November 5, 2019

The Role of Energy Efficiency in a Decarbonized Economy

RAP Webinar

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Questions?

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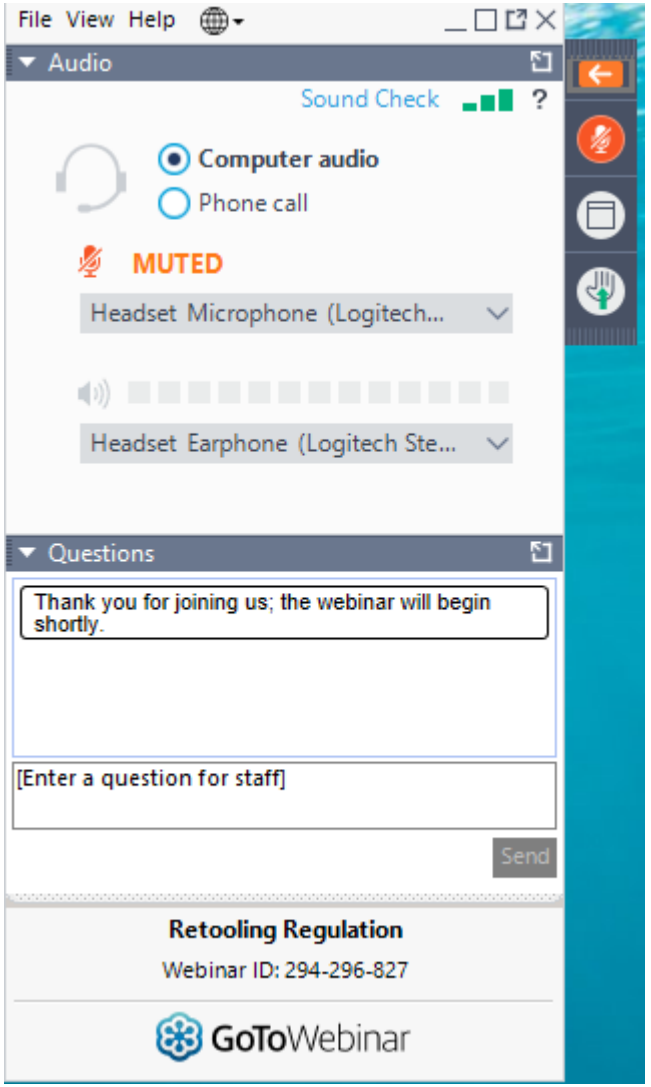


the Electricity JOURNAL

August-September 2019 Special Issue

“Energy Optimization is the Key to Affordable, Reliable Decarbonization”

https://www.sciencedirect.com/journal/the-electricity-journal/vol/32/issue/7 (*subscription required*)

Free downloads TODAY ONLY - use links in our blog post

https://www.raponline.org/blog/clean-flexible-and-efficient-a-recipe-for-energy-optimization/

What *is* “Energy Optimization” and why does RAP think it is so important?

Our Presenters

Steve Nadel
Executive Director
American Council for an Energy- Efficient Economy

Sue Coakley
Executive Director
Northeast Energy Efficiency Partnerships

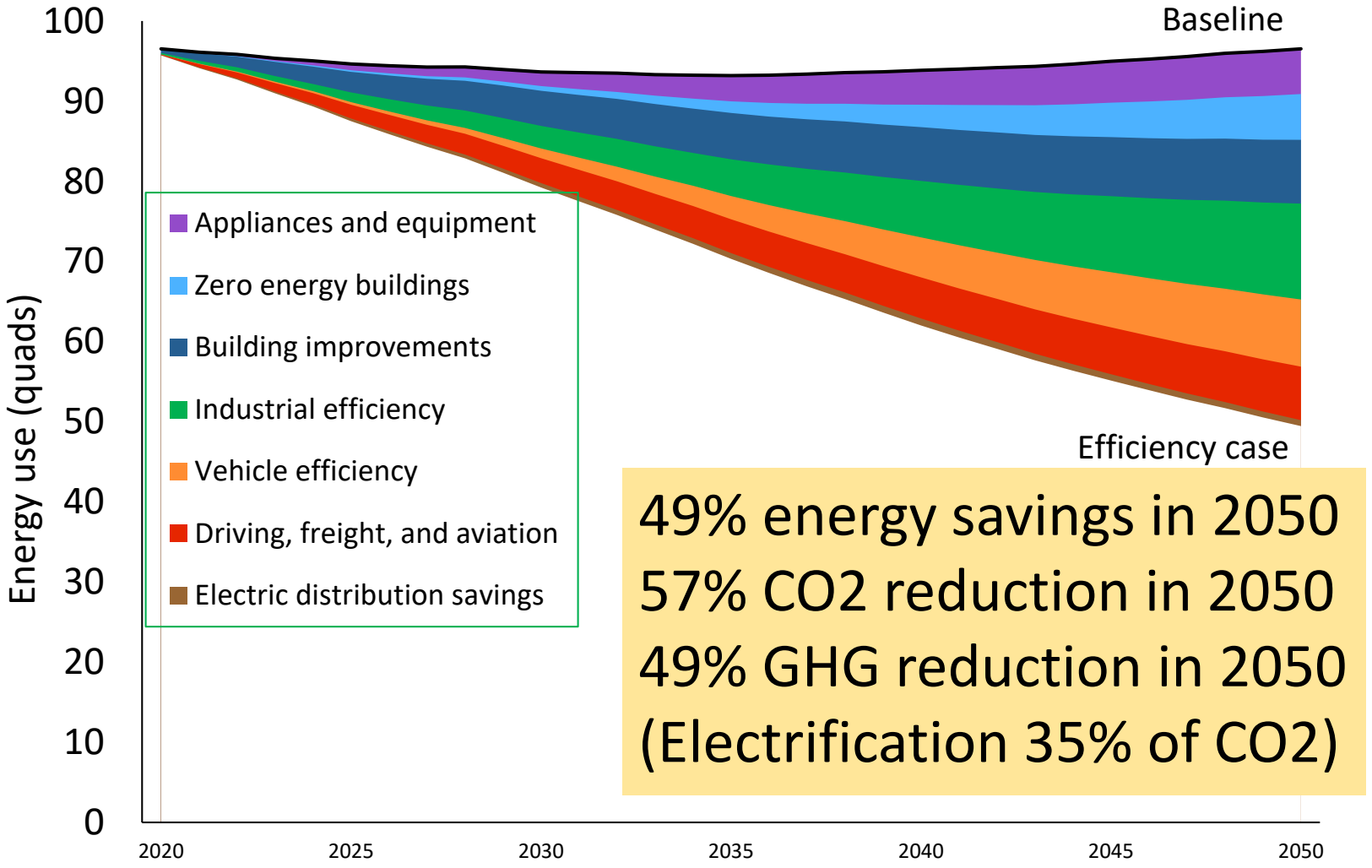
Carmen Best
Director of Policy & Emerging Markets
Recurve

Proven Energy Efficiency Policies and How They Can Evolve to Address Future Needs

Steve Nadel, ACEEE

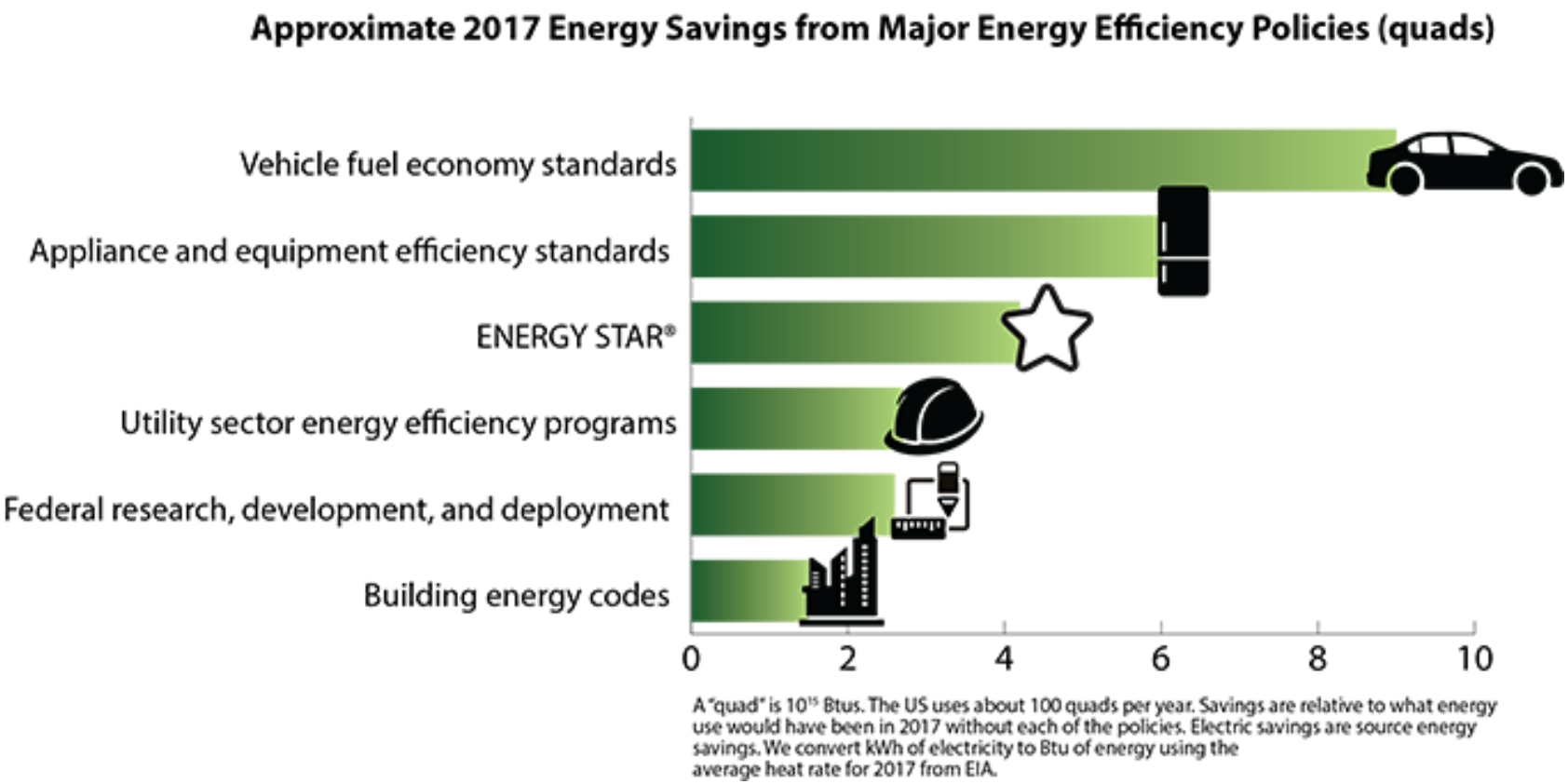
ACEEE
American Council for an Energy-Efficient Economy

