

2017 Sustainability Speaker Series

May 31, 2017



Sponsored by City of Sunnyvale and the Sustainability Commission



New Energy Choices

Introducing Silicon Valley Clean Energy

May 2017

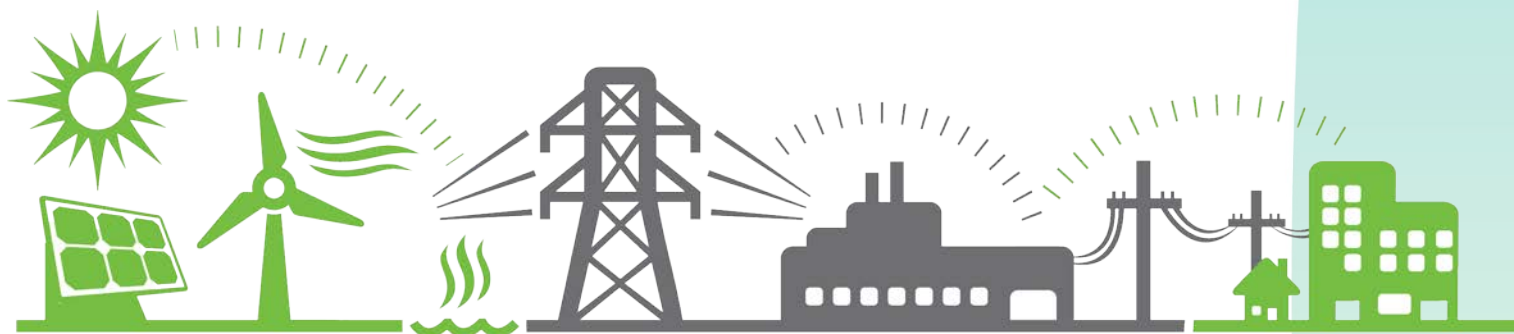


Introducing SVCE

- A new Community Choice Energy agency formed by 12 local communities to:
 - source cleaner electricity at more competitive rates
 - reduce carbon emissions and benefit the environment
 - offer new customer choices, and local economic benefits
- Service launched April 3, 2017



How does it work?



SOURCE



SVCE

buying and
building energy
supplies

DELIVERY



PG&E

delivering energy,
repairing lines,
serving customers

CUSTOMER



YOU

benefitting from
cleaner energy,
local control

SVCE Organization and Governance

- Serving 220,000 residential and 28,000 commercial customers
- Small full-time staff
- Public board meetings monthly at 7pm on second Wednesdays, Cupertino Community Hall



Rob Rennie, Chair
City of Los Gatos

Daniel Harney, Vice Chair
City of Gilroy

Liz Gibbons
City of Campbell

Rod Sinks
City of Cupertino

Jeannie Bruins
City of Los Altos

Courtenay Corrigan
Town of Los Altos Hills

Burton Craig
City of Monte Sereno

Steve Tate
City of Morgan Hill

Margaret Abe-Koga
City of Mountain View

Howard Miller
City of Saratoga

Jim Griffith
City of Sunnyvale

Dave Cortese
Santa Clara County

Where are the CCAs in CA located?



Emerging Communities:

San Jose, Monterey County, Alameda County, Santa Barbara County, San Luis Obispo County and many others.



Enrollment

- Customers are automatically enrolled in a CCA program
- Customers can “opt out” to stay with PG&E’s bundled service
- Customers receive at least four notices (2 pre- and 2 post-enrollment)



Your electricity service is about to get a lot greener!

Silicon Valley Clean Energy (SVCE) will soon be your official electricity provider, bringing you **100% carbon-free electricity at lower rates than PG&E**. SVCE serves homes and businesses in our local community. Because there are no shareholders, we reinvest revenue right here to keep rates low and promote local green energy projects.

You're in!

 **GreenStart**
100% Carbon-Free

In April 2017, you'll be automatically enrolled in SVCE GreenStart—you don't need to do a thing. Or, you can choose to upgrade to GreenPrime, providing 100% renewable energy. You can also opt out to remain entirely with PG&E.
SVCleanEnergy.org

¡Su servicio de electricidad está a punto de ser mucho más verde!

Electricidad 100% libre de carbono a precios más bajos que PG&E.

您的電力服務即將變得更加環保!

100% 無碳電力, 比PG&E更便宜



Electricity Choices



GreenStart

Your default option, 1% below comparable PG&E generation rates

- 100% carbon free
 - o 50% renewable energy
 - o 50% non-polluting hydroelectric energy



GreenPrime

Your voluntary option costs less than 1 penny more per kilowatt hour than GreenStart

- 100% renewable energy
- 100% carbon free

Sample Bill

PG&E **ENERGY STATEMENT**
www.pge.com/MyEnergy

Account No: 6632598009-3
Statement Date: 09/09/2015
Due Date: 09/30/2015

Service For:
Sparky Joule
123 Main Avenue
Los Altos, CA 94022

Questions about your bill?
24 hours per day, 7 days per week
Phone: 1-866-743-0335
www.pge.com/MyEnergy

Local Office Address
10900 N Blaney Avenue
Cupertino, CA 95014

Your Account Summary

Amount Due on Previous Statement	\$115.84
Payment(s) Received Since Last Statement	-115.84
Previous Unpaid Balance	\$0.00
Current PG&E Electric Delivery Charges	\$77.76
SVCE Electric Generation Charges	52.83
Current Gas Charges	16.22
Total Amount Due by 09/30/2015	\$146.81

