



CALIFORNIA ENERGY COMMISSION

California Dreaming...and Doing ----- Turning a Sustainable Energy Vision into a Living Reality

Andrew McAllister
Commissioner
California Energy Commission

National Energy Efficiency Conference
Melbourne - November 21, 2017



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Policies

A Broad Suite of (Usually)
Complementary Initiatives

California is fortunate to have broad agreement – population, elected leadership, business community, investors, local governments – that climate change must be confronted; and further, that the transition to clean energy is full of opportunity.

COLLABORATION AND
LEADERSHIP



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California Policy Foundations

Codes and Standards (Since 1975)

- Buildings** Building Energy Efficiency Standards have improved the performance of new buildings by 80% since 1976
- Appliances** CA Has Authority to Create Standards Where No National Standards Exist. TVs, Showers, Computers...

Global Warming Solutions Act (2006)

- AB 32 Reduces statewide greenhouse gas (GHG) emissions to 1990 levels by 2020

Long Term Energy Efficiency Strategic Plan (2008)

State's first integrated framework—a single roadmap to achieve maximum energy savings across all major groups and sectors.

Global Warming Solutions Act II (2016)

- SB 32 Reduces statewide greenhouse gas (GHG) emissions to 40% below 1990 levels by 2030.

Clean Energy & Pollution Reduction Act (2015)

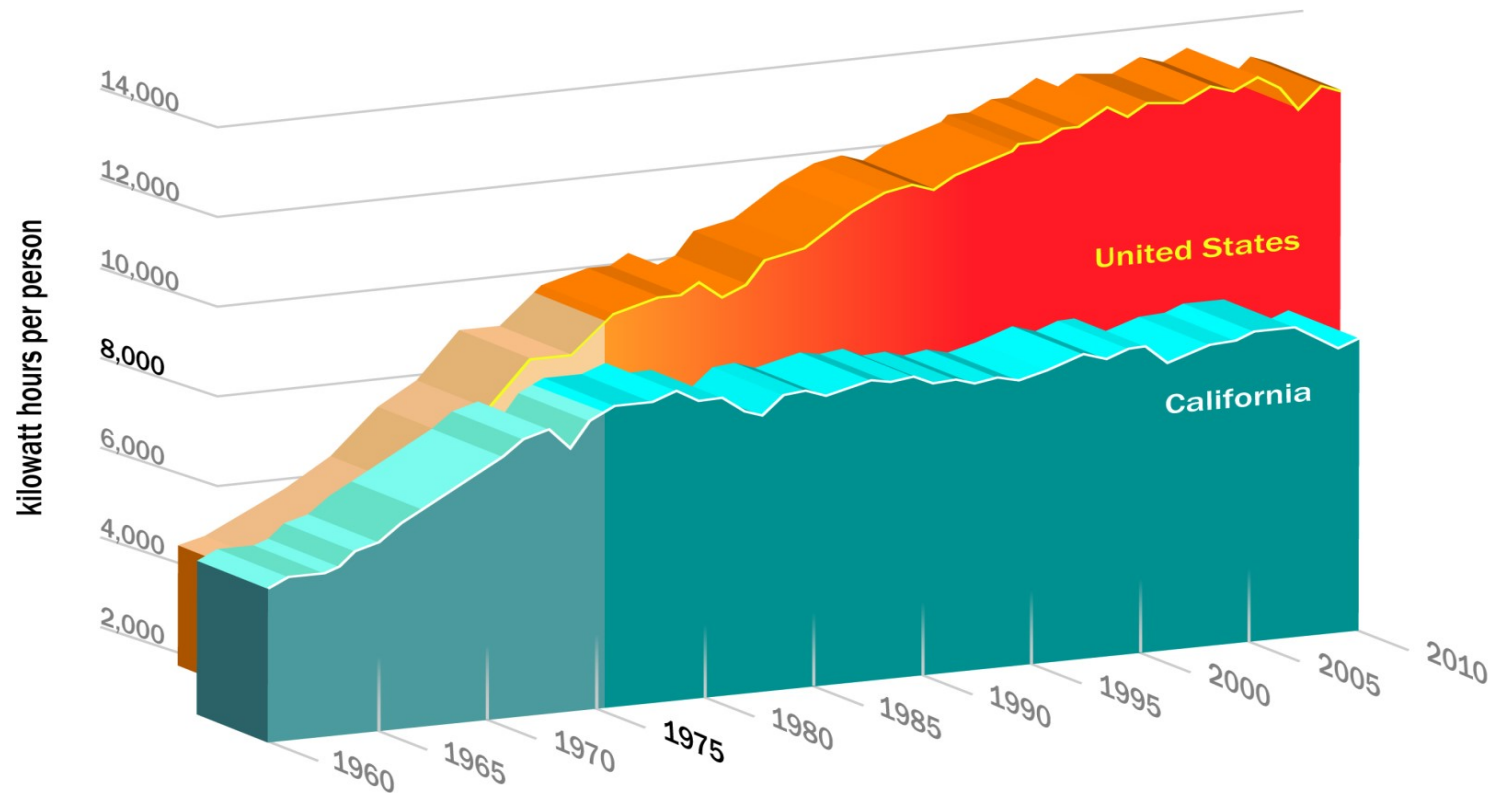
- Mandates 50% Renewable Electricity by 2030
- Doubles Expectations for Energy Efficiency
- Directs focus on Low-Income





Energy Efficiency in California

per capita electricity consumption





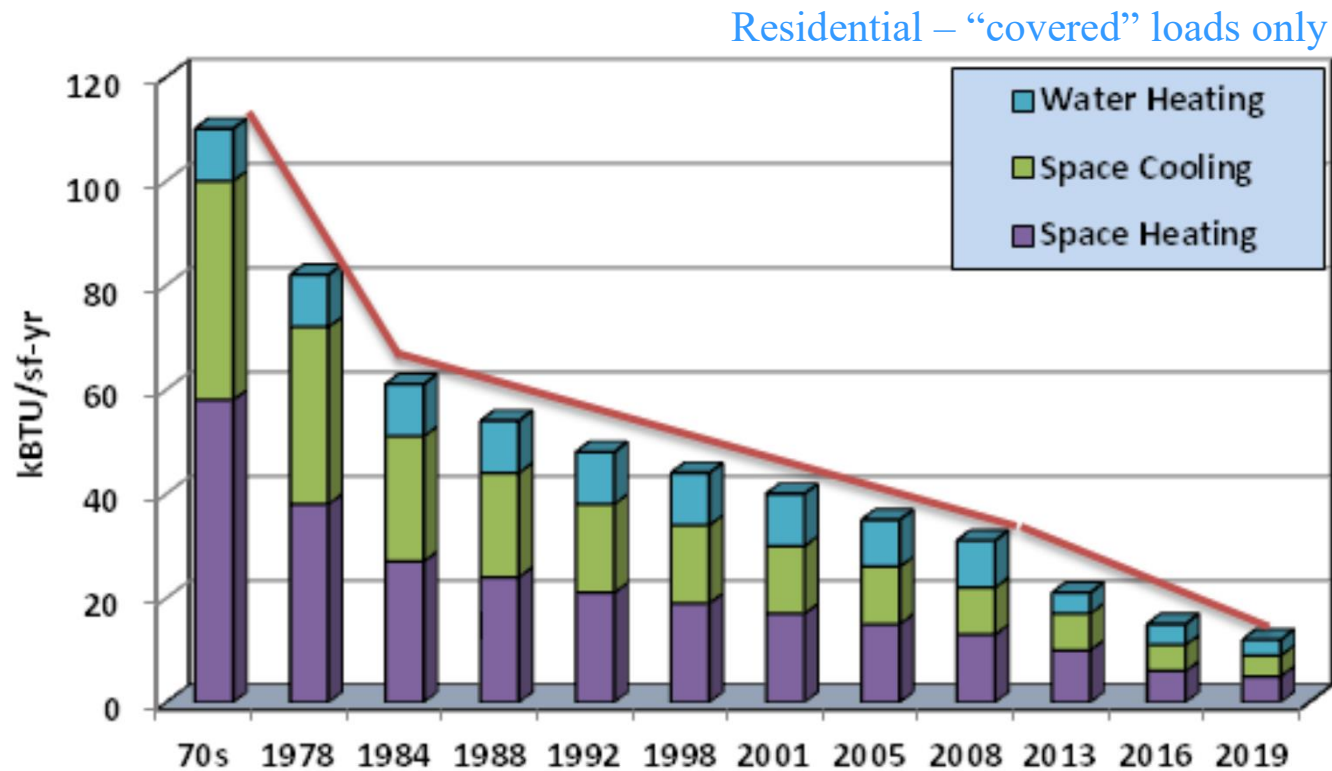
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CALIFORNIA ELECTRICITY SAVINGS





