Clean Coalition

Making Clean Local Energy Accessible Now

Peninsula Advanced Energy Community (PAEC)

Innovative approaches to energy efficiency retrofits

Photo: Berkeley Labs

Kim Springer, San Mateo County
Rachael Londer, San Mateo County
Andy Jain, San Mateo County
Ann Edminster, Design AVEnues

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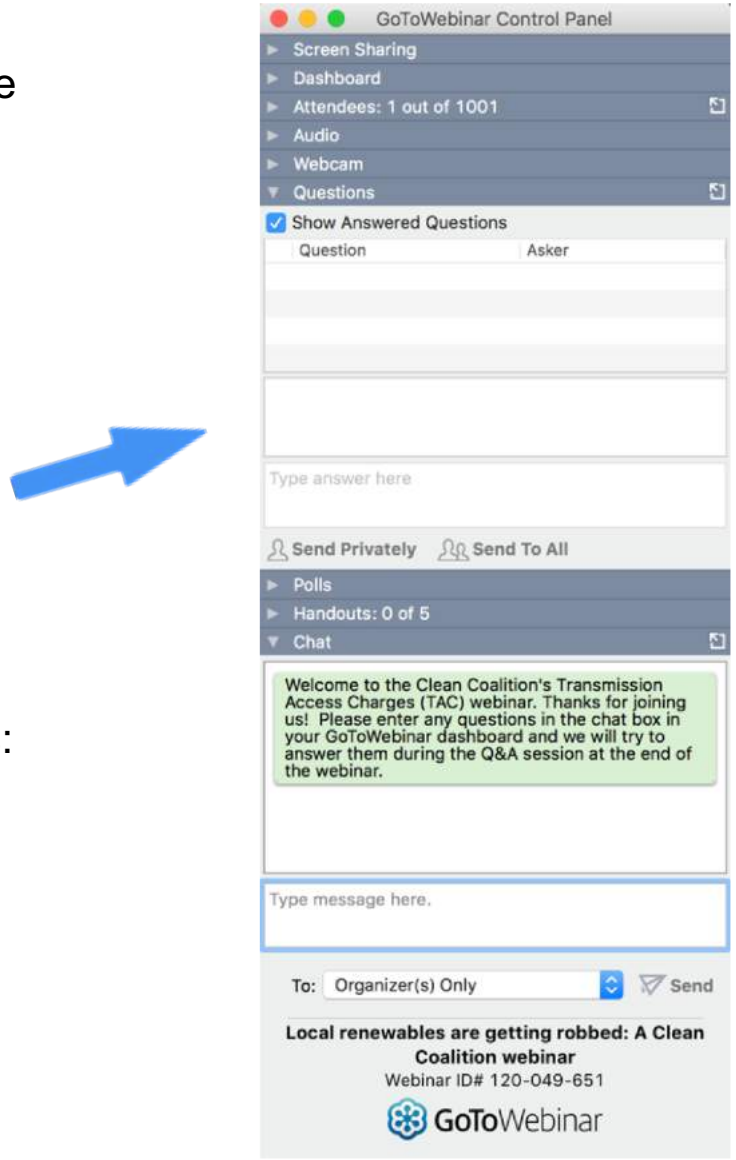
- All webinars are archived on www.clean-coalition.org and the Clean Coalition's YouTube channel
- Submit questions in the Questions window at any time (window view varies by operating system and browser)
- Questions will be answered during the Q&A portion of the webinar
- Contact Josh for webinar questions: josh@clean-coalition.org



Today's presenters

Kim Springer
San Mateo County
Office of Sustainability
kspringer@smcgov.org

Rachael Londer
San Mateo County
Office of Sustainability
rlonder@smcgov.org

Andy Jain
San Mateo County Office of Sustainability
ajain@smcgov.org

Ann Edminster
Design AVEnues
ann@annedminster.com

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COUNTY OF SAN MATEO

Innovative Approaches to Energy Efficiency Retrofits

Topics for today's webinar

Background and Overview:

- County of San Mateo / OOS
- County's scope of work for Peninsula Advanced Energy Community

Presentations:

- Green lease principles and language that help building owners and tenants share the benefits and costs of energy efficiency upgrades
- The financial case for building management systems

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County of San Mateo, Office of Sustainability

Solving For Tomorrow

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Energy and Water Programs

- Energy Watch
- BayREN
- Groundwater
- Stormwater
- Water Conservation

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Lease Language
Issue and Opportunity

Split Incentive

- Implementation of capital improvements, end up yielding energy savings that result in one party paying for improvements while the other party receives the benefits of reduced utility costs.
- How do you create a lease that is attractive to, and benefits both parties?

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Process of Study

1. Collect samples of any existing “green” lease language
2. Review and select best example as a baseline to work from
3. Find practitioners (lawyers, property owners and managers) that integrate language that resolves the split incentive issue
4. Share the baseline example hold a lease language “round table” event
5. Integrate the outcome of the discussion into new language samples

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Lease Language Reviewed

Title	Agency	Year
Energy Efficiency Lease Guidance Owners Pedge Property Manager's Pledge Tenant Pledge Energy Aligned Lease Model	NRDC NRDC NRDC NRDC NRDC	2011
Green Lease Guide	BOMA - RIMA	2012
Commercial Energy Policy Toolkit – Green Leasing	ICLEI - IMT	2012
Memorandum: Green Lease Policies and Procedures for Lease Acquisition High Performance Lease Criteria and Sample Lease Language	GSA GSA	2007
Energy Efficiency in Separate Tenant Spaces - A Feasibility Study	DOE	2016
Portland's Green Tenant Improvement Guide	City of Portland	2010
Retail Green Leasing	IMT	
Sustainable Incentive Best Practices	SDUPD CSE	2016

Take-Aways

Good:

- Most mentioned sub-metering
  - Step in the right direction

Not so good:

- Limited specific reference to energy
  - Mainly Energy Star or Portfolio Manager
- Most were outdated by current Code
  - Daylighting sensors, LED, etc.