Monthly Billing History

\$600			
\$450			

Daily Usage Comparison

1 Year Ago	Last Period	Current Period
27.03	17.96	20.06



- One bill from PG&E as always, with SVCE generation charges replacing PG&E generation charges

Cost Comparison Example – Small Commercial

SVCE GreenStart	PG&E	SVCE GreenPrime
50% RENEWABLE ENERGY	30% RENEWABLE ENERGY	100% RENEWABLE ENERGY
100% CARBON FREE	60% CARBON FREE	100% CARBON FREE
\$112.05 PG&E ELECTRIC DELIVERY	\$112.05 PG&E ELECTRIC DELIVERY	\$112.05 PG&E ELECTRIC DELIVERY
\$65.22 ELECTRIC GENERATION	\$86.08 ELECTRIC GENERATION	\$72.28 ELECTRIC GENERATION
\$20.00 PG&E ADDED FEES	\$0 PG&E ADDED FEES	\$20.00 PG&E ADDED FEES
\$197.27 AVERAGE TOTAL COST	\$198.13 AVERAGE TOTAL COST	\$204.33 AVERAGE TOTAL COST

Enrollment Phasing

April
2017



July
2017



Residential

20%

OF ACCOUNTS



Residential

100%

OF ACCOUNTS



**Small/Medium
Commercial**

100%

OF ACCOUNTS



**Large
Commercial**

100%

OF ACCOUNTS



Municipal

100%

OF ACCOUNTS



**Industrial &
Agriculture**

100%

OF ACCOUNTS

NEM Enrollment Schedule

- Automatic enrollment with SVCE will be based on your annual NEM true-up date, as shown below:

If your NEM true-up month is:	Your scheduled SVCE enrollment date is:
February, March or April 2017	Phase 1 - April 2017
May, June or July 2017	Phase 2 - July 2017
August, September or October 2017	Phase 3 - October 2017
November or December 2017, or January 2018	Phase 4 - January 2018

- More info about SVCE's NEM program available at SVCleanEnergy.org/solar

Summary

- New options for clean, renewable electricity at **competitive** rates
- Helping your community take **a big and immediate step** to reduce carbon emissions
- A locally governed agency supporting **clean energy investment, innovation and transformation** here in Santa Clara County



SVCE - where to learn more:



SVCleanEnergy.org



844-474-SVCE (7823)



Billing & Customer Service:

customerservice@svcleanenergy.org



General Info:

info@svcleanenergy.org



@SVCleanEnergy

Tackling the Ghosts in your Heating Closet

Eliminating Emissions from Fossil Energy Use in Homes



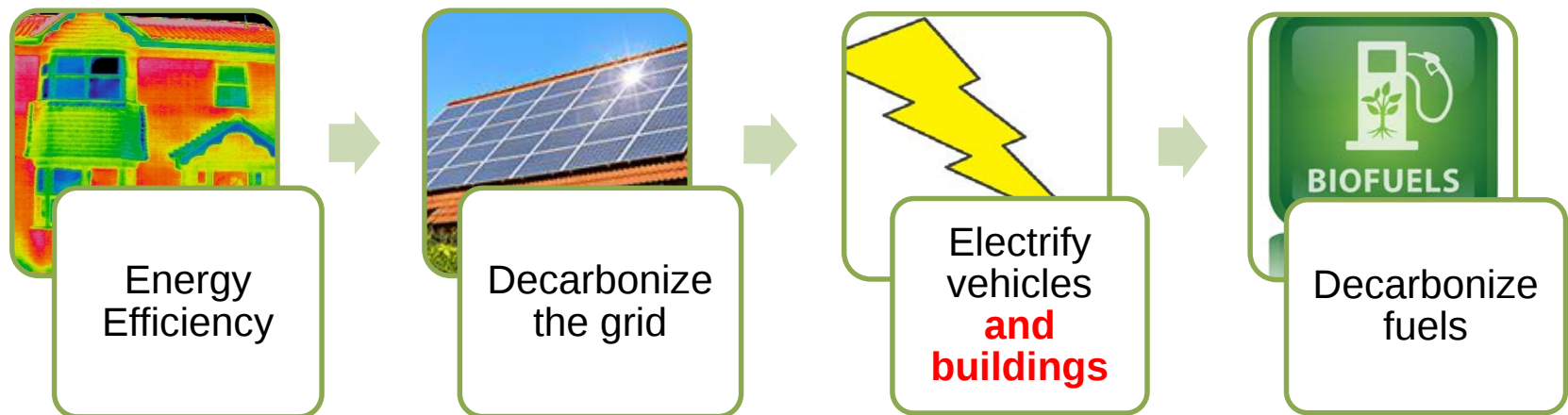
Pierre Delforge, NRDC

May 31 - Sunnyvale

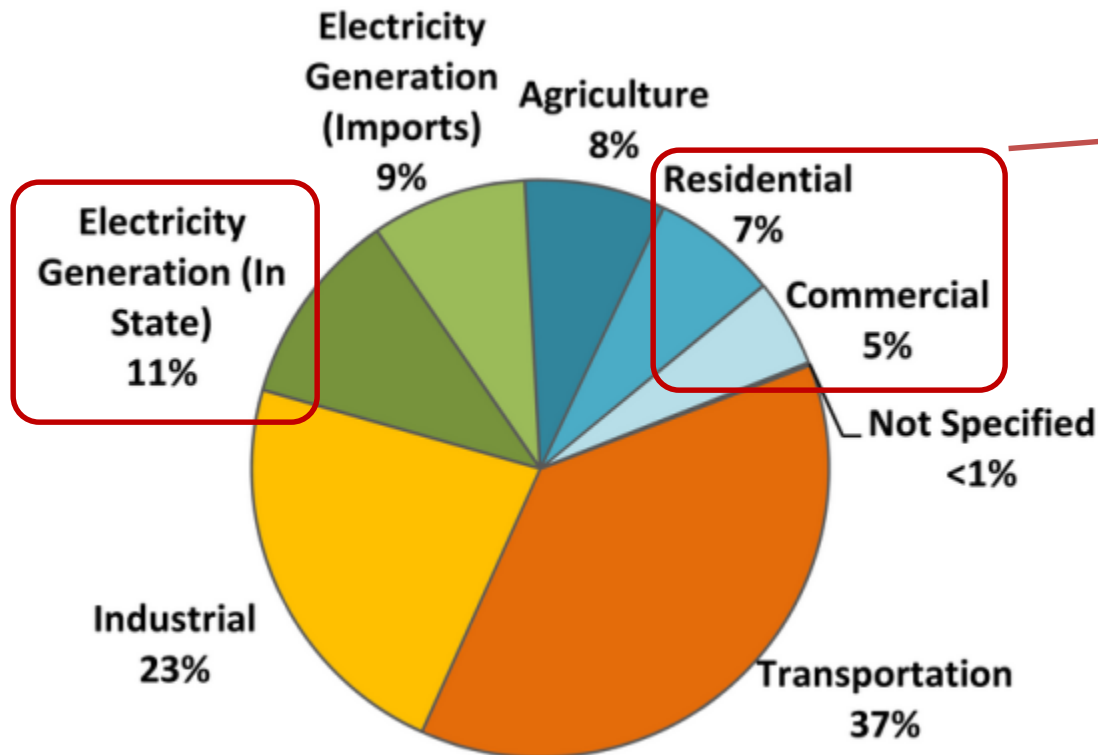
Building electrification in 80/50 decarbonization framework

To minimize climate change impacts, we need to reduce GHG emissions by **80%** by **2050** (below 1990)

80/50 Decarbonization Framework



Direct emissions from residential and commercial buildings $\approx$ emissions from all in-state power plants

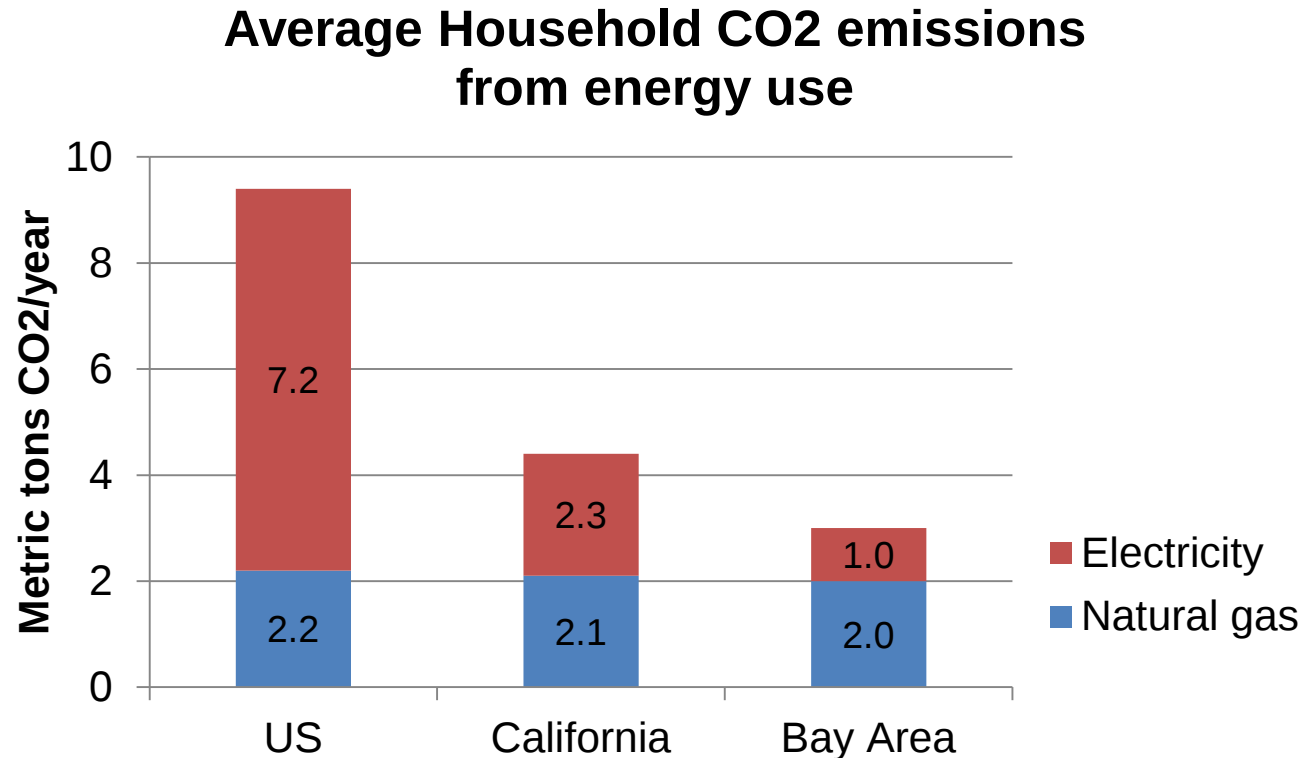


2013 Total CA Emissions: 459.3 MMTCO₂e

- In CA, 12% GHGs from residential and commercial buildings (mostly from natural gas burned for water and space heating)
- Similar to all in-state power plants!
- + fugitive emissions from gas distribution
- + gas use in industry

