

# **Electric Energy Efficiency Resource Acquisition Options for BC Hydro**

Prepared for the British Columbia Sustainable Energy  
Association and the Sierra Club of British Columbia

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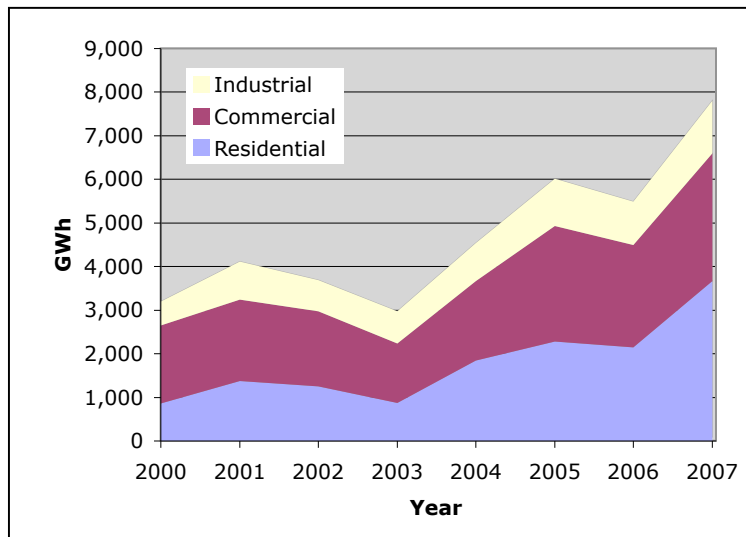
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## I. Electric Energy Efficiency Portfolio Performance and Costs in Other Jurisdictions

Utilities across North America have been relying on energy efficiency investment to reduce electric energy and capacity requirements for well over two decades. The US Department of Energy's Energy Information Administration (EIA) statistics on demand-side management show that reported electric savings have more than doubled since 2000.<sup>1</sup>

**Figure 1: Electric Energy Savings in the US by Sector**



Green Energy Economics Group (GEEG) estimates that if the British Columbia Hydro and Power Authority ("BC Hydro") followed the examples of leading efficiency portfolio administrators in the United States and Canada, after 20 years it could be providing cumulative annual savings of 15,388 GWh at costs of about \$0.046 per kWh.

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<sup>1</sup>Energy Information Administration (2009). *Demand-Side Management Program Incremental Effects by Sector*. Retrieved from <http://www.eia.doe.gov/cneaf/electricity/epa/epat9p5.html>

## A. ACEEE State Energy Efficiency Scorecards

According to the American Council for an Energy-Efficient Economy (ACEEE), electric utility ratepayers throughout the U.S. supported \$4.2 billion (2011 dollars) in demand-side management portfolios in 2006 and 2007, with planned spending in 2009 reported at over \$3.5 billion. Efficiency portfolio investment in 2006-7 lowered electric energy requirements by a reported total of 17,650 GWh annually, the equivalent to the output of 4.5 600-MW coal-fired stations.<sup>2</sup> At an average measure life of 10 years and a 6 percent real discount rate, between 2006 and 2007 the nation's ratepayers spent an average of 3.2 cents per kWh in constant 2011 dollars for energy-efficiency resources.

Efficiency savings can be compared across jurisdictions by first dividing incremental annual electric energy savings reported in any one year by corresponding electricity sales. Efficiency spending can be compared between jurisdictions either in terms of scale or yield. To compare spending between service areas, expenditures are divided by annual energy sales for each service area. To compare savings yields from DSM investment, annual expenditures are divided by annual savings to calculate the portfolio-wide cost to acquire an annual kWh of electricity savings.

### 1. Annual Energy Savings

Table 1 consolidates data tabulated in ACEEE's three most recent scorecards on electric utility energy efficiency investment performance and costs between 2008 and 2010. It presents information reported by demand-side management (DSM) portfolio administrators to the EIA regarding annual efficiency savings for all fifty states and the District of Columbia for 2006, 2007, 2008, and 2009 and compares savings achieved with annual sales reported for the same years.

**Table 1: Savings by State as Reported by ACEEE**

State	Total Incremental Elec. Savings (GWh)				Savings as a Percent of Electricity Sales			
	2006	2007	2008	2009	2006	2007	2008	2009
Vermont	62.9	105.2	148.5	90.2	1.08%	1.80%	2.59%	1.64%
Hawaii	67.9	124.8	204.6	113.2	0.64%	1.20%	1.97%	1.12%
Nevada	216.0	233.2	402.3	438.6	0.62%	0.65%	1.14%	1.28%
Connecticut	328.0	371.9	354.2	250.4	1.04%	1.10%	1.14%	0.84%
California	1,912.0	3,393.0	3,044.0	2,293.0	0.73%	1.30%	1.14%	0.88%
Minnesota	370.4	463.5	540.8	637.8	0.55%	0.68%	0.79%	1.00%

<sup>2</sup> Operating at a 75% capacity factor.

State	Total Incremental Elec. Savings (GWh)				Savings as a Percent of Electricity Sales			
	2006	2007	2008	2009	2006	2007	2008	2009
Wisconsin	344.2	467.7	545.1	583.5	0.49%	0.66%	0.78%	0.88%
Rhode Island	96.0	65.0	60.1	81.5	1.23%	0.81%	0.77%	1.07%
Idaho	150.9	103.0	182.1	185.7	0.66%	0.43%	0.76%	0.82%
Iowa	314.2	322.2	323.3	409.7	0.73%	0.71%	0.71%	0.94%
Utah	121.0	139.0	194.9	176.5	0.46%	0.50%	0.69%	0.64%
Massachusetts	455.0	489.6	388.3	458.7	0.82%	0.86%	0.69%	0.84%
Oregon	369.8	437.5	318.2	291.7	0.77%	0.90%	0.65%	0.61%
New Hampshire	73.9	78.5	70.3	68.1	0.67%	0.70%	0.64%	0.64%
Maine	74.8	107.7	74.3	94.0	0.61%	0.91%	0.64%	0.83%
Washington	630.7	635.1	530.0	665.2	0.74%	0.74%	0.61%	0.74%
Arizona	123.4	312.7	401.8	570.6	0.17%	0.41%	0.53%	0.78%
New Jersey	227.8	242.3	405.5	497.5	0.29%	0.30%	0.50%	0.66%
Colorado	60.0	146.6	203.3	254.6	0.12%	0.29%	0.39%	0.50%
Montana	64.7	43.3	52.1	57.3	0.47%	0.28%	0.34%	0.40%
New York	814.3	540.6	471.1	949.6	0.58%	0.36%	0.33%	0.68%
New Mexico	0.2	10.2	60.2	58.9	0.00%	0.05%	0.27%	0.27%
North Dakota	0.3	0.3	25.7	2.5	0.00%	0.00%	0.21%	0.02%
Texas	397.3	457.8	734.5	750.6	0.12%	0.13%	0.21%	0.22%
South Dakota	-	0.1	18.8	21.8	0.00%	0.00%	0.17%	0.20%
Florida	301.1	348.2	348.4	364.6	0.13%	0.15%	0.15%	0.16%
Maryland	0.2	0.2	85.0	274.2	0.00%	0.00%	0.13%	0.44%
Arkansas	0.0	6.2	50.8	59.8	0.00%	0.01%	0.11%	0.14%
Tennessee	61.3	63.5	97.9	120.8	0.06%	0.06%	0.09%	0.13%
Georgia	2.5	3.0	61.9	53.6	0.00%	0.00%	0.05%	0.04%
Kansas	-	34.7	13.9	1.0	0.00%	0.09%	0.04%	0.00%
South Carolina	14.7	13.4	26.9	45.6	0.02%	0.02%	0.03%	0.06%
Ohio	0.4	29.8	54.6	530.1	0.00%	0.02%	0.03%	0.36%
Alabama	8.4	7.7	14.5	63.4	0.01%	0.01%	0.02%	0.08%
Mississippi	5.5	3.5	11.2	31.2	0.01%	0.01%	0.02%	0.07%
Missouri	3.9	4.5	20.0	86.3	0.00%	0.01%	0.02%	0.11%
Kentucky	118.0	17.9	21.3	64.7	0.13%	0.02%	0.02%	0.07%
Nebraska	5.4	6.9	5.2	65.2	0.02%	0.02%	0.02%	0.23%
Michigan	-	-	8.9	375.7	0.00%	0.00%	0.01%	0.38%
North Carolina	3.1	1.4	15.2	51.9	0.00%	0.00%	0.01%	0.04%
Alaska	1.1	1.4	0.9	1.0	0.02%	0.02%	0.01%	0.02%
Indiana	12.6	20.7	11.5	39.9	0.01%	0.02%	0.01%	0.04%
District of Columbia	-	-	-	55.9	0.00%	0.00%	0.00%	0.46%
Pennsylvania	2.3	3.8	2.7	278.9	0.00%	0.00%	0.00%	0.19%
Oklahoma	-	0.2	2.3	20.3	0.00%	0.00%	0.00%	0.04%

State	Total Incremental Elec. Savings (GWh)				Savings as a Percent of Electricity Sales			
	2006	2007	2008	2009	2006	2007	2008	2009
Illinois	0.2	0.3	6.4	553.2	0.00%	0.00%	0.00%	0.40%
Virginia	0.1	0.1	0.0	1.0	0.00%	0.00%	0.00%	0.00%
Wyoming	-	-	-	7.4	0.00%	0.00%	0.00%	0.04%
Delaware	-	-	-	0.5	0.00%	0.00%	0.00%	0.00%
Louisiana	-	-	-	-	0.00%	0.00%	0.00%	0.00%
West Virginia	-	-	-	-	0.00%	0.00%	0.00%	0.00%

#### **Sources**

*Eldridge, Maggie, Max Neubauer, Dan York, Shruti Vaidyanathan, Anna Chittum, and Steven Nadel. "The 2008 State Energy Efficiency Scorecard". American Council for an Energy-Efficient Economy, October 2008, Report E086. Table 4, Table 6*

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*Molina, Maggie, Max Neubauer, Michael Sciortino, Seth Nowak, Shruti Vaidyanathan, Nate Kaufman, Anna Chittum, Colin Sheppard, Margaret Harper, Arne Jacobson, Charles Chamberlin, and Yerina Mugica. "The 2010 State Energy Efficiency Scorecard". American Council for an Energy-Efficiency Economy, October 2010, Report E107. Table 8*

*Sciortino, Michael, Max Neubauer, Shruti Vaidyanathan, Anna Chittum, Sara Hayes, Seth Nowak, Maggie Molina, Colin Sheppard, Arne Jacobson, Charles Chamberlin, and Yerina Mugica. "The 2011 State Energy Efficiency Scorecard". American Council for an Energy-Efficiency Economy, October 2011, Report E115. Table 4, Table 8*

For utilities that did report savings in 2006 and 2007, the average (weighted by sales) was 0.35 percent, with values ranging from 0.01 percent for four jurisdictions (Arkansas, Alabama, Missouri, and Mississippi) up to 2 percent and above (Hawaii and Vermont).

## 2. Annual Expenditures

Table 2 reproduces ACEEE's scorecards of total portfolio expenditures for 2006 and 2007, along with planned spending in 2009 and 2010 (ACEEE stopped reporting previous-year spending in 2009). Nominal expenditures were converted to 2011 dollars using the U.S. Bureau of Labor Statistics all-urban Consumer Price Index.

**Table 2: Spending and Budgets by State as Reported by ACEEE**

State	Total Spending (Million 2011\$)				2011¢/ kWh Sold			
	2006 Actual*	2007 Actual*	2009 Budgets	2010 Budgets	2006 Actual	2007 Actual	2009 Budgets	2010 Budgets**
Vermont	\$17.5	\$25.6	\$32	\$35	0.3027¢	0.4359¢	0.5825¢	0.6347¢
Hawaii	\$14.3	\$17.9	\$37	\$20	0.1355¢	0.1688¢	0.3656¢	0.1956¢
Nevada	\$26.6	\$30.5	\$44	\$46	0.077¢	0.0856¢	0.1274¢	0.1347¢
Connecticut	\$77.2	\$103.3	\$77	\$130	0.2438¢	0.3026¢	0.2576¢	0.4381¢
California	\$396.2	\$815.0	\$1,041	\$1,188	0.1507¢	0.3084¢	0.401¢	0.4577¢
Minnesota	\$53.4	\$98.4	\$116	\$164	0.08¢	0.1443¢	0.1812¢	0.2568¢
Wisconsin	\$81.3	\$86.9	\$105	\$95	0.1165¢	0.1219¢	0.1591¢	0.1429¢
Rhode Island	\$19.1	\$19.4	\$31	\$33	0.2444¢	0.2415¢	0.4038¢	0.4323¢
Idaho	\$22.7	\$18.0	\$33	\$37	0.0996¢	0.0756¢	0.1444¢	0.1628¢
Iowa	\$58.0	\$61.0	\$58	\$70	0.1338¢	0.1347¢	0.1329¢	0.1594¢
Utah	\$18.6	\$15.1	\$47	\$57	0.0707¢	0.0542¢	0.1716¢	0.2064¢
Massachusetts	\$138.7	\$129.7	\$192	\$310	0.2484¢	0.2269¢	0.3526¢	0.5698¢
Oregon	\$70.3	\$74.6	\$88	\$93	0.1462¢	0.1531¢	0.1857¢	0.1965¢
New Hampshire	\$19.5	\$20.2	\$16	\$27	0.1755¢	0.1794¢	0.1482¢	0.2522¢
Maine	\$12.2	\$18.2	\$22	\$14	0.0994¢	0.1536¢	0.1922¢	0.1273¢
Washington	\$125.7	\$136.7	\$153	\$190	0.1479¢	0.1594¢	0.1694¢	0.2104¢
Arizona	\$18.2	\$34.4	\$51	\$95	0.0248¢	0.0446¢	0.0699¢	0.129¢
New Jersey	\$92.3	\$103.5	\$138	\$203	0.1158¢	0.1263¢	0.1821¢	0.2682¢
Colorado	\$12.2	\$16.5	\$49	\$66	0.0245¢	0.0322¢	0.0954¢	0.1301¢
Montana	\$9.2	\$7.2	\$14	\$9	0.0667¢	0.0463¢	0.0961¢	0.0637¢
New York	\$249.6	\$260.6	\$395	\$599	0.1755¢	0.1759¢	0.2817¢	0.4276¢



State	Total Spending (Million 2011\$)				2011¢/ kWh Sold			
	2006 Actual*	2007 Actual*	2009 Budgets	2010 Budgets	2006 Actual	2007 Actual	2009 Budgets	2010 Budgets**
New Mexico	\$1.1	\$3.2	\$15	\$18	0.0052¢	0.0143¢	0.0694¢	0.0829¢
North Dakota	\$0.6	\$0.7	\$0	\$1	0.0051¢	0.0061¢	0.0008¢	0.0105¢
Texas	\$64.1	\$85.8	\$103	\$132	0.0187¢	0.0249¢	0.0298¢	0.0382¢
South Dakota	\$0.7	\$2.5	\$3	\$4	0.0068¢	0.0239¢	0.0256¢	0.0326¢
Florida	\$74.4	\$99.9	\$138	\$126	0.0326¢	0.0432¢	0.0615¢	0.0562¢
Maryland	\$0.1	\$2.7	\$40	\$91	0.0002¢	0.0042¢	0.0633¢	0.1456¢
Arkansas	\$-	\$1.7	\$8	\$13		0.0036¢	0.0186¢	0.0311¢
Tennessee	\$6.1	\$10.8	\$25	\$50	0.0059¢	0.0101¢	0.0267¢	0.053¢
Georgia	\$11.1	\$5.2	\$22	\$22	0.0082¢	0.0038¢	0.017¢	0.0169¢
Kansas	\$0.4	\$7.3	\$4	\$6	0.0009¢	0.0182¢	0.0101¢	0.0145¢
South Carolina	\$6.5	\$9.6	\$15	\$13	0.0081¢	0.0118¢	0.0199¢	0.0165¢
Ohio	\$31.9	\$31.0	\$19	\$157	0.0208¢	0.0192¢	0.0133¢	0.1072¢
Alabama	\$0.5	\$2.5	\$9	\$18	0.0006¢	0.0027¢	0.0115¢	0.0219¢
Mississippi	\$0.5	\$0.3	\$10	\$13	0.001¢	0.0007¢	0.0208¢	0.0279¢
Missouri	\$2.4	\$1.4	\$24	\$42	0.0029¢	0.0017¢	0.0297¢	0.0521¢
Kentucky	\$6.6	\$19.3	\$18	\$28	0.0074¢	0.0209¢	0.0202¢	0.0313¢
Nebraska	\$1.0	\$1.0	\$7	\$13	0.0035¢	0.0036¢	0.026¢	0.0469¢
Michigan	\$11.1	\$-	\$52	\$94	0.0103¢		0.0532¢	0.0957¢
North Carolina	\$4.2	\$7.3	\$67	\$46	0.0033¢	0.0055¢	0.0525¢	0.0364¢
Alaska	\$0.2	\$0.3	\$-	\$0	0.0029¢	0.0051¢		0.0065¢
Indiana	\$4.1	\$4.4	\$14	\$17	0.0039¢	0.004¢	0.0143¢	0.017¢
District of Columbia	\$9.4	\$-	\$13	\$10	0.0828¢		0.1069¢	0.0791¢
Pennsylvania	\$4.2	\$4.4	\$101	\$113	0.0029¢	0.0029¢	0.0703¢	0.0785¢
Oklahoma	\$0.0	\$0.2	\$4	\$29	0¢	0.0003¢	0.0073¢	0.0525¢
Illinois	\$3.6	\$0.9	\$94	\$170	0.0025¢	0.0006¢	0.0686¢	0.1242¢
Virginia	\$0.1	\$0.0	\$0	\$0	0.0001¢	0¢	0.0004¢	0.0002¢
Wyoming	\$-	\$-	\$3	\$4			0.0164¢	0.0266¢

State	Total Spending (Million 2011\$)				2011¢/ kWh Sold			
	2006 Actual*	2007 Actual*	2009 Budgets	2010 Budgets	2006 Actual	2007 Actual	2009 Budgets	2010 Budgets**
Delaware	\$-	\$0.2	\$-	\$4		0.0019¢		0.0328¢
Louisiana	\$-	\$-	\$2	\$-			0.003¢	
West Virginia	\$-	\$-	\$-	\$-				

\* Utility spending is on “ratepayer-funded energy efficiency” programs, or energy efficiency programs funded through charges included in customer utility rates or otherwise paid via some type of charge on customer bills. This includes both utility- administered programs and “public benefits” programs administered by other entities. We do not include data on separately funded low-income programs, load management programs, or energy efficiency research and development.

