

## DOCKETED

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# Palo Alto's Approach to Encouraging EV Adoption & Utility Resource Planning

California Energy Commission Workshop

Discussion with POUs considering including transportation electrification into Utility IRPs

October 5, 2016

# Topics

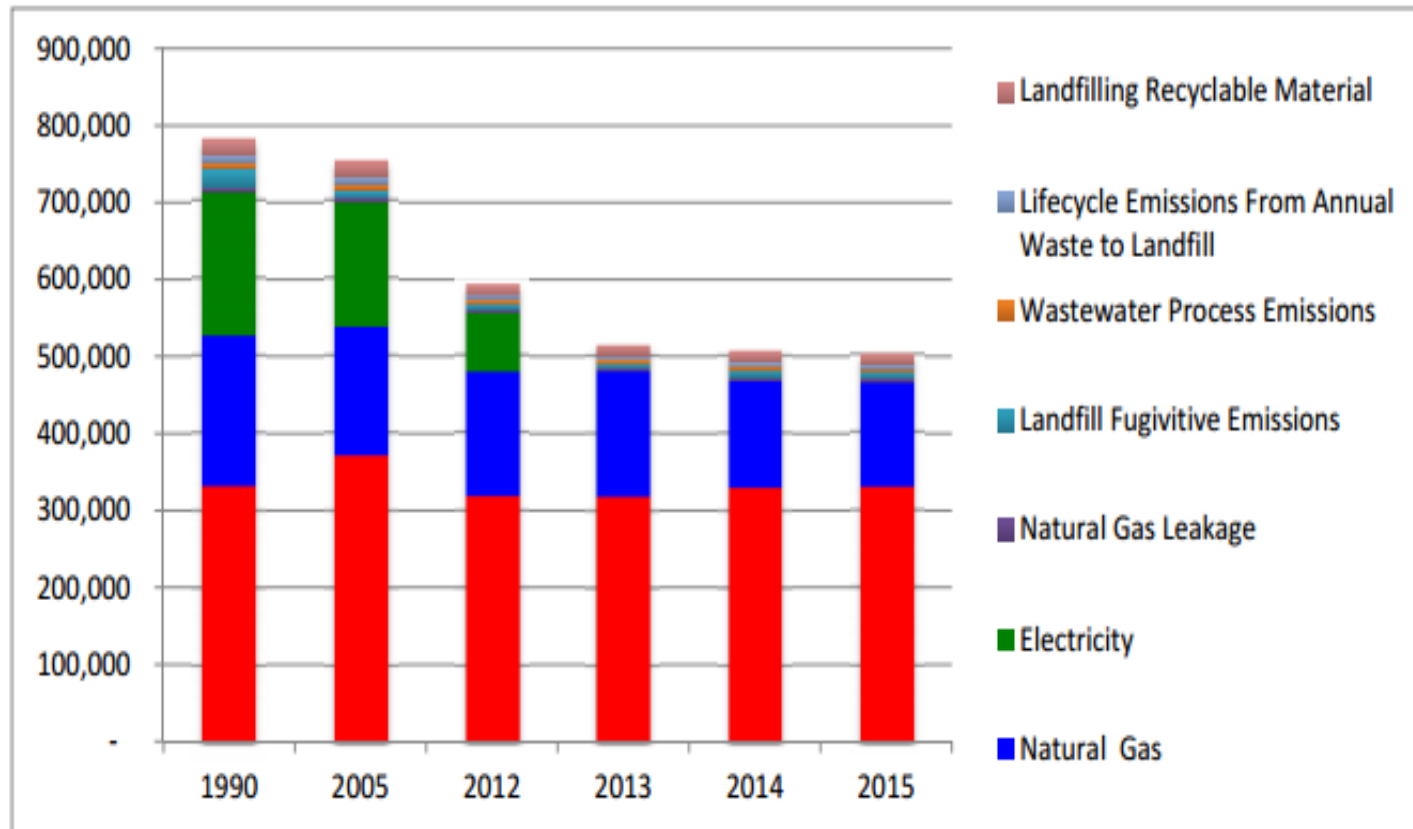
- About Palo Alto & Community Goals
- City of Palo Alto's Approach
  - Development Services/Buildings
  - Public Works/Fleet
  - Utilities
  - Sustainability Office
- Utilities Planning Process & approach to including EVs into IRP
- How can CEC help POUs like us?

# City of Palo Alto Utilities

- City of Palo Alto
  - Resident Population 65k; Day Time, 70k to 100k
  - 25 square miles
- Community owned electric, gas and water utility
  - 30,000 customers, 72,000 meters
  - Annual revenue of \$200+M
- Electrical Load: 175 MW Peak & 1,000 GWh/year
  - Commercial customers – 80% of electric load
  - 100% Carbon Neutral Supplies (50% hydro, 50% renewables)
  - Average retail rate ~ 12 cents/kWh
- Community GHG Emissions
  - 0.5M tons of CO<sub>2e</sub> in 2015 - 36% below 1990 levels
  - Aspiration goal – 80% below 1990 levels by 2030
  - Major push for EV and electrify natural gas appliances

