



# DSM Advisory Group Meeting

September 26, 2017



PPL companies

# Agenda

- Welcome/Introductions
- Updates since last meeting/review of DSM program history
  - Energy savings
  - Demand savings
  - Annual spend
- Challenges for future programs
  - Rapid adoption of energy efficient technologies
    - Low to flat load growth
  - Low avoided costs for energy and capacity
  - Program cost-effectiveness
- Next steps
  - October meeting to review 2019-2023 EE/DSM Filing

# Since last Advisory Meeting on October 13, 2016...

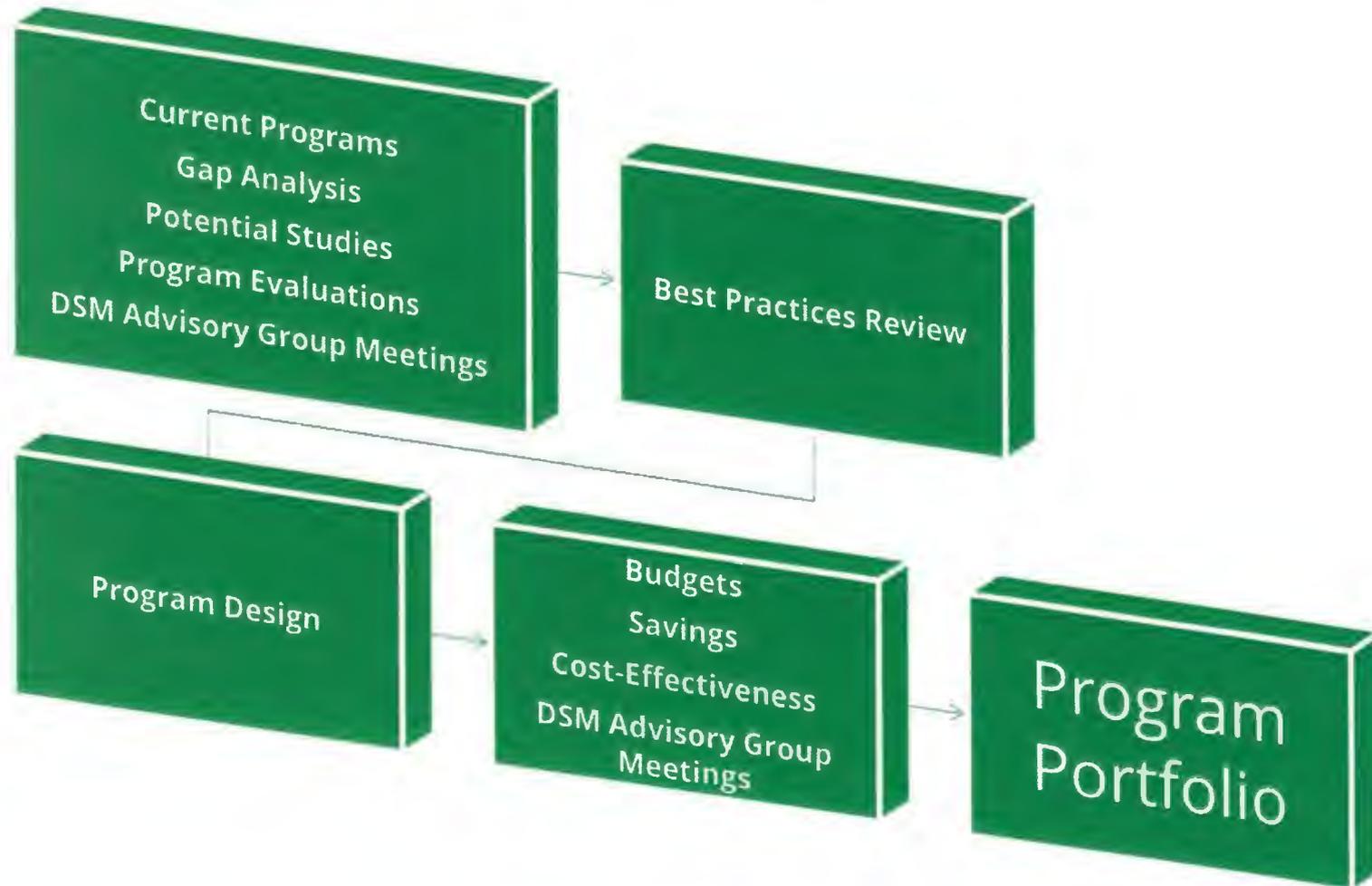
## LG&E/KU has:

