





blue  planet
FOUNDATION

CLIMATE



Star Advertiser

Wednesday, June 24, 2015

82.0°F 

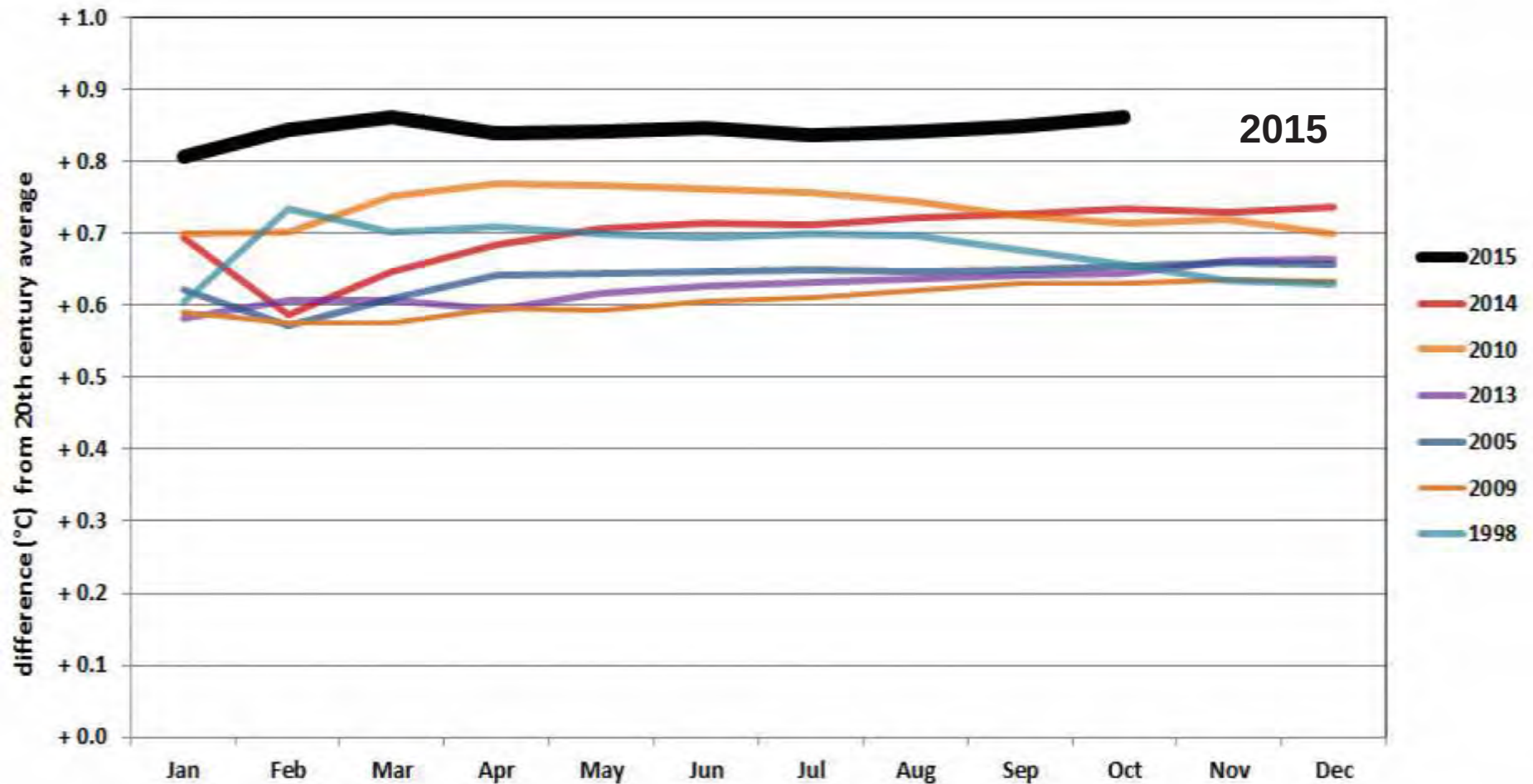
High temperature sets another record in Honolulu



Globally **2015** was the
HOTTEST year in
recorded history

Climate change: UN report confirms 2015 hottest year since records began

28/01 16:11 CET | updated at 28/01 - 22:01



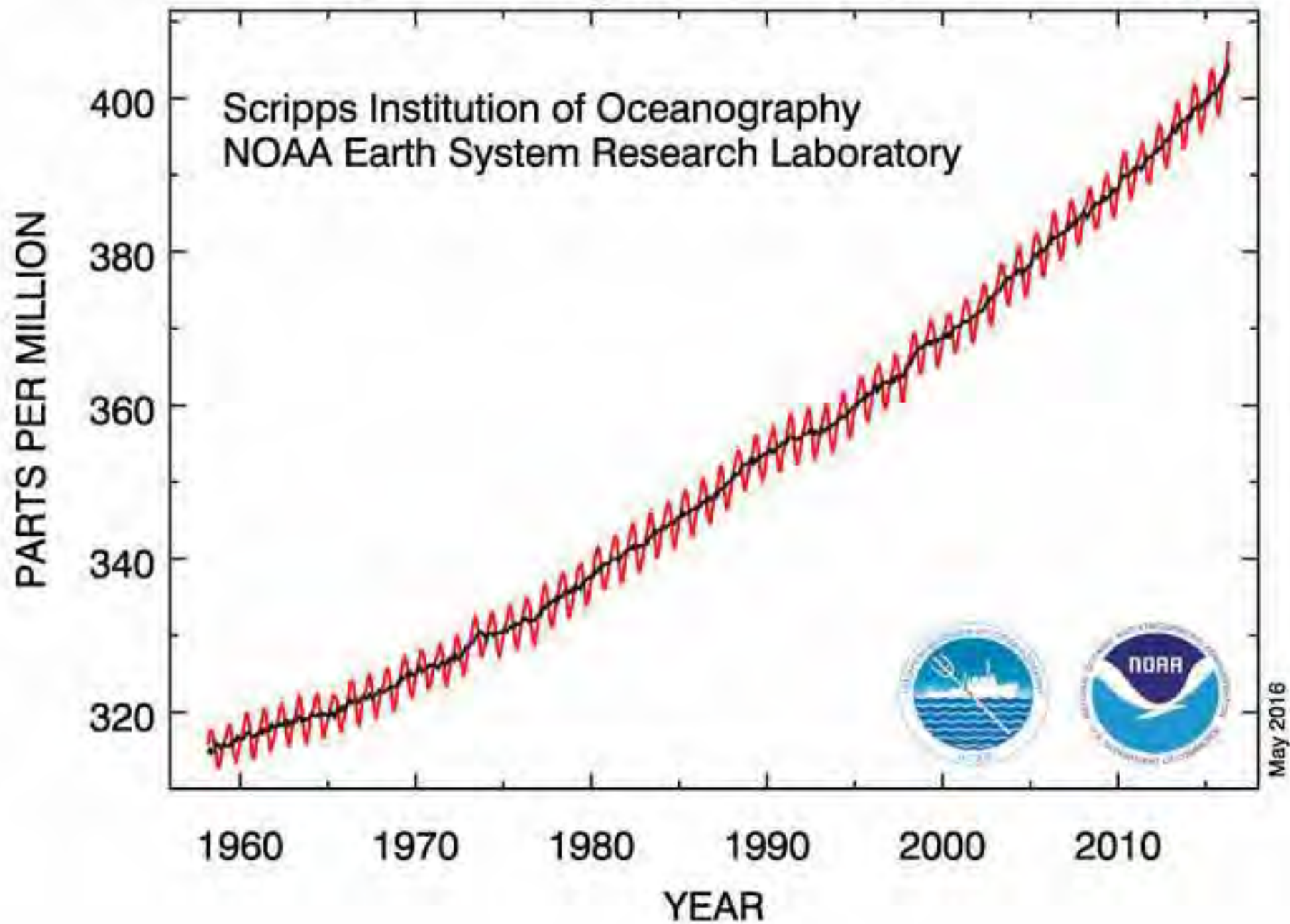
Mercury rising: India records its highest temperature ever

By Huizhong Wu, CNN

🕒 Updated 4:01 PM ET, Fri May 20, 2016



Atmospheric CO₂ at Mauna Loa Observatory



407.57

Atmospheric carbon dioxide for April 2016

(the most important number on Earth)





News Video TV Opinions More...

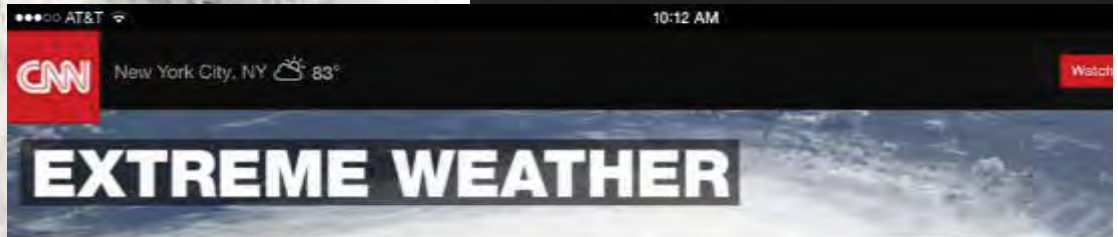
U.S. World Politics Tech Health Entertainment Living Travel Money

'Unbelievable destruction'

BREAKING NEWS

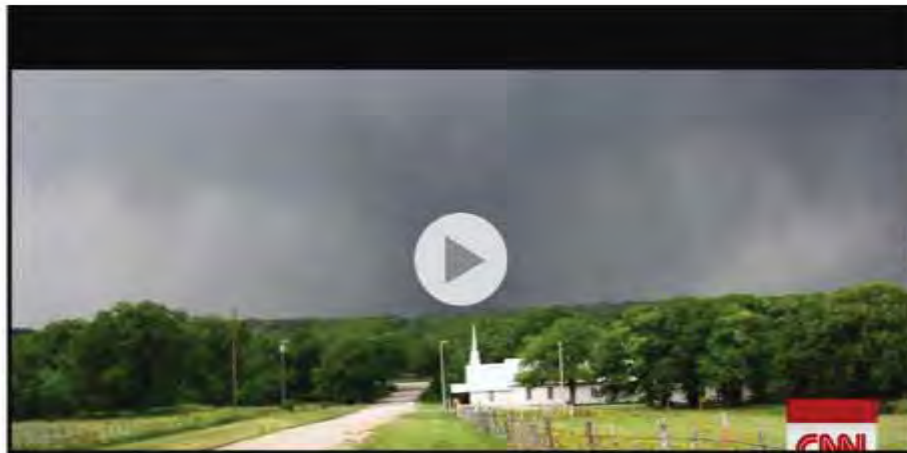


Tropical Cyclone Pam smashes Vanuatu



33 million in U.S. under severe weather threat

By Rachel Aissen, CNN Meteorologist
Updated 3:19 PM ET, Sun May 10, 2015



More from CNN



Is the 'T-word' the new 'N-word'?



After hours of

Smithsonian Scientists Discover Sudden Melting in the Antarctic

Warmer waters are eating away at protective ice shelves, letting glaciers flow into the sea



A Large Chunk of Antarctica May Disappear Into the Ocean By 2020

Justin Worland @justinworland May 15, 2015



The loss of the ice shelf will likely increase the rate of global sea level growth

A 618-square mile section of Antarctica's Larsen B Ice Shelf has been melting away and may disappear into the ocean entirely by 2020, according to a new [study](#). The area is the last remaining section of a 10,000-year-old ice shelf that partially collapsed in 2002.







POPE FRANCIS
PRAISE
BE TO
YOU

Laudato Si'

On Care for Our Common Home



IGNATIUS



**Over 1 billion
Catholics globally**

2015 Paris Climate Agreement





< 1.5° C



A sunset over the ocean with a white circular overlay containing the text "100% CLEAN ENERGY BY 2045". The background shows a bright sun setting behind a dark horizon, with silhouettes of palm trees on the right and mountains in the distance. The sky is a mix of orange, yellow, and dark blue.

100%
CLEAN
ENERGY
BY 2045

Hawai'i should not only demonstrate the future of clean energy, it should help *invent it*.

