Energy Efficiency in Western Utility Resource Plans

Implications for Regional Assessments and Initiatives

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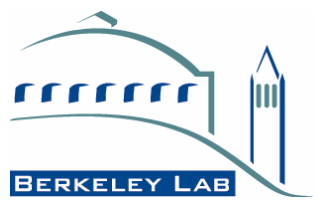


Overview of Presentation

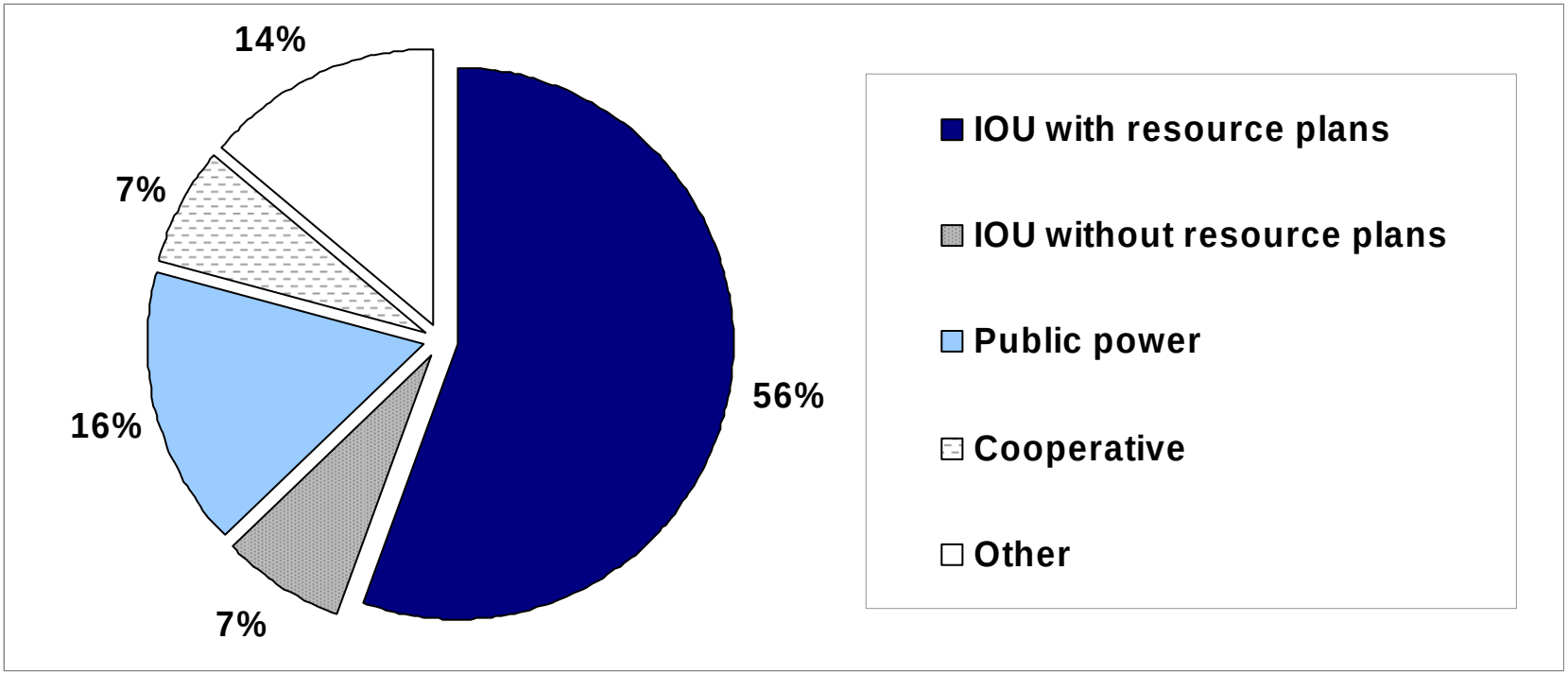
- LBNL/CREPC Resource Assessment Project
  - Overview
  - Data Sources
- Treatment of Energy Efficiency (EE) in Resource Plans
  - Why does it matter?
- Energy Efficiency in Recent Resource Plans:
  - Common Inconsistencies and Data Problems
  - Levels of EE Proposed in Recent Utility Resource Plans
- Recommendations and tools for tracking and reporting EE in future resource plans to support West-wide goals and analysis

LBNL/CREPC Resource Assessment Project Overview

- Project scope: Comparative analysis of recent resource plans filed by 14 utilities in the Western U.S. and Canada

- Project objectives:
  - Analyze treatment of conventional & emerging resource options—including energy efficiency (EE)
  - Assess risk analysis & portfolio management
  - Develop more standardized methods and conventions for resource assessment
  - Summarize how issues are handled in resource plans; identify "best practices" and offer recommendations
  - Create information tools for CREPC that facilitate work on related projects (e.g. regional transmission planning)

Utility resource plans are publicly available for much of the load in the Western U.S.