1. Reviewed existing program offerings, measures, model assumptions, and cost-effectiveness
2. Enlisted Cadmus to provide external expertise on portfolio offerings
3. Worked with Cadmus to complete an updated Residential & Commercial EE Potential Study
4. Incorporated findings from both completed EE Potential Studies (Industrial in 2016 & latest Residential / Commercial in 2017) into program planning for 2019+

# Recent potential studies' results

<i>Medium Scenario - 20-year Cumulative Achievable Potential</i>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>
<i>Study Period</i>	2019-2038	2019-2038	2016-2035
<b>Energy (% of baseline)</b>			
LGE	5.5%	5.4%	7.3%
KU	5.5%	6.7%	6.5%
Total	5.5%	6.1%	6.7%
<b>Demand (MWs)</b>			
LGE	26	47	24
KU	48	65	51
Total	74	112	74

# The DSM Planning Process...



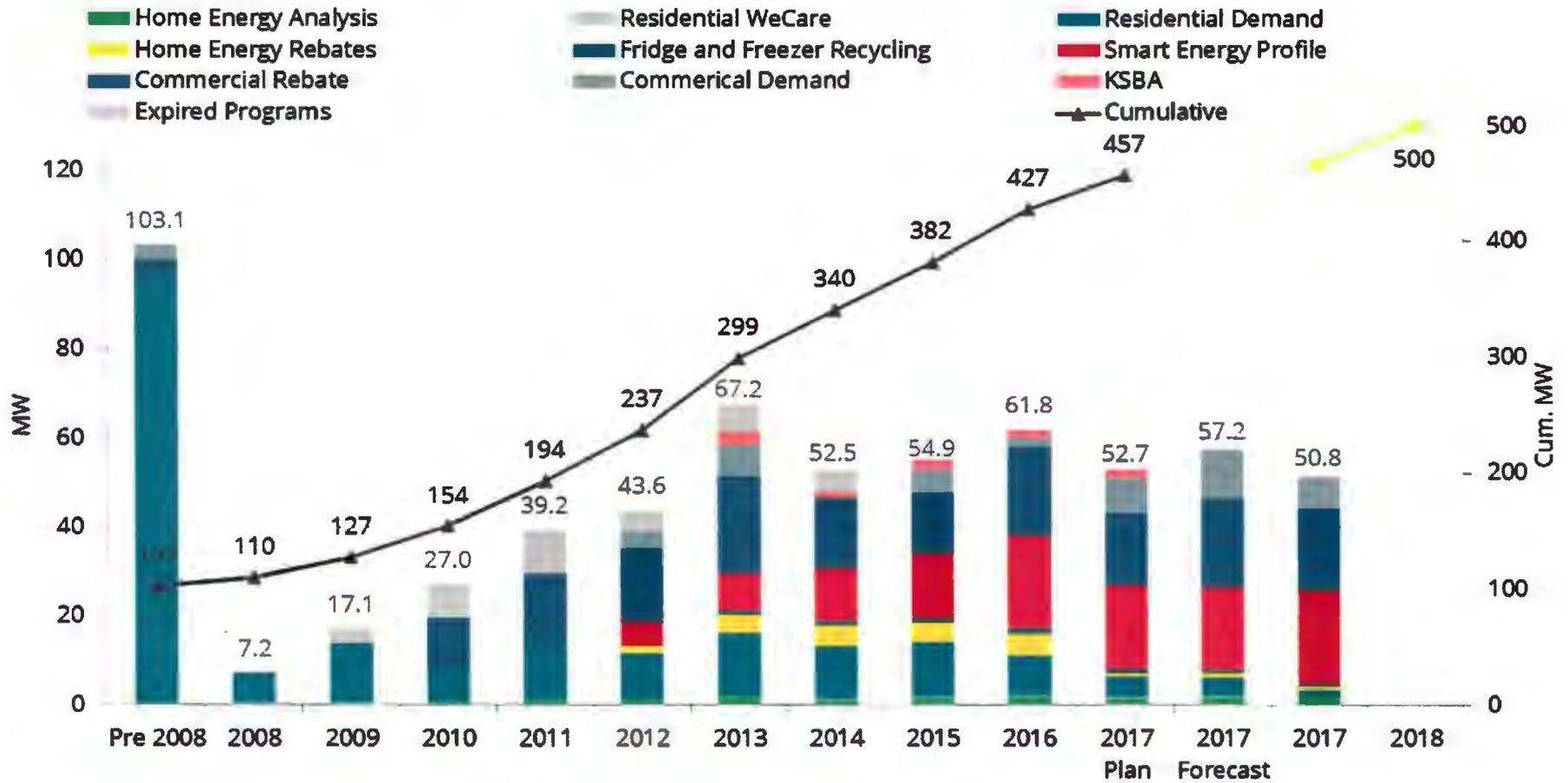
# Upcoming DSM related filings

- 2018 Budget Filing
- KSBA Filing
- Current programs expire December 2018
- 2018 Balancing Adjustment

# Current Energy Efficiency Portfolio

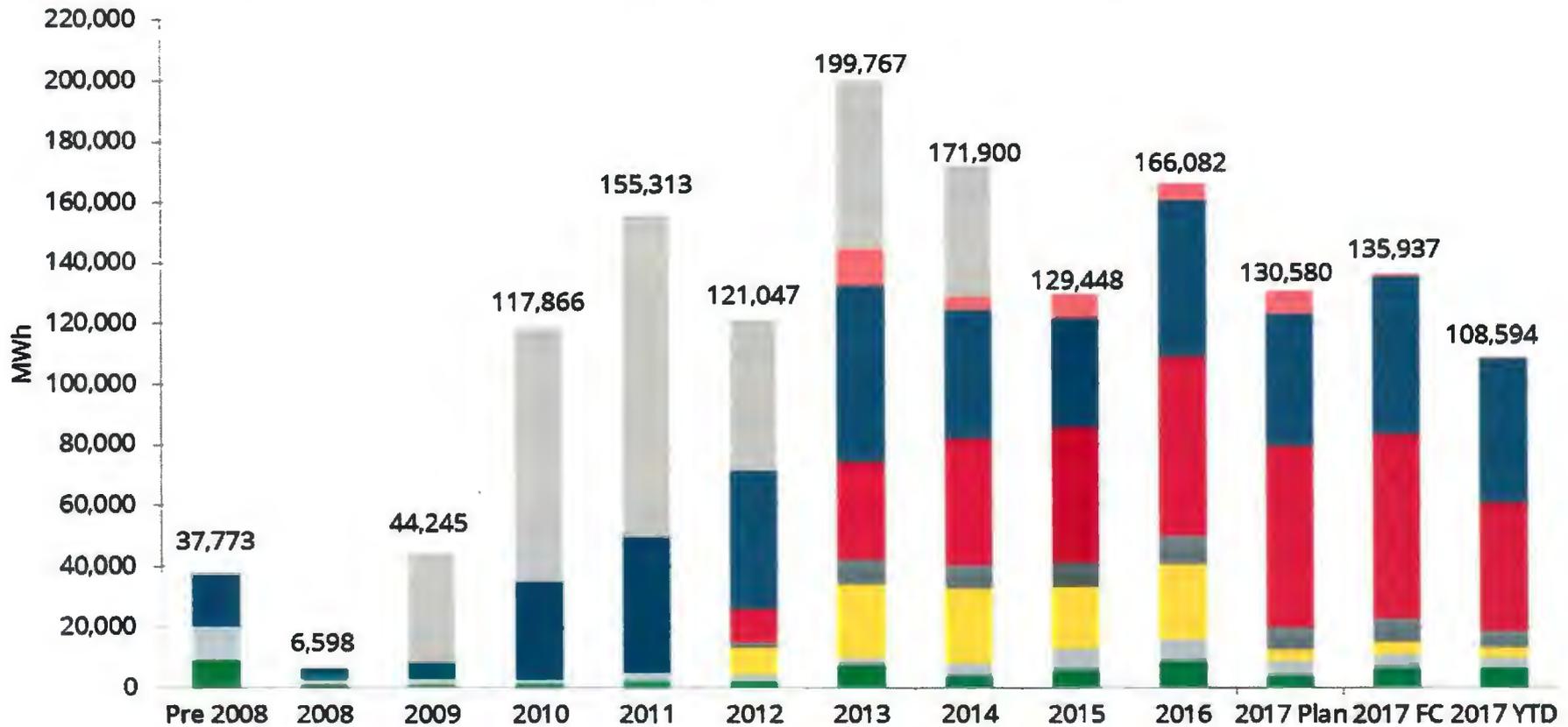
- Home Energy Rebates
- Home Energy Analysis
- Fridge & Freezer Recycling
- WeCare
- Smart Energy Profile
- Residential Demand Conservation
- Large Non-Residential Demand Conservation
- Non-Residential Rebates
- KSBA
- AMS Opt-in
- Customer Education and Public Information (CEPI)
- Program Development & Administration (PD&A)

