

# Six Reasons why California needs to deploy Dynamic Pricing by 2030

PRESENTED BY

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# By 2025, 10 million customers in California will be on default TOU rates

Currently, there are some 2.2 million customers on TOU rates

On an opt-out basis, SMUD has 542,000, SDGE has 670,000

On opt-in basis, PG&E has 515,000 customers on TOU rates, SCE has 500,000 customers

Starting in October 2020, the latter two utilities will place all new connections on TOU rates; the transition of all customers to opt-out TOU rates should be completed by 2025

# California's transition to opt-out TOU rates will lay the groundwork for dynamic pricing

TOU rates promote economic efficiency and equity between customers; they have gained widespread acceptance by numerous stakeholders in the state

TOU rates incentivize smart charging of EVs and make the best use of PVs with battery storage

They lay the foundation for technology-enabled dynamic pricing

There are six reasons for the state to begin planning the next step in pricing reform

# Reason1: California suffered a major energy crisis in 2000-01

One of the major reasons for the debacle was the absence of price-responsive demand, which disconnected retail from wholesale markets

A group of economists (including xxx, and me) signed a manifesto calling for the introduction of dynamic pricing in the state

The CPUC initiated a docket on dynamic pricing, demand response and smart metering under the leadership of Mike Peevey

## Reason 2: Californians understand and respond to dynamic pricing

A Statewide Pricing Pilot, jointly conducted by a stakeholder group under the sponsorship of the CPUC and the CEC, ran over a two-year period

It provided conclusive evidence that Californians accepted and responded to dynamic pricing

Using the results of the pilot, the three investor-owned utilities filed business cases for AMI involving some \$5 billion and all were approved

## Reason 3: California is the Innovation Capital of the world

World class companies like Apple, Cisco, Facebook, Google, LinkedIn, Tesla and Twitter are located in the state

Just about everything new and exciting begins in California and then it sweeps the nation and eventually encompasses the entire globe

California, with ~15% of the nation's GDP, has a "golden" opportunity to serve as a role model in the pricing of electricity for the rest of the nation

# Reason 4: Californians have already encountered dynamic pricing

ACTIVITY	EXAMPLES
Driving their car	Toll bridges, roads, parking meters
Entertainment	Movies, operas, plays, happy hour at restaurants
Ride sharing	Uber, Lyft, Kareem
Sporting events	Baseball, basketball, football
Vacation and business travel	Airlines, hotels, car rentals

## Reason 5: Enabling technologies are widely deployed in the state

Enabling technologies such as smart, WiFi thermostats and digital appliances are widespread in the state, as are energy efficient LEDs and appliances, many of which are digital

PVs, Battery Storage and EVs are being adopted at a rapid clip, showing that customers are keen to manage their energy lifestyle

New homes will have solar built into their roofs and many will become zero energy homes

## Reason 6: By 2045, the grid will be 100% carbon free

California's grid will face reliability challenges stemming from the heavy dependence on intermittent renewable energy sources

Load flexibility will be needed to maintain system reliability at least cost

One of the best ways to promote load flexibility is to deploy dynamic pricing as a default tariff by 2030

# Conclusion

The state should begin offering dynamic pricing as an opt-in tariff in 2025 when default TOU deployment has been completed

It should gain experience and insights during the next five and prepare Californians for the advent of a new era in 2030

In that year, dynamic pricing, integrated with enabling technologies, should be made the default tariff in the state

# References

Caves, Douglas and Laurits Christensen. “Econometric Analysis of Residential Time-of-Use Electricity Pricing Experiments.” *Journal of Econometrics* (1980)

Caves, Douglas, Laurits Christensen, and Joseph Herriges. “Modelling Alternative Residential Peak-Load Electricity Rate Structures.” *Journal of Econometrics* Vol. 24, Issue 3 (1984): 249-268

Goett, Andrew A. and Dennis Keane, “Customer participation and load impacts of the PG&E residential voluntary Time-of-Use experiment,” ACEEE Summer Study Proceedings, v6-006, 1988.

Faruqui, Ahmad, “2040: A Pricing Odyssey: How to price electricity when the grid goes 100 percent green,” *Public Utilities Fortnightly*, June 1, 2019.

Faruqui, Ahmad and J. Robert Malko, “The Residential Demand for Electricity by Time-of-Use: A survey of twelve experiments with peak load pricing,” *Energy: The International Journal*, 8:10 (October 1983): 781-795

Faruqui, Ahmad, Neil Lessem and Sanem Sergici, “Dynamic Pricing Works in a Hot, Humid Climate,” *Public Utilities Fortnightly*, May 2017.