- All states in the Western U.S.—except WY and AZ—require investor-owned utilities (IOUs) to regularly file resource plans
- Municipally owned utilities that purchase electricity from the Western Area Power Administration are also required to prepare resource plans (but are not required to make them publicly available)

Western Utility Resource Plans Included in this Study

Utility	Year and name of the resource plan
Avista Corp.	2005 Electric Integrated Resource Plan
BC Hydro	2004 Integrated Electricity Plan
Idaho Power Co.	2004 Integrated Resource Plan
Nevada Power	2003 Integrated Resource Plan
NorthWestern Energy Corp. (NWE)	2004 Electric Default Supply Resource Procurement Plan
PacifiCorp	2004 Integrated Resource Plan
Pacific Gas & Electric (PG&E)	2004 Long-term Procurement Plan
Portland General Electric (PGE)	2002 Integrated Resource Plan
Public Service Company of New Mexico (PNM)	2005 Electric Supply Plans
Public Service of Colorado (PSCO)	2003 Least-Cost Resource Plan
Puget Sound Energy (PSE)	2005 Least Cost Plan
San Diego Gas & Electric (SDG&E)	2004 Long-term Resource Plan
Sierra Pacific	2005 Integrated Resource Plan
Southern California Edison (SCE)	2004 Long-term Procurement Plan

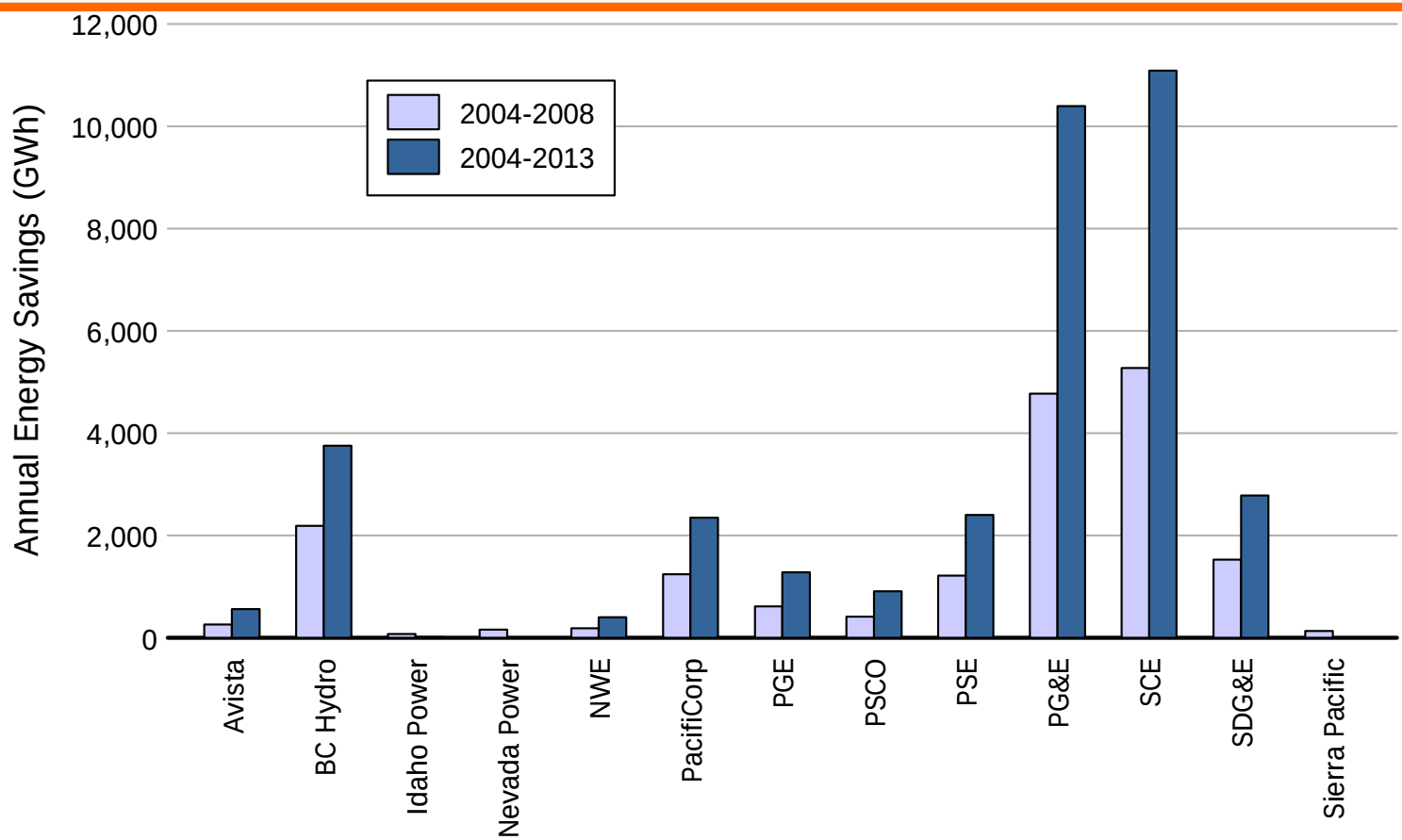
Energy Efficiency (EE) in Resource Plans