\*\* Divided by 2009 sales since 2010 EIA sales data is not yet available

Table 2 shows that states with energy efficiency savings in 2006 and 2007 reported spending an average of 0.0745¢ per kWh sold per year over the two-year period in 2011 dollars. Spending ranged from 0.0001¢ per kWh sold per year for Virginia in 2006, up to 0.4348¢ per kWh sold per year in the state of Vermont in 2007.

### 3. Costs of Saved Energy

The annual electricity savings produced by energy-efficiency portfolios last between ten and twenty years, depending on the life expectancies of the efficiency measures installed in any particular year. To compute the levelized cost of efficiency portfolio savings, the average measure lifetime is necessary for levelizing the up-front costs of the investments. Levelized costs of efficiency investment are directly comparable to the levelized costs of electric energy supply alternatives.

ACEEE provides both cost and savings data only for 2006 and 2007. The first two columns in Table 3 calculate the cost of annual energy savings achieved in each state in 2006 and 2007 in 2011 dollars. The third and fourth columns estimate the levelized cost per kWh saved in 2006 and 2007 for each state, assuming that portfolios across the country were composed of measures lasting an average of 10 years. 10 years probably understates the true average measure lives of the efficiency portfolios in those years, given the range of efficiency technologies targeted (from compact fluorescent lamps lasting an average of 5 years to high-efficiency lighting and cooling lasting 15 to 20 years or longer).

**Table 3: Cost of Saved Energy by State**

State	2011\$ / Annual kWh Saved		Levelized \$/kWh saved	
	2006	2007	2006	2007
Vermont	0.28	0.24	0.038	0.033
Hawaii	0.21	0.14	0.029	0.019
Nevada	0.12	0.13	0.017	0.018
Connecticut	0.24	0.28	0.032	0.038
California	0.21	0.24	0.028	0.033
Minnesota	0.14	0.21	0.020	0.029
Wisconsin	0.24	0.19	0.032	0.025
Rhode Island	0.20	0.30	0.027	0.040
Idaho	0.15	0.17	0.020	0.024
Iowa	0.18	0.19	0.025	0.026
Utah	0.15	0.11	0.021	0.015
Massachusetts	0.30	0.26	0.041	0.036
Oregon	0.19	0.17	0.026	0.023
New Hampshire	0.26	0.26	0.036	0.035
Maine	0.16	0.17	0.022	0.023
Washington	0.20	0.22	0.027	0.029
Arizona	0.15	0.11	0.020	0.015
New Jersey	0.41	0.43	0.055	0.058

State	2011\$ / Annual kWh Saved		Levelized \$/kWh saved	
	2006	2007	2006	2007
Colorado	0.20	0.11	0.028	0.015
Montana	0.14	0.17	0.019	0.023
New York	0.31	0.48	0.042	0.066
New Mexico	5.87	0.31	0.798	0.042
North Dakota	2.22	2.71	0.301	0.368
Texas	0.16	0.19	0.022	0.025
South Dakota		29.15		3.960
Florida	0.25	0.29	0.034	0.039
Maryland	0.59	16.40	0.080	2.228
Arkansas	0.00	0.27	0.000	0.037
Tennessee	0.10	0.17	0.013	0.023
Georgia	4.38	1.75	0.595	0.237
Kansas		0.21		0.029
South Carolina	0.44	0.72	0.060	0.098
Ohio	81.21	1.04	11.033	0.142
Alabama	0.06	0.32	0.008	0.044
Mississippi	0.09	0.09	0.012	0.013
Missouri	0.62	0.31	0.085	0.043
Kentucky	0.06	1.08	0.008	0.147
Nebraska	0.18	0.15	0.024	0.020
Michigan				
North Carolina	1.38	5.26	0.187	0.714
Alaska	0.16	0.23	0.021	0.031
Indiana	0.33	0.21	0.045	0.029
District of Columbia				
Pennsylvania	1.85	1.16	0.252	0.157
Oklahoma		0.92		0.125
Illinois	18.34	2.85	2.491	0.387
Virginia	1.48	0.01	0.201	0.002
Wyoming				
Delaware				
Louisiana				
West Virginia				

*States with blanks had either no costs or savings, or reported values too small to show up in the table.*

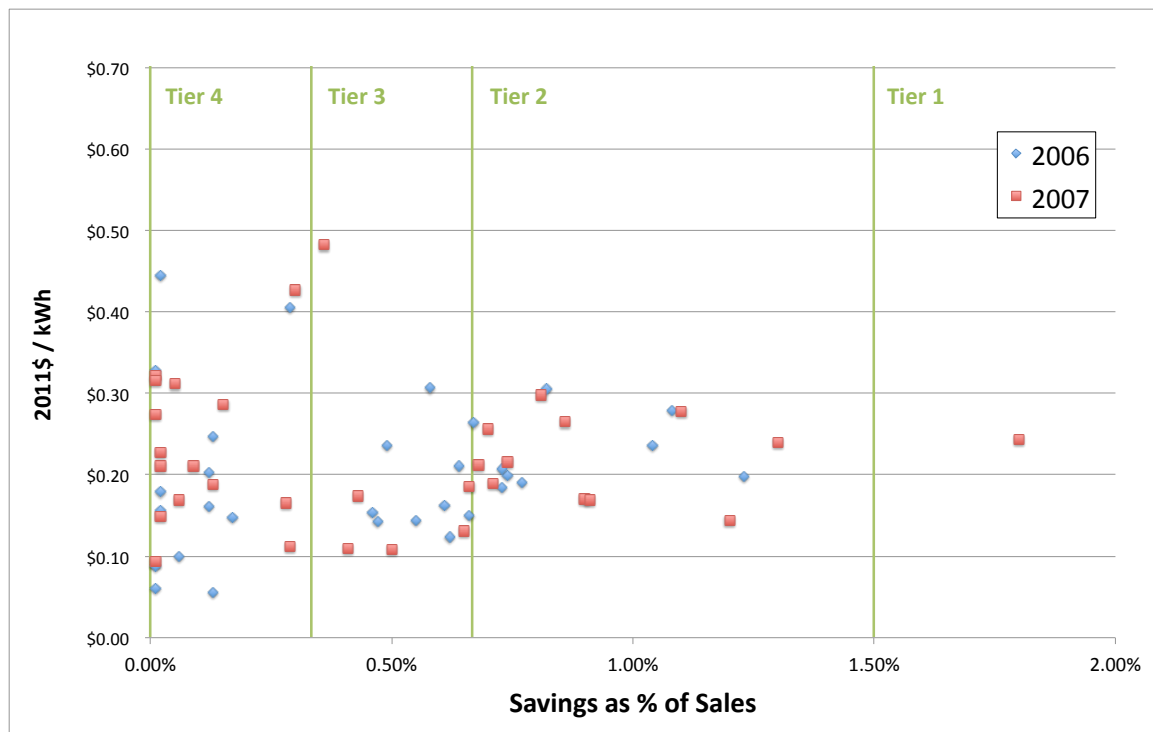
Table 3 shows that efficiency resources, excluding outliers, cost from around \$0.03 to \$1.0 per kWh per year saved in 2006 and 2007.

There are a number of outliers in the data above. In general, an outlier can be assumed to years with a cost of energy savings greater than \$2.00 per annual kWh.

This includes New Mexico in 2006, North Dakota in 2006 and 2007, South Dakota in 2007, Maryland in 2007, Georgia in 2006, Ohio in 2006, North Carolina in 2007, as well as Illinois in 2006 and 2007. These extreme values are probably due to incomplete DSM savings data collected through form EIA 861.

The following figure uses the data in Table 3 to plot the cost per kWh/yr saved against savings as a percent of sales for each state in 2006 and 2007. For each state, a year's data was excluded if the savings as a percent of sales were less than 0.01 percent or if the cost per kWh in 2011 dollars was less than \$0.01 or greater than \$0.60, this left 31 states for 2006 and 33 states for 2007.

**Figure 2: ACEEE Costs and Savings for States by Year**



## B. Regulatory Filings

Although the three most recent ACEEE scorecards encompass the entire country, they do not provide cost data corresponding to reported savings beyond 2006 and 2007. Nor does ACEEE separately report portfolio savings and cost information for residential and non-residential sectors, for which efficiency opportunities differ significantly. Green Energy Economics Group (GEEG) has found that data on costs and performance reported to state regulators to be more consistent and reliable than that reported to EIA.

GEEG collected historical cost and savings data on efficiency portfolios reported to regulators for states with the greatest savings as a percentage of sales, including California and Northeastern states; for Midwestern and Western states with significant efficiency portfolios (Iowa, Nevada, and Wisconsin); and for neighboring jurisdictions of Arkansas and Texas. Where possible, GEEG obtained cost and saving data separately for the residential and nonresidential sectors. GEEG also collected efficiency spending and savings data for two Canadian provinces, British Columbia and Nova Scotia. Finally, GEEG assembled the latest information available on future plans for electric end-use efficiency investment in several leading states and provinces.

For the states mentioned above,

Table 4 presents historical data on annual savings as a percentage of electric energy sales, and spending per annual kWh of savings, by year, ranked in decreasing order in terms of savings as a percentage of sales.

Table 4 is an aggregation of the data found in Appendix A, which attempts to make a direct comparison between energy efficiency programs and the pool of energy sales that these programs directly influence. The ACEEE data provided in the previous section provides savings as a percentage of statewide sales, regardless of whether or not those sales occurred in territories where energy efficiency programs existed. Due to a more “apples to apples” comparison of savings to sales as well as differing sources, the data provided in

Table 4 tends to find higher savings as a percentage of sales.

**Table 4: Statewide Totals by Year, Ranked by Savings as a Percent of Sales**

State / Province	Year	Savings as a % of Sales	2011\$/kWh/yr Saved
Tier 1			
CA	2008	2.52%	\$0.20
VT	2008	2.33%	\$0.26
CA	2010	1.98%	\$0.26
VT	2010	1.94%	\$0.33
VT	2011	1.83%	\$0.35

State / Province	Year	Savings as a % of Sales	2011\$/kWh/yr Saved
CA	2007	1.80%	\$0.22
CA	2005	1.61%	\$0.18
VT	2007	1.60%	\$0.23
CT	2010	1.52%	\$0.30
<b>Tier 2</b>			
VT	2009	1.46%	\$0.36
HI	2008	1.38%	\$0.11
NV	2009	1.35%	\$0.09
CT	2008	1.28%	\$0.30
NV	2008	1.24%	\$0.07
Pacific Northwest	2008	1.24%	\$0.12
IA	2009	1.14%	\$0.20
MA	2010	1.12%	\$0.40
CT	2007	1.12%	\$0.29
Nova Scotia	2011	1.12%	\$0.23
CT	2006	1.11%	\$0.24
Pacific Northwest	2009	1.10%	\$0.17
CT	2001	1.10%	\$0.35
Pacific Northwest	2007	1.09%	\$0.11
CA	2009	1.06%	\$0.41
RI	2009	1.05%	\$0.31
CT	2005	1.03%	\$0.28
HI	2009	1.01%	\$0.17
IA	2010	0.98%	\$0.21
British Columbia	2010	0.98%	\$0.22
CT	2004	0.97%	\$0.27
CA	2004	0.93%	\$0.19
RI	2006	0.91%	\$0.27
ME	2008	0.87%	\$0.13
VT	2005	0.87%	\$0.35
VT	2006	0.86%	\$0.34
MA	2007	0.86%	\$0.26
NV	2006	0.86%	\$0.06
CT	2009	0.85%	\$0.31
CT	2002	0.84%	\$0.43
IA	2006	0.84%	\$0.16
Pacific Northwest	2002	0.83%	\$0.19
IA	2007	0.83%	\$0.16
CA	2006	0.83%	\$0.28
ME	2010	0.82%	\$0.17
RI	2005	0.82%	\$0.28
Pacific Northwest	2001	0.82%	\$0.17
RI	2007	0.81%	\$0.27
VT	2003	0.81%	\$0.36
British Columbia	2007	0.81%	\$0.08
British Columbia	2005	0.81%	\$0.10
VT	2004	0.81%	\$0.37
MA	2005	0.80%	\$0.31
MA	2004	0.79%	\$0.34
MA	2009	0.78%	\$0.46
RI	2008	0.77%	\$0.26

State / Province	Year	Savings as a % of Sales	2011\$/kWh/yr Saved
Pacific Northwest	2006	0.77%	\$0.16
British Columbia	2004	0.77%	\$0.12
NY	2010	0.75%	\$0.22
HI	2007	0.75%	\$0.23
IA	2008	0.75%	\$0.19
MA	2006	0.75%	\$0.34
Pacific Northwest	2003	0.74%	\$0.17
British Columbia	2009	0.74%	\$0.20
NV	2007	0.72%	\$0.07
Pacific Northwest	2005	0.72%	\$0.17
ME	2009	0.70%	\$0.18
ME	2007	0.69%	\$0.15
MA	2008	0.69%	\$0.34
IA	2005	0.69%	\$0.18
Nova Scotia	2010	0.68%	\$0.23
Pacific Northwest	2004	0.68%	\$0.17
<b>Tier 3</b>			
IA	2004	0.65%	\$0.20
VT	2002	0.64%	\$0.39
VT	2001	0.62%	\$0.34
WI	2009	0.61%	\$0.21
NJ	2009	0.61%	\$0.23
British Columbia	2008	0.60%	\$0.17
MA	2003	0.57%	\$0.46
NY	2005	0.56%	\$0.17
NY	2006	0.56%	\$0.17
ME	2006	0.55%	\$0.14
WI	2010	0.54%	\$0.25
Nova Scotia	2009	0.53%	\$0.13
IA	2003	0.52%	\$0.21
British Columbia	2006	0.52%	\$0.12
NY	2007	0.51%	\$0.19
NY	2009	0.50%	\$0.25
NJ	2005	0.47%	\$0.26
NJ	2010	0.46%	\$0.45
MA	2002	0.45%	\$0.59
British Columbia	2011	0.45%	\$0.45
NJ	2004	0.42%	\$0.33
NJ	2008	0.42%	\$0.25
IA	2002	0.38%	\$0.25
IA	2001	0.37%	\$0.27
CT	2003	0.37%	\$0.43
AR	2010	0.34%	\$0.08
<b>Tier 4</b>			
HI	2006	0.33%	\$0.32
NJ	2007	0.27%	\$0.42
NY	2004	0.24%	\$0.43
AR	2009	0.24%	\$0.09
OK	2010	0.24%	\$0.25
NY	2008	0.23%	\$0.44
PA	2009	0.19%	\$0.16

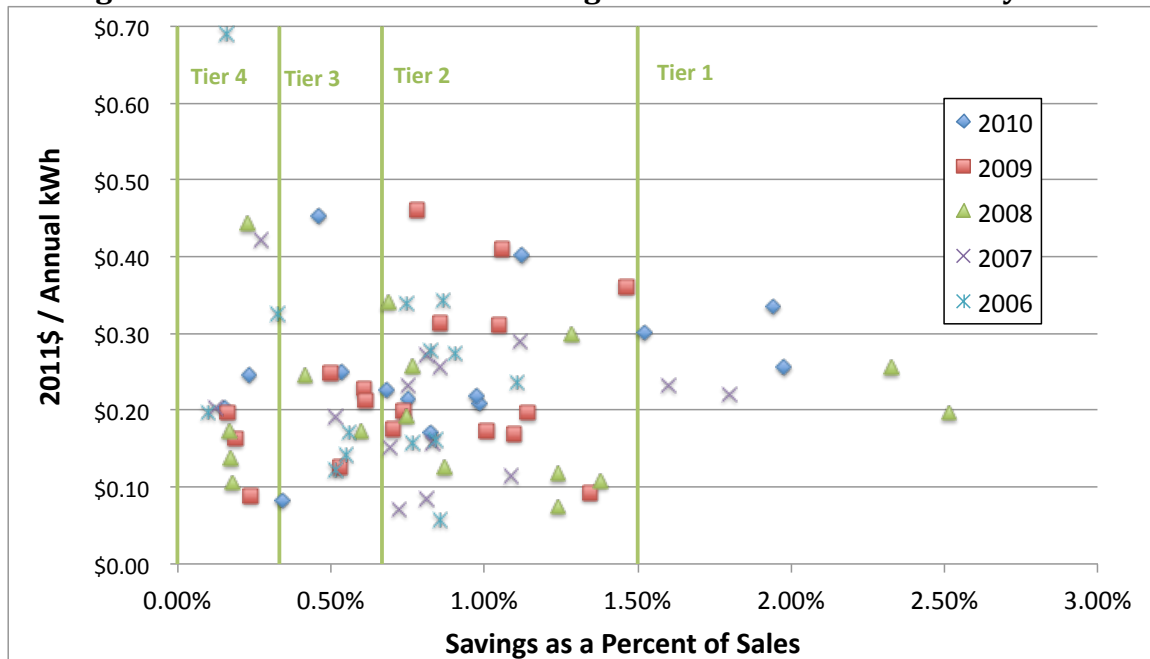


State / Province	Year	Savings as a % of Sales	2011\$/kWh/yr Saved
AR	2008	0.18%	\$0.11
Nova Scotia	2008	0.17%	\$0.14
TX	2008	0.17%	\$0.17
TX	2009	0.16%	\$0.20
NJ	2006	0.16%	\$0.69
TX	2010	0.15%	\$0.20
TX	2007	0.12%	\$0.20
TX	2006	0.10%	\$0.20

\* New York has rolled out a number of new programs in 2009 under the EEPS initiative. These programs have not yet been accounted for in this table. Additionally, savings values for NYSDERDA from 2008 onward only include appliance savings from the New York Energy SmartSM Products Program.