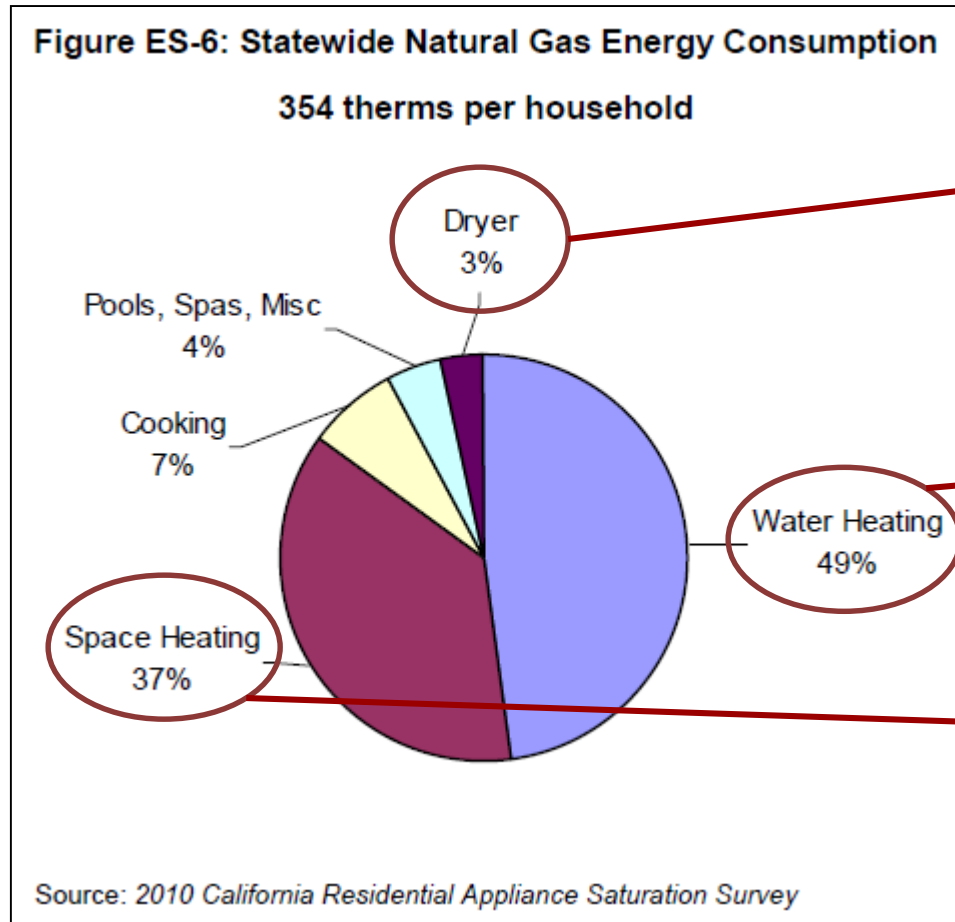
Source: www.arb.ca.gov/cc/inventory/data/data.htm

As electricity is getting cleaner, emissions from burning natural gas are becoming the majority of energy-related emissions from buildings



- Jones C., Kammen D., “Bay Area Consumption-Based Greenhouse Gas Emissions Inventory”, Jan. 2016, <http://www.baaqmd.gov/research-and-data/emission-inventory/consumption-based-ghg-emissions-inventory>
- Note including emissions from methane and other high global warming potential gases