- Why does energy efficiency matter?
  - EE is or is likely to become a significant resource
- Growing need for long-term tracking of EE resources in several venues
  - Regional resource assessment/adequacy:
    - EE affects the level of supply resources needed to meet resource adequacy requirements
    - inconsistencies in EE treatment and insufficient EE data in utility resource plans contribute to uncertainty
  - WGA CDEAC goal: 20% EE by 2020
  - Climate change?
- Can utility resource plans support efforts to track EE?
  - Need to distinguish among EE resources:
    - EE strategies: EE programs, building codes and EE standards
  - Also need to distinguish EE proposed in resource plans from residual savings from "pre-plan" EE

Inconsistencies and Insufficient Data in Current Western Resource Plans

- Data reported does not include all EE resources
  - only EE program effects reported (no EE standards or building codes)
  - only effects of EE programs proposed in the plan provided—no savings from previous investments reported
  - plan and pre-plan savings not reported separately
- Energy efficiency often embedded in the load forecast
  - Difficult to assess impacts and distinguish between utility EE programs and other EE strategies (codes, standards)
- Planning horizon inconsistencies within plans
  - tends to be short for EE resources vs. 10-15 years for resource plans
  - short-term EE program plans (2-5 years) vs. longer-term EE/DSM targets
- Limited data on capacity (MW) impacts in the Pacific Northwest
  - Data either not reported or refers to winter peak
- Unclear how the *level* of EE resources is determined
  - May be based on other factors (e.g., budgets, prior agreements, rate impacts)?
  - Generally does not appear to be linked to EE potential or cost-effectiveness analysis
- Lack of transparency—redaction of key data

Energy Savings Impacts of EE Programs Proposed in Western Utility Resource Plans

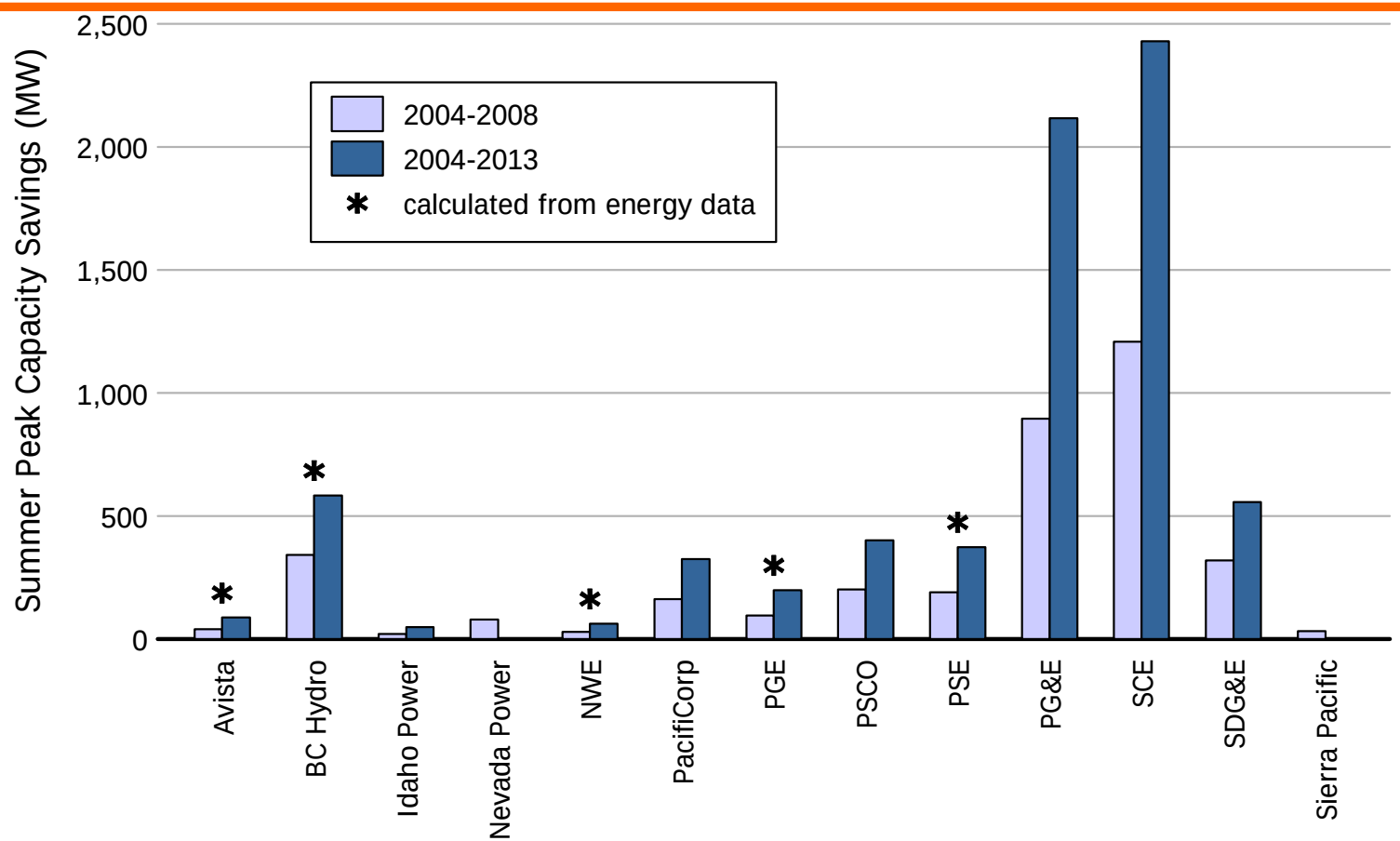


% of energy demand* growth (2008):	Avista	BC Hydro	Idaho Power	Nevada Power	NWE	PacifiCorp	PGE	PSCO	PSE	PG&E	SCE	SDG&E	Sierra Pacific
	26%	64%	5%	8%	26%	44%	27%	16%	100%	74%	76%	91%	23%