World's first royal residence lit by electricity

November 16, 1886







Policy solutions

- Solar tax credit (and other incentives)
- Net energy metering
- Renewable Portfolio Standards
- Greenhouse gas reduction law
- Solar water heating mandate (all new homes)
- Oil barrel tax for clean energy programs
- Energy efficiency portfolio standards
- Feed-in tariff



Solar mandate: SUCCESS



Feed-in tariff: **FAILURE**



Hawaiian Electric Company
Maui Electric Company
Hawaii Electric Light Company

**Energy Agreement Among the State of Hawaii,
Division of Consumer Advocacy of the
Department of Commerce & Consumer Affairs,
and Hawaiian Electric Companies**

October 2008







HECO TIMELINE

HAWAIIAN ELECTRIC COMPANY, INC. (HECO)

Renewable Energy Commitments	Cumulative Target Goal (MW by year-end)			
	2010	2015	2020	2025
ENERGY EFFICIENCY/CUSTOMER SITED GENERATION				
PV (through feed-in tariff or PPA)	6.5	23.0	65.0	108.0
Solar Opportunity PV Host Program	2.0	12.0	22.0	32.0
Net Energy Metering	5.0	23.0	57.0	97.0

Anticipated NEM PV by end of 2015: 23 MW

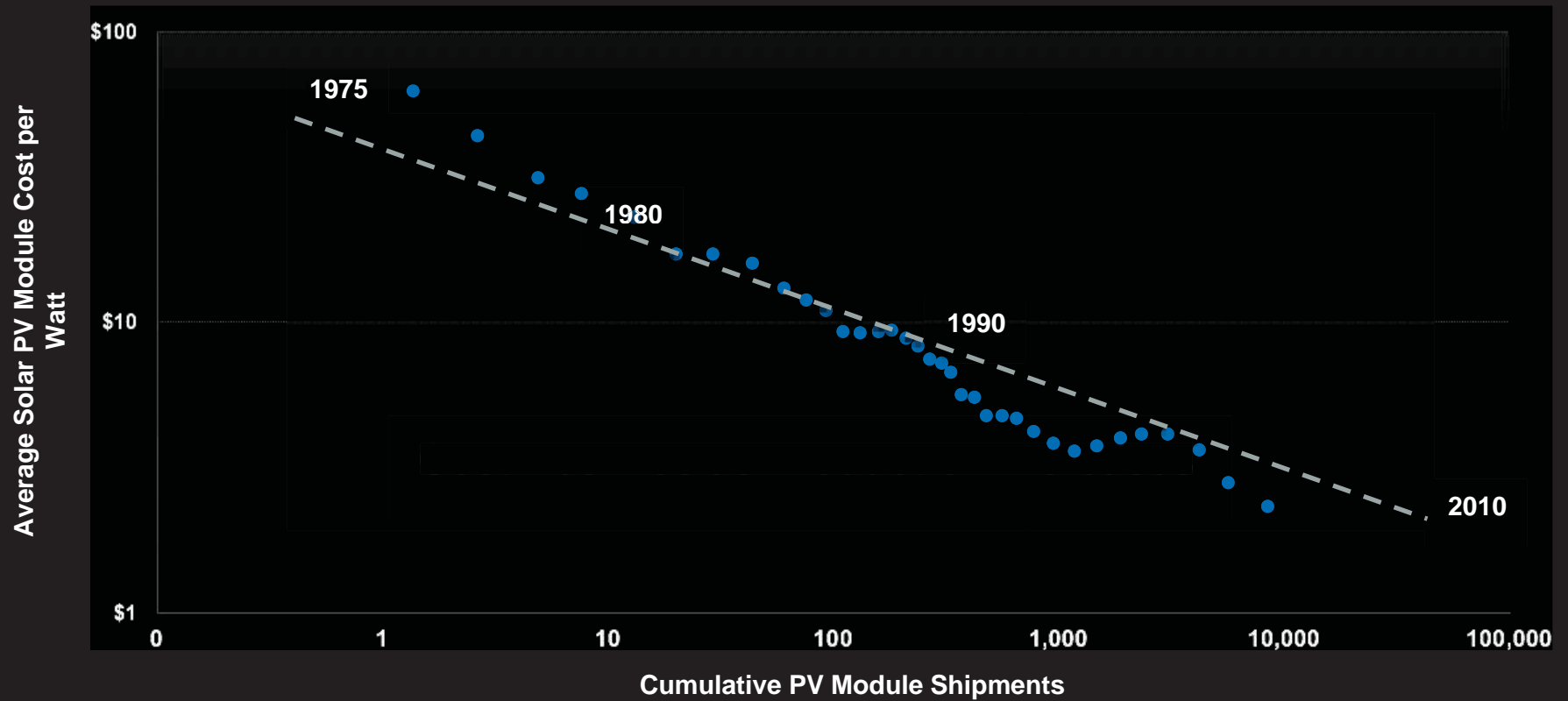
Actual NEM at end of 2015: 345.2 MW

> 15x





Solar Photovoltaics Cost



Source: U.S. Department Of Energy, National Renewable Energy Laboratory, "Sun Shot Vision Study," February 2012

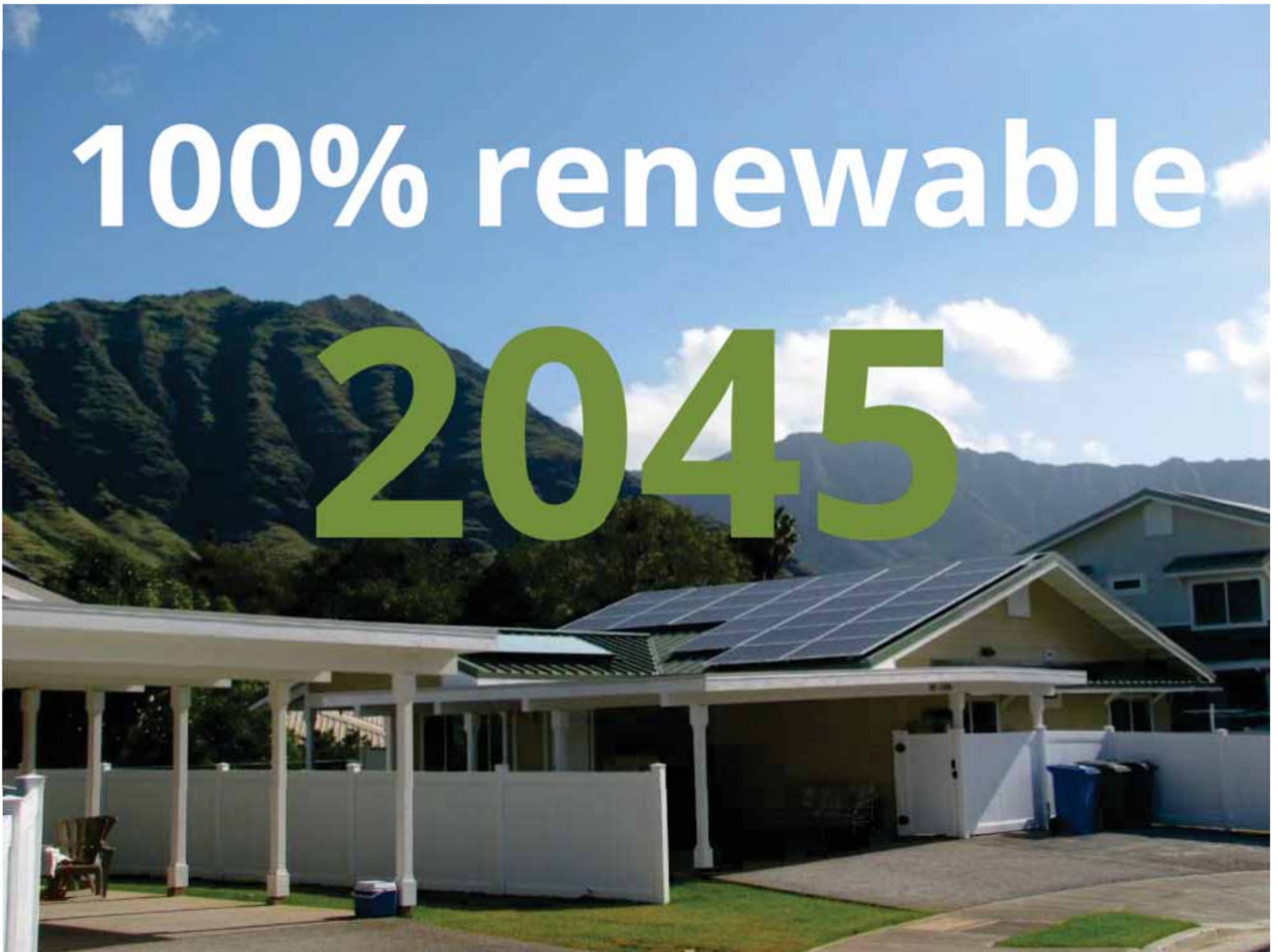
Nearly **eighty thousand** residential properties in Hawai'i now have solar systems installed.

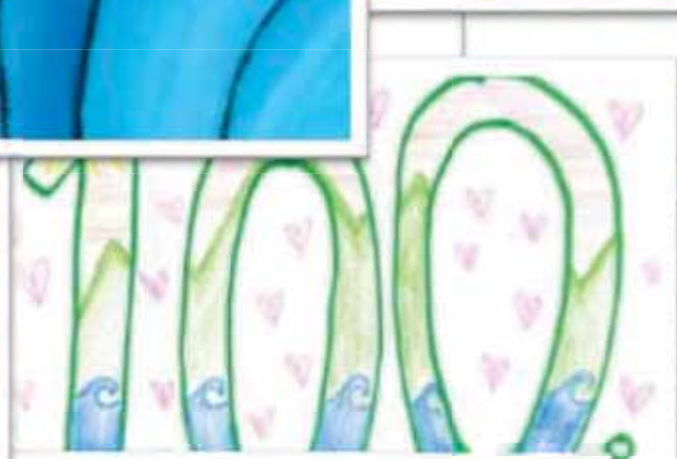
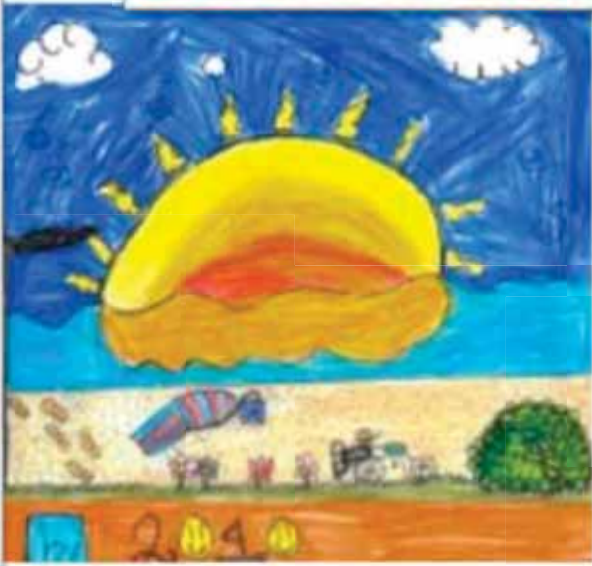
That's more than **one in three** single-family dwellings.



100% renewable

2045





Dear Legislators,

We are **tomorrow's** scientists,
farmers, **teachers**, **dreamers**,
and Leaders, asking you to make
our future brighter by passing
House Bill 623: 100% clean,
renewable energy by 2040.

100% renewable energy by 2040



blue planet
FOUNDATION



VIEWPOINTS

ISLAND VOICES

Hawaii's renewable energy goal should be 100%

By Gov. George Ariyoshi, Christine Camp and Peter Crouch

Under the state's existing renewable energy laws, in 2031 — around the time today's preschoolers will graduate high school — the majority of our energy could still come from fossil fuels. We owe it to the kids growing up today, and the ones following them, to do better than that.

Climate reality is everywhere: eroding coastlines, dying coral reefs, droughts,

Hawaii and the Hawaiian Electric companies acknowledged and agreed:

"The future of Hawaii requires that we move more decisively and irreversibly away from imported fossil fuel for electricity and transportation and towards indigenously produced renewable energy and an ethic of energy efficiency. The very future of our land, our economy and our quality of life is at risk if we do not make this move and we do so for the future of Hawaii and of the genera-



George Ariyoshi was governor of Hawaii 1974-1986; Christine Camp is managing director of Avalon Development Co., LLC; and Peter Crouch is dean of the College of Engineering at the University of Hawaii-Manoa. They are on the board of directors of Blue Planet Foundation.

achieve this target by 2040, if not sooner.

Elsewhere, 100 percent renewable goals are becoming a norm. The island nations

able targets and related policies, there is "no doubt that Hawaii is further along the path to increased utilization of renewable and indigenous

progress in clean energy technology and policies, as well as a rising tide of citizens intent on reversing climate change. With continued action in these areas — building on progress like advanced rooftop solar inverters to accommodate high solar penetration, an 80 percent drop in solar power module prices since 2008, a strong barrel tax and greenhouse gas laws, solar hot water on every new home, low-cost green financing, and a movement to divest our univer-





LEADERSHIP MATTERS

- **New Governor**
- **New CEO of Hawaiian Electric utility**
- **New Chair of Public Utilities Commission**

Hawaii legislature approves 100% renewables target

JOHN CONROY | 7 MAY, 12:19 PM

CLIMATE | ENERGY MARKETS | POLICY & POLITICS | RENEWABLE ENERGY |
SOLAR ENERGY | WIND POWER

Hawaii's legislature has passed a bill calling for a 100% renewable power target by 2045, with interim targets of 70% by 2030 (up from a previously agreed 40%) and 30% by 2020, *Energy Matters* reports.

Hawaii Votes to Go 100% Renewable

By Peter Fairley
Posted 6 May 2015 | 16:09 GMT

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100% Renewable Electricity Goal Passed By Hawaiian Legislature

11th, 2015 by [Jake Richardson](#)

INDUSTRY NEWS ENERGY

Hawaii legislation sets 100 percent renewable energy goal for the state

May 6, 2015, 4:56pm EDT | Updated May 6, 2015 | 11:00am EDT

Quinn Sturgis
Pacific Business News

[Share](#) | [Email](#) | [Print](#)

Hawaii moved a huge step closer to becoming the first state in the nation to adopt a 100 percent renewable energy portfolio standard, with a bill passed by the state Legislature on Tuesday that's now headed to the governor's desk for his signature.



