



housing innovation,
vision & economics

INSPIRED PROCESS

Course Number: HIVE107

Course Date: 9/28/16

Provider Number: k029

Best Practice

Hanley Wood, an AIA approved provider, will report credits earned by course attendees to AIA CES for the approved course numbers HIVE101-107. If a certificate was requested, it will be emailed to you with all other courses completed by course attendees upon the conclusion of the conference.

If you would like to receive credit for this course, please be sure to provide your name and AIA number on the form right outside the room.

Course Description

JB Straubel, CTO at Tesla, presents how Tesla has been able to spur technological innovation and enforce collaboration to make a wildly successful product, and in so doing, disrupt the automotive industry. This session will help architects and builders identify useful tools that can help disrupt the business model in the design and construction industry, and in so doing, deliver a better-designed product to the people who live in their communities.

Learning Objectives

1. Understand key insights on how to disrupt the design process to allow for a more creative and out-of-the-box approach to design commissions.
2. Describe ways to engage the broader community—either designer colleagues or community organizations—to support new approaches to design.
3. Implement new methods to incorporate a new, disrupted design process on a small scale into larger projects for larger clients.
4. Understand how new energy-efficient technologies can be used to bring sustainable innovation to residential design projects.

Tesla Innovation and Disruption

Tesla Motors

JB Straubel – co-founder, CTO

HIVE Conference

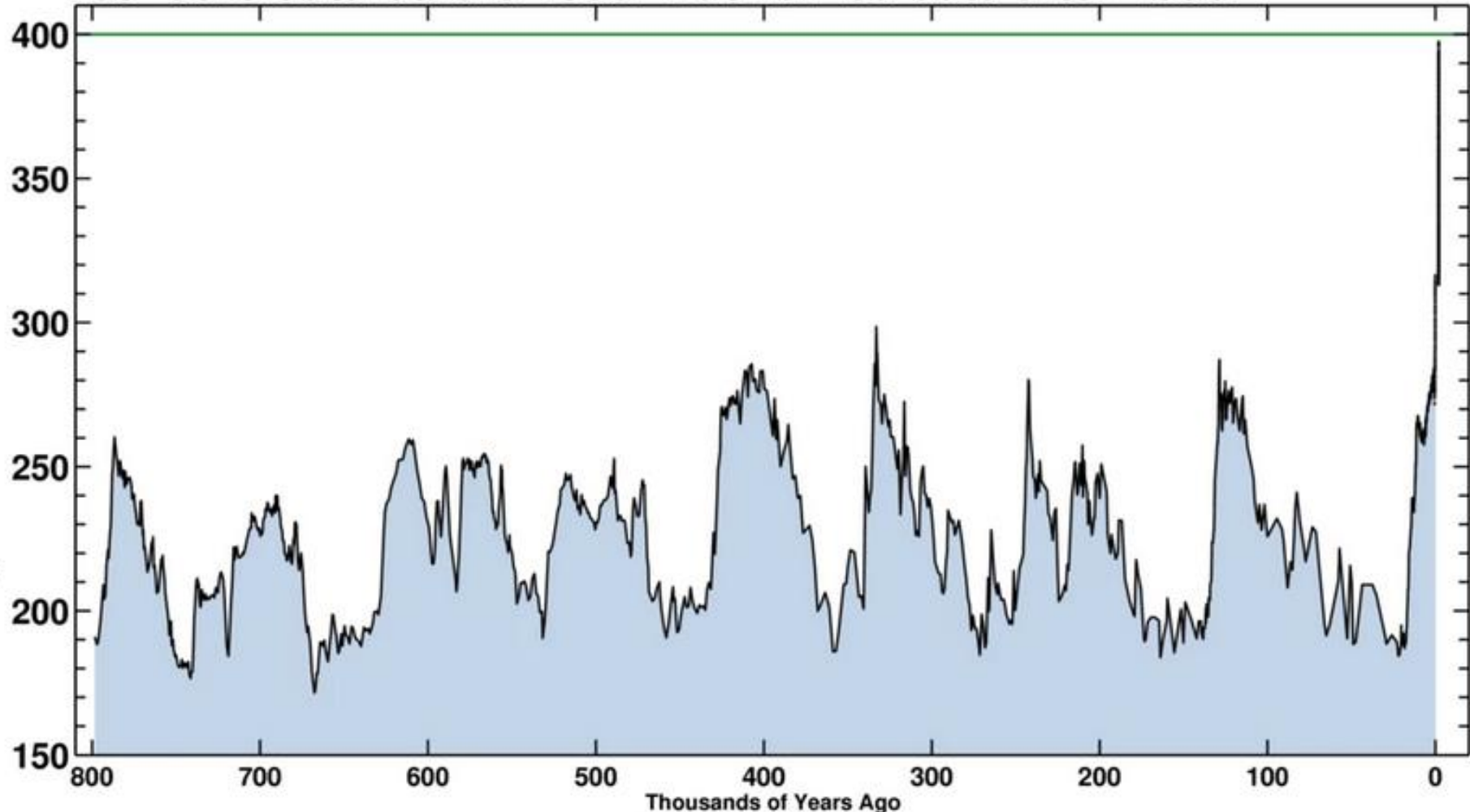
Sept 28th 2016





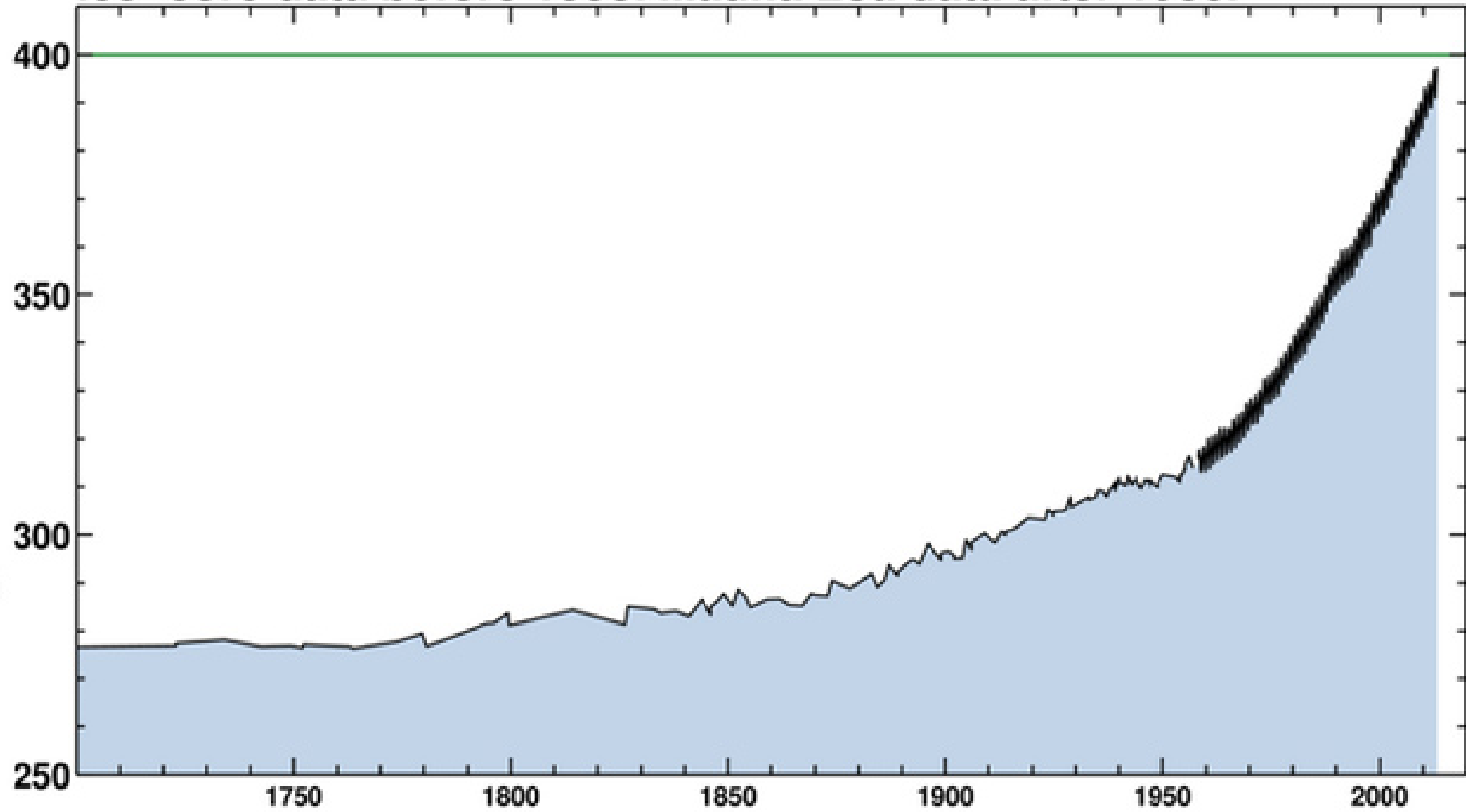
Ice-core data before 1958. Mauna Loa data after 1958.

CO₂ Concentration (ppm)

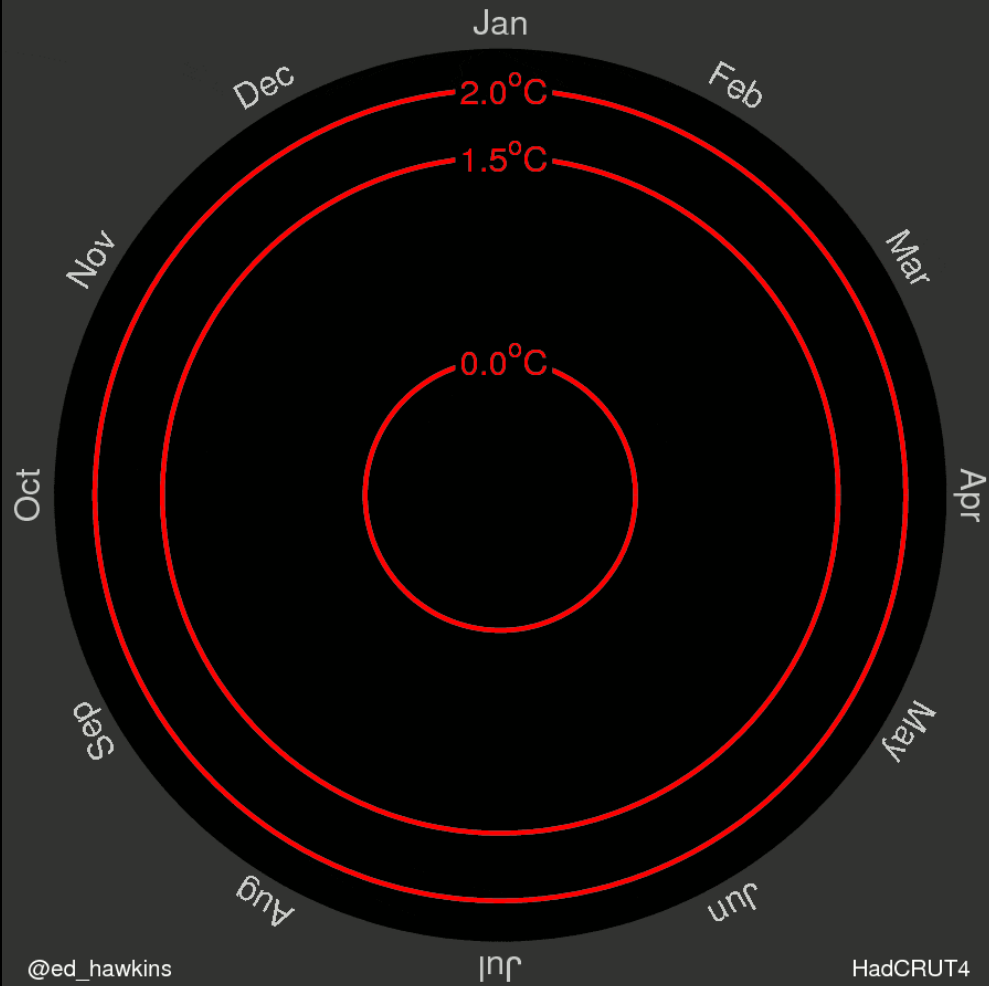


Ice-core data before 1958. Mauna Loa data after 1958.