Halfway There: Energy Savings



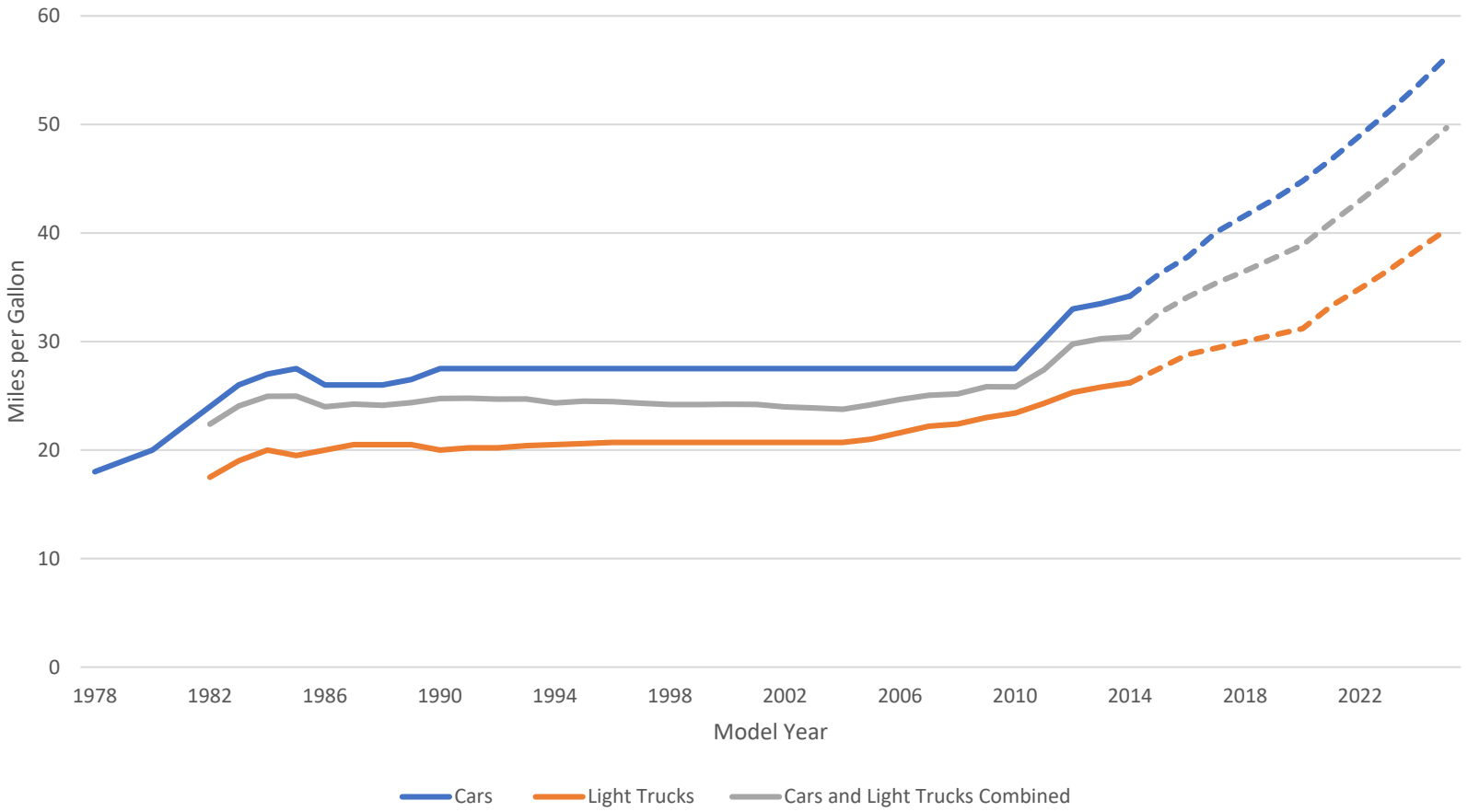
49% energy savings in 2050
57% CO_2 reduction in 2050
49% GHG reduction in 2050
(Electrification 35% of CO_2)

Source: ACEEE 2019, *Halfway There*



Source: https://aceee.org/blog/2019/06/here-are-six-ways-we-have-slashed-us

Fuel Economy Standards



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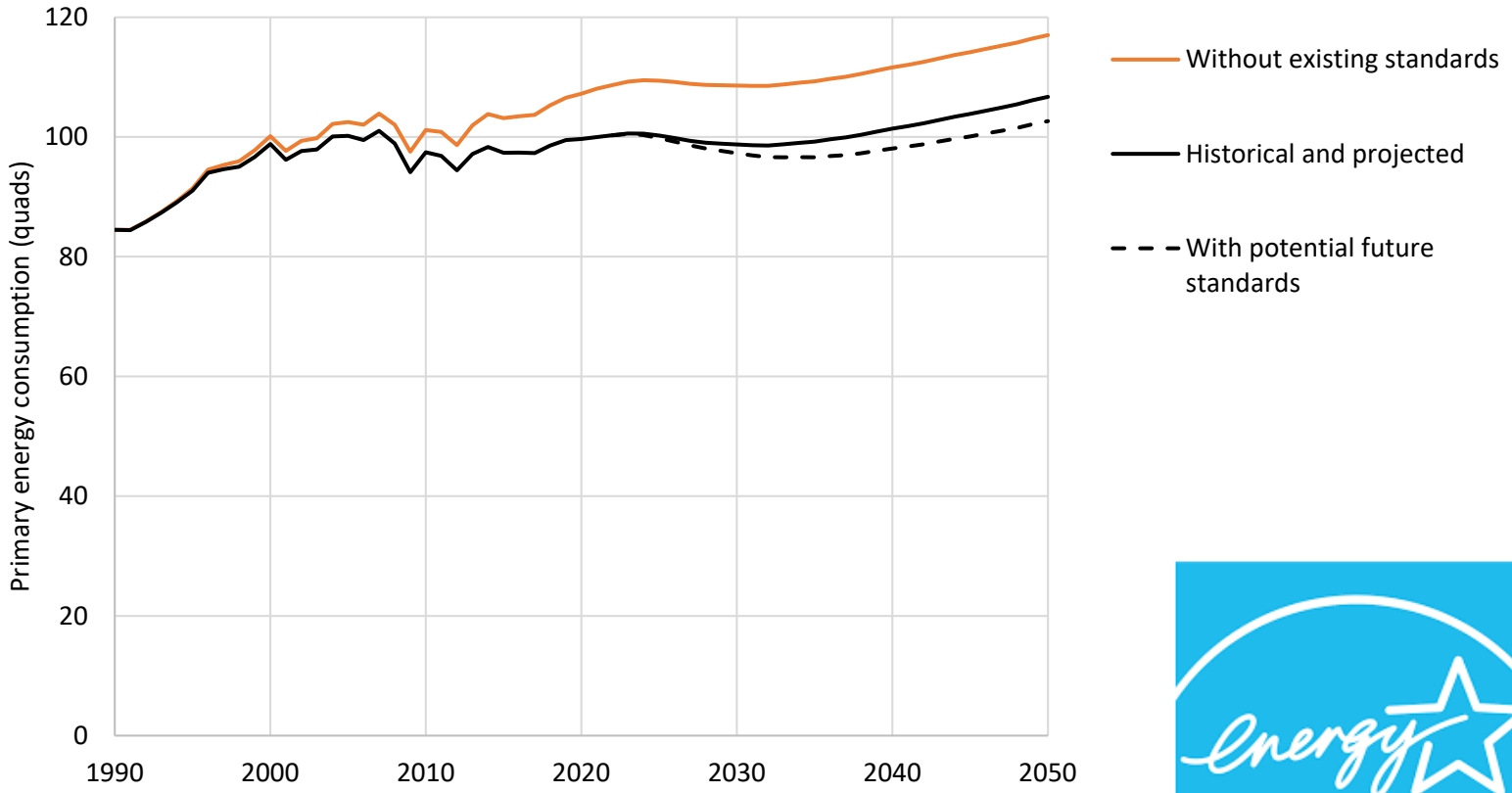
Impact of Equipment Efficiency Standards; Energy Star Complements



