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# Northwest Residential Code Savings for Idaho, Montana and Washington

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Date: 3/01/2011  
To: Aaron James, Northwest Energy Efficiency Alliance  
From: Ben Larson and Virginia Mugford, Ecotope  
Re: NW Residential Code Savings Contract #: 40320

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## Overview

Ecotope has completed a final estimate of the site energy savings realized in 2010 for new Idaho, Washington, and Montana houses. Houses built in 2010 under the code effective in each state for 2010 were evaluated and compared to results for the same houses built under the previously effective code. The relevant codes were as follows:

**Table 1. State by State Code History and Savings Estimate.**

State	Code in 2010	Previous Code	Savings
Idaho	IECC 2006	IECC 2003	1.8%
Washington	WSEC 2006	WSEC 2003	4.6%
Montana	IECC 2003 w/ MT amend.	MEC 1996 w/ MT amend.	7.4%

Using census<sup>1</sup> data and other sources<sup>2</sup> to characterize the three states' new construction markets, the analysis showed how much less energy would be consumed by houses built in 2010 to the code in force, as compared to the previously effective code. The energy end-uses considered in the house were space heating, space cooling, ventilation, domestic water heating, and lighting. Ecotope's analysis shows a predicted three-state savings of 4.2% from code improvements (accounting only for heating, cooling, ventilation, lighting, and water heating energy use). In energy terms, this amounts to a total savings of about 4,704 MWh (537 average kW) and 732,483 therms for the approximately 27,000 housing units expected to be completed in 2010.

This memo explains the methodology and results for the code analysis of Idaho, Washington and Montana. It contains the deliverables for Tasks 1, 2 and 3.

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<sup>1</sup> <http://censtats.census.gov/bldg/bldgprmt.shtml>

<sup>2</sup> Single-Family Residential New Construction Characteristics and Practices Study. March 27, 2007. Prepared for Northwest Energy Efficiency Alliance by RLW Analytics. <http://neea.org/research/reportdetail.aspx?ID=191>

Multi-Family Residential New Construction Characteristics and Practices Study. June 14, 2007. Prepared for Northwest Energy Efficiency Alliance by RLW Analytics. <http://neea.org/research/reportdetail.aspx?ID=193>

## Idaho, Washington and Montana Code Savings 2010

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The analysis approach used here is the same methodology approved by the Regional Technical Forum to estimate savings of the proposed 2011 ORSC<sup>3</sup>. Where necessary, it has been adapted to suit the investigated codes. Broadly, the analysis methodology is to develop a representative set of prototypical houses whose energy use can be estimated through simulation tools. These representative characteristics include climate, single or multi-family occupancy, house size, ground contact type (slab, crawl, or basement), and heating system type. Since we are analyzing the 2010 construction year, we used the same housing stock characteristics for both the old and in-force codes. The housing population consists of the number and geographic distribution of houses specific to 2010 within each state.

### Energy Use Calculations

The building energy use was predicted by a combination of numerical simulations and engineering calculations. SEEM (Simplified Energy and Enthalpy Model) was used to simulate heating, cooling, and ventilation energy use. The program combines building shell characteristics, thermostat settings, occupant behavior inputs, descriptions of heating and cooling systems, and duct distribution efficiency to develop an overall estimate of energy requirements of a house. Additionally, engineering calculations calibrated by field studies were employed to determine the energy use for lighting and water heating. Lighting energy calculations were done using a lighting power density method corresponding to the level of regular and high efficacy lights required by the codes. This method assumes all lamps in the house operate 1.5 hours per day throughout the year<sup>4</sup>. Water heating energy was calibrated to the equivalent of 22 gals per day per occupant. Occupancy varies with house size and construction type (either single family or multi-family).

Importantly, this analysis includes only regulated loads: space heating and cooling, water heating, lighting and ventilation. Loads not regulated by the code, including appliances and plug loads are excluded from the analysis. Since they are not regulated, there will be no savings from them year over year due to code changes. Ventilation, while not specifically regulated, is included because it is part of our standard energy-use modeling suite. No savings are attributed to ventilation savings but they do contribute to the total predicted energy use of the home.

SEEM (version 0.93), the residential energy-simulation program used for the analysis was developed by and for the Northwest Power and Conservation Council and the Northwest Energy Efficiency Alliance (NEEA), and written by Larry Palmiter of Ecotope. It is the simulation engine used to provide heating and cooling energy savings estimates for the residential sector in the Northwest Power Plan, for the Performance Tested Comfort System (PTCS) incentive program, as well as numerous other utility program offerings. SEEM is also used extensively to support state building energy code revisions including, most recently, the revised Washington State Energy Code and Oregon Residential Specialty Code.

The SEEM program consists of an hourly thermal simulation and an hourly moisture (humidity) simulation that interact with ducts, equipment, building shell and weather parameters to calculate the space conditioning requirements of the building. It is based on algorithms consistent with current American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), American Heating and Refrigeration Institute (AHRI), and International Organization for Standards (ISO) calculation standards. The simulation generates outputs used in this analysis; they include building heat

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<sup>3</sup> RTF Meeting 9/2010. <http://www.nwcouncil.org/energy/rtf/meetings/2010/09/Default.htm>

<sup>4</sup> RTF Meeting 9/2010: <http://www.nwcouncil.org/energy/rtf/meetings/2010/09/Default.htm>

loss (UA), heating equipment input energy, and cooling equipment input energy.

The weather files used in all savings simulations are composite TMY weather files corresponding to the heating and cooling climate zones assigned to each Northwest county by the Regional Technical Forum (RTF).<sup>5</sup>

Four distinct building prototypes were used in the SEEM simulations: a 1344 ft<sup>2</sup> (square foot) ranch style home, a 2200 ft<sup>2</sup> split level home, a 2688 ft<sup>2</sup> home with a full conditioned basement, and 952 ft<sup>2</sup> unit in an eight-unit townhouse structure. These are standard analytical prototypes used by the Northwest Power and Conservation Council to develop and evaluate energy forecasts and conservation plans for the region's utilities. The 952 ft<sup>2</sup> prototype is a special case in this analysis which represents multifamily construction. The state codes regulate multifamily structures three stories or less which the 952 ft<sup>2</sup> prototype represents well. This type of construction has many shared walls so the overall heating load per unit is less than for a single family detached dwelling.