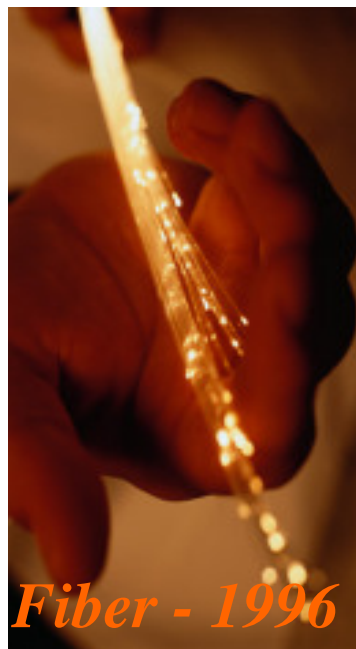
# Community GHG Emissions Reduction

- 36% Reductions since 1990
- 65% of remaining emissions related to transportation

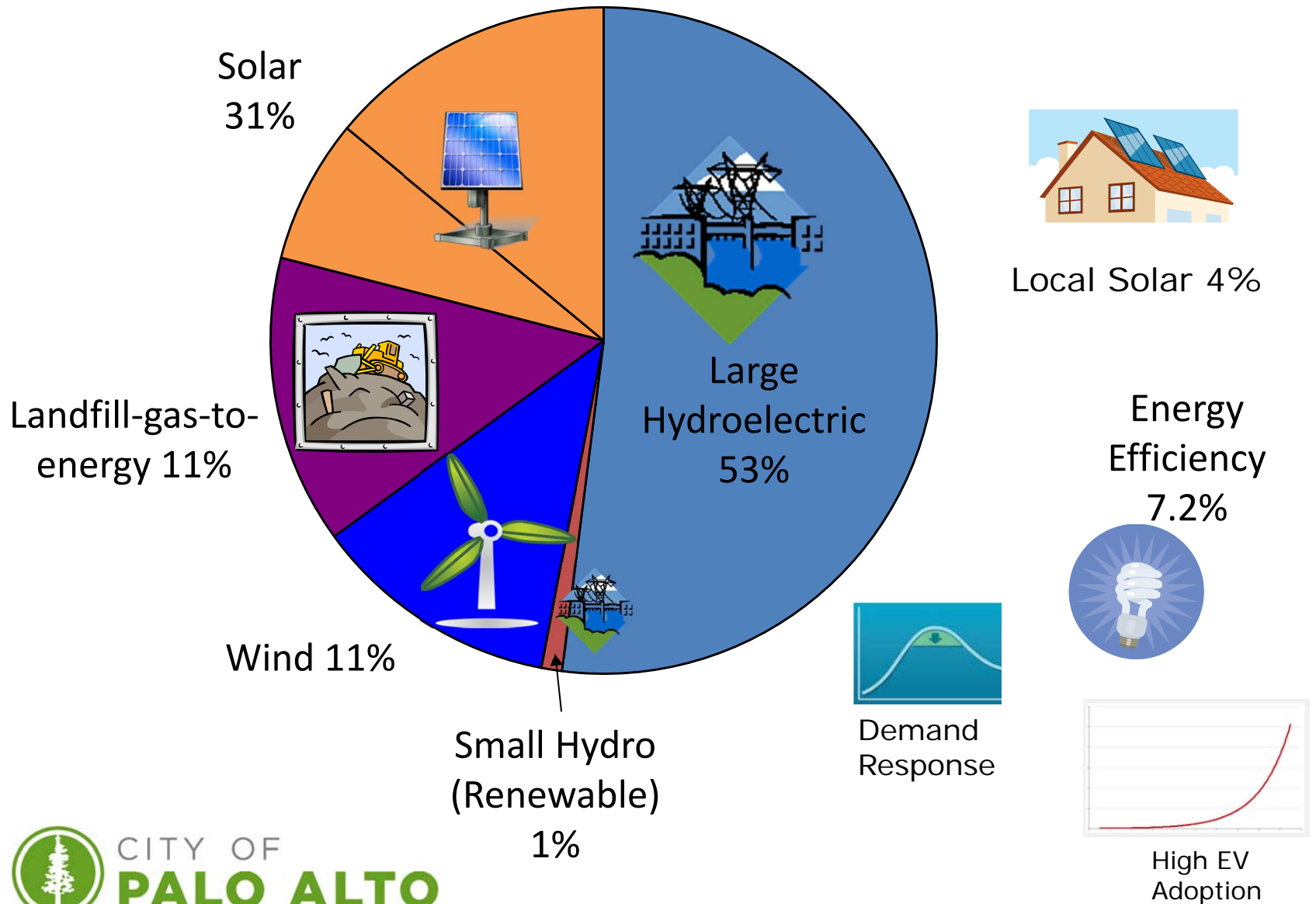


1,000 gasoline vehicles displaced by ZEVs will lower road travel related emissions by ~1%