ENERGY STAR

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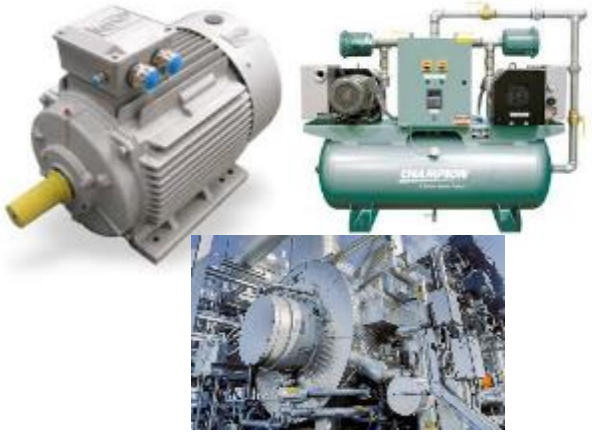
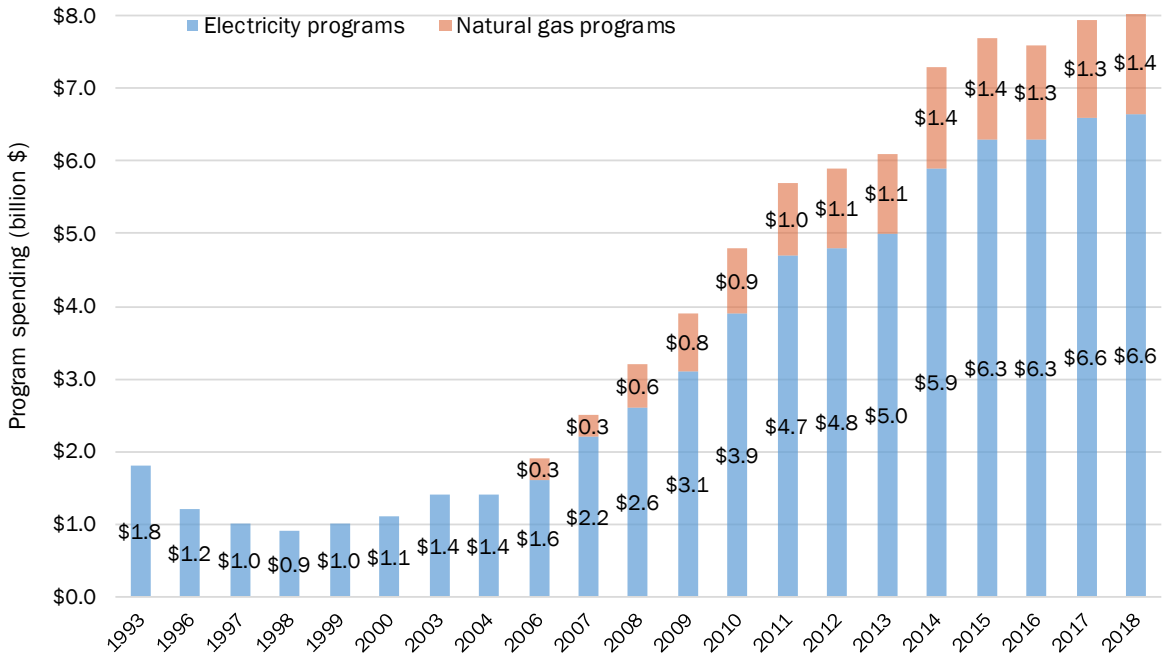
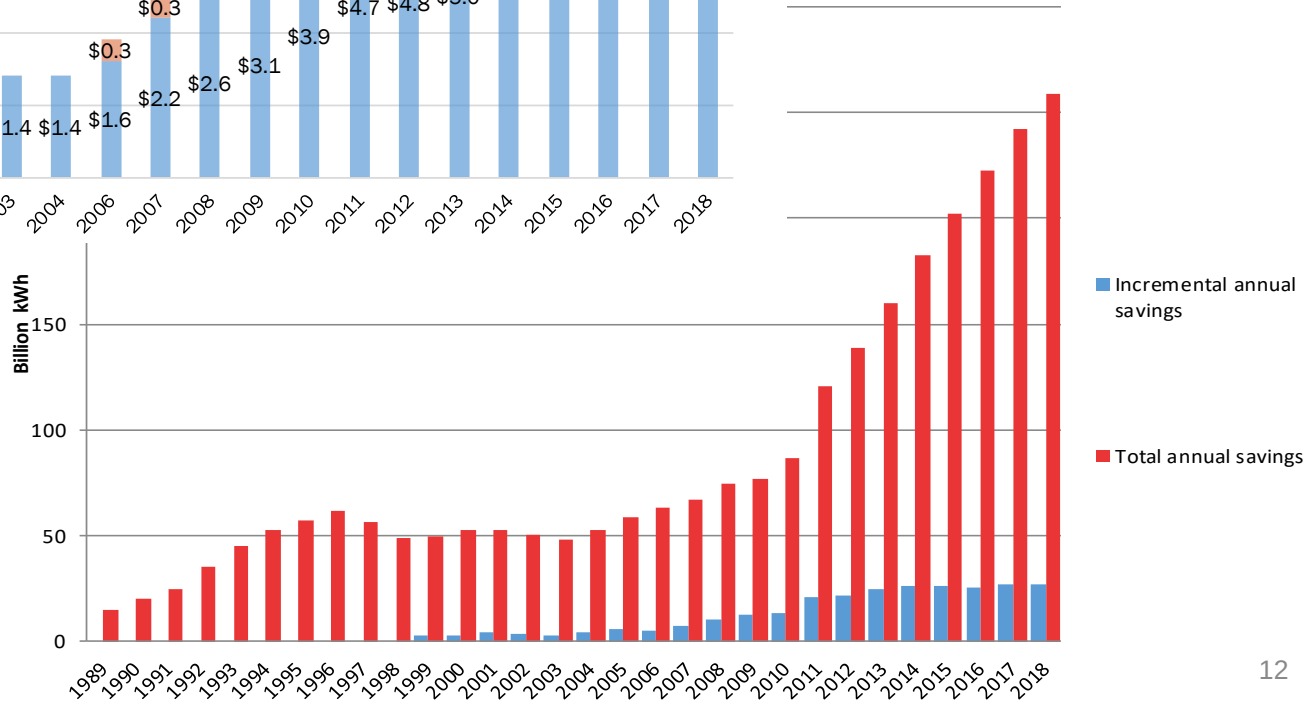
70% of Savings from New Standards Will Come from a Dozen Products



Utility EE Spending and Savings





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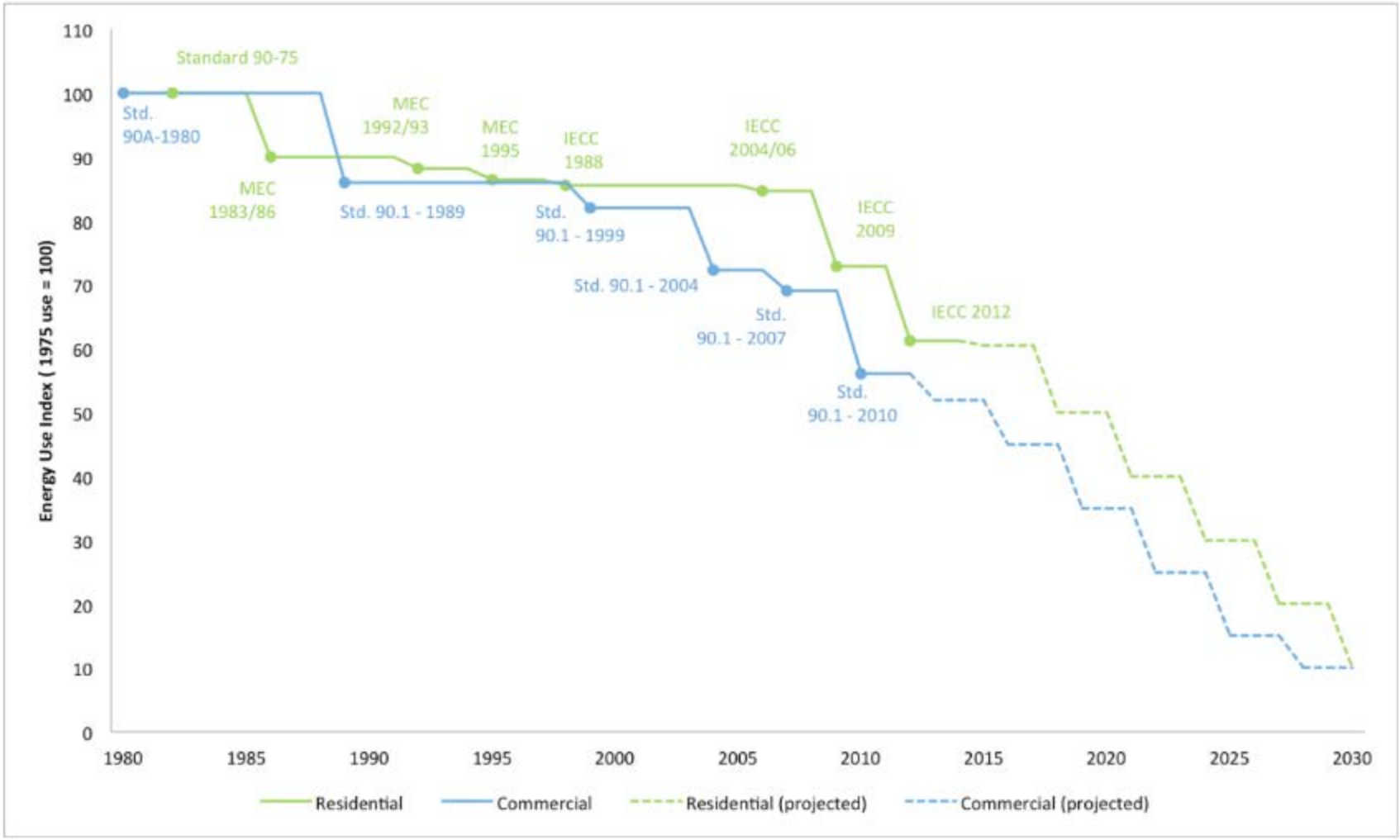
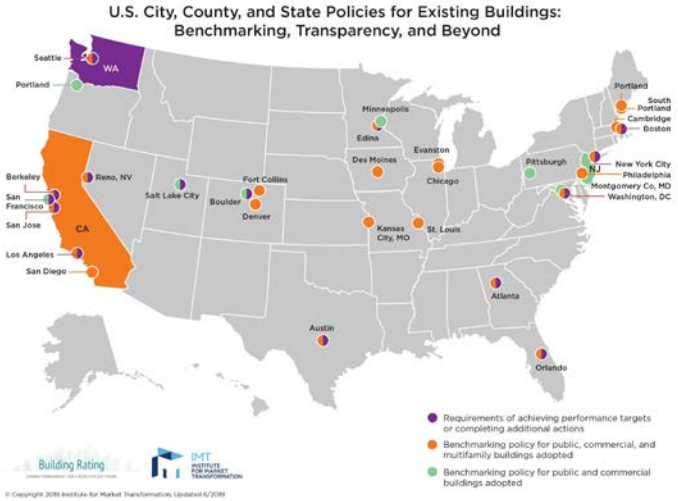
Key Efficiency Programs for the 2020s