### Estimation of 2010 New Building Stock

At the time of this analysis, monthly housing starts census data for 13 of the 139 state counties were available for January through December of 2010.

**Table 2. Counties Reporting 2010 Housing Starts by State.**

State	Reporting Counties	Total Counties
Idaho	5	44
Washington	6	39
Montana	2	56

The totals covering all counties in 2010 will be available in May 2011. In lieu of these totals, we conducted an estimate of the 2010 totals based upon the known data from 2010, scaling it in proportion to 2009 data. The total number of units estimated to be built in 2010 is 27,123 (21,578 single family units and 5,545 multifamily units). Throughout the analysis, the single family units are detached structures while the multifamily units come eight to a building. The breakdown by state is as follows:

**Table 3. Housing Start Estimates by State.**

State	Single Family	Multifamily (units)	Total
Idaho	4042	421	4463
Washington	16299	4923	21222
Montana	1238	200	1438

\* Note that in Montana, only the housing starts in the 23 counties served by NEEA utilities were totaled above and evaluated in the code analysis, although all Montana counties were used in determining the ratio for housing allocation in 2010.

The total yearly figures for every county in each state were available for 2009. Using the 2009 and 2010 datasets, the expected total new single family housing stock for 2010 was estimated as follows.

The counties for which no 2010 data was available were estimated based upon their 2009 figures. A ratio

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<sup>5</sup> <http://www.nwcouncil.org/energy/rtf/zones/zonemapsx.htm>

between each state's characterized county totals in 2009 and the entire statewide 2009 total was determined and used to extrapolate total 2010 total housing starts, based upon the 2010 subtotals for the known counties. The percentage of housing starts in each county during 2009 over the 2009 state total was then determined. Using this ratio, the extrapolated 2010 total was apportioned to each county in the state following the 2009 distribution. These extrapolated totals were then compared to historical behavior for each state, and it was noted that while distributions in Montana remained consistent with historical figures, multifamily housing starts increased drastically and were highly variable in urban Washington and Idaho counties in 2010. Multifamily starts were noted to have varied widely from year to year in these states, however, applying 2010 behavior in known counties to all counties' 2009 ratios resulted in multifamily housing increases of three times any historical figure in these states. The best prediction of current multifamily housing starts behavior in rural counties was assumed to be rural counties' past behavior and not present behavior of urban counties, and so the 2009 multifamily figures were used for all counties in Idaho and Washington that did not report monthly data in 2010.

The estimated new housing in each county was assigned to an appropriate representative heating and cooling climate zone combination as designated by the Regional Technical Forum.<sup>6</sup>

### **Savings from New Building Construction**

The history of change to each state's building codes is outlined by the US Department of Energy<sup>7</sup> in the state's "BACKGROUND/HISTORY" section. In general, code changes include prescribed improvements of envelope insulation as well as lighting, heating and cooling efficiency. While insulation requirements changed in each evaluated code cycle, lighting was not regulated in the state codes considered in this analysis. Regulation of residential lighting does not start to occur until the 2008 OR, 2010 WA, and 2009 IECC codes. Lighting power density was therefore calculated using an assumption of zero percent high efficiency lighting (CFLs). Heating and cooling system efficiencies did change with code adoptions in each state; however, these codes are superseded by the National Appliance Energy Conservation Act (NAECA) which required HSPF 7.7 / SEER 13 or better and AFUE of 0.78 or better in 2010. These federal standards are not attributable to state code improvements, and so heating and cooling efficiencies were held constant at 2010 federal levels in all analyses. Water heater efficiency standards are similarly regulated under NAECA. Likewise, the federal requirements for water heating equipment in 2010 were used in the analysis. The changes in each code cycle due to envelope improvements were thus the only source of energy savings in each state. A summary of these envelope changes by state is included in Table 4.

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<sup>6</sup> Ibid.

<sup>7</sup> <http://www.energycodes.gov/states/>

**Table 4. State by State Code Mandated Envelope Insulation.**

Envelope Component	Idaho		Washington		Montana	
	IECC 2006	IECC 2003	WSEC 2006	WSEC 2003	IECC 2003	MEC 1996
<b>Glazing U-value</b>	0.35	0.35	0.35	0.35-0.40	0.35	0.4
<b>Door U-value</b>	0.70	0.70	0.20	0.46	0.35	.5
<b>Ceiling insulation*</b>	R-45.74*	R-40.67*	R-38	R-38	R-38 Adv Rsd Heel	R-38
<b>Wall Insulation*</b>	R-19	R-20.1*	R-21	R-19	R-21	R-19
<b>Floor Insulation</b>	R-30	R-21	R-30	R-30	R-21	R-19
<b>Slab Insulation</b>	R-10	R-10	U-0.36	U-0.54	R-19	R-19
<b>Basement Wall Insulation</b>	R-13	R-10	R-15	R-10	R-11	R-10

\* A change in the IECC climate zones classifications for Idaho counties between 2003 and 2006 necessitated the calculation of a composite insulation value here. See discussion below.

With adoption of the 2006 IECC, Idaho counties were redistricted into less detailed climate zone assignments. This redistricting reduced wall insulation requirements in many counties. To account for this unusual circumstance, net weighted insulation values for ceilings and walls were calculated and are included above. These weighted values take into account the county based climate assignment, the insulation level for that climate and the number of houses built in each county in 2010. As seen above, there was a net loss in wall insulation due to this reclassification of climate zones. Effective ceiling insulation increased under this change; however ceilings represent both a smaller percentage of house area exposed to heat loss, and a diminishing return in terms of effectiveness of increased insulation at these high R values. This net loss in insulation is reflected in the lower code savings results for Idaho state.