Little that will get us to our Advanced Energy Community or allow us to address our existing building stock.

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Selected Model

NRDC - Energy Efficiency Lease Guidance

- Language, in terms of layout, was close to what we intended to write for our report
- The NRDC document did not appear to be widely adopted by the current market
- Discussion starter for Round Table

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Green Lease Language Round Table

Held May 2017

- Simple format - facilitated discussion
- Review of sections of NRDC language to gain feedback
- Discover new language to promote collaboration between tenants and landlords, on EE
- The discussion lasted 3 ½ hours

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Learnings

1. There is a lack of education on how to sell energy efficiency and renewable energy in leased space situations. Education is key to knowing how to gain buy-in from landlords, tenants, and brokers.

2. Boiler plate language isn't necessarily the right pathway, as leases are too nuanced, and a "one size fits all" is not the best approach to resolving the issue.

3. Lease language should explicitly provide language that benefits both parties.

4. A modified Gross Lease is the best format for resolving the split incentive issue.

5. A Letter of Intent (LOI) is a good starting point for setting the "deal".

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LOI Language

Both the tenant and landlord will fully participate in a meeting together to determine the energy use and management plan of the building, with the goal of operating the building as efficiently as possible. This meeting will distinguish how an energy baseline will be created, how energy use will be monitored, and identify a third-party contractor to establish energy use data. The contract will identify energy efficiency projects that have shared economic and environmental benefit for both the landlord and tenant.

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Guiding Principles

1. Landlord and tenant should operate the building as efficiently as possible
2. Shared benefit to both landlord and tenant
3. Consumption and Demand for resources should be measurable and transparent to both parties
4. Education helps both parties understand benefits

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Conclusion

To support a transition to EE or ZNE:

- Though all real estate rental agreements are unique, a gross lease (or modified gross lease) is preferred so tenant and landlord can share savings and other benefits.

- Saving or other benefits should be shared. For example, typically a tenant should receive a reduced monthly rental cost, and a landlord will realize increased property value.

- A Letter of Intent (or language in a Letter of Intent) is a good vehicle for establishing the energy use and savings is part of the lease transaction, prior to negotiations.

- Meeting time should take place, specifically to address energy and to establish a "starting point" for lease language. The meeting should include a discussion about:
  - understanding of energy efficiency goals
  - how a baseline or benchmark will be established
  - what building or operating systems will be monitored for data collection and on what cycle
  - agreement to establish a 3rd party to collect and share energy use data
  - a schedule for building retrocomissioning
  - sharing of costs and saving from energy efficiency projects and changes in energy use

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Other Resources

US DOE – Green Lease Impact Potential, 2017

Rocky Mountain Institute – Best Practices NZE Buildings, 2018

Institute for Market Transformation – Green Lease Library, various

US DOE – Promoting Solar PV on Leased Buildings Guide, 2015

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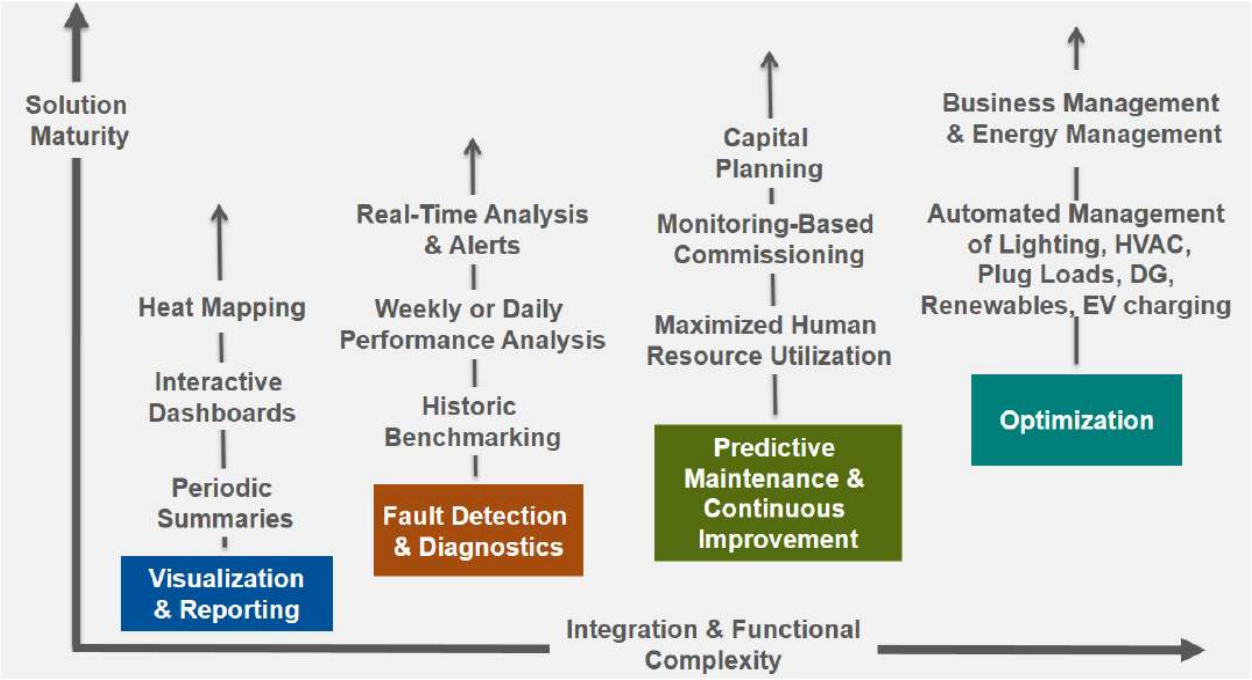
Building Energy Management and Control Systems