## References (continued)

Faruqui, Ahmad and Sanem Sergici, “Household response to dynamic pricing of electricity—a survey of 15 experiments,” *Journal of Regulatory Economics* (2010), 38:193-225.

Faruqui, Ahmad, Sanem Sergici and Lamine Akaba. “Dynamic Pricing in a Moderate Climate: The Evidence from Connecticut.” *Energy Journal* 35:1 (January 2014): 137-160

Faruqui, Ahmad, Sanem Sergici and Lamine Akaba. “Dynamic Pricing of Electricity for Residential Customers: The Evidence from Michigan.” *Energy Efficiency* 6:3 (August 2013): 571–584

Faruqui, Ahmad and Sanem Sergici, “Dynamic pricing of electricity in the mid-Atlantic region: econometric results from the Baltimore gas and electric company experiment,” *Journal of Regulatory Economics*, 40:1 (August 2011) 82-109

Faruqui, Ahmad and Jennifer Palmer, “Dynamic Pricing of Electricity and its Discontents,” *Regulation*, 34:3 (Fall 2011), 16-22

# References (concluded)

Faruqui, Ahmad and Jennifer Palmer, “The Discovery of Price Responsiveness – A Survey of Experiments Involving Dynamic Pricing of Electricity,” *Energy Delta Institute*, 4:1 (April 2012)

Faruqui, Ahmad, Sanem Sergici, Neil Lessem, and Dean Mountain, “Impact Measurement of Tariff Changes when Experimentation is not an Option – A case study of Ontario, Canada,” *Energy Economics*, 52 (December 2015) 39-48.

Faruqui, Ahmad, Neil Lessem, Sanem Sergici, and Dean Mountain, “The Impact of Time-of-Use Rates in Ontario,” *Public Utilities Fortnightly*, February 2017.

US Department of Energy, Final Report on Customer Acceptance, Retention and Response to Time-Based Rates from the Customer Behavior Studies (CBS), November 15, 2016.

# Presenter Information



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Ahmad Faruqui is an internationally recognized authority on the design, evaluation and benchmarking of tariffs. He has analyzed the efficacy of tariffs featuring fixed charges, demand charges, time-varying rates, inclining block structures, and guaranteed bills. He has also designed experiments to model the impact of these tariffs and organized focus groups to study customer acceptance. Besides tariffs, his areas of expertise include demand response, energy efficiency, distributed energy resources, advanced metering infrastructure, plug-in electric vehicles, energy storage, inter-fuel substitution, combined heat and power, microgrids, and demand forecasting. He has worked for nearly 150 clients on 5 continents, including electric and gas utilities, state and federal commissions, governments, independent system operators, trade associations, research institutes, and manufacturers.

Ahmad has testified or appeared before commissions in Alberta (Canada), Arizona, Arkansas, California, Colorado, Connecticut, Delaware, the District of Columbia, FERC, Illinois, Indiana, Kansas, Maryland, Minnesota, Nevada, Ohio, Oklahoma, Ontario (Canada), Pennsylvania, Saudi Arabia, and Texas. He has presented to governments in Australia, Egypt, Ireland, the Philippines, Thailand, New Zealand and the United Kingdom and given seminars on all 6 continents. He has also given lectures at Carnegie Mellon University, Harvard, Northwestern, Stanford, University of California at Berkeley, and University of California at Davis and taught economics at San Jose State, the University of California at Davis, and the University of Karachi.

His research been cited in Business Week, The Economist, Forbes, National Geographic, The New York Times, San Francisco Chronicle, San Jose Mercury News, Wall Street Journal and USA Today. He has appeared on Fox Business News, National Public Radio and Voice of America. He is the author, co-author or editor of 4 books and more than 150 articles, papers and reports on energy matters. He has published in peer-reviewed journals such as Energy Economics, Energy Journal, Energy Efficiency, Energy Policy, Journal of Regulatory Economics and Utilities Policy and trade journals such as The Electricity Journal and the Public Utilities Fortnightly. He is a member of the editorial board of The Electricity Journal. He holds BA and MA degrees from the University of Karachi, both with the highest honors, and an MA in agricultural economics and a PhD in economics from The University of California at Davis, where he was a research fellow.

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