* Energy demand does not include load reductions from EE programs, or reserve margins

- Majority of energy-efficiency program activity is projected to occur in California and the Pacific Northwest
- BUT—for some smaller utilities (Pacificorp, PSE), EE projected to provide a large share of demand growth

Incremental EE Program Effects: Summer Peak Capacity Savings

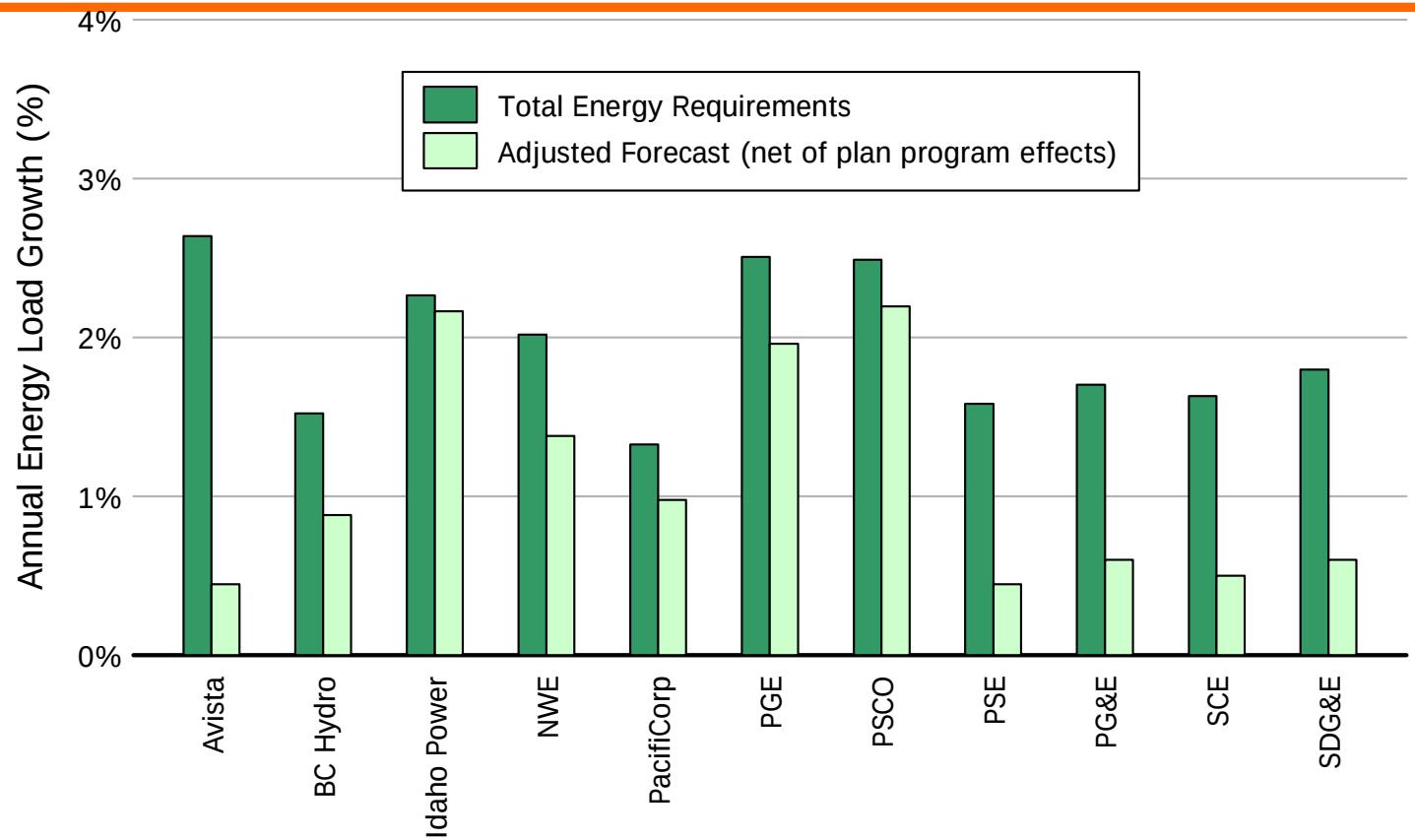


% of summer peak demand* growth (2008):	Avista	BC Hydro	Idaho Power	Nevada Power	NWE	PacifiCorp	PGE	PSCO	PSE	PG&E	SCE	SDG&E	Sierra Pacific
	29%	*63%*	6%	*15%*	–	14%	*36%*	34%	*123%*	62%	53%	74%	*24%*