IT-based monitoring and control systems that tie into existing energy-related data streams of a building's infrastructure, such as its heating, ventilation, and air conditioning (HVAC) and lighting systems, and provide visualization and analysis of that data to enable better energy-related decision-making



(Source: Navigant Research)

Opportunities

- 60% of large commercial properties utilize BEMCS
- 22% of medium sized commercial properties utilize BEMCS
- 2% of small buildings utilize a BEMCS

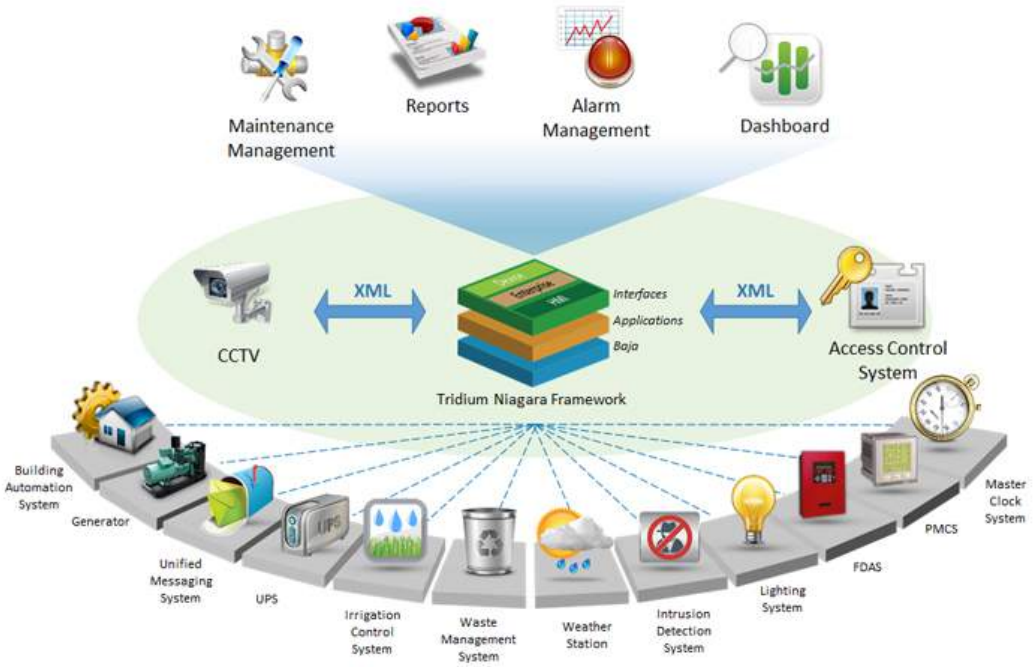
California Commercial Saturation Survey, CPUC, available at http://www.calmac.org/publications/California_Commercial_Saturation_Study_Report_Finalv2ES.pdf

Financial Case

- Reduce maintenance and equipment failure costs
- Reduce demand charges
- Higher rental value
- Individual tenant billing for energy costs and services
- Real time data can provide insight for cost-effective upgrades

Building Energy Management and Control Systems at San Mateo County

Andy Jain, PE, CEM, LEED AP
Energy Manager, County of San Mateo



Selecting and Specifying EMCS

- Compared various available EMCS and standardized on Tridium Niagara due to:
  - Non-Proprietary
  - Integrates with other systems such as lighting, Security etc.
  - Multiple controls contractors for installation and service
  - Parts, service, and building engineer training
- Standardized on strict specification using open communication protocol (BACnet) that focused on:
  - Most efficient sequence of operations that are advanced but need facility engineers to be trained
  - Provide easy to use graphics, trends, alerts and alarms
  - Commissioning that used functional testing
- Small Building Controls using wireless thermostat controls (Pelican)

Benefits and Challenges of using EMCS

- Scheduling operating hours, holidays and special events
- Remote monitoring, controls and trouble shooting
- Energy Dashboards with meters connected to EMCS
- Using Alerts and Alarms for maintenance
- Integrating lighting, Solar, CoGen and other systems on a common graphical floor plan
- Using Automated Demand Response
- Facility staff training is key
- EMCS systems need to calibrated, maintained

EMCS Upgrade Case Studies

Hall of Justice (1955 & 1968) – 300,000 sf office Building.