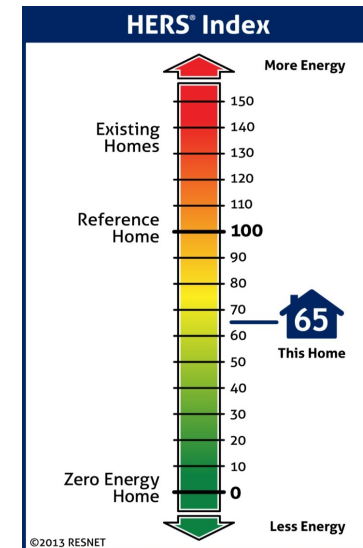
Building Standards Saved \$50+B Since 1976

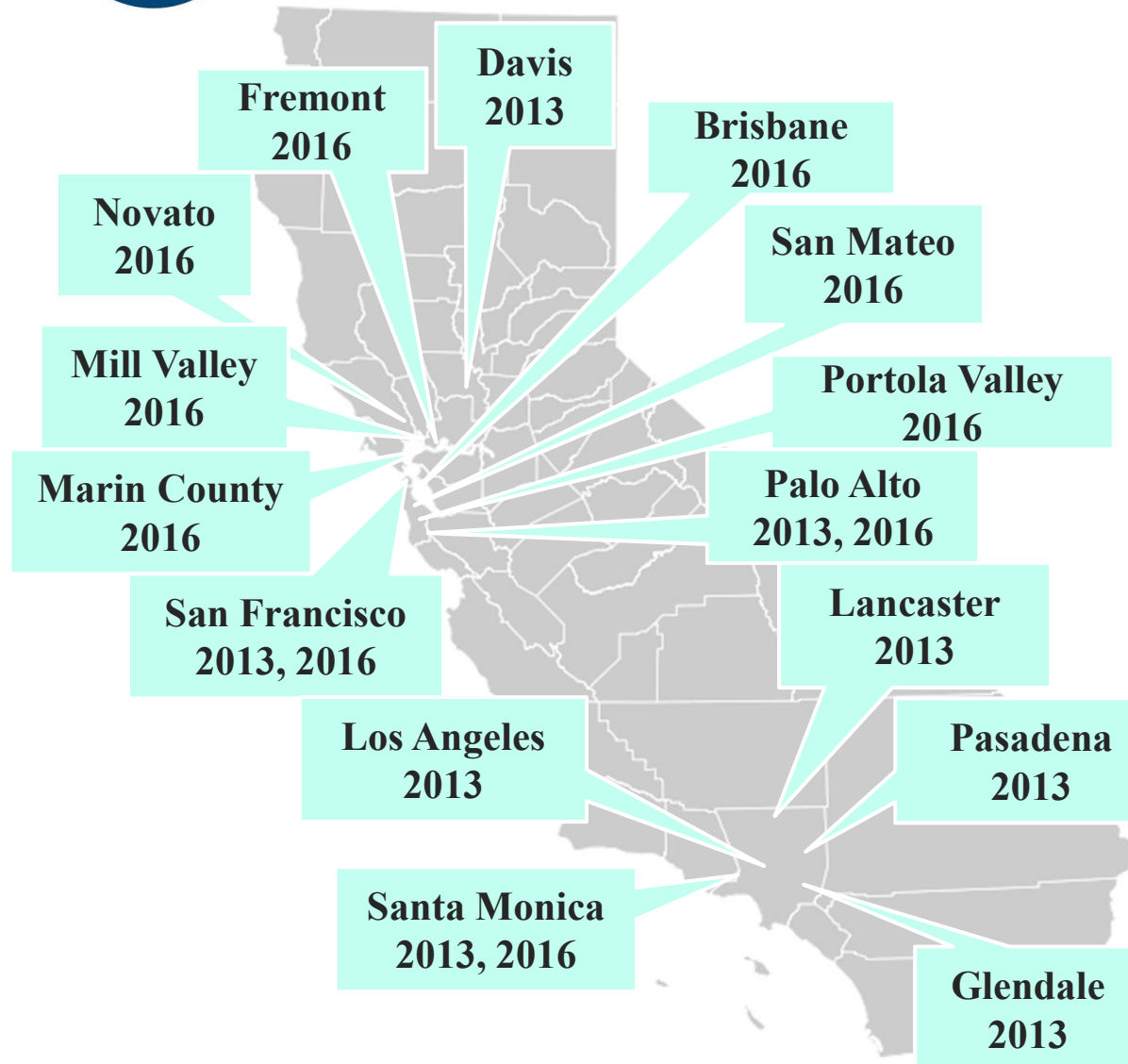




2019 Building Standards Update - Residential

- **High Efficiency Envelope**
 - High R-value Attics, Walls
 - Low U-value & SHG Coeff Windows
 - Quality Insulation Installation (QII)
- **Heat Recovery Ventilation**
 - Enables tighter envelopes
- **High-Eff Water Heating** (gas tankless or heat pump)
- **General Lighting – dimmable & CT \leq 3500K**
- **Self-Generation *required* for first time**
 - Modest PV Systems - sized to meet site electricity loads
 - Encourage grid harmonization: tradeoffs allowed with thermal and/or electrical storage.



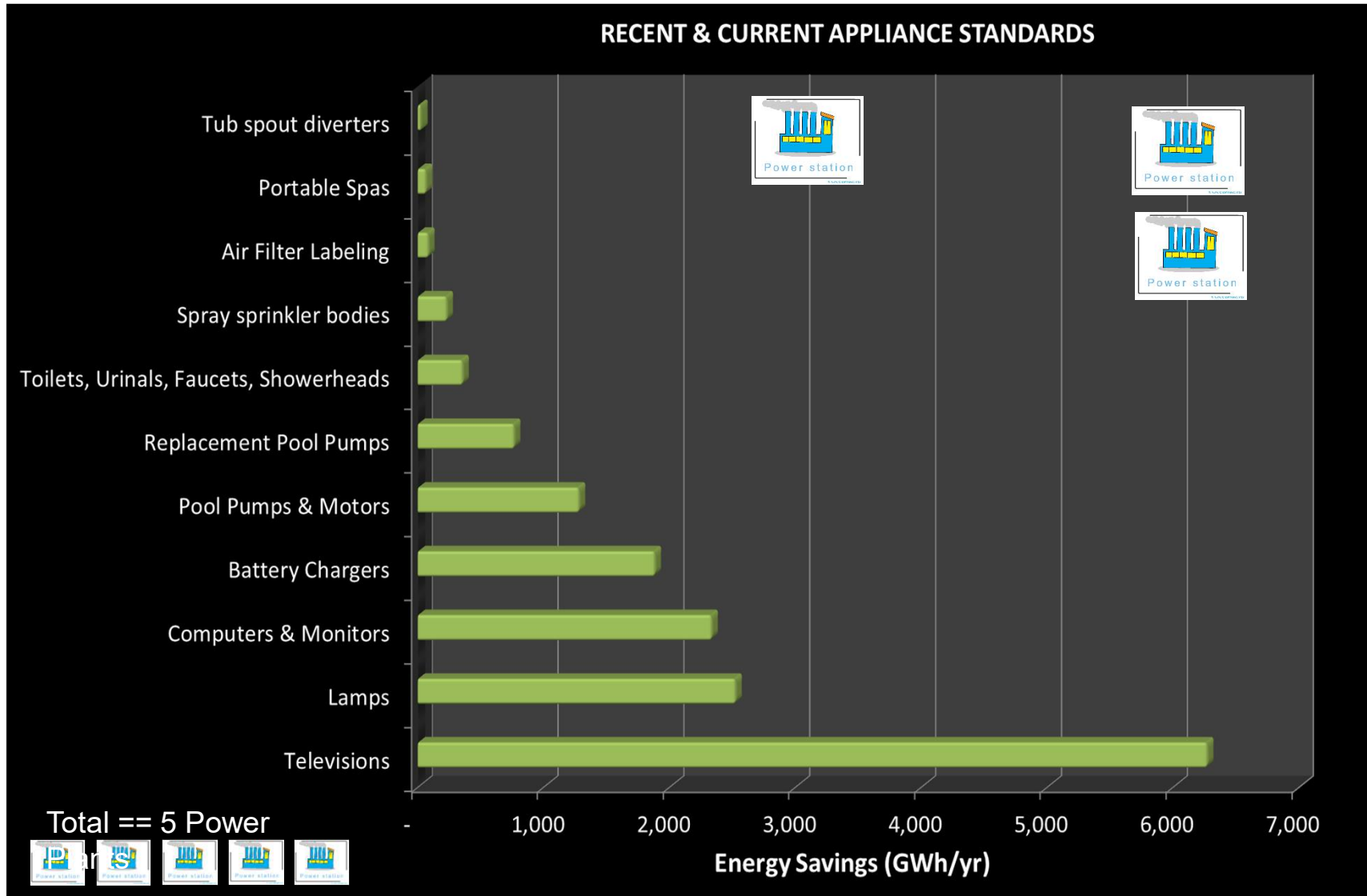


Local 'Stretch' Codes

- Eight cities submitted local ordinances exceeding the 2013 Standards
- Ten local jurisdictions have submitted ordinances exceeding the 2016 Standards
- Local standards include cool roofs, lighting power reduction and PV requirements