Follow the Leader: Hawaii Aims for 100 Percent Renewable Energy

by Tim Casey on Monday, May 11th, 2015

1488 Shares and Likes



Hawaii legislature sets 100% renewable portfolio standard by 2045

By [Davide Savenije](#) | May 6, 2015 | [print](#)

[share](#) | [tweet](#) | [post](#) | [email](#)



Hawaii Will Soon Get All Of Its Electricity From Renewable Sources

BY [SAMANTHA PAGE](#) | POSTED ON MAY 7, 2015 AT 1:20 PM

[116,813 Share This](#) | [2,879 Tweet This](#)





Barack Obama 

@BarackObama



Follow

Hawaii just set a goal of generating 100 percent of its electricity from renewable resources: ofa.bo/r7hi #SwitchToClean



Hawaii News Now

Gov. Ige signs bill setting 100 percent renewable energy goal for...

By Hawaii News Now @HawaiiNewsNow

Gov. David Ige on Monday signed into law four energy bills, including one that strengthens Hawaii's commitment to clean energy by directing the state's utilities to generate 100 percent of their el...



Hawaiian Electric
Maui Electric
Hawai'i Electric Light



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FOR HAWAII'S FUTURE

Committed to Achieving Hawaii's 100 Percent Renewable Energy Goal



"NextEra has the financial clout and experience that can help Hawaiian Electric build a grid network that will benefit our community for generations to come. This merger makes sense for Hawaii."

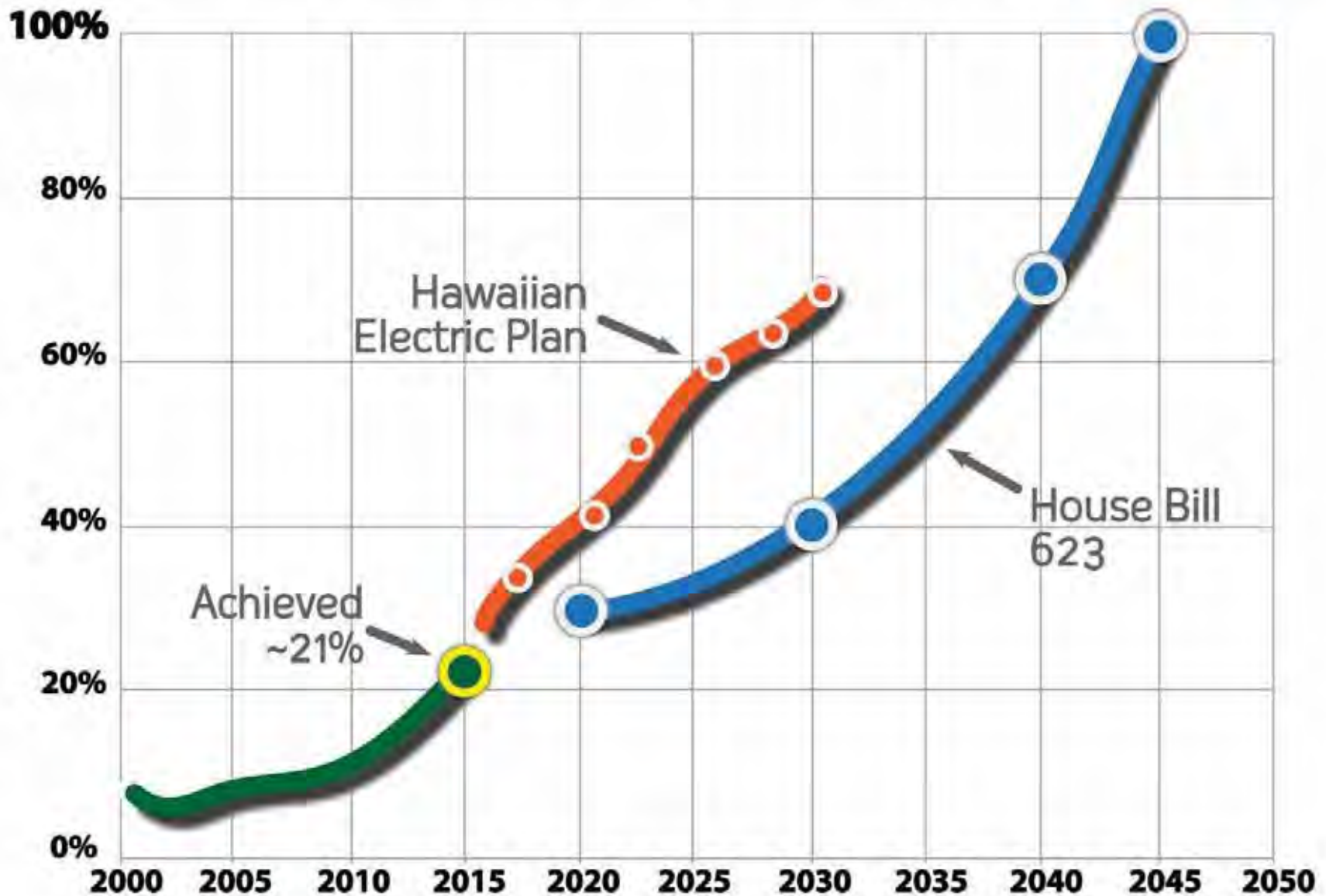
- Dean Okimoto, Nalo Farms



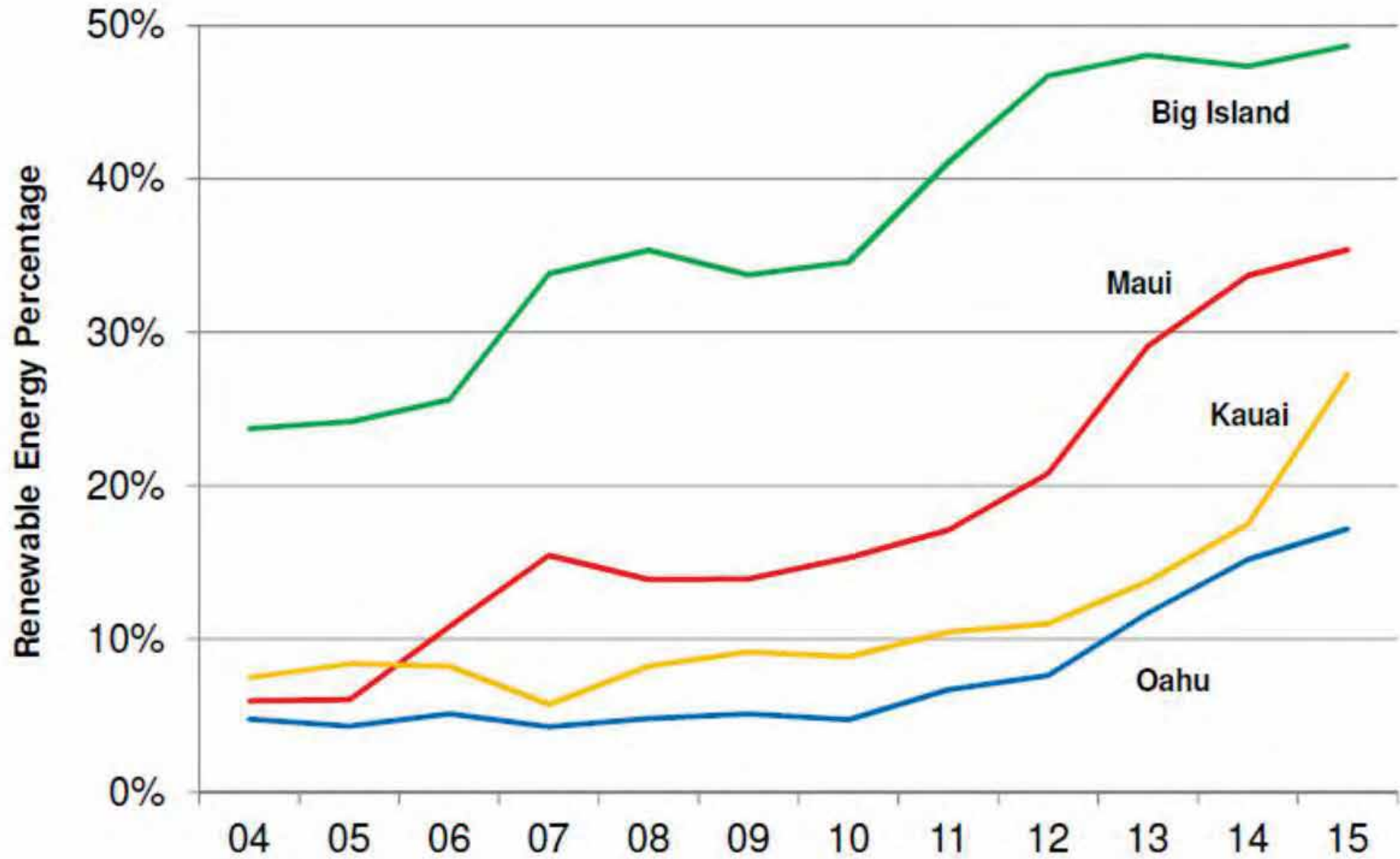
It's their future we are creating today.



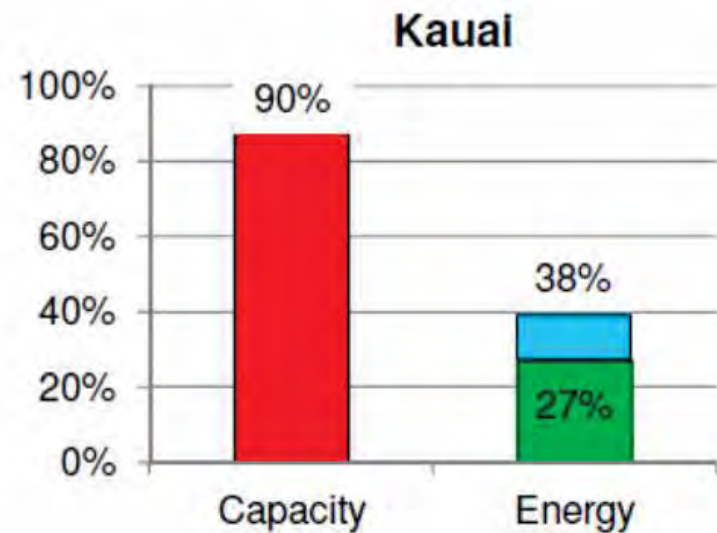
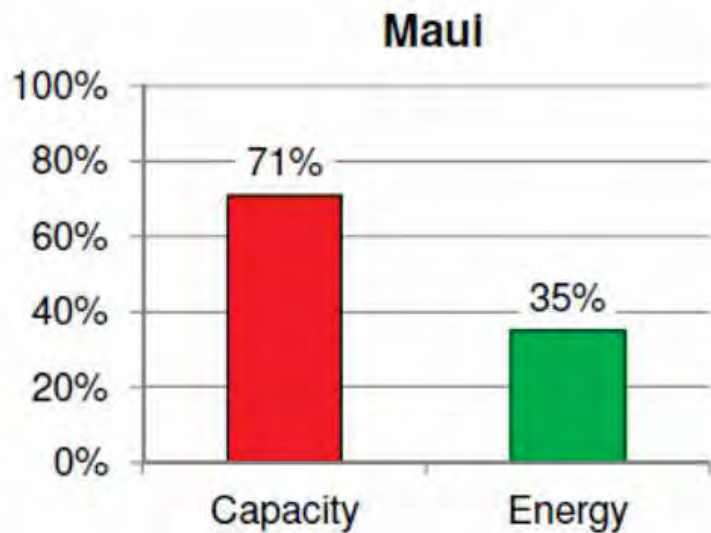
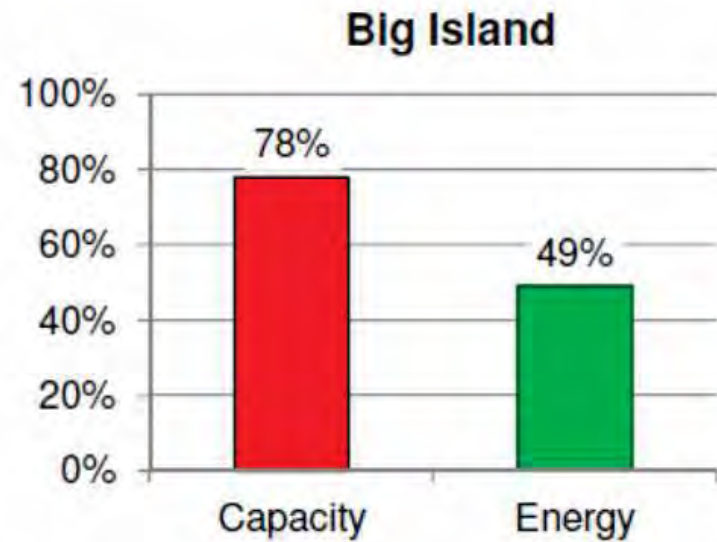
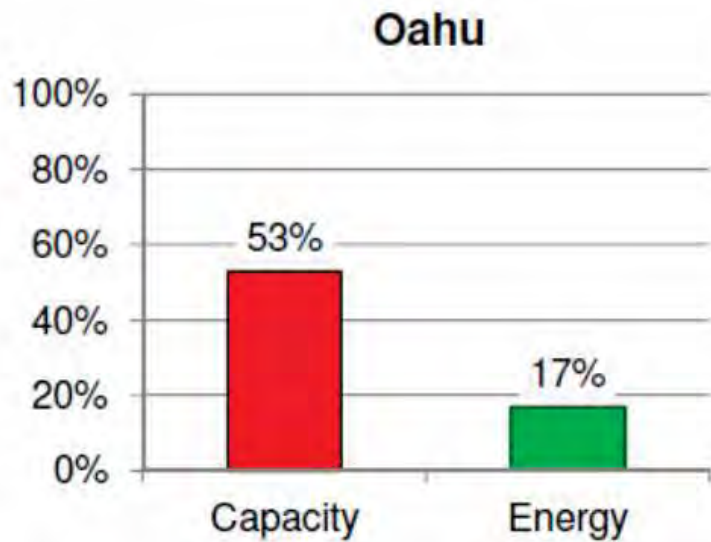
Hawai'i's Renewable Energy Future