- In 2012, Replaced Robertshaw Pneumatic controls with Tridium Niagara/Invensys DDC controls
- Project Cost: $1.5M, Project Duration: 1.5 years, PG&E Rebate: $108,000
- Electric use decreased by 13%,
- Gas use decreased by 82%,
- GHG emission decreased by 55% (1477 Metric Tons of CO_2)
- Annual utility cost decreased by 32% ($278,778)
- Earned Energy Certification
- Reduced Maintenance calls

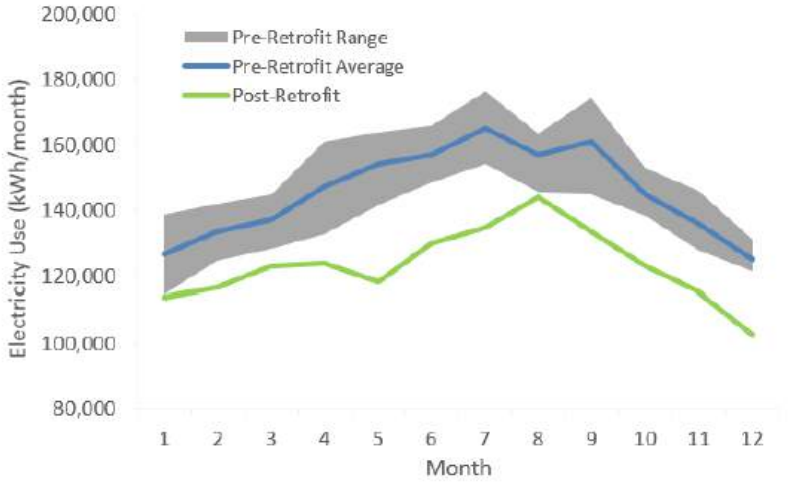
EMCS Upgrade Case Studies

County Office Building 2 (1999) – 150,000 sf office Building.

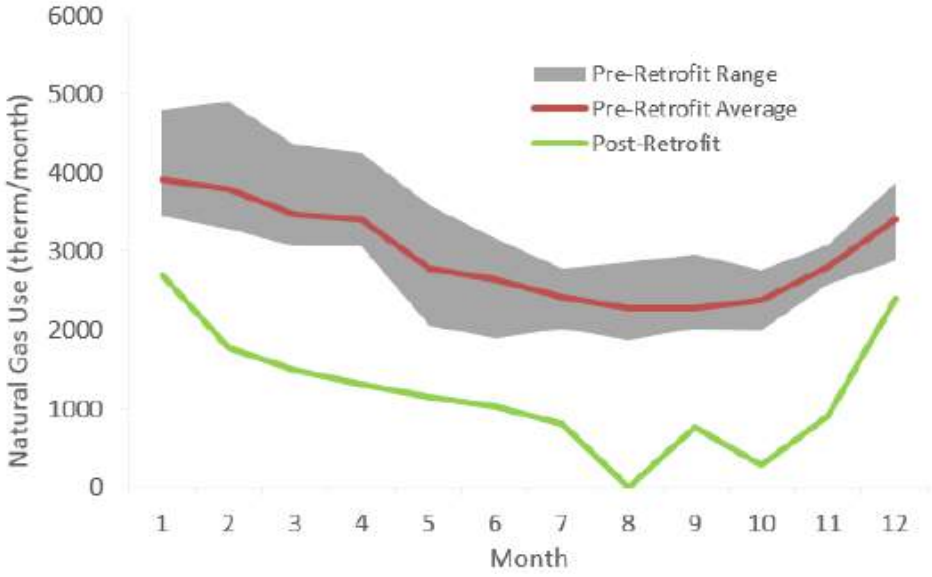
- In 2015, Upgraded Delta control system with Tridium Niagara/Distech DDC controls with advanced sequence of operations and commissioning
- Project Cost: $450,000, Project Duration: 1 year
- Electric use decreased by 15%,
- Gas use decreased by 56%,
- GHG emission decreased
- Annual utility cost decreased by $50,000
- Earned Star Score Improved
- Easy to use graphics, trends and reports