A side by side comparison of energy use in each state under the existing and previous code follows. Idaho realized the least energy savings from code improvements, at 1.8%. Idaho showed the least savings due to the net loss of insulation value under climate rezoning. Washington's energy savings was 4.6%. Montana realized a savings of 7.4%, a larger value that reflects the gap of approximately nine years between the two code changes in this state.

**Table 5. Idaho Statewide Residential 2010 New Construction Energy Use IECC 2006/IECC 2003**

Idaho	IECC 2006 Code			IECC 2003 Code		
	Gas (therms)	Electric (kWh)	Total (kBtu)	Gas (therms)	Electric (kWh)	Total (kBtu)
<b>State Total</b>	3,359,826	26,820,138	427,492,873	3,427,957	27,040,833	435,059,042
<b>Per ft<sup>2</sup> Built</b>	0.374	2.989	47.645	0.382	3.014	48.488
<b>Per Unit Built</b>	753	6,009	95,775	768	6,058	97,471

**Table 6. Idaho Site Energy Savings for 2010 New Construction IECC 2006/IECC 2003**

Idaho	Gas (therms)	Electric (kWh)	Total (kBtu)
<b>State Total</b>	68,132	220,695	7,566,169
<b>Per ft<sup>2</sup> Built</b>	0.008	0.025	0.843
<b>Per Unit Built</b>	15	49	1,695
<b>% Savings</b>	2.0%	0.8%	1.8%

**Table 7. Washington Statewide Residential 2010 New Construction Site Energy Use WSEC 2006/WSEC 2003**

Washington	WSEC 2006 Code			WSEC 2003 Code		
	Gas (therms)	Electric (kWh)	Total (kBtu)	Gas (therms)	Electric (kWh)	Total (kBtu)
<b>State Total</b>	11,037,993	124,137,724	1,527,357,260	11,607,782	127,907,990	1,597,200,232
<b>Per ft<sup>2</sup> Built</b>	0.281	3.163	38.918	0.296	3.259	40.698
<b>Per Unit Built</b>	520	5,850	71,971	547	6,027	75,262

**Table 8. Washington Site Energy Savings for 2010 New Construction WSEC 2006/WSEC 2003**

Washington	Gas (therms)	Electric (kWh)	Total (kBtu)
<b>State Total</b>	569,788	3,770,266	69,842,972
<b>Per ft<sup>2</sup> Built</b>	0.015	0.096	1.780
<b>Per Unit Built</b>	27	178	3,291
<b>% Savings</b>	5.2%	3.0%	4.6%

**Table 9. Montana Statewide Residential 2010 New Construction Site Energy Use IECC 2003/MEC 1996**

Montana	IECC 2003 Code			MEC 1996 Code		
	Gas (therms)	Electric (kWh)	Total (kBtu)	Gas (therms)	Electric (kWh)	Total (kBtu)
<b>State Total</b>	1,287,479	9,249,092	160,305,853	1,382,043	9,961,988	172,194,552
<b>Per ft<sup>2</sup> Built</b>	0.457	3.285	56.931	0.491	3.538	61.153
<b>Per Unit Built</b>	895	6,431	111,469	961	6,927	119,736

**Table 10. Montana Site Energy Savings for 2010 New Construction IECC 2003/MEC 1996**

Montana	Gas (therms)	Electric (kWh)	Total (kBtu)
<b>State Total</b>	94,563	712,895	11,888,699
<b>Per ft<sup>2</sup> Built</b>	0.034	0.253	4.222
<b>Per Unit Built</b>	66	496	8,267
<b>% Savings</b>	7.3%	7.7%	7.4%

**Formulas for State Code Calculations: Idaho, Washington and Montana**

The state-wide energy use for houses built under either code can be calculated on a square-foot or unit construction basis using the information from Tables 5, 7, & 9 for Idaho, Washington, and Montana Respectively. These formulas will be particularly useful if the total housing starts reported for 2010 (expected announcement in May 2011) differ substantially from our predictions. In that case, a new total energy use can be calculated by using the new total number of units built in 2010. This assumes the distribution of houses by climate remains similar between predicted and reported value, which, given the way in which we determined the distribution is likely to be the case

**Idaho**

*2003 Code Energy Use Formulas:*

$$0.382 \text{ therms/ft}^2 * \text{Total New Construction Area (ft}^2\text{)} = \text{Total therms in 2010}$$

$$3.014 \text{ kWh/ft}^2 * \text{Total New Construction Area (ft}^2\text{)} = \text{Total kWh in 2010}$$

$$768 \text{ therms/unit} * \text{Total Number of Units Built} = \text{Total therms in 2010}$$

$$6,058 \text{ kWh/unit} * \text{Total Number of Units Built} = \text{Total kWh in 2010}$$

*2006 Code Energy Use Formulas:*

$$0.374 \text{ therms/ft}^2 * \text{Total New Construction Area (ft}^2\text{)} = \text{Total therms in 2010}$$

$$2.989 \text{ kWh/ft}^2 * \text{Total New Construction Area (ft}^2\text{)} = \text{Total kWh in 2010}$$

$$753 \text{ therms/unit} * \text{Total Number of Units Built} = \text{Total therms in 2010}$$

$$6,009 \text{ kWh/unit} * \text{Total Number of Units Built} = \text{Total kWh in 2010}$$



## **Washington**

### *2003 Code Energy Use Formulas:*

0.296 therms/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total therms in 2010

3.259 kWh/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total kWh in 2010

547 therms/unit \* Total Number of Units Built = Total therms in 2010

6,027kWh/unit \* Total Number of Units Built = Total kWh in 2010

### *2006 Code Energy Use Formulas:*

0.281 therms/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total therms in 2010

