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Given its low average retail rates (shown in Table 2), BC Hydro is able to further increase its DSM savings by implementing conservation rates with higher price signals. The combined impact of programs, codes and standards, and conservation rates is anticipated to reduce 2015 loads by about 12.0 percent. However, no direct comparison of the conservation rates component with other jurisdictions is available to put this DSM target in context, as jurisdictions with higher rates are already receiving energy savings from higher prices (acquired as natural conservation), and instead typically focus on achieving capacity savings from their rate designs.

Aside from the percent-of-sales mandates, some utilities in states that allow utilities to propose savings targets are also aggressively pursuing DSM. The levels of savings achieved in 2009 by leading utilities are presented in the next section. It should be noted when comparing the standards and achievements in different jurisdictions that, in addition to different types of savings being counted (i.e. DSM programs, codes and standards, conservation rates), there are also differing methods of attributing savings to such initiatives. BC Hydro's savings noted above are all net of free-ridership and spillover, whereas many jurisdictions base their targets on gross savings or do not specify a measurement procedure at all.

## 2. Historic DSM Achievements

To assess the aggressiveness and success of BC Hydro's DSM programs, Cadmus reviewed savings achieved by other organizations across North America from 2005 to 2009. The term "organization" is used here to encompass utilities who implement their own DSM programs, as well as third-party implementers, such as statewide implementers. Cadmus worked with BC Hydro staff to develop a list of such organizations for this analysis, aiming to span a range of geographies, implementation mechanisms, and levels of savings. The list included:

- Leading utilities in Canadian jurisdictions outside of British Columbia (Hydro Quebec, Manitoba Hydro, and the Ontario Power Authority).
- U.S. investor-owned utilities with at least 10,000 GWh in annual retail sales, that reported DSM savings on Energy Information Administration (EIA) Form 861<sup>1</sup> for at least the period from 2007 through 2009. Cadmus filtered this list of qualifying utilities to those averaging DSM savings of at least 0.15 percent of retail sales from 2007 to 2009, in order to focus the analysis on leading utilities.
- Several states who implement DSM through a third party (Vermont, Energy Trust of Oregon, NYSERDA, and New Jersey Clean Energy).
- Additional utilities that were included in BC Hydro's 2008 review of DSM planned savings (National Grid and San Diego Gas & Electric).

Table 2 provides the list of all organizations included in this analysis, along with summary information on their sales, customers, revenues, and savings in 2009. Spending and impacts are intended to reflect energy-efficiency efforts only, and do not include demand response programs. The data used for this analysis was a combination of annual reports of sales and DSM accomplishments and information reported by U.S. utilities to the Energy Information Administration on Form 861.

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<sup>1</sup> <http://www.eia.doe.gov/cneaf/electricity/page/eia861.html>



**Table 2. Summary of Utilities Included in DSM Achievement Review - 2009**

Organization	Jurisdictions(s)	2009 Baseline Data						DSM Savings	
		Customers	Sales (GWh)	Revenues (Million \$)	Average Retail Rate (\$/kWh)	Summer Peak (MW)	Winter Peak (MW)	% of Energy Sales	% of Peak Demand
San Diego Gas & Electric	US - CA	1,370,621	16,994	2,929	0.17	4,482	3,691	2.89%	2.59%
Wisconsin Electric Power Co	US - MI, WI	1,115,500	25,818	2,459	0.10	5,751	4,758	2.42%	0.03%
Massachusetts Electric Co	US - MA	1,153,519	10,973	1,714	0.16	4,494	3,711	2.14%	0.87%
Southern California Edison Co	US - CA	4,855,071	77,983	10,973	0.14	21,786	15,262	2.14%	1.36%
Pacific Gas & Electric Co	US - CA	5,215,171	79,985	10,894	0.14	18,410	12,553	1.91%	1.48%
Nevada Power Co	US - NV	826,637	21,189	2,358	0.11	5,586	3,545	1.54%	0.86%
Vermont* ^	US - VT	356,132	5,621	710	0.13	1,103		1.51%	1.24%
Puget Sound Energy Inc	US - WA	1,072,811	21,866	2,021	0.09	3,508	4,906	1.47%	0.00%
Connecticut Light & Power Co	US - CT	1,077,735	12,090	2,349	0.19	4,873	4,016	1.32%	0.49%
Interstate Power and Light Co	US - IA, IL, MN	526,023	14,876	1,242	0.08	2,949	2,568	1.18%	1.12%
MidAmerican Energy Co	US - IA, IL, SD	723,178	20,184	1,210	0.06	4,299	3,522	1.08%	1.07%
Idaho Power Co	US - ID, OR	488,176	13,948	893	0.06	3,031	2,528	0.94%	0.59%
Energy Trust of Oregon*	US - OR	1,370,642	30,841	2,533	0.08			0.91%	
PacifiCorp**	US - CA, ID, UT, WA, WY	1,163,416	39,287	2,506	0.06			0.77%	
Arizona Public Service Co	US - AZ	1,117,199	28,173	2,962	0.11	7,218	4,086	0.74%	0.47%
Manitoba Hydro	Canada - MB	527,472	21,266	1,784	0.08			0.70%	
British Columbia Hydro	Canada - BC	1,801,328	50,771	4,269	0.08			0.69%	
Wisconsin Power & Light Co	US - WI	455,794	9,858	915	0.09	2,558	2,265	0.62%	0.35%
New Jersey Clean Energy*	US - NJ	3,892,544	79,130	12,686	0.16	18,189		0.58%	0.25%
Hydro Quebec	Canada - QC	3,300,000	165,300	12,055	0.07			0.55%	
Public Service Co of Colorado	US - CO	1,356,014	27,316	2,223	0.08	6,272	5,941	0.54%	2.66%
Kansas City Power & Light Co	US - KS, MO	510,296	14,681	1,134	0.08	3,448	2,631	0.27%	0.44%
Consolidated Edison Co-NY Inc	US - NY	2,672,296	23,477	5,038	0.21	5,329	3,849	0.18%	0.15%
NYSERDA*	US - NY	7,937,995	140,043	25,253	0.18	37,642		0.17%	
Florida Power & Light Co	US - FL	4,502,355	102,682	11,542	0.11	22,351	20,081	0.15%	0.33%
Ontario Power Authority*	Canada - ON		150,999						
<b>Average Excluding BC Hydro</b>								<b>1.11%</b>	<b>0.86%</b>

