



Forecasting & Market Reality: Exploring the Future of e-mobility

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Thank you

- ◆ For including me on this workshop
- ◆ Main objective:
 - Share my views on growth opportunities for e-mobility
- ◆ Preface:
 - California-centric perspective
 - A “utility”, not an “e-mobility” perspective
- ◆ Key question:
 - How can we best accelerate?

Take away ...

- ◆ e-mobility is here & now
 - **Tesla**: A wake up call for ICEs?
 - **Uber**: The end of car ownership?
 - **Autonomous cars**: The end of drivers?
 - **Super-capacitors**: The end of range anxiety?
- ◆ e-mobility will get better & cheaper – fast
 - Rapid global urbanization, falling costs, increased range
- ◆ Implications
 - Oil demand, electric utilities, pollution/climate change
- ◆ Supportive policies can/will help

Why is this man smiling?



Image address

<https://qzprod.files.wordpress.com/2017/04/elon-musk-tesla-e1491836636947.jpg?quality=80&strip=all&w=3200>

Tesla Inc.

13 year-old teenager growing on steroids



Tesla Model 3

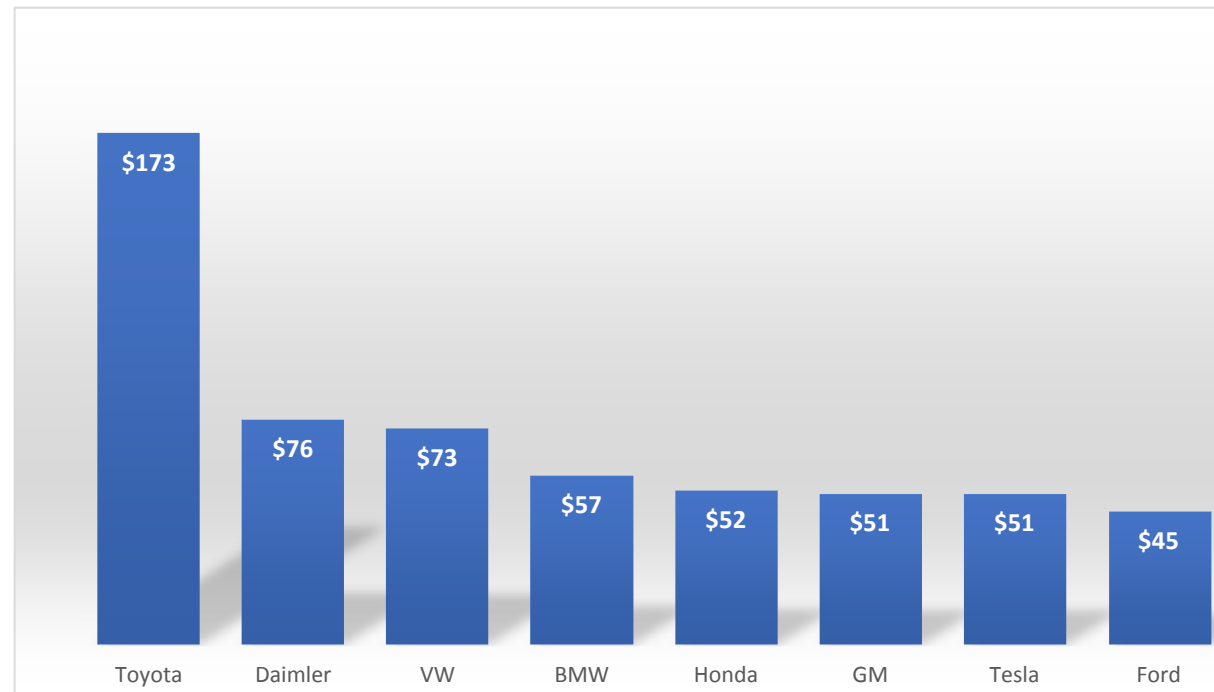
400,000 reservations



Source: Tesla website

Tesla's wake-up call

Market capitalization of major car makers, \$b on 11 Apr 2017



Tesla's \$5 b gigafactory

World's largest building



Uber: End of car ownership?

It is no longer about the metal & pedal



Source: The Economist, 17 Sept 2016

End of drivers



Not if but when?



**No wheels, no brake, no gas
pedal & no gas**



Super-capacitors

End of range anxiety; revolutionize mass transit



Source: [Solaris Urbino 12 electric](#) from Braunschweiger Verkehrs-GmbH (Germany)

Who needs oil?