3.163 kWh/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total kWh in 2010

520 therms/unit \* Total Number of Units Built = Total therms in 2010

5,850 kWh/unit \* Total Number of Units Built = Total kWh in 2010

## **Montana**

### *1996 Code Energy Use Formulas:*

0.491 therms/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total therms in 2010

3.538 kWh/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total kWh in 2010

961 therms/unit \* Total Number of Units Built = Total therms in 2010

6,927 kWh/unit \* Total Number of Units Built = Total kWh in 2010

### *2003 Code Energy Use Formulas:*

0.457 therms/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total therms in 2010

3.285 kWh/ ft<sup>2</sup> \* Total New Construction Area (ft<sup>2</sup>) = Total kWh in 2010

895 therms/unit \* Total Number of Units Built = Total therms in 2010

6,431 kWh/unit \* Total Number of Units Built = Total kWh in 2010

## **Reference Analysis Files**

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The spreadsheets used to conduct the analysis for both the OR code savings and EnergyStar savings are attached to this memo transmittal. The "Tables" sheet in the file contains the summary data used to produce the tables in this memo.

### **2010 Code Savings:**

WA\_ID\_MT\_code\_comparison.xls

### **Housing Census Data:**

WA\_Monthly\_Data.xls

ID\_Monthly\_Data.xls

MT\_Monthly\_Data.xls

## Appendix: Detailed Tables and Discussion of Results

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The following Appendices give detailed tables of codes savings and system type distributions amongst climate zones for each state based upon 2010 housing starts. Not all climate zone combinations are present in every state. Of the nine possible combinations of heating and cooling climate zones, each state analyzed had counties assigned to six. In several cases, there were no estimated 2010 housing units built in a given climate zone combination. These fields are left blank in the tables below. In addition, electrically heated zonal and heat pump houses use no gas so the therm usage for these fields in the table are also left blank.

In Tables A3 and B3 which follow, it is noted that code changes between IECC 2003 and 2006 in Idaho, and between WSEC 2006 and 2003 in Washington have resulted a slight electricity loss rather than savings for some houses employing gas furnaces with air conditioning. Although the simulations predict an overall decrease in combined energy (gas and electricity site consumption) for every prototype, the interaction of the cooling system with the changes in insulation requirements have resulted in moderately increased electricity use. For example, buildings with little insulation between the house and ground benefit from cooler earth in the summer and require less cooling. Therefore, increasing the insulation in the floor, slabs, and basements of houses can have the effect of increasing the cooling load. Heating dominates the energy use of the houses in our simulations, however, and that use is always reduced by increasing insulation levels. Further, in these code cycles, the only changes effecting electricity use in gas furnace houses were items which reduced cooling use and heating system (furnace fan) run time. There are no other changes influencing electricity use which is why we see the slight negative numbers for some houses. In contrast, houses with electric heating: heat pumps and zonal resistance, the insulation effects on heating load are large and show significant electric savings. Lastly, these effects are present in all of the code models (ID, WA, and MT) and all climate zones but are only apparent in certain situations when individual end uses are examined separately.

### In Summary:

Appendix Tables A1 through A7 outline Idaho Code Savings in 2010.

Appendix Tables B1 through B7 outline Washington Code Savings in 2010.

Appendix Tables C1 through C7 outline Montana Code savings in 2010.

The tables are arranged as follows in each section:

#### Table 1: Total Electric Energy Use

Total energy use by each system type in each climate zone for the state under the then extant code and the preceding code.

#### Table 2: Per Unit Electric Energy Use

Per unit energy use by each system type in each climate zone for the state under the then extant code and the preceding code.

#### Table 3: Total and per Unit Electric Energy Savings

Total energy savings from code change for each system type in each climate, followed by per housing unit savings for each system type in each climate.

#### Table 4: Total Gas Energy Use

Total energy use by each system type in each climate zone for the state under the then extant code and the preceding code.

**Table 5: Per Unit Gas Energy Use**

Per unit energy use by each system type in each climate zone for the state under the then extant code and the preceding code.

**Table 6: Total and per Unit Gas Energy Savings**

Total energy savings from code change for each system type in each climate, followed by per housing unit savings for each system type in each climate.

**Table 7: Total Housing Units per state**

The distribution and counts of estimated housing units built as each system type in each climate zone in 2010.

**Table A1. 2010 Idaho New Construction Site Energy Use by System Type and Climate: Electric Energy Totals**

Electric Site Energy 2010		Idaho IECC 2006						Total Units per System Type
		Heating Zone1	Heating Zone2			Heating Zone3		
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	
Single Family KWh	Gas	296,231	21,139	261,852	34,557	80,499	46,415	263
	Gas with AC	5,575,656	290,145	4,057,248	623,863	1,083,941	701,845	3,214
	Heat pump	1,725,742	140,827	1,785,405	243,434	618,665	363,517	283
	Zonal	1,795,019	151,096	1,871,650	247,001	632,342	364,607	283
Multi Family KWh	Gas	8,513	34,798	14,499		19,040		51
	Gas with AC	28,033	72,039	35,860		37,873		84
	Heat pump	25,824	116,886	50,171		73,036		21
	Zonal	305,561	1,482,048	617,520		885,742		265

Electric Site Energy 2010		Idaho IECC 2003						Total Units per System Type
		Heating Zone1	Heating Zone2			Heating Zone3		
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	
Single Family KWh	Gas	297,826	21,276	263,543	34,780	81,082	46,752	263
	Gas with AC	5,570,440	290,250	4,055,488	623,759	1,085,243	702,088	3,214
	Heat pump	1,743,472	142,529	1,806,219	246,192	626,541	368,014	283
	Zonal	1,833,194	154,405	1,912,632	252,410	646,598	372,827	283
Multi Family KWh	Gas	8,555	34,995	14,581		19,158		51
	Gas with AC	27,943	71,817	35,747		37,784		84
	Heat pump	25,985	117,725	50,515		73,562		21
	Zonal	310,470	1,506,270	627,613		900,556		265