# CPAU Operates Five Utility Services



# The Carbon Neutral Portfolio



# Major Focus on Electrification

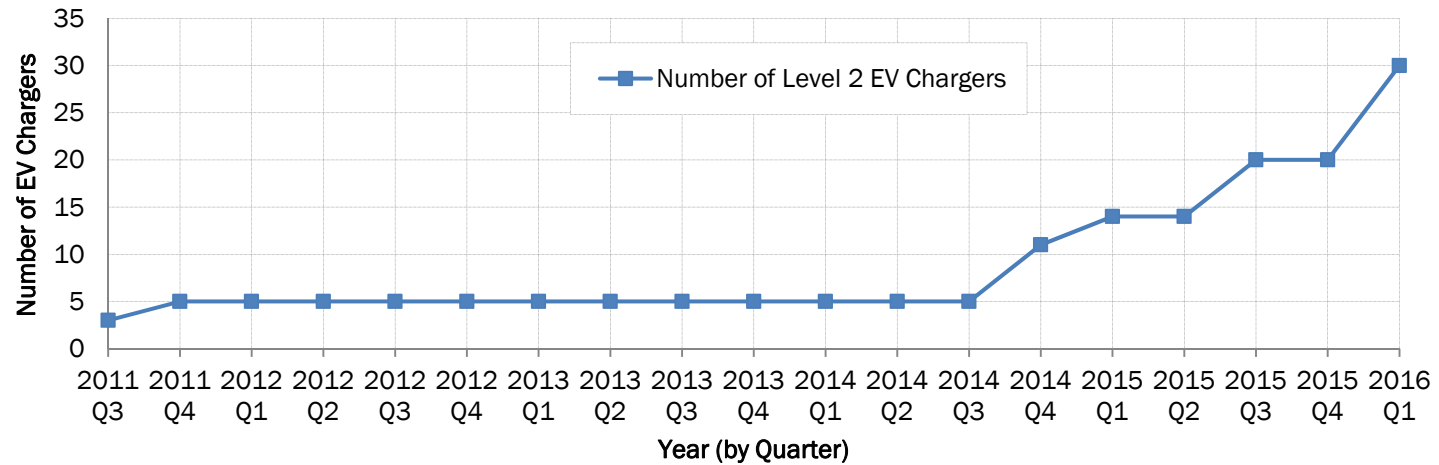
- Electrification of Buildings and Transportation
- Council approves electrification work plan – 2015
  - Programs to support residential electrification with HPWH and HPSH systems
  - Building code support for electrification (e.g. all-electric buildings exempt from City Reach Code)
  - Explore electric retail rate options
  - Support for Electric Vehicles

# Three Departmental Approach to Encouraging EV Adoption

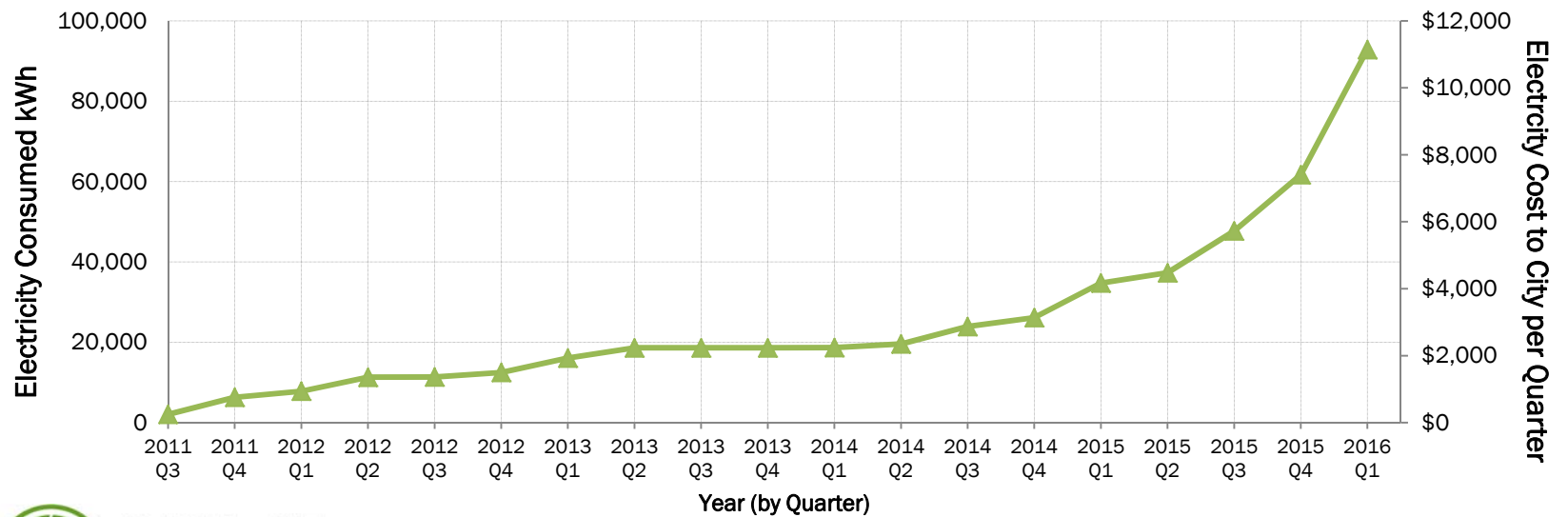
- Building Code
  - EVSEs in New Buildings and Major Remodels
    - Actual EVSE installation & EVSE ready
  - Facilitate publicly accessible EVSE installation by residents
  - Over the counter permits for Level 1 and Level 2 EVSEs
- Public Works/City Fleet
  - Default Policy is to purchase EV for City Fleet, unless EVs found not-suited
  - Currently: LDV mainly CNG; HDVs are diesel
  - Install EVSE at City Facilities
- Utility Programs using LCFS funds

# City-owned EV Chargers

City-Owned Smart EV Chargers



Electricity Consumed per Quarter  
by City-Owned Smart EV Chargers



# Utility Programs to Encourage EV Adoption

## 1. Pilot Time-of-Use (TOU) electric rate

- ☒ TOU pilot currently available to 150 residential customers

## 2. Effective 7/1/16, 2-tier residential electric rates

(down from 3 tiers, but includes minimum bill)