Charge them from the sun





Policy matters

CA offers blueprint

- ◆ Ambitious climate policy
 - 40% cut in GHG emissions from 1990 level by 2030
- ◆ How?
 - Decarbonize electricity sector
 - Electrify transport
 - Invest in EV charging infrastructure
- ◆ Norway another example
- ◆ Denmark yet another



Utility Sector issues

- ◆ The future is about PVs, EVs & storage

Future of consumption?

One in 3 homes are solar in sunny suburbs of CA



Next: Solar roofs

Makes no sense to build a roof and add solar panels

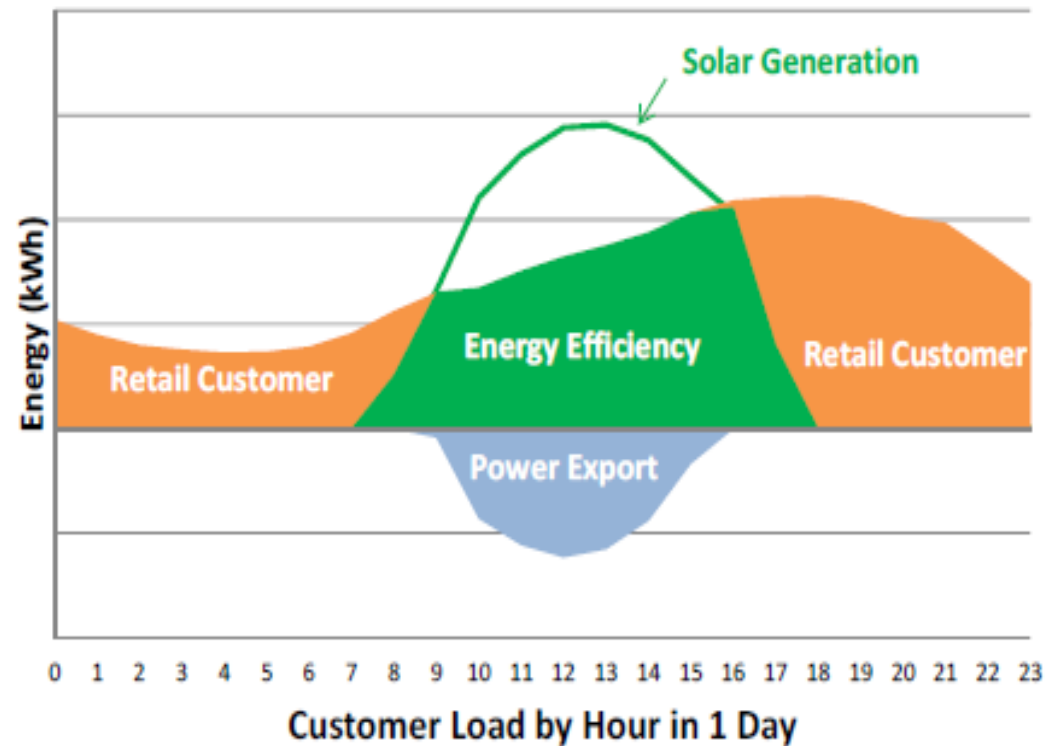


Lancaster, CA

Zero energy ordinance



From consumer to Prosumer



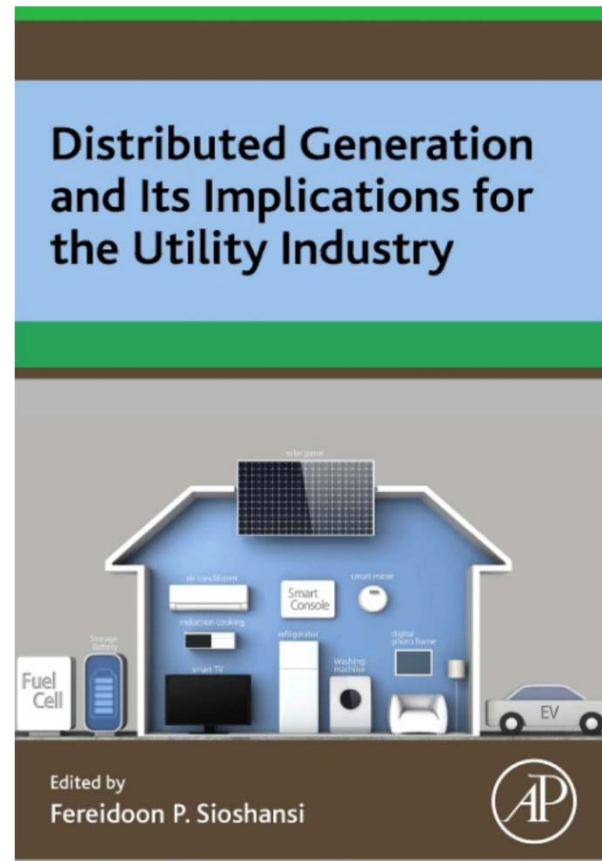
Source: Evaluating the benefits and costs of NEM laws in California, prepared for Vote Solar, Jan 2013