Appliance Efficiency Standards





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Appliance Standards completed & under way

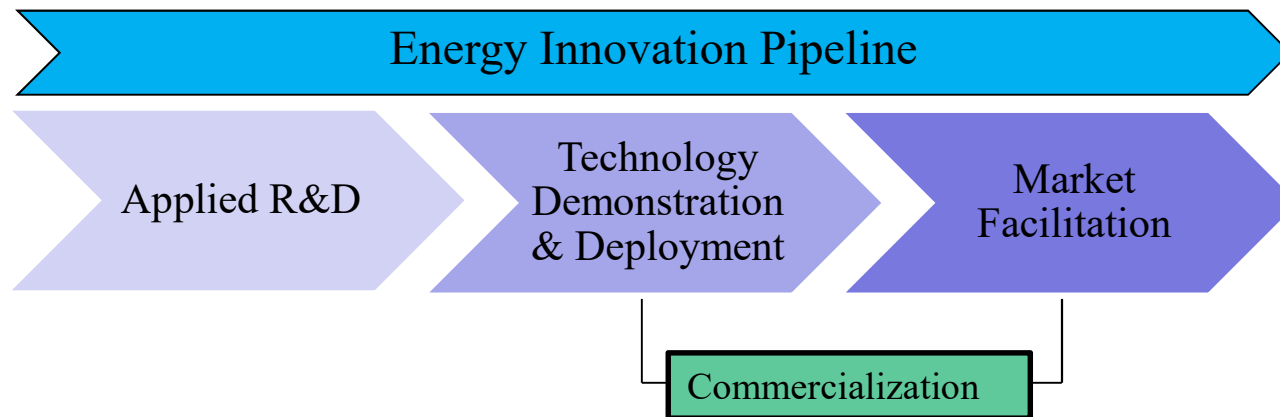
Topic	Phase 1	Phase 2	Phase 3
Consumer Electronics	<ul style="list-style-type: none"> Displays Game consoles Computers 	<ul style="list-style-type: none"> Set-top boxes (roadmap) Low power modes (roadmap) Power factor (roadmap) 	TBD
Lighting	<ul style="list-style-type: none"> Dimming ballasts MR lamps LED lamps 	EISA exempt lamps/GSLs expanded scope	TBD
Water & Other	<ul style="list-style-type: none"> Commercial clothes dryers Toilets & urinals Air filter labeling Faucets Amend pools and spas standards Water meters * 	<ul style="list-style-type: none"> Commercial & industrial fans and blowers Irrigation equipment Tub-spout diverters Spray sprinkler bodies Solar inverters (roadmap) 	TBD

* No plans yet to pursue regulations



CA Research and Clean Energy Funding

- \$284 million/year for research and clean energy infrastructure
 - \$160M electricity R&D
 - \$24M natural gas R&D
 - \$100M clean transportation





Incentive Programs and Financing

- Utility Ratepayer-funded EE programs
 - ~\$1.5B annually
- Finance for local jurisdictions
 - \$409M revolving loan fund (CA General Fund)
 - Low-interest; term up to project's useful life
 - LGs, public schools, hospitals (860 & counting)
- Infrastructure Bank (I-Bank): CLEEN Fund
 - Part of CA Treasurer (state bonding authority);
 - MUSH market



SENATE BILL 350:

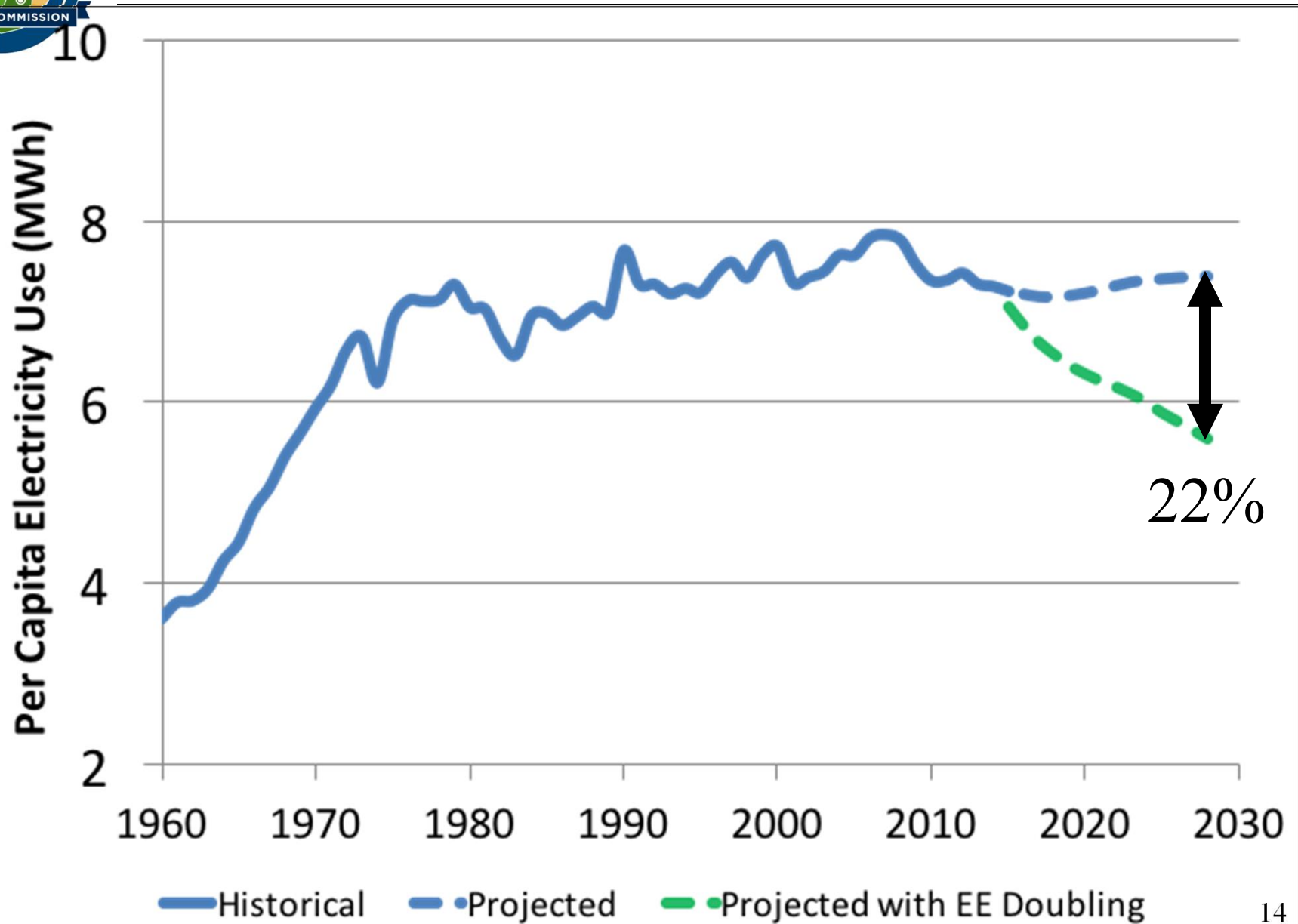
The Clean Energy and Pollution Reduction Act of 2015

- 50% renewable energy by 2030
- **Double energy efficiency savings by 2030**
- Encourage widespread transportation electrification
- Integrated Resource Planning to reduce greenhouse gas emissions
- Address barriers for low-income residents & disadvantaged communities