## 3. Evaluate retail electric rate schedules for home that electrify

- ☐ Evaluate merits of increased baseline for electrified appliance
- ☐ Initial study finds customer load factor increases due to EV charging
- ☐ All rates have to be Prop 26 compliant
- ☐ Use of LCFS funds to subsidize night time charging by EV owners  
(increase the current 2 cents/kWh discount to 7 cents/kWh)

# Utility Programs to Encourage EV Adoption

4. Use of LCFS funds to subsidize electric service upgrade fee
  - ☐ Lowering the connection fee, up to \$3,000
  - ☐ Fixed fees for service connections up to 400A (up from current 200A)
5. Use LCFS Funds to provide EVSE rebates for non-residential customers, up to \$3,000/unit
6. Incentivize customers who share access to EV charging info
7. Group Buy of PVs & EVs at Discounted Prices - SunShares

# EV Projections for Palo Alto

## Palo Alto Residential EV Projection

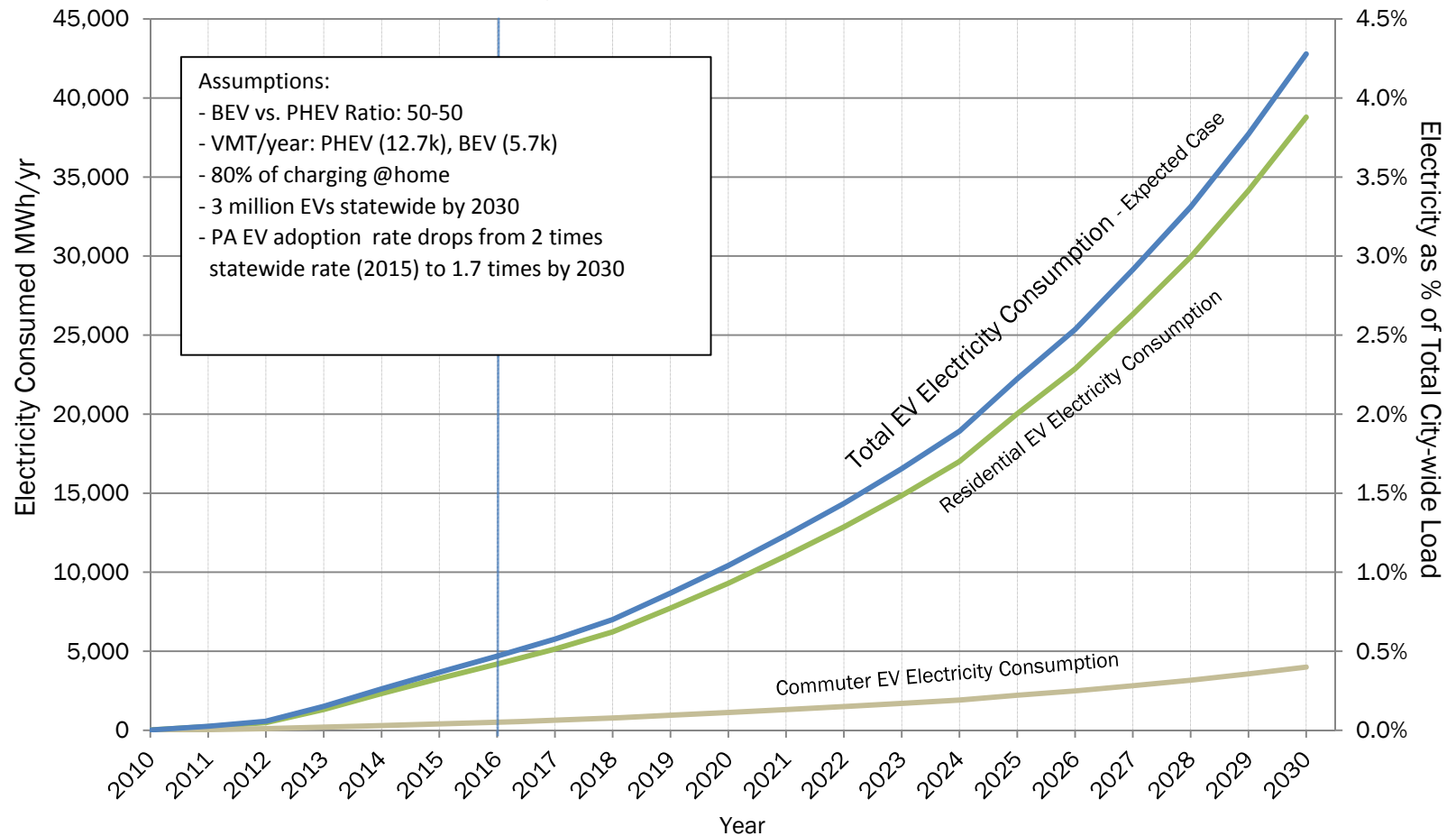
(Based on 3 to 10 Million Projected EVs in CA by 2030)