**Table A2. 2010 Idaho New Construction Site Energy Use by System Type and Climate: Electric Energy per Unit**

Electric Unit Energy 2010		Idaho IECC 2006					
		Heating Zone1	Heating Zone2			Heating Zone3	
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2
Single Family per Unit KWh	Gas	2,650	2,890	2,890	2,890	3,088	3,088
	Gas with AC	4,078	3,243	3,661	4,266	3,399	3,817
	Heat pump	14,336	17,877	18,297	18,904	22,035	22,454
	Zonal	14,912	19,181	19,181	19,181	22,522	22,522
Multi Family per Unit KWh	Gas	1,339	1,510	1,510		1,653	
	Gas with AC	2,645	1,876	2,241		1,973	
	Heat pump	9,745	12,176	12,543		15,216	
	Zonal	9,151	12,252	12,252		14,645	

Electric Unit Energy 2010		Idaho IECC 2003					
		Heating Zone1	Heating Zone2			Heating Zone3	
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2
Single Family per Unit KWh	Gas	2,664	2,909	2,909	2,909	3,110	3,110
	Gas with AC	4,075	3,244	3,659	4,265	3,403	3,819
	Heat pump	14,484	18,093	18,510	19,118	22,315	22,732
	Zonal	15,229	19,601	19,601	19,601	23,030	23,030
Multi Family per Unit KWh	Gas	1,345	1,519	1,519		1,663	
	Gas with AC	2,636	1,870	2,234		1,968	
	Heat pump	9,806	12,263	12,629		15,325	
	Zonal	9,298	12,453	12,453		14,890	

**Table A3. 2010 Idaho New Construction Site Energy Savings by System Type and Climate: Electric Energy**

Electric Total Energy Savings 2010		Idaho Total Savings						Total Units per System Type
		Heating Zone1	Heating Zone2			Heating Zone3		
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	
Single Family KWh	Gas	1,594	137	1,691	223	583	336	263
	Gas with AC	-5,216	105	-1,760	-105	1,302	243	3,214
	Heat pump	17,730	1,702	20,814	2,758	7,876	4,497	283
	Zonal	38,176	3,308	40,982	5,408	14,256	8,220	283
Multi Family KWh	Gas	42	197	82		118		51
	Gas with AC	-91	-222	-113		-89		84
	Heat pump	161	839	345		525		21
	Zonal	4,910	24,222	10,092		14,815		265

Electric Unit Energy Savings 2010		Idaho per Unit Savings					
		Heating Zone1	Heating Zone2			Heating Zone3	
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2
Single Family per Unit KWh	Gas	14	19	19	19	22	22
	Gas with AC	-4	1	-2	-1	4	1
	Heat pump	147	216	213	214	281	278
	Zonal	317	420	420	420	508	508
Multi Family per Unit KWh	Gas	7	9	9		10	
	Gas with AC	-9	-6	-7		-5	
	Heat pump	61	87	86		109	
	Zonal	147	200	200		245	

**Table A4. 2010 Idaho New Construction Site Energy Use by System Type and Climate: Gas Energy Totals**

Gas Site Energy 2010		Idaho IECC 2006						Total Units per System Type
		Heating Zone1	Heating Zone2			Heating Zone3		
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	
Single Family therms	Gas	86,297	7,354	91,096	12,022	31,300	18,047	263
	Gas with AC	1,060,349	90,264	1,118,111	147,557	383,840	221,322	3,214
	Heat pump							283
	Zonal							283
Multi Family therms	Gas	3,196	15,495	6,456		9,372		51
	Gas with AC	5,355	25,933	10,805		15,654		84
	Heat pump							21
	Zonal							265

Gas Site Energy 2010		Idaho IECC 2003						Total Units per System Type
		Heating Zone1	Heating Zone2			Heating Zone3		
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	
Single Family therms	Gas	7,502	92,928	12,264	31,921	18,405	7,502	263
	Gas with AC	92,085	1,140,666	150,533	391,533	225,757	92,085	3,214
	Heat pump							283
	Zonal							283
Multi Family therms	Gas	15,708	6,545		9,498	15,708		51
	Gas with AC	26,294	10,956		15,867	26,294		84
	Heat pump							21
	Zonal							265

**Table A5. 2010 Idaho New Construction Site Energy Use by System Type and Climate: Gas Energy per Unit**

Gas Unit Energy 2010		Idaho IECC 2006					
		Heating Zone1	Heating Zone2			Heating Zone3	
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2
Single Family per Unit therms	Gas	772	1,005	1,005	1,005	1,201	1,201
	Gas with AC	776	1,009	1,009	1,009	1,204	1,204
	Heat pump						
	Zonal						
Multi Family per Unit therms	Gas	502	673	673		814	
	Gas with AC	505	675	675		815	
	Heat pump						
	Zonal						

Gas Unit Energy 2010		Idaho IECC 2003					
		Heating Zone1	Heating Zone2			Heating Zone3	
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2
Single Family per Unit therms	Gas	788	1,026	1,026	1,026	1,224	1,224
	Gas with AC	792	1,029	1,029	1,029	1,228	1,228
	Heat pump						
	Zonal						
Multi Family per Unit therms	Gas	510	682	682		824	
	Gas with AC	513	685	685		826	
	Heat pump						
	Zonal						



**Table A6. 2010 Idaho New Construction Site Energy Average Savings by System Type and Climate: Gas Energy**

Gas Total Energy Savings 2010		Idaho Total Savings						Total Units per System Type
		Heating Zone1	Heating Zone2			Heating Zone3		
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	
Single Family therms	Gas	1,814	148	1,832	242	621	358	263
	Gas with AC	22,359	1,821	22,555	2,977	7,692	4,435	3,214
	Heat pump							283
	Zonal							283
Multi Family therms	Gas	47	213	89		125		51
	Gas with AC	80	361	150		213		84
	Heat pump							21
	Zonal							265