*** Summer peak demand does not include load reductions from EE programs, or reserve margins**

- Somewhat larger range in utilities' summer-peak capacity savings
- Caveat—most utilities in the Pacific Northwest did not report capacity (MW) data—the results are derived from energy data

Impact of EE programs in reducing utility load growth (2004-2013)



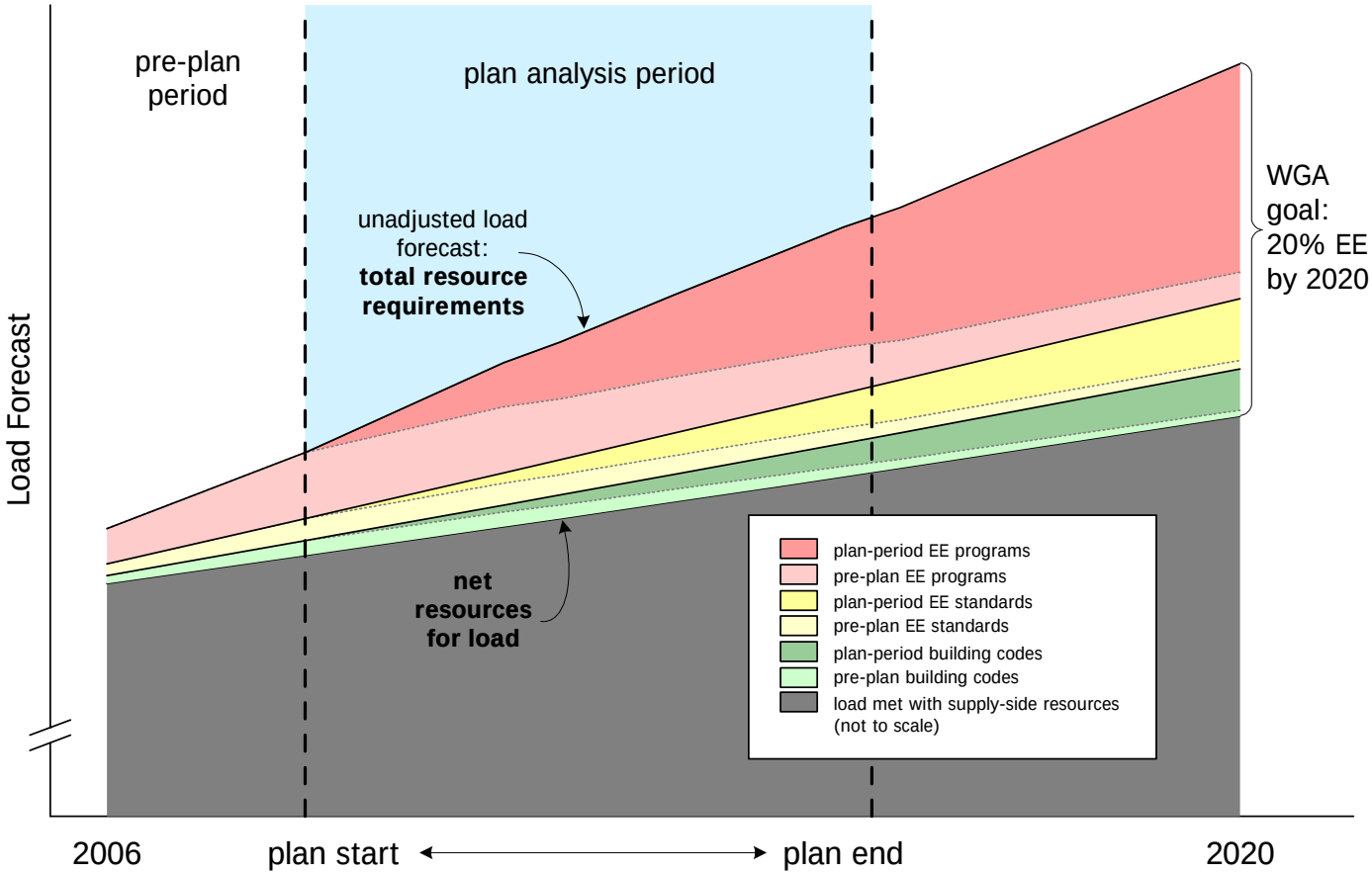
- EE can significantly reduce load growth
  - Projected load growth without EE programs ranges from 1.1% to 2.9% per year
  - Including EE programs reduces growth to 0.4–2.2%
- Five utilities (Avista, PSE, PG&E, SCE and SDG&E) proposed EE programs that can reduce growth from 1.6–2.6% per year to under ~0.5%
- Impacts of other EE strategies (efficiency standards, building codes) not included

Progress Toward the WGA CDEAC Goal: 20% by 2020?