# Electricity Used by EVs

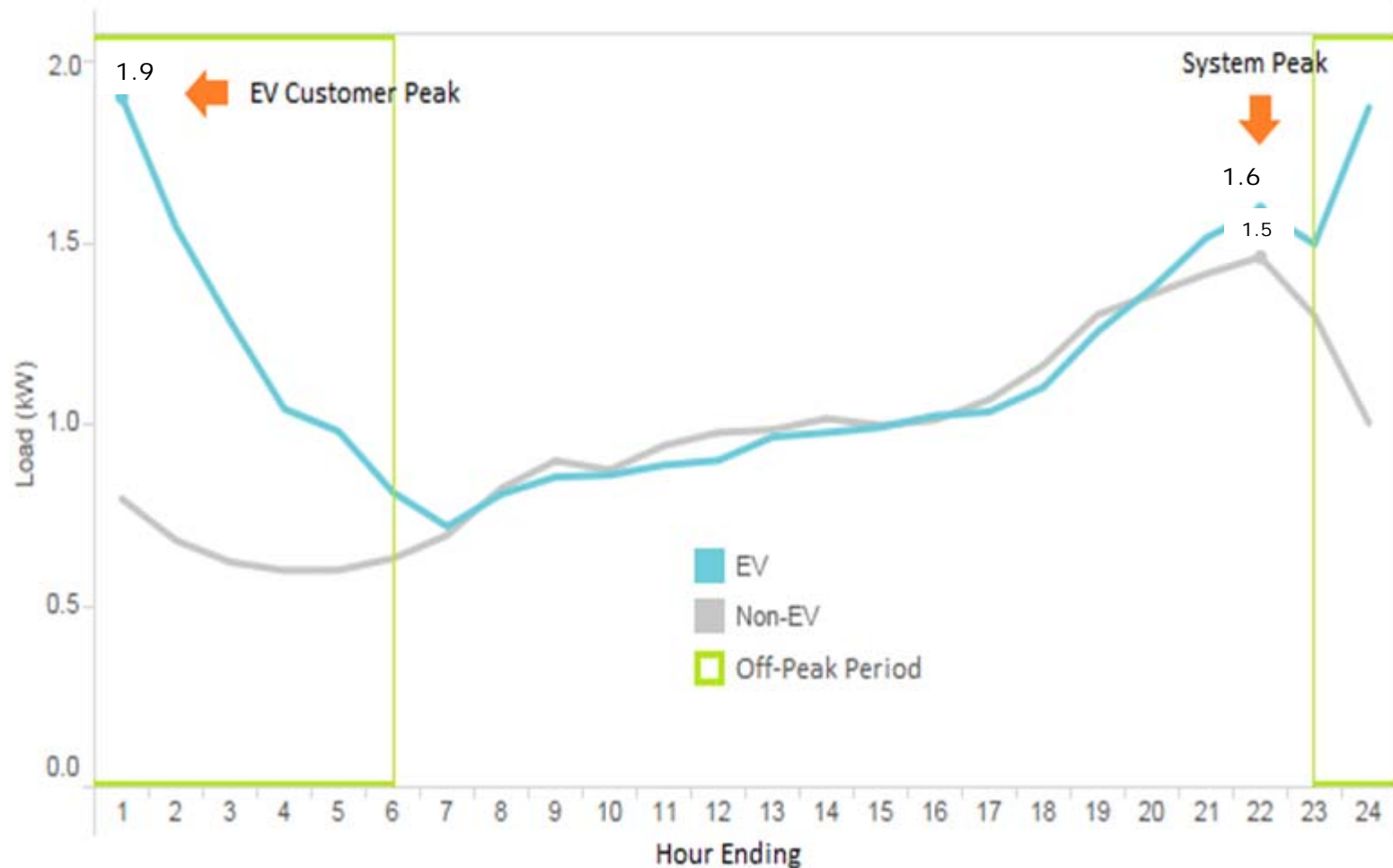
~4 % of total electricity energy use in Palo Alto by 2030

Projection of Electricity Consumption of EVs in Palo Alto



# Residential Load Profile: Non-EV vs. EVs

## -25 kWh/day vs 30 kWh/day



# Palo Alto's IRP/LEAP History

## Palo Alto Initiatives

- 1992: First 10 year Electric IRP
- 2002:** Palo Alto adopts its first RPS
- 2003:** First Long-term Electric Acquisition Plan (LEAP)
- 2005:** First Western IRP (updated every 5 years)
- 2006:** Electric Resource Adequacy Program adopted
- 2007:** City Climate Protection Plan –GHG reduction goals
- 2007:** LEAP Updated –loading order and RPS update
- 2010:** First 10 year Energy Efficiency Plan; 2012 update
- 2011/12:** LEAP Updated –carbon reduction goals & storage
- 2013:** Carbon Neutral Plan adopted
- 2014:** Local Solar Plan adopted
- 2015:** Electrification work plan adopted
- 2016: Aspirational GHG Reduction goal of 80% by 2030