Building Code Progress



Complementing Traditional Approaches with Additional Policies

- Building benchmarking and retrofit policies
- Strategic Energy Management
- Smart buildings and manufacturing,
- Improving the efficiency of planes and freight and people movement



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Conclusions

- Traditional energy efficiency policies have saved much energy
- They can continue to be a major source of energy savings and emissions reductions
  - **Some refinements would be useful**
- Additional complementary policies will also be needed

RAP Energy Optimization Webinar: Transforming Our Buildings for a Low-Carbon Era – Five Key Strategies

Sue Coakley, Executive Director
Northeast Energy Efficiency Partnerships
November 5, 2019

Building Decarbonization → 3 Key Elements

Advanced Electric Technologies

Space/Water Heating – Heat Pumps

Deep Energy Efficiency

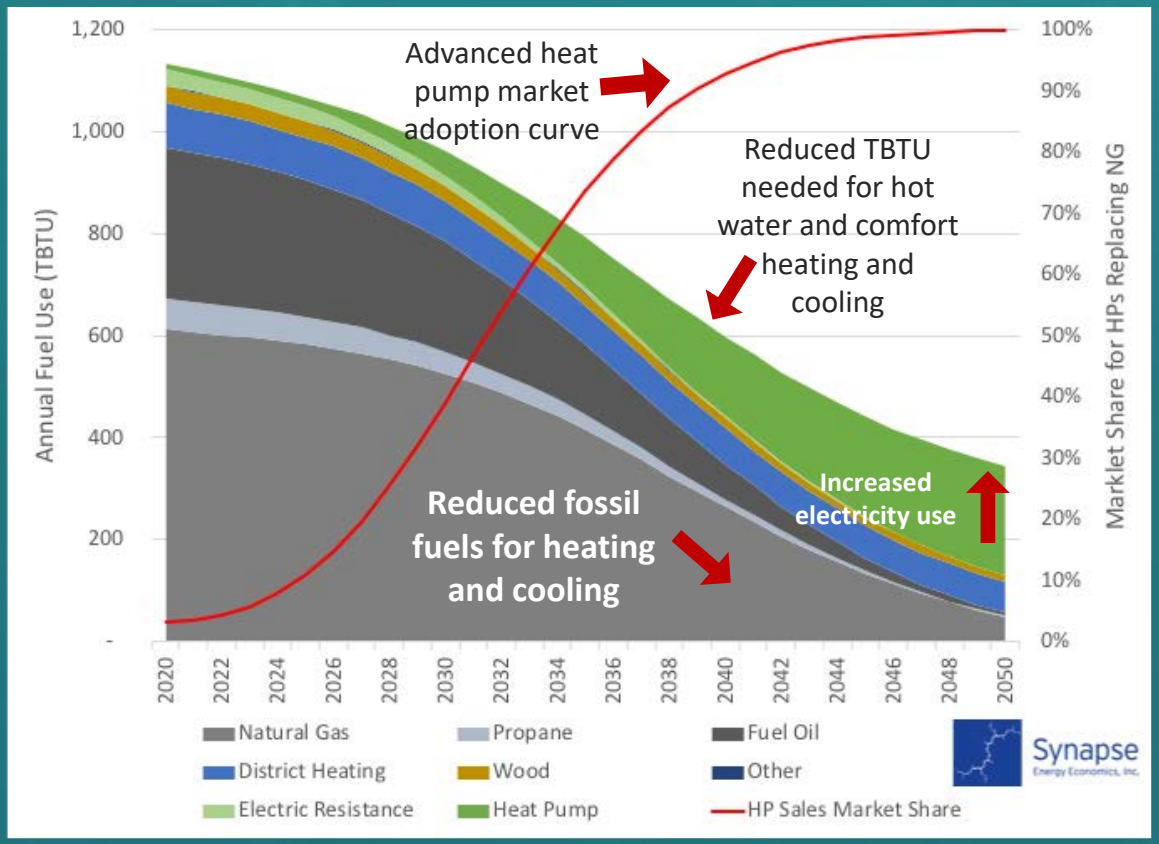
Thermal Improvements

Grid Integration

Flexible use of Low-Carbon Electricity

Northeast Strategic Electrification Action Plan – NEEP 2018

Advanced Heat Pumps for Space & Water Heating Cuts Building Energy Requirements Two-Thirds by 2050



Residential and commercial sector advanced heat pump market adoption ***in natural market cycles***

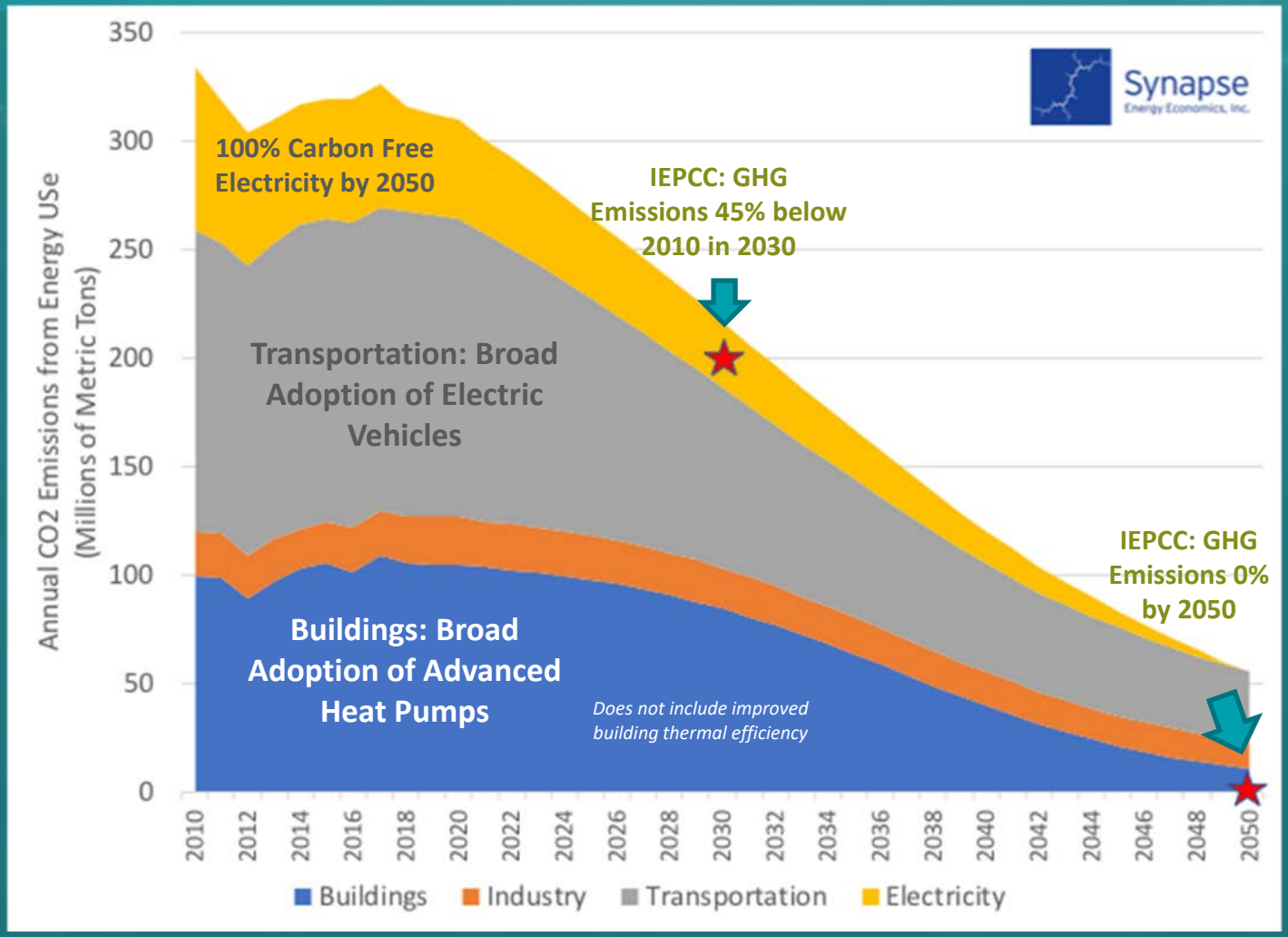
New England + New York: Plausibly Optimistic Scenario
Analysis by Dr. Asa Hopkins, Synapse Energy Economics – June 2019

Increasing ASHP market adoption to 100% of sales by 2045...