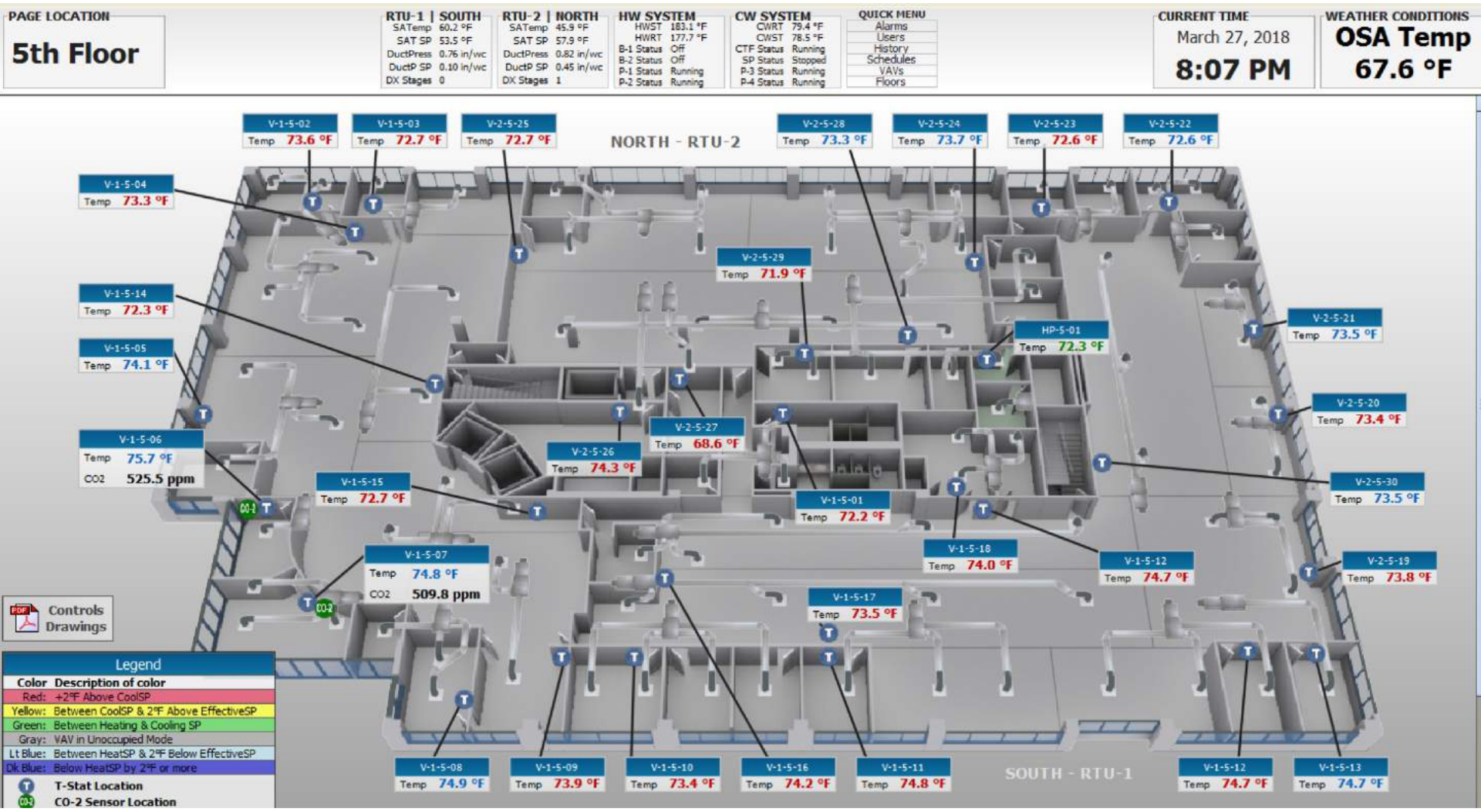
Gas & Electric Savings in COB2

Electric Savings



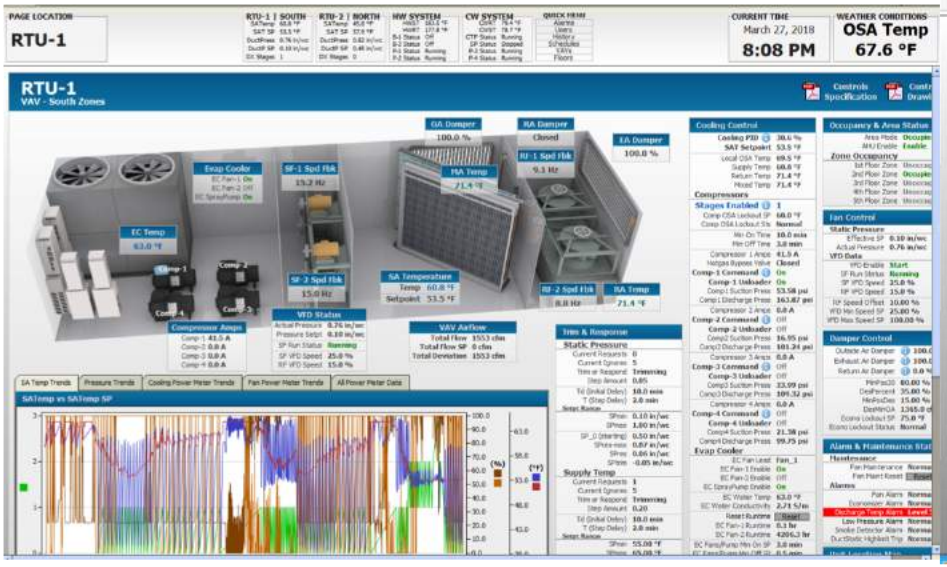
Gas Savings



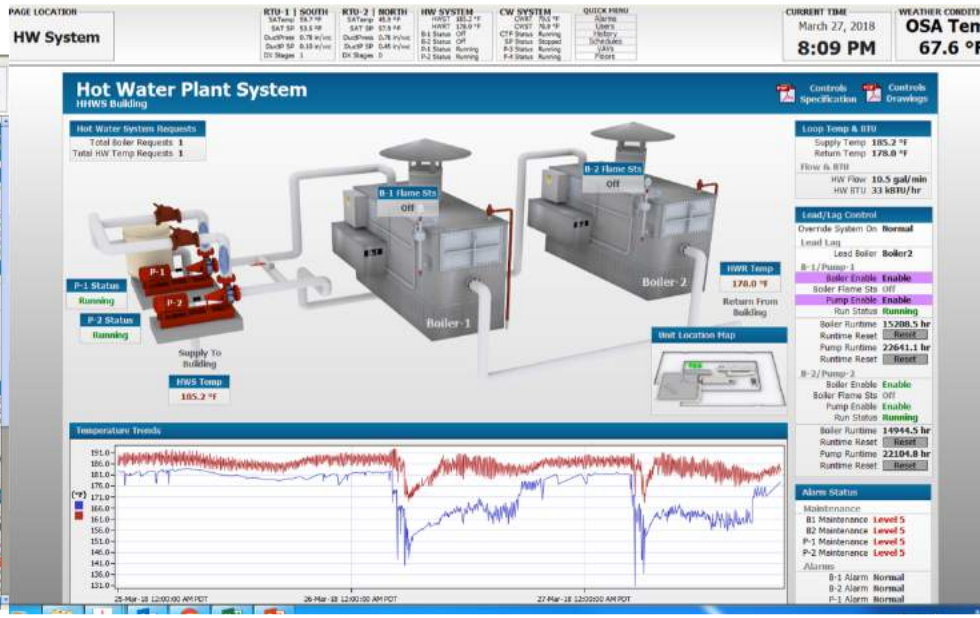

PAGE LOCATION
5th Floor
RTU-1 | SOUTH
SATemp 60.2 °F
SAT SP 53.5 °F
DuctPress 0.76 in/wc
DuctP SP 0.10 in/wc
DX Stages 0
RTU-2 | NORTH
SATemp 45.9 °F
SAT SP 57.9 °F
DuctPress 0.82 in/wc
DuctP SP 0.45 in/wc
DX Stages 1
HW SYSTEM
HWST 183.1 °F
HWRT 177.7 °F
B-1 Status Off
B-2 Status Off
P-1 Status Running
P-2 Status Running
CW SYSTEM
CWRT 79.4 °F
CWST 78.5 °F
CTF Status Running
SP Status Stopped
P-3 Status Running
P-4 Status Running
QUICK MENU
Alarms
Users
History
Schedules
VAVs
Floors
CURRENT TIME
March 27, 2018
8:07 PM
WEATHER CONDITIONS
OSA Temp
67.6 °F
NORTH - RTU-2
SOUTH - RTU-1
V-1-5-02 Temp 73.6 °F
V-1-5-03 Temp 72.7 °F
V-2-5-25 Temp 72.7 °F
V-2-5-28 Temp 73.3 °F
V-2-5-24 Temp 73.7 °F
V-2-5-23 Temp 72.6 °F
V-2-5-22 Temp 72.6 °F
V-1-5-04 Temp 73.3 °F
V-2-5-29 Temp 71.9 °F
V-1-5-14 Temp 72.3 °F
V-1-5-05 Temp 74.1 °F
HP-5-01 Temp 72.3 °F
V-2-5-21 Temp 73.5 °F
V-2-5-20 Temp 73.4 °F
V-1-5-06 Temp 75.7 °F CO2 525.5 ppm
V-2-5-27 Temp 68.6 °F
V-2-5-26 Temp 74.3 °F
V-1-5-15 Temp 72.7 °F
V-2-5-30 Temp 73.5 °F
V-1-5-01 Temp 72.2 °F
V-1-5-18 Temp 74.0 °F
V-1-5-12 Temp 74.7 °F
V-2-5-19 Temp 73.8 °F
V-1-5-07 Temp 74.8 °F CO2 509.8 ppm
V-1-5-17 Temp 73.5 °F
V-1-5-08 Temp 74.9 °F
V-1-5-09 Temp 73.9 °F
V-1-5-10 Temp 73.4 °F