Utility	Plan EE Program Impacts as % of Total Energy Requirements	
	2008	2013
Avista	2.5 %	4.8 %
BC Hydro	3.8 %	6.0 %
Idaho Power	0.4 %	0.9 %
Nevada Power	0.7 %	—
NWE	2.9 %	5.9 %
PacifiCorp	1.9 %	3.4 %
PGE	2.8 %	5.1 %
PSCO	1.4 %	2.8 %
PSE	5.7 %	10.4 %
PG&E	5.0 %	10.1 %
SCE	5.3 %	10.4 %
SDG&E	6.7 %	11.3 %
Sierra Pacific	1.4 %	—

- In 2013, utilities are projected to meet 0.9% to 11.3% of load with EE programs
- This underestimates actual progress: EE standards and building codes not included!
- No information on status in 2020
- Bottom line:
  - Some states/utilities on track to meet CDEAC goals
  - insufficient information in current resource plans to judge progress fairly in other states

Recommendation:
Track EE Explicitly in Load Forecasts



Total resource requirements = load forecast *not* including demand reductions from EE strategies or reserve margins; losses are included.

Net Resources for Load = load forecast *including* demand reductions from EE strategies. Does not include reserve margins; losses are included.

- Clearly track EE strategies in load forecast to establish progress toward WGA goal:
  - by type (EE programs, EE standards, building codes)
  - by implementation period (pre-plan EE, plan-period EE)
- To fully capture the value of EE, calculate planning margins based on Net Resources for Load

Spreadsheet Tool for Tracking EE Resources Over Time (1)

Data Input: Energy Efficiency Impacts

* summer-peak capacity savings

Incremental Savings (including losses) in Calendar Year… NOTE: Savings measured at the customer meter should be adjusted to produce "generation-equivalent" values.

Program Year	Strategy	2006 GWh	2006 MW*	2007 GWh	2007 MW*	2008 GWh	2008 MW*	2009 GWh	2009 MW*	2010 GWh	2010 MW*	2011 GWh	2011 MW*	2012 GWh	2012 MW*	2013 GWh	2013 MW*	2014 GWh	2014 MW*	2015 GWh	2015 MW*	2016 GWh	2016 MW*	2017 GWh	2017 MW*	2018 GWh	2018 MW*	2019 GWh	2019 MW*	2020 GWh	2020 MW*
2006	EE Programs	500	28	500	28	500	28	500	28	500	28	500	28	500	28	500	28	500	28	500	28	400	22	400	22	400	22	400	22	400	22
	Building codes	175	10	175	10	175	10	175	10	175	10	175	10	175	10	175	10	175	10	175	10	140	8	140	8	140	8	140	8	140	8
	EE standards	75	4	75	4	75	4	75	4	75	4	75	4	75	4	75	4	75	4	75	4	60	3	60	3	60	3	60	3	60	3
	Total	750	42	750	42	750	42	750	42	750	42	750	42	750	42	750	42	750	42	750	42	600	33	600	33	600	33	600	33	600	33
2007	EE Programs			550	31	550	31	550	31	550	31	550	31	550	31	550	31	550	31	550	31	550	31	440	24	440	24	440	24	440	24
	Building codes			193	11	193	11	193	11	193	11	193	11	193	11	193	11	193	11	193	11	193	11	154	9	154	9	154	9	154	9
	EE standards			83	5	83	5	83	5	83	5	83	5	83	5	83	5	83	5	83	5	83	5	66	4	66	4	66	4	66	4
	Total			825	46	825	46	825	46	825	46	825	46	825	46	825	46	825	46	825	46	825	46	660	37	660	37	660	37	660	37
2008	EE Programs					605	34	605	34	605	34	605	34	605	34	605	34	605	34	605	34	605	34	605	34	484	27	484	27	484	27
	Building codes					212	12	212	12	212	12	212	12	212	12	212	12	212	12	212	12	212	12	212	12	169	9	169	9	169	9
	EE standards					91	5	91	5	91	5	91	5	91	5	91	5	91	5	91	5	91	5	91	5	73	4	73	4	73	4
	Total					908	50	908	50	908	50	908	50	908	50	908	50	908	50	908	50	908	50	908	50	726	40	726	40	726	40
2009	EE Programs							666	37	666	37	666	37	666	37	666	37	666	37	666	37	666	37	666	37	666	37	532	30	532	30
	Building codes							233	13	233	13	233	13	233	13	233	13	233	13	233	13	233	13	233	13	233	13	186	10	186	10
	EE standards							100	6	100	6	100	6	100	6	100	6	100	6	100	6	100	6	100	6	100	6	80	4	80	4
	Total							998	55	998	55	998	55	998	55	998	55	998	55	998	55	998	55	998	55	998	55	799	44	799	44
2010	EE Programs									732	41	732	41	732	41	732	41	732	41	732	41	732	41	732	41	732	41	732	41	586	33
	Building codes									256	14	256	14	256	14	256	14	256	14	256	14	256	14	256	14	256	14	256	14	205	11
	EE standards									110	6	110	6	110	6	110	6	110	6	110	6	110	6	110	6	110	6	110	6	88	5
	Total									1,098	61	1,098	61	1,098	61	1,098	61	1,098	61	1,098	61	1,098	61	1,098	61	1,098	61	1,098	61	878	49
2011	EE Programs											805	45	805	45	805	45	805	45	805	45	805	45	805	45	805	45	805	45	805	45
	Building codes											282	16	282	16	282	16	282	16	282	16	282	16	282	16	282	16	282	16	282	16
	EE standards											121	7	121	7	121	7	121	7	121	7	121	7	121	7	121	7	121	7	121	7
	Total											1,208	67	1,208	67	1,208	67	1,208	67	1,208	67	1,208	67	1,208	67	1,208	67	1,208	67	1,208	67
2012	EE Programs																														
	Building codes																														
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	EE standards																														
	Total																														
Cumulative Effects in Each Year	EE Programs	500	28	1,0																											
	Building codes	175	10	3																											
	EE standards	75	4	1																											
	Total	750	42	1,5																											