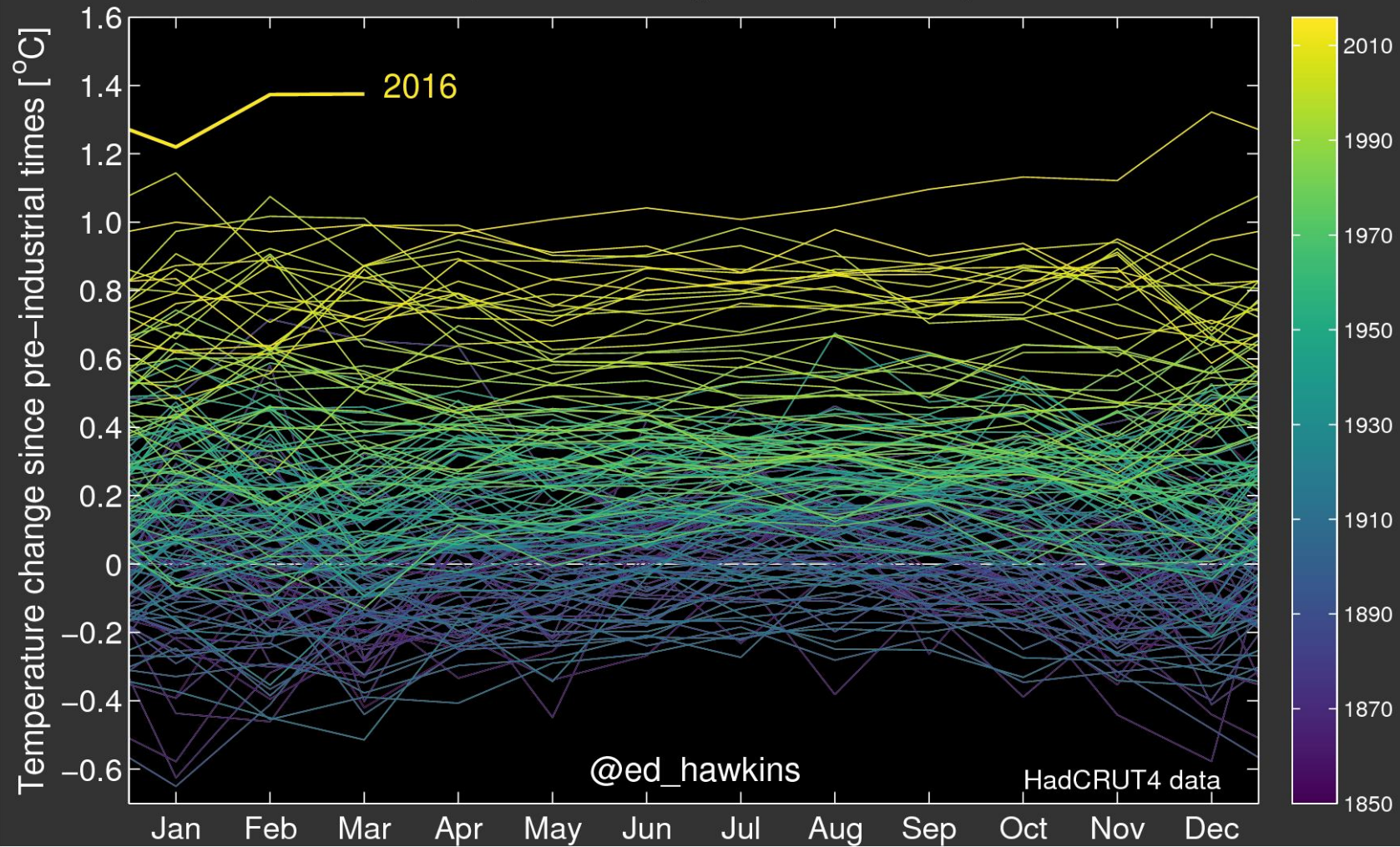
CO₂ Concentration (ppm)



Global temperature change (1850–2016)



Global temperature changes since 1850 by month



Tesla's Mission:

Accelerate the world's transition to sustainable transportation and energy

Teach 4 the Heart

How to
Dis...

I WILL FOLLOW THE RULES I WILL FOLLOW
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James R. Patton