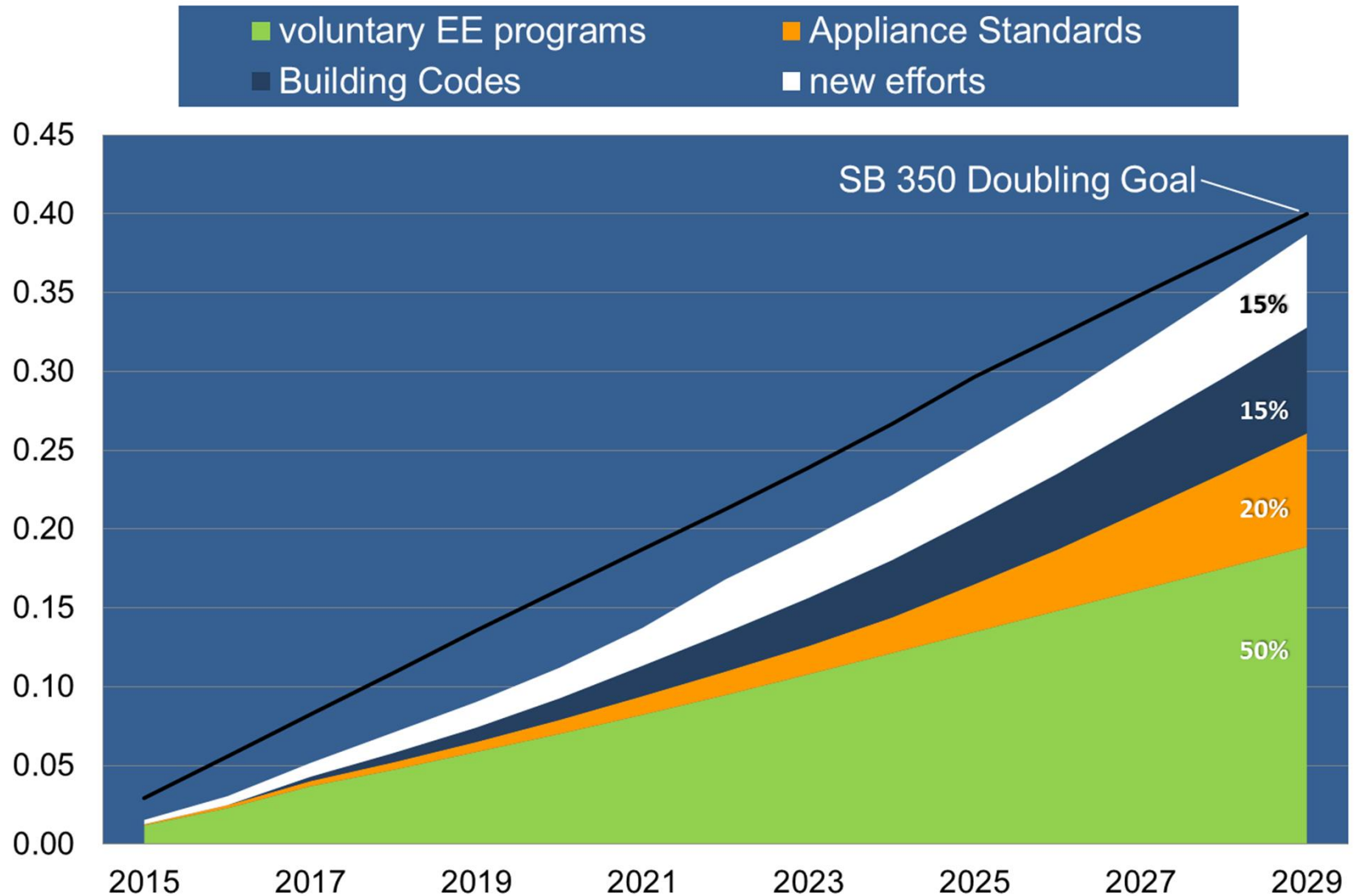
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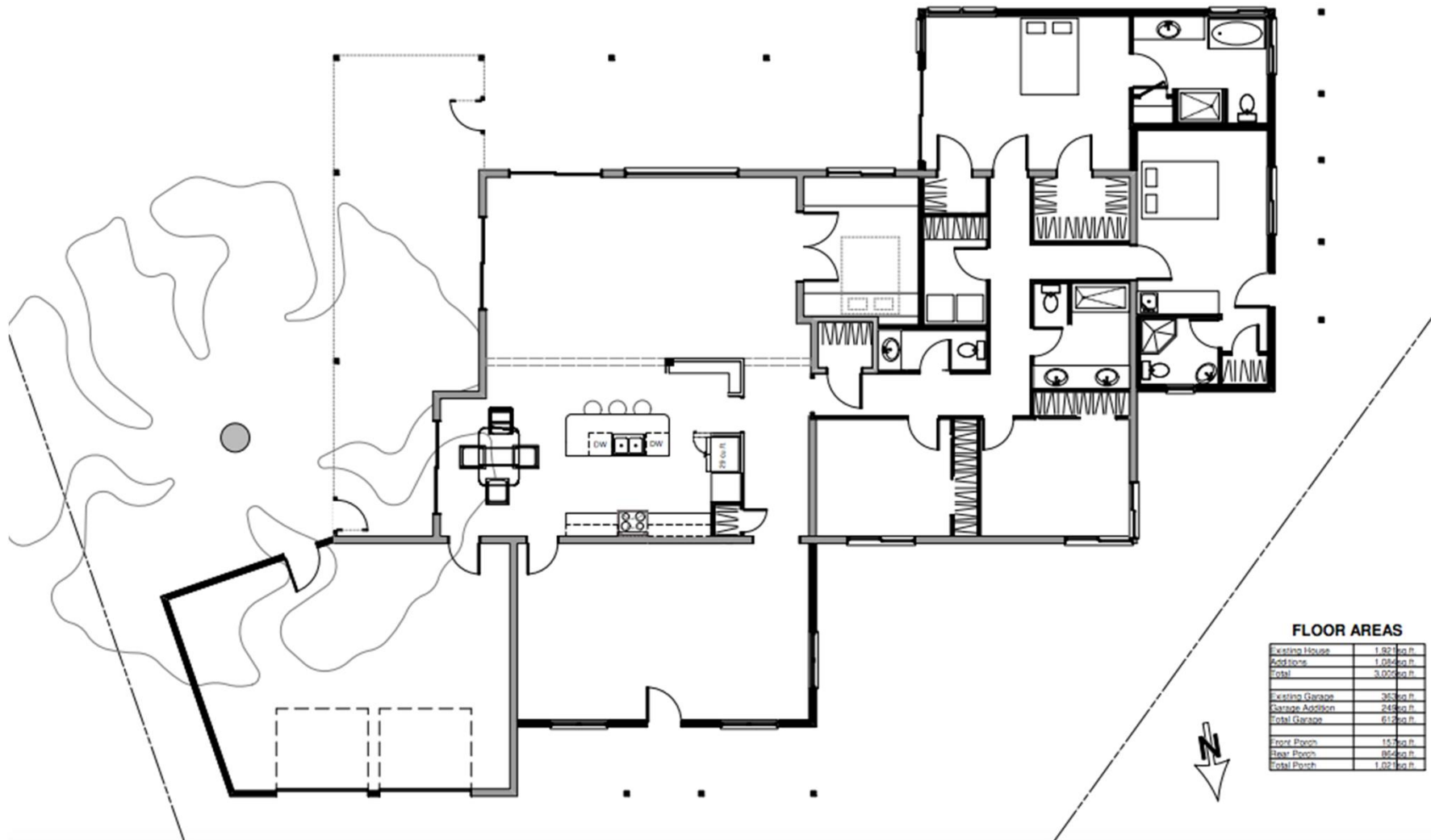
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Energy Savings (Quad BTUs)





Existing Buildings: Investment Happens





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Existing Buildings EE Action Plan

Vision & Goals Framework

VISION

Robust, sustainable efficiency marketplaces that deliver multiple benefits to building owners and occupants through improvements, investments and operation of existing homes, businesses, and public buildings.

Resulting In: Doubling of energy savings from building energy efficiency projects in California. This is equivalent to a 20% reduction of statewide building energy use from 2014 levels by 2030.

GUIDING PRINCIPLES

Market Centered

User Focused

Performance Driven

Scalable

Policy Coordination

Partner & Leverage

10-YEAR GOALS

1. Increased government leadership in energy efficiency

2. Data-driven decision making

3. Increased building industry innovation and performance

4. Recognized value of energy efficiency upgrades

5. Affordable and accessible energy efficiency solutions

PRIMARY STRATEGIES

- 1.1 State and School Buildings
- 1.2 Benchmarking and Disclosure
- 1.3 Building Performance Assessment Tools
- 1.4 Energy Asset Ratings
- 1.5 Building Energy Efficiency Standards
- 1.6 Plug Load Efficiency
- 1.7 Local Government Leadership
- 1.8 Efficiency as a Clean Energy Resource
- 1.9 State Policy Leadership

- 2.1 Data for Improved Decisions
- 2.2 Customer Focused Energy Efficiency

- 3.1 Streamlined and Profitable Industry
- 3.2 Performance Driven Value
- 3.3 Workforce Alignment
- 3.4 Zero Net Energy Retrofits

- 4.1 Real Estate Value
- 4.2 Marketing, Education and Outreach

- 5.1 Foster Private Capital Market
- 5.2 Asset Based Financing
- 5.3 Borrower-Based Financing
- 5.4 Integrated Delivery of Efficiency Solutions, Finance & Utility Incentives
- 5.5 Government Building Finance Mechanisms
- 5.6 Leveled Tax Playing Field
- 5.7 Deeper Subsidies for Low Income Households