Data Input: Load Forecast

		2006 GWh	2006 MW*	2007 GWh	2007 MW*	2008 GWh	2008 MW*	2009 GWh	2009 MW*	2010 GWh	2010 MW*	2011 GWh	2011 MW*	2012 GWh	2012 MW*	2013 GWh	2013 MW*
1.	Total Resource Requirements[1]	100,000	5,000	101,500	5,075	103,023	5,151	104,568	5,228	106,136	5,307	107,728	5,386	109,344	5,467	110,984	5,549
2.	EE Programs	500	28	1,050	58	1,655	92	2,321	129	3,053	170	3,858	214	4,744	264	5,718	318
3.	Building codes	175	10	368	20	579	32	812	45	1,068	59	1,350	75	1,660	92	2,001	111
4.	EE standards	75	4	158	9	248	14	348	19	458	25	579	32	712	40	858	48
5.	Total EE Strategies (2+3+4)	750	42	1,575	88	2,483	138	3,481	193	4,579	254	5,787	321	7,115	395	8,577	476
6.	Program-adjusted forecast (1-2)[2]	99,500	4,972	100,450	5,017	101,368	5,059	102,247	5,099	103,084	5,137	103,871	5,172	104,601	5,204	105,267	5,232
7.	Net Resources for Load (1-5)[2]	99,250	4,958	99,925	4,988	100,540	5,013	101,087	5,035	101,558	5,052	101,942	5,065	102,229	5,072	102,408	5,073
8.	Planning Reserve Multiplier[2]	--	15%	--	15%	--	15%	--	15%	--	15%	--	15%	--	15%	--	15%
9.	Planning Reserves (6x7)	--	744	--	748	--	752	--	755	--	758	--	760	--	761	--	761
10.	Capacity Requirements (6+8)[3]	--	5,702	--	5,736	--	5,765	--	5,790	--	5,810	--	5,825	--	5,833	--	5,834

		2014 GWh	2014 MW*	2015 GWh	2015 MW*	2016 GWh	2016 MW*	2017 GWh	2017 MW*	2018 GWh	2018 MW*	2019 GWh	2019 MW*	2020 GWh	2020 MW*
1.	Total Resource Requirements[1]	112,649	5,632	114,339	5,717	116,054	5,803	117,795	5,890	119,562	5,978	121,355	6,068	123,176	6,159
2.	EE Programs	6,790	377	7,969	443	9,166	509	10,482	582	11,930	663	13,523	751	15,276	849
3.	Building codes	2,376	132	2,789	155	3,208	178	3,669	204	4,176	232	4,733	263	5,347	297
4.	EE standards	1,018	57	1,195	66	1,375	76	1,572	87	1,790	99	2,029	113	2,291	127
5.	Total EE Strategies (2+3+4)	10,185	566	11,953	664	13,748	764	15,723	874	17,896	994	20,285	1,127	22,914	1,273
6.	Program-adjusted forecast (1-2)[2]	105,860	5,255	106,370	5,274	106,888	5,294	107,313	5,307	107,631	5,315	107,832	5,316	107,900	5,310
7.	Net Resources for Load (1-5)[2]	102,465	5,067	102,386	5,053	102,306	5,039	102,072	5,016	101,666	4,984	101,070	4,941	100,262	4,886
8.	Planning Reserve Multiplier[2]	--	15%	--	15%	--	15%	--	15%	--	15%	--	15%	--	15%
9.	Planning Reserves (6x7)	--	760	--	758	--	756	--	752	--	748	--	741	--	733
10.	Capacity Requirements (6+8)[3]	--	5,827	--	5,811	--	5,795	--	5,769	--	5,731	--	5,682	--	5,619

* summer-peak demand

- Spreadsheet tool designed to help utilities/ states track EE resources for CDEAC and other regional assessment needs
- Two data input forms collect detailed information on forecasted EE impacts and loads

Spreadsheet Tool for Tracking EE Resources Over Time (2)

Output:
Efficiency Resource Summary Tables

Energy Efficiency Strategy Summary
Cumulative Impacts of EE Strategies Implemented Starting in 2006

	2010		2015		2020	
	GWh	MW*	GWh	MW*	GWh	MW*
EE Strategy Impacts						
Cumulative EE Strategy Impacts[1]	4,579	254	11,953	664	22,914	1,273
Forecast Total Resource Requirements (TRR)[2]	106,136	5,307	114,339	5,717	123,176	6,159
EE Strategies as Percent of TRR	4%	5%	10%	12%	**19%**	**21%**
EE Strategies as Percent of TRR Growth (since 2006)	75%	83%	83%	93%	99%	110%
Impact of EE strategies on forecast load growth						
Average Annual growth in TRR (since 2006)	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Net Resources for Load (NRL)[3]	101,558	5,052	102,386	5,053	100,262	4,886
Average Annual Growth in NRL	0.6%	0.5%	0.3%	0.2%	0.1%	-0.1%
Percentage reduction in growth rate	62%	69%	77%	86%	95%	107%

*** summer-peak capacity**

← **WGA goal**

- Data are aggregated into summary tables that provide key EE metrics, including progress toward WGA CDEAC goal

For More Information...