By 2050:

- ✓ Reduces total energy required by homes & buildings by 66%
- ✓ Reduces building fossil fuel use to a small fraction
- ✓ Efficient electricity use increases to meet remaining needs

Carbon Free Powered Advanced Heat Pumps Puts 2050 Climate Stabilization Goals In Reach



New England + New York: Plausibly Optimistic Scenario
Analysis by Dr. Asa Hopkins, Synapse Energy Economics – June 2019

Maximizing the Economic Benefits of Building Decarbonization – Five Strategies

1. Buildings as Batteries
2. Drive Scale and Competition with Programs & Incentives
3. Work within Natural Market Cycles
4. Focus First on High Value Markets
5. Work with Local Government & Affordable Housing Leaders

For More Information :

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Sue Coakley
Executive Director
NEEP
scoakley@neep.org

Dave Lis
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At www.neep.org:

- Building Decarb Central
- NEEP Air Source Heat Pump Resource Center
- Resilient High Performance Communities

RECURVE
SHAPE THE FUTURE OF ENERGY

Decarbonization of Electricity Requires Market-Based Demand Flexibility

Carmen Best
Director of Policy & Emerging Markets
carmen@recurve.com

The Grid Has Changed

New Problems Require New Solutions

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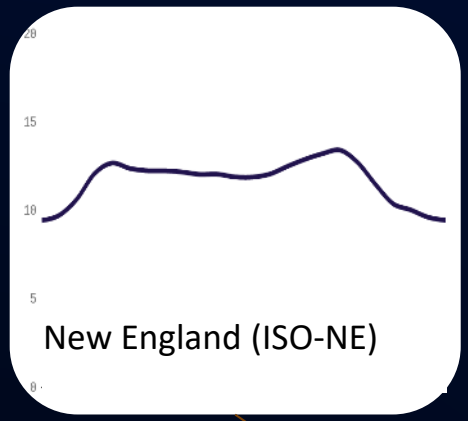
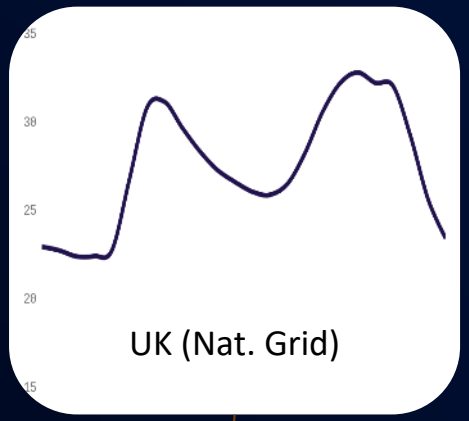
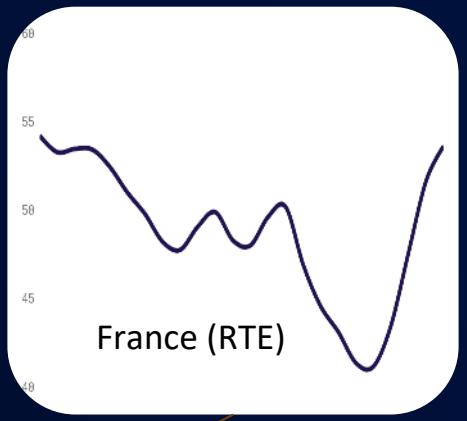
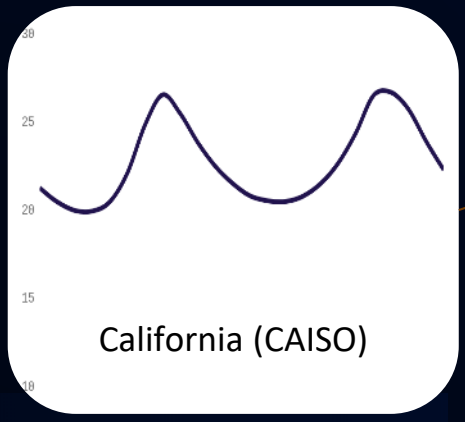
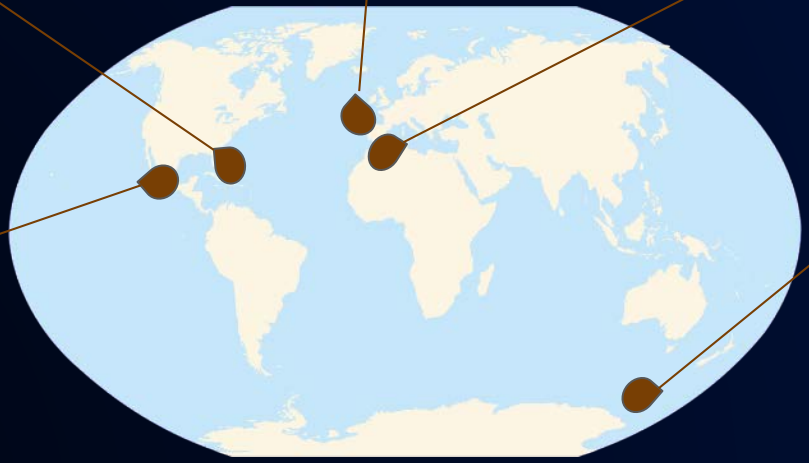
Load Shaping Is Not Just a California Problem