V-1-5-16 Temp 74.2 °F
V-1-5-11 Temp 74.8 °F
V-1-5-12 Temp 74.7 °F
V-1-5-13 Temp 74.7 °F
Controls Drawings
Legend
Color Description of color
Red: +2°F Above CoolSP
Yellow: Between CoolSP & 2°F Above EffectiveSP
Green: Between Heating & Cooling SP
Gray: VAV in Unoccupied Mode
Lt Blue: Between HeatSP & 2°F Below EffectiveSP
Dk Blue: Below HeatSP by 2°F or more
T-Stat Location
CO-2 Sensor Location

COB2 Mechanical Equipment

Roof Top VAV Unit



Boiler Plant



What's Next

- Web-based Automated Fault Detection and Diagnosis
- Web-based Energy Monitoring and Dashboards for reporting and analysis
- Integrating EMCS with CMMS systems for preventive maintenance

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THANK YOU!
Questions?

Kim Springer
kspringer@smcgov.org

Innovative Approaches to Encouraging Energy Efficiency

New & Existing Homes

for Advanced Energy Communities

Building for *tomorrow*, free of the compromise of today, because we all share the same home.

http://energiesprong.eu/

ANN V EDMINSTER
AVE DESIGN AVEnues LLC

Clean Coalition webinar
March 28, 2018

New & Existing Homes

for Advanced Energy Communities

1. Existing homes: the challenge
2. Energiesprong
3. Existing homes: the solution
4. Rebuilding Sonoma County as an advanced energy community

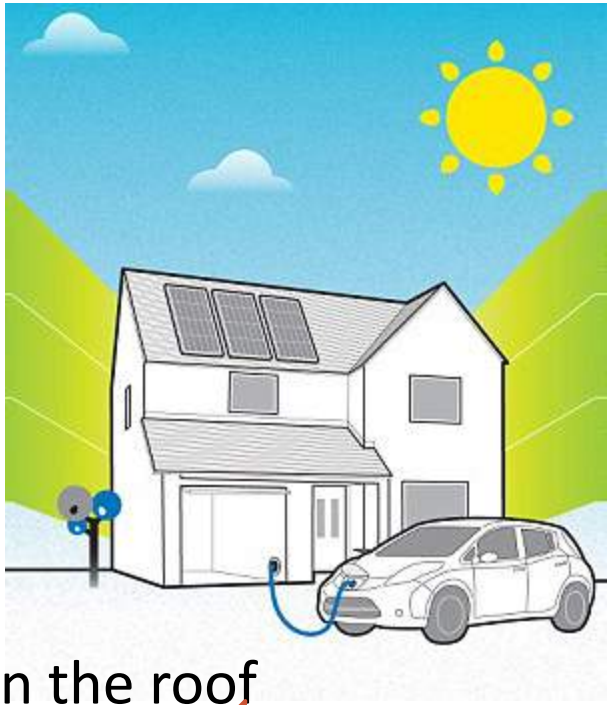
1 Existing Homes: the Challenge

Q: What does an "Advanced Energy Community" home look like?