# Demand Reduction (MW)



# Energy Savings (MWh)

- Home Energy Analysis    ■ Residential WeCare    ■ Residential Demand    ■ Home Energy Rebates    ■ Smart Energy Profile
- Commercial Rebate    ■ Commercial Demand    ■ KSBA    ■ Expired Programs

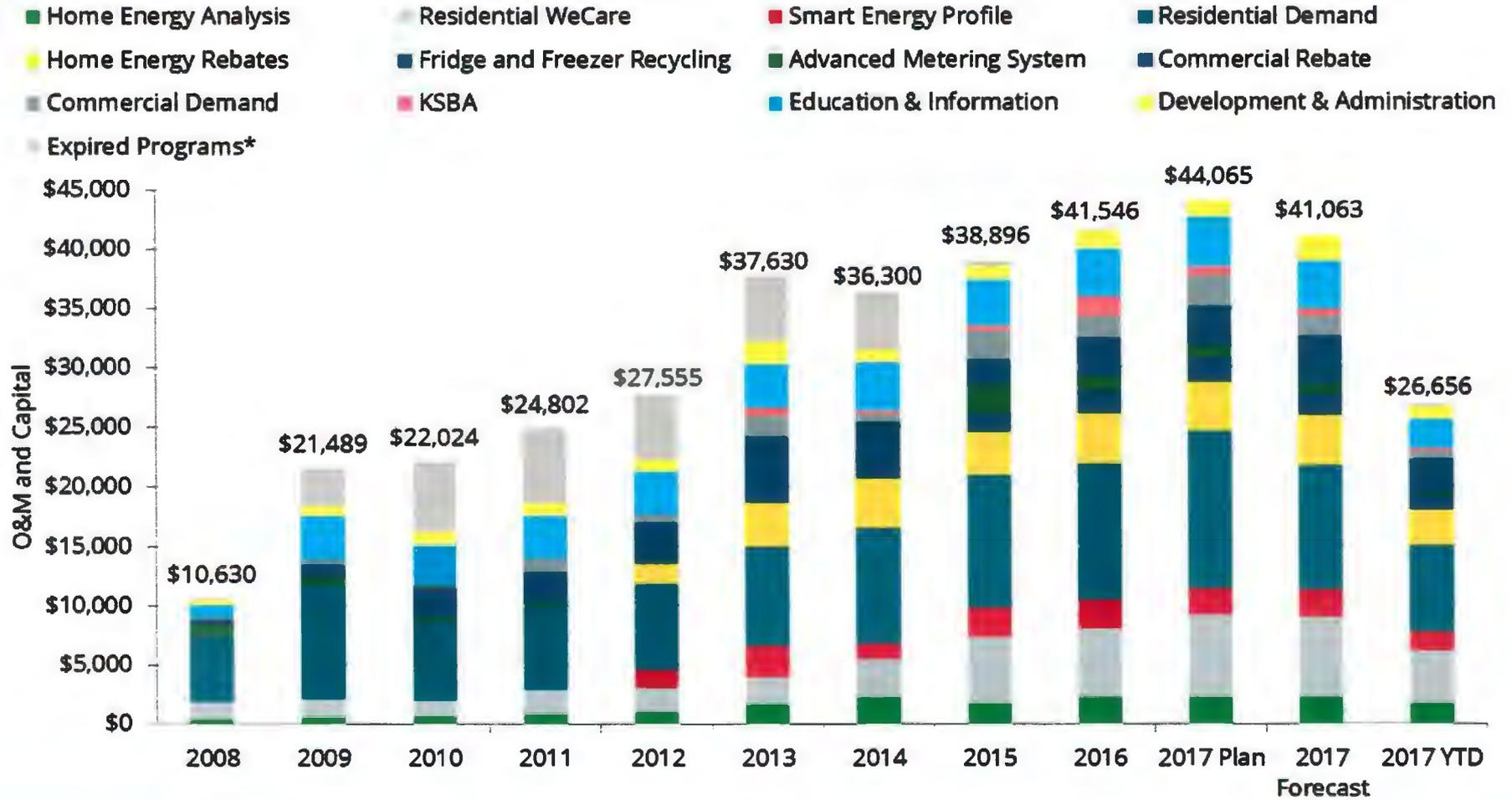


Note: Energy Savings are the result of the company meeting Demand reductions through Energy Efficient programs.

