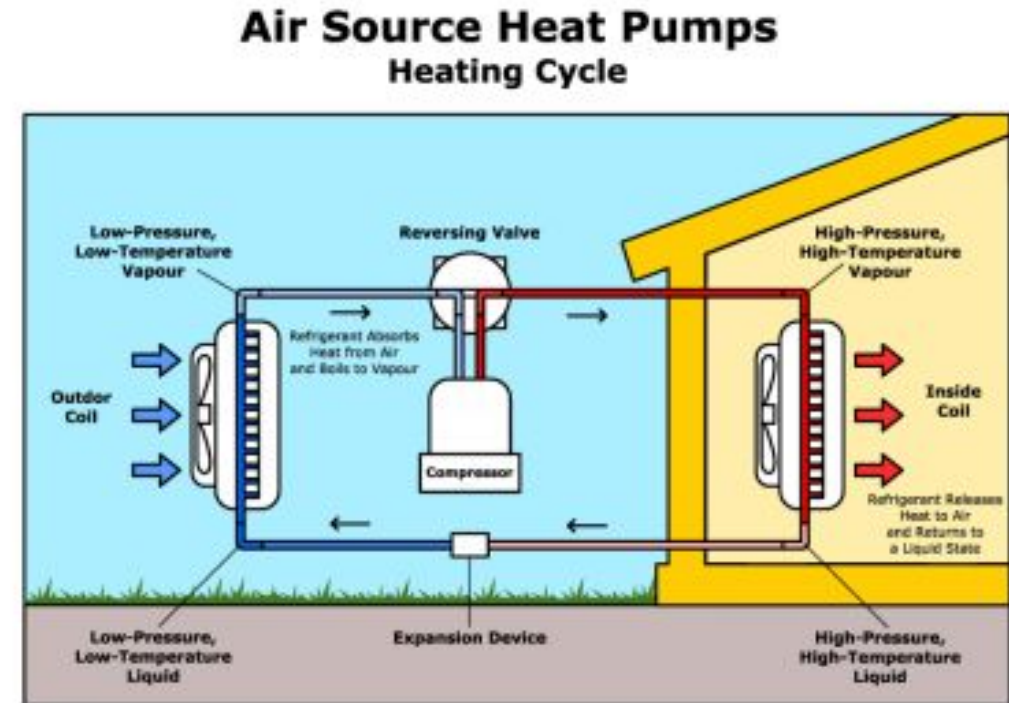


# Building decarbonization is being encouraged through incentives and/or mandated in new construction

Utilities are encouraging the adoption of heat pumps for space heating and water heating

In a few cases, utilities are ensuring that new homes are built as all-electric homes

A few cities have banned the use of gas for cooking in restaurants



# What lies ahead?

As consumption slows down, utility revenues shrink but costs don't; Utilities raise rates, pushing consumers to become prosumers

As the number of prosumers rise, utilities mandate time-of-use rates, turning prosumers into prosumagers

As renewable resources are added, power supply require fast ramping up and ramping down

There will be a strong need for demand flexibility to maintain grid reliability



# California's blackouts are a vivid reminder of what might go wrong in the future

Demand and supply can be balanced in real time without cutting power to customers in the middle of a heat wave while the pandemic and the smoky air force them to stay indoors

California (and eventually the US) needs to introduce more price-responsive demand via dynamic pricing: the meters are there and the technology to get prices-to-devices is waiting in the wings

In addition to the record-breaking heat, fires across the state are restricting power supply. Thank you to our [Southern California Edison \(SCE\)](#) customers and partners for working together during this historic time.





## ADDITIONAL READINGS



# Selected papers on pricing and customer-centricity

“Refocusing on the consumer,” *Regulation*, Spring 2020.

“Customer centricity: Lynchpin of strategy,” *Public Utilities Fortnightly*, November 1, 2019.

“The Tariffs of Tomorrow: Innovations in Rate Designs,” *IEEE Power and Energy Magazine*, vol. 18, no. 3, pp. 18-25, May-June 2020.

“2040: A Pricing Odyssey,” *Public Utilities Fortnightly*, June 1, 2019.

“Rate Design 3.0 – Future of Rate Design,” *Public Utilities Fortnightly*, May 2018.

“Innovations in Pricing: Giving Customers What They Want,” *Electric Perspectives*, September/October 2017.

# APPENDIX B

## QUOTABLE QUOTES



# Why do we have so little price-responsive demand?

*“The greatest barriers [to price responsive demand] are legislative and regulatory, deriving from state efforts to protect retail customers from the vagaries of competitive markets.” Eric Hirst*

*“In electricity markets, as generating capacity constraints are reached, relatively little demand can be rationed by short-term price movements and, instead, must be rationed administratively with rolling blackouts. [This situation could be avoided if more demand-side instruments were available such as having] more customers who can see and respond to rapid changes in market prices and expanded use of price-contingent priority rationing contracts. The demand response instruments that are available are poorly integrated with spot markets ... moreover, the prices that are paid ... are too low compared to the long-run cost of generating capacity.” Paul Joskow*