Energy Data Access, Benchmarking & Disclosure

Jan. 1, 2016

► **Utilities begin to maintain records**

Jul. 1, 2018

► *Commercial reporting to CEC begins*

Jul. 1, 2020

► *Multi-family data publicly disclosed*

Oct. 11, 2017

► *Regulations in effect*

Jul. 1, 2019

► *Commercial data publicly disclosed*

Jan. 1, 2017

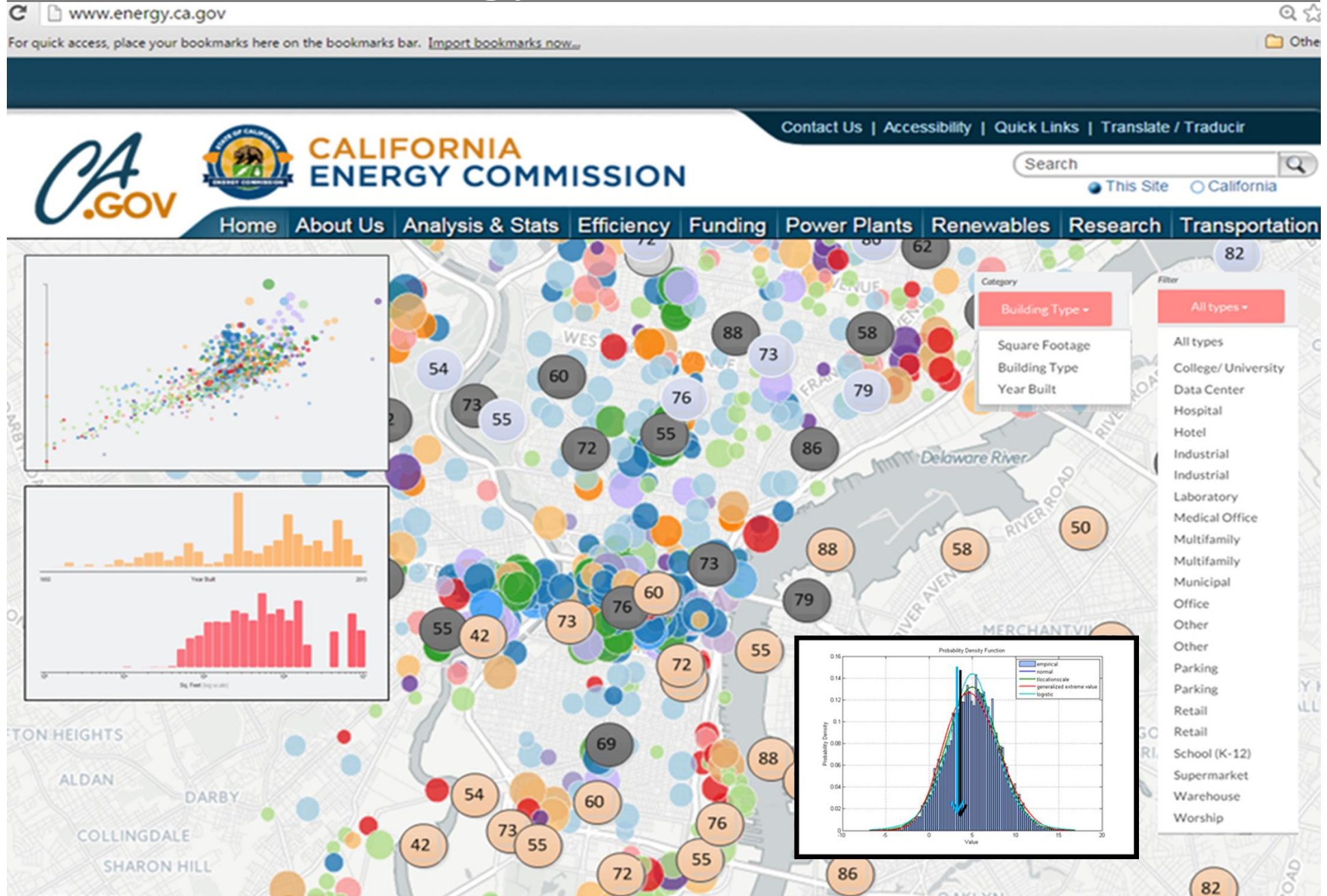
► **Utilities begin to provide data upon request**

Jul. 1, 2019

► *Multi-family reporting begins*

Bold: Statutory mandates
Regulatory Requirements

Vision for Energy Benchmarks Disclosure





Analytics Innovators

Buildings Space

Green Charge Networks

Retrofficiency

Bright Power

Advanced Microgrid Solutions

Mission:Data

Maalka

Kevala Analytics

Enervee

CALTrack/OpenEEMeter

Yardi Energy

LO3 Energy

Empowered Energy

Device Fingerprinting

Ecocentric “Numen” (AU)