Renewable Energy Trends



2015 Renewable capacity vs energy produced



Resource Combinations to Achieve 100% Renewable Power (*Oahu*)

Matthias Fripp

University of Hawaii, Manoa

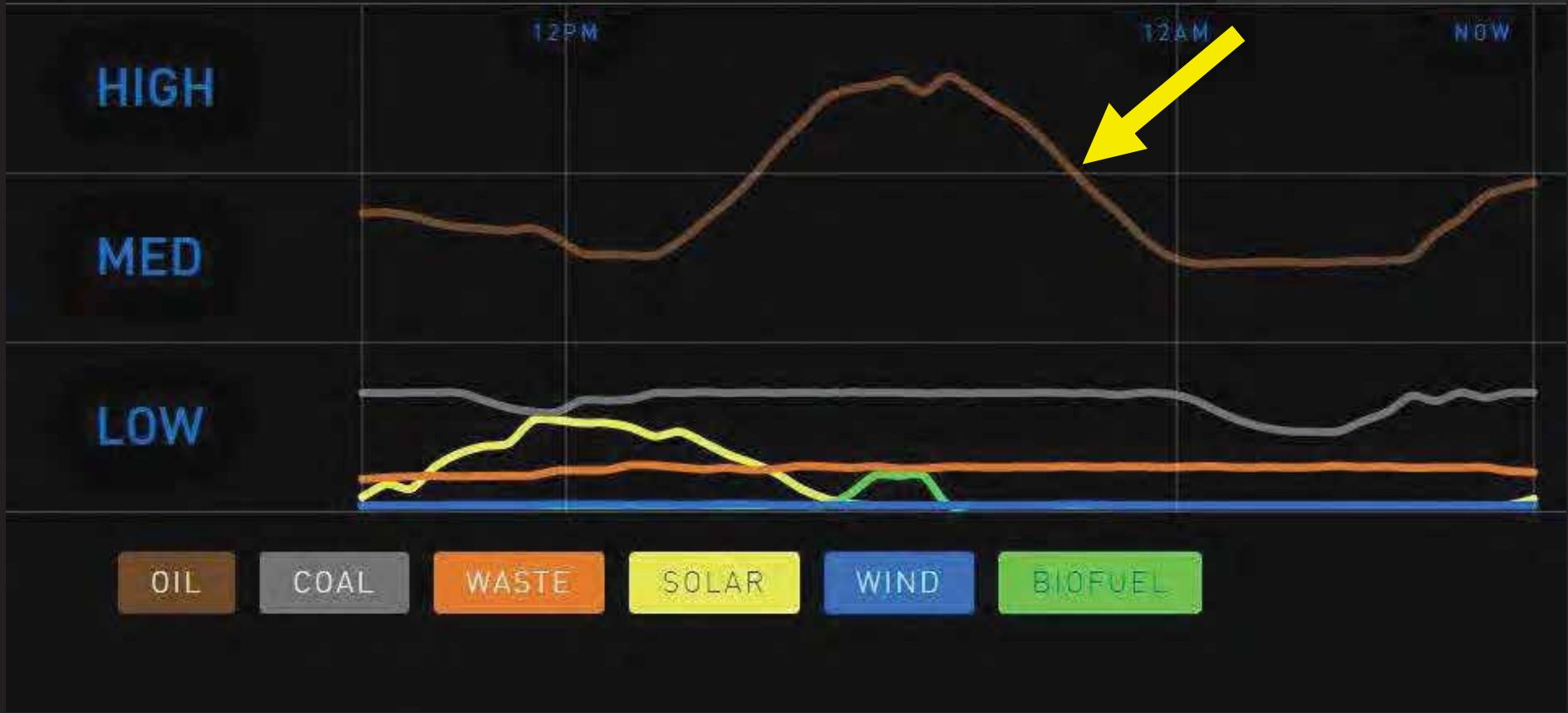
- Asst. Prof. of Electrical Engineering
- U.H. Energy Research Organization (UHERO)
- Renewable Energy & Island Sustainability (REIS)

Framework for Achieving 100%

- **Meet overall energy requirements**
 - Build wind projects where appropriate (~300 MW Oahu)
 - Build a lot of solar power (2,000–3,000 MW)
 - Use biofuels as needed/appropriate (0-16% of energy)
- **Meet hourly energy requirements**
 - Harness demand response via real-time pricing (300 MW?)
 - Same loads can also provide “spinning” reserves
 - Build pumped hydro storage if cost-effective (150 MW+)
 - Build as much battery capacity as needed (100–400 MW)
 - Fill in with biofuel or hydrogen as needed (400-600 MW)
- **Meet seasonal energy requirements**
 - Use biofuel or hydrogen on low-sun days
 - Produce hydrogen on high-sun / high-wind days

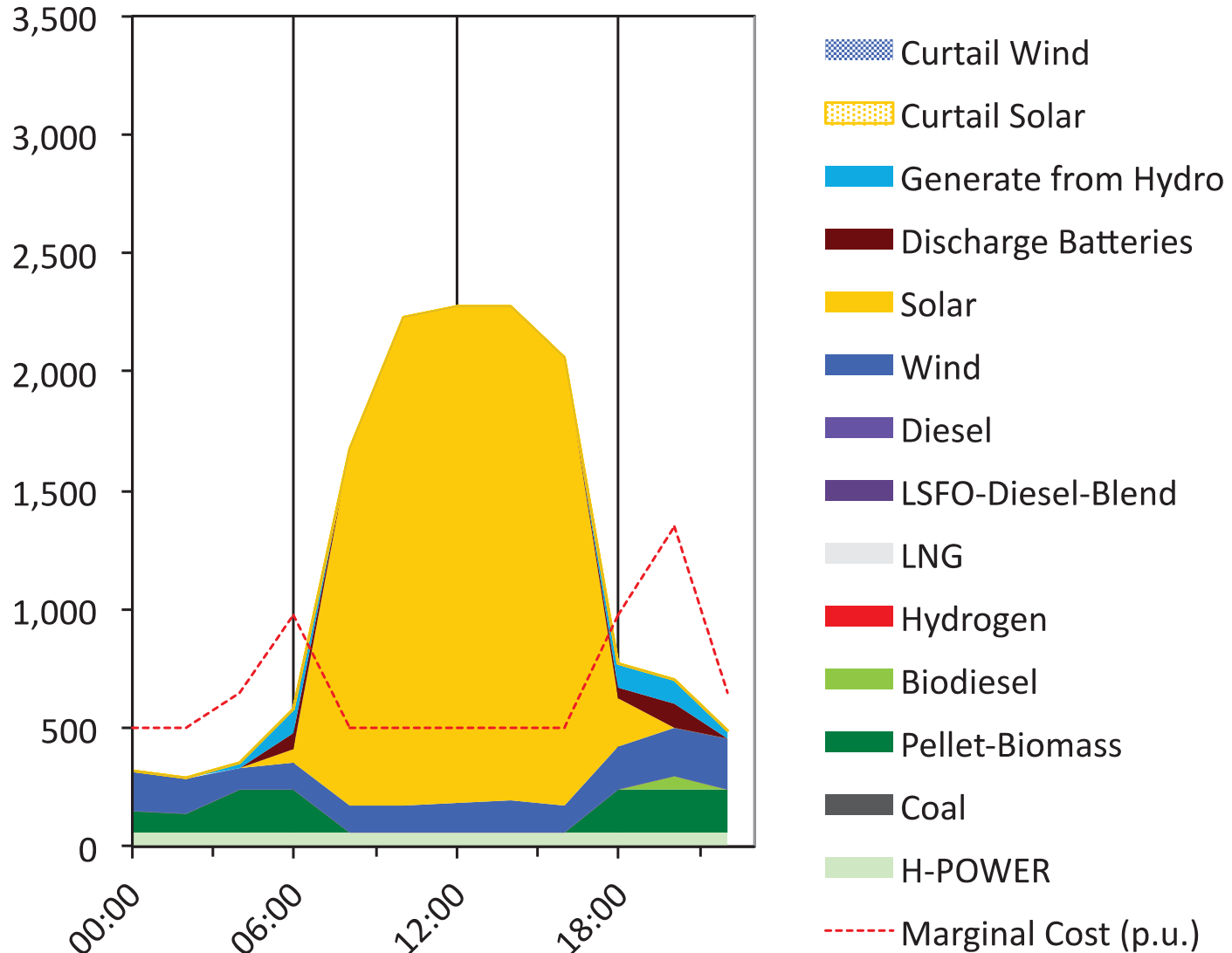
TOTAL ENERGY MIX

LAST 24 HOURS



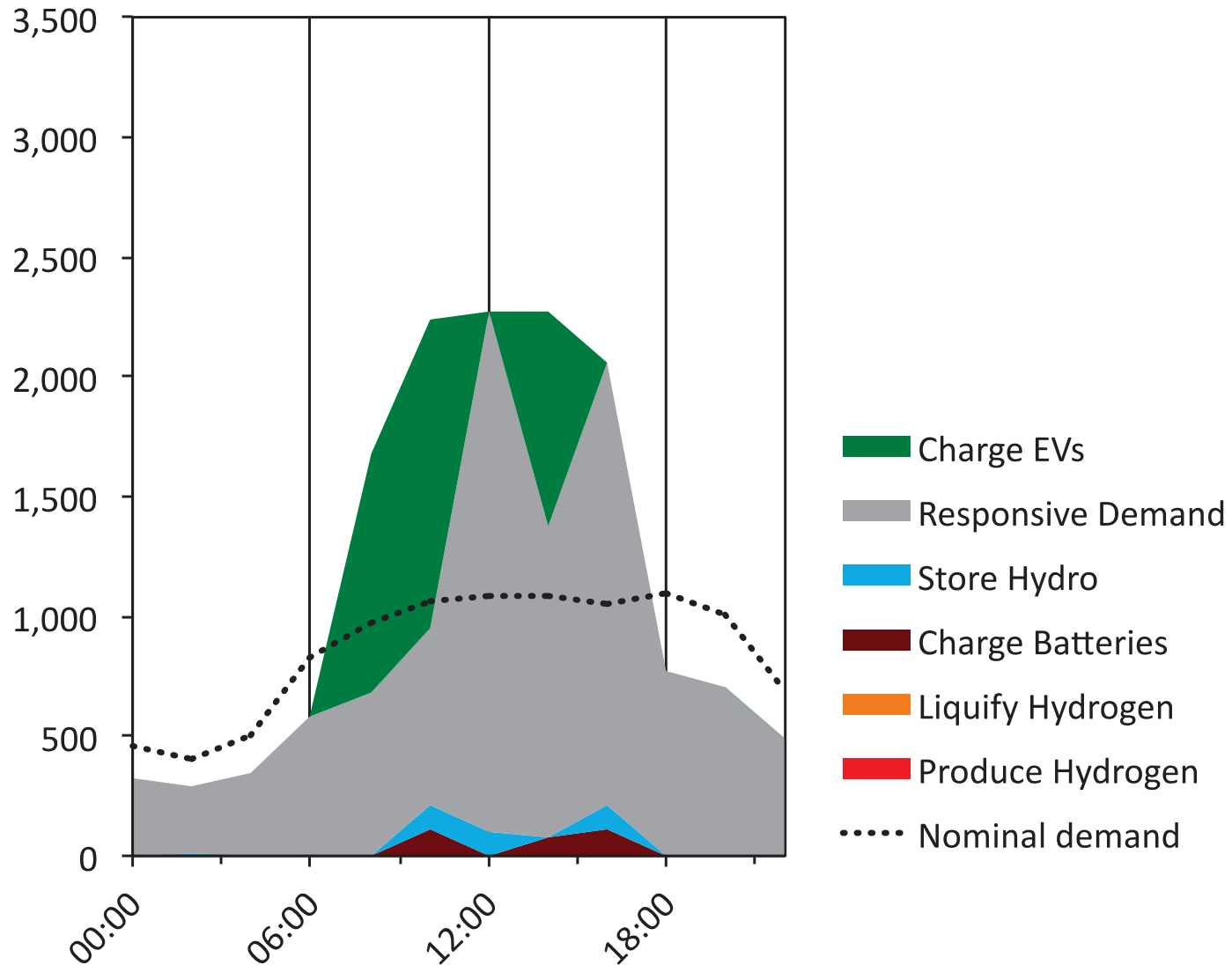
Daily Energy Production 100% Renewable

Hourly Power Production (MW)