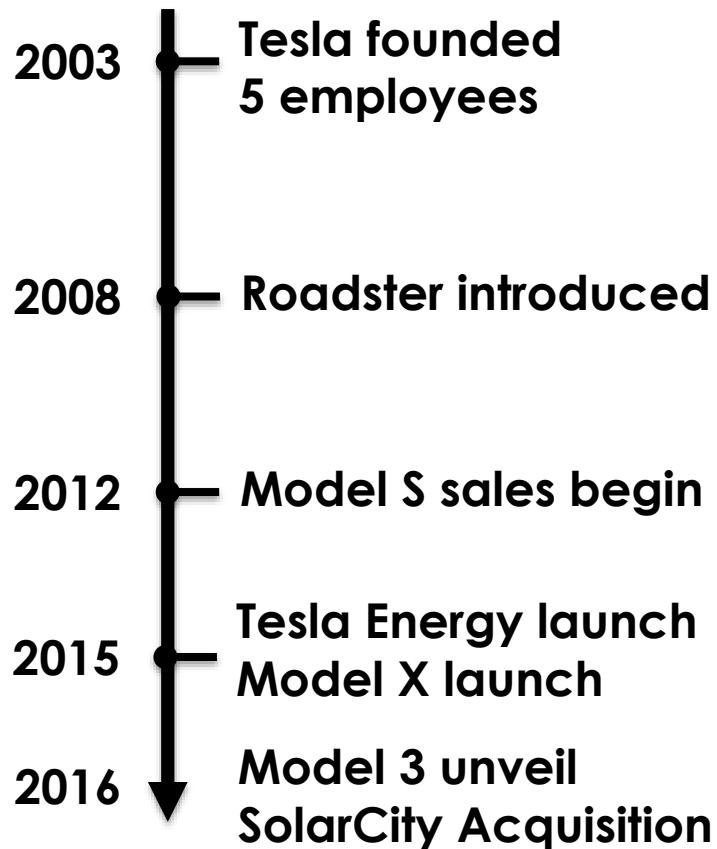


**Breaking the Rules in 2004:
Performance (?) Electric Cars**

First Roadster Prototype - 2005



Tesla History & Milestones



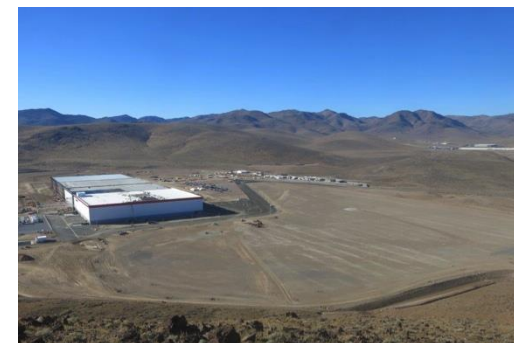
Headquarters Palo Alto, CA



Tesla Factory Fremont, CA

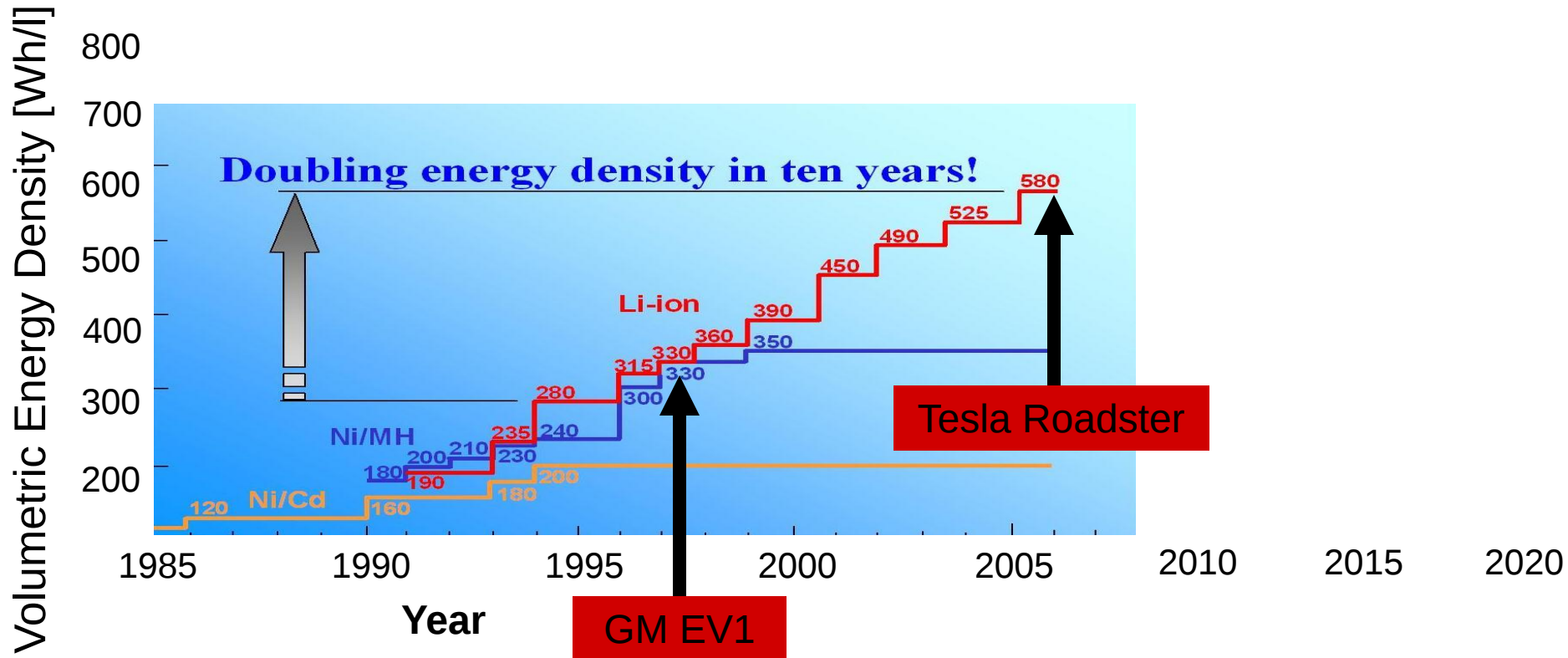


Design Studio Hawthorne, CA

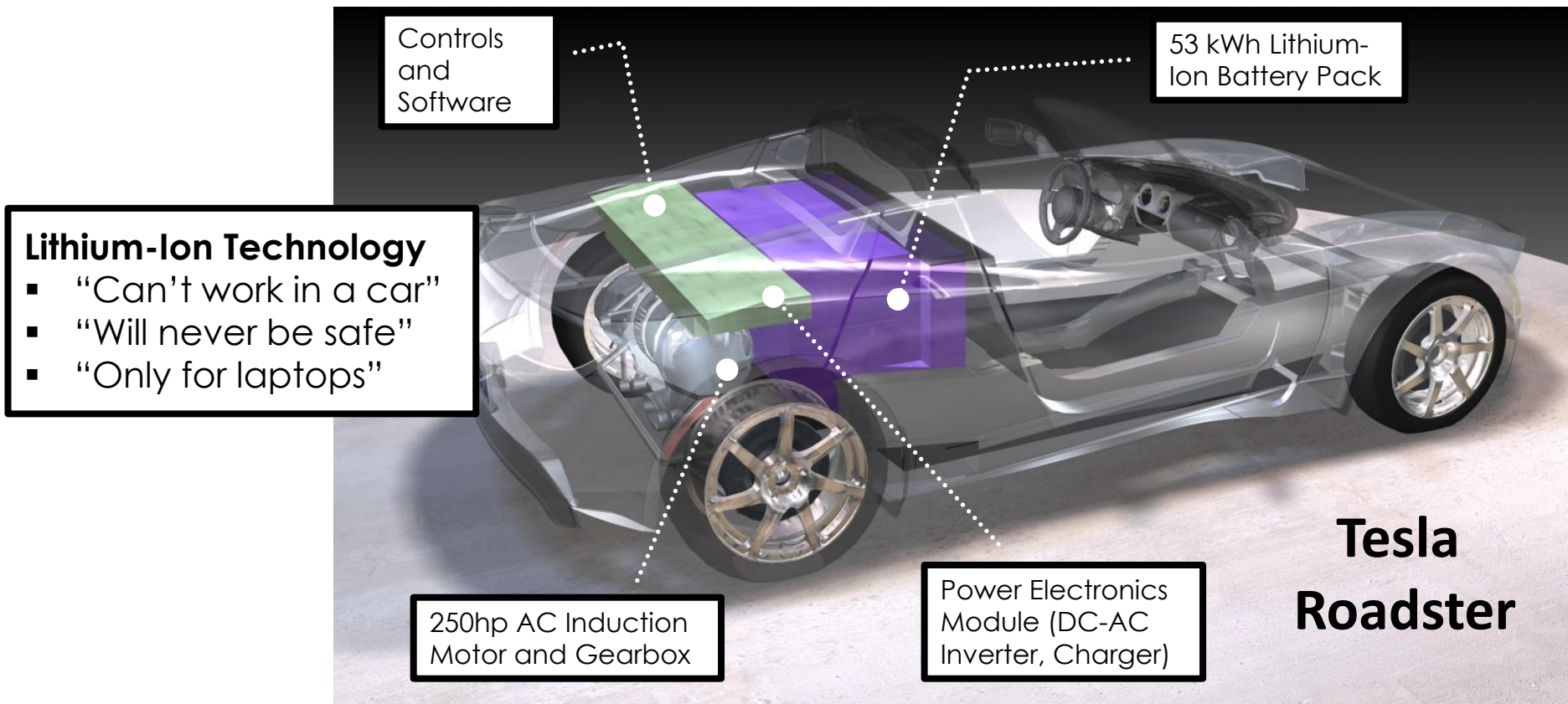


Gigafactory Sparks, NV

Battery Energy Density Trend



Industry First Lithium-Ion EV Powertrain



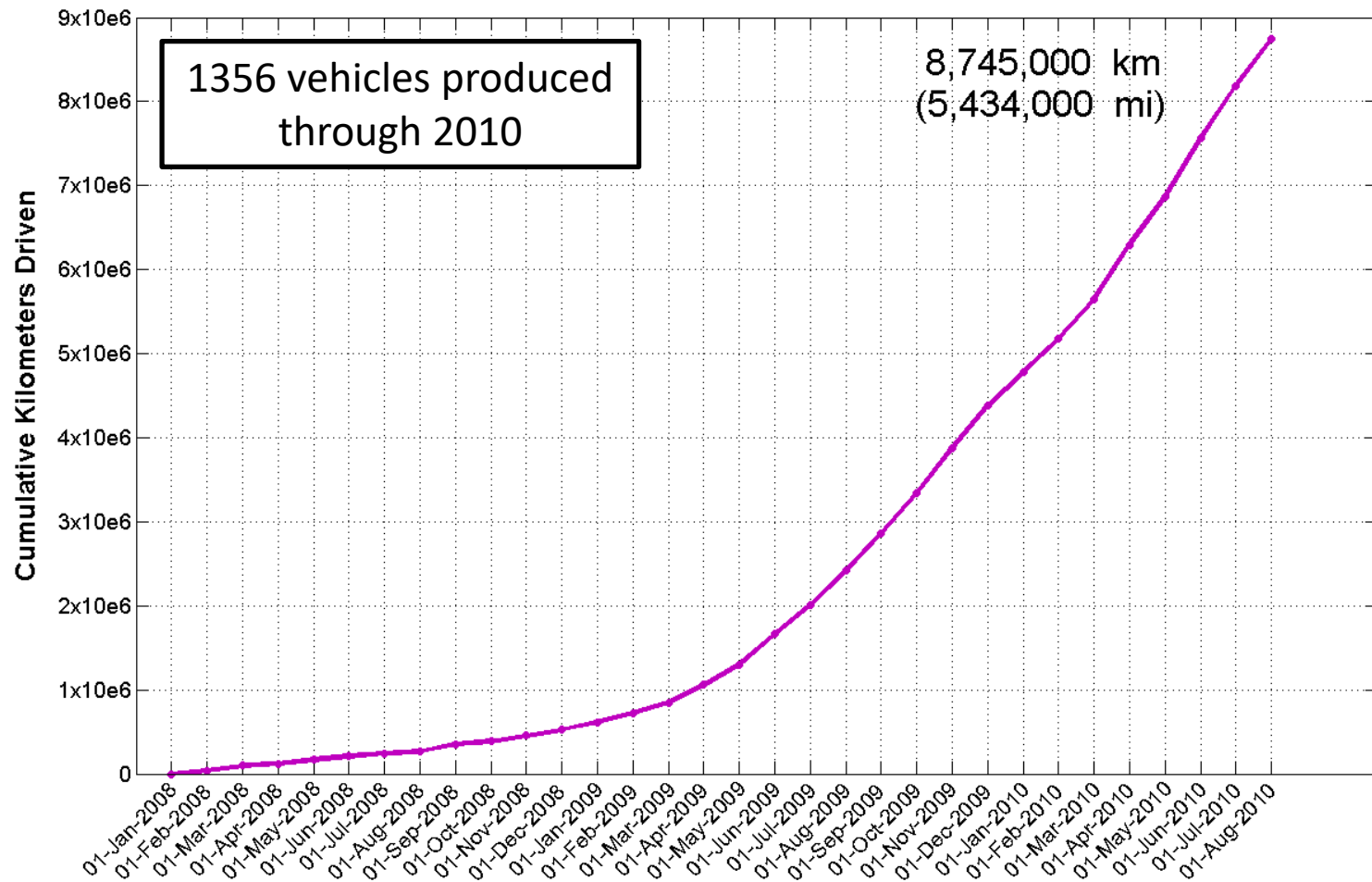
Tesla OEM Partnerships

Curiosity to Competitor

TESLA

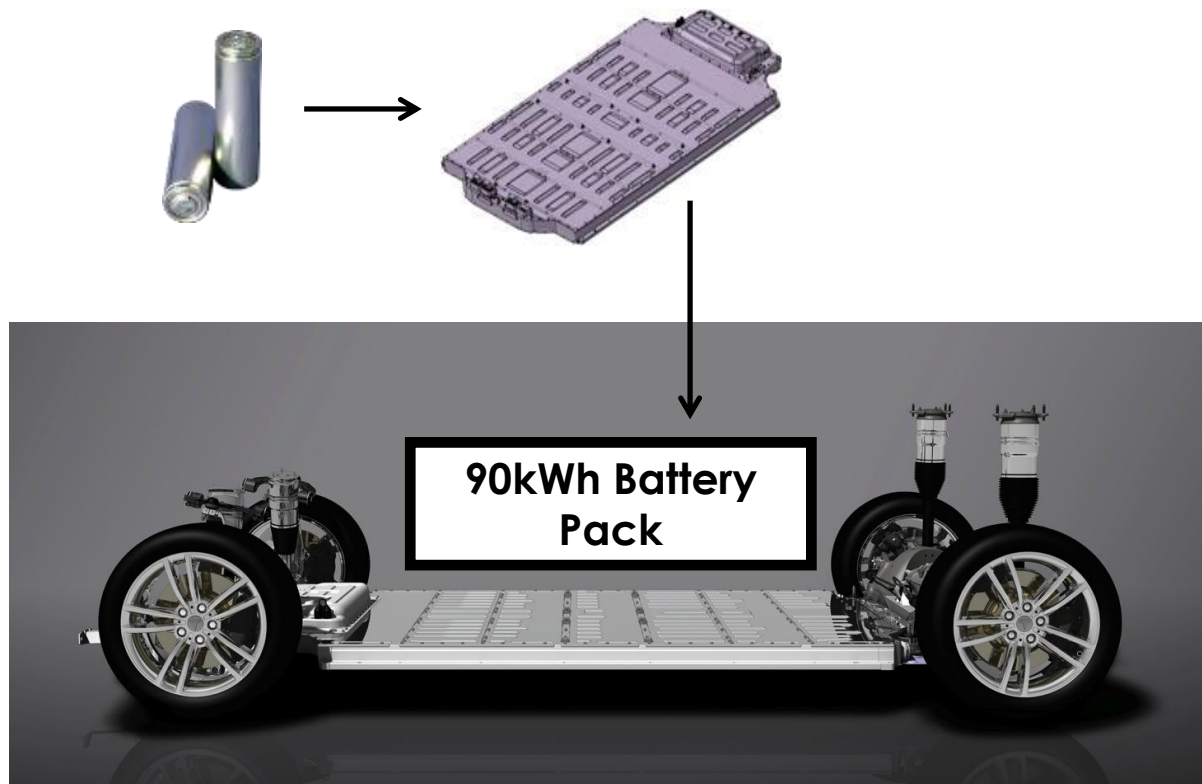


Total Roadster Fleet Miles



Model S: Ground-Up Design as EV Only

- No rule book
- 1st new car from a new company
- “They will fail”
- “They don’t know how hard it is”



Tesla Model S

*“Breaks the rating system”
“103 out of 100 points”*

**Consumer
Reports**



- Quickest production car in the world
- Highest safety rating in America
- Available All-Wheel Drive
- Zero to 60 mph in as little as 2.5 seconds (P100DL)
- Up to 315 miles range (EPA)