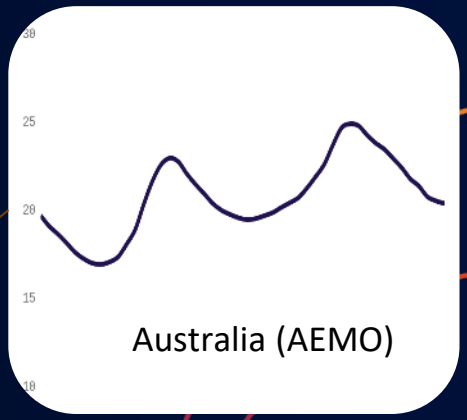








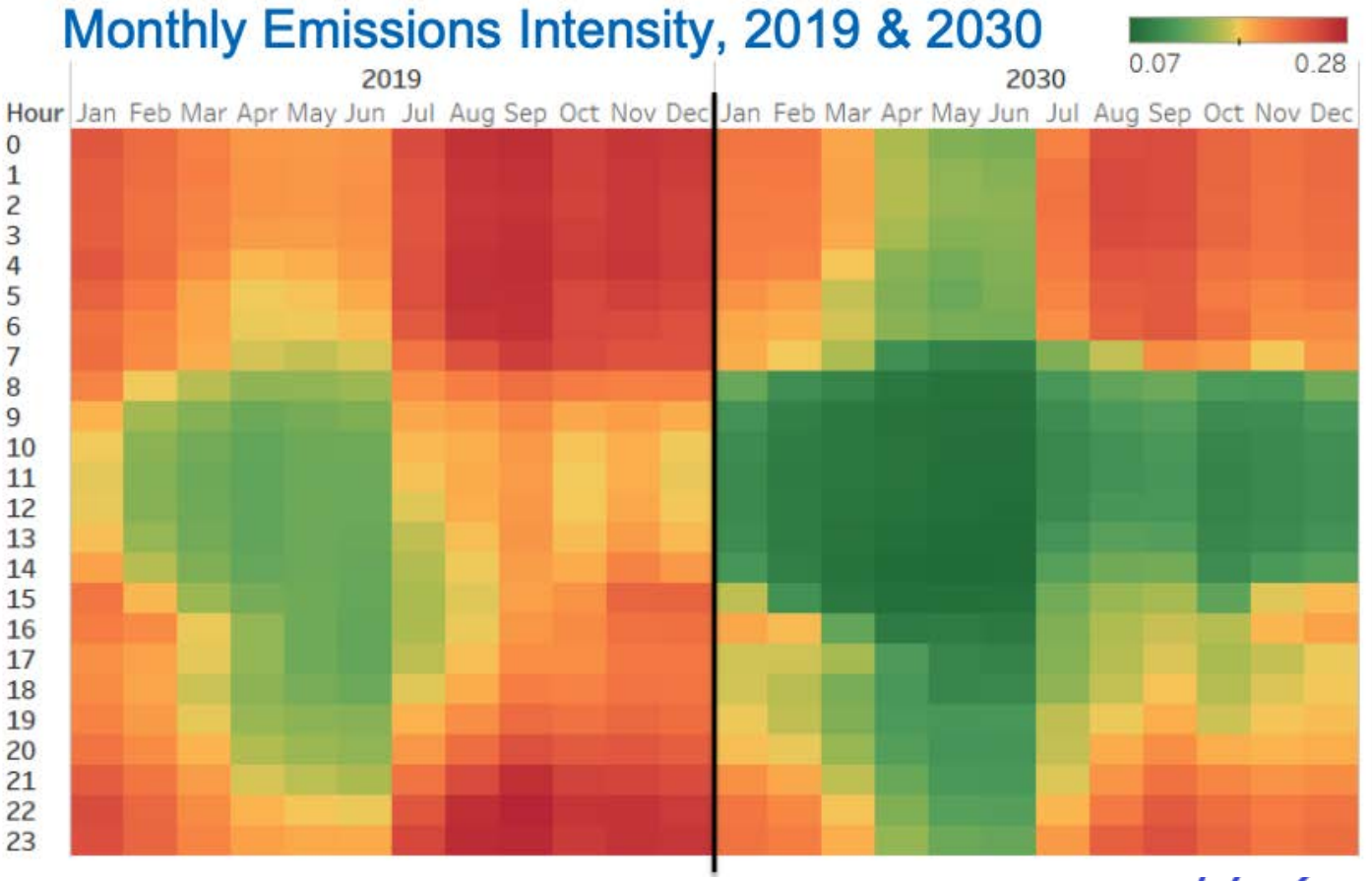




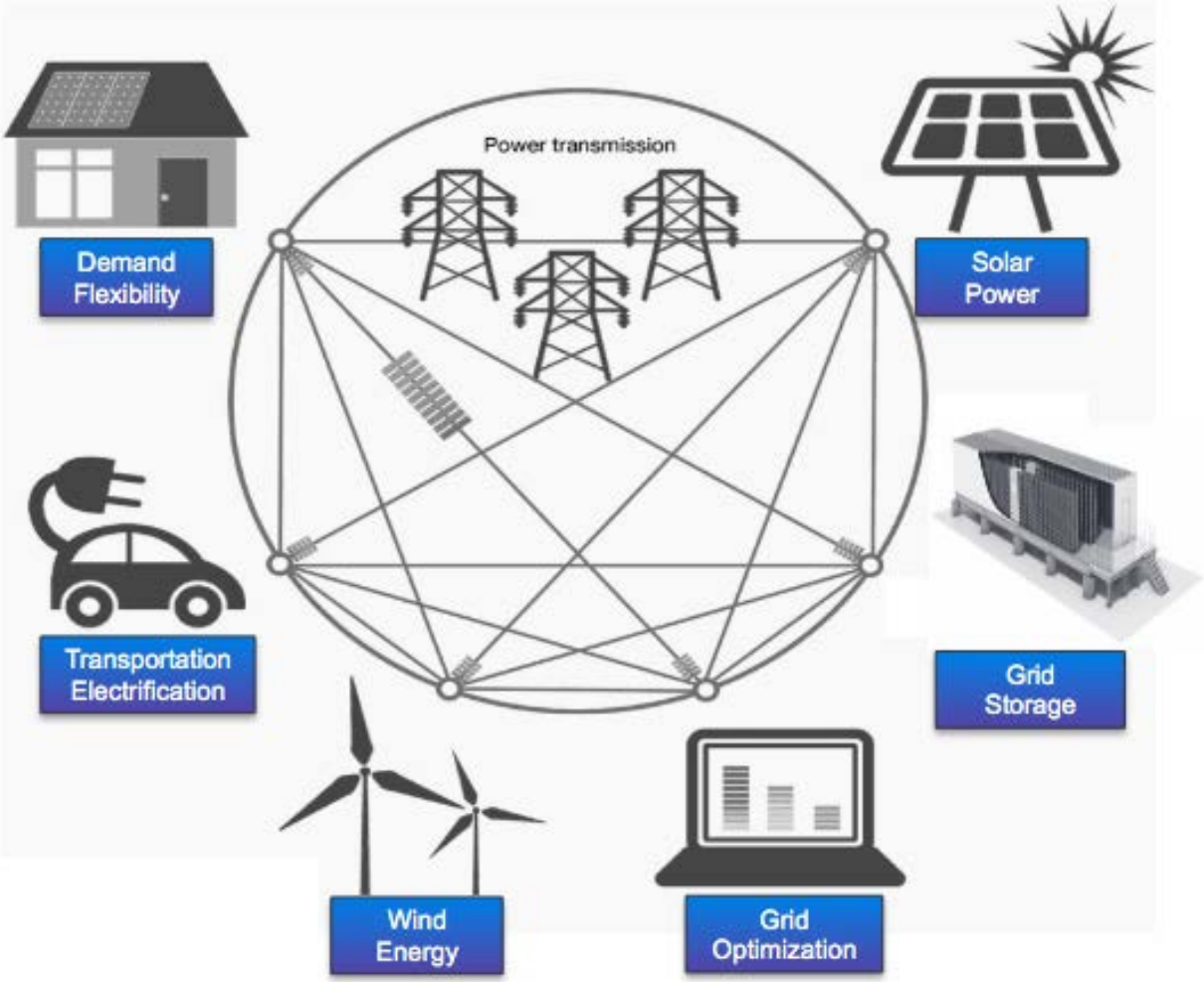
Decarbonization & Grid Optimization

CALIFORNIA ENERGY COMMISSION

Electricity CO_2 Intensity



Demand Flexibility Enables Grid Integration of Behind the Meter Resources



Time Value of Efficiency is Key to the Grid of the Future

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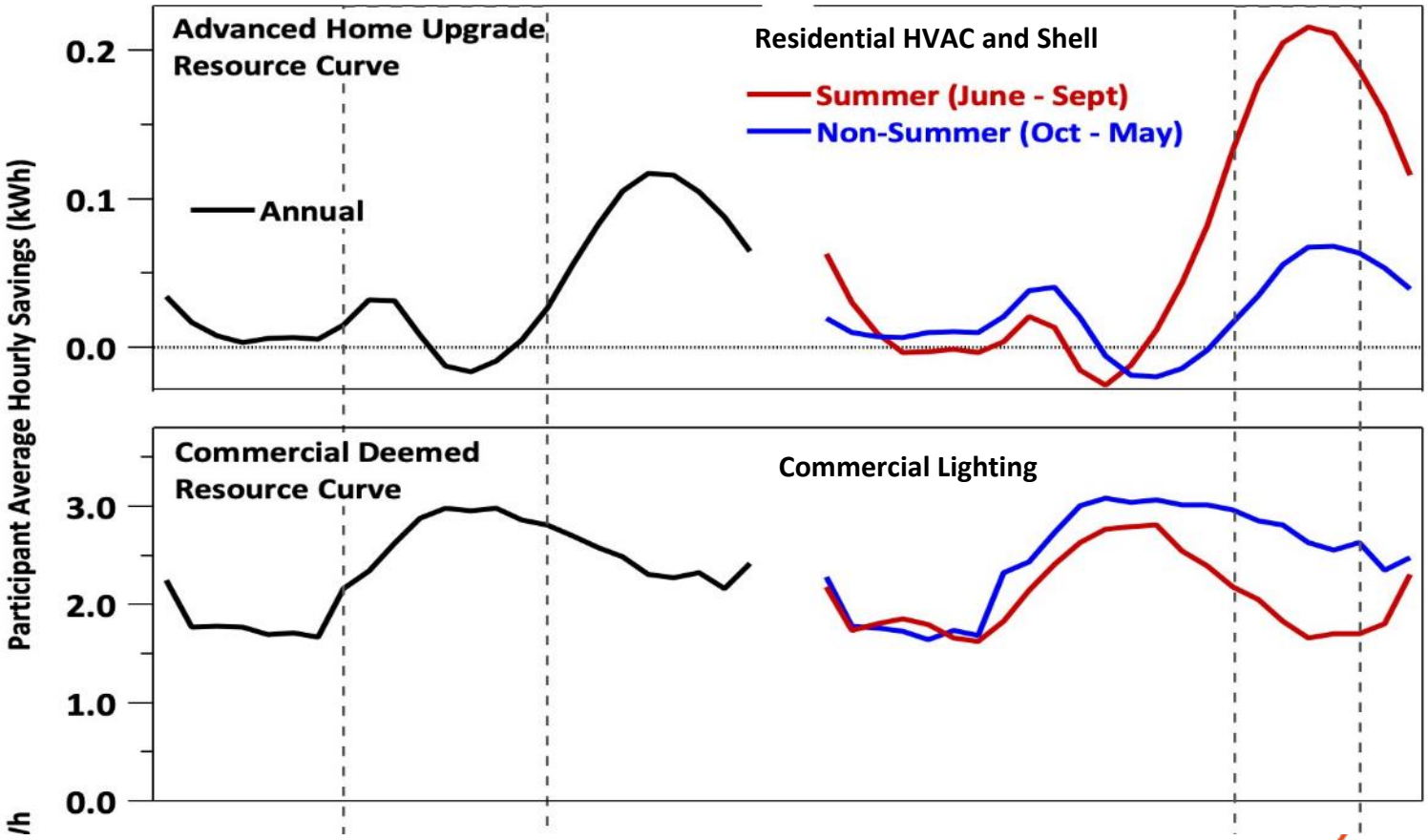
Not All Energy Efficiency is of Equal Carbon Value

Time-value Signals



Cost effectiveness test signal*	Residential HVAC/Shell	Commercial Lighting
Total Resource Cost Test (CA)	0.35	2.80

*Cost effectiveness estimates from http://eestats.cpuc.ca.gov/Views/EEDataPortal.aspx

Market-Based Behind the Meter Demand Flexibility

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Markets Need Standard Weights and Measures

- Standard M&V Calculation Methods
- Monthly, Daily, and Hourly
- Public Stakeholders Empirical Process
- www.CalTRACK.org

- Python CalTRACK Engine
- Open Source Apache 2.0
- How It Works: https://goo.gl/mhny2s
- Code Repo: https://goo.gl/qFdW4P