Figure 3 shows the annual state and province data for 2006 through 2010 from Table 4, with the cost per kWh saved per year in 2011\$ mapped against the savings as a percent of sales.

**Figure 3: Historical Costs and Savings for States and Provinces by Year**



## 1. Annual Energy Savings

Table 4 shows that annual energy savings as a percentage of sales varies for leading efficiency portfolios and varies widely, both geographically and over time. Looking at savings as a percent of sales from highest to lowest, performance can be classified according to four tiers.

**Tier 1 ( $\geq 1.5\%$ ):** In the top tier, states are achieving at or near 2 percent of sales. It contains 9 program years of experience, including California for 4 out of the past 5 years, Vermont 4 out the past 5 years, as well as Connecticut as of last year.

**Tier 2 ( $\geq 0.67\%$  and  $< 1.5\%$ ):** States in the second tier are saving at or near 1 percent of annual sales, with annual savings ranging from two-thirds ( $2/3$ ) of one percent to 1.5 percent of sales. In addition to earlier years' performance by California, Vermont, and Connecticut, this group also includes 60 program years of experience from efficiency portfolios in Iowa, Maine, Massachusetts, Nevada, New York, Rhode Island, Hawaii, the Pacific Northwest, British Columbia, and Nova Scotia.

**Tier 3 ( $\geq 0.33\%$  and  $< 0.67\%$ ):** States with savings at or near 0.5% of sales fall into the third tier. This group contains 26 program years of results, and includes savings in even earlier years for states in the first two tiers, plus Arkansas, New Jersey, and Wisconsin.

**Tier 4 ( $< 0.33\%$ ):** All other states with savings less than one-third ( $1/3$ ) of a percent of sales fall into the lowest tier. This group saved around 0.25% of sales and includes earlier results for some states with performance in Tier 3, as well as Texas, and Arkansas

Examination of the program-year data reveals that several states with DSM portfolios in the top two performance tiers over time have progressed through lower tiers. Also evident from program year performance data is that moving up from one tier to the next is common, especially to and from the second tier. For example, Connecticut increased annual savings from 0.37 percent to 1.52 percent of sales between 2003 and 2010, moving from Tier 3 to Tier 1. Nova Scotia recently went from 0.17 percent of sales in 2008, Tier 4 results, to 0.68 percent of sales in 2010, Tier 2 results. These observations support the feasibility of ramping up utility investment over time.

Another significant observation, not readily evident from the data, is that the top three tiers are all represented by both utility- and non-utility portfolio administrators. California, Connecticut, Rhode Island and Massachusetts portfolios are all administered by distribution utilities; Maine, Vermont, Hawaii, and

Wisconsin all have relied on non-utility (either government or non-government) administration for at least the last five years. New Jersey has changed from utility to non-utility program administration several years ago; New York has evolved in the opposite direction, supplementing government agency administration of statewide programs with utility-administered programs starting in 2009.

This finding supports the feasibility of scaling up BC Hydro's efficiency resource acquisition: the existing capabilities of BC Hydro need not be a binding constraint.

## **2. Costs of Energy Savings**

The relationship between the cost (\$/kWh/yr) and depth (savings as a % of sales) depends on whether the focus is on an individual efficiency measure, a single customer project, or a program serving a group of customers. At the individual measure or project level, the law of diminishing marginal returns applies generally: the next unit of efficiency savings costs more than the last. At the measure level, for example, it costs more per kWh saved to upgrade to a central air-conditioner with a seasonal energy efficiency rating ("SEER") of 20 from a SEER 16 system than it does to upgrade to a SEER 16 system from a SEER 13.

The same holds true at the individual customer level. It is always possible to assess the energy savings from all potential efficiency measures that could be installed over time for any customer, and compute the levelized costs per kWh saved. Whether at the household or factory level, costs and savings almost always can be ordered to present an increasingly steep series of steps of progressively more expensive savings. The cost of acquiring savings depends on how multiple opportunities are bundled and installed most effectively.

At the program or portfolio level, economies of scale combine with diminishing returns to determine the relationship between savings costs and depth. It depends on the effectiveness of the program in attracting participants, and how much it costs in marketing, technical assistance, and other program services to achieve that participation. The cost per kWh saved follows a downward trajectory at low levels of program activity. Beyond a certain level of participation, fixed program costs are spread over more savings and tend to level off.

As efficiency portfolios scale up, the law of diminishing returns takes over in two powerful and mutually reinforcing ways to increase the acquisition costs of efficiency savings. First, the available efficiency opportunities become more expensive as the depth of savings increases at the measure and project level. Second, experience shows that higher financial incentives are required to achieve participation rates in the 75-90 percent range. The upshot is that at the deeper end of the pool of achievable efficiency potential, the shape of the efficiency savings cost curve can be expected to become progressively steeper.

While Figure 3 shows that costs per kWh (in constant 2011 dollars) of annual energy savings vary widely between jurisdictions and from year to year, they also provide evidence that efficiency portfolio costs are subject to scale economies as well as diminishing marginal returns. The program year data suggest that some portfolio administrators have been working their way down their efficiency supply cost curves as they have ramped up activity levels; others appear to be encountering diminishing yields as programs invest in more expensive efficiency technology to achieve deeper savings along with more expensive program designs (e.g., higher financial incentives) to penetrate wider segments of eligible markets.

Some states appear to have experienced both dynamics, with scale economies offsetting diminishing returns; for example, Connecticut managed to increase savings from 1.10% to 1.51% of sales between 2001 and 2010, during which time costs of saved energy decreased from \$0.35/kWh/year to \$0.30/kWh/yr. In other words, savings increased by 36 percent while costs declined by 14 percent over the last decade.

Table 5 shows the minimum, maximum, and average cost per annual kWh savings for each tier.

**Table 5: Minimum, Maximum, and Average Costs of Energy by Tier**

	2011\$/kWh/yr	State / Province	Year
<b>Tier 1</b>			
Min	\$0.18	CA	2005
Max	\$0.35	VT	2011
Average	\$0.26		
<b>Tier 2</b>			
Min	\$0.06	NV	2006
Max	\$0.46	MA	2009
Average	\$0.23		
<b>Tier 3</b>			
Min	\$0.08	AR	2010
Max	\$0.59	MA	2002
Average	\$0.27		
<b>Tier 4</b>			
Min	\$0.09	AR	2009
Max	\$0.69	NJ	2006
Average	\$0.27		
<b>TOTAL</b>			
Min	\$0.06	NV	2006
Max	\$0.69	NJ	2006
Average	\$0.25		

No clear correspondence emerges from visual examination of program year data between cost per kWh saved and savings depth. Nonetheless, several trends are apparent from

Table 4 and Table 5:

- Costs of saved energy are not readily distinguishable between the top two savings tiers, with values ranging from \$0.06/kWh/year saved for NV in 2006 to achieve 0.86 percent savings, up to \$0.46/kWh/year for MA in 2009 to achieve 0.78% savings.
- Costs of saved energy in the top two tiers are generally higher than the costs to achieve lower savings percentages in the bottom two tiers, with values in Tiers 3 and 4 ranging between \$0.08/kWh/year for AR in 2010 to achieve 0.34 percent savings and \$0.69/kWh/year for NJ in 2006 to achieve 0.16 percent savings.
- More recent experience shows costs increasing among portfolios in the top two tiers; for example, Massachusetts spent \$0.40/kWh/year for 1.12 percent savings in 2010, increasing from \$0.26/kWh/year for 0.86 percent savings three years before.
- Lower tiers show high costs as well as low, suggesting lower activity levels pursuing relatively low-cost efficiency measures have confined administrators on the downward sloping portion of their efficiency supply curves.
- The unweighted average cost per kWh/yr of savings is practically the same – roughly \$0.25/kWh/yr -- across all four tiers. This is the most striking evidence that scale economies and diminishing returns cancel each other out when states expand and deepen their electric efficiency investment.
- Maximum and average costs go down slightly the higher the tier, showing that higher costs of ramping up have been offset by economies of scale. Minimum costs stay around the same until tier 1, when they essentially double, which suggests inexpensive and easy savings from low-hanging fruit by portfolios in the lower tiers.. The downward trend in average costs of saved energy from tier 4 to tier 2 also suggests economies of scale.

### **3. Plans for 2011 and Beyond**

GEEG obtained efficiency investment expenditures and planned savings for several jurisdictions with portfolios that ranked in the top two tiers in Table 4, as well as two nearby states, Nevada and Arkansas. Table 6 presents annual incremental savings as a percentage of electric energy sales for periods of varying length. Vermont projects savings in the neighborhood of 2 percent annually for the next 10 years.

**Table 6: Planned Electric Energy Efficiency Portfolio Savings in the US and Canada**

SAVINGS AS A PERCENT OF SALES											
Year	VT	Nova Scotia	Pacific Northwest	RI	CA	CT	MA	NV	PA	AR	MD
2011			1.13%	1.32%	1.21%	1.19%	1.65%	0.89%	1.03%	0.26%	1.37%
2012	2.04%		1.21%	1.65%	1.23%		2.03%	0.51%	1.00%	0.50%	1.37%
2013	2.06%	1.08%	1.30%	2.04%				0.57%		0.74%	1.37%
2014	2.07%	1.11%	1.38%	2.43%						0.31%	1.37%
2015	1.96%	1.13%	1.41%								
2016	2.09%	1.16%	1.54%								
2017	2.16%	1.20%	1.61%								
2018	2.13%		1.64%								
2019	2.16%		1.67%								
2020	1.95%		1.67%								
2021	1.95%		1.65%								

Oklahoma Gas and Electric's (OG&E) service territory includes part of western Arkansas, and approximately 10% of OG&E's 2009 sales were in Arkansas<sup>3</sup>. In proceedings before the Arkansas Public Service Commission, OG&E estimated that "it could ramp up to savings of 'slightly less than 1% per year'"<sup>4</sup>. In effect, OG&E is stating that it is capable of elevating its OK portfolio savings from Tier 4 performance in 2011 to Tier 3 performance in 2012, and then to Tier 2 performance in 2013.

Table 7 presents planned efficiency expenditures per annual kWh of electric energy savings from efficiency portfolios listed in Table 6. Costs of saved energy are expected to increase in Tier 1 states to \$0.40/kWh/year saved, as well as in the second tier jurisdictions of Connecticut and Massachusetts. Lower costs of savings projected for Nova Scotia are consistent with the fact that the province has only recently begun to ramp up efficiency investment in the last several years.

<sup>3</sup> From US Energy Information Administration's Form 861

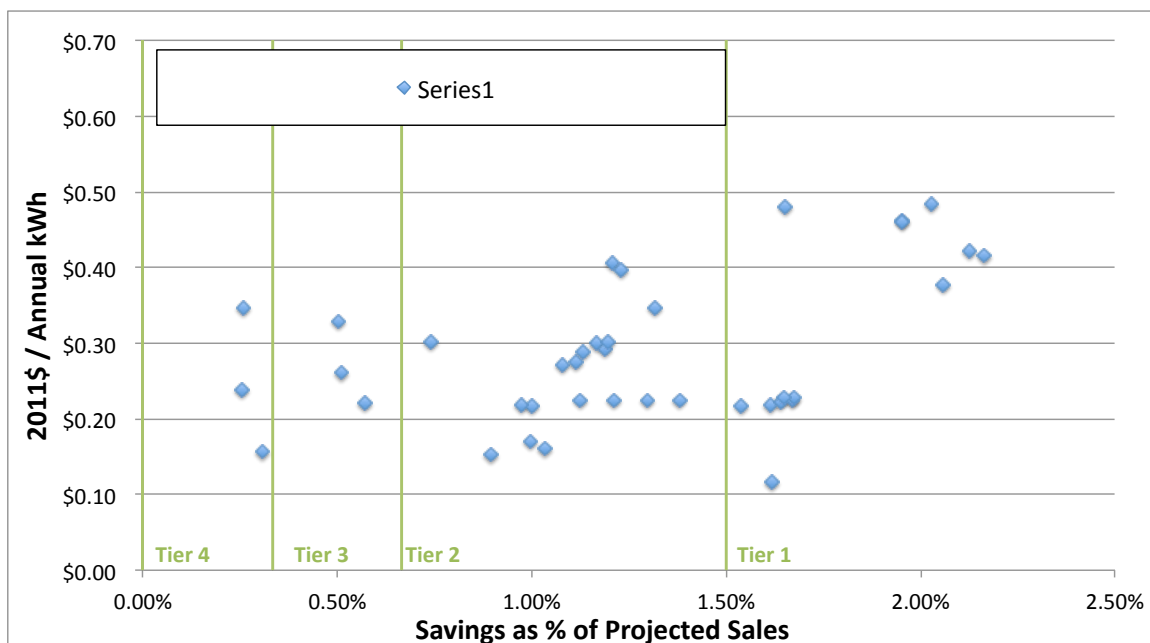
<sup>4</sup> Arkansas Public Service Commission: Docket No. 08-137-U, Order No. 1 (December 10, 2010). Page 12.

**Table 7: Planned Electric Energy Efficiency Portfolio Costs in the US and Canada**

Year	SPENDING PER KWH/YR SAVED (2011\$)									
	VT	Nova Scotia	Pacific Northwest	RI	CA	CT	MA	NV	PA	AR
2011			\$0.23	\$0.35	\$0.41	\$0.29	\$0.48	\$0.15	\$0.16	\$0.35
2012	\$0.36	\$0.27	\$0.22		\$0.40		\$0.48	\$0.26	\$0.17	\$0.33
2013	\$0.38	\$0.28	\$0.22					\$0.22		\$0.30
2014	\$0.39	\$0.29	\$0.22							\$0.16
2015	\$0.42	\$0.30	\$0.21							
2016	\$0.42	\$0.30	\$0.22							
2017	\$0.42		\$0.22							
2018	\$0.42		\$0.22							
2019	\$0.42		\$0.22							
2020	\$0.46		\$0.23							
2021	\$0.46		\$0.23							

Figure 4 shows cost per kWh saved per year in 2011\$, from Table 6, plotted against the savings as a percent of sales, from Table 7, for a state or province's planned energy efficiency efforts.

**Figure 4: Planned Costs and Savings for States and Provinces by Year**



Prospectively, the positive correlation between the savings costs and savings depth is more pronounced in Figure 4 than it is in historical data depicted in Figure 2 and Figure 3.

## 4. State and Regional Policies

### California

California has one of the most mature energy efficiency industries in the United States, and it continues to pursue a policy of energy efficiency as the first-priority resource for utility procurement. In 2008, the California Public Utility Commission adopted California's first Long Term Energy Efficiency Strategic Plan, which provides an integrated framework of goals and strategies to acquire energy efficiency resources across sectors from 2009 to 2020. While the plan does not contain explicit savings goals, it provides four very aggressive high-level goals that set the tone for energy efficiency efforts in California for the next decade. The goals are:

1. All new residential construction in California will be zero net energy by 2020
2. All new commercial construction in California will be zero net energy by 2030
3. The Heating Ventilation and Air Conditioning (HVAC) industry and market will be transformed to ensure that its energy performance is optimal for California's climate
4. All eligible low-income customers will be given the opportunity to participate in low-income energy efficiency programs by 2020

### Northwest Power and Conservation Council (NWPCC)

Congress created the NWPCC in 1980 to help determine the future of electricity generated at, and fish and wildlife affected by, the Columbia River Basin hydropower dams, an area affecting Idaho, Montana, Oregon, and Washington. One of the main principal mandates of the NWPCC is to develop a 20-year electric power plan, which places energy conservation as one of its priorities. The Sixth Northwest Conservation and Electric Power Plan was released in February of 2010, with the following findings:

"The plan finds enough conservation to be available and cost-effective to meet 85 percent of the region's load growth for the next 20 years. If developed aggressively, this conservation, combined with the region's past **successful development of energy efficiency could constitute a resource comparable in size to the Northwest federal hydroelectric system.**" (Emphasis added)

Details on spending and savings levels can be found in Table 6 and Appendix B.