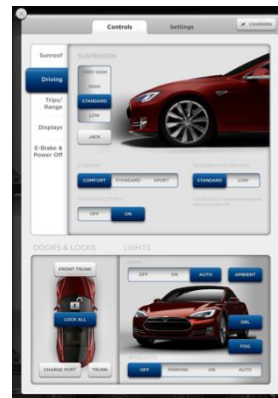
Tesla Model X

"Tesla has made the family car cool" **WIRED**



- 7 people plus gear
- 289 miles max range (EPA)
- 5000 lb towing capacity

Connected Vehicle / Consumer Electronics Device



Full OTA Software Updates
New features sent wirelessly
The car gets better with each release



Connected Energy

Today

- 70,000+ cumulative electric vehicles
- **5GWh of batteries**

Near Future

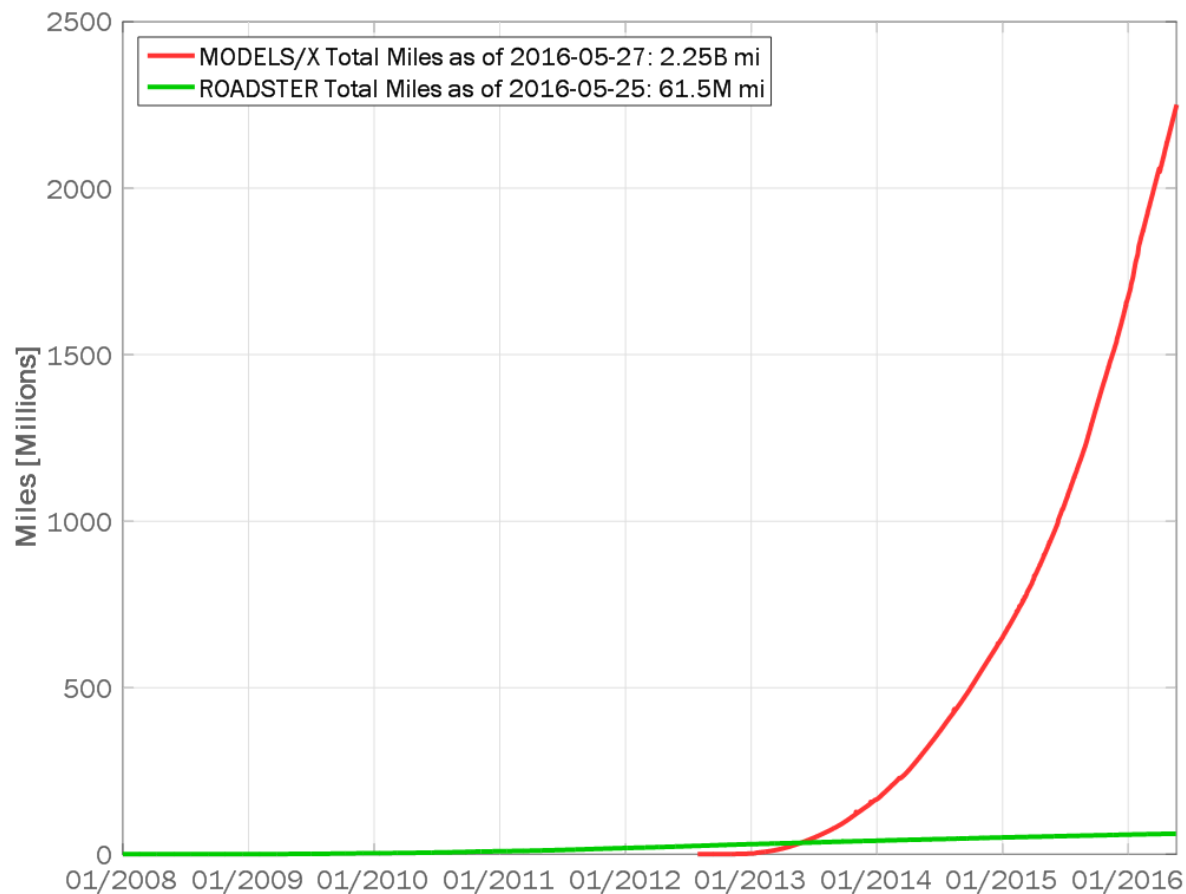
- 1,000,000 electric vehicles
- **70GWh of batteries**
- **10GW Controllable Charge Load**



ON-BOARD CHARGER



Tesla Fleet Mileage



SUPERCHARGER

Find a charging location near you



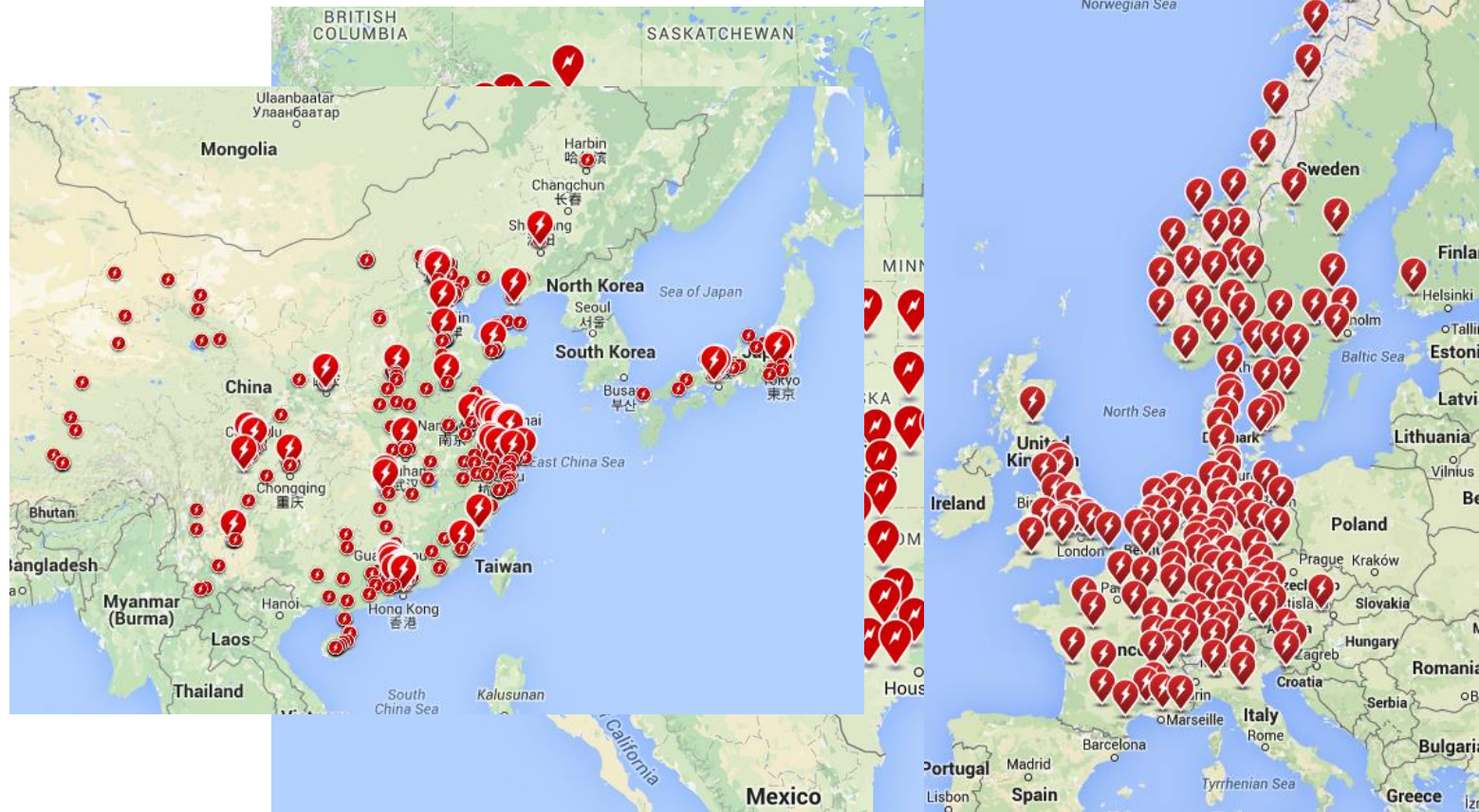
Tesla Supercharger Network

- 120 kW power
- 400 mph charging (30 minutes)