Electric Unit Energy Savings 2010		Idaho per Unit Savings					
		Heating Zone1	Heating Zone2			Heating Zone3	
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2
Single Family per Unit therms	Gas	16	20	20	20	24	24
	Gas with AC	16	20	20	20	24	24
	Heat pump						
	Zonal						
Multi Family per Unit therms	Gas	7	9	9		11	
	Gas with AC	8	9	9		11	
	Heat pump						
	Zonal						

**Table A7. 2010 Idaho New Construction Housing Distribution by System Type and Climate**

Distribution of Housing Units by Climate*		Idaho 2010 Housing Units						Total Units per System Type
		Heating Zone1	Heating Zone2			Heating Zone3		
		Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	
Single Family	Gas	112	7	91	12	26	15	263
	Gas with AC	1367	89	1108	146	319	184	3,214
	Heat pump	120	8	98	13	28	16	283
	Zonal	120	8	98	13	28	16	283
Multi Family	Gas	6	23	10	0	12	0	51
	Gas with AC	11	38	16	0	19	0	84
	Heat pump	3	10	4	0	5	0	21
	Zonal	33	121	50	0	60	0	265

\* See Table 3 for the grand totals by house type and state.

The preceding set of seven tables gives the predicted site energy use and savings by system type and climate within Idaho.

**Table B1. 2010 Washington New Construction Site Energy Use by System Type and Climate: Electric Energy Totals**

Electric Site Energy 2010		WSEC 2006						Total Units per System Type
		Heating Zone1			Heating Zone2		Heating Zone3	
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1	
Single Family KWh	Gas	22,839,322	1,013,240	3,615,754	609,055	3,591,855	52,707	8,889
	Gas with AC	13,304,362	649,000	2,617,545	348,896	2,255,983	29,817	4,643
	Heat pump	20,846,208	951,610	3,533,201	691,172	4,166,586	69,908	2,107
	Zonal	6,785,262	301,020	1,074,193	221,256	1,304,842	21,608	658
Multi Family KWh	Gas	1,006,425	16,663	1,282		251,506		591
	Gas with AC	2,038,467	38,131	3,412		558,380		985
	Heat pump	1,759,464	30,232	2,446		563,194		246
	Zonal	20,232,424	334,974	25,767		6,380,554		3,102

Electric Site Energy 2010		WSEC 2003						Total Units per System Type
		Heating Zone1			Heating Zone2		Heating Zone3	
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1	
Single Family KWh	Gas	22,991,839	1,020,006	3,639,899	614,488	3,623,901	53,262	8,889
	Gas with AC	13,338,266	651,163	2,630,385	350,311	2,266,552	29,974	4,643
	Heat pump	21,422,759	977,486	3,627,859	714,408	4,304,629	72,497	2,107
	Zonal	7,076,285	313,931	1,120,266	231,156	1,363,225	22,596	658
Multi Family KWh	Gas	1,018,838	16,868	1,298		255,681		591
	Gas with AC	2,028,487	38,054	3,417		558,480		985
	Heat pump	1,836,270	31,525	2,548		592,745		246
	Zonal	21,788,931	360,744	27,750		6,889,214		3,102

**Table B2. 2010 Washington New Construction Site Energy Use by System Type and Climate: Electric Energy per Unit**

Electric Unit Energy 2010		WSEC 2006					
		Heating Zone1			Heating Zone2		Heating Zone3
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1
Single Family per Unit KWh	Gas	3,546	3,546	3,546	3,723	3,723	3,869
	Gas with AC	3,954	4,348	4,914	4,083	4,477	4,190
	Heat pump	13,654	14,050	14,618	17,826	18,222	21,652
	Zonal	14,220	14,220	14,220	18,258	18,258	21,413
Multi Family per Unit KWh	Gas	2,136	2,136	2,136		2,258	
	Gas with AC	2,596	2,933	3,412		3,009	
	Heat pump	8,963	9,302	9,783		12,138	
	Zonal	8,180	8,180	8,180		10,914	

Electric Unit Energy 2010		WSEC 2003					
		Heating Zone1			Heating Zone2		Heating Zone3
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1
Single Family per Unit KWh	Gas	3,569	3,569	3,569	3,756	3,756	3,910
	Gas with AC	3,964	4,362	4,938	4,100	4,498	4,212
	Heat pump	14,032	14,432	15,010	18,425	18,825	22,454
	Zonal	14,830	14,830	14,830	19,075	19,075	22,393
Multi Family per Unit KWh	Gas	2,163	2,163	2,163		2,296	
	Gas with AC	2,583	2,927	3,417		3,009	
	Heat pump	9,354	9,700	10,192		12,775	
	Zonal	8,809	8,809	8,809		11,784	

**Table B3. 2010 Washington New Construction Site Energy Average Savings by System Type and Climate: Electric Energy**

Electric Total Energy Savings 2010		Washington Total Savings					
		Heating Zone1			Heating Zone2		Heating Zone3
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1
Single Family KWh	Gas	152,516	6,766	24,145	5,434	32,046	555
	Gas with AC	33,904	2,163	12,840	1,415	10,569	157
	Heat pump	576,550	25,876	94,658	23,237	138,043	2,589
	Zonal	291,023	12,911	46,073	9,900	58,383	988
Multi Family KWh	Gas	12,412	206	16		4,175	
	Gas with AC	-9,980	-77	5		100	
	Heat pump	76,807	1,294	102		29,551	
	Zonal	1,556,506	25,770	1,982		508,659	

Electric Unit Energy Savings 2010		Washington per Unit Savings					
		Heating Zone1			Heating Zone2		Heating Zone3
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1
Single Family per Unit KWh	Gas	24	24	24	33	33	41
	Gas with AC	10	14	24	17	21	22
	Heat pump	378	382	392	599	604	802
	Zonal	610	610	610	817	817	980
Multi Family per Unit KWh	Gas	26	26	26		37	
	Gas with AC	-13	-6	5		1	
	Heat pump	391	398	409		637	
	Zonal	629	629	629		870	