### Pennsylvania

Pennsylvania has begun ramping up energy efficiency from basically nothing, as shown in the Table 1, to hopefully achieve the targets shown in Table 8. In 2008, the state passed "Act 129" with an overall goal of reducing energy consumption and



demand. In particular, all electric distribution companies with at least 100,000 customers had to develop and file an energy efficiency and conservation plan. The following table outlines the Pennsylvania Public Utility Commission's goals for each utility and the state as a whole.

**Table 8: Pennsylvania Act 129 Electric Energy Savings Goals**

Utility	Cumulative Annual GWh Goals		2009 Sales Base Line (GWh)
	PY 2010 - 1%	PY 2012 - 3%	
Duquesne	141	423	14,086
Met-Ed	149	446	14,865
Penelec	144	432	14,399
Penn Power	48	143	4,773
PPL	382	1,146	38,214
PECO	394	1,182	39,386
Allegheny	209	628	20,939
<b>Total</b>	<b>1,467</b>	<b>4,400</b>	<b>146,662</b>

*Act 129 program years (PY) go from June of the given calendar year to May 31 of the next calendar year (ex. PY 2009 is June 1, 2009 to May 31, 2010)*

Source: [http://www.puc.state.pa.us/General/consumer\\_ed/pdf/EEC\\_Business-FS.pdf](http://www.puc.state.pa.us/General/consumer_ed/pdf/EEC_Business-FS.pdf)

Pennsylvania's goals can be met by each utility achieving incremental annual energy efficiency savings equivalent to 0.50% of the 2009 sales base in the first two program years, and 1.0% of 2009 sales in the second two program years.

## II. Energy Efficiency for BC Hydro

### A. Historical and Planned Savings

BC Hydro has pursued energy efficiency under a mandate from the British Columbia Government and has made it a part of its long-term resource planning. In recent years, this has translated to a goal of saving approximately 0.8% of sales from energy efficiency programs<sup>5</sup>. The following table shows the spending and savings achieved by BC Hydro since its fiscal 2004<sup>6</sup>.

**Table 9: BC Hydro's Historic Energy Efficiency<sup>7</sup>**

<b>Fiscal Year</b>	<b>Spending (\$M)</b>	<b>Incremental Savings (GWh)</b>	<b>Savings as a % Sales</b>
<b>2004</b>	\$39.5	384	0.8%
<b>2005</b>	\$36.5	414	0.8%
<b>2006</b>	\$28.8	256	0.5%
<b>2007</b>	\$32.1	413	0.8%
<b>2008</b>	\$52.2	301	0.6%
<b>2009</b>	\$73.2	370	0.7%
<b>2010</b>	\$104.9	478	1.0%
<b>2011</b>	\$102.9	203	0.4%*

*\* BC Hydro had a large one-time write down of energy savings in one of its industrial programs in F2011. Savings going forward are expected to more closely reflect 2010 results.*

Table 9 shows that spending has ramped up significantly since F2004 while savings have stayed relatively flat.

BC Hydro is currently working on the 2012 update to its 2008 Long Term Acquisition Plan (2008 LTAP), and as part of this update has continued to refine projections for DSM activity. Table 10 shows the most recent projections that BC Hydro has provided.

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<sup>5</sup> Page 31 of BC Hydro's Implementation Plan for Energy-Focused Demand Side Management, Appendix K to BC Hydro's 2008 LTAP

<sup>6</sup> BC Hydro's fiscal year goes from April of the previous year to March of the current year. So FY 2008 started in April 2007 and ended March 2008.

<sup>7</sup> See Appendix D for sources

**Table 10: BC Hydro's Planned Energy Efficiency (Cumulative GWh)<sup>8</sup>**

<b>Fiscal Year</b>	<b>Cumulative Energy Savings Since 2008 (GWh)</b>	<b>Cumulative Spending Since 2008 (\$M)</b>
2012	1,682	\$439.9
2013	2,031	\$582.0
2014	2,440	\$727.7
2015	2,668	\$893.2
2023	4,891	\$2,352.6
2033	5,482	\$4,112.2

*Results are for DSM programs excluding Load Displacement*

## **B. Economically Achievable Efficiency Resource Acquisition Targets for BC Hydro**

This report establishes the feasibility of a more aggressive scenario for acquiring energy efficiency resources than what is currently projected by BC Hydro. By following industry best practices discussed further in Section D, below, BC Hydro can continue to achieve savings of one percent or ramp up its planned efficiency investment to reduce forecast electricity sales by two percent annually beginning in F2014, as shown in Table 11. BC Hydro could choose to maintain this pace of annual savings going forward.

**Table 11: Annual Incremental Electricity Savings as a Percentage of BC Hydro Forecast Annual Electric Energy Sales**

<b>Fiscal Year</b>	<b>Tier 1</b>
<b>2013</b>	1.50%
<b>≥ 2014</b>	2.00%

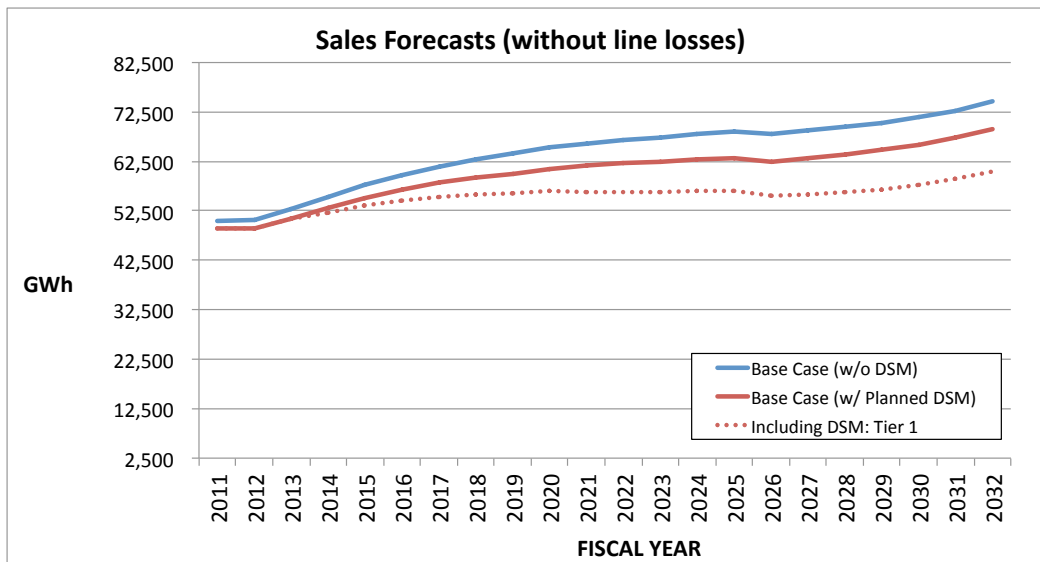
This analysis considers “Year 1” to be the first year that DSM projections differ from those provided by BC Hydro. This analysis projects out new savings for 20 years beyond the shift to higher savings, to BC Hydro’s Fiscal 2032. To calculate the savings values, BC Hydro’s updated 2011 load forecast was used as the basis, with residential sector sales set to the values from the 2010 forecast and commercial/industrial sales set to the difference between the 2011 load forecast and 2010 residential forecast.

Figure 5 depicts, and Table 12 summarizes, the impact the two percent scenario would have on BC Hydro’s future electric energy requirements. This analysis considers “Year 1” to be the first year that DSM projections differ from those provided by BC Hydro. This analysis projects out new savings for 20 years beyond

<sup>8</sup> See Appendix D for sources

the shift to higher savings, to BC Hydro's Fiscal 2032. To calculate the savings values, BC Hydro's updated 2011 load forecast was used as the basis, with residential sector sales set to the values from the 2010 forecast and commercial/industrial sales set to the difference between the 2011 load forecast and 2010 residential forecast.<sup>9</sup>

**Figure 5: BC Hydro Electric Sales Forecast**



**Table 12: BC Hydro Efficiency Savings (Cumulative Annual since 2008<sup>10</sup>, with Line Losses<sup>11</sup>)**

Time Period		GWh	MW
Year 1	F2013	2,492	461
Year 2	F2014	3,587	657
Year 10	F2023	11,274	2,041
Year 20	F2032	15,388	2,786

Reducing BC Hydro's electric energy requirements by two percent annually would yield cumulative annual savings by F2032 of 15,388 GWh since F2008. Detailed savings and sales projections are in Appendix C.

<sup>9</sup> 2011 load forecast comes from BC Hydro's Amended New Appendix II, F12/F13 DSM Expenditures, Attachment 2, page 114. 2010 load forecasts come from BC Hydro's 2010 Electric Load Forecast, Table 6.1

<sup>10</sup>The cumulative savings incorporate measure decay. The decay is based analysis done by Efficiency Vermont on February 28, 2012 for the Vermont Department of Public Service. By the end of year 5, incremental residential savings will have decayed by 41% and non-residential savings will have decayed 6%. By the end of year 10, savings will have decayed by 92% and 37% respectively.

<sup>11</sup> Savings shown "with line losses" reflect the higher amount of energy required at generation to provide the net energy used by consumers. Conversely, energy "sales" are shown "without line losses".

## C. Estimated Costs to Acquire Energy Efficiency Savings in BC Hydro

### 1. Model for Resource Acquisition Costs per kWh of Annual Savings

GEEG has developed an empirical model that predicts energy efficiency resource acquisition costs per kWh of annual savings as a function of four types of variables:

- Savings depth (% of annual sales)
- Time: Portfolio maturity (years); post-2011 plan vs. historical results; year that portfolio investment commenced
- Customer sector (nonresidential)
- Location (if the portfolio is in New England or California)

The model is estimated using ordinary least-squares regression analysis from a pooled (time series, cross section) sample of 470 observations of annual efficiency spending and savings data for portfolio administrators in 19 American states and two Canadian provinces<sup>12</sup>. In 220 cases (438 of the data points), spending and savings data are reported separately for residential and non-residential efficiency investment; in 32 other cases, data was available only at the portfolio level. In aggregate, the dataset represents approximately \$25 billion of historical and planned investment (in 2011\$), generating cumulative annual energy savings of over 105,000 GWh/yr.

All the model's estimated coefficients are highly statistically significant (with confidence levels beyond 99.9%). The model accounts for over 85 percent of the sample variance of the dependent variable, acquisition cost per kWh/yr (Adjusted R-square = 0.8742). Table 13 and Table 14 below show general information regarding the model.

**Table 13: Linear Regression Model for Cost of Energy Savings**

Variables		Coefficients	Std. Error	t value	Pr(> t )	Signf
Dol_kWh_Yr_201: Y						
Intercept		0				
Per_Sav	$X_1$	(26.24)	3.07	(8.539)	< 2E-16	***
Per_Sav_Pow	$1/X_1$	0.00008	0.00002	4.880	1.5E-06	***
Per_Sav_Sq	$X_1^2$	534.2	86.6700	6.164	1.6E-09	***
Yr_1	$X_2$	0.00017	0.00001	16.796	< 2E-16	***
Maturity	$X_3$	0.0081	0.0013	6.442	3.0E-10	***
Nonres	$X_4$	(0.0752)	0.0110	(6.849)	2.4E-11	***
Planned	$X_5$	0.0654	0.0148	4.422	1.2E-05	***
CA	$X_6$	0.1727	0.0215	8.040	7.6E-15	***
NE	$X_7$	0.2025	0.0137	14.836	< 2E-16	***

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '+' 0.1 '.' 1

<sup>12</sup> The data points are derived from the tables in Appendices A and B.

**Table 14: Linear Regression Model Summary Statistics**

Regression Statistics		Residuals	
Residual standard error	0.1177 on 461 degrees of freedom	Min	-0.275
Multiple R-squared	0.8766	1Q	-0.070
Adjusted R-squared	0.8742	Median	-0.011
F-statistic	363.9 on 9 and 461 DF	3Q	0.057
p-value	< 2.2e-16	Max	0.531

The model predicts acquisition costs as a polynomial function of savings depth, indicating both scale economies for savings up to 2.5% of sales, and diminishing returns thereafter. It also predicts that acquisition costs increase with portfolio maturity and with each calendar year. Nonresidential efficiency acquisition costs are \$0.0752/kWh-yr cheaper than residential or total portfolio costs. Acquisition costs are lower outside California and New England, with the former adding \$0.1727/kWh-yr and the later adding \$0.2025/kWh-yr to costs.

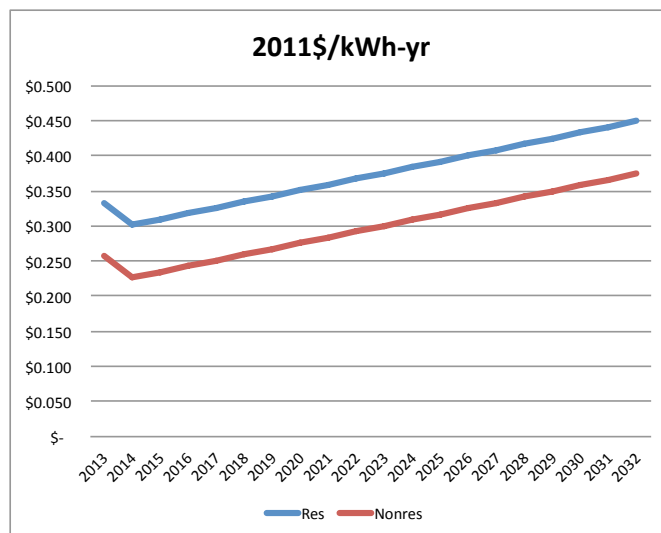
## 2. Energy Savings Acquisition Costs for BC Hydro

The linear model predicts portfolio administrator unit acquisition costs (\$/kWh-yr) based on values selected for each explanatory variable. To achieve Tier 1 savings, BC Hydro would start by achieving 1.5% in F2013 and then 2.0% per year going forward, as shown in Table 11. The regression model can predict acquisition costs each year using those values, by recognizing both that the savings are from investments planned for the future and that BC Hydro is a mature portfolio with over 20 years of experience starting in approximately 1990. Additionally, variables for California and New England are set to false. These assumptions are then used to forecast two scenarios; (1) forecast costs for residential energy efficiency resources, and, (2) forecasts for non-residential energy efficiency resources. Table 15 shows the costs predicted by the model.

**Table 15: Cost of Energy Savings for BC Hydro**

Predicted 2011\$/kWh-yr

Year	Savings	Res	Nonres
2013	1.500%	\$ 0.332	\$ 0.256
2014	2.000%	\$ 0.301	\$ 0.226
2015	2.000%	\$ 0.309	\$ 0.234
2016	2.000%	\$ 0.317	\$ 0.242
2017	2.000%	\$ 0.326	\$ 0.250
2018	2.000%	\$ 0.334	\$ 0.259
2019	2.000%	\$ 0.342	\$ 0.267
2020	2.000%	\$ 0.350	\$ 0.275
2021	2.000%	\$ 0.359	\$ 0.283
2022	2.000%	\$ 0.367	\$ 0.292
2023	2.000%	\$ 0.375	\$ 0.300
2024	2.000%	\$ 0.383	\$ 0.308
2025	2.000%	\$ 0.391	\$ 0.316
2026	2.000%	\$ 0.400	\$ 0.324
2027	2.000%	\$ 0.408	\$ 0.333
2028	2.000%	\$ 0.416	\$ 0.341
2029	2.000%	\$ 0.424	\$ 0.349
2030	2.000%	\$ 0.433	\$ 0.357
2031	2.000%	\$ 0.441	\$ 0.366
2032	2.000%	\$ 0.449	\$ 0.374



The residential costs start at \$0.332/kWh-yr, falling to as low as \$0.301 by 2014, and then rising monotonically thereafter to nearly \$0.45 by 2032. Non-residential costs start at \$0.256/kWh-yr range, falling to around \$0.226/kWh-yr, and ending up near \$0.37/kWh-yr. These findings are in line with recent analysis done by ISO New England on calculating the future costs of state-sponsored energy efficiency for 2014-2020<sup>13</sup>. ISO-New England is currently using cost assumptions of \$0.45/kWh for future energy efficiency activity in Maine, Vermont, Connecticut, Rhode Island, Massachusetts, almost all of which have aggressive energy efficiency targets.

### 3. Annual Expenditures

GEEG estimated annual budgets for each portfolio scenario by multiplying the sector-level acquisition costs in Table 15 by the annual incremental savings acquired (detailed on page C-2 of Appendix C). The table below shows BC Hydro spending by sector by year.

**Table 16: BC Hydro Spending Projections (Millions of 2012\$)**

Year	Residential	Non-Residential	Total
<b>2013</b>	\$95	\$130	\$225
<b>2014</b>	\$117	\$163	\$279
<b>2022</b>	\$163	\$260	\$423
<b>2032</b>	\$229	\$367	\$596
<b>NPV (@5.5%)</b>	\$1,425	\$2,303	\$3,728

### 4. Estimated Levelized Costs of Savings

GEEG calculated the levelized cost per kWh of electric efficiency savings using a real discount rate of 6 percent, and assuming an average savings lifetime of 10 years for residential programs and 15 years for nonresidential programs. This is consistent with expectations about the greater longevity of high-efficiency lighting, HVAC, and other equipment most likely to constitute the majority of future efficiency investments in each sector. The results are shown in Table 17. Achieving two percent annual savings is projected to cost between \$29 and \$46 per GWh saved.