EMPower Devices

PlotWatt ; Sense

Demand Assessment

OPower

Lucid

Home Energy Analytics

Bidgely

Chai Energy

FirstFuel

Policy Dev’t

CA Energy Commission

Data : Hemoglobin :: Buildings : Lungs



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CalTRACK Open Dashboard

OPEN METER

FILTERS: > 10000 kWh HVAC system improvement roof insulation improvement

● Editable by everyone ▼ Go Full Screen Tags ▼ More ▼ ★ ⓘ

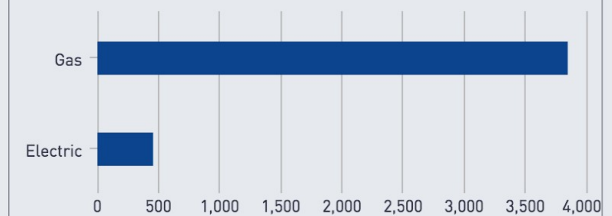
NEW SQL CHART

4,135
=kWh Saved / Project / Year

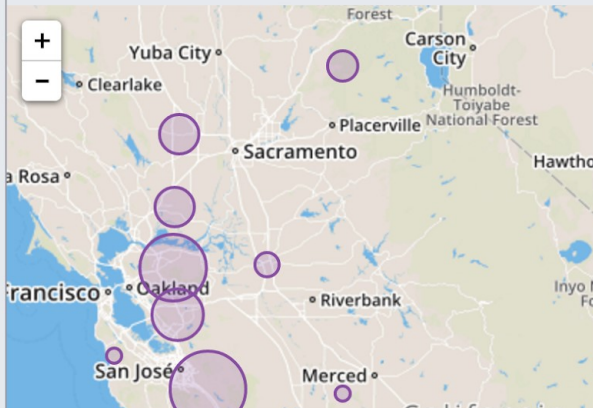
19%
Savings

465
Projects

Annual Unweighted =kWh Savings Mix



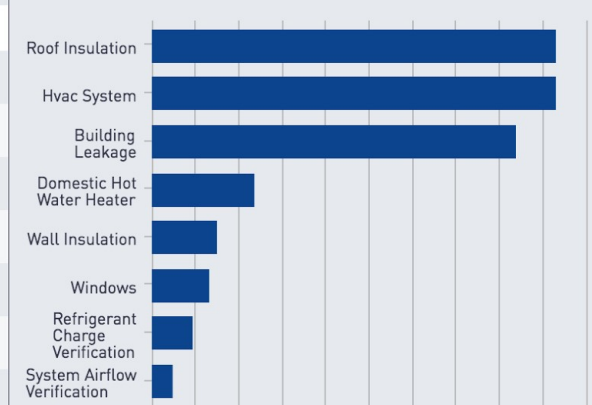
Project Locations



Project Attributes

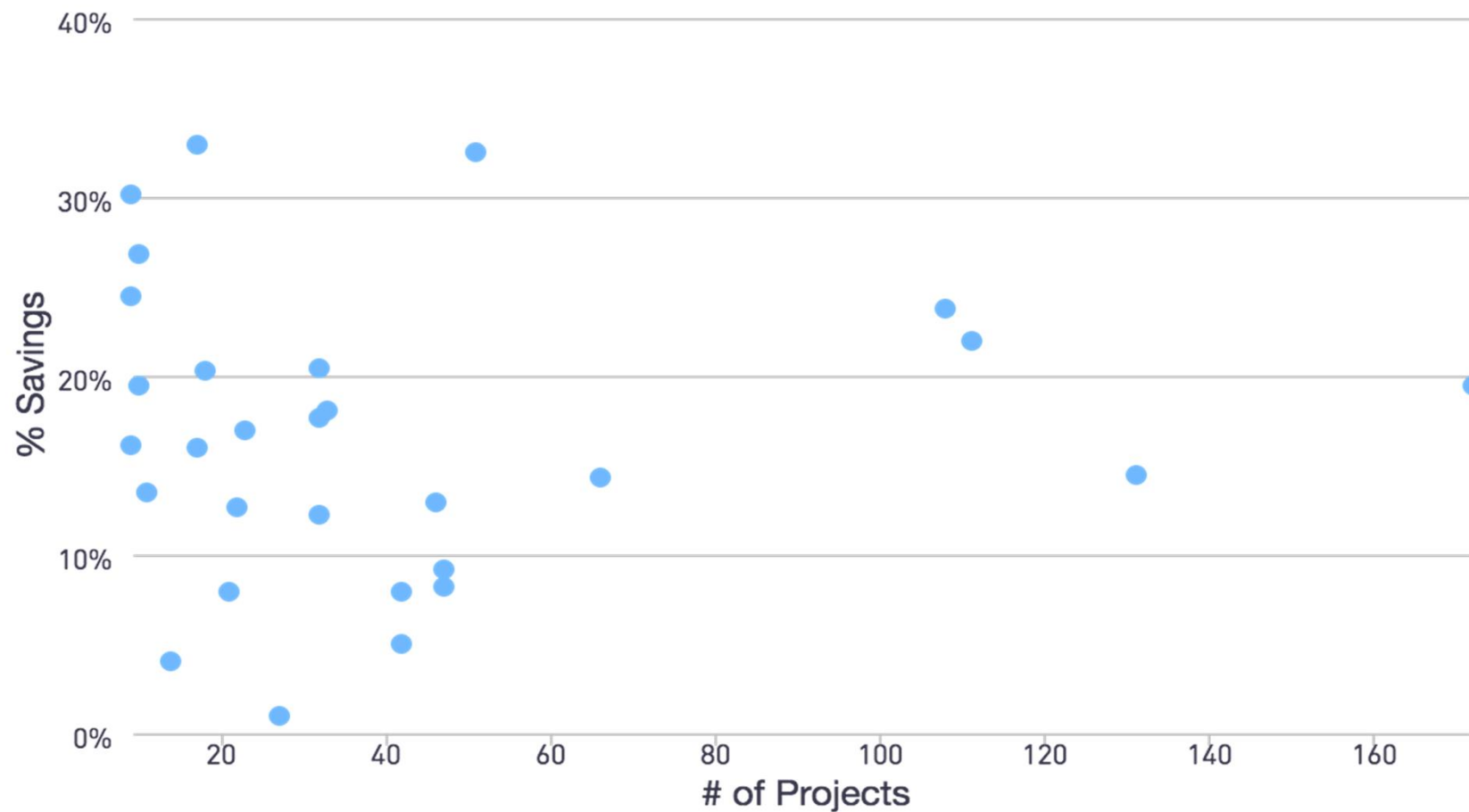
BLOCK ATTRIBUTES	RESULTS
Number of Buildings	465
Number of Contractors	50
Average Building Age	49 years
Average Square Footage	1945
Average Number of Measures	5
Number of projects with electric savings	465
Number of projects with gas savings	437

ECM Breakdown





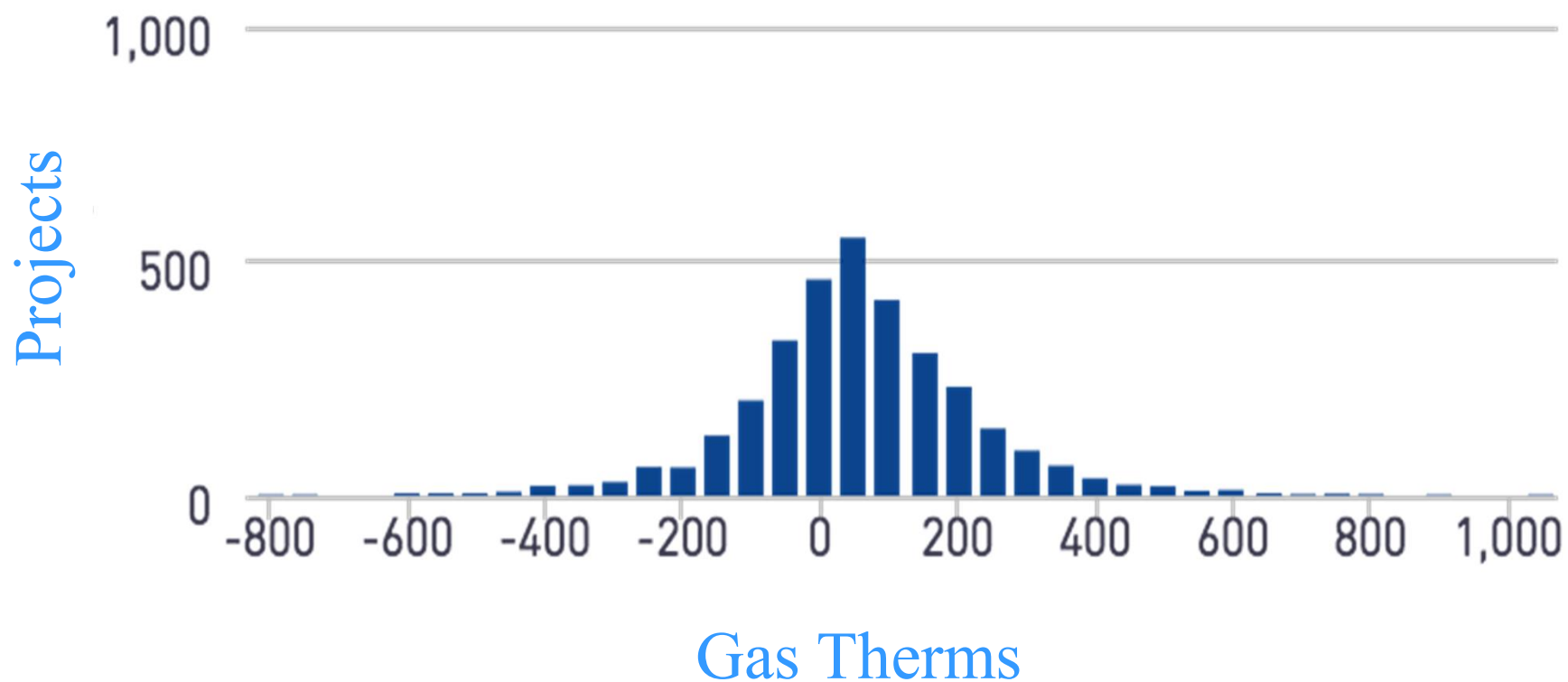
How Do Contractors Perform?



Source: Matt Golden, *Energy Efficiency is a Distributed Energy Resource*, Feb 2017



Efficiency is Manageable as a Portfolio





Pay-for-Performance and EE Procurement

- Track time and locational dependent savings
- Send a price signal based on grid value
- Align market incentives with grid benefit
- Create a project finance cash flow

It takes Time and Location to make EE
into a Distributed Energy Resource



The Construction Industry Is Transforming

- ✓ **Energy Efficiency is foundational**
- ✓ **Technologies can enhance performance**
- ✓ **First cost increments are not large and decreasing with experience**
- ✓ **Business models are recognizing this, capturing market share**



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Existing Commercial Building Upgrade