Note: Energy Savings are based on the engineered deemed savings associated with each measure and service provided through the company's programs.

Note: Expired Programs include: Residential Lighting, Residential HVAC, New Homes, and Commercial HVAC.

# Financials (\$000)



# California Standards Tests: Costs & Benefits

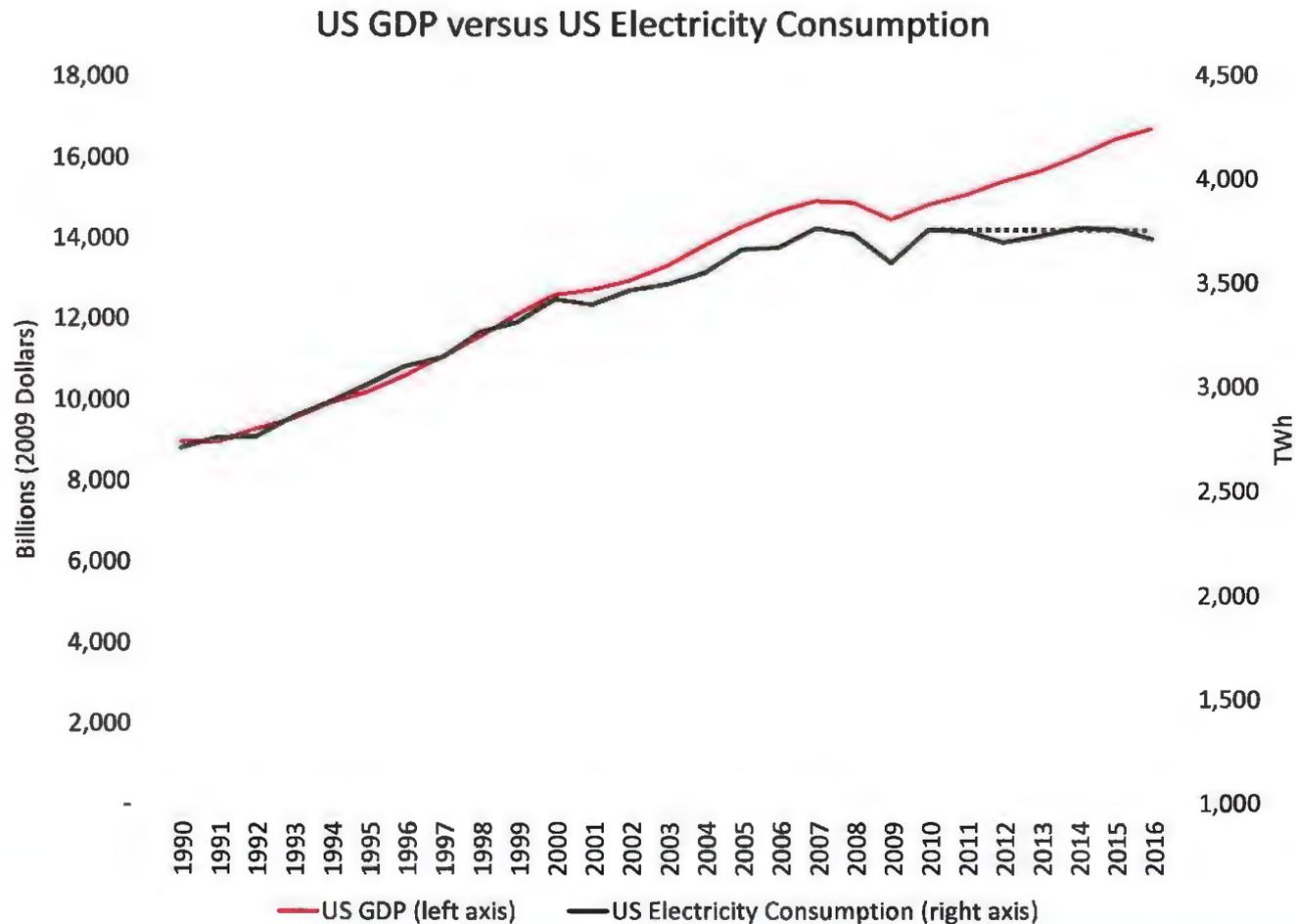
Costs & Benefits	TRC	RIM	PCT	PAC
Avoided Energy (Fuel, O&M of generation, T&D systems)	Benefit	Benefit		Benefit
Avoided Capacity (Constructing power plants, T&D lines, pipelines)	Benefit	Benefit		Benefit
Other benefits (Fossil fuel savings, water savings, equipment O&M)	Benefit			
Externalities (Environmental benefits like emissions reductions)				
Participants' incremental cost (above baseline) of efficient equipment	Cost		Cost	
Program administration costs (Staff, marketing, EM&V, etc.)	Cost	Cost		Cost
Incentives (Rebates paid to customers)		Cost	Benefit	Cost
Lost utility revenue or Lower bills (Due to lower/less sales)		Cost	Benefit	