LFENERGY

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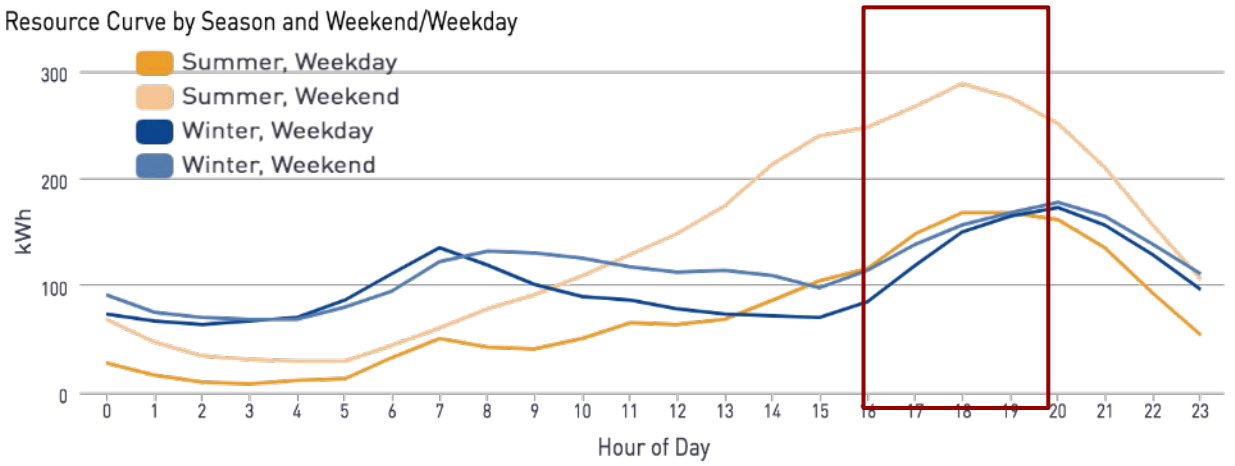
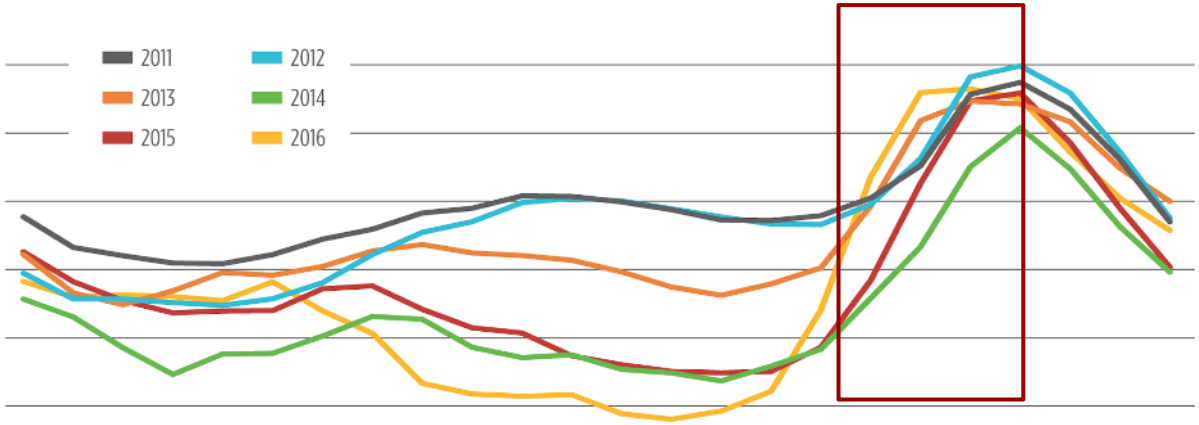
Sending the Right Price Signal

Resource Curve



Duck Curve



Sales and Marketing

Contractor Management

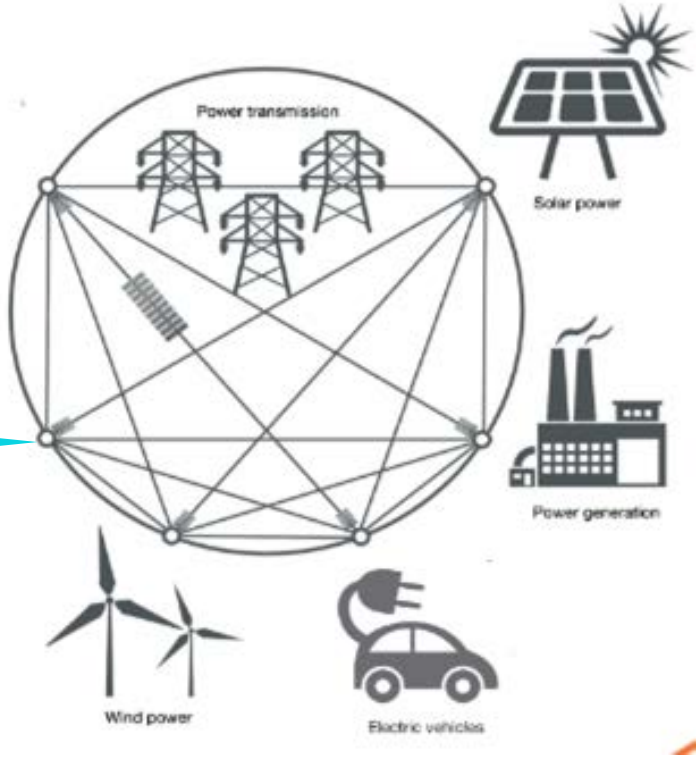
Project Finance

3RD Party Providers
(aggregators)

Services and Products

Consumer Finance

DEMAND FLEXIBILITY



BUSINESS MODELS

Savings Comfort Health

PG&E Residential Hourly Pay-for-Performance

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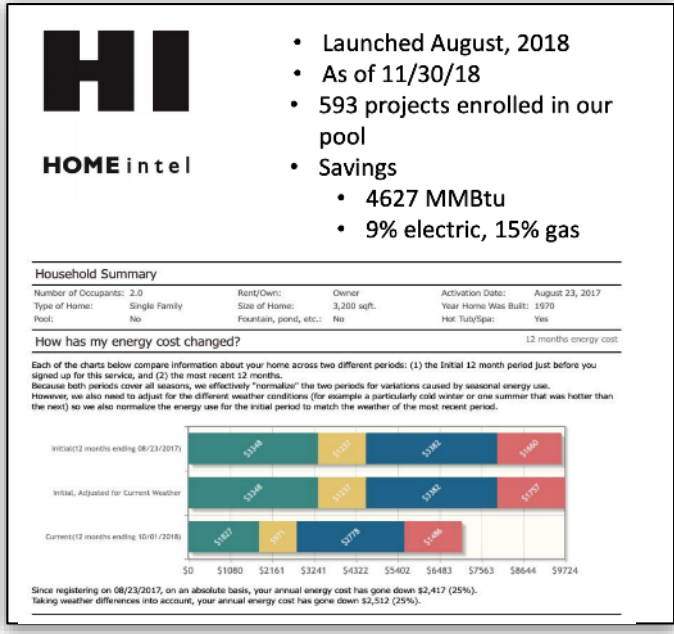
Competitive Markets Drive Innovation

HOMEintel

- Launched August, 2018
- As of 11/30/18
- 593 projects enrolled in our pool
- Savings
  - 4627 MMBtu
  - 9% electric, 15% gas



ICF – Home Energy Optimization

- $199 for $2,000 in Products and Services ($59 for DAC customers)
- Home Energy Report, Home Energy Advisor
- Smart T-Stat plus optimization (all)
- Advanced Power Strips (half)
- LEDs (4 per home)
- AC Tune Up (most)
  - Air Flow Adjustment
  - Refrigerant Charge
  - Condenser Coil Cleaning
  - Evaporator Coil Cleaning
- Comfort Guard for HVAC Equipment Performance Optimization
- SWH Controller for Electric and Gas Water Heaters (all)
- Temperature Control Valves (TCVs) (half)
- Faucet aerators
- Pipe insulation (half)

ICF

PG&E

11

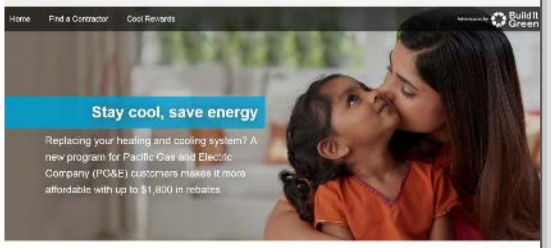
Build it Green – Cool Savers

Build It Green

Seal Ducts

Smart T-Stat

High Efficiency AC



Lower your monthly energy bills and replace your outdated heating and cooling system, thanks to rebates and incentives through the new Cool Savers Program.