Energy Efficiency in Western Utility Resource Plans: Impacts on Regional Resource Assessment and Support for WGA Policies

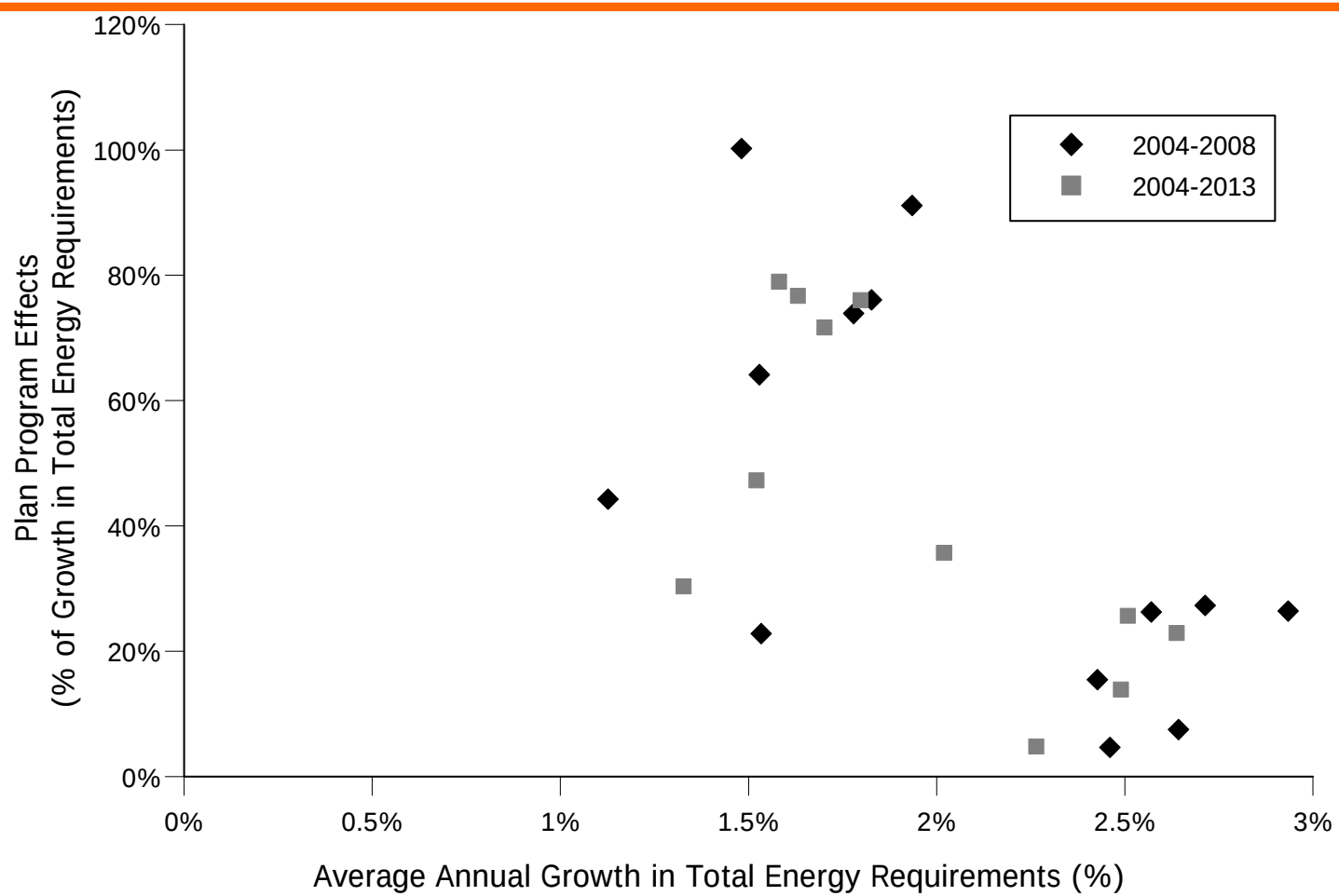
Hopper, N., C. Goldman and J. Schlegel. LBNL-58271. August 2006.

Report and spreadsheet tool available at:

http://eetd.lbl.gov/ea/EMS/rplan-pubs.html

Background Slides

EE Program Effects as Percent of Load Growth



- It may be harder for utilities with high forecasted load growth to meet a large share of that growth with energy efficiency
- BUT—greater EE opportunities exist for fast-growing utilities (e.g., new construction)