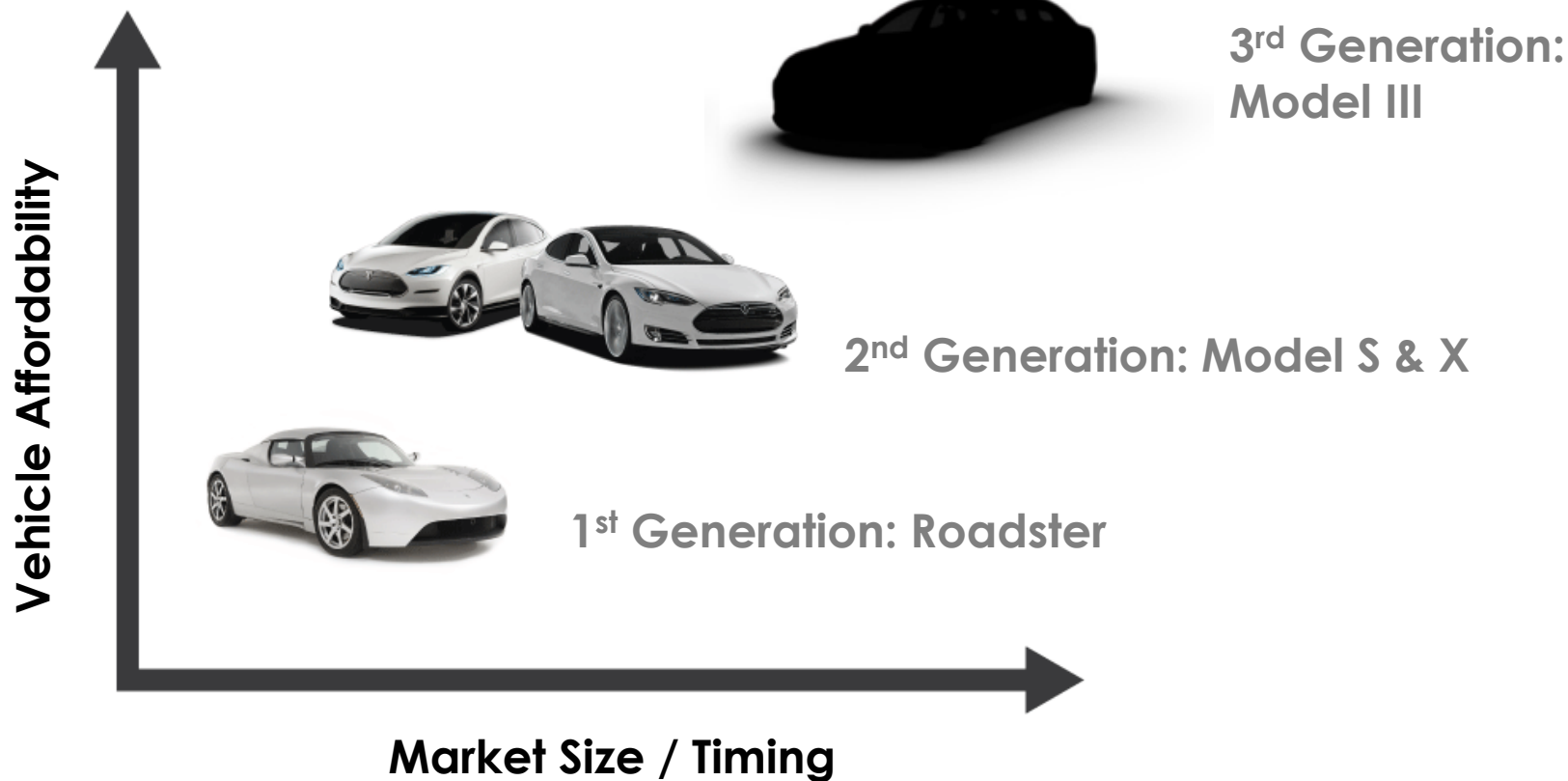


The World's Fastest
Charging Station

Superchargers Today



Product Roadmap





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Tesla Gigafactory

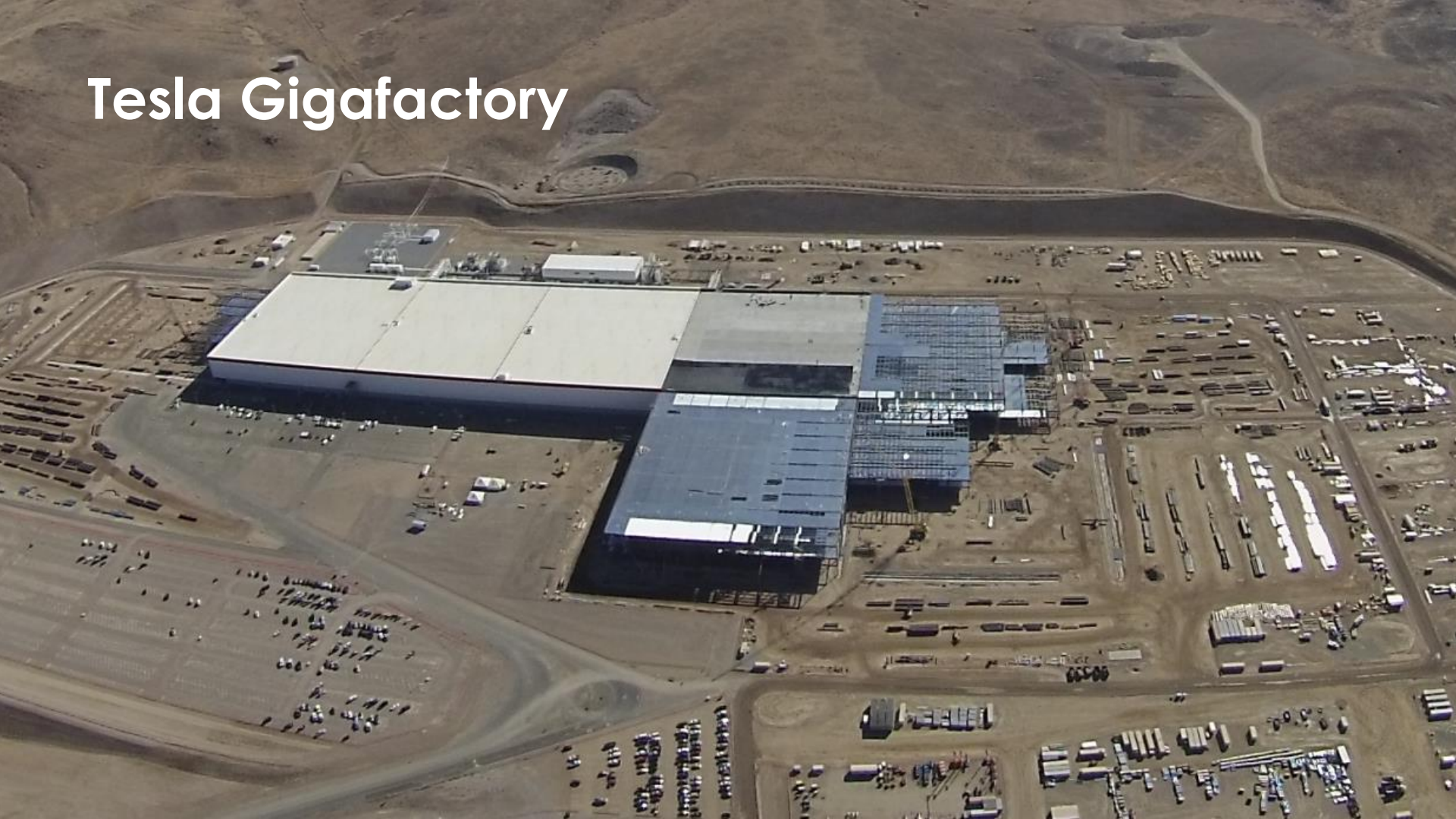


50 GWh in annual battery production by 2020
Enough for 500,000 Tesla cars
Powered by renewable energy
Net zero energy factory



- Largest battery factory in the world
- Under construction in Tahoe-Reno, Nevada

Tesla Gigafactory

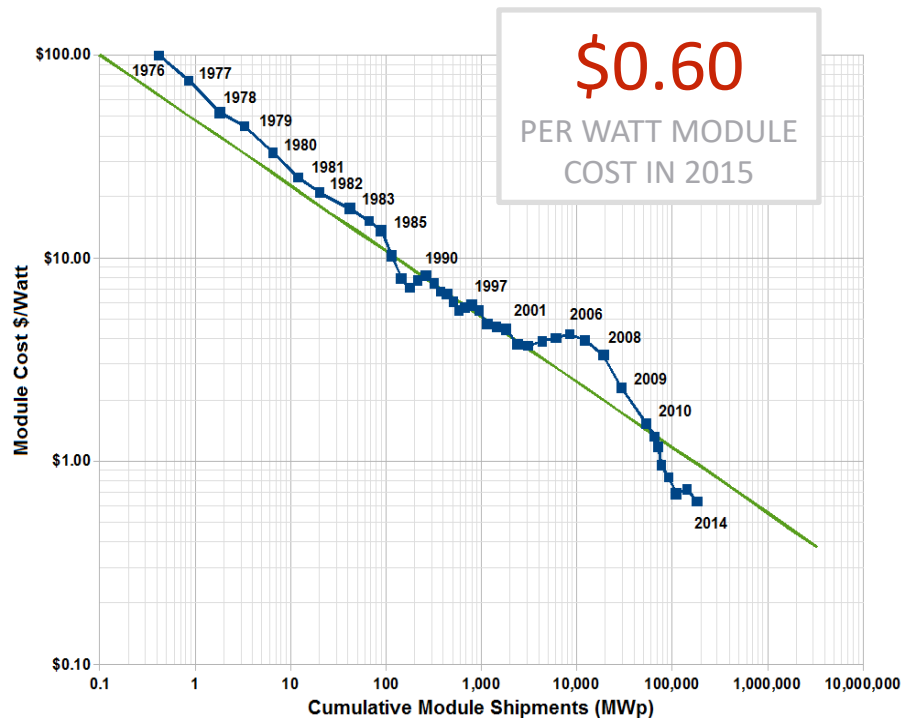


Energy Storage Cost

- Battery **Cost** is steadily declining
 - Higher energy density – less materials / kWh
 - Production volume increasing dramatically, economy of scale
 - Production process moving from electronics to high volume

Solar PV has followed a similar path

- The cost of solar PV has dropped precipitously
- Faster decline than even those closest to the industry expected