Heat pump technology can electrify over 90% of thermal end uses



Heat-pump clothes dryer



Heat-pump water heater



Heat pump space heating

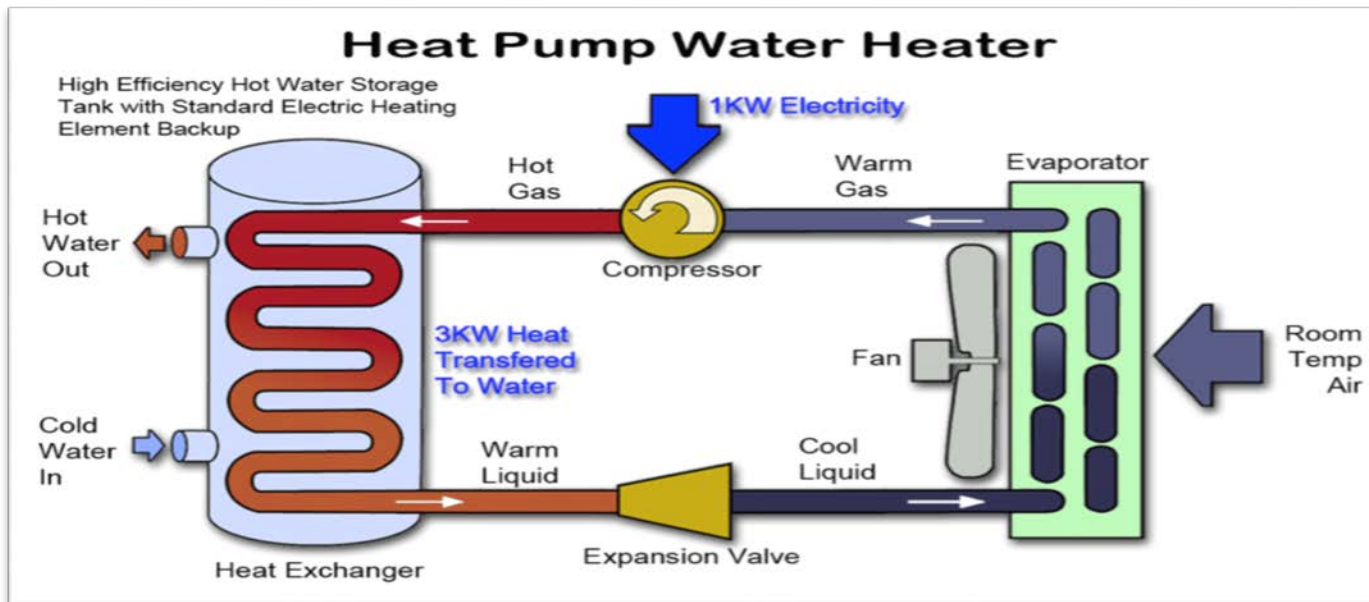


Heat pumps 101

Moves (or “pumps”) heat from ambient air into the tank or building, instead of generating it with a resistive element

Like a fridge or A/C in reverse

250-400% efficient!



Hybrids / pure heat pumps



Hybrid

- Switches to electric resistance backup below $\approx 35^{\circ}\text{F}$, or during high demand periods



Pure Heat Pump

- Higher capacity heat pump that operates at wider range of temperatures

Air source / ground source (“geothermal”)



Air-source

- Collects heat from ambient air
- Less efficient in cold weather (but cold climate models operate down to -20 F)
- Most common in CA



Ground-source (“geothermal”)

- Collects heat from the ground
- Higher efficiency at cold temperatures
- But much more expensive.
- Best for cold climates (e.g. mountain)

Heat pump water heating

Heat pump water heaters are a mature technology with a wide range of affordable models in the market

Popular models:



AO Smith



Bradford
White



Rheem



Stiebel
Eltron



Sanden



100+ ENERGY STAR models

Heat pump space heating

Heat pumps provide both heating and cooling (replace A/C)

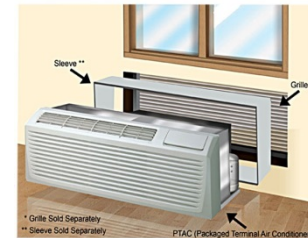
Three main types of heat pumps for residential space heating and cooling:



Central heat pump



Ductless heat pump
("Mini-split")



Packaged terminal
heat pump (PTHP)

Multi-family and commercial too!



Water heating:

- ☐ Unitary, as in single family
- ☐ Centralized: larger tank, shared between multiple units

Space heating:

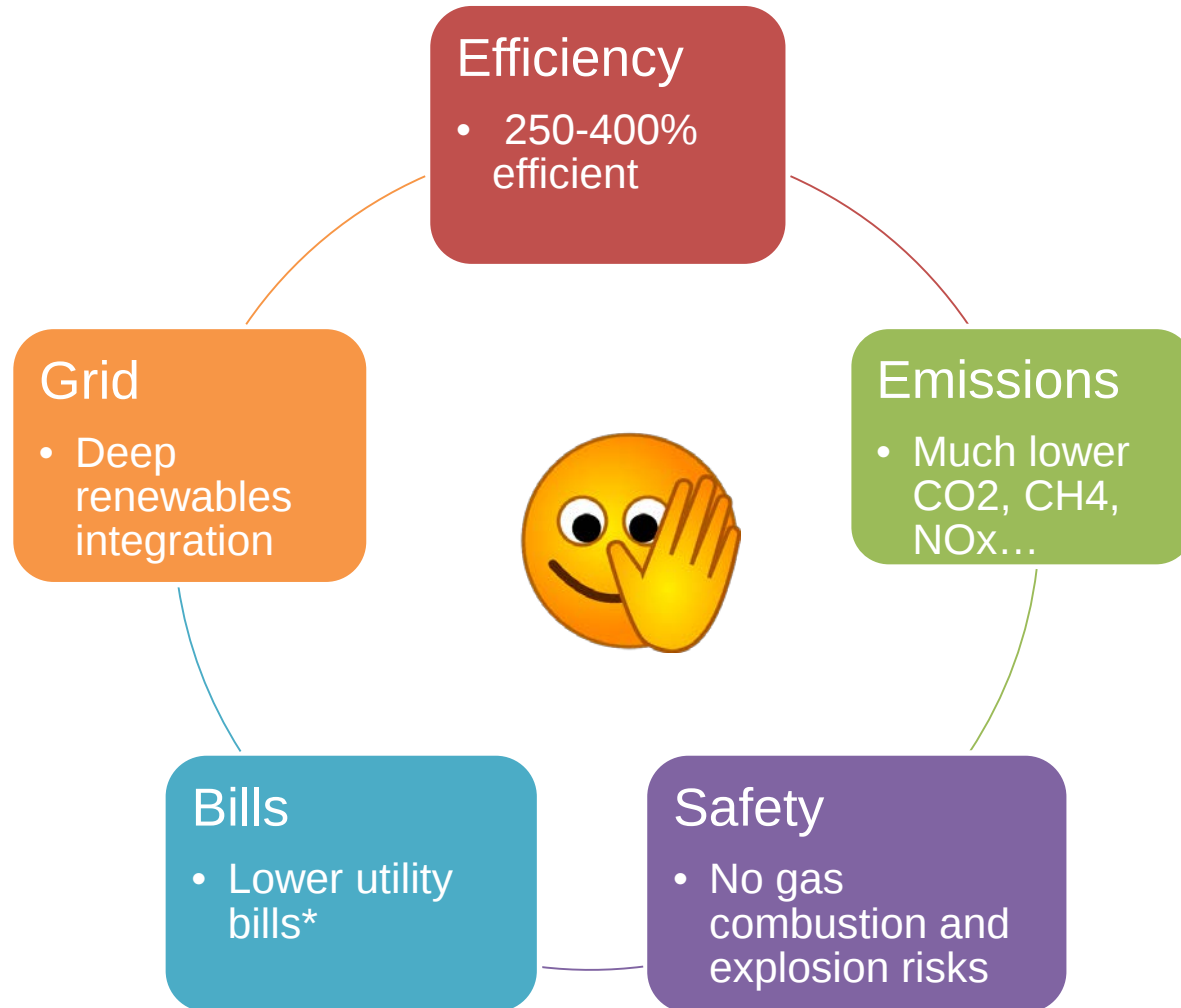
- ☐ Central heat pump
- ☐ Mini-split
- ☐ Packaged-terminal