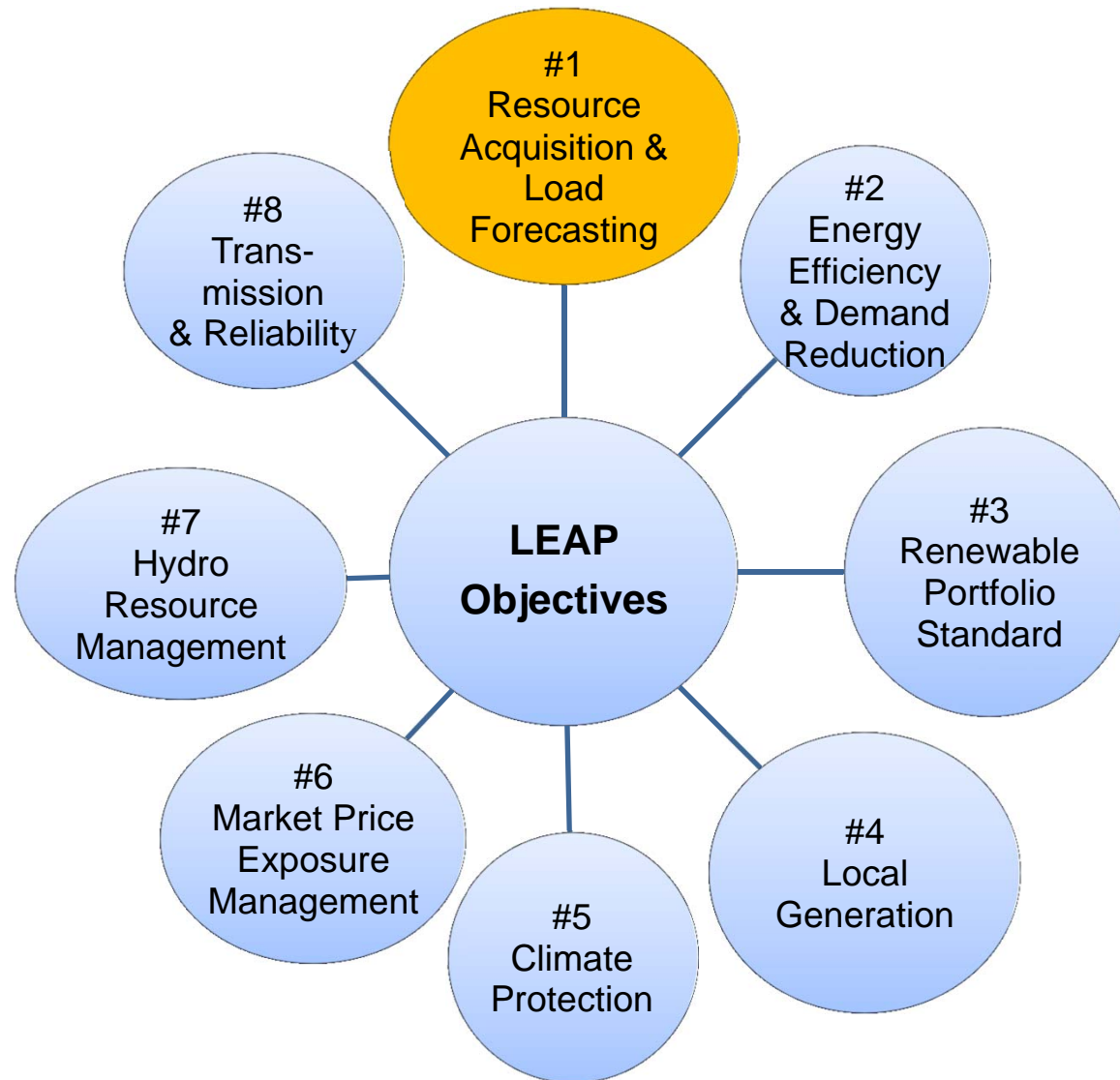
## California Initiatives

- 1996:** Public Benefit Charge & Direct Access
- 2002:** RPS introduced
- 2005:** “loading order”
- 2006:** AB 32  
RPS accelerated  
CA Solar Initiative
- 2010:** Energy Storage
- 2011:** 33% RPS
- 2015:** SB 350
- 2016:** SB 32

# LEAP Objectives

1. Meet customer electricity needs through the acquisition of least total cost energy and demand resources including an assessment of the environmental costs and benefits.
2. Manage supply portfolio cost uncertainty to meet rate and reserve objectives.
3. Enhance supply reliability to meet City and customer needs by pursuing opportunities including transmission system upgrades and local generation.

# LEAP Strategies (IRP Framework)



# Load Forecasting Approach

- Econometric Model with Exogenous Variables introduced when justified

## Appendix A: Econometric Model Documentation

The forecast was produced using an econometric model comprising of 3 variables and a constant. The independent variables of the model include day-type and weather. The econometric model was estimated using data from 2003 to 2014.

## Appendix B – Large Customer Planned Load Increase (GWh)

	<i>FY15</i>	<i>FY16</i>	<i>FY17</i>	<i>FY18</i>	<i>FY19</i>
Cust #1	2.4	2.5	17	2.5	2.5

## Appendix C: Energy Efficiency Programs Existing and Incremental (GWh)

	<i>FY15</i>	<i>FY16</i>	<i>FY17</i>	<i>FY18</i>	<i>FY19</i>	<i>FY20</i>	<i>FY21</i>	<i>FY22</i>	<i>FY23</i>
GWh	65.5	73.4	80.3	87.9	94.9	101.3	106.7	110.3	113.7