# EE portfolio cost-effectiveness since 2015 is favorable to 2014 filing values

Program	1/2015 - 4/2017 Cost Effectiveness Ratios				2014 Filing Cost Effectiveness Ratios			
	TRC	RIM	PCT	PAC	TRC	RIM	PCT	PAC
Smart Energy Profile	4.23	1.38	NA	4.23	3.07	0.74	NA	3.07
ARP - Fridge-Freeze Recycle	3.68	0.60	NA	2.48	2.26	0.56	NA	1.86
WeCare	2.69	0.59	NA	2.69	2.57	0.60	NA	2.57
Home Energy Analysis	1.76	0.75	3.30	3.23	1.93	0.68	6.50	2.52
Home Energy Rebates	2.06	0.81	2.72	3.68	2.37	0.81	3.20	4.53
Residential Demand Conservation	2.14	1.41	NA	1.41	2.95	1.02	NA	1.47
Commercial Rebates	7.33	1.50	5.38	25.43	7.26	1.18	7.56	16.42
Commercial Demand Conservation	4.32	3.51	NA	3.51	2.27	0.86	NA	1.64
Overall Portfolio w/ PD&A, CEPI	3.32	1.09	5.93	4.01	3.07	0.86	8.66	3.13

Note: All values are California test ratios based on avoided costs of \$100/kW-year and \$0.043/kWh.

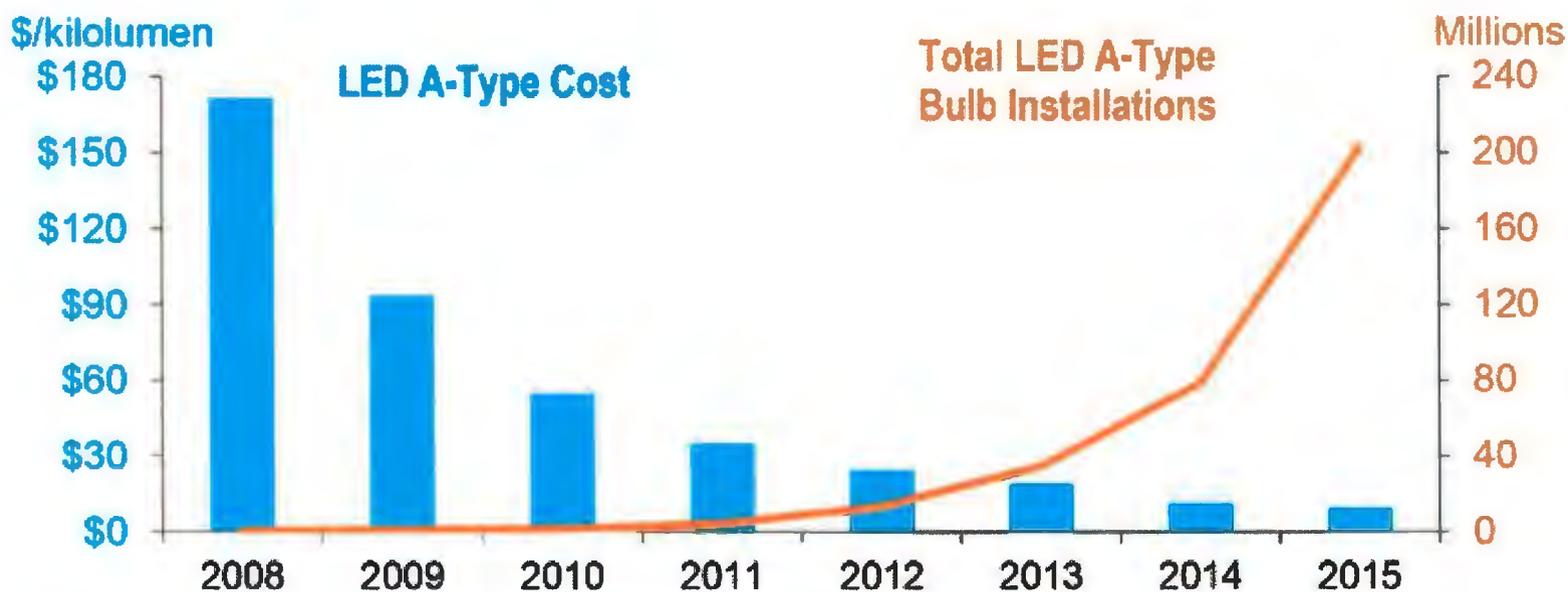
# US electricity consumption has flattened over the last decade despite economic growth