**Table 17: Levelized Cost of Energy Savings**

Sector	Levelized Cost \$/GWh	
	Min (F2014)	Max (F2032)
Residential	\$41.0	\$60.7
Non-Residential	\$23.3	\$38.1
<b>Total</b>	<b>\$29.1</b>	<b>\$45.8</b>

<sup>13</sup> Ehrlich, David, and Eric Winkler. "ISO-NE Proof of Concept Forecast of New State-Sponsored Energy Efficiency 2014-2020". PAC Meeting. November 16, 2011.

## **D. Characteristics of BC Hydro's Energy-Efficiency Investment Portfolio**

### **1. Sources of Electric Savings in BC Hydro**

Opportunities abound for BC Hydro's homes and businesses to reduce the amount of electricity consumed to operate appliances and equipment serving practically every end use – particularly lighting, cooling, ventilation, refrigeration, space and water heating, motors and drives, compressors. Together, these end uses constitute the vast majority of electricity consumption by BC Hydro's residential, commercial, and industrial electricity customers. Today's electricity demand results from millions of past choices about efficiency levels in the equipment and buildings that comprises BC Hydro's current capital stock. Future electricity demand depends on the efficiency of the turnover of, and additions to, BC Hydro's capital stock over time.

BC Hydro can acquire efficiency savings by intervening in the marketplace in either of two fundamentally different ways. One is to try to influence transactions that will take place anyway as people buy new products and equipment and build or renovate homes and business facilities (i.e., market-driven transactions). Long-lasting electricity savings from market-driven transactions are relatively inexpensive to acquire since costs are limited to the incremental cost of higher-efficiency technologies. The other is to stimulate transactions that otherwise would not have taken place in order to accelerate the turnover of existing capital stock. Retrofit investment involves early retirement of existing inefficient capital stock (e.g., installing high-efficiency lighting to replace functioning inefficient fixtures and lamps), and installation of supplemental technologies (e.g., insulation or controls). Early retirement is a more expensive proposition since it involves the full cost of the new equipment and installation labor.

Opportunities to influence decisions in market-driven transactions are extremely transitory, and will not resurface until the end of the useful life of the inefficient new equipment or building. The only way to acquire savings before then is to retire the inefficient equipment before the end of its life and replace it with new high-efficiency technology through retrofit investment. Efficiency savings from market-driven transactions are therefore considered "lost-opportunity" resources in the industry.

BC Hydro can follow the increasingly well-worn path leading efficiency investment portfolio administrators have taken to design and implement demand-side management program to capitalize on the myriad opportunities to help customers invest in cost-effective efficiency upgrades over time in all major markets. As discussed in Section I-B-2, jurisdictions with the most aggressive and mature efficiency programs are continuing, and in a growing number of cases deepening, their investments in the future. They have been deploying programs targeting the full array of electric (and in most cases gas) efficiency opportunities for all classes of



customer for 10 years or more. These programs follow what are widely recognized as best industry practices in program design and implementation.<sup>14</sup>

BC Hydro should likewise seek to maximize the depth of savings by pursuing comprehensive treatment whenever and wherever possible. The Company should also pursue maximum market penetration in the lost-opportunity markets involving building construction and equipment replacement as its top priority for achieving long-lasting savings at the lowest possible cost. Maximizing market penetration entails technical assistance and financial incentive covering most or all the price premium for the highest-efficiency products and equipment, working up and down the supply chain in each target market.

Unlike lost-opportunity resource, the timing of retrofit investment in early retirement and supplemental measures existing building in the residential, commercial, and industrial sectors, is purely discretionary. BC Hydro can choose the pace of retrofit investment to meet specific resource acquisition goals over time by deciding what fraction of the existing building stock it would need to reach in ten years to achieve the difference between each year's annual savings target and expected savings from lost-opportunity programs. Portfolio administrators can scale up retrofit programs by redeploying and/or re-designing programs to increase participation and the savings each participant realizes. Achieving both requires aggressive targeted marketing, close technical assistance, and financial incentives covering most or all of the installed costs of efficiency measures.

## **2. Feasibility of Achieving Projected Electricity Savings**

### ***a) Mandatory Federal Efficiency Standards***

U.S. federal efficiency standards enacted in 2007 for a variety of products and equipment, especially lighting, will significantly change the baseline market conditions confronting DSM program design.<sup>15</sup> New standards will have the dual effects of lowering forecasts of future electricity demand, and reducing the amount of savings that DSM programs can achieve beyond market forces. Operating in tandem with tightening building codes and equipment standards, technological change is expected to increase the efficiency of a wide variety of products and equipment available in the next two decades, reducing the energy intensity of major household and business electricity end uses.

Most profound are changes under way in the lighting market. These changes are expected to radically alter the mix of lighting products available to and chosen by consumers over the next decade, with or without DSM programs. Predicting the magnitude and timing of the changes in the costs, performance, and market

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<sup>14</sup> See <http://www.eebestpractices.com/>

<sup>15</sup> United States. Cong. House. *Energy Independence and Security Act of 2007*. 110<sup>th</sup> Cong. 1<sup>st</sup> sess. HR 6. Washington: GPO, 2007. Print

penetration of lighting technologies over the next ten years is extremely difficult. This complicates forecasting electricity demand, and forecasting savings from demand-side management programs designed to change market behavior from “business as usual.” The same is true for other end uses, although to a far lesser degree than in the rapidly changing lighting market.

Tightening lighting standards and rapid technological advances will raise market efficiency baselines but will not eliminate the potential for cost-effective efficiency investment. The last wave of major U.S. federal electric end-use efficiency standards took effect in the 1990-92 timeframe, with minor incremental increases in stringency since then. It was during this period that most of the large-scale efficiency resource investment in the U.S. began, yielding large and cost-effective electric energy and peak demand savings. Technological innovation in the future will continue to outpace, and thus largely drive, future efficiency standard levels, as it has for the past 30 years. For example, the SEER 13 central air conditioner promoted as the high-efficiency option in 1992 is today’s baseline, and DSM programs promote the SEER 14-16 central air conditioner. In other words, as the efficiency of baseline items increase, so too will the higher-efficiency options, and the gap between what is most cost-effective and what is commonly chosen in the marketplace at any given time can be expected to persist indefinitely.

Much, if not most, of the long-run potential for economically achievable efficiency savings originates in the existing capital stock. Energy efficiency retrofit investments will continue to provide large-scale savings potential, realized through changing standards covering the sale, importation, or manufacture of new products and equipment. Technological advances increase the potential for cost-effective investment in lighting retrofits as the gap between existing equipment and new high-efficiency lighting technology continues to widen over time.

## **APPENDIX A**

Historic Spending and Savings  
in the United States and Canada  
by Administrator

# Appendix A – Historical DSM

Spending values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total		
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	
ARKANSAS								
Entergy Arkansas	2008	0.1%	\$0.29	0.2%	\$0.07	0.18%	\$0.11	
	2009	0.1%	\$0.25	0.3%	\$0.05	0.24%	\$0.09	
	2010	0.6%	\$0.08	0.2%	\$0.08	0.34%	\$0.08	
CALIFORNIA								
SDG&E	2005	2.1%	\$0.17	2.0%	\$0.23	2.05%	\$0.20	
	2006	0.8%	\$0.26	0.5%	\$0.32	0.64%	\$0.29	
	2007	2.6%	\$0.17	1.6%	\$0.20	1.96%	\$0.18	
	2008	2.4%	\$0.23	1.6%	\$0.35	1.93%	\$0.30	
	2009	1.0%	\$0.51	1.6%	\$0.27	1.37%	\$0.34	
	2010	1.7%	\$0.19	1.2%	\$0.27	1.37%	\$0.23	
SCE	2004	1.6%	\$0.14	0.9%	\$0.19	1.16%	\$0.17	
	2005	1.8%	\$0.15	1.6%	\$0.20	1.67%	\$0.18	
	2006	1.3%	\$0.20	0.6%	\$0.24	0.86%	\$0.22	
	2007	2.7%	\$0.14	1.3%	\$0.26	1.75%	\$0.20	
	2008	2.6%	\$0.14	1.4%	\$0.24	1.78%	\$0.19	
	2009	1.5%	\$0.25	0.7%	\$0.43	0.98%	\$0.33	
PG&E	2010	3.1%	\$0.20	1.5%	\$0.24	2.09%	\$0.22	
	2004	0.9%	\$0.26	0.6%	\$0.20	0.68%	\$0.23	
	2005	1.3%		1.5%		1.45%	\$0.18	
	2006	1.1%	\$0.42	0.8%	\$0.24	0.84%	\$0.34	
	2007	2.1%	\$0.30	1.6%	\$0.22	1.81%	\$0.25	
	2008	3.8%	\$0.18	3.2%	\$0.19	3.40%	\$0.18	
CONNECTICUT	2009	1.5%	\$0.41	0.8%	\$0.61	1.06%	\$0.51	
	2010	2.7%	\$0.33	1.6%	\$0.27	2.01%	\$0.30	
	Statewide (UI and CL&P)	2001	0.8%	\$0.47	1.3%	\$0.30	1.10%	\$0.35
2002		0.6%	\$0.48	1.0%	\$0.41	0.84%	\$0.43	
2003		0.3%	\$0.47	0.5%	\$0.36	0.37%	\$0.43	
2004		0.8%	\$0.26	1.1%	\$0.28	0.97%	\$0.27	

## Appendix A – Historical DSM

Spending values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved
	2005	0.8%	\$0.30	1.2%	\$0.27	1.03%	\$0.28
	2006	0.9%	\$0.29	1.3%	\$0.21	1.11%	\$0.24
	2007	0.9%	\$0.24	1.2%	\$0.32	1.12%	\$0.29
	2008	1.0%	\$0.24	1.5%	\$0.33	1.28%	\$0.30
	2009	0.7%	\$0.39	1.0%	\$0.27	0.85%	\$0.31
	2010	2.2%	\$0.25	1.0%	\$0.38	1.52%	\$0.30
<b>HAWAII</b>							
<b>Hawaii Energy</b>	2006					0.33%	\$0.32
	2007					0.75%	\$0.23
	2008					1.38%	\$0.11
	2009	1.4%	\$0.22	0.8%	\$0.11	1.01%	\$0.17
<b>IOWA</b>							
<b>Statewide (IOUs)</b>	2001	0.2%	\$0.72	0.4%	\$0.17	0.37%	\$0.27
	2002	0.3%	\$0.60	0.4%	\$0.16	0.38%	\$0.25
	2003	0.3%	\$0.68	0.6%	\$0.12	0.52%	\$0.21
	2004	0.4%	\$0.56	0.7%	\$0.12	0.65%	\$0.20
	2005	0.7%	\$0.33	0.7%	\$0.13	0.69%	\$0.18
	2006	0.7%	\$0.32	0.9%	\$0.11	0.84%	\$0.16
	2007	0.7%	\$0.34	0.9%	\$0.11	0.83%	\$0.16
<b>Interstate Power &amp; Light</b>	2008	0.8%	\$0.27	0.7%	\$0.13	0.75%	\$0.17
	2009	1.5%	\$0.22	1.1%	\$0.15	1.18%	\$0.18
	2010	1.5%	\$0.22	0.9%	\$0.18	1.03%	\$0.19
<b>MidAmerican</b>	2008	0.6%	\$0.28	1.1%	\$0.09	0.92%	\$0.12
	2009	0.9%	\$0.28	1.3%	\$0.17	1.15%	\$0.19
	2010	1.6%	\$0.19	1.1%	\$0.20	1.21%	\$0.19
<b>MAINE</b>							
<b>Efficiency Maine</b>	2006	0.9%	\$0.12	0.3%	\$0.18	0.55%	\$0.14
	2007	1.0%	\$0.12	0.5%	\$0.18	0.69%	\$0.15
	2008	1.3%	\$0.11	0.6%	\$0.15	0.87%	\$0.13
	2009	0.8%	\$0.13	0.7%	\$0.21	0.70%	\$0.18

## Appendix A – Historical DSM

Spending values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved
	2010	1.2%	\$0.10	0.6%	\$0.26	0.82%	\$0.17
<b>MARYLAND</b>							
<b>Statewide</b>	2007	0.5%		0.6%		0.57%	
	2008	0.5%		0.6%		0.59%	
	2009	0.5%		0.6%		0.59%	
	2010	0.5%		0.6%		0.59%	
<b>MASSACHUSETTS</b>							
<b>Statewide (IOUs)</b>	2002	0.4%	\$0.71	0.5%	\$0.53	0.45%	\$0.59
	2003					0.57%	\$0.46
	2004					0.79%	\$0.34
	2005					0.80%	\$0.31
	2006	0.8%	\$0.36	0.7%	\$0.32	0.75%	\$0.34
	2007	1.2%	\$0.22	0.6%	\$0.30	0.86%	\$0.26
	2008	0.8%	\$0.41	0.6%	\$0.30	0.69%	\$0.34
	2009	0.7%	\$0.68	0.8%	\$0.37	0.78%	\$0.46
	2010	1.0%	\$0.54	1.2%	\$0.34	1.12%	\$0.40
<b>National Grid</b>	2006	1.4%	\$0.30	0.8%	\$0.31	0.99%	\$0.30
	2007	1.7%	\$0.18	0.7%	\$0.31	1.09%	\$0.23
	2008	1.0%	\$0.37	0.7%	\$0.31	0.84%	\$0.34
	2009	0.8%	\$0.64	0.9%	\$0.40	0.90%	\$0.49
<b>NSTAR</b>	2006	0.7%	\$0.45	0.8%	\$0.33	0.76%	\$0.36
	2007	1.2%	\$0.24	0.8%	\$0.29	0.91%	\$0.27
	2008	0.8%	\$0.42	0.8%	\$0.28	0.78%	\$0.32
	2009	0.7%	\$0.66	1.0%	\$0.34	0.91%	\$0.42
<b>Fitchburg Gas &amp; Electric</b>	2006	0.5%	\$0.76	0.5%	\$0.36	0.50%	\$0.50
	2007	0.2%	\$1.06	0.7%	\$0.33	0.56%	\$0.44
	2008	0.1%	\$1.44	0.6%	\$0.39	0.43%	\$0.52
	2009	0.2%	\$2.31	0.7%	\$0.50	0.50%	\$0.73
<b>WMECo</b>	2006	0.6%	\$0.52	4.0%	\$0.30	1.90%	\$0.35
	2007	0.5%	\$0.47	3.1%	\$0.23	1.39%	\$0.29

# Appendix A – Historical DSM

Spending values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved
Cape Light	2008	0.5%	\$0.57	2.1%	\$0.31	1.02%	\$0.39
	2009	0.6%	\$0.94	4.2%	\$0.31	1.57%	\$0.48
	2005	0.5%	\$0.52		\$0.42	0.77%	\$0.48
	2006	0.4%	\$0.46	3.2%	\$0.41	0.87%	\$0.43
	2007	0.9%	\$0.26	0.5%	\$0.61	0.71%	\$0.37
	2008	0.5%	\$0.60	0.3%	\$0.77	0.40%	\$0.66
	2009	0.4%	\$0.87	0.6%	\$0.51	0.52%	\$0.66
NEVADA							
Sierra Pacific Power	2006	0.9%	\$0.09	0.8%	\$0.04	0.86%	\$0.06
	2007	1.4%	\$0.06	0.5%	\$0.09	0.72%	\$0.07
	2008	2.7%	\$0.05	0.8%	\$0.12	1.29%	\$0.08
	2009	2.1%	\$0.07	1.0%	\$0.11	1.35%	\$0.09
Nevada Power	2008	1.8%	\$0.05	0.8%	\$0.10	1.22%	\$0.07
NEW JERSEY							
Statewide (NJ CEP)	2004	0.4%	\$0.58	0.4%	\$0.19	0.42%	\$0.33
	2005	0.3%	\$0.73	0.6%	\$0.11	0.47%	\$0.26
	2006	0.1%	\$2.24	0.2%	\$0.25	0.16%	\$0.69
	2007	0.4%	\$0.55	0.2%	\$0.23	0.27%	\$0.42
	2008	0.8%	\$0.28	0.2%	\$0.17	0.42%	\$0.25
	2009	1.3%	\$0.23	0.2%	\$0.24	0.61%	\$0.23
	2010	0.8%	\$0.56	0.3%	\$0.28	0.46%	\$0.45
NEW YORK							
NYSERDA	2004	0.2%		0.3%		0.24%	
	2005	0.6%	\$0.23	0.5%	\$0.13	0.56%	\$0.17
	2006	0.6%	\$0.20	0.5%	\$0.12	0.57%	\$0.15
	2007	0.4%	\$0.36	0.5%	\$0.11	0.47%	\$0.18
	2008	0.1%	\$1.94	0.2%	\$0.32	0.15%	\$0.67
	2009	0.3%	\$0.71	0.6%	\$0.13	0.48%	\$0.25
LIPA	2006	0.7%	\$0.28	0.4%	\$0.31	0.51%	\$0.29
	2007	1.0%	\$0.19	0.6%	\$0.30	0.78%	\$0.23
	2008	1.0%	\$0.13	0.4%	\$0.18	0.72%	\$0.15