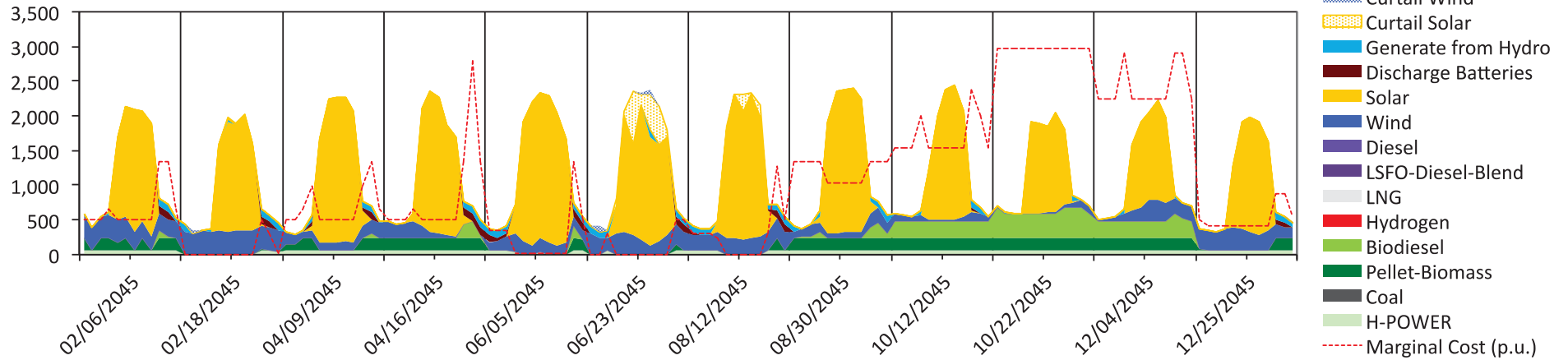
Daily Energy Consumption 100% Renewable

Hourly Power Consumption (MW)

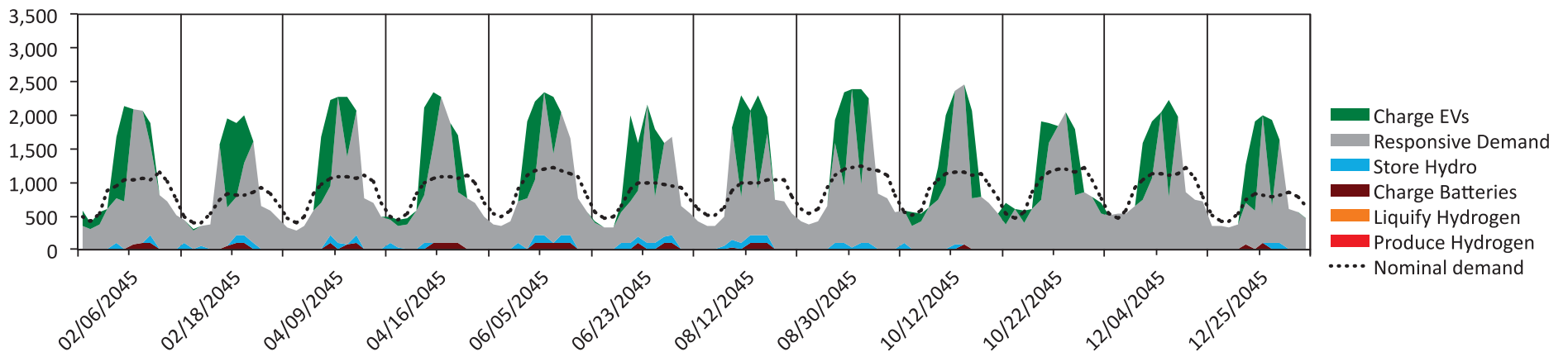


Year-Round Energy Balance with 16.5% Biofuels (~20.7¢/kWh avg. cost)

Hourly Power Production (MW)

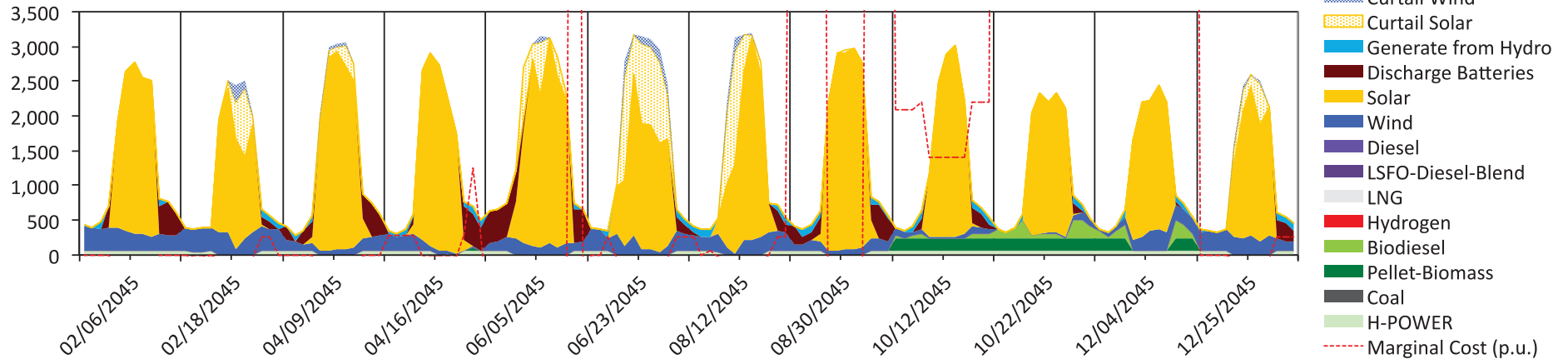


Hourly Power Consumption (MW)

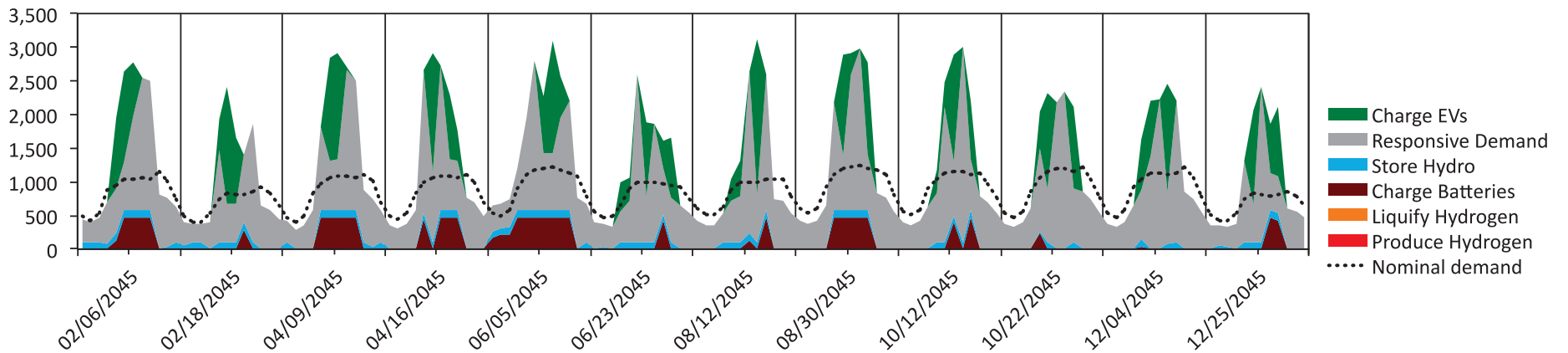


Year-Round Energy Balance with 5% Biofuels (~22.0¢/kWh)

Hourly Power Production (MW)

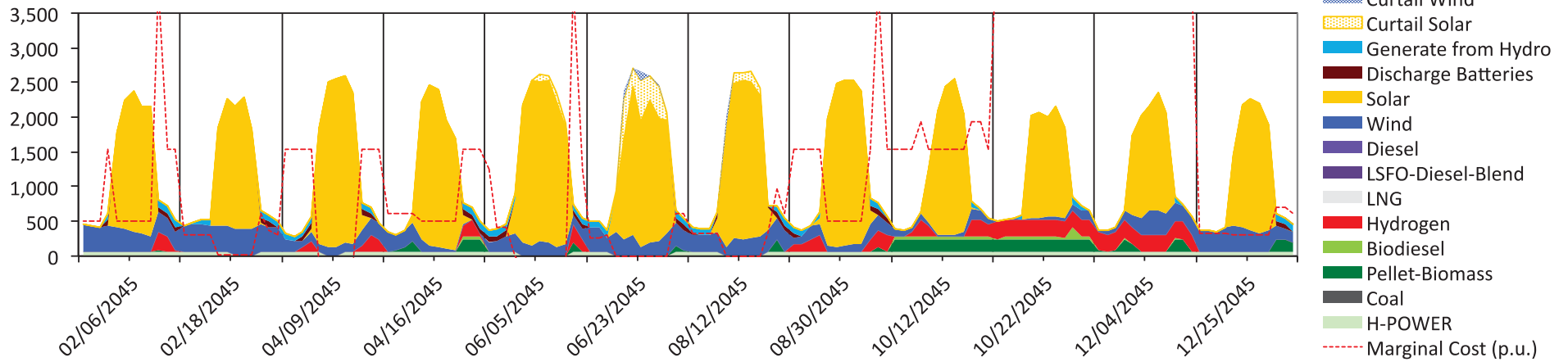


Hourly Power Consumption (MW)

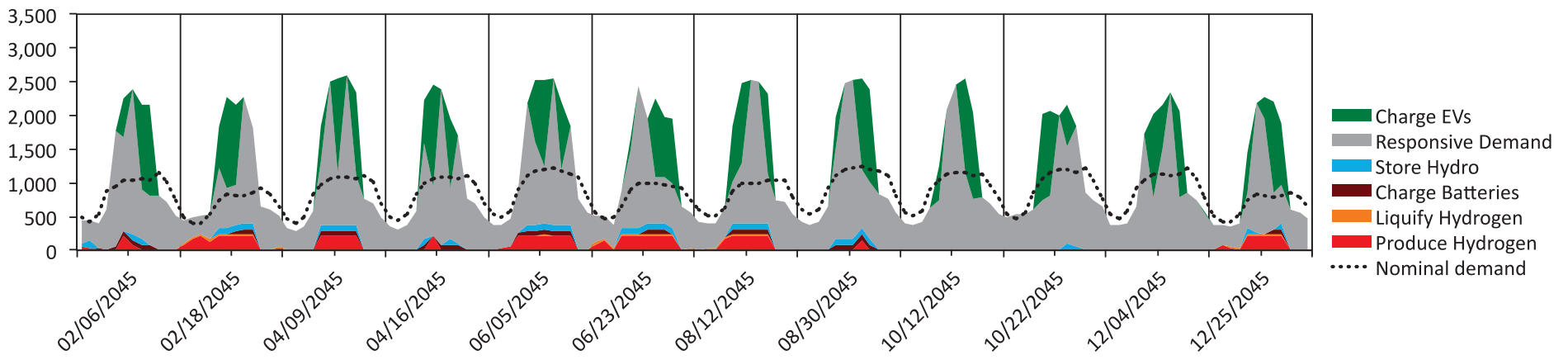


Year-Round Energy Balance with Hydrogen (~20.4¢/kWh)

Hourly Power Production (MW)



Hourly Power Consumption (MW)





TESLA

TESLA



**“We call it the Airbnb
of energy.**

**We give that virtual
platform and let
customers participate
with each other.”**

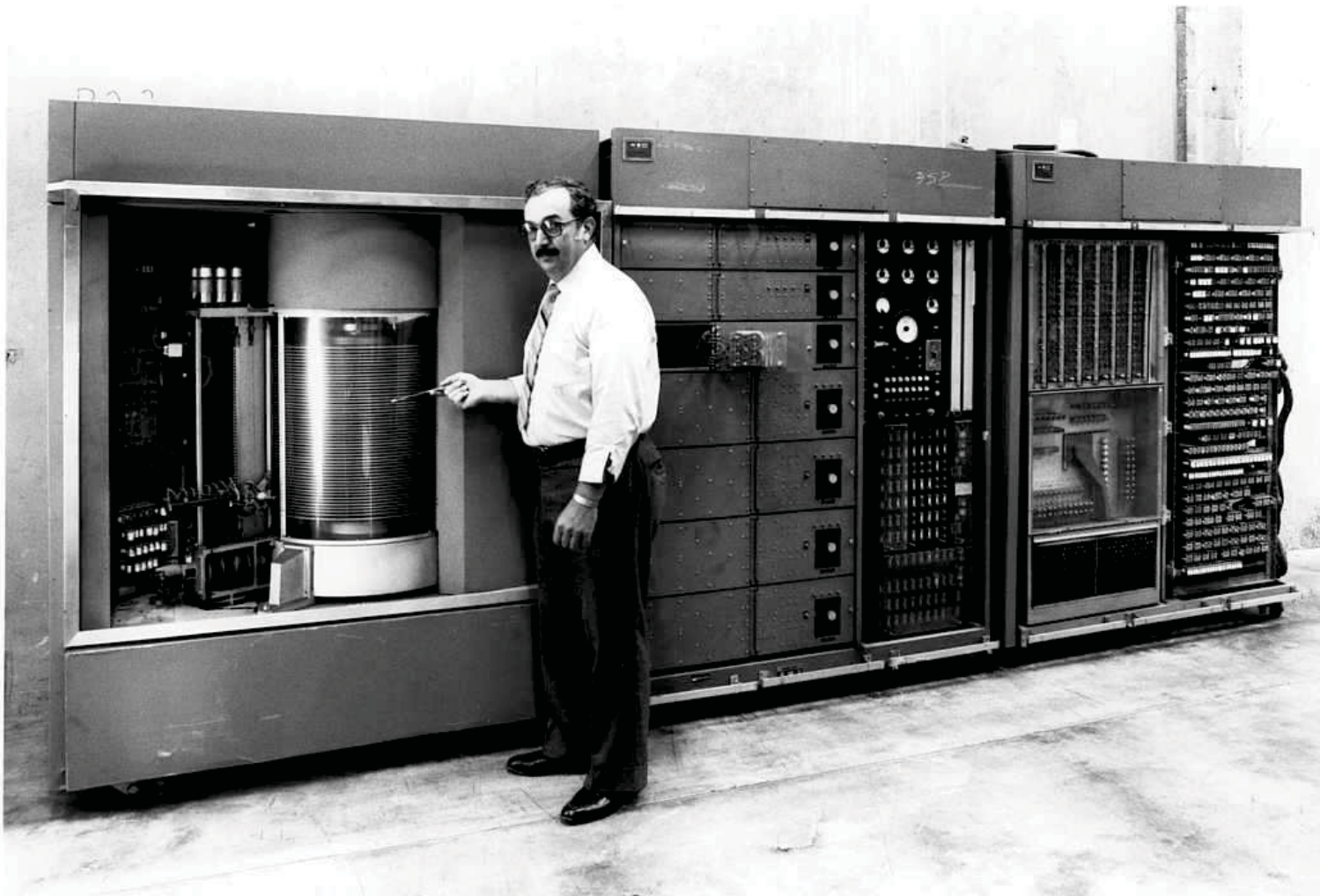
Sonnen’s CEO
Boris von Bormann





ORISON

Rethink the Power of Energy



Data Storage

September 1956

IBM 305 RAMAC

4.4 megabytes of data

\$50,000 (\$11,000 per MB)