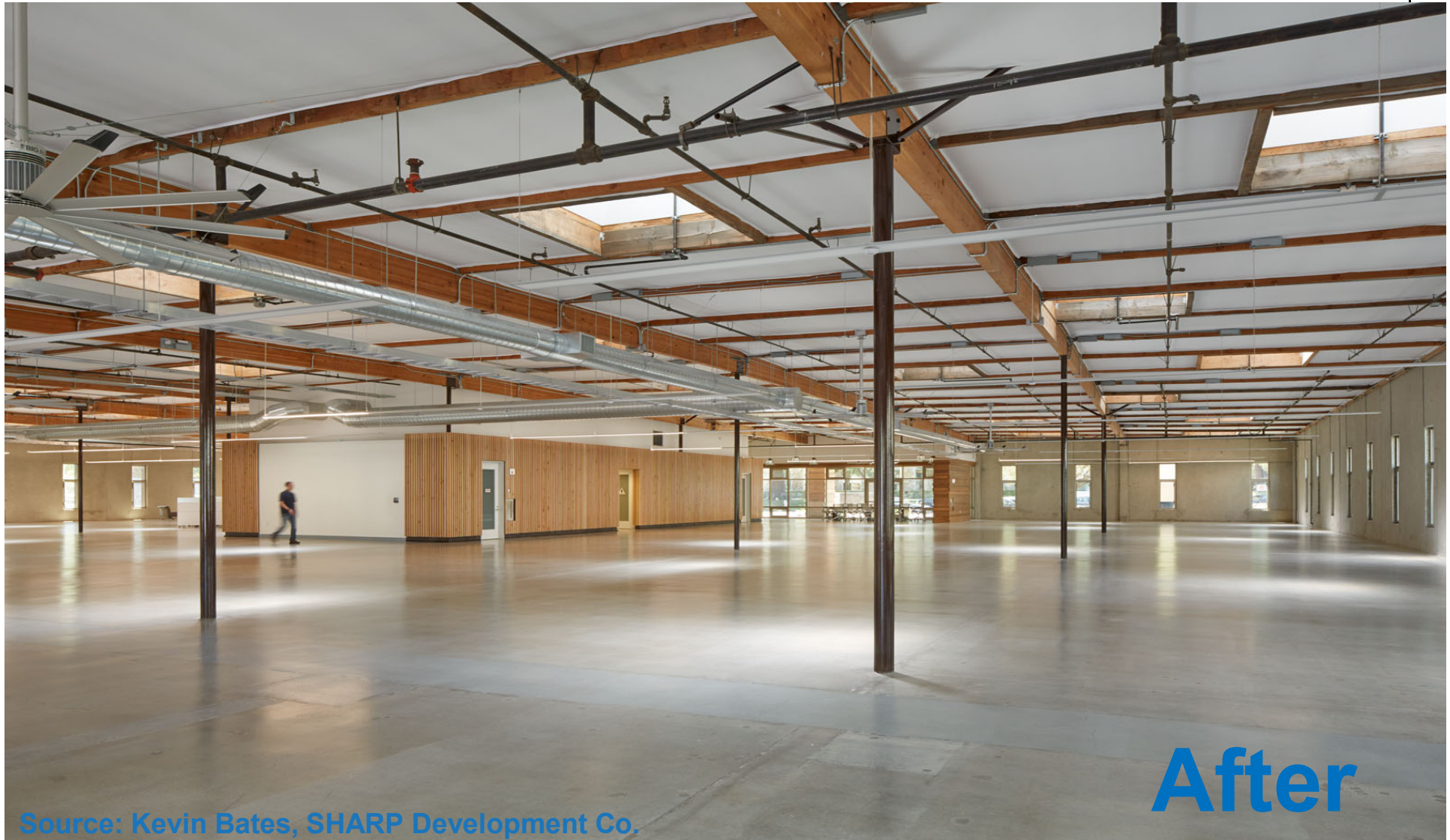
BEFORE

Source: Kevin Bates, SHARP Development Co.



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PASSIVE THERMAL COMFORT



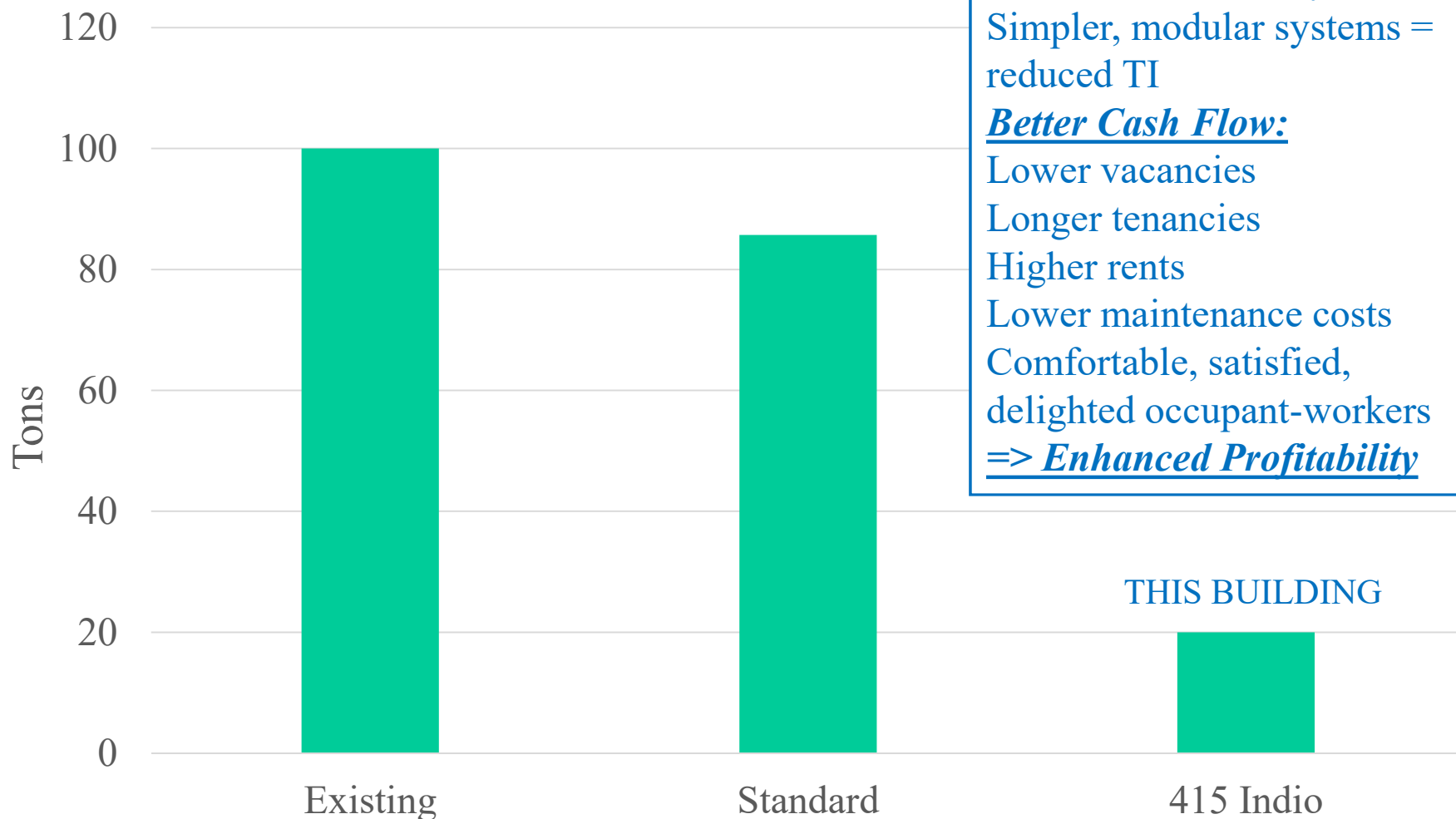
After

Source: Kevin Bates, SHARP Development Co.



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REDUCED HVAC SIZE



...Tenant-Centered Design:

Capital Savings:

Downsized HVAC system,
Simpler, modular systems =
reduced TI

Better Cash Flow:

Lower vacancies
Longer tenancies
Higher rents
Lower maintenance costs
Comfortable, satisfied,
delighted occupant-workers
=> Enhanced Profitability

Accessible Cutting-Edge Energy Innovation

MUTUAL HOUSING AT SPRING LAKE



EQUAL HOUSING
OPPORTUNITY

2170

OFFICE (530) 669-5767
TDD (800) 735-2922



Mutual
Housing
YOLO

62-Unit Affordable ZNE Community - Woodland, CA

- All-electric
- Next is an energy-positive community!

New City Library – Berkeley, CA

Zero Net Energy, Passive Design





A Principle Challenge to
Achieving Our 2050 Goals Is:

**Integratio
n**

VISION

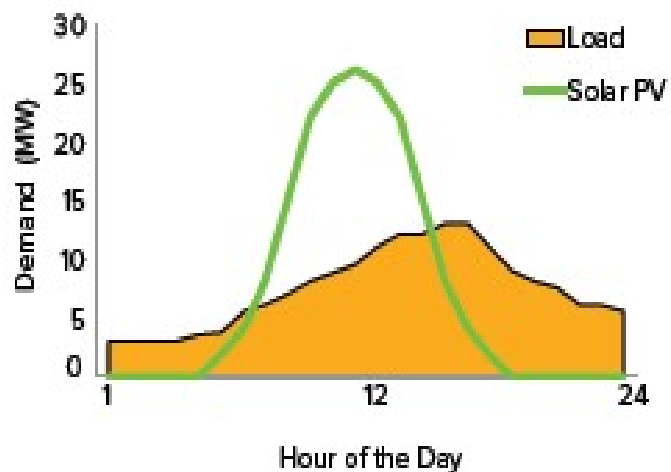
- ✓ **Energy Efficiency is foundational**
- ✓ **Technologies at all scales**
- ✓ **Supply AND Demand Are Responsive**
- ✓ **Flexibility Throughout the System**
- ✓ **Standardized Data Access and Communications**
- ✓ **Control & Automation**