**Table B4. 2010 Washington New Construction Site Energy Use by System Type and Climate: Gas Energy Totals**

Gas Site Energy 2010		WSEC 2006						Total Units per System Type
		Heating Zone1			Heating Zone2		Heating Zone3	
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1	
Single Family therms	Gas	4,707,701	208,852	745,289	155,636	917,851	15,471	8,889
	Gas with AC	2,469,956	109,577	391,025	81,585	481,140	8,101	4,643
	Heat pump							2,107
	Zonal							658
Multi Family therms	Gas	208,860	3,458	266		66,089		591
	Gas with AC	350,220	5,798	446		110,673		985
	Heat pump							246
	Zonal							3,102

Gas Site Energy 2010		WSEC 2003						Total Units per System Type
		Heating Zone1			Heating Zone2		Heating Zone3	
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1	
Single Family therms	Gas	4,938,139	219,075	781,770	163,349	963,336	16,241	8,889
	Gas with AC	2,591,688	114,977	410,297	85,639	505,049	8,508	4,643
	Heat pump							2,107
	Zonal							658
Multi Family therms	Gas	226,801	3,755	289		71,768		591
	Gas with AC	380,167	6,294	484		120,156		985
	Heat pump							246
	Zonal							3,102

**Table B5. 2010 Washington New Construction Site Energy Use by System Type and Climate: Gas Energy per Unit**

Gas Unit Energy 2010		WSEC 2006					
		Heating Zone1			Heating Zone2		Heating Zone3
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1
Single Family per Unit therms	Gas	731	731	731	951	951	731
	Gas with AC	734	734	734	955	955	734
	Heat pump						
	Zonal						
Multi Family per Unit therms	Gas	443	443	443		593	
	Gas with AC	446	446	446		596	
	Heat pump						
	Zonal						

Gas Unit Energy 2010		WSEC 2003					
		Heating Zone1			Heating Zone2		Heating Zone3
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1
Single Family per Unit therms	Gas	767	767	767	998	998	1,192
	Gas with AC	770	770	770	1,002	1,002	1,196
	Heat pump						
	Zonal						
Multi Family per Unit therms	Gas	481	481	481		644	
	Gas with AC	484	484	484		647	
	Heat pump						
	Zonal						

**Table B6. 2010 Washington New Construction Site Energy Average Savings by System Type and Climate: Gas Energy**

Gas Site Energy Savings 2010		Washington Total Savings						Total Units per System Type
		Heating Zone1			Heating Zone2		Heating Zone3	
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1	
Single Family therms	Gas	230,438	10,223	36,481	7,713	45,485	770	8,889
	Gas with AC	121,732	5,400	19,272	4,054	23,909	406	4,643
	Heat pump							2,107
	Zonal							658
Multi Family therms	Gas	17,941	297	23		5,679		591
	Gas with AC	29,948	496	38		9,483		985
	Heat pump							246
	Zonal							3,102

Gas Unit Energy Savings 2010		Washington per Unit Savings					
		Heating Zone1			Heating Zone2		Heating Zone3
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1
Single Family per Unit therms	Gas	36	36	36	47	47	57
	Gas with AC	36	36	36	47	47	57
	Heat pump						
	Zonal						
Multi Family per Unit therms	Gas	38	38	38		51	
	Gas with AC	38	38	38		51	
	Heat pump						
	Zonal						



**Table B7. 2010 Washington New Construction Housing Distribution by System Type and Climate**

Distribution of Housing Units by Climate*		Washington 2010 Housing						Total Units per System Type
		Heating Zone1			Heating Zone2		Heating Zone3	
		Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone1	Cooling Zone2	Cooling Zone1	
Single Family	Gas	6442	286	1020	164	965	14	8,889
	Gas with AC	3365	149	533	85	504	7	4,643
	Heat pump	1527	68	242	39	229	3	2,107
	Zonal	477	21	76	12	71	1	658
Multi Family	Gas	471	8	1	0	111	0	591
	Gas with AC	785	13	1	0	186	0	985
	Heat pump	196	3	0	0	46	0	246
	Zonal	2473	41	3	0	585	0	3,102

\* See Table 3 for the grand totals by house type and state.

The preceding set of seven tables gives the predicted site energy use and savings by system type and climate within Washington.

**Table C1. 2010 Montana New Construction Site Energy Use by System Type and Climate: Electric Energy Totals**

Electric Site Energy 2010		Montana IECC 2003				Total Units per System Type
		Heating Zone3		Heating Zone2		
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2	
Single Family KWh	Gas	935,027	183,509	65,769	10,228	391
	Gas with AC	1,773,620	390,614	127,133	22,301	661
	Heat pump	1,461,540	292,339	89,187	14,197	87
	Zonal	1,501,035	294,593	95,986	14,927	87
Multi Family KWh	Gas	37,524	750			24
	Gas with AC	74,184	1,763			40
	Heat pump	140,226	2,875			10
	Zonal	1,686,046	33,721			126

Electric Site Energy 2010		MEC 1996				Total Units per System Type
		Heating Zone3		Heating Zone2		
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2	
Single Family KWh	Gas	958,589	188,133	67,166	10,445	391
	Gas with AC	1,855,381	411,249	132,738	23,445	661
	Heat pump	1,557,031	311,671	94,514	15,060	87
	Zonal	1,599,864	313,990	101,964	15,857	87
Multi Family KWh	Gas	40,713	814			24
	Gas with AC	77,965	1,865			40
	Heat pump	150,130	3,080			10
	Zonal	1,990,514	39,810			126