## Appendix A – Historical DSM

Spending values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved
	2009	0.8%	\$0.23	0.4%	\$0.25	0.62%	\$0.24
	2010	1.0%	\$0.23	0.5%	\$0.19	0.75%	\$0.22
<b>OKLAHOMA</b>							
<b>Public Service of Oklahoma</b>	2008					0.01%	
	2009					0.12%	
	2010	0.4%	\$0.32	0.2%	\$0.14	0.27%	\$0.22
<b>Oklahoma Gas &amp; Electric</b>	2008					0.03%	\$0.00
	2009					0.21%	\$0.00
	2010	0.2%	\$0.91	0.2%	\$0.04	0.21%	\$0.27
<b>Empire Direct</b>	2008					0.00%	
	2009					0.01%	
	2010	0.0%	\$2.88	0.0%	\$22.88	0.00%	\$4.91
<b>PACIFIC NORTHWEST</b>							
<b>Northwest Power and Conservation Council (NWPCC)</b>	2001					0.82%	\$0.17
	2002					0.83%	\$0.19
	2003					0.74%	\$0.17
	2004					0.68%	\$0.17
	2005					0.72%	\$0.17
	2006					0.77%	\$0.16
	2007					1.09%	\$0.11
	2008					1.24%	\$0.12
	2009					1.10%	\$0.17
<b>PENNSYLVANIA</b>							
<b>Allegheny</b>	2009	0.0%	\$0.91	0.0%	\$0.77	0.03%	\$0.83
<b>Duquesne</b>	2009	0.1%	\$0.44			0.03%	\$1.12
<b>PECO</b>	2009	1.1%	\$0.08	0.1%	\$0.17	0.21%	\$0.18
<b>PPL</b>	2009	0.6%	\$0.18	0.0%	\$2.61	0.21%	\$0.18
<b>Met-Ed</b>	2009	0.2%	\$0.27	0.0%	\$0.30	0.08%	\$0.28
<b>Penelec</b>	2009	0.2%	\$0.29	0.0%	\$0.21	0.09%	\$0.27
<b>Penn Power</b>	2009	0.3%	\$0.14	0.0%	\$0.34	0.12%	\$0.17



# Appendix A – Historical DSM

Spending values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved
RHODE ISLAND							
Narragansett Electric	2004	0.6%	\$0.35	0.6%	\$0.33	0.59%	\$0.34
	2005	0.9%	\$0.28	0.8%	\$0.28	0.82%	\$0.28
	2006	0.8%	\$0.30	1.0%	\$0.26	0.91%	\$0.27
	2007	0.8%	\$0.28	0.8%	\$0.27	0.81%	\$0.27
	2008	0.6%	\$0.30	0.9%	\$0.24	0.77%	\$0.26
	2009	1.1%	\$0.32	1.0%	\$0.31	1.05%	\$0.31
TEXAS							
Statewide (IOUs)	2006					0.10%	\$0.20
	2007					0.12%	\$0.20
	2008					0.17%	\$0.17
	2009					0.16%	\$0.20
	2010					0.15%	\$0.20
VERMONT							
EVT	2001	0.8%	\$0.38	0.5%	\$0.29	0.62%	\$0.34
	2002	0.8%	\$0.44	0.5%	\$0.35	0.64%	\$0.39
	2003	0.6%	\$0.52	0.9%	\$0.29	0.81%	\$0.36
	2004	0.9%	\$0.36	0.7%	\$0.38	0.81%	\$0.37
	2005	1.1%	\$0.29	0.7%	\$0.42	0.87%	\$0.35
	2006	1.2%	\$0.32	0.7%	\$0.37	0.86%	\$0.34
	2007	2.3%	\$0.19	1.2%	\$0.29	1.60%	\$0.23
	2008	3.3%	\$0.14	1.7%	\$0.39	2.33%	\$0.26
	2009	1.7%	\$0.26	1.3%	\$0.45	1.46%	\$0.36
	2010	2.3%	\$0.23	1.7%	\$0.42	1.94%	\$0.33
	2011	2.3%	\$0.26	1.6%	\$0.43	1.83%	\$0.35
WISCONSIN							
Focus on Energy	2009	0.4%	\$0.37	0.7%	\$0.18	0.61%	\$0.21
	2010	0.4%	\$0.37	0.6%	\$0.22	0.54%	\$0.25
CANADA							
Nova Scotia Power / Efficiency Nova Scotia	2008	0.3%	\$0.12	0.1%	\$0.17	0.17%	\$0.14
	2009	0.9%	\$0.10	0.3%	\$0.18	0.53%	\$0.13

## Appendix A – Historical DSM

Spending values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved
FortisBC	2010	0.5%	\$0.33	0.8%	\$0.19	0.68%	\$0.23
	2011	0.0%	\$0.00	0.0%	\$0.00	1.12%	\$0.23
	2005	0.5%	\$0.12	1.2%	\$0.07	0.80%	\$0.09
	2006	0.6%	\$0.10	1.0%	\$0.08	0.76%	\$0.09
	2007	0.8%	\$0.09	1.0%	\$0.08	0.91%	\$0.09
	2008	0.7%	\$0.11	1.2%	\$0.09	0.88%	\$0.10
	2009	0.5%	\$0.19	1.6%	\$0.08	0.90%	\$0.11
	2010	0.6%	\$0.17	1.5%	\$0.09	0.95%	\$0.12
BC Hydro	2011	0.6%	\$0.17	2.1%	\$0.14	1.18%	\$0.15
	2003		\$0.22		\$0.10		\$0.12
	2004	1.1%	\$0.12	0.6%	\$0.12	0.77%	\$0.12
	2005	1.2%	\$0.06	0.6%	\$0.14	0.81%	\$0.10
	2006	0.5%	\$0.10	0.5%	\$0.14	0.50%	\$0.12
	2007	0.4%	\$0.16	1.0%	\$0.07	0.80%	\$0.08
	2008	0.4%	\$0.23	0.7%	\$0.16	0.58%	\$0.18
	2009	0.3%	\$0.42	0.9%	\$0.17	0.73%	\$0.21
	2010	0.4%	\$0.41	1.3%	\$0.19	0.98%	\$0.23
	2011	0.4%	\$0.40	0.4%	\$0.57	0.40%	\$0.51

### Notes

Savings % of Sales calculated from DSM annual kWh savings installed in that year divided by the applicable kWh sales for the same year.

Spending per annual kWh Saved calculated from program administrator DSM annual spending divided by DSM annual kWh savings at the customer meter installed in that year.

Data for states includes all program administrators for that state.

Savings values for NYSEDA from 2008 onward only include appliance savings from the New York Energy SmartSM Products Program.

Pennsylvania values are for the Act 129 program year 2009, which went from June 1, 2009 to May 31, 2010.

Hawaii values are for a program year that starts on July 1st of a calendar year and goes to June 30th of the next calendar year.

BC Hydro Values are for a fiscal year that starts on April 1st of a previous calendar year and goes to March 31st of the given calendar year.

All sales data up until 2009 comes from the U.S. Energy Information Administration's historical values reported on Form 861, which can be found at <http://www.eia.gov/cneaf/electricity/page/eia861.html>. All "Savings as a Percent of Sales" for 2010 use 2009 sales figures unless otherwise noted below.

## Appendix A – Historical DSM

*Spending values are in 2011 dollars*

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved	Savings % of Sales	Spending per Annual kWh Saved

- (i) Entergy Arkansas 2010 sales are forecasted values
- (ii) Vermont 2010 sales are from the Vermont Department of Public Service
- (iii) PSO'S 2010 sales are from its Annual Energy Efficiency Report for 2010
- (iv) OG&E's 2010 sales are from the OG&E 2010 Annual Report
- (v) Pennsylvania sales are baseline 2009 sales established by the Pennsylvania Public Utility Commission for Act 129.
- (vi) BC Hydro's sales are from BC Hydro's 2010 load forecast
- (vii) FortisBC's sales are from Fortis BC's 2012 Long Term Acquisition Plan

## **APPENDIX B**

Planned Spending and Savings  
in the United States and Canada  
by Administrator

## Appendix B – Planned DSM

Spending Values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved
ARKANSAS							
Entergy	2011	0.51%	\$0.24	0.12%	\$0.60	0.26%	\$0.35
	2012	0.51%	\$0.36	0.49%	\$0.31	0.50%	\$0.33
	2013	0.56%	\$0.40	0.84%	\$0.26	0.74%	\$0.30
CALIFORNIA							
SDG&E	2011					0.97%	\$0.48
	2012					0.92%	\$0.46
	2013					0.77%	
SCE	2011					1.28%	\$0.37
	2012					1.26%	\$0.36
	2013					1.30%	
PG&E	2011					1.19%	\$0.43
	2012					1.28%	\$0.42
	2013					1.45%	
CONNECTICUT							
Statewide (UI and CL&P)	2011	1.58%	\$0.22	0.86%	\$0.39	1.19%	\$0.29
HAWAII							
Hawaii Energy	2010	2.88%	\$0.10	1.07%	\$0.12	1.62%	\$0.12
MARYLAND							
Statewide	2011	1.50%		1.26%		1.37%	
	2012	1.50%		1.26%		1.37%	
	2013	1.50%		1.26%		1.37%	
	2014	1.50%		1.26%		1.37%	
MASSACHUSETTS							
Statewide (IOUs)	2011	1.22%	\$0.72	1.89%	\$0.39	1.65%	\$0.48
	2012	1.51%	\$0.69	2.32%	\$0.41	2.03%	\$0.48

## Appendix B – Planned DSM

Spending Values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved
NEVADA							
Nevada Power	2009	0.93%	\$0.14	0.62%	\$0.15	0.75%	\$0.14
	2010	1.02%	\$0.14	0.73%	\$0.18	0.85%	\$0.16
	2011	0.97%	\$0.16	0.71%	\$0.18	0.81%	\$0.17
	2012	0.31%	\$0.49	0.62%	\$0.20	0.49%	\$0.27
Sierra Pacific Power	2010	2.59%	\$0.08	0.49%	\$0.14	1.09%	\$0.10
	2011	2.47%	\$0.09	0.59%	\$0.19	1.12%	\$0.12
	2012	0.51%	\$0.40	0.57%	\$0.18	0.56%	\$0.24
	2013	0.56%	\$0.34	0.57%	\$0.18	0.57%	\$0.22
OKLAHOMA							
Public Service of Oklahoma	2011	0.51%	\$0.36	0.48%	\$0.41	0.49%	\$0.39
	2012	0.47%	\$0.36	0.46%	\$0.42	0.46%	\$0.40
	2013	0.45%	\$0.36	0.44%	\$0.42	0.45%	\$0.40
	2014	0.43%	\$0.37	0.43%	\$0.43	0.43%	\$0.41
	2015	0.41%	\$0.37	0.41%	\$0.43	0.41%	\$0.41
Empire Direct	2011	0.09%	\$0.74	0.04%	\$0.78	0.05%	\$0.76
	2012	0.09%	\$0.72	0.04%	\$0.76	0.05%	\$0.74
PACIFIC NORTHWEST							
Northwest Power and Conservation Council (NWPCC)	2010	1.51%	\$0.27	0.74%	\$0.17	1.04%	\$0.23
	2011	1.58%	\$0.27	0.84%	\$0.17	1.13%	\$0.23
	2012	1.66%	\$0.27	0.93%	\$0.17	1.21%	\$0.22
	2013	1.76%	\$0.27	1.01%	\$0.17	1.30%	\$0.22
	2014	1.88%	\$0.27	1.07%	\$0.17	1.38%	\$0.22
	2015	1.58%	\$0.27	1.30%	\$0.17	1.41%	\$0.21
	2016	1.84%	\$0.27	1.35%	\$0.17	1.54%	\$0.22
	2017	2.02%	\$0.27	1.36%	\$0.17	1.61%	\$0.22
	2018	2.23%	\$0.27	1.28%	\$0.17	1.64%	\$0.22
	2019	2.31%	\$0.27	1.27%	\$0.17	1.67%	\$0.22
	2020	2.45%	\$0.27	1.19%	\$0.17	1.67%	\$0.23
	2021	2.45%	\$0.27	1.15%	\$0.17	1.65%	\$0.23

## Appendix B – Planned DSM

Spending Values are in 2011 dollars

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved
PENNSYLVANIA							
Allegheny	2010	0.88%	\$0.23	0.89%	\$0.10	0.89%	\$0.14
	2011	1.30%	\$0.13	1.18%	\$0.08	1.22%	\$0.10
	2012	1.31%	\$0.16	0.60%	\$0.15	0.86%	\$0.16
Duquesne	2010	1.08%	\$0.16	1.18%	\$0.13	1.15%	\$0.13
	2011	1.08%	\$0.16	1.18%	\$0.12	1.15%	\$0.13
	2012	1.08%	\$0.16	1.18%	\$0.12	1.15%	\$0.13
PECO	2010	1.22%	\$0.15	0.61%	\$0.18	0.82%	\$0.17
	2011	1.37%	\$0.17	0.58%	\$0.23	0.85%	\$0.20
	2012	1.01%	\$0.24	0.61%	\$0.26	0.75%	\$0.25
PPL	2010	0.97%	\$0.18	0.86%	\$0.16	0.90%	\$0.17
	2011	0.99%	\$0.19	1.19%	\$0.16	1.11%	\$0.17
	2012	1.00%	\$0.20	1.58%	\$0.16	1.35%	\$0.17
Met-Ed	2010	1.36%	\$0.26	0.74%	\$0.12	0.99%	\$0.20
	2011	1.36%	\$0.24	0.74%	\$0.11	0.99%	\$0.18
	2012	1.22%	\$0.14	0.67%	\$0.11	0.89%	\$0.13
Penelec	2010	1.51%	\$0.26	0.75%	\$0.11	1.00%	\$0.18
	2011	1.51%	\$0.23	0.75%	\$0.10	1.00%	\$0.17
	2012	1.40%	\$0.14	0.67%	\$0.11	0.91%	\$0.12
Penn Power	2010	1.20%	\$0.21	0.85%	\$0.10	0.99%	\$0.15
	2011	1.20%	\$0.19	0.85%	\$0.09	0.99%	\$0.14
	2012	1.09%	\$0.14	0.76%	\$0.09	0.89%	\$0.11
RHODE ISLAND							
Narragansett	2011	1.16%	\$0.57	1.41%	\$0.24	1.32%	\$0.35
	2012					1.65%	
	2013					2.04%	
	2014					2.43%	
VERMONT							
	2012	1.90%	\$0.29	2.15%	\$0.41	2.04%	\$0.36
	2013	1.91%	\$0.30	2.17%	\$0.43	2.06%	\$0.38

## Appendix B – Planned DSM

*Spending Values are in 2011 dollars*

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved
<b>EVT</b>	2014	1.97%	\$0.32	2.15%	\$0.44	2.07%	\$0.39
	2015	1.77%	\$0.37	2.10%	\$0.46	1.96%	\$0.42
	2016	1.96%	\$0.37	2.19%	\$0.45	2.09%	\$0.42
	2017	2.08%	\$0.38	2.23%	\$0.44	2.16%	\$0.42
	2018	2.04%	\$0.38	2.19%	\$0.45	2.13%	\$0.42
	2019	1.98%	\$0.36	2.30%	\$0.45	2.16%	\$0.42
	2020	1.88%	\$0.47	2.01%	\$0.46	1.95%	\$0.46
	2021	1.92%	\$0.46	1.98%	\$0.46	1.95%	\$0.46
	2022	1.94%	\$0.46	1.97%	\$0.46	1.96%	\$0.46
	2023	1.95%	\$0.46	1.95%	\$0.46	1.95%	\$0.46
	2024	1.94%	\$0.46	1.91%	\$0.47	1.92%	\$0.47
	2025	1.96%	\$0.46	1.89%	\$0.47	1.92%	\$0.47
	2026	1.94%	\$0.46	1.87%	\$0.48	1.90%	\$0.47
	2027	1.90%	\$0.46	1.84%	\$0.48	1.87%	\$0.47
	2028	1.89%	\$0.46	1.82%	\$0.49	1.85%	\$0.48
	2029	1.87%	\$0.46	1.81%	\$0.50	1.84%	\$0.48
	2030	1.84%	\$0.46	1.80%	\$0.50	1.82%	\$0.48
	2031	1.84%	\$0.46	1.78%	\$0.51	1.81%	\$0.49
<b>BRITISH COLUMBIA</b>							
<b>Fortis BC</b>	2012	0.83%	\$0.26	1.27%	\$0.18	1.00%	\$0.22
	2013	0.86%	\$0.25	1.15%	\$0.18	0.97%	\$0.22
<b>NOVA SCOTIA</b>							
<b>Efficiency Nova Scotia</b>	2013					1.08%	\$0.27
	2014					1.11%	\$0.28
	2015					1.13%	\$0.29
	2016					1.16%	\$0.30
	2017					1.20%	\$0.30

### Notes



## Appendix B – Planned DSM

*Spending Values are in 2011 dollars*

Program Administrator, State, or Province	Year	Residential		Non-Residential		Total	
		Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved	Savings % of Sales	Spending per annual kWh Saved

Unless otherwise noted in the source material, all dollar figures were assumed to be nominal. An inflation assumption of 2.6% was used to provide 2011 dollars.

Data for California does not contain spending or savings for the Low Income Energy Efficiency programs.

Pennsylvania IOUs have program years that go from June 1st of a given calendar year and go to May 31st of the next calendar year.