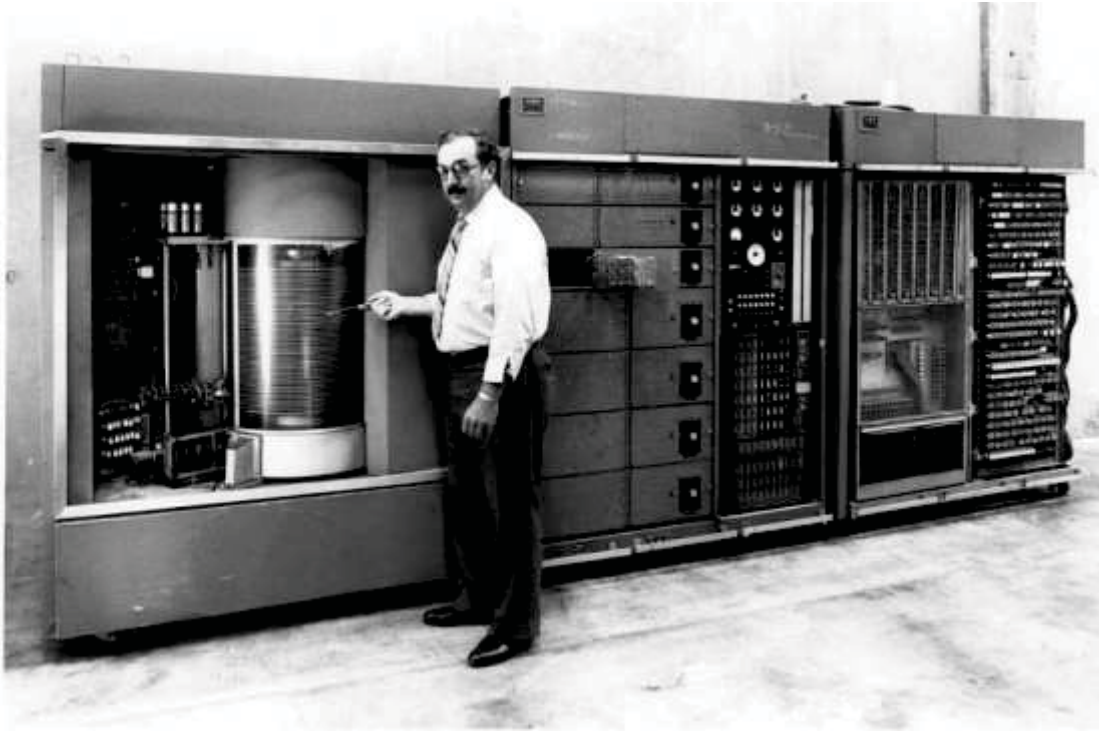


June 2016

128,000 megabytes

\$29.97

\$0.00023 per MB



1/47,000,000th the cost

** and slightly smaller*

Battery Costs

Electric and Hybrid Vehicle Batteries



Source: Generation Investment Management



CC BY-NC-SA 4.0 Bob Tregilus (07/22/2015)

Tesla Gigafactory

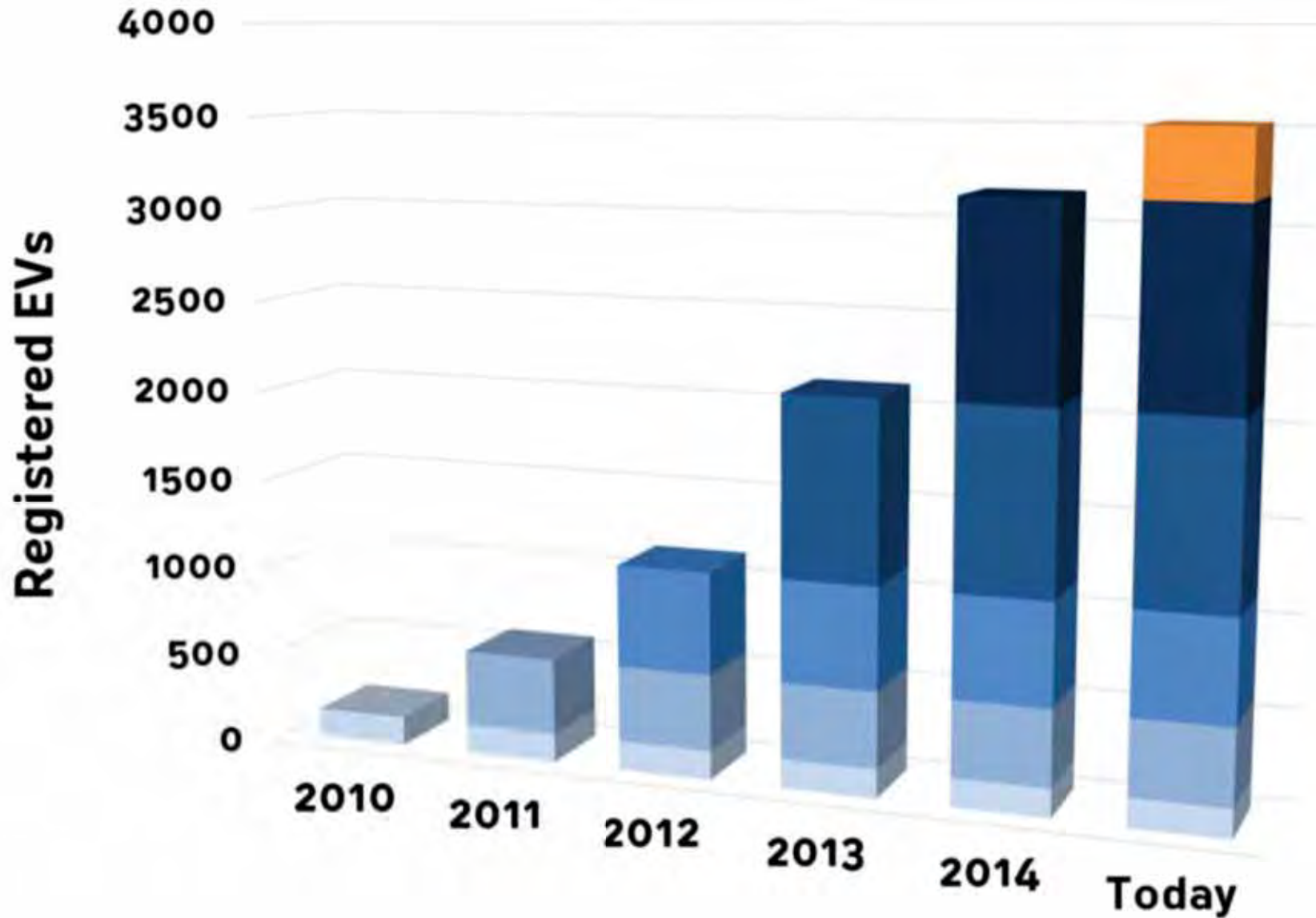
*Jefferies Analyst: Tesla To Drive Down
Battery Costs By **50%** Via Economies Of
Scale, Supply Chain Optimization*



Tesla Model 3

373,000 reservations in first month

Registered Electric Vehicles



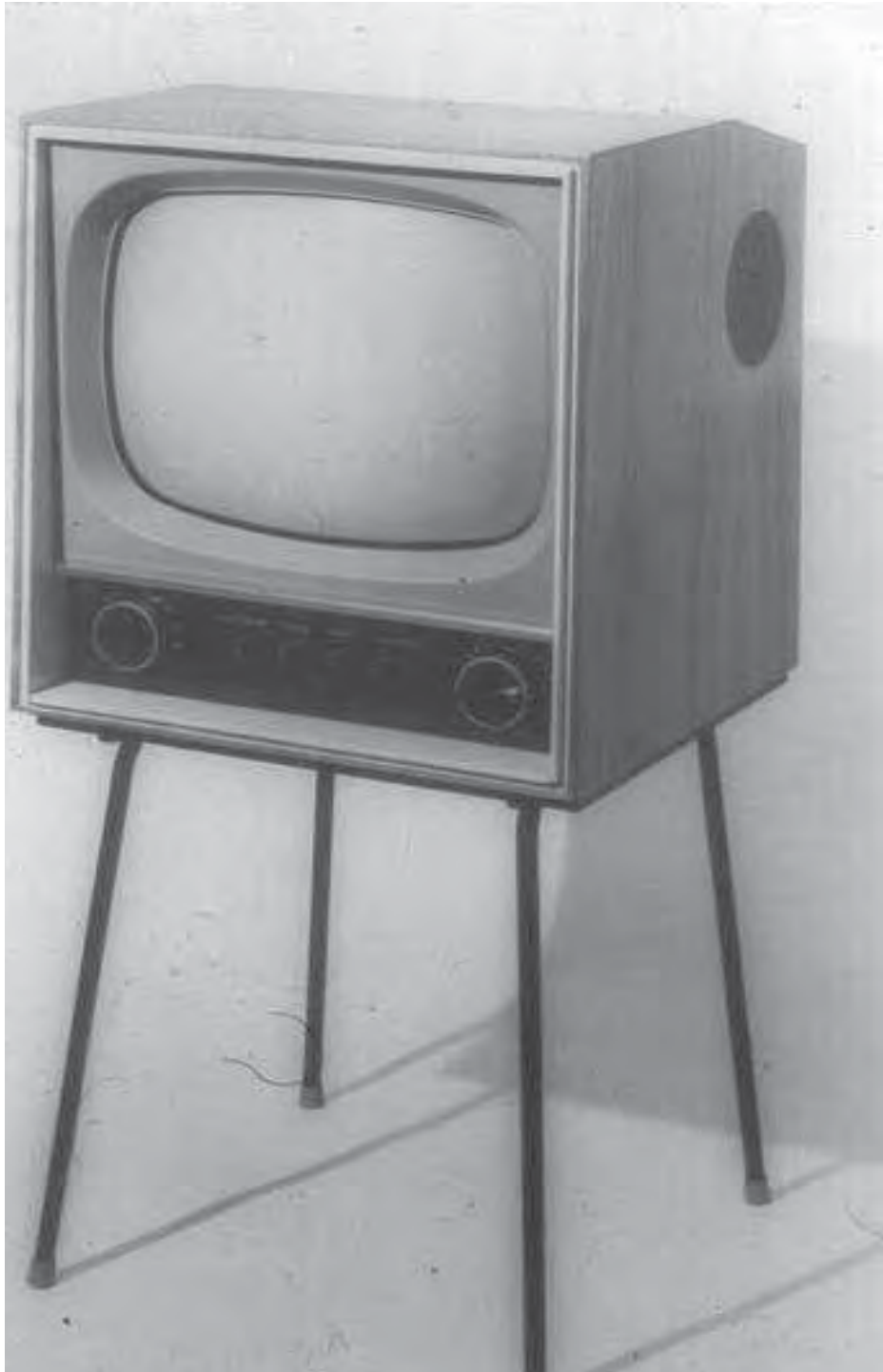




What does an electric utility look like in a world where customers can produce and store their own energy, where businesses want energy that doesn't change the climate, and where electric cars can store enough energy to power a home for days?









U B E R



“The ultimate hope for this transformation is a “plug-and-play” grid, where the grid is a distribution platform that’s been designed to allow for distributed resources to plug in.

Maintain that plug and play grid and provide a market where third party providers provide grid services and they must be compensated fairly.”