# Flat sales trend impacted by end-use efficiency gains

- LED Lighting
  - Costs have fallen 97+% since 2008; efficiency expected to double by 2025.
  - Department of Energy forecasts 48% market share by 2020; 84% in 2030, up from 2% in 2013. This would reduce lighting consumption by 15% in 2020 and 40% in 2030.

## LED Lighting: Global Cost and Installation Trends



Source: U.S. Department of Energy

# Greater anticipated end-use efficiencies drive reductions in PIRA electricity sales forecast

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  - Costs have fallen 90% since 2008; efficiency expected to double by 2025.
  - DOE forecasts 48% market share by 2020 and 84% in 2030, up from 2% in 2013. This would reduce lighting consumption by 15% in 2020 and 40% in 2030.
- Space Cooling
  - New standard for commercial rooftop air conditioners in 2018 expected to cut consumption by 30%.

# In Summary

- Companies' programs have achieved excellent results over time
- Studies show declining energy efficiency potential and savings
- Avoided costs of energy and capacity are significantly lower since prior filing in 2014
- Low load growth and rapid adoption of efficient technology seen throughout the U.S.

# Next steps

- Next meeting – October 26, 2017
- Review planning and timeline for next EE filing

# Appendix

# California Standards Tests Definitions

- **The Total Resource Cost Test (TRC):** The Total Resource Cost Test measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both the participants' and the utility's costs. This test represents the combination of the effects of a program on both the customers participating and those not participating in a program. In a sense, it is the summation of the benefit and cost terms in the Participant and the Ratepayer Impact Measure tests, where the revenue (bill) change and the incentive terms intuitively cancel (except for the differences in net and gross savings).
- **The Ratepayer Impact Measurement Test (RIM):** The Ratepayer Impact Measure test measures what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program. Rates will go down if the change in revenues from the program is greater than the change in utility costs. Conversely, rates or bills will go up if revenues collected after program implementation is less than the total costs incurred by the utility in implementing the program. This test indicates the direction and magnitude of the expected change in customer bills or rate levels.

# California Standards Tests Definitions

- **The Participant Test (PCT):** The Participant Test is the measure of the quantifiable benefits and costs to the customer due to participation in a program. Since many customers do not base their decision to participate in a program entirely on quantifiable variables, this test cannot be a complete measure of the benefits and costs of a program to a customer.
- **The Program Administrator Cost Test (PAC):** The Program Administrator Cost Test measures the net costs of a demand-side management program as a resource option based on the costs incurred by the program administrator (including incentive costs) and excluding any net costs incurred by the participant. The benefits are similar to the TRC benefits. Costs are defined more narrowly.