Hawaii Energy's program year goes from July 1s of a given calendar year and goes to June 30th of the next calendar year.

Information for Entergy Arkansas uses sector sales forecasts from EAI's 2009 IRP process, resulting in savings as a percent of sales that are slightly less than the AR PSC's goals, which were taken as a percent of 2010 sales.

Spending levels for the NWPCC are suggested based on results from 2006

## **APPENDIX C**

### **Detailed Projections for BC Hydro Assuming Tier 1 DSM**

## Appendix C – Detailed Projections for BC Hydro, Assuming Tier 1 DSM

### PROJECTION ASSUMPTIONS

Sector	Measure Life
Residential	10
Non-Residential	15
Real Discount Rate	5.50%
Line loss factor	8.83%

Fiscal Year	Savings as a Percent of Sales	2011\$/kWh-yr	
		Residential	Non- residential
2013	1.50%	\$0.332	\$0.256
2014	2.00%	\$0.301	\$0.226
2015	2.00%	\$0.309	\$0.234
2016	2.00%	\$0.317	\$0.242
2017	2.00%	\$0.326	\$0.250
2018	2.00%	\$0.334	\$0.259
2019	2.00%	\$0.342	\$0.267
2020	2.00%	\$0.350	\$0.275
2021	2.00%	\$0.359	\$0.283
2022	2.00%	\$0.367	\$0.292
2023	2.00%	\$0.375	\$0.300
2024	2.00%	\$0.383	\$0.308
2025	2.00%	\$0.391	\$0.316
2026	2.00%	\$0.400	\$0.324
2027	2.00%	\$0.408	\$0.333
2028	2.00%	\$0.416	\$0.341
2029	2.00%	\$0.424	\$0.349
2030	2.00%	\$0.433	\$0.357
2031	2.00%	\$0.441	\$0.366
2032	2.00%	\$0.449	\$0.374

## Appendix C – Detailed Projections for BC Hydro, Assuming Tier 1 DSM

### SERVICE TERRITORY SAVINGS SUMMARY

#### BC Hydro Efficiency Savings (Cumulative Annual GWh since F2008, without losses)

Time Period		Tier 1
Year 1	F2013	2,290
Year 2	F2014	3,296
Year 10	F2022	10,359
Year 20	F2032	14,140

#### BC Hydro Efficiency Savings (Cumulative Annual MW since F2008, without losses)

Time Period		Tier 1
Year 1	F2013	423
Year 2	F2014	604
Year 10	F2022	1,875
Year 20	F2032	2,560

#### BC Hydro Efficiency Savings (Cumulative Annual GWh since F2008, with losses)

Time Period		Tier 1
Year 1	F2013	2,492
Year 2	F2014	3,587
Year 10	F2022	11,274
Year 20	F2032	15,388

#### BC Hydro Efficiency Savings (Cumulative Annual MW, with losses)

Time Period		Tier 1
Year 1	F2013	461
Year 2	F2014	657
Year 10	F2022	2,041
Year 20	F2032	2,786

## Appendix C – Detailed Projections for BC Hydro, Assuming Tier 1 DSM

### INCREMENTAL SAVINGS

Projected Incremental Annual Energy Efficiency Savings (without losses)

Fiscal Year	GWh	MW
2013	794	147
2014	1,108	203
2015	1,155	209
2016	1,196	216
2017	1,229	223
2018	1,259	228
2019	1,284	232
2020	1,307	237
2021	1,320	239
2022	1,335	242
2023	1,346	244
2024	1,360	246
2025	1,369	248
2026	1,359	246
2027	1,373	249
2028	1,390	252
2029	1,406	255
2030	1,428	258
2031	1,456	264
2032	1,491	270

## Appendix C – Detailed Projections for BC Hydro, Assuming Tier 1 DSM

### CUMULATIVE ENERGY SAVINGS SINCE F2008

Projected Cumulative Energy Efficiency Savings (without losses)\*.

Fiscal Year	GWh	MW
2013	2,290	423
2014	3,296	604
2015	4,283	776
2016	5,261	952
2017	6,215	1,125
2018	7,175	1,299
2019	8,093	1,465
2020	8,908	1,613
2021	9,659	1,749
2022	10,359	1,875
2023	10,923	1,977
2024	11,426	2,068
2025	11,895	2,153
2026	12,422	2,249
2027	12,883	2,332
2028	13,210	2,391
2029	13,451	2,435
2030	13,677	2,476
2031	13,902	2,517
2032	14,140	2,560

\* The cumulative savings incorporate measure decay. The decay is based analysis done by Efficiency Vermont on February 28, 2012 for the Vermont Department of Public Service. By the end of year 5, incremental residential savings will have decayed by 41% and non-residential savings will have decayed 6%. By the end of year 10, savings will have decayed by 92% and 37% respectively.

## Appendix C – Detailed Projections for BC Hydro, Assuming Tier 1 DSM

### SALES FORECASTS (GWh, without Losses)

<b>Fiscal Year</b>	<b>Without Energy Efficiency</b>	<b>With Energy Efficiency</b>
<b>2013</b>	52,928	50,638
<b>2014</b>	55,417	52,121
<b>2015</b>	57,775	53,492
<b>2016</b>	59,783	54,522
<b>2017</b>	61,455	55,240
<b>2018</b>	62,948	55,773
<b>2019</b>	64,198	56,106
<b>2020</b>	65,328	56,420
<b>2021</b>	66,003	56,344
<b>2022</b>	66,739	56,380
<b>2023</b>	67,282	56,359
<b>2024</b>	68,018	56,592
<b>2025</b>	68,461	56,566
<b>2026</b>	67,957	55,535
<b>2027</b>	68,654	55,771
<b>2028</b>	69,479	56,269
<b>2029</b>	70,312	56,861
<b>2030</b>	71,380	57,703
<b>2031</b>	72,781	58,878
<b>2032</b>	74,549	60,409

## Appendix C – Detailed Projections for BC Hydro, Assuming Tier 1 DSM

### SPENDING PROJECTIONS

Fiscal Year	Budgets (Millions 2012\$)		
	Residential	C&I	Total
2011	\$28.88	\$74.04	\$102.92
2012	\$30.34	\$104.27	\$134.61
2013	\$94.58	\$130.49	\$225.07
2014	\$116.68	\$162.65	\$279.33
2015	\$122.27	\$177.79	\$300.07
2016	\$128.46	\$191.54	\$320.00
2017	\$133.90	\$204.80	\$338.69
2018	\$139.57	\$217.48	\$357.05
2019	\$145.36	\$229.23	\$374.60
2020	\$151.72	\$240.27	\$391.99
2021	\$157.09	\$249.86	\$406.95
2022	\$162.89	\$259.66	\$422.55
2023	\$168.93	\$268.34	\$437.27
2024	\$175.76	\$277.72	\$453.48
2025	\$181.66	\$286.22	\$467.89
2026	\$188.03	\$288.34	\$476.36
2027	\$194.51	\$298.16	\$492.67
2028	\$201.06	\$309.00	\$510.07
2029	\$207.68	\$320.10	\$527.79
2030	\$214.13	\$333.28	\$547.41
2031	\$220.86	\$348.99	\$569.85



## **APPENDIX D**

### List of Sources for Planned and Historic Energy Efficiency Data

## Appendix D – DSM Data Sources

State / Province	Administrator	Data	Source
TX	Texas Statewide	2006 - 2009 Spending and Savings	"Table 3: Utility Funds Expended with Associated Demand and Energy Saving" from the EEUMOT Energy Efficiency Accomplishments Reports by Frontier Associates, <a href="http://www.texasefficiency.com/layout/inside.php?pgID=42&amp;sn=Reports">http://www.texasefficiency.com/layout/inside.php?pgID=42&amp;sn=Reports</a>
TX	Texas Statewide	2010 Spending and Savings	Presentation by Electric Utility Marketing Managers of Texas on June 2, 2011 titled "2010 Program Results and 2011 Program Plans". Located at <a href="http://www.texasefficiency.com/files/EUMMOT_EEIP_June_2011.pdf">http://www.texasefficiency.com/files/EUMMOT_EEIP_June_2011.pdf</a>
AR	Entergy Arkansas	2008 - 2010 Spending. 2010 Savings	Entergy Arkansas, Inc. "Energy Efficiency Program Portfolio Annual Report: 2010 Program Year (Docket No. 08-038-RP)". April 1, 2011. Page 8, Table 2.1
AR	Entergy Arkansas	2009 Savings	Entergy Arkansas, Inc. Energy Efficiency Quick Start Programs: 2009 Program Year Annual Report. April 1, 2010. Page 10, Table 3
AR	Entergy Arkansas	2008 Savings	Entergy Arkansas, Inc. Energy Efficiency Quick Start Programs: 2008 Program Year Annual Report. April 1, 2009. Page 8, Table 2
AR	Entergy Arkansas	2010 - 2013 Spending and Savings	Entergy Arkansas, Inc. "2011 - 2013 Energy Efficiency Program Plan (Docket No. 07-085-TF)". March 1, 2011. Page 3, Table1
VT	Efficiency Vermont	2001-2011 Spending and Savings	From EVT Annual Reports (2009 and 2010 savings are at generation and have a 88.7% factor applied to get to meter savings)
VT	Efficiency Vermont	2001 - 2008 Sales	EIA data for Vermont, excluding BED and Vermont Marble Industrial Sales.
VT	Efficiency Vermont	2010 Sales	Vermont Department of Public Service Memo of June 24, 2011 (Total State excluding BED)
VT	Efficiency Vermont	2012 - 2031 Spending and Savings	VEIC Excel workbook used for DRP reply comments to the PSB.

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State / Province	Administrator	Data	Source
CA	SDG&E	2005 Spending and Savings	Energy Efficiency Programs Annual Summary and Technical Appendix 2005 Results. San Diego Gas & Electric. 2006. Pages 1-182. 18 Jan. 2008 < <a href="http://sdge.com/regulatory/tariff/cpuc_openProceedings.shtml">http://sdge.com/regulatory/tariff/cpuc_openProceedings.shtml</a> >
CA	SDG&E	2006 -2008, 2010 Savings	San Diego Gas and Electric. Monthly Portfolio Summary Reports for December 2006, 2007, 2008, 2009, and 2010. Table 1.7: Portfolio Impacts - Market Sector
CA	SDG&E	2009 Savings	California Public Utilities Commission. <i>Energy Efficiency Evaluation Report for the 2009 Bridge Funding Period</i> . January 2011. Page 34
CA	SDG&E	2006 - 2010 Spending	San Diego Gas and Electric. Monthly Portfolio Summary Reports for December 2006, 2007, 2008, 2009, and 2010. Table 1.1: Monthly Summary Table
CA	SDG&E	2011 - 2018 Sales	Application of 0.87% average annual growth rate for 2011 - 2018 from "CED 2009 Staff Draft High Rate" Scenario. From: Gorin, Tom. Committee Workshop on 2010 - 2010 Peak Demand and Energy Forecasts, SDG&E Planning Area Forecast. June 26, 2009. <a href="http://www.energy.ca.gov/2009_energypolicy/documents/2009-06-26_workshop/presentations/">http://www.energy.ca.gov/2009_energypolicy/documents/2009-06-26_workshop/presentations/</a>
CA	SDG&E	2011 - 2013 Savings	Public Utilities Commission of the State of California. "Decision 09-09-047: Approving 2010 to 2012 Energy Efficiency Portfolio and Budgets". September 24, 2009. Table 2, p 45 and 46
CA	SDG&E	2011 - 2012 Budgets	Public Utilities Commission of the State of California. "Decision 09-09-047: Approving 2010 to 2012 Energy Efficiency Portfolio and Budgets". September 24, 2009. Page 365
CA	SCE	2006 -2008, 2010 Savings	Southern California Edison. Monthly Portfolio Summary Reports for December 2006, 2007, 2008, 2009, and 2010. Table 1.7: Portfolio Impacts - Market Sector

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State / Province	Administrator	Data	Source
CA	SCE	2006 - 2010 Spending	Southern California Edison. Monthly Portfolio Summary Reports for December 2006, 2007, 2008, 2009, and 2010. Table 1.1: Monthly Summary Table
CA	SCE	2009 Savings	California Public Utilities Commission. <i>Energy Efficiency Evaluation Report for the 2009 Bridge Funding Period</i> . January 2011. Page 34
CA	SCE	2005 Spending and Savings	2006 Energy Efficiency Annual Report. Southern California Edison. 2006. 1-242. 18 Jan. 2008 < <a href="http://www.sce.com/AboutSCE/Regulatory/eefilings/Annual_Reports/">http://www.sce.com/AboutSCE/Regulatory/eefilings/Annual_Reports/</a> >. Pages 11-13, 145-237
CA	SCE	2004 Spending and Savings	2005 Energy Efficiency Annual Report. Southern California Edison. 2005. 1-222. 18 Jan. 2008 < <a href="http://www.sce.com/AboutSCE/Regulatory/eefilings/Annual_Reports/">http://www.sce.com/AboutSCE/Regulatory/eefilings/Annual_Reports/</a> >. Pages 12, 131-222
CA	SCE	2011 - 2018 Sales	Application of 0.69% average annual growth rate for 2010 - 2018 from "CED 2009 Staff Draft High Rate" Scenario. From: Gorin, Tom. Committee Workshop on 2010 - 2010 Peak Demand and Energy Forecasts, SCE Planning Area Forecast. June 26, 2009. <a href="http://www.energy.ca.gov/2009_energypolicy/documents/2009-06-26_workshop/presentations/">http://www.energy.ca.gov/2009_energypolicy/documents/2009-06-26_workshop/presentations/</a>
CA	SCE	2011 - 2013 Savings	Public Utilities Commission of the State of California. "Decision 09-09-047: Approving 2010 to 2012 Energy Efficiency Portfolio and Budgets". September 24, 2009. Table 2, p 45 and 46
CA	SCE	2011 - 2012 Budgets	Public Utilities Commission of the State of California. "Decision 09-09-047: Approving 2010 to 2012 Energy Efficiency Portfolio and Budgets". September 24, 2009. Page 365

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State / Province	Administrator	Data	Source
CA	PG&E	2006-2010 Spending and 2006-2008, 2010 Savings	Pacific Gas and Electric. Monthly Portfolio Summary Reports for December 2006, 2007, 2008, 2009, and 2010. Tables 1.1 and 1.7
CA	PG&E	2009 Savings	California Public Utilities Commission. <i>Energy Efficiency Evaluation Report for the 2009 Bridge Funding Period</i> . January 2011. Page 34
CA	PG&E	2011 - 2013 Savings	Public Utilities Commission of the State of California. "Decision 09-09-047: Approving 2010 to 2012 Energy Efficiency Portfolio and Budgets". September 24, 2009. Table 2, p 45 and 46
CA	PG&E	2011 - 2012 Budgets	Public Utilities Commission of the State of California. "Decision 09-09-047: Approving 2010 to 2012 Energy Efficiency Portfolio and Budgets". September 24, 2009. Page 365
CA	PG&E	2011 - 2018 Sales	Application of 0.71% average annual growth rate for 2010 - 2018 from "CED 2009 Staff Draft High Rate" Scenario. From: Gorin, Tom. Committee Workshop on 2010 - 2010 Peak Demand and Energy Forecasts, PG&E Planning Area Forecast. June 26, 2009. <a href="http://www.energy.ca.gov/2009_energypolicy/documents/2009-06-26_workshop/presentations/">http://www.energy.ca.gov/2009_energypolicy/documents/2009-06-26_workshop/presentations/</a>
NY	NYSERDA	2004-2006 Spending and Savings	NEW YORK ENERGY \$MARTSM PROGRAM EVALUATION AND STATUS REPORTS, <a href="http://www.nyserda.org/Energy_Information/evaluation.asp">http://www.nyserda.org/Energy_Information/evaluation.asp</a>
NY	NYSERDA	2007 Spending and Savings	Spending and Savings from: NEW YORK ENERGY \$MARTSM PROGRAM QUARTERLY EVALUATION AND STATUS REPORT, September 2007, <a href="http://www.nyserda.org/Energy_Information/evaluation.asp">http://www.nyserda.org/Energy_Information/evaluation.asp</a>
NY	NYSERDA	2008 Spending and Savings	New York Energy \$mart. "New York's System Benefits Charge Programs Evaluation and Status Report: Year Ending December 31, 2008". March 2009.
NY	NYSERDA	2009 Spending and Savings	New York Energy \$mart. "New York's System Benefits Charge Programs Evaluation and Status Report: Year Ending December 31, 2009". March 2010.