Pedro Pizarro, President, Southern California Edison



FORM 25 CL200 240V 3W 60Hz TA=30 Kh 7.2
CPS ENERGY 7 006 019
110 232 088
Larsis+Ger







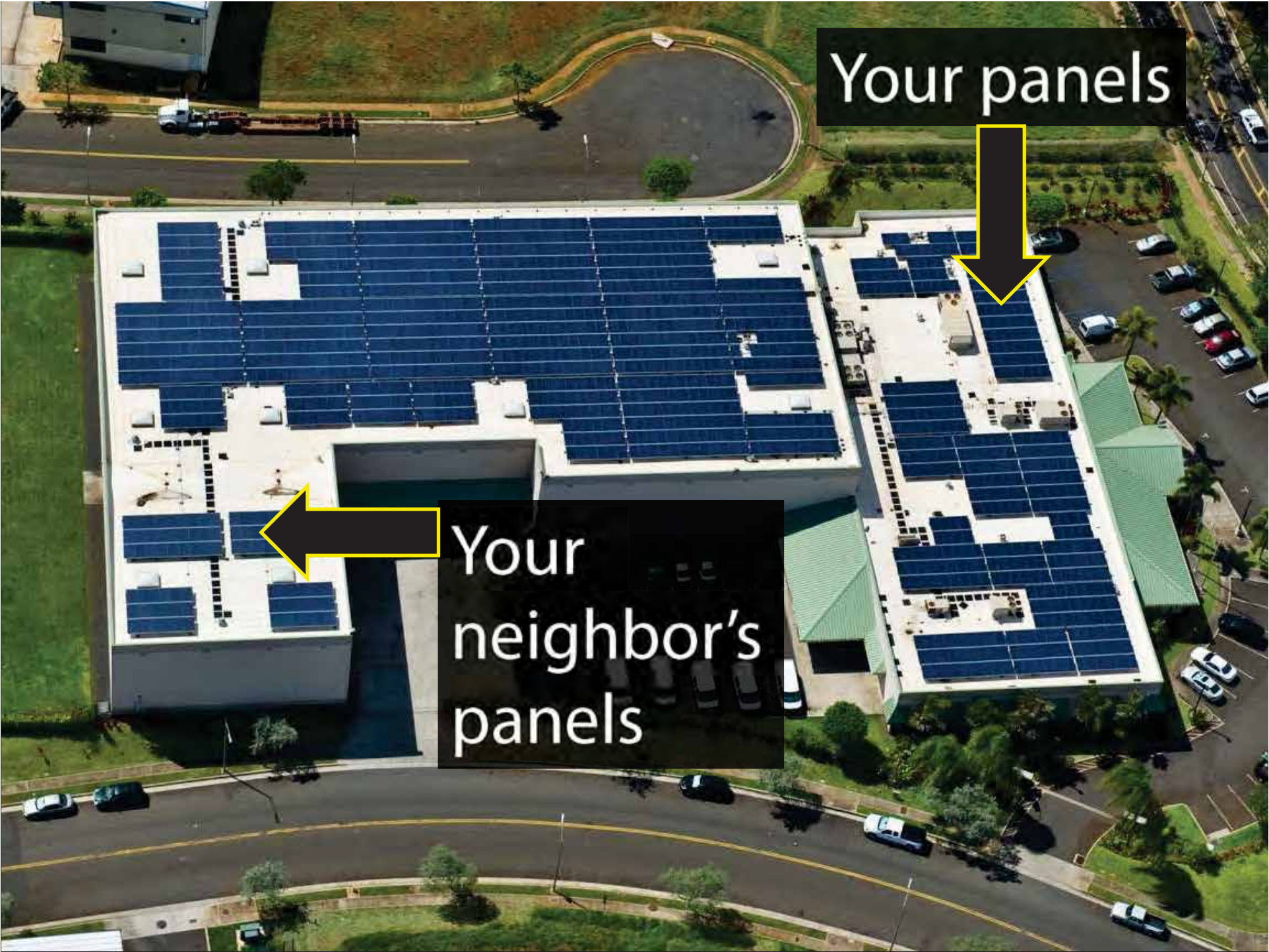


“These resources are so valuable to the grid when they are properly valued and integrated that whatever amount of money you can make selling hardware is not significant.”
eMotorWerks CEO Val Miftakhov





Community-based
renewable energy



Your panels

Your neighbor's panels

The Energy Cloud: Today and Tomorrow

TODAY: ONE-WAY POWER SYSTEM



EMERGING: THE ENERGY CLOUD



©2014 Navigant Consulting, Inc. All rights reserved.

(Source: Navigant Consulting)

- Large, centrally located generation facilities
- Designed for one-way energy flow
- Utility controlled
- Technologically inflexible
- Simple market structures and transactions
- Highly regulated (rate base) and pass through

- Distributed energy resources
- Multiple inputs and users, supporting two-way energy flows
- Digitalization of the electric-mechanical infrastructure: smart grid and behind the meter energy management systems
- Flexible, dynamic, and resilient
- Complex market structures and transactions
- Regulation changing rapidly around renewables, distributed generation (solar, micro-grid, storage), net metering etc.

MENU

**PACIFIC
BUSINESS NEWS**

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TRAVEL

Record \$1.3B in hotel properties for sale in Hawaii, report says



RETAILING & RESTAURANTS

Hawaii-based Cyanotech Corp. embroiled in legal case



PACIFIC BUSINESS NEWS AFTERNOON EDITION

INDUSTRY NEWS > ENERGY

Hawaiian Electric opposes increasing cap of solar program

May 26, 2016, 1:49pm HST

INDUSTRIES & TAGS [Energy](#), [Solar Energy](#)

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Duane Shimogawa

Reporter
Pacific Business News





NEWS

WEATHER

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SUNRISE

WHAT'S ON

HECO proposes plan to use LNG to generate electricity

Published: Wednesday, May 18th 2016, 8:45 pm HST



(Image: Hawaii News Now)

WAIANAЕ, OAHU (HawaiiNewsNow) - Hawaiian Electric company proposed a plan to ship Liquefied Natural Gas (LNG) and overhaul the aging Kahe power plant to burn it.

The LNG would be delivered to Kahe and other power plants on the Big Island after arriving by ship from Canada.

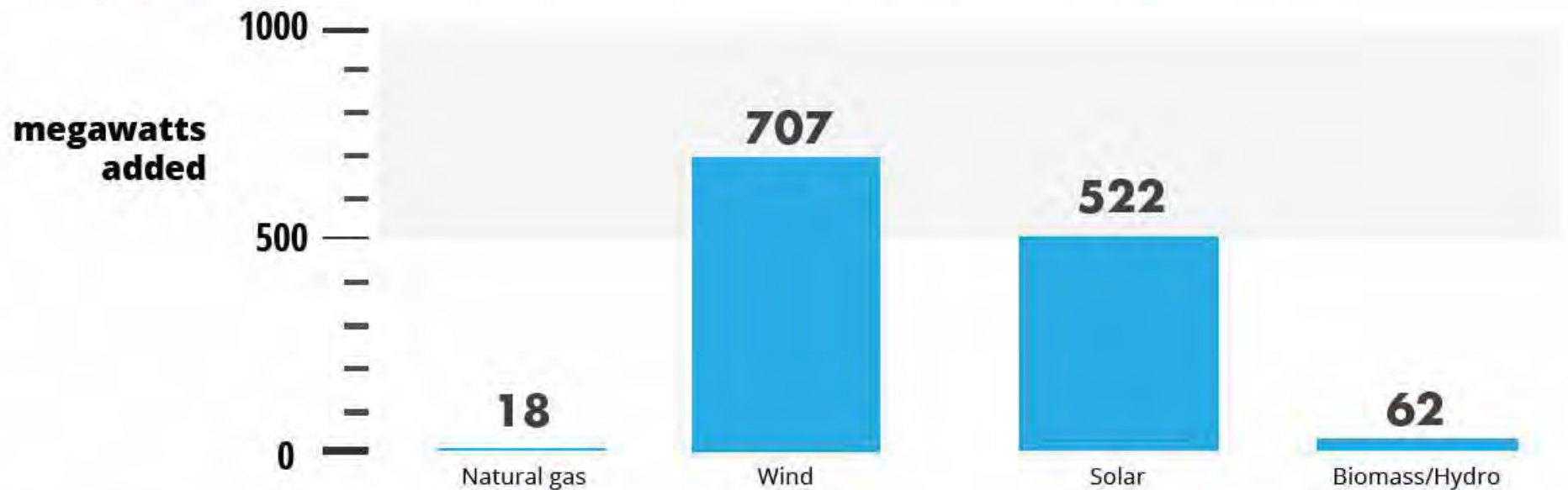
Hawaiian Electric says the natural gas is cheaper and cleaner than the oil now burned at the plant and would save typical electric customers hundreds of dollars a year.



LNG is a fossil fuel. LNG is imported. And any time and money spent on LNG is time and money not spent on renewable energy...I have reached the conclusion that Hawai'i does not need LNG in our future. It is time to focus all of our efforts on renewable energy...

NEW GENERATION ADDED FIRST QUARTER 2016

RENEWABLES SMASHED NATURAL GAS IN THE FIRST QUARTER OF 2016



Source: FERC

THINKPROGRESS



KODAK

200

35mm color print film

DXN

Kodak 200 • 24
PROCESS C-41

200 24 exp.

By the late 1970s, Kodak enjoyed 85% of camera sales and 90% of film sales in the United States.





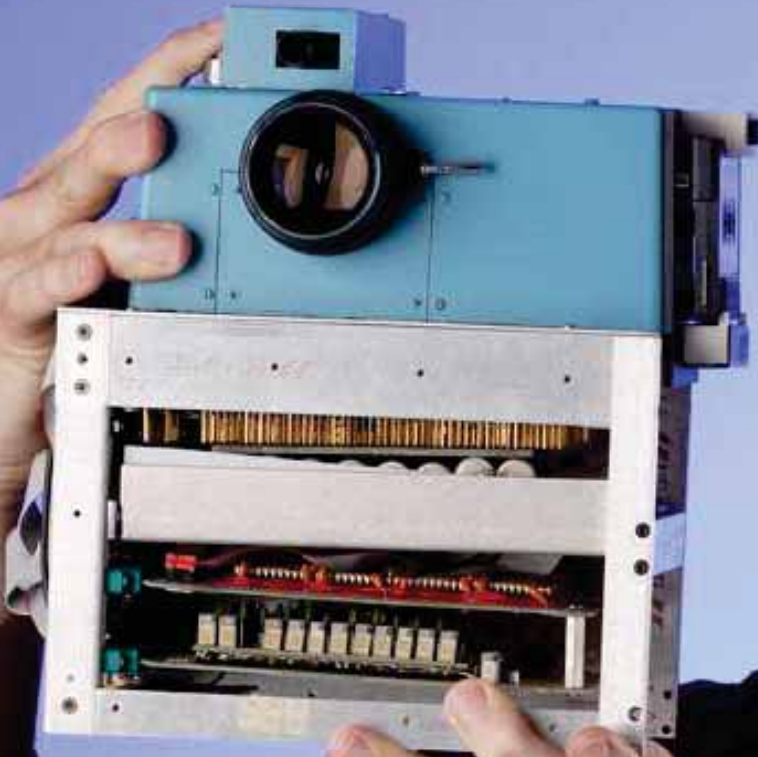
KODAK HULA SHOW

HAWAII





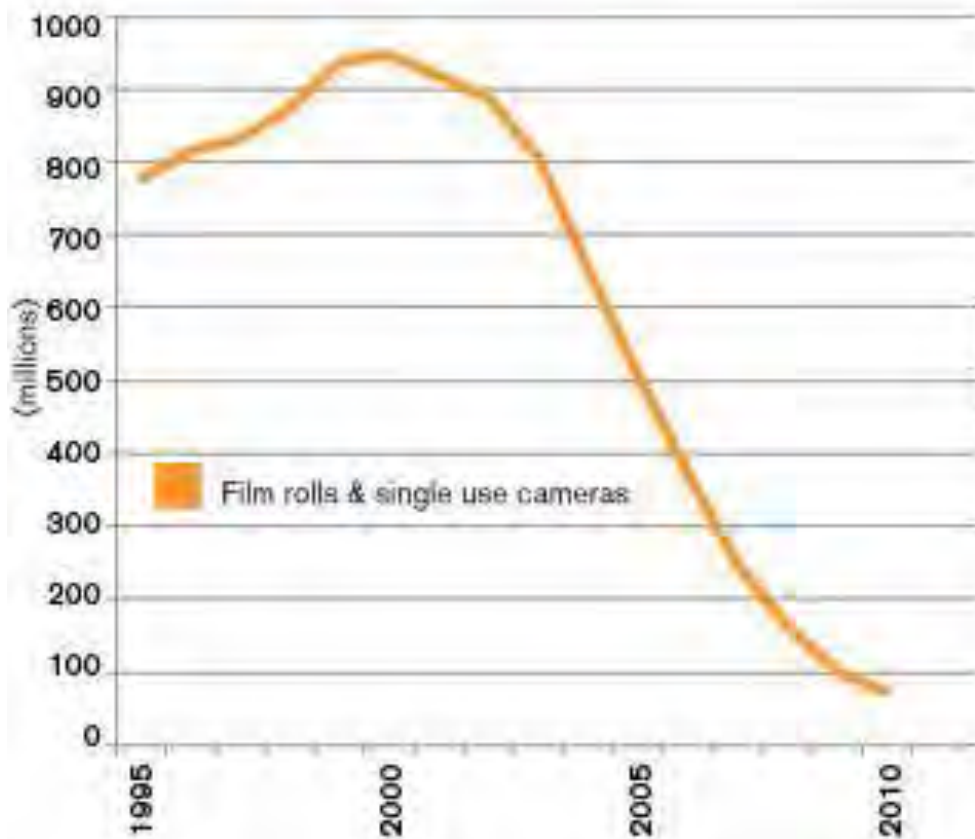
Steve Sasson, inventor of the digital camera