## Appendix D: Electric Vehicles (GWh)

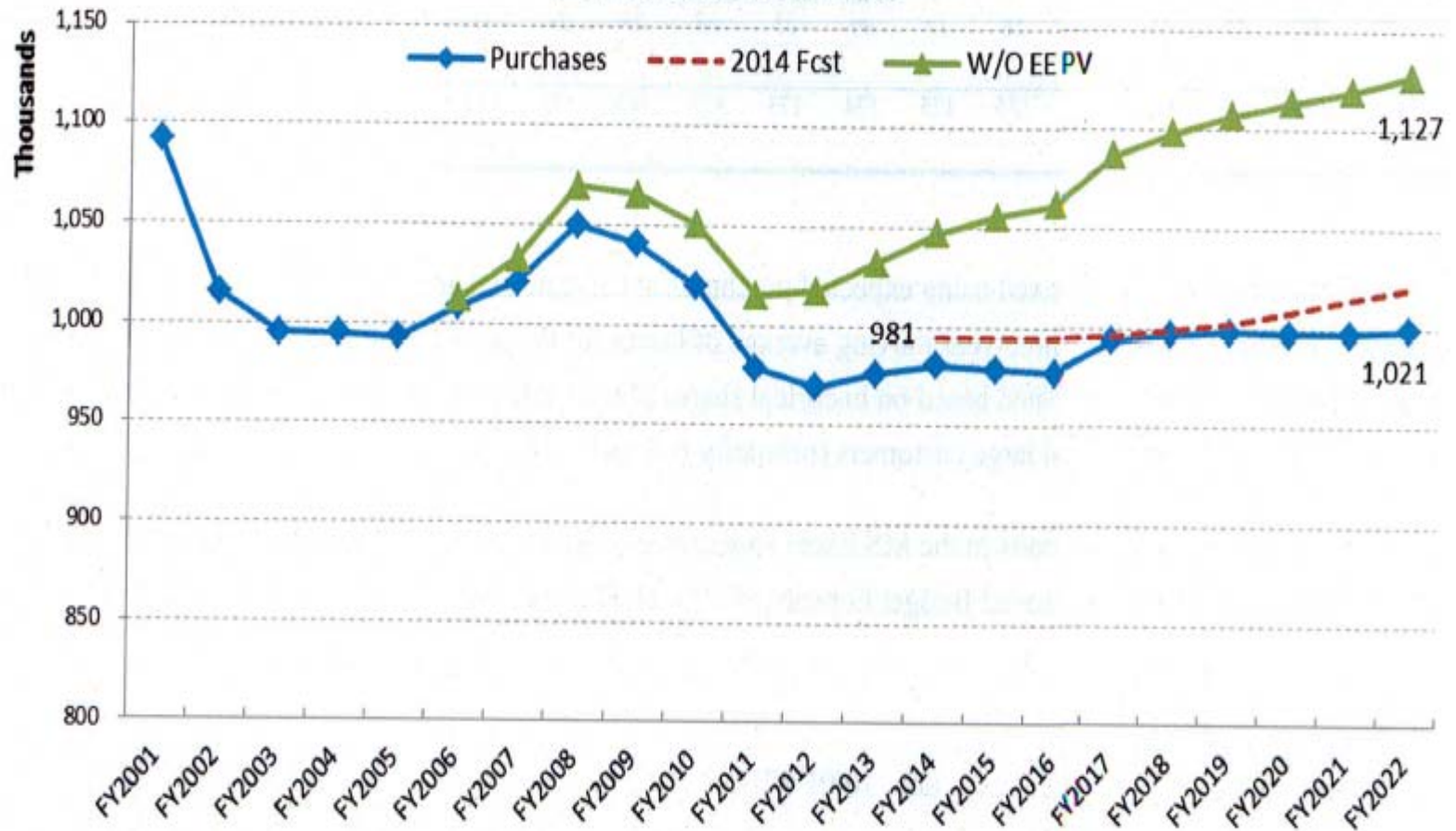
	<i>FY15</i>	<i>FY16</i>	<i>FY17</i>	<i>FY18</i>	<i>FY19</i>	<i>FY20</i>	<i>FY21</i>	<i>FY22</i>	<i>FY23</i>
GWh	3.4	4.0	4.6	5.4	6.3	7.3	8.5	10.0	11.6
# EV	1,238	1,444	1,685	1,965	2,293	2,674	3,120	3,639	4,245

## Appendix E: Photovoltaic - Energy (GWh) and Capacity in (MW)

	<i>FY15</i>	<i>FY16</i>	<i>FY17</i>	<i>FY18</i>	<i>FY19</i>	<i>FY20</i>	<i>FY21</i>	<i>FY22</i>	<i>FY23</i>
GWh	11.8	14.5	15.3	16.3	17.4	18.8	20.5	22.5	24.8
MW	7.2	8.8	9.4	10.1	10.9	11.8	12.9	14.2	15.7

# Load Forecasting Approach (Ctd.)

Electricity Energy Forecast (with & without PV & Efficiency)



# Use of Annual Forecasts for Planning & Operations

- Energy Resource Planning and Balancing
- Capacity Resource Planning, Resource Adequacy
- Energy Efficiency & DR Potential Assessment
- CAISO, CEC, PG&E
- Budgeting and Rate-making; performance tracking
- Distribution system planning & investments
  - Distribution transformer and feeder loading
  - Impact of EVs, NZE homes, HPWH/HPSH, PVs
  - PF correction with Capacitors and PV Inverter controls

## Public Power Preparing For EVs

- NCPA and SCPPA have both established EV Working Groups
  - Forum to establish best practices, share program designs, discuss/explore market developments.
- LCFS and ARFVTP have supported POU EV charging activities in the past and are key to spurring future investment:
  - Significant changes to these programs could impact EV charging activity and forecasts.
- Learning from Energy Efficiency – one size does NOT fit all:
  - EV charging potential will vary among POU communities
  - CPAU EV charging needs/forecast may be significantly different than Redding or Roseville.