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State / Province	Administrator	Data	Source
NY	LIPA	2006 - 2008 Spending and Savings	LIPA Clean Energy Initiative Annual Reports for 2006 - 2008 from <a href="http://www.lipower.org/residential/efficiency/cei.html">http://www.lipower.org/residential/efficiency/cei.html</a>
NY	LIPA	2009 Spending and Savings	LIPA Efficiency Long Island. PY2009 Assessment, Volume I. Table 3 and Table 8.
NY	LIPA	2010 Spending and Savings	LIPA Efficiency Long Island 2010 Annual Report, Volume I. Table 1. Net Impacts: ELI & Renewable Portfolio Evaluated Impacts versus Goals
CT	Connecticut Statewide	2001 - 2010 Spending and Savings	From ECMB Annual Reports. <a href="http://www.dpuc.state.ct.us/Electric.nsf/cafda428495eb61485256e97005e054b/5abe828f8be753568525713900520270/\$FILE/FINAL%20ECMB%202005%20Report.pdf">http://www.dpuc.state.ct.us/Electric.nsf/cafda428495eb61485256e97005e054b/5abe828f8be753568525713900520270/\$FILE/FINAL%20ECMB%202005%20Report.pdf</a>
CT	Connecticut Statewide	2011 Spending and Savings	2011 Electric and Natural Gas Conservation and Load Management Plan (Docket No. 10-10-03 and 10-10-04). October 1, 2010. P
NJ	NJ Clean Energy	2001 - 2009 Spending and Savings	Reporting Excel File from <a href="http://www.njcleanenergy.com/main/public-reports-and-library/financial-reports/clean-energy-program-financial-reports">http://www.njcleanenergy.com/main/public-reports-and-library/financial-reports/clean-energy-program-financial-reports</a>
NJ	NJ Clean Energy	2010 Spending and Savings	New Jersey Board of Public Utilities. "New Jersey's Clean Energy Program Report: January 1, 2010 through December 31, 2010". Page 28
NJ	NJ Clean Energy	2011 Spending	New Jersey Clean Energy Program. "Monthly Report of Progress Toward Goals". April 2011. Page 21
ME	Efficiency Maine	2006 - 2010 Spending and Savings	Efficiency Main Annual Reports from <a href="http://www.efficiencymaine.com/documents-services/reports">http://www.efficiencymaine.com/documents-services/reports</a>
RI	Narragansett Electric	2004 Spending and Savings	Revised 2004 DSM Year-End Report for The Narragansett Electric Company
RI	Narragansett Electric	2005 Spending and Savings	Revised 2005 DSM Year-End Report for The Narragansett Electric Company

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State / Province	Administrator	Data	Source
RI	Narragansett Electric	2006 Spending and Savings	National Grid Demand-Side Management Programs, Electric Operations 2006 Year-End Report
RI	Narragansett Electric	2007 Spending and Savings	National Grid Demand-Side Management Programs, Electric Operations 2007 Year-End Report
RI	Narragansett Electric	2008 Spending and Savings	National Grid Electric and Gas Demand-Side Management Programs, Electric Operations 2008 Year-End Report
RI	Narragansett Electric	2009 Spending and Savings	The Narragansett Electric Company d/b/a National Grid, 2009 DSM Year-End Report
RI	Narragansett Electric	2011 Plan	The Narragansett Electric Company (d/b/a National Grid). "Docket No. 4209 Revised Attachment 6 - Revised Text Table 1". December 6, 2010.
RI	Narragansett Electric	2012 - 2014 Savings Targets	Letter titled "RE: Energy Efficiency Savings Targets" from the Rhode Island Energy Efficiency and Resource management Council (EERMC) to the Rhode Island Public Utility Commission on September 1, 2010.
WI	Focus on Energy	2009-2010 Savings	Focus on Energy and Tetra Tech. "State of Wisconsin Public Service Commission of Wisconsin: Focus on Energy Evaluation Annual Report (2010)". April 11, 2011. Page 2-6, Table 2-5, Column "Annual kWh Saved -Verified Net"
WI	Focus on Energy	2010 Spending	Focus on Energy and Tetra Tech. "State of Wisconsin Public Service Commission of Wisconsin: Focus on Energy Evaluation Annual Report (2010)". April 11, 2011. Page 2-36, Table 2-28, Sum of columns "Incentives" and "Incremental Costs"
WI	Focus on Energy	2010 Spending	Focus on Energy and PA Consulting Group. "State of Wisconsin Public Service Commission of Wisconsin: Focus on Energy Evaluation Semiannual Report (Second Half of 2009)". April 23, 2010. Page 2-40, Table 2-23, Sum of columns "Incentives" and "Incremental Costs"
MA	Massachusetts Statewide	2002 Spending and Savings	Energy Efficiency Activities, A Report by the Division of Energy Resources, An Annual Report to the Great Court on the Status of Energy Efficiency Activities in Massachusetts, Summer 2004, Table 12.

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State / Province	Administrator	Data	Source
MA	Massachusetts Statewide	2003-2005 Spending and Savings	Massachusetts Saving Electricity: A Summary of the Performance of Electric Efficiency Programs Funded by Ratepayers Between 2003 and 2005 Executive Office of Energy and Environmental Affairs, Massachusetts Division of Energy Resources, 4/2/2007
MA	Massachusetts Statewide	2006-2009 Spending and Savings	Individual reports for Ngrid, NSTAR, WMECO, FG&E, and Cape Light
MA	Massachusetts Statewide	2010 Spending and Savings	Energy Efficiency Advisory Council. "Efficiency as Our First Fuel: Strategic Investments in Massachusetts' Energy Future". 2010 Report to the Massachusetts Legislature. June 2011.
MA	Massachusetts Statewide	2011 - 2012 Spending and Savings	Commonwealth of Massachusetts Department of Public Utilities. Order for D.P.U. 09-116 through 09-120. January 28, 2010. Appendix A and C
MA	National Grid	2005 - 2009 Spending and Savings	National Grid Annual Energy Efficiency Reports before the Massachusetts Department of Public Utilities
MA	NSTAR Electric	2006 - 2009 Spending and Savings	NSTAR Electric Annual Energy Efficiency Reports before the Massachusetts Department of Public Utilities
MA	WMECo	2006 Spending	Western Massachusetts Electric Company. Information Request AG-01 in Docket No. DPU 07-111. January 17, 2008. Response to Q-AG1-007.
MA	WMECo	2007 Spending and Savings	Western Massachusetts Electric. "2007 Summary of Energy Efficiency Performance". February 2007. Appendix 3, Table 2: Reported, "Total PA Costs"
MA	WMECo	2008 Spending	The Commonwealth of Massachusetts Department of Public Utilities. Decision in D.P.U. 09-54. August 9, 2010. Appendix, Table 1
MA	WMECo	2009 Spending and Savings	Western Massachusetts Electric. "2009 Energy Efficiency Annual Report". August 2, 2010. Appendix 3, Table 2: Reported, "Total PA Costs"



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State / Province	Administrator	Data	Source
MA	WMECo	2006 and 2008 Savings	EAI Form 861 Data, File 3
MA	FG&E	2006 - 2009 Spending and Savings	Fitchburg Gas & Electric Annual Energy Efficiency Reports before the Massachusetts Department of Public Utilities
MA	FG&E	2005 - 2009 Spending and Savings	Cape Light Compact Annual Energy Efficiency Reports before the Massachusetts Department of Public Utilities
IA	Iowa Statewide	2001 - 2007 Spending and Savings	Energy Efficiency in Iowa's Electric and Natural Gas Sectors. January 1, 2009. <a href="http://www.state.ia.us/government/com/util/energy/energy_efficiency.html">http://www.state.ia.us/government/com/util/energy/energy_efficiency.html</a>
IA	MidAmerican	2008 - 2010 Spending and Savings	MidAmerican Energy Company Annual Energy Efficiency Reports from <a href="http://www.state.ia.us/government/com/util/energy/energy_efficiency/ee_plans_reports.html">http://www.state.ia.us/government/com/util/energy/energy_efficiency/ee_plans_reports.html</a>
IA	IPL	2008 - 2010 Spending and Savings	Interstate Power and Light Annual Energy Efficiency Reports from <a href="http://www.state.ia.us/government/com/util/energy/energy_efficiency/ee_plans_reports.html">http://www.state.ia.us/government/com/util/energy/energy_efficiency/ee_plans_reports.html</a>
IA	MidAmerican	2008 - 2010 Spending and Savings	MidAmerican Energy Company Annual Energy Efficiency Reports from <a href="http://www.state.ia.us/government/com/util/energy/energy_efficiency/ee_plans_reports.html">http://www.state.ia.us/government/com/util/energy/energy_efficiency/ee_plans_reports.html</a>
NV	Nevada Power	2010 - 2012 Spending and Savings	Nevada Power Company. "Triennial Integrated Resource Plan for 2010 - 2029: Demand Side Plan - Exhibit A". Volume 7 of 26, Program Data Sheets (Page 2 to 432)
NV	Nevada Power	2006 - 2009 Spending and Savings	Nevada Power Company. "Triennial Integrated Resource Plan for 2010 - 2029: Demand Side Plan - Exhibit B". Volume 8 of 26, 2009 Annual Demand Side Management Update Reports (Page 2 to 171)

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State / Province	Administrator	Data	Source
NV	SPP	2004 - 2005 Spending and Savings	Sierra Pacific Power Company. "Integrated Resource Plan 2011 - 2030: Demand Side Plan 2011 - 2013". Volume 5 of 22, Page 38. Table DS-9
NV	SPP	2009 - 2013 Spending and Savings	Sierra Pacific Power Company. "Integrated Resource Plan 2011 - 2030: Demand Side Plan 2011 - 2013". Volume 5 of 22 Program Data Sheets (Pg 95 -382)
NV	SPP	2007 - 2008 Spending and Savings	Sierra Pacific Power Company. "Integrated Resource Plan 2011 - 2030: Demand Side Plan and Technical Appendix". Volume 6 of 22, 2010 Annual Demand Side Management Update Reports (Page 2 to 121)
NV	SPP	2006 Spending and Savings	Sierra Pacific Power Company. "Integrated Resource Plan 2008 - 2027: Volume V Demand Side Plan 2008 - 2010". Page 35 Table 10
Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2008 - 2010 Sales	Emera Inc. 2010 Annual Financial Report. Page 19 "Year-to Date (YTD) Electric Sales Volumes"
Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2010 Spending	Efficiency Nova Scotia Corporation. In the Matter of an Application to Approve Efficiency Nova Scotia Corporation's Electricity Demand Side Management (DSM) Plan for 2012. Figure 2.4 Page 9 February 28, 2011
Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2010 Savings	Nova Scotia Power Inc. Nova Scotia's 2010 Electricity Demand Side Management Plan Evaluation Reports. February 28, 2011 Table 1-1, Page 2.
Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2009 Savings	Nova Scotia Power Inc. Nova Scotia's 2009 Electricity Demand Side Management Plan Evaluation Reports. February 26, 2010. Table 1-1, Page 2.

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Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2008 Savings	H. Gil Peach & Associates/Scan America. Savings Verification Study of Nova Scotia Power Incorporated 2008 Demand Side Management Programs. October 2009. Table 1, Page 7.
Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2008 - 2009 Spending	Nova Scotia Utility and Review Board. Evidence of NSPI as Interim DSM Administrator: In the matter of an Application to Approve Nova Scotia's Electricity Demand Side Management Plan for 2011. February 26, 2010. Page 7, Figure 2.2
Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2011 - 2032 Sales, Spending and Savings	Nova Scotia Utility and Review Board. NSPI 2009 Integrated Resource Plan Update Report: Appendix D. November 30, 2009.
Nova Scotia	Efficiency Nova Scotia / Nova Scotia Power	2011, 2013-2017 Spending and Savings	Evidence of ENSC as DSM Administrator, February 27, 2012
PA	Allegheny	2009 - 2012 Plan	West Penn Power Company d/b/a Allegheny Power. "Pennsylvania Act 129 Energy Efficiency and Conservation Plan (Docket No. M-2009-2093218)". June 30, 2009.
PA	Allegheny	PY 2009	West Penn Power Company d/b/a Allegheny Power. "Annual Report to the Pennsylvania Public Utility Commission for the period June 1, 2009 to May 31, 2010: Program Year 1, Annual Report". September 21, 2010.
PA	Duquesne	2009 - 2012 Plan	Duquesne Light Company. "Proposed Changes to Duquesne Light Company's EE&C Plans (Docket No. M-2009-2093217)". September 15, 2010.
PA	Duquesne	PY 2009	Duquesne Light Company. "Annual Report to the Pennsylvania Public Utility Commission for the period December 2009 to May 2010, Program Year 2009". September 15, 2010.

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State / Province	Administrator	Data	Source
PA	PECO	2009 - 2012 Plan	PECO Energy Company. "Revised PECO Energy Efficiency and Conservation Plan (Program Years 2009 - 2012)". Light Company. September 15, 2010.
PA	PECO	PY 2009	PECO Energy Company. "Annual Report to the Pennsylvania Public Utility Commission for the period December 2009 to May 2010, Program Year 2009". September 15, 2010.
PA	PPL	2009 - 2012 Plan	PPL Electric Utilities Corporation. "Revised Energy Efficiency and Conservation Plan (Docket No. M-2009-2093216)". September 15, 2010.
PA	PPL	PY 2009	PPL Electric Utilities. "Annual Report to the Pennsylvania Public Utility Commission for the period ending May 2010, Program Year 1". September 15, 2010.
PA	Met-Ed	2009 - 2012 Plan	Metropolitan Edison Company. "Revised Energy Efficiency and Conservation Plan (Docket No. M-2009-2092222)". September 21, 2009.
PA	Met-Ed	PY 2009	Metropolitan Edison Company. "Annual Report to the Pennsylvania Public Utility Commission for the period June 2009 to May 2010, Program Year 1". September 15, 2010.
PA	Penelec	2009 - 2012 Plan	Pennsylvania Electric Company. "Revised Energy Efficiency and Conservation Plan (Docket No. M-2009-2112956)". December 2, 2009.
PA	Penelec	PY 2009	Pennsylvania Electric Company. "Annual Report to the Pennsylvania Public Utility Commission for the period June 2009 to May 2010, Program Year 1". September 15, 2010.
PA	Penn Power	2009 - 2012 Plan	Pennsylvania Power Company. "Revised Energy Efficiency and Conservation Plan (Docket No. M-2009-2112956)". December 2, 2009.
PA	Penn Power	PY 2009	Pennsylvania Power Company. "Annual Report to the Pennsylvania Public Utility Commission for the period June 2009 to May 2010, Program Year 1". September 15, 2010.
HI	Hawaii Energy	2006 - 2008 Spending and Savings	Hawaii Energy Conservation and Efficiency Program. "Public Benefits Fee Administrator Annual Report - PY 2009, Executive Summary". December 15, 2010.

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State / Province	Administrator	Data	Source
HI	Hawaii Energy	2010 Plan	Hawaii Energy: Conservation and Efficiency Program. "Annual Plan Program Year 2010" Honolulu, HI: September 10, 2010.
HI	Hawaii Energy	2009 Spending and Savings	Hawaii Energy: Conservation and Efficiency Program. "Annual Report Program Year 2009". Honolulu, HI: September 10, 2010.
British Columbia	BC Hydro	2003 - 2007 Spending and Savings	BC Hydro Power Smart. "Report on Demand-Side Management Activities for the Twelve Months Ending March 31, 2007". September 2007. Page 8, Table 2; Page 9, Table 3.
British Columbia	BC Hydro	2008 - 2010 Spending	BC Hydro Power Smart. "Report on Demand-Side Management Activities for Fiscal 2010". Revised August 16, 2010. Page 8, Table 2.
British Columbia	BC Hydro	2008 Savings	BC Hydro Power Smart. "Report on Demand-Side Management Activities for the Twelve Months Ending March 31, 2008". October 2008. Page 9, Table 3
British Columbia	BC Hydro	2009 Savings	BC Hydro Power Smart. "Report on Demand-Side Management Activities for Fiscal 2009". September 11, 2009. Page 5, Table 1
British Columbia	BC Hydro	2010 Savings	BC Hydro Power Smart. "Report on Demand-Side Management Activities for Fiscal 2010". Revised August 16, 2010. Page 7, Table 1
British Columbia	BC Hydro	2004 - 2005 Sales	BCHydro PowerSmart, F2010 Demand Side Management Milestone Evaluation Summary Report, p.20
British Columbia	BC Hydro	2006 - 2010 Sales	Table A7.4 2010 BC Hydro, Reference Load Forecast Before DSM and Rate Impacts (Excluding the Impact of EVs and Overlap for Codes and Standards
Pacific Northwest	NWPCC	2010 - 2029 Sales	Northwest Power and Conservation Council. "Sixth Northwest Conservation and Electric Power Plan (Council Document 2010-09): Appendix C". February 2010.
Pacific Northwest	NWPCC	2010 - 2029 Spending and Savings	The Northwest Power and Conservation Council's "6th Plan Conservation Target Calculator" from <a href="http://www.nwcouncil.org/energy/powerplan/6/supplycurves/1937/default.htm">http://www.nwcouncil.org/energy/powerplan/6/supplycurves/1937/default.htm</a>

## Appendix D – DSM Data Sources

State / Province	Administrator	Data	Source
Pacific Northwest	NWPCC	1991 - 2009 Spending, Savings, and Sales	Northwest Power and Conservation Council Excel summary of 2009 conservation achievements from <a href="http://www.nwcouncil.org/energy/rtf/consreport/2009/Default.asp">http://www.nwcouncil.org/energy/rtf/consreport/2009/Default.asp</a>
MD	Maryland Statewide	2007 - 2014 Savings	Maryland Energy Administration. Plan to Reduce Per Capita Electricity Consumption in Maryland by 15% by 2015. March 2010. Page 9.
British Columbia	Fortis BC	2005 -2010, 2012 - 2013 Spending, Savings, and Sales	FortisBC Inc. Responses to British Columbia Utility Commission ("BCUC") Interrogatory Request ("IR") 1. September 9, 2011.
British Columbia	Fortis BC	2005 -2010, 2012 - 2013 Spending, Savings, and Sales	FortisBC Inc.'s. Semi-Annual DSM Report for Year Ended December 31, 2011. March 30, 2012