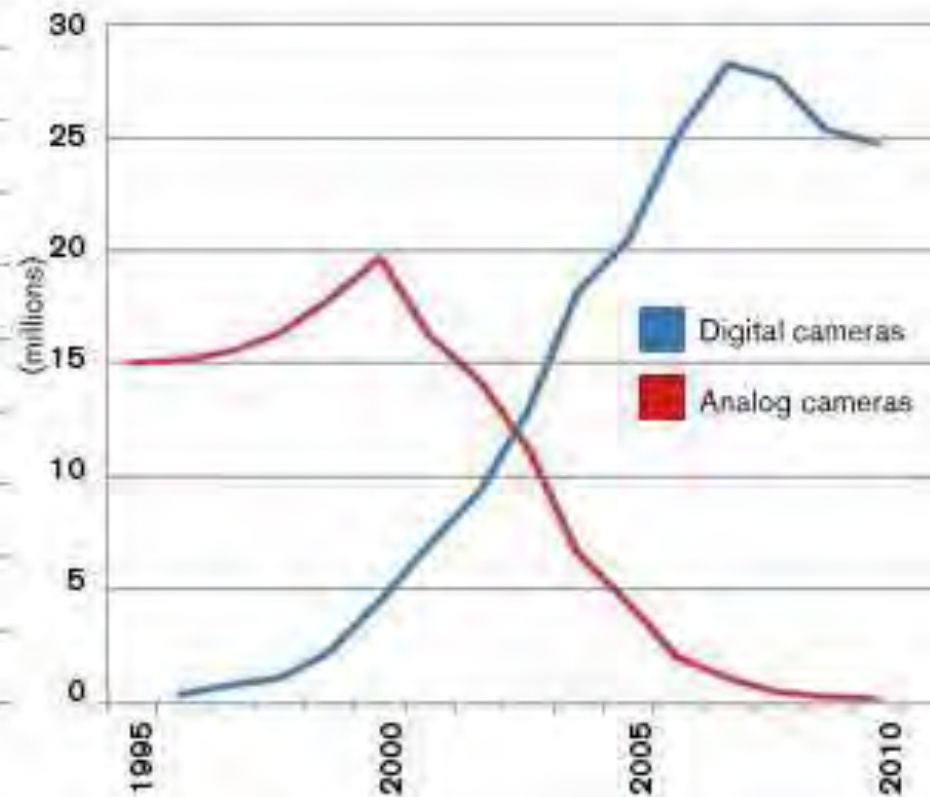
“But it was filmless photography, so management’s reaction was, ‘that’s cute—but don’t tell anyone about it.’”

Decline of Film

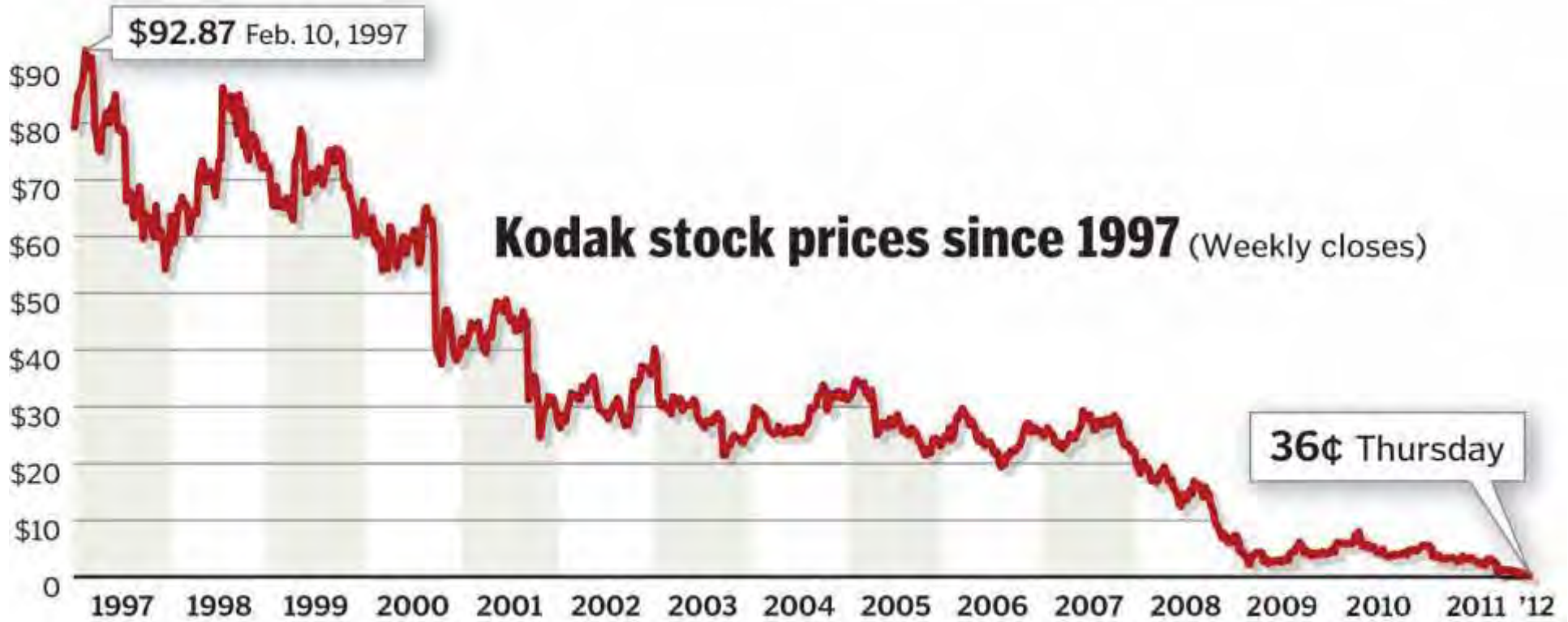
Film rolls sold



Camera sales



Kodak stock prices since 1997 (Weekly closes)







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To clear the path for clean energy

- We inspire leaders to change the rules and accelerate cost-effective, secure, renewable energy.
- We inspire communities to adopt smart, replicable energy solutions.
- We inspire everyone to believe in the power and possibility of a future beyond fossil fuels.



byp



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W  **fficiency.org**



Damien Memorial School - Phase II

Project: [Gymnasium Lighting Upgrade](#)

Damien Memorial School serves students in grades 6 through 12 with the mission to guide young men and women to become responsible, respectful and community-minded citizens. This second phase of Damien's energy efficiency campaign will enable Damien to save over \$9,700 annually by upgrading their existing gym lighting. This upgrade will benefit Damien athletics, by providing a tournament ready facility for future generations of young student athletes.

100%

\$28,652
GOAL

\$28,652.00
PLEGGED

Funded
DAYS TO GO



Boys and Girls Club of Hawaii

Project: [Clubhouse lighting upgrade](#)

Boys and Girls Club of Hawaii (BGCH) is a nonprofit organization that inspires Hawaii's youth to become successful and responsible members of their communities. By enabling high efficiency lighting upgrades for BGCH's Clubhouses on Oahu, WEfficiency will facilitate approximately \$18,000 in savings annually. Each \$1 loaned through WEfficiency yields \$3 in energy savings for BGCH. The savings achieved via lighting upgrades will allow Boys and Girls Club of Hawaii to allocate more funds toward their developmental programs and further empower Hawaii's youth.

100%

\$60,000
GOAL

\$60,000.00
PLEGGED

Funded
DAYS TO GO

ISLAND PULSE



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 Hawaiian
Electric
Company

ENERGY USAGE

● OAHU

3:34PM

CURRENT ENERGY MIX

1,200MW

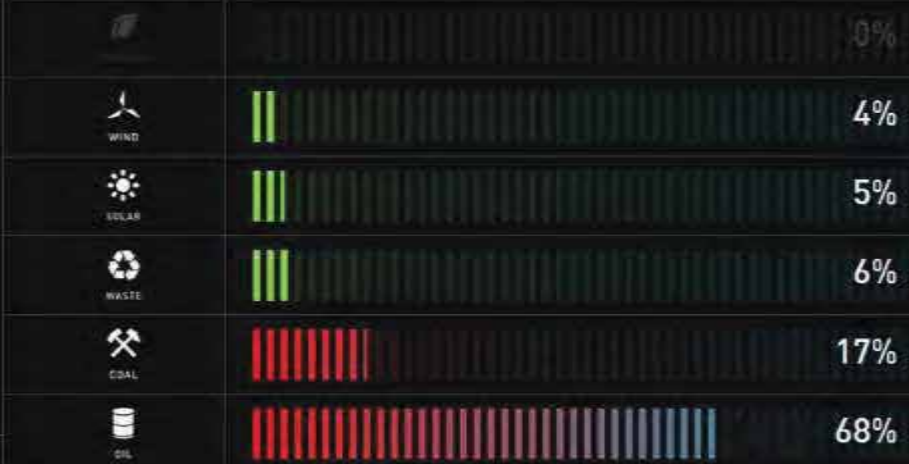
WE ARE USING
1,060
MEGAWATTS
RIGHT NOW

WEEKLY PROGRESS

	LOW	HIGH
FR I	687	1,116
SA T	709	1,045
SU N	679	1,092
MO N	694	1,110
TU E	683	1,104
WE D	680	1,100
TO DAY	670	1,108

YESTERDAY

500MW



POWERED BY



Hawaiian Electric

islandpulse.org

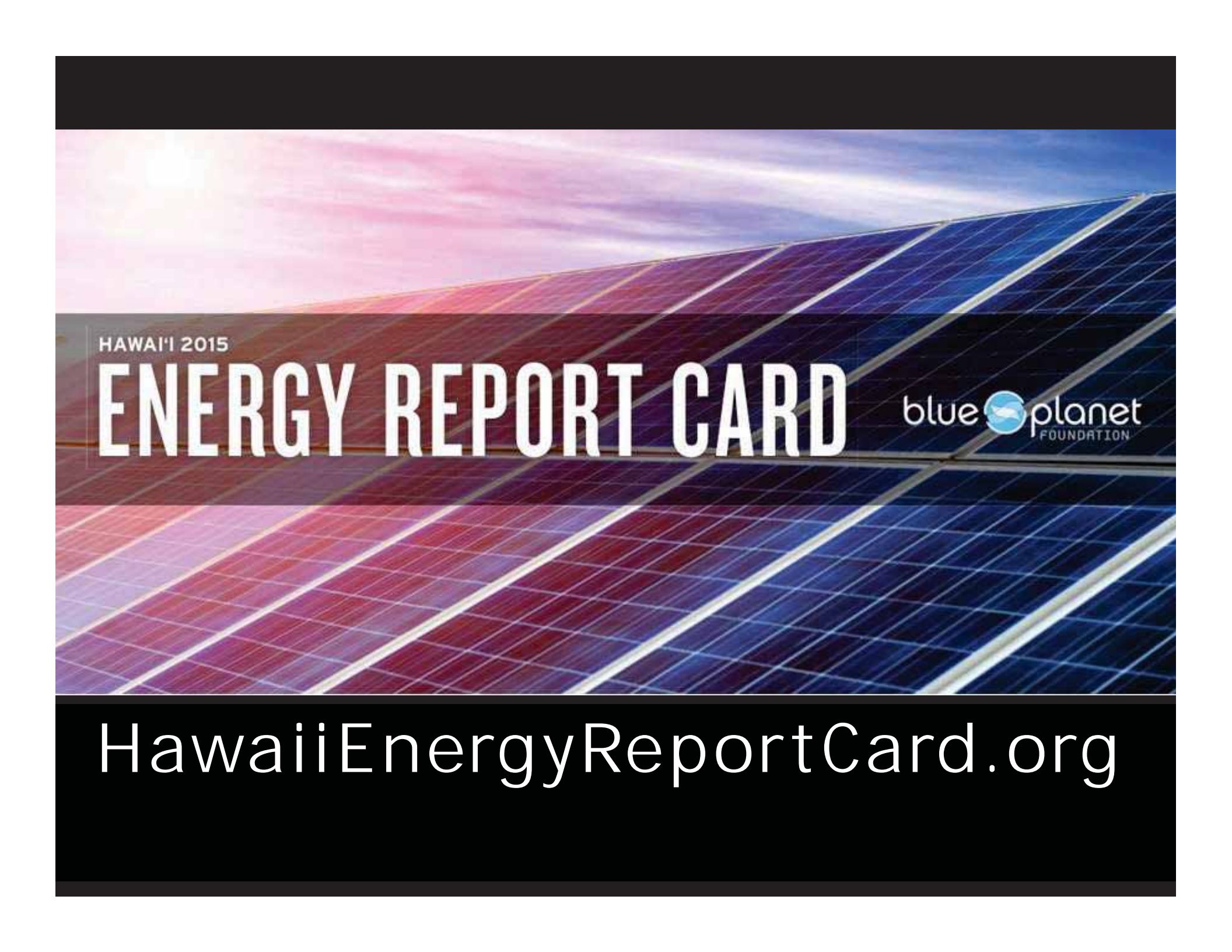
BUILDING DIRECTORY
→



DEPARTMENT OF FRANCE





A large array of solar panels is shown from a low angle, receding into the distance. The sky is a mix of soft pinks, purples, and blues, suggesting a sunset or sunrise. The solar panels are dark blue with a grid pattern of thin lines.

HAWAII 2015

ENERGY REPORT CARD

blue planet
FOUNDATION

HawaiiEnergyReportCard.org

**We have everything we need
to change our energy culture.**







100% Renewable Islands



IUCN
World
Conservation
Congress
Hawai'i 2016



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FOUNDATION

jeff@blueplanetfoundation.org

808-954-6142

blueplanetfoundation.org



Blue Planet Foundation

What do residents want?

Market Trends Pacific
*Poll of 615 households statewide April
2015*

Price is the most important; use the cheapest energy available

Market Trends Pacific *Poll of 615 households statewide, April 2015*