How about solar thermal?

- ❑ GHGs roughly similar to heat pumps (need gas or electric backup in winter)
- ❑ Currently much more expensive than HPWH + PV
- ❑ Costs need to come down significantly to be able to scale up

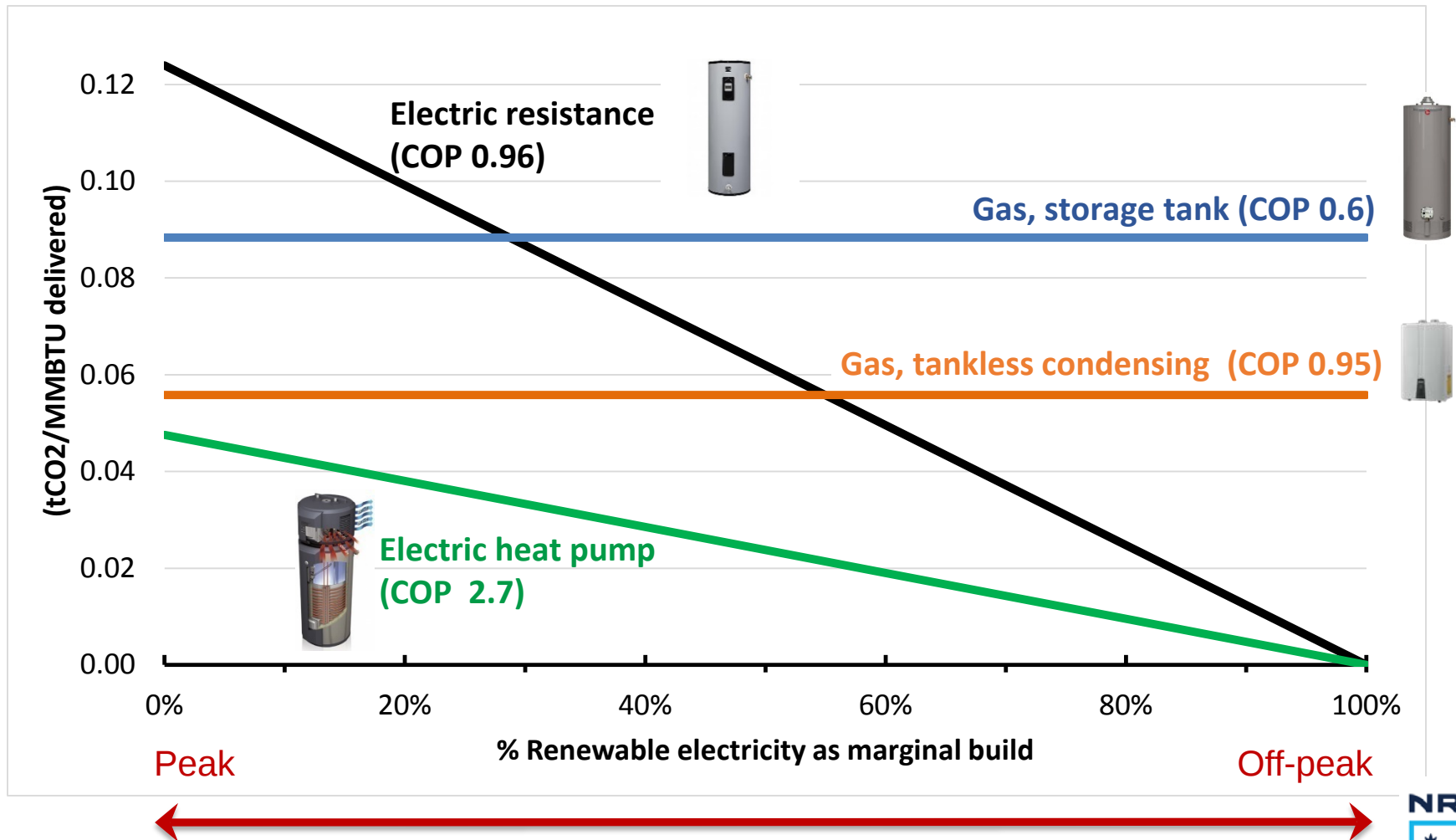


Benefits: high-five for heat pumps!