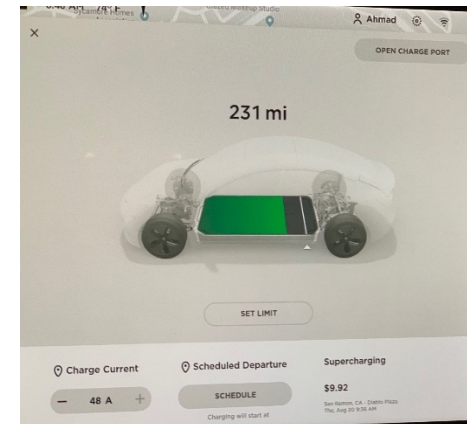
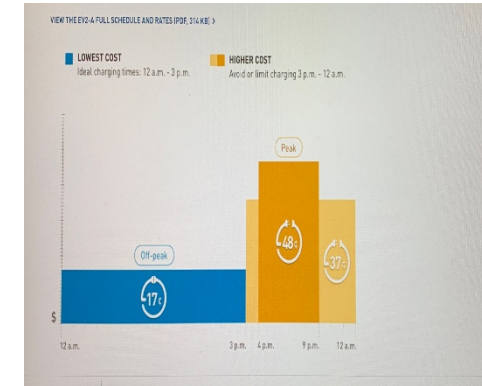
# APPENDIX C

THE CONSUMER OF THE FUTURE





# Yesterday's customer is today's prosumer and tomorrow's prosumager



# APPENDIX D

## A POCKET HISTORY OF RATE DESIGN





# A Pocket History of Rate Design

Year	Author	Contribution
1882	Thomas Edison	<ul style="list-style-type: none"><li>Electric light was priced to match the competitive price from gas light and not based on the cost of generating electricity</li></ul>
1892	John Hopkinson	<ul style="list-style-type: none"><li>Suggested a two-part tariff with the first part based on usage and the second part based on connected kW demand</li></ul>
1894	Arthur Wright	<ul style="list-style-type: none"><li>Modified Hopkinson's proposal so that the second part would be based on actual maximum demand</li></ul>
1897	Williams S. Barstow	<ul style="list-style-type: none"><li>Proposed time-of-day pricing at the 1898 meeting of the AEIC, where his ideas were rejected in favor of the Wright system</li></ul>
1946	Ronald Coase	<ul style="list-style-type: none"><li>Proposed a two-part tariff, where the first part was designed to recover fixed costs and the second part was designed to recover fuel and other costs that vary with the amount of kWh sold</li></ul>
1951	Hendrik S. Houthakker	<ul style="list-style-type: none"><li>Argued that implementing a two-period TOU rate is better than a maximum demand tariff because the latter ignores the demand that is coincident with system peak</li></ul>
1961	James C. Bonbright	<ul style="list-style-type: none"><li>Published "Principles of Public Utility Rates" which would become a canon in the decades to come</li></ul>



# A Pocket History of Rate Design (Concluded)

Year	Author	Contribution
1971	William Vickrey	<ul style="list-style-type: none"><li>Proffered the concept of real-time-pricing (RTP) in <i>Responsive Pricing of Public Utility Services</i></li></ul>
1976	California Legislature	<ul style="list-style-type: none"><li>Added a baseline law to the Public Utilities Code in the <i>Warren-Miller Energy Lifeline Act</i>, creating a two-tiered inclining rate</li></ul>
1978	U.S. Congress	<ul style="list-style-type: none"><li>Passed the <i>Public Utility Regulatory Act (PURPA)</i>, which called on all states to assess the cost-effectiveness of TOU rates</li></ul>
1981	Fred Schweppe	<ul style="list-style-type: none"><li>Described a technology-enabled RTP future in <i>Homeostatic Control</i></li></ul>
2001	California Legislature	<ul style="list-style-type: none"><li>Introduced <i>AB 1X</i>, which created the five-tier inclining block rate where the heights of the tiers bore no relationship to costs. By freezing the first two tiers, it ensured that the upper tiers would spiral out of control</li></ul>
2001	California PUC	<ul style="list-style-type: none"><li>Began rapid deployment of California Alternative Rates for Energy (CARE) to assist low-income customers during the energy crisis</li></ul>
2005	U.S. Congress	<ul style="list-style-type: none"><li>Passed the <i>Energy Policy Act of 2005</i>, which requires all electric utilities to offer net metering upon request</li></ul>

# Presenter Information



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Dr. Faruqui provides expert advice and testimony on rate design, load flexibility, energy efficiency, demand response, distributed energy resources, demand forecasting, decarbonization, and electrification. He has worked for over 150 clients on five continents and appeared before regulatory bodies, governments, and legislative councils.

He has authored or coauthored more than 100 papers in peer-reviewed and trade journals and co-edited books on industrial structural change, customer choice, and electricity pricing. His work has been cited in *Bloomberg*, *Business Week*, *The Economist*, and *Forbes*, in addition to *The New York Times* and the *Washington Post*, and he has appeared on NPR and Fox Business News.

Dr. Faruqui has taught economics at San Jose State, UC Davis and the University of Karachi and delivered guest lectures at Carnegie Mellon, Harvard, Idaho, MIT, New York, Northwestern, Rutgers, Stanford, and UC Berkeley. He obtained an MA in Agriculture Economics and a PhD in Economics from UC Davis, and a BA and an MA in Economics from the University of Karachi.

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