\* Third-party implementer across multiple utility service territories.  
 \*\* Excludes Oregon service territory where DSM is implemented by the Energy Trust of Oregon  
 ^ Statewide, including Efficiency Vermont and Burlington Electric Department programs.

The data indicate that for utilities included in the analysis, 2009 program savings ranged from 0.15 percent to 2.89 percent of retail sales, with an average of 1.11 percent, excluding BC Hydro. On average, energy efficiency also reduced peak demand by 0.86 percent. It is important to note that many of these utilities also run capacity-focused demand response programs, which would create additional peak demand reductions not included in these numbers. Additionally, reductions in peak may not be comparable between organizations due to differences in weather, sectoral composition of customers, and other factors.

While these numbers provide an excellent sample across utility size, geography, and historic DSM accomplishments, they are all based on a single year. Savings achieved in a single year are a function of economic conditions, new construction rates, available budgets, and other factors, so it is important to base such an analysis on multiple years of data, where possible. Table 3 shows the savings achieved from 2005 to 2009 for those same utilities listed in Table 2, where available.

**Table 3. Summary of DSM Achievements – 2005 to 2009**

Organization	Annual Energy Savings as Percent of Retail Sales					
	2005	2006	2007	2008	2009	Average
San Diego Gas & Electric		1.00%	2.13%	1.99%	2.89%	2.0%
Wisconsin Electric Power Co		0.20%	0.17%	0.27%	2.42%	0.8%
Massachusetts Electric Co	1.27%	1.94%	1.53%	0.92%	2.14%	1.6%
Southern California Edison Co	1.62%	0.99%	1.91%	1.98%	2.14%	1.7%
Pacific Gas & Electric Co	1.61%	1.00%	2.05%	3.35%	1.91%	2.0%
Nevada Power Co	0.34%	0.69%	0.82%	1.39%	1.54%	1.0%
Vermont	1.04%	1.06%	1.88%	2.51%	1.51%	1.6%
Puget Sound Energy Inc	0.83%	0.78%	1.02%	1.23%	1.47%	1.1%
Connecticut Light & Power Co	0.97%	1.18%	1.72%	1.95%	1.32%	1.4%
Interstate Power and Light Co	0.74%	0.83%	0.83%	0.80%	1.18%	0.9%
MidAmerican Energy Co	0.60%	0.78%	0.77%	0.83%	1.08%	0.8%
Idaho Power Co	0.31%	0.51%	0.62%	0.94%	0.94%	0.7%
Energy Trust of Oregon	1.10%	0.69%	0.96%	0.88%	0.91%	0.9%
PacifiCorp	0.41%	0.51%	0.44%	0.57%	0.77%	0.5%
Arizona Public Service Co		0.28%	0.93%	0.88%	0.74%	0.7%
Manitoba Hydro	0.51%	0.67%	1.13%	0.42%	0.70%	0.7%
British Columbia Hydro	1.09%	1.25%	1.09%	0.88%	0.69%	1.0%
Wisconsin Power & Light Co	0.57%	0.62%	0.65%	0.74%	0.62%	0.6%
New Jersey Clean Energy	0.47%	0.16%	0.27%	0.41%	0.58%	0.4%
Hydro Quebec					0.55%	0.5%
Public Service Co of Colorado	0.38%	0.17%	0.45%	0.63%	0.54%	0.4%
Kansas City Power & Light Co			0.09%	0.21%	0.27%	0.2%
Consolidated Edison Co-NY Inc	0.02%	0.16%	0.21%	0.38%	0.18%	0.2%
New York State Research and	0.36%	0.28%	0.48%	0.11%	0.17%	0.3%
Florida Power & Light Co	0.18%	0.19%	0.20%	0.16%	0.15%	0.2%
Ontario Power Authority			0.17%	0.25%		0.2%
<b>Average Excluding BC Hydro</b>	<b>0.70%</b>	<b>0.67%</b>	<b>0.89%</b>	<b>0.99%</b>	<b>1.11%</b>	<b>0.85%</b>