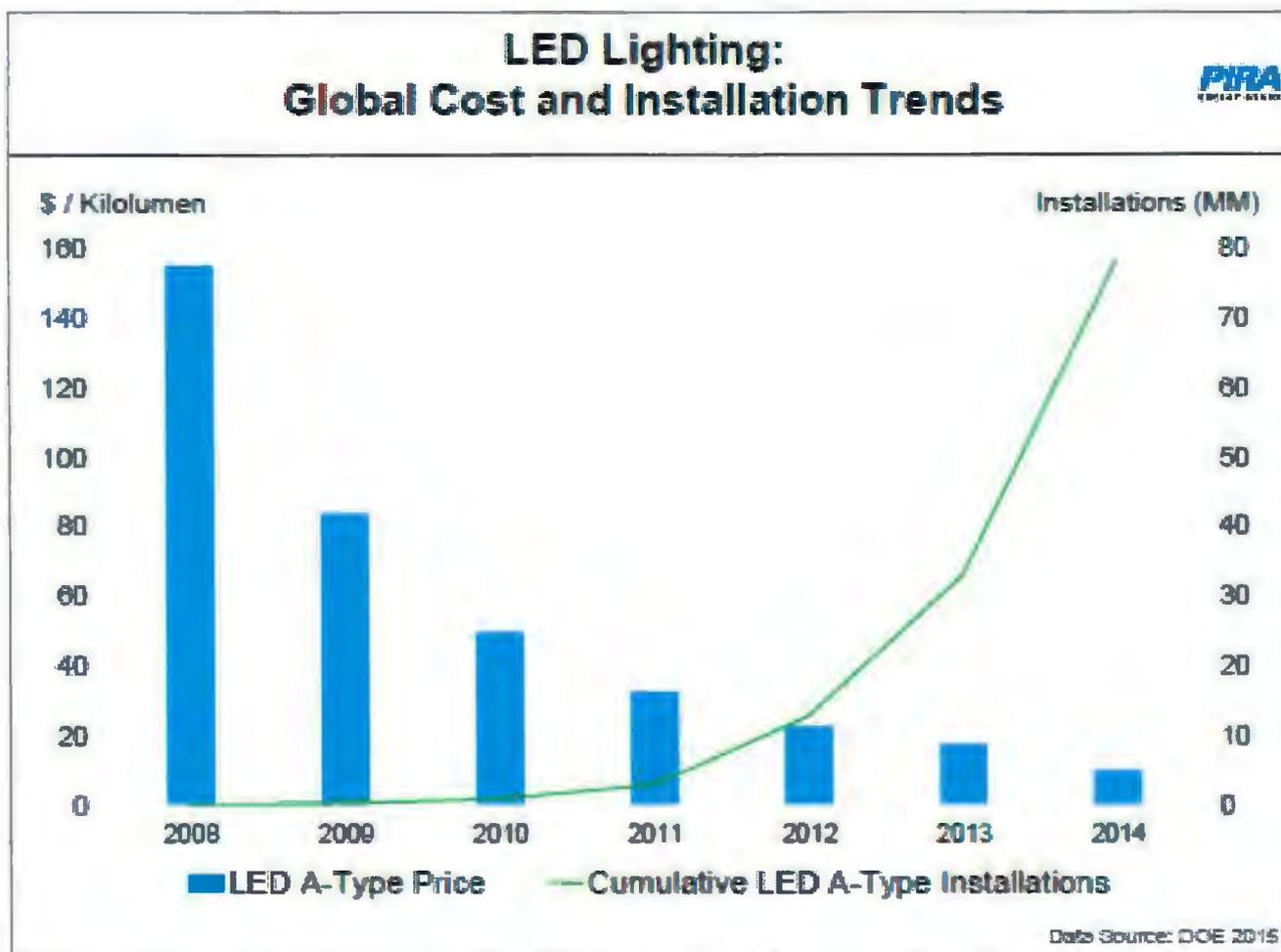
# Structural headwinds may lead to declining US electricity growth

- Morgan Stanley forecasts US electricity consumption to decrease by ~0.3% annually over the next decade
  - Forecast risk skewed to the downside given the potential for efficiency breakthroughs and / or incremental government regulations
  - GDP, population, computing, and electric vehicles provide the most upside
- 0.3% CAGR 2015-2040 residential sales (EIA)
  - Reduced from 0.5% in previous AEO
- 0.54% CAGR in electricity sales through 2035 (PIRA)
  - Reduced from 0.83% in previous forecast

# Recent saturation survey shows significant increase in LED adoption

In past 12 months...	2007	2010	2013	2014	2016	2017
Install CFL?	34%	72%	60%	56%	40%	34%
Average # installed	7	11	9	9	8	8
Install LED?	n/a	n/a	35%	37%	51%	61%
Average # installed			7	7	9	10

# LED lighting saturation ramps up



# Potential Study Completed by Cadmus

- Conducted by Cadmus Group