Renewable Energy



**THE MISSING
PIECE**



Electric Transport

Address all Applications

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EMERGENCY BACKUP



MICROGRID



ANCILLARY SERVICES



PEAK SHAVING



LOAD SHIFTING



DEMAND RESPONSE

POWERWALL

TESLA HOME BATTERY



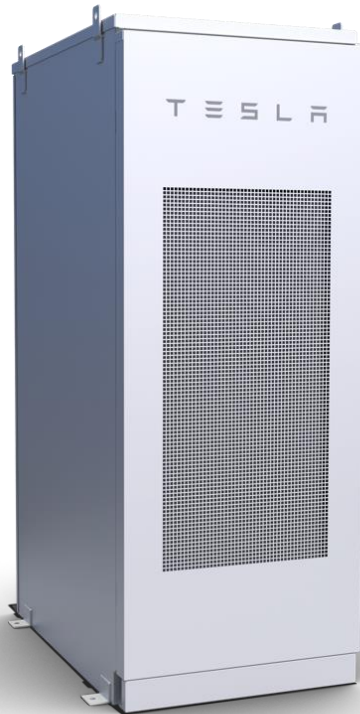
CAPACITY FIRMING



TRANSMISSION
& DISTRIBUTION SUPPORT

POWERPACK

TESLA COMMERCIAL BATTERY

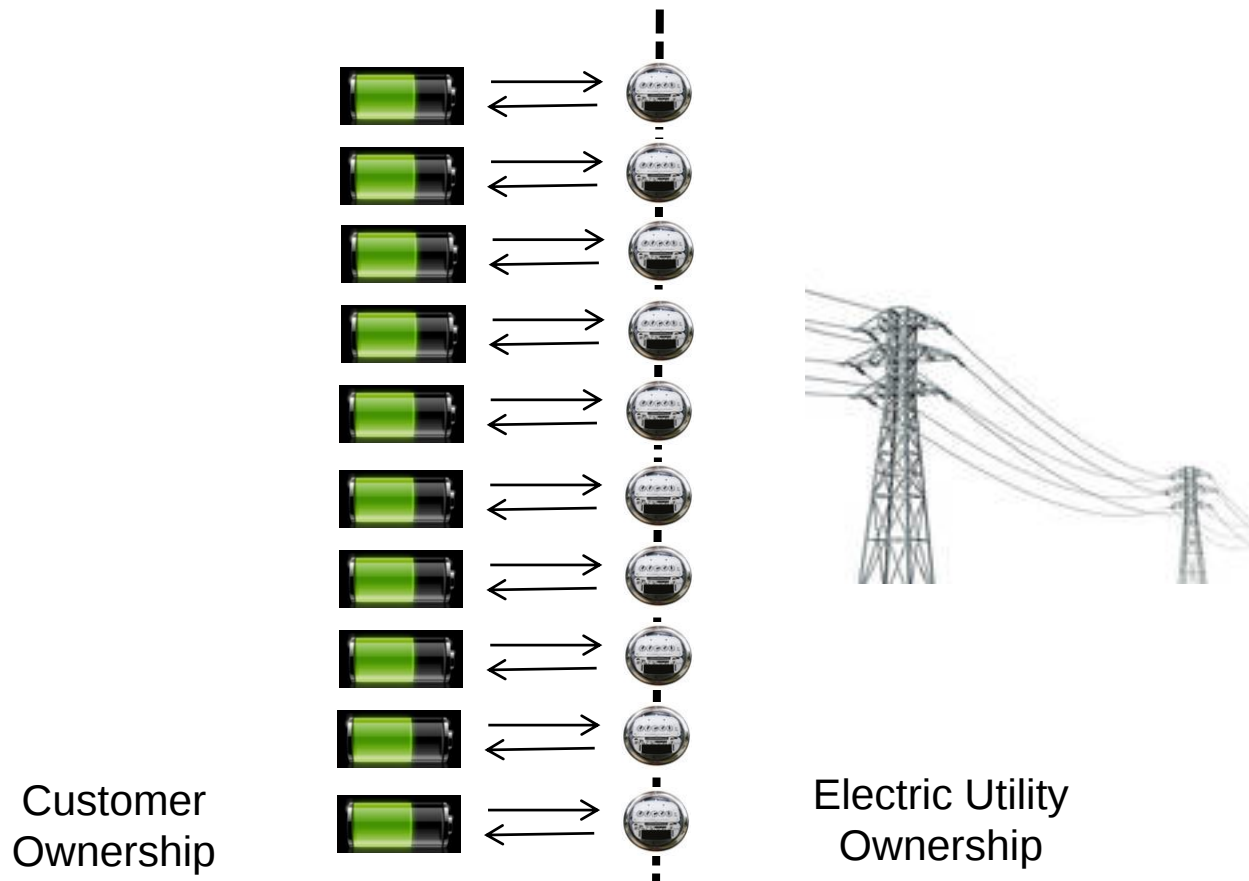




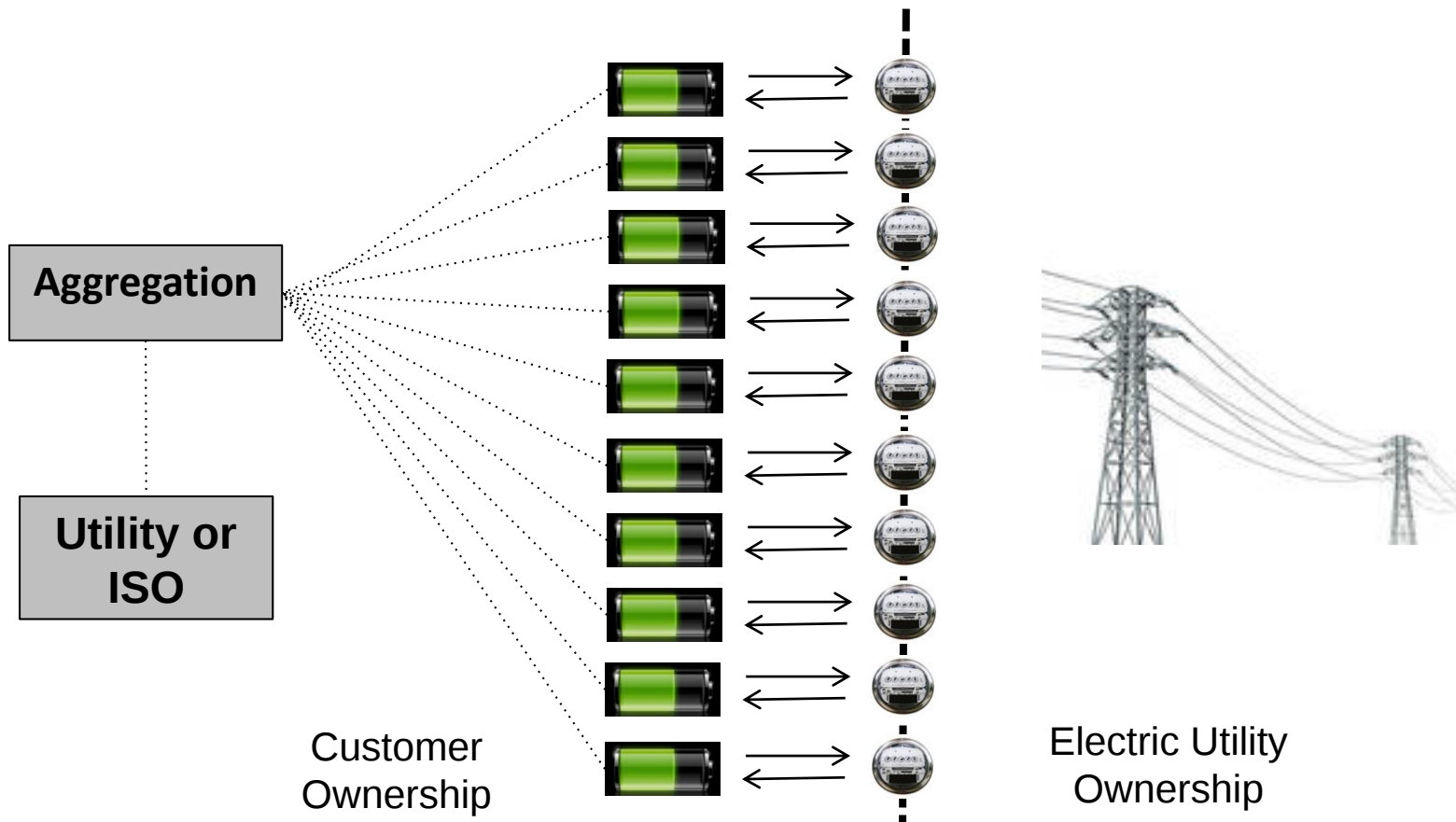
COMPLETE SUSTAINABLE FUTURE



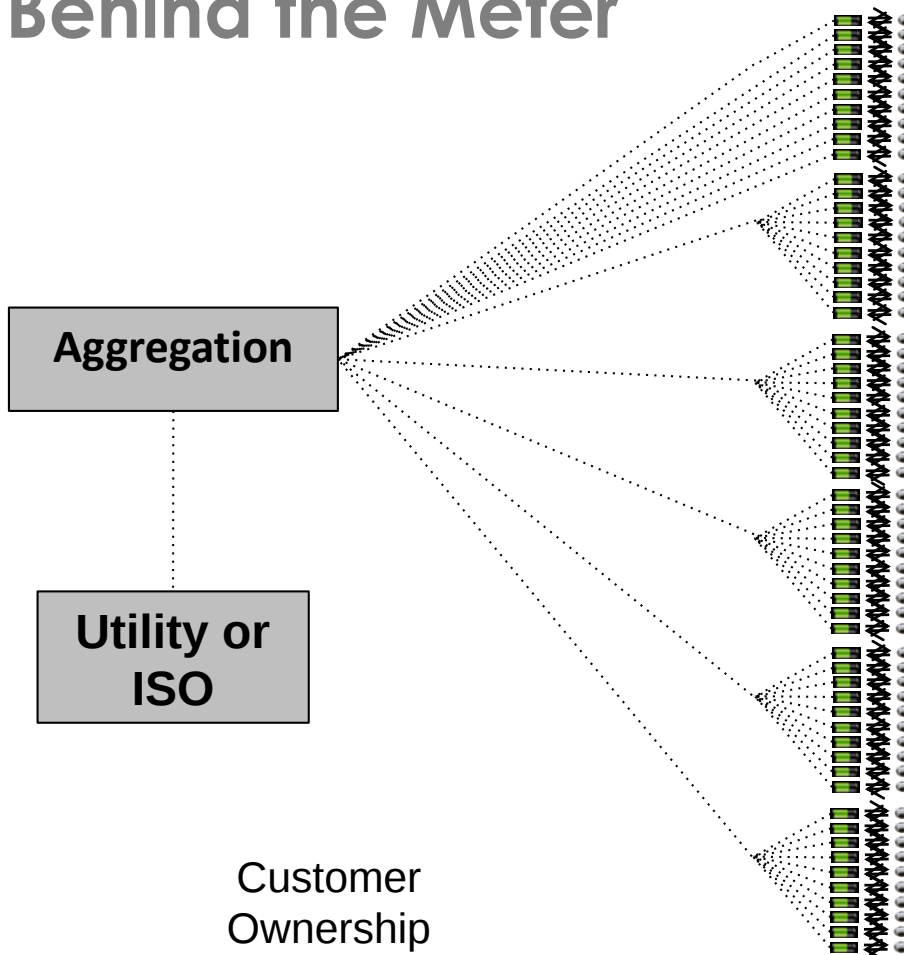
Storage Behind the Meter



Storage Behind the Meter

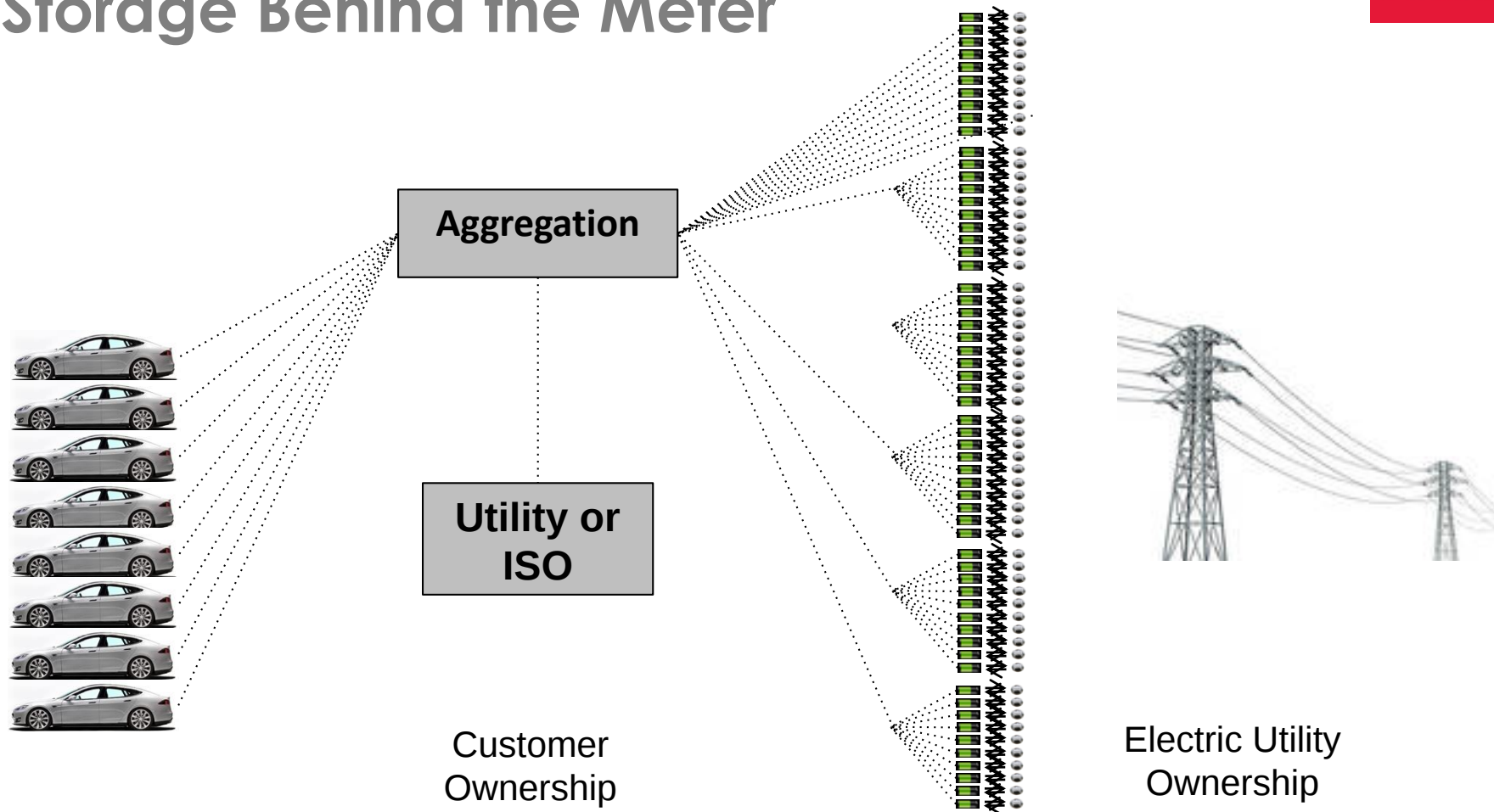


Storage Behind the Meter



Electric Utility
Ownership

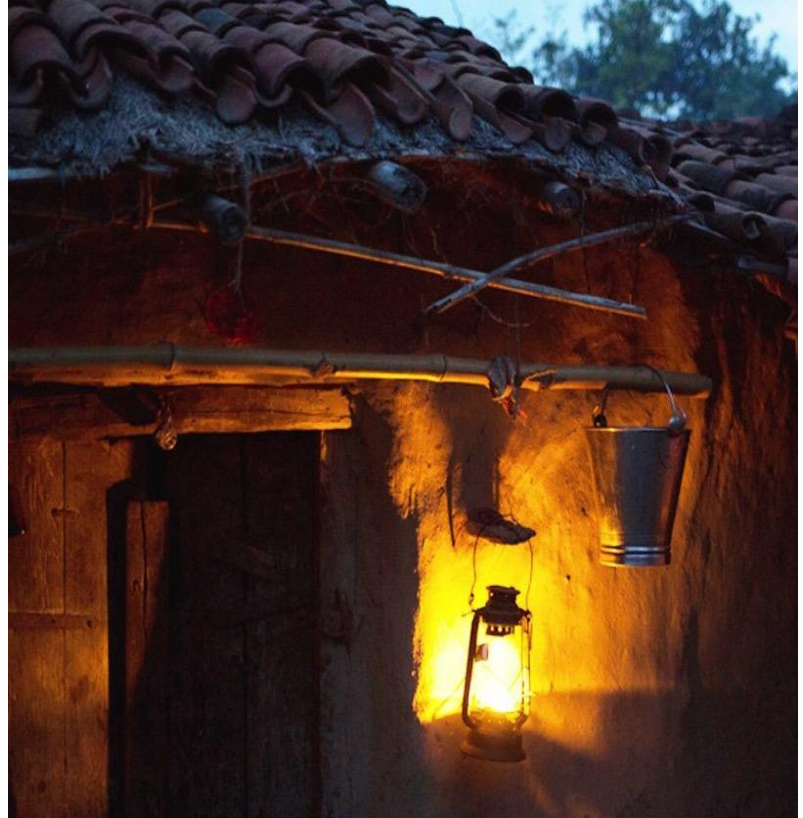
Storage Behind the Meter



Tomorrow's Electric Infrastructure

1.2 B

PEOPLE WITHOUT
ELECTRICITY

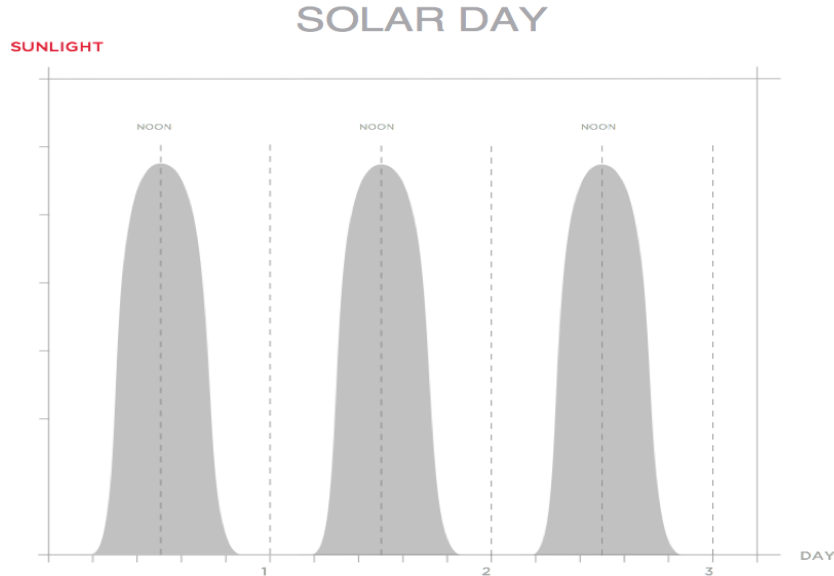