The data show that there is a wide spread in levels of savings across these organizations. Average savings over the time period ranged from as low as 0.2 percent to as high as 2 percent of sales, with an average across years and organizations (excluding BC Hydro) of .9 percent. It is also evident that even for a given organization, savings can fluctuate greatly over an extended time period. For example, Pacific Gas & Electric's savings ranged from one percent up to well over three percent. This volatility can be used to inform BC Hydro's treatment of uncertainty in planning and forecasting, as discussed further in the next section.

It is important to note that the savings that organizations are allowed to claim varies by jurisdiction. Most organizations are only able to claim savings realized directly through their DSM programs. However, in some jurisdictions (e.g. California) utilities can claim savings from improved codes and standards, which is one reason savings reported for these utilities tend to be higher than other organizations. To make reported savings as comparable as possible across utilities, savings from codes and standards and conservation rates have been removed from BC Hydro's annual DSM savings.

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### 3. DSM Achievements Relative to Goals

Before implementing DSM programs, many utilities file plans with regulatory bodies detailing expected program costs and savings. In some cases, these budgets represent hard caps (i.e., once funds are exhausted, programs end for the year), while other utilities are allowed to continue spending above anticipated levels as long as they continue to provide cost-effective savings. At the end of a program year, a retrospective analysis can be conducted to assess program or portfolio achievements compared to planned savings. However, there are a few reasons why such a comparison can prove difficult:

- Some utilities do not file formal energy-efficiency plans, or they file plans that include only budgets and no savings goals.
- Some goals span multiple years (e.g., one savings goal for 2009-2011) without targets for individual years. In these cases, the analysis has taken a pro-rated share in each year for comparison to actual achievements.
- Utilities that cover multiple states may have different requirements and performance metrics for each jurisdiction.

Any number of factors can lead to utilities under- or over-achieving their goals. Some of these include:

- Overly conservative or aggressive planning
- Delays in approval of plans
- Economic conditions
- Unexpected realization rates
- Net-to-gross ratios (for those utilities with goals based on net savings)
- Lost savings due to federal or state programs or improved codes and standards

These caveats aside, Cadmus reviewed planned savings for the utilities shown in Section 2 of this report. The results of this analysis will inform BC Hydro's future DSM targets and identify appropriate ranges of uncertainty for integrated resource planning. Planned energy savings for 2009 were available for 19 of these 27 organizations, and the results of this comparison are shown in Table 4. The table also includes peak savings relative to plans, where available.

Table 4. 2009 DSM Performance Relative to Goals

Organization	Energy			Peak Capacity		
	Planned (GWh)	Achieved (GWh)	% of Planned Achieved	Planned (MW)	Achieved (MW)	% of Planned Achieved
San Diego Gas & Electric**	281	506	180%	54	116	213%
Southern California Edison Co**	1,189	1,704	143%	207	296	143%
Pacific Gas & Electric Co**	1,014	1,560	154%	230	267	116%
Nevada Power Co	186	332	179%	45	48	106%
Vermont	127	86	68%			
Puget Sound Energy Inc	296	326	110%		-	
Interstate Power and Light Co	134	177	132%		37	
MidAmerican Energy Co	200	221	110%	255	46	18%
Energy Trust of Oregon	337	283	84%	39	32	84%
PacifiCorp	304	305	100%	49	66	134%
Arizona Public Service Co	198	209	106%		34	
Manitoba Hydro	145	150	103%	589		
British Columbia Hydro*	467	468	100%			
Hydro Quebec	985	912	93%			
Public Service Co of Colorado	181	149	82%	35	167	481%
Kansas City Power & Light Co	15	40	256%		15	
Consolidated Edison Co-NY Inc	177	43	24%			
NYSERDA	214	234	110%		55	
National Grid	248	189	76%	34	33	97%
<b>Average Excluding BC Hydro</b>			<b>117%</b>			<b>155%</b>

\* Includes savings from codes and standards, and rate structures

\*\* Includes savings from codes and standards

The data indicate that in 2009, most of these organizations met or exceeded their goals. The average achievement across the 18 organization was 117 percent of planned energy savings. For the nine organizations where peak capacity savings could be compared to goals, the average achievement was 155 percent of the goal.