A: It's super-efficient & all-electric

- **No more gas appliances**
  - **Water heater**
  - **Dryer**
  - **Furnace**
  - Stove
  - **Fireplace**

People get attached to these!



- It probably has photovoltaics (PVs) on the roof
- And a battery for load balancing
- And maybe an electric vehicle

cha-CHING!

Existing Homes: the Challenge

- Financial hurdles
  - Replacing stuff is expensive – especially when it's not broken!
- Timing
  - Wouldn't it be handy if everything broke at once?!
  - (But then it would be *really* expensive!)
- Too many solution providers
  - Who wants to deal with a bunch of different vendors, contractors, and installers?
- Disruption

  - Retrofitting insulation, electrical, etc.

2 Energiesprong

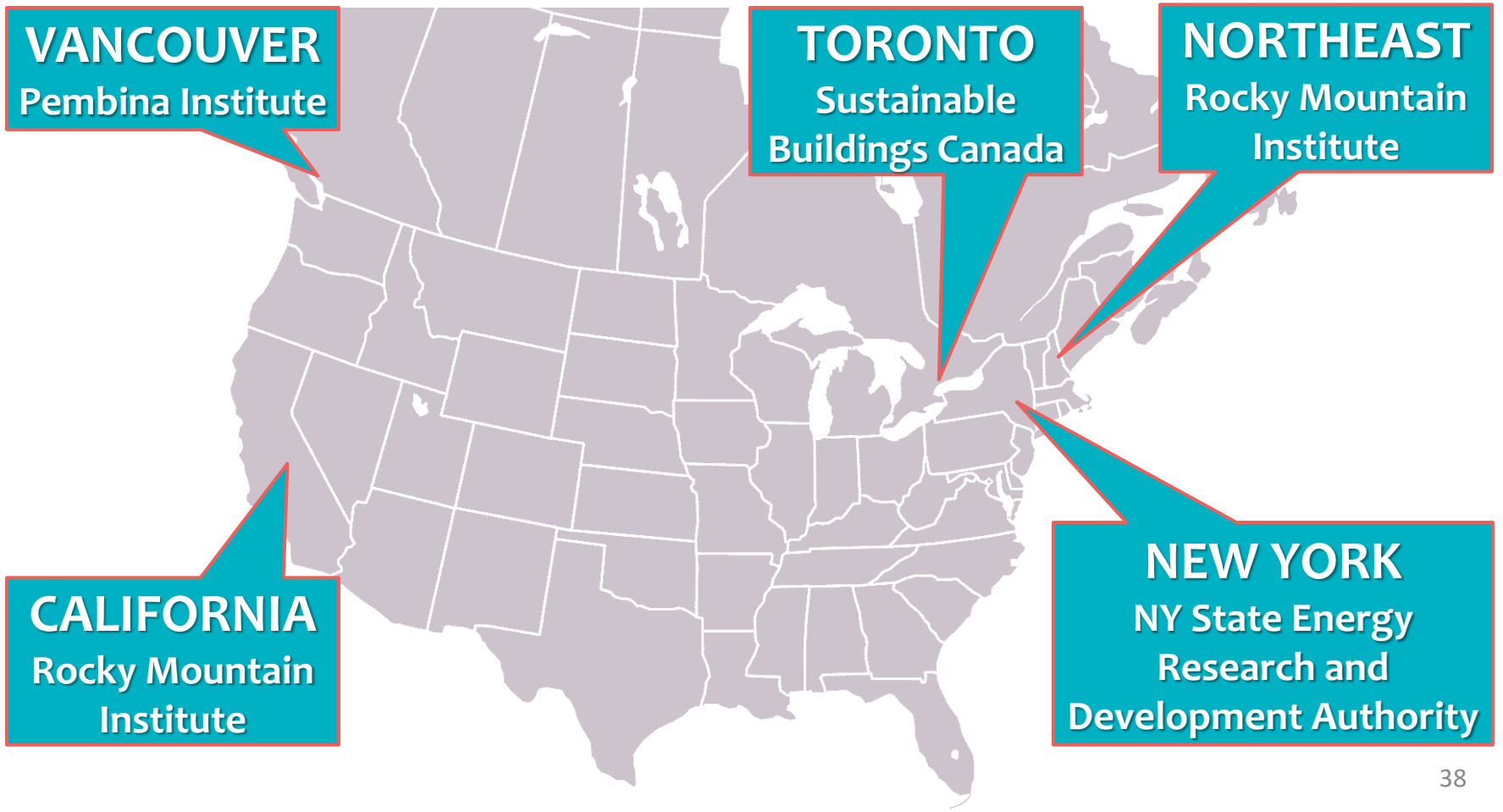
http://energiesprong.eu/

Energiesprong's Key Strategy

4 interdependent tactics:

- Aggregate mass demand from high-volume housing providers
- Attract service & supply partners capable of implementing an industrial approach
- Create new finance mechanism
- Address regulatory barriers

Energiesprong & Its Offspring



3 Existing Homes: the Solution

Follow Energiesprong's lead:

- Financing
  - "Pay as you save" (PAYS) model – savings from increased efficiency cover monthly finance cost
- Timing
  - Everything that's aging out *and/or*
  - Strategically phased implementation
- A single solution provider
  - One party designing, coordinating, installing … *and financing*
- Disruption
  - Minimized by industrial approach
  - Desirable improvements make it worthwhile

4 Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD INCENTIVES

- TIER 2: All Electric Home **$12,500**
  - 20% above code + all electric end uses
  - Design roof for additional structural loads associated with solar panels & add conduit for future installation
  - Electric vehicle charging station – equipment free from Sonoma Clean Power
- PLUS: Add solar **$5,000**
  - Solar panel system designed to fully offset annual electric usage *and*
  - Battery storage sufficient to hold 30% of one summer day's production *or*
  - Pre-purchase of 20-year premium on 100% local renewable power (EverGreen or SolarChoice)

https://sonomacleanpower.org/advancedenergyrebuild/

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code

- **Lower utility bills**
- **Improved comfort**
- **Reduced impact of rising energy costs**

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code
  - All electric end uses

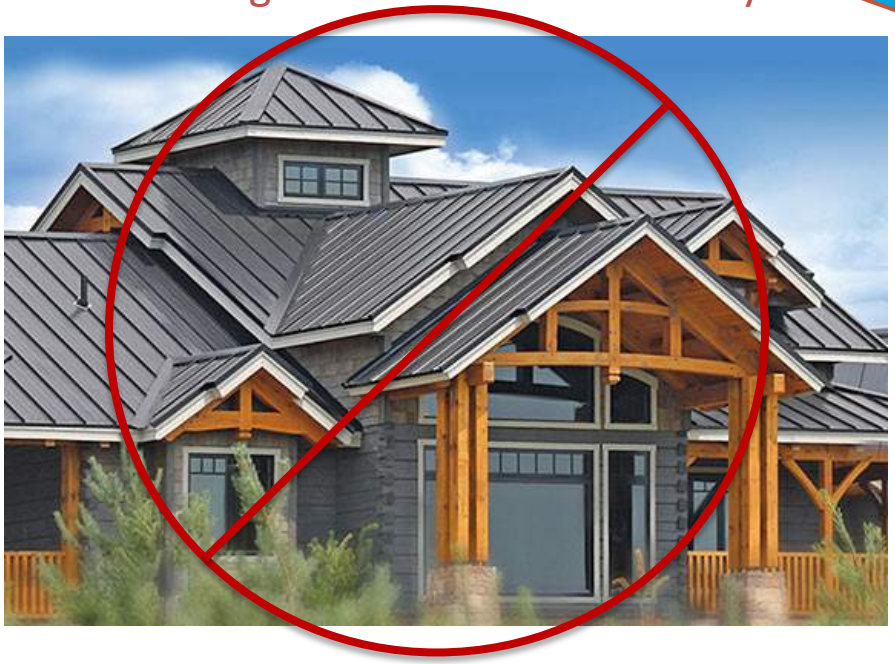
- **Improved indoor air quality**
- **Positive effect on respiratory health conditions**
- **Reduced risk of stove burns for children & elderly**
- **Easy cooking cleanup!**
- **Reduce risks from natural gas in earthquakes and fires**
- **Contribute to State's climate goals**

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code
  - All electric end uses
  - Roof designed for future solar array



- **Avoided costs & disruption of later retrofit**
- **Faster, cheaper, installation process**

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code
  - All electric end uses
  - Roof designed for future solar array
  - Free EV charging station

- **Ready for cheaper, cleaner transportation whenever you are**
- **Faster, cheaper, installation process**
- **Avoided cost of later retrofit**

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code
  - All electric end uses
  - Roof designed for future solar array
  - Free EV charging station
- PLUS: Add Solar
  - PVs to offset annual loads

- **Take advantage of federal tax credit before it disappears**

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code
  - All electric end uses
  - Roof designed for future solar array
  - Free EV charging station
- PLUS: Add Solar
  - PVs to offset annual loads
  - Battery storage

- **Store cheap energy from your roof to use during expensive peak periods**
- **Maintain critical functions during power outages**

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code
  - All electric end uses
  - Roof designed for future solar array
  - Free EV charging station
- PLUS: Add Solar
  - PVs to offset annual loads
  - Battery storage

  OR
  - EverGreen or Solar Choice contract

- **100% clean energy (and most of the benefits) without needing to install it yourself**

Rebuilding Sonoma County

as an Advanced Energy Community

ADVANCED ENERGY REBUILD BENEFITS

- TIER 2: All Electric Home
  - 20% above code
  - All electric end uses
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  - Free EV charging station
- PLUS: Add Solar
  - PVs to offset annual loads
  - Battery storage

  OR
  - EverGreen or SolarChoice contract

- **Set up to participate in a community microgrid with addition of "smart" devices and controls**
- **Contribute to local resiliency**
- **Demonstrate a new model for clean, safe energy delivery**

AnnEdminster.com

Questions?

For questions and assistance, contact:

Josh Valentine

Communications Manager, Clean Coalition

josh@clean-coalition.org