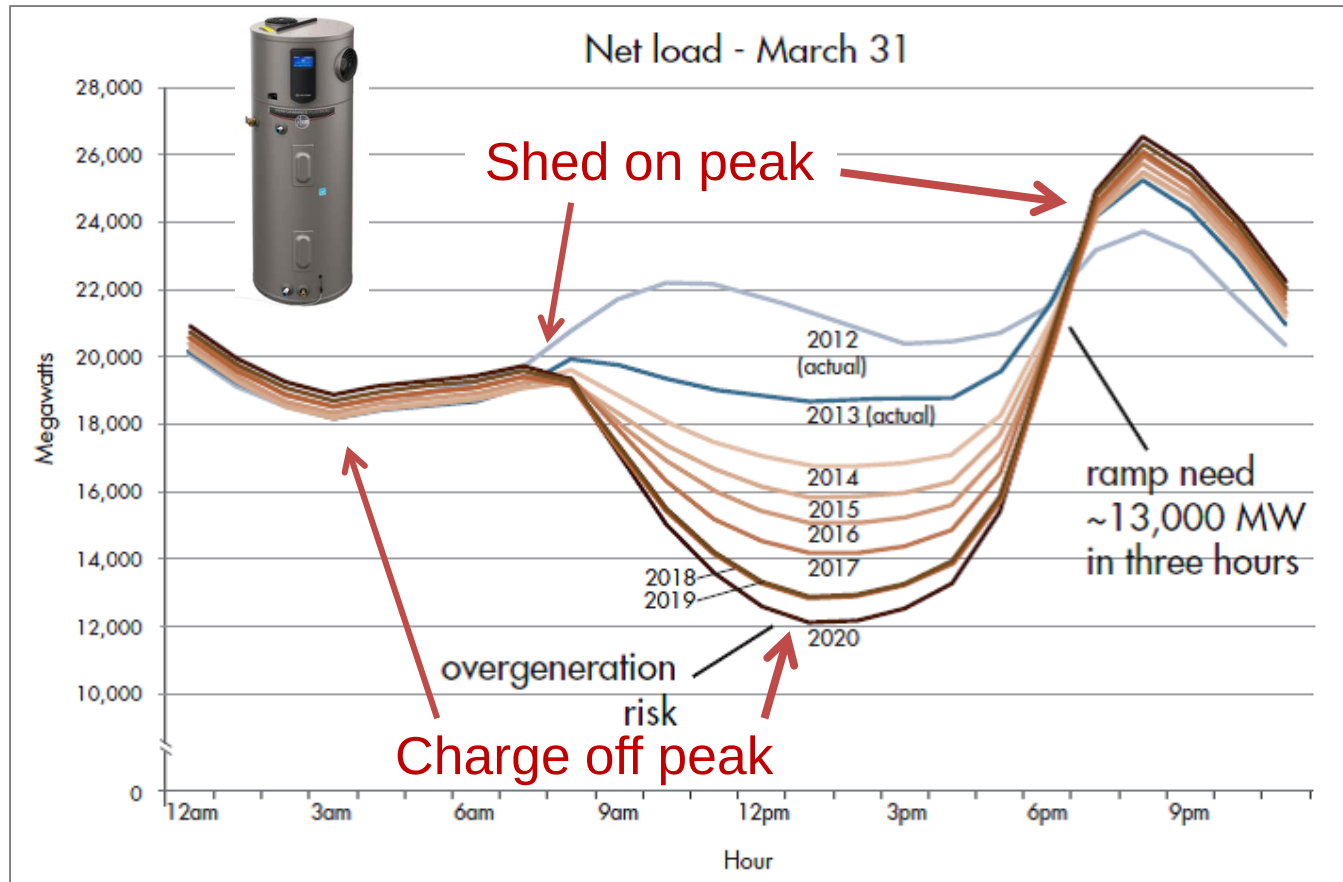
Water heater CO2 emissions*

As CA grid gets cleaner, HPWH offer pathway to very low-GHG hot water



- 1) Not including fugitive methane emissions
- 2) 45%-efficient combined cycle gas plant (build margin)

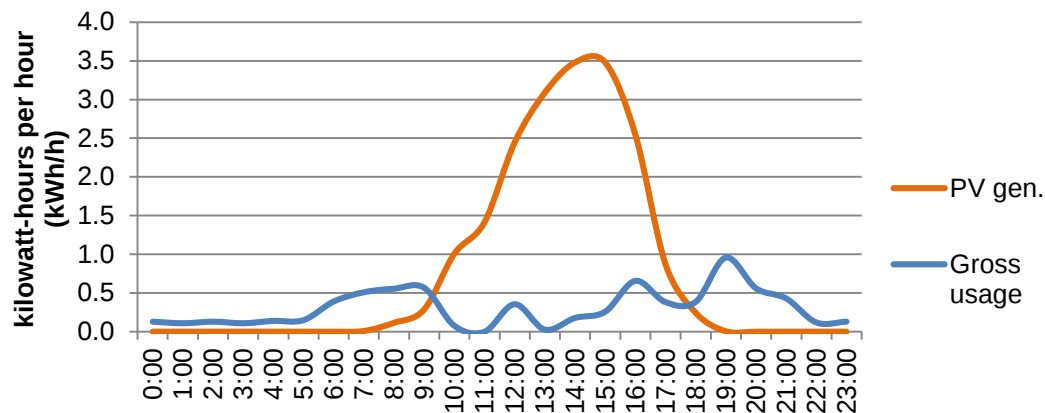
Grid-interactive heat pump water heaters can help deep integration of renewable energy