## CEC Can Assist Small POU's with EVs & IRP

- EV Registration data from DMV, by POU or ZIP Code
  - Number and Characteristics (BEV, PHEV, FCV, CNG, gasoline)
  - Comparative state and regional vehicle characteristics
- Provide medium/long term state-wide EV forecasts
- Provide guidance on ways to forecast electricity use of EVs
  - E.g. 3 to 4 miles/kWh; average miles travelled PHEV/BEV
  - Time-of-day loading patterns
  - Case studies of other POU's
- Engage small POU's through joint action agencies such as NCPA/SCPPA

# CONTACT INFORMATION

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## CALIFORNIA ENERGY COMMISSION

COMMISSIONER JANE A. SCOTT  
1515 NINTH STREET  
SACRAMENTO, CA 95814-5512  
www.energy.ca.gov



September 15, 2016

Shiva Swaminathan  
City of Palo Alto Utilities  
250 Hamilton Avenue  
Palo Alto, CA 94301

Dear Mr. Swaminathan:

The California Energy Commission is hosting a workshop on Wednesday, October 5, 2016 to discuss how California's publicly owned utilities (POUs) are considering including transportation electrification into their Integrated Resources Plans. The workshop will be held in Sacramento at the Energy Commission in the Art Rosenfeld Hearing Room and will begin at 9:00am. I would like to invite you to present information on your utility's approach and activities to address transportation electrification. We have also invited representatives from other publicly owned electric utilities and independent experts to make presentations as well.

To comply with Senate Bill 350 (de León, Chapter 547, Statutes of 2015) sixteen publicly owned electric utilities must adopt IRPs no later than January 1, 2019, and adopt updates at least every five years thereafter. The Energy Commission will review IRPs submitted by POUs for consistency with SB 350 and, if needed, provide comments, suggestions, and requests for more information. The Energy Commission expects to adopt guidelines to govern submission of information and data and reports needed to support its review of IRPs. The October 5<sup>th</sup> workshop will focus on transportation electrification.

Transportation electrification could include several applications, such as trucks used in freight movement, refuse collection and port drayage, a multitude of off-road applications, electric and plug in electric passenger vehicles and light trucks, transit buses, and electric rail. We are seeking initial information about your planning, capabilities and challenges as well as your recommendations regarding state government actions to implement the SB 350 transportation electrification objectives.

The Energy Commission also co-funds deployment of electric vehicle charging infrastructure through annual funding awards under the Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP). We are interested in your achievements to date and seek your feedback on configuring deployment of future funding in the context of other investments, including POU electric transportation actions.

Each presenter will have a total of 30 minutes. We ask you to kindly provide a 20 minute presentation summarizing your plans, activities and insights and save 10 minutes for questions and brief discussion. Your presentation should focus on the following topics related to your service area:

1. How would you characterize your approach and current and proposed activities to include transportation electrification elements in integrated resource plans? Do you expect to establish electric transportation targets or goals?

2. What are your current capabilities to address in IRPs transportation electrification procurement? What do you see as challenges?
3. What are your estimates of the existing baseline and projected growth of electric transportation and estimates of greenhouse gas emission reductions by 2020, 2030 and 2050? What analytical method do you use to make these calculations? What data do you expect to gather to evaluate progress, how do you plan to gather it, and can you share the data with the Energy Commission?
4. What have you achieved in electric transportation to date and what do you anticipate for future deployment regarding:
  - Utility fleet vehicles and workplace charging for your employees;
  - Procurement funding and funding mechanisms for service area electric vehicle charging deployment in market subsectors (residence, workplace, multi-unit dwellings, public destinations and corridors) and the number and types of installations, amounts of funding and project locations;
  - Reliability of charging stations in your service area;
  - Anticipated need for electric distribution system upgrades and cost;
  - Tariffs;
  - General public and business education and outreach, and plans to engage disadvantaged communities; and
  - Other activities.
5. How would you characterize your interaction with private companies providing electric vehicle charging equipment, installation, operation and services? How do you expect relationships and business models to evolve and change?
6. To what extent have you taken advantage of state government incentives (ARFVTP grants, Clean Vehicle Rebates, and Low Carbon Fuel Standard credits)? In what market subsectors do you see a need to for continuation of these incentives to complement POU electric transportation activities? Do you have any recommendations to improve implementation of government incentives?
7. To what extent do you anticipate transportation electrification growth to impact strategies for SB 350 requirements, such as achieving the 50 percent renewable portfolio standard and doubling of additional achievable energy efficiency savings by 2030?
8. Where do you need assistance to achieve the SB 350 requirements related to transportation electrification?

Please RSVP to Tim Olson at [Tim.Olson@energy.ca.gov](mailto:Tim.Olson@energy.ca.gov) or 916-654-4528 by September 21, 2016 to confirm your interest in participating on October 5, 2016. Tim is also available if you have additional questions or comments. I look forward to your participation and seeing you at the workshop.

Sincerely,

*Jane A. Scott*  
JANE A. SCOTT  
Commissioner

# EV & IRP Related General Observations

## - Response to Questions Posed by CEC

- LCFS Credits highly valued by Palo Alto
  - 2.3 credits per EV per year
  - Valued at \$230/EV/year @ price of \$100/credit
- Relationships and service level of EVSE vendors adequate
- City government relies on grant funding for EVSE installation
  - BAAQMD grants
  - hard to justify otherwise
- Electrification of natural gas appliances such as HPWH and HPSH can help meet SB350 efficiency goals