**Table C2. 2010 Montana New Construction Site Energy Use by System Type and Climate: Electric Energy per Unit**

Electric Unit Energy 2010		Montana IECC 2003			
		Heating Zone3		Heating Zone2	
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2
Single Family per Unit KWh	Gas	3,066	3,066	2,873	2,873
	Gas with AC	3,378	3,791	4,704	3,638
	Heat pump	21,635	22,050	17,585	17,999
	Zonal	22,220	22,220	18,925	18,925
Multi Family per Unit KWh	Gas	1,595	1,595		
	Gas with AC	1,892	2,248		
	Heat pump	14,307	14,666		
	Zonal	13,653	13,653		

Electric Unit Energy 2010		MEC 1996			
		Heating Zone3		Heating Zone2	
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2
Single Family per Unit KWh	Gas	3,143	3,143	2,934	2,934
	Gas with AC	3,534	3,991	4,912	3,825
	Heat pump	23,049	23,508	18,635	19,094
	Zonal	23,683	23,683	20,104	20,104
Multi Family per Unit KWh	Gas	1,731	1,731		
	Gas with AC	1,989	2,379		
	Heat pump	15,318	15,711		
	Zonal	16,118	16,118		

**Table C3. 2010 Montana New Construction Site Energy Savings by System Type and Climate: Electric Energy**

Electric Total Energy Savings 2010		Montana Total Savings				Total Units per System Type
		Heating Zone3		Heating Zone2		
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2	
Single Family KWh	Gas	23,562	4,624	1,397	217	391
	Gas with AC	81,761	20,635	5,605	1,145	661
	Heat pump	95,491	19,332	5,326	863	87
	Zonal	98,830	19,396	5,979	930	87
Multi Family KWh	Gas	3,188	64			24
	Gas with AC	3,781	103			40
	Heat pump	9,904	205			10
	Zonal	304,468	6,089			126

Electric Unit Energy Savings 2010		Montana per Unit Savings			
		Heating Zone3		Heating Zone2	
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2
Single Family per Unit KWh	Gas	77	77	61	61
	Gas with AC	156	200	207	187
	Heat pump	1,414	1,458	1,050	1,095
	Zonal	1,463	1,463	1,179	1,179
Multi Family per Unit KWh	Gas	136	136		
	Gas with AC	96	131		
	Heat pump	1,010	1,045		
	Zonal	2,465	2,465		

**Table C4. 2010 Montana New Construction Site Energy Use by System Type and Climate: Gas Energy Totals**

Gas Site Energy 2010		Montana IECC 2003				Total Units per System Type
		Heating Zone3		Heating Zone2		
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2	
Single Family therms	Gas	359,098	70,477	22,587	3,513	391
	Gas with AC	619,792	121,641	39,019	6,068	661
	Heat pump					87
	Zonal					87
Multi Family therms	Gas	17,703	354			24
	Gas with AC	26,694	534			40
	Heat pump					10
	Zonal					126

Gas Site Energy 2010		MEC 1996				Total Units per System Type
		Heating Zone3		Heating Zone2		
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2	
Single Family therms	Gas	384,298	75,422	24,104	3,748	391
	Gas with AC	664,562	130,427	41,700	6,485	661
	Heat pump					87
	Zonal					87
Multi Family therms	Gas	21,085	422			24
	Gas with AC	29,206	584			40
	Heat pump					10
	Zonal					126

**Table C5. 2010 Montana New Construction Site Energy Use by System Type and Climate: Gas Energy per Unit**

Gas Unit Energy 2010		Montana IECC 2003			
		Heating Zone3		Heating Zone2	
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2
Single Family per Unit therms	Gas	1,178	1,178	987	987
	Gas with AC	1,181	1,181	1,444	990
	Heat pump				
	Zonal				
Multi Family per Unit therms	Gas	753	753		
	Gas with AC	681	681		
	Heat pump				
	Zonal				

Gas Unit Energy 2010		MEC 1996			
		Heating Zone3		Heating Zone2	
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2
Single Family per Unit therms	Gas	1,260	1,260	1,053	1,053
	Gas with AC	1,266	1,266	1,543	1,058
	Heat pump				
	Zonal				
Multi Family per Unit therms	Gas	896	896		
	Gas with AC	745	745		
	Heat pump				
	Zonal				

**Table C6. 2010 New Construction Site Energy Savings by System Type and Climate: Gas Energy**

Gas Total Energy Savings 2010		Montana Total Savings				Total Units per System Type
		Heating Zone3		Heating Zone2		
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2	
Single Family therms	Gas	25,200	4,946	1,517	236	391
	Gas with AC	44,770	8,787	2,681	417	661
	Heat pump					87
	Zonal					87
Multi Family therms	Gas	3,381	68			24
	Gas with AC	2,512	50			40
	Heat pump					10
	Zonal					126

Gas Unit Energy Savings 2010		Montana per Unit Savings			
		Heating Zone3		Heating Zone2	
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2
Single Family per Unit therms	Gas	83	83	66	66
	Gas with AC	85	85	99	68
	Heat pump				
	Zonal				
Multi Family per Unit therms	Gas	144	144		
	Gas with AC	64	64		
	Heat pump				
	Zonal				

**Table C7. 2010 New Construction Site Distribution by System Type and Climate: Montana State**

Distribution of Housing Units by Climate*		Montana 2010 Housing				Total Units per System Type
		Heating Zone3		Heating Zone2		
		Cooling Zone1	Cooling Zone2	Cooling Zone1	Cooling Zone2	
Single Family therms	Gas	305	60	23	4	391
	Gas with AC	525	103	27	6	661
	Heat pump	68	13	5	1	87
	Zonal	68	13	5	1	87
Multi Family therms	Gas	24	0	0	0	24
	Gas with AC	39	1	0	0	40
	Heat pump	10	0	0	0	10
	Zonal	123	2	0	0	126

\* See Table 3 for the grand totals by house type and state.

The preceding set of seven tables gives the predicted site energy use and savings by system type and climate within Montana.