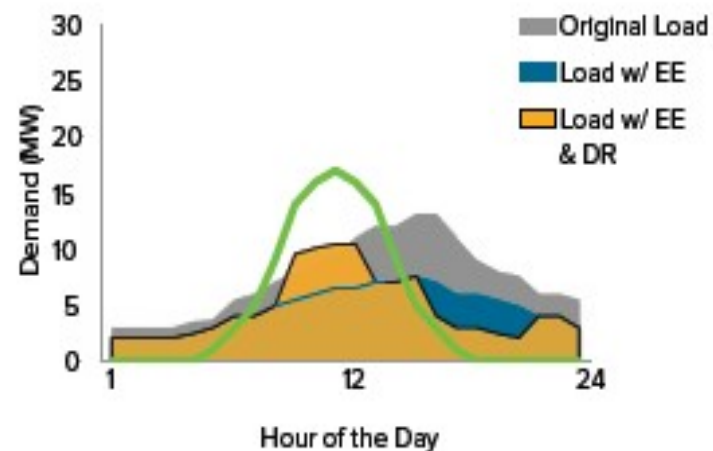
Tale of Two Buildings - BOTH ZNE



Solar PV



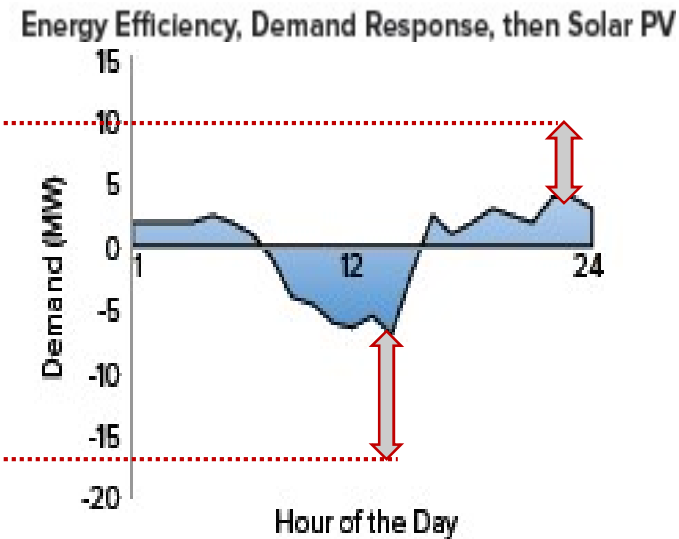
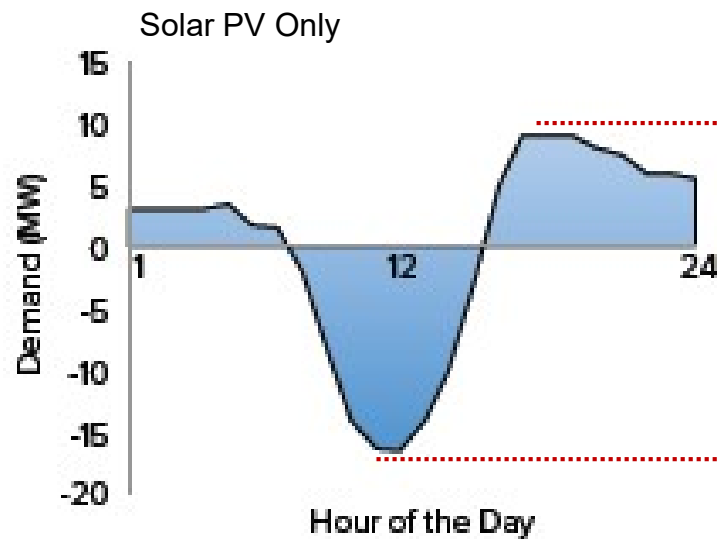
Energy Efficiency, Demand Response, then Solar PV



Source: New Buildings Institute, PG&E Corp.



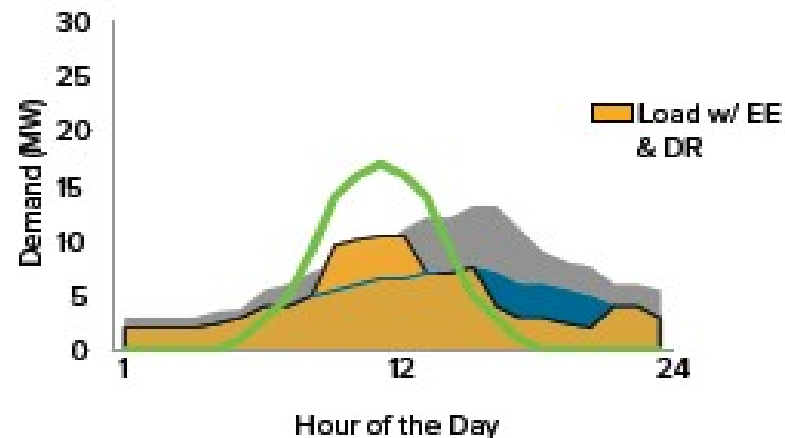
Tale of Two Buildings – Grid View





Integrated Design and Smart Operation

- *Lower Energy infrastructure cost (smaller PV system)*
- *Somewhat lower energy bill*
- *Customer satisfaction: high-performing, more comfortable building*
- *Flexibility for the utility: load shifting, dynamic DR*
Energy Efficiency, Demand Response, then Solar PV
Grid usage cut to 10 MW



Storage & Controls: **Creating Beauty?**

Smart?
Affordable?

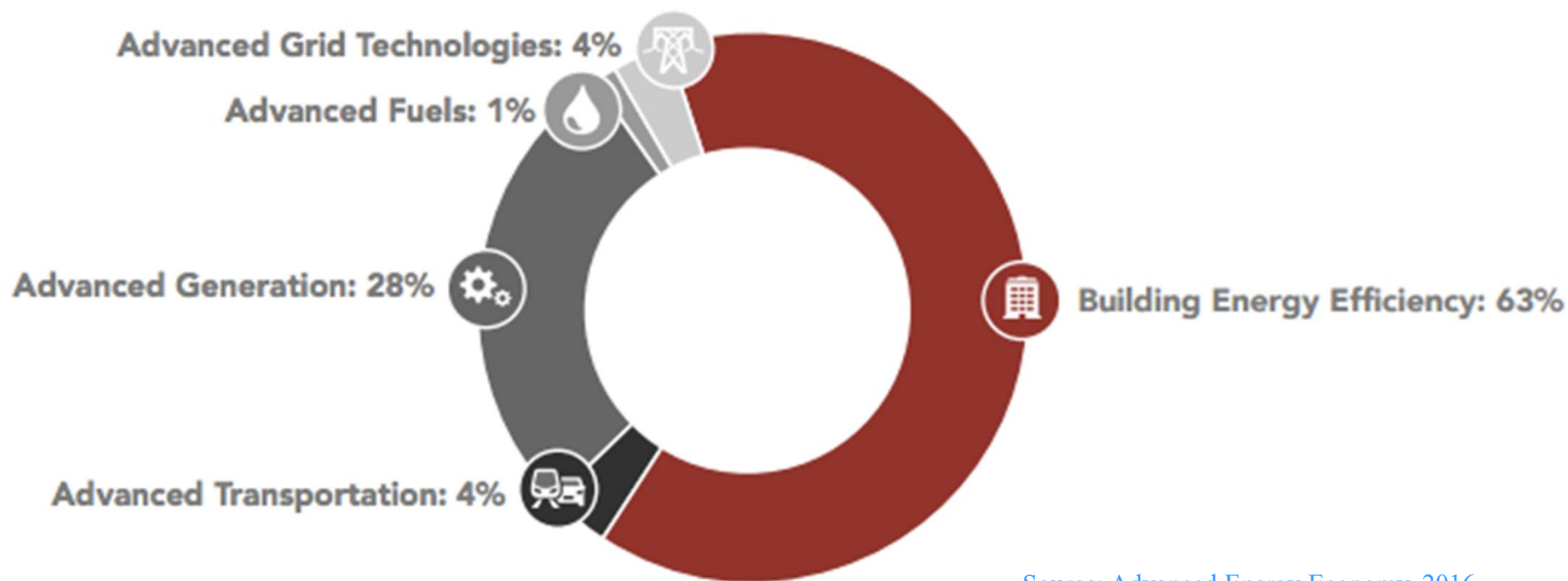
Distributed Resources





Clean Energy: 400,000 Jobs in California!

Advanced Energy Employment by Segment, 2015



Source: Advanced Energy Economy, 2016



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Economic Development is Central to the Sustainable





Reducing Fossil Fuel Use

- Electrification – Buildings and Vehicles (EE provides the distribution ‘headroom’)
- Fuel Cell Vehicles
- Heavy Duty Vehicles: BioDiesel, NG





In Sum: Modern Energy Efficiency...

- Lowers energy bills
- Is a resource that can complement intermittent renewables
- Brings many co-benefits, including non-exportable jobs and economic resilience
- Can make the Aussie Transition easier by reducing need for new supply



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THANK YOU!

Commissioner Andrew McAllister
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