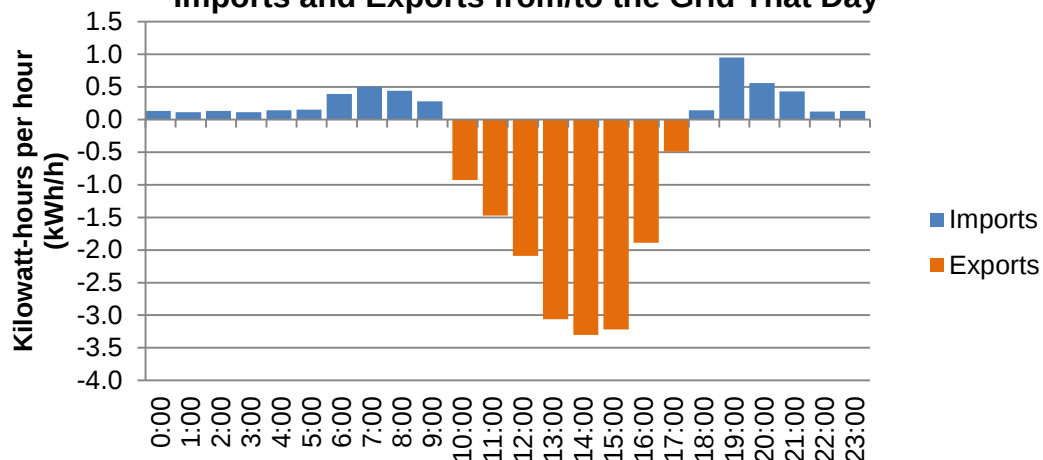
- NRDC et. al. study in-progress to quantify the load shifting capacity and value of HPWH, results planned for Sep. 2017

My very own duck curve...

Electrical Use and PV Generation – March 23, 2017



Imports and Exports from/to the Grid That Day



- ❑ My house on 3/23/17:
 - Exported **87%** of my PV production
 - Imported **64%** of my consumption
- ❑ More solar supply than electricity demand causes **curtailment and low prices**, hindering growth of solar
- ❑ **Load shaping** critical to high solar penetration:
 - ❑ Chemical storage (batteries)
 - ❑ Thermal storage (e.g. **heat pump water heaters**)

Obstacles: What's preventing progress?



Awareness/perception

- “Heat what?”
- “Clean natural gas”...
- Gas cooking in all-electric



Costs

- Equipment
- Installation
- Operation



Access

- On-truck
- In-store



Technology

- Installation flexibility, performance, noise, controls...



Regulatory

- CEC: Building code...
- CPUC: incentives, rates...
- ARB: Scoping Plan

How much does it cost?* (in retrofits)

Baseline gas water heater (EF 0.6)



Equipment: ~\$500
Installation: \$700-\$1,000
=====

Equipment	~\$500
Installation	\$700-\$1,000
Total	\$1,200 - \$1,500

Heat pump water heater (EF 3+)



Equipment: \$1,000-\$1,500
Electrical conduit: \$300-\$750
(panel upgrade: \$0 - \$2,500)
Installation: \$900-\$1,500
=====

Equipment	\$1,000-\$1,500
Electrical conduit	\$300-\$750
Panel upgrade	\$0 - \$2,500
Installation	\$900-\$1,500
Total	\$2,200 - \$3,750

- Near-parity in upfront cost is critical to scale HPWH deployment, hence need for rebates
- SMUD and Palo Alto offer a \$1,500 rebate for HPWH fuel switching, PG&E \$300 (but not for fuel switching)

* Costs vary widely by home, contractor, market. Indicative only.



Making it work for your wallet



Upfront costs

- ✓ New construction
- ✓ All-electric
- ✓ Rebates
- ✓ A/C install / replacement
- ✓ Financing

Utility bills

- ✓ Rooftop PV
- ✓ Time-of-use rates + controls
- ✓ Highest efficiency HPs
- ✓ Propane, electric resistance (often rural communities, trailer parks...)

“Renewable Hot Water” model ordinance: Leadership opportunity for cities

Model ordinance for cities to adopt as local “reach” building code (beyond state code)

For new construction and major renovations (not replacements)

Menu of 3 options:

- ☐ Option 1 - Heat pump water heater + solar PV
- ☐ Option 2 - Solar thermal with 60% solar fraction
- ☐ Option 3 - CALGreen “PV-Plus” efficiency package

For more info: pdelforge@nrdc.org

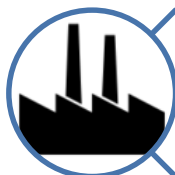
Benefits of HPWH+PV vs. gas tankless



50% lower fuel costs / utility bills



13% lower life cycle costs



30% lower source energy



50% lower CO₂

*California average, climate zone-specific analysis available upon request

What will it take to transform the market?



Home Owners

- Go electric!
- Talk to friends and neighbors
- Host open house



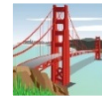
Building Professionals

- Contractors
- Builders
- Architects
- Energy consultants
- Raters
- Distributors
- Retailers
- Manufacturers
- Help raise awareness and build demand!



City/County

- Ordinances: reach code, time-of-sale...
- Train building department
- Bulk buy programs
- Outreach
- Financing
- Munis/CCEs : rates, incentives



Region

- Air quality and GHG regs
- Incentives



State

- **CEC:** building code, energy planning (IEPR)
- **CPUC:** incentive programs, rates
- **ARB:** AB 32 scoping plan
- **Legislation**
- **Governor** leadership

RDC



THANK YOU!

QUESTIONS / COMMENTS ?