Find a contractor >

https://www.coolhomesavers.com/

EGIA

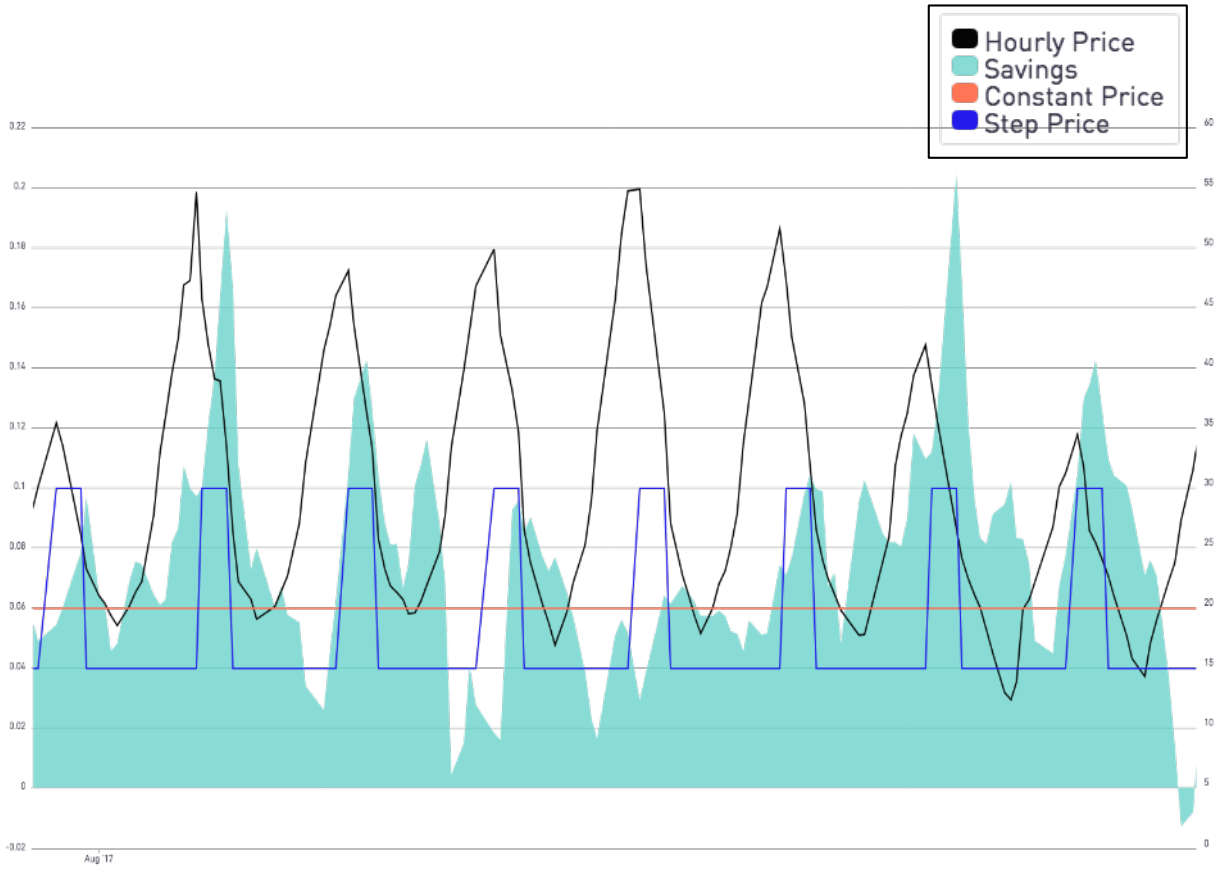
GEO Smart FINANCING CLEARINGHOUSE

Advancing Our Clean Economy

California Efficiency + Demand Management Council

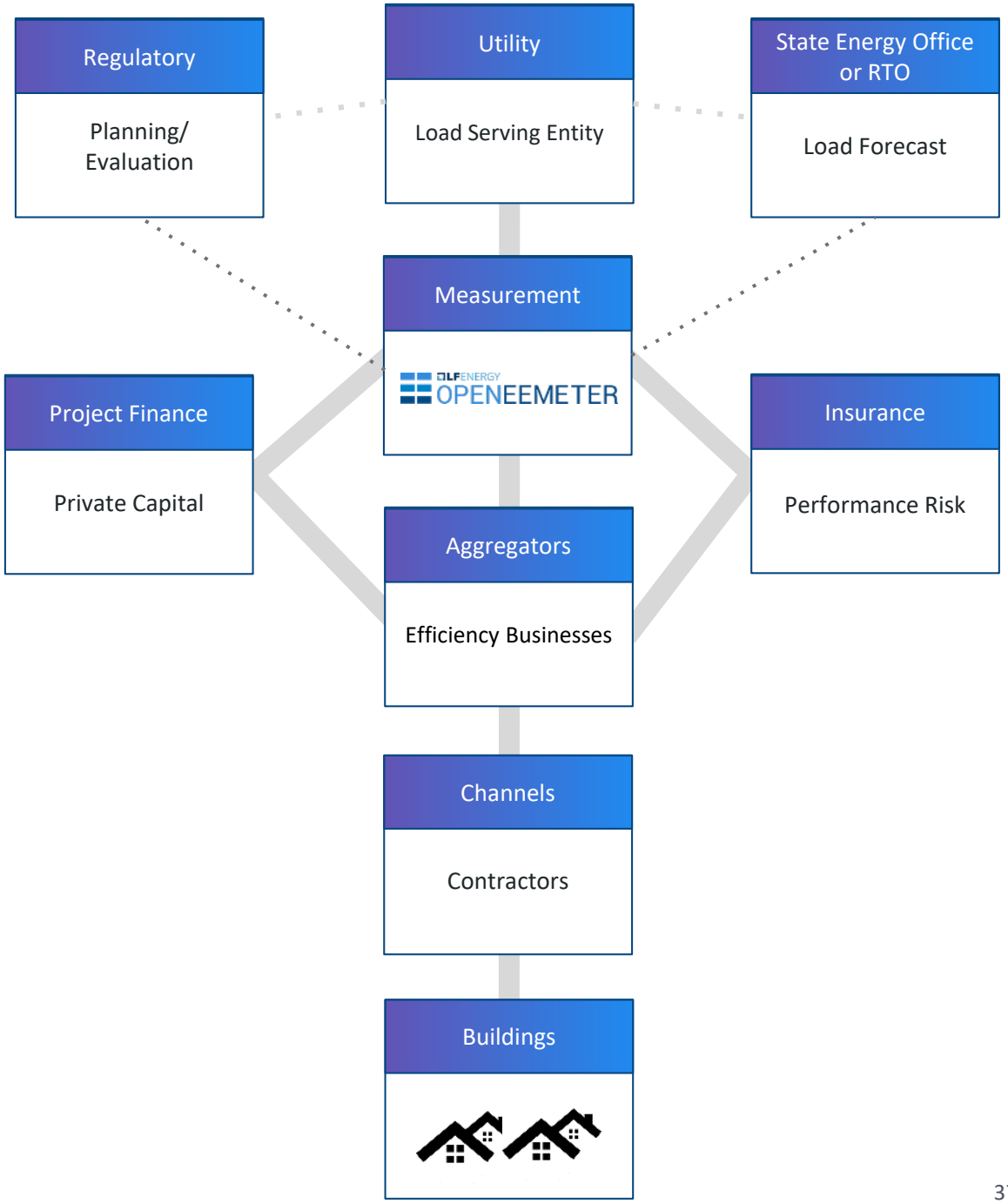
35

Paying for Performance When it Matters Most



- Savings Purchase Agreement (SPA)
- 3x Kicker for summer savings from 4pm to 9pm
- Payments based on CalTRACK / OpenEEmeter

Scalable Structures and Private Capital



Project Finance: The long-term financing of projects based upon projected cash flows rather than the balance sheets of its sponsors.

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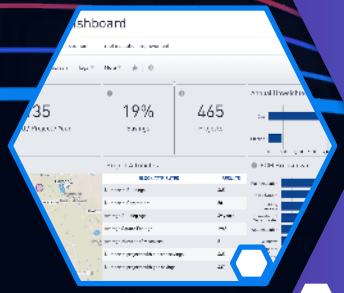


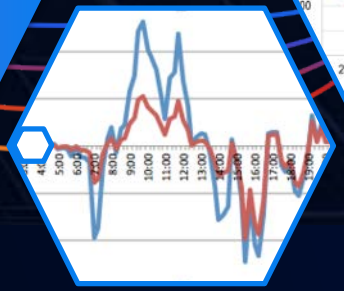
Pay for Performance

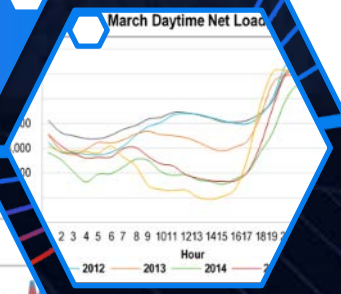
Demand Flexibility

Procurement

Resource Curve

Metered Flexiwatt





Carmen Best

carmen@recurve.com

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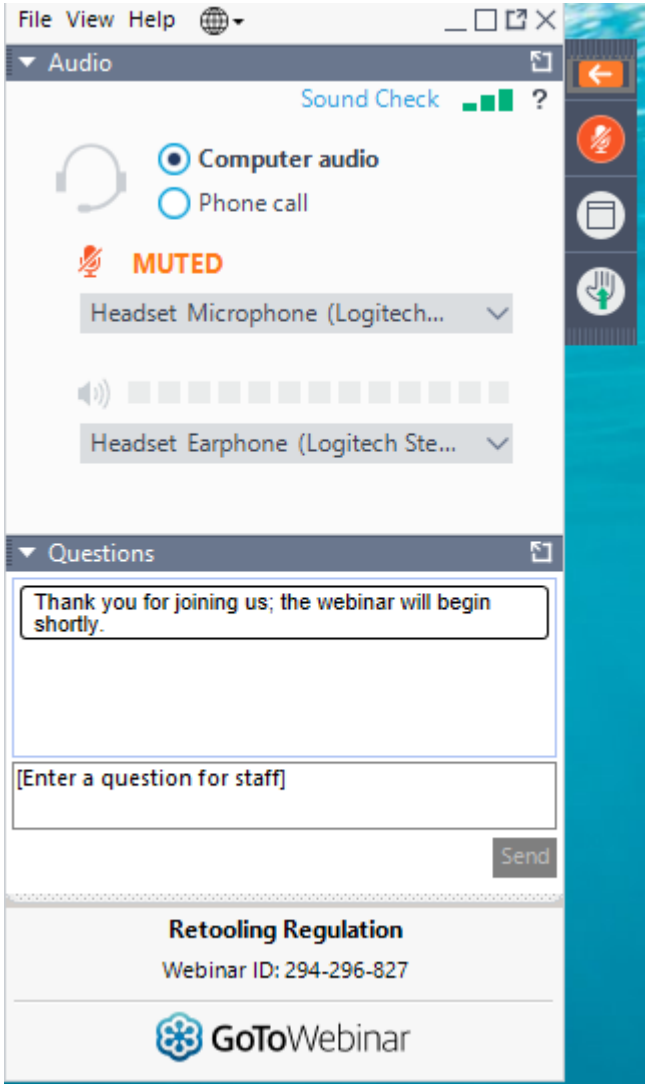

Free article downloads TODAY ONLY at: https://www.raponline.org/blog/clean-flexible-and-efficient-a-recipe-for-energy-optimization/

Key Takeaways

1. Development of new clean energy technologies is no longer our biggest challenge.
2. Energy optimization is the bigger challenge.
3. Traditional approaches to EE need to evolve.
4. Focus on buildings.
5. Treat EE comparably to other energy resources.

Resources

- https://www.sciencedirect.com/journal/the-electricity-journal/vol/32/issue/7
- raponline.org
  - https://www.raponline.org/blog/clean-flexible-and-efficient-a-recipe-for-energy-optimization/
- aceee.org
- neep.org
- recurve.com

About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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