Prosumer + Storage = Prosumager



Source: The Wall Street Journal 2 May 2015

New business, new business model



The book cover features a dark blue background with a glowing circuit board pattern. At the bottom, a globe is depicted with a blue and green gradient, overlaid with circuit traces. The title is prominently displayed in the center, with the word 'Utilities' highlighted in yellow. The subtitle and editor's name are in white. The AP logo is in the bottom right corner.

The Future of **Utilities** **Utilities** of the Future

How technological innovations in distributed energy
resources will reshape the electric power sector

Fereidoon P. Sioshansi, Editor





Innovation and Disruption at the Grid's Edge

How distributed energy resources are
disrupting the utility business model

Edited by

FEREIDOON SIOSHANSI





Thank you

- ◆ Questions?

550 MW

Topaz Solar Farm, San Luis Obispo, CA



BrightSource

392 MW Ivanpah CSP



Source: California Energy Commission (CEC)

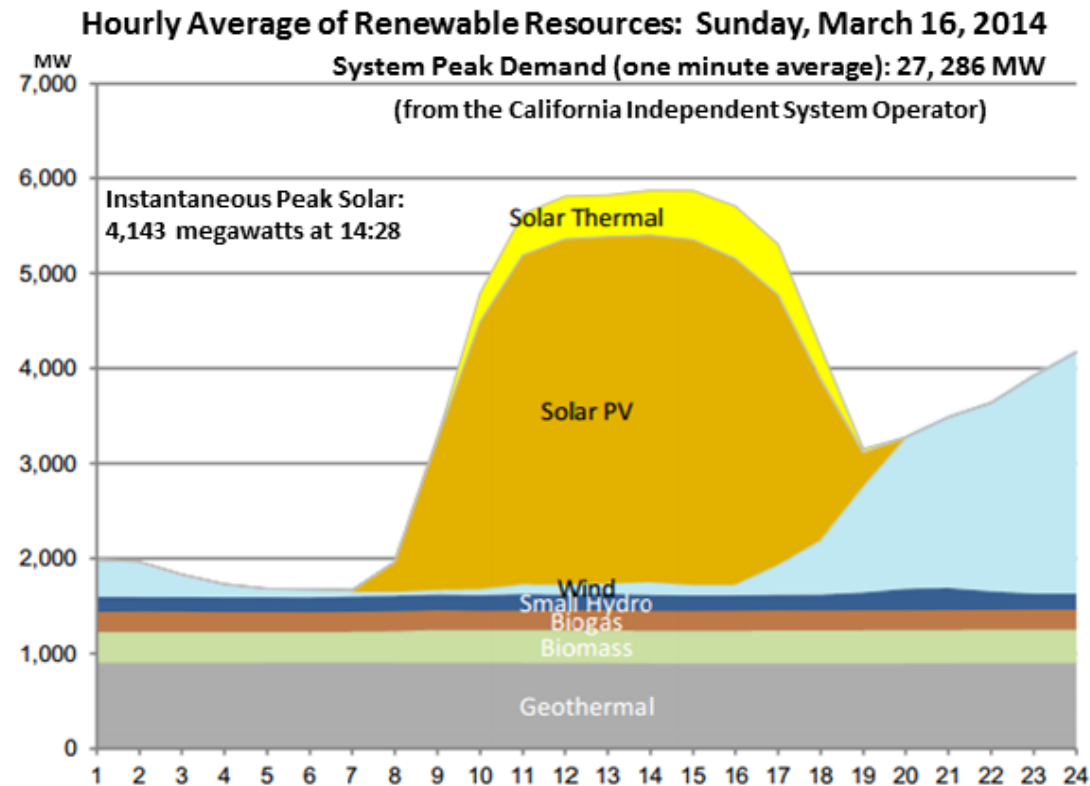
Solar thermal with storage



Source: SolarReserve

Mid-day sun = “over-generation”

In many networks mid-day peaks have disappeared



Source: ISO

CAISO

Is this a dispatch center or weather forecasting station?



Source: CAISO