Lathrop, CA

4MWh Installation Online



Solar and Wind cheaper than Coal: 3.87 cents/kWh



NV Energy buys utility-scale solar at record low price under 4 cents/kWh

By [Herman K. Trabish](#) | July 9, 2015 print



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Dive Brief:

- NV Energy, a subsidiary of Warren Buffett's Berkshire Hathaway Energy, has agreed to a power purchase agreement (PPA) at a \$0.0387 per kWh rate for the 100 MW output of First Solar's Playa Solar 2 installation. It is likely the lowest rate for solar energy-generated electricity made public to date, Bloomberg reports, and is likely the cheapest electricity available in the U.S. today.

An Island Example – Kauai (Hawaii)



552 square miles

65,000 people

Goal: 50% renewable by 2023

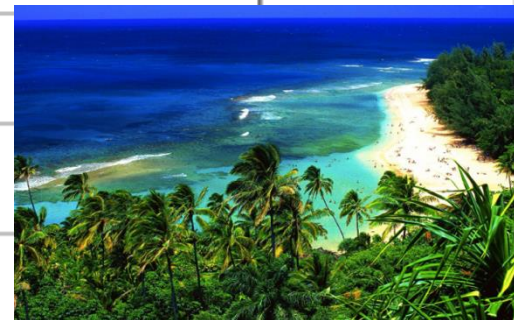
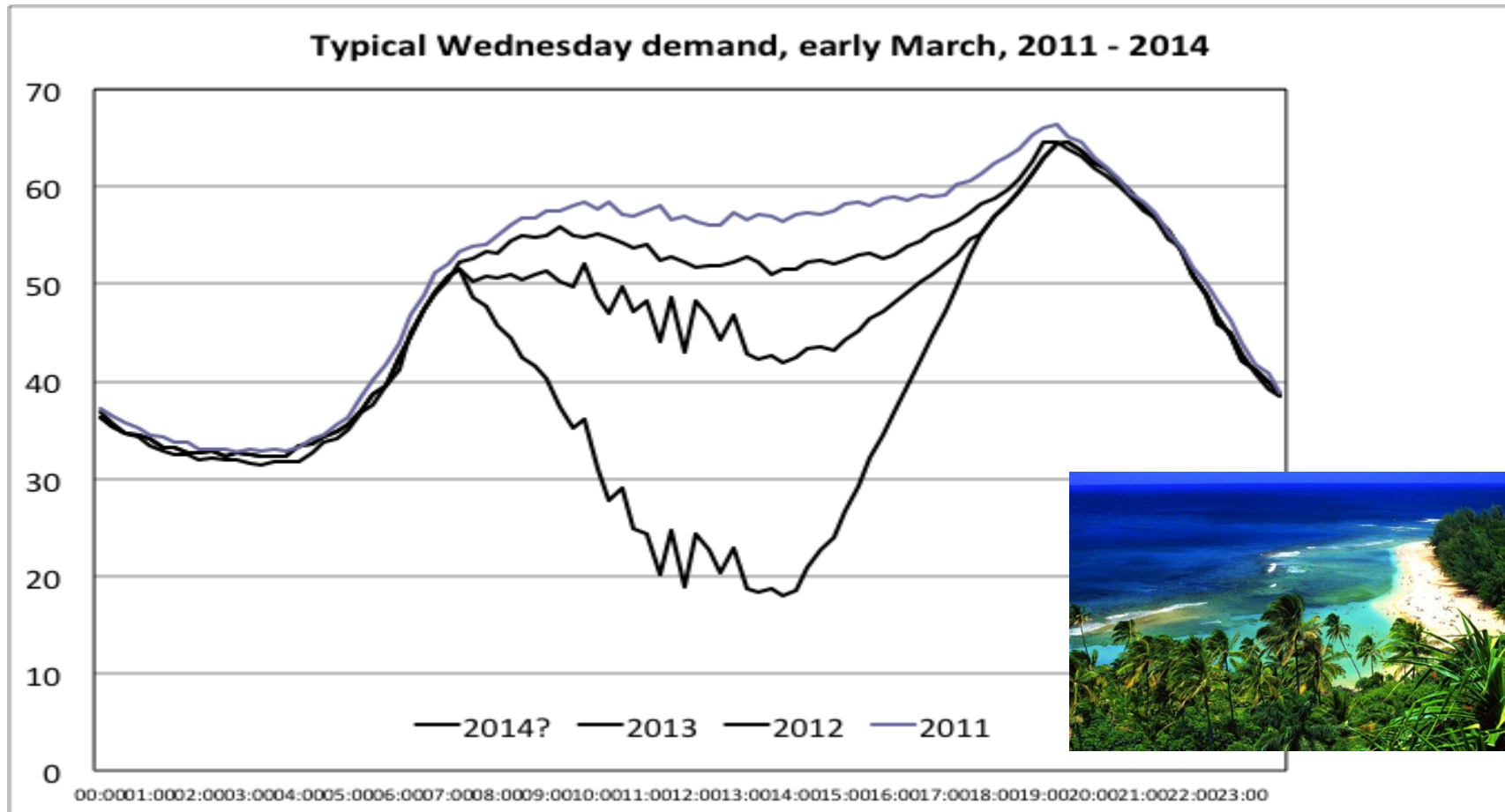
Kauai Solar (6 MW array, 10% of daytime load)

TESLA



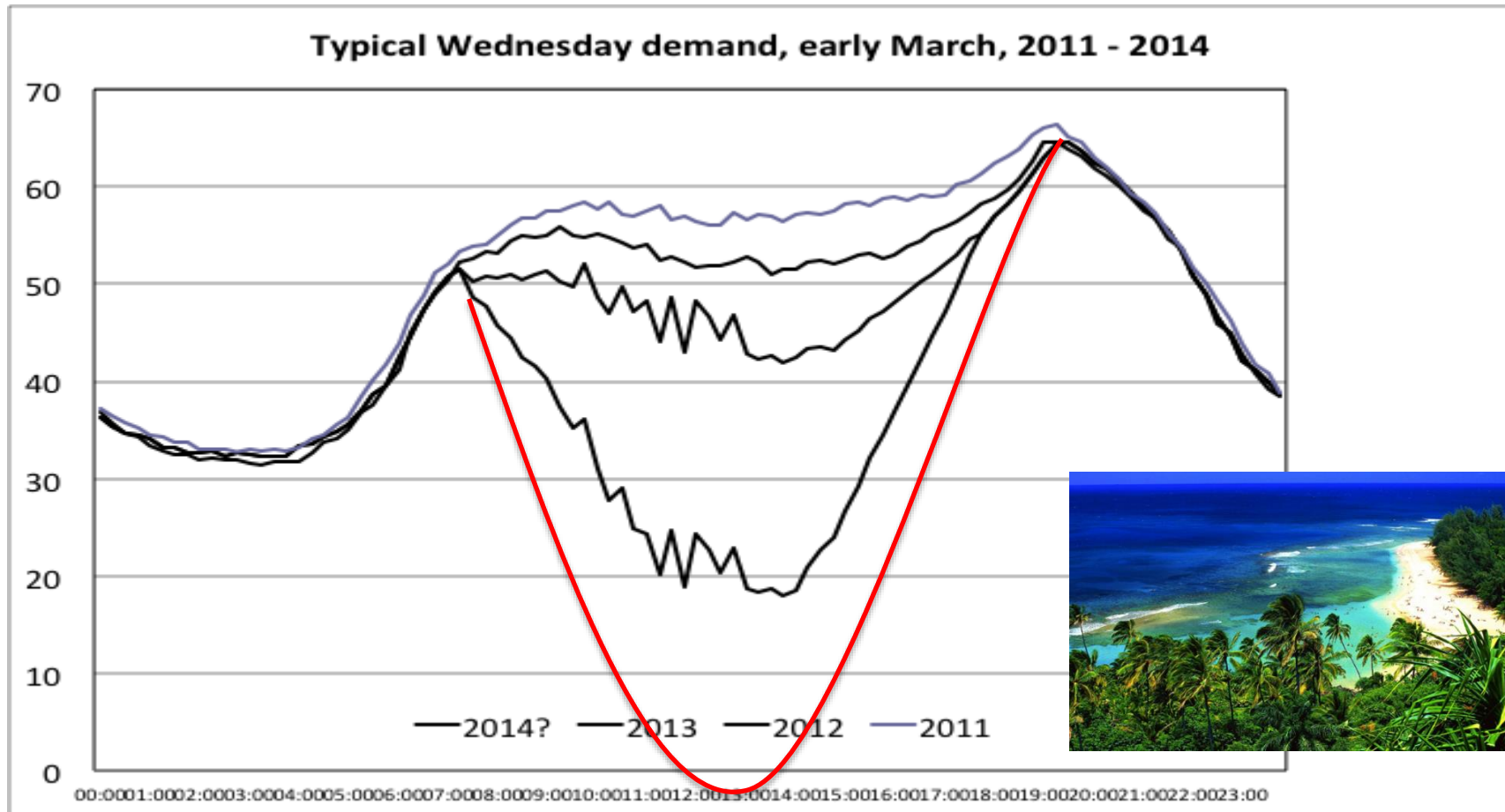
Kauai Load Curve

TESLA



Kauai Load Curve

TESLA



Storing Bulk Renewable Energy



**Load
Level**

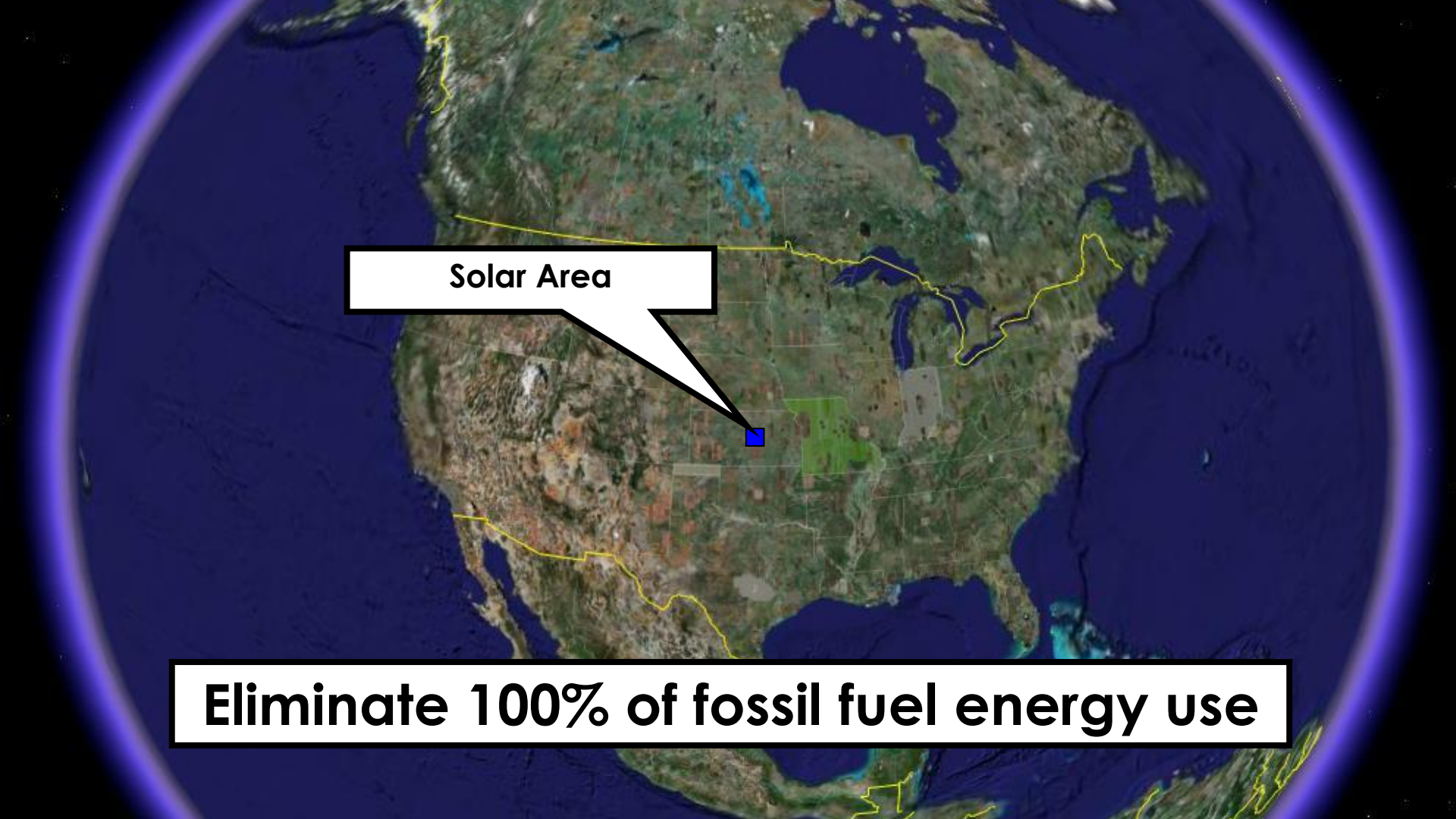


Utility Scale Solar Storage

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Project	Size	Product	Construction Start
KIUC	13MW/52MWh	Powerpack	June 2016



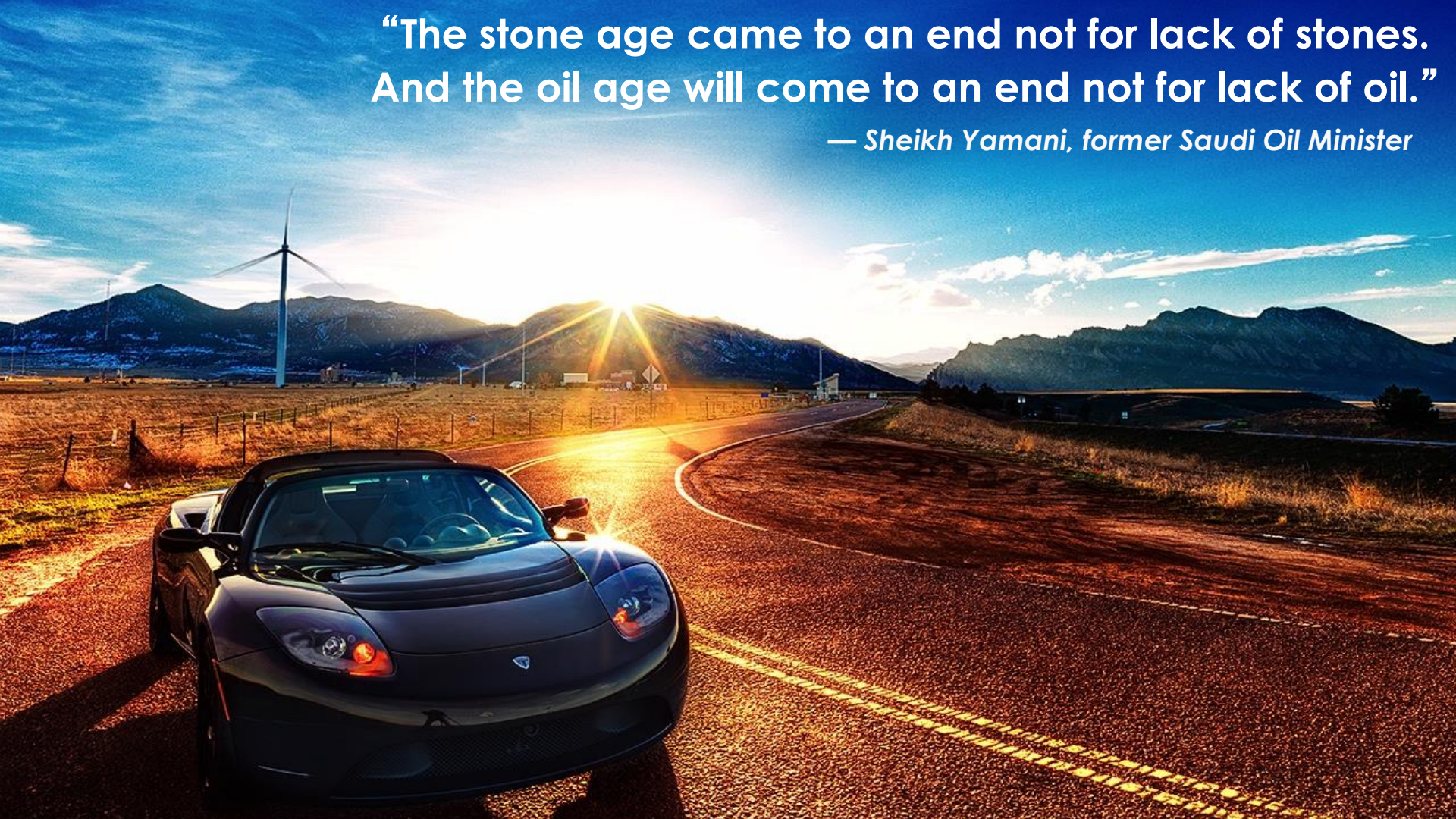
A satellite map of North America, showing the United States and Mexico. A yellow line outlines the continental United States. A blue square is located in the central United States, in the state of Colorado. A white callout box with a black border points to this square. The text "Solar Area" is inside the callout box. At the bottom of the image, there is a large white rectangular box with a black border containing the text "Eliminate 100% of fossil fuel energy use".

Solar Area

Eliminate 100% of fossil fuel energy use

**“The stone age came to an end not for lack of stones.
And the oil age will come to an end not for lack of oil.”**

— Sheikh Yamani, former Saudi Oil Minister



Question? Please raise
your hand and a mic
runner will come to you

