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Memorandum

Date: November 1, 2012

To: Duane Jonlin, SBCC, Chuck Murray, Department of Commerce;

From: David Baylon, Ecotope, Inc

RE: Comparison of 2009 WSEC and 2012 IECC (with amendments) -- Multi-Family sector

The multi-family sector has been divided into two separate categories in the proposed 2012 energy code:

1. Low rise construction consisting of residential occupancies of 3 stories and less would be regulated under the residential code sections
2. Medium and high rise residential (greater than 3 stories) would be regulated under the commercial code sections.

This differs from the 2009 WSEC in that all multifamily residential was subsumed in the commercial code.

The changes in the 2012 code are minimal in this sector except the redefinition of the Zone 2 WSEC requirements into the Zone 5a IECC requirements. This has the effect of eliminating the difference between most of the eastern counties (especially Spokane) and the western counties. As a result there are cost reductions from less stringent envelope requirements and increases in energy use as a result of these reduced standards.

The analysis of the incremental code impact in this sector is based on reduced insulation requirements in the Zone 2 walls and reduced lighting power that is the result of a high efficacy requirement in the units and a reduced LPD in the common area. This results in substantial lighting savings but a small increase in heating (and reduced cooling) requirements brought on by the reduced internal gains from the lighting system.

Analysis

The analysis of the code impact was divided into two separate prototypes:

1. The first was a mid-rise prototype based on the PNNL analytical prototypes developed for the national evaluation of the commercial IECC code. This prototype was analyzed using the eQuest implementation of DOE-2 . The prototype is a 32 unit, four story building. The floor is assumed to be a PT slab over an unheated space (such as a parking garage). Both gas and electric heat options were evaluated in this prototype.

- The second is a low rise two story eight unit building with exterior access for each unit. This building would have been regulated under the commercial code in the 2009 WSEC. The analysis is done with the SEEM program which is used by the Northwest Power and Conservation Council (NPCC) as a planning tool for the region. In this prototype the floor is a slab on grade construction with electric resistance heat. The 2009 WSEC commercial code was used as the baseline and the 2012 IECC residential code compared that code.

The costs were estimated using cost estimations generated from the residential and commercial sector analysis. There are very few changes between the two codes except the reduced envelope requirements (decrease in the frame wall insulation requirements) in the WSEC Zone 2 counties. This change resulted in a reduction in wall construction costs and an increase in space heating requirements. This effect was partly counter-balanced by the change in window U-values from 0.32 to 0.30. A mandatory use of high efficacy lamps in the units resulted in reduced lighting energy which was partly offset by increased heating loads. In the case of the larger prototype a reduction in LPD in common areas and corridors was assumed.

The savings benefits were calculated using estimated energy costs of \$.08/kWh for electric energy and \$1.00/th for gas.

Results

Table 1 summarizes the analysis for the mid rise prototype. The costs and savings are developed for each combination of climate zones and prototype itself.

Table 1: Mid Rise Analysis

Prototype (32 units, 33,700sf)									
WSEC Climate Zone		Zone 1 (WSEC)				Zone 2 (WSEC)			
Code Year		2009	2012	2009	2012	2009	2012	2009	2012
Heating fuel		Gas		Electric		Gas		Electric	
Energy Use	kWh (1000)	260	244	289	276	273	258	328	322
	Therms	1420	1550	0	0	2590	2990	0	0
Energy Saved	kWh (1000)		16		13		15		6
	Therms		-130		0		-390		0
Cost	\$		1302		1302		-11148		-11148
Benefit	\$/yr		1126		1019		821		509
Cost \$/unit	\$/unit		41		41		-348		-348
Savings	\$/unit/yr		35		32		26		16

Table 2 summarizes the SEEM simulation results for the low rise multi-family building. This analysis has been limited to electric resistance zone heating which is the most common type of heating system used in this housing type.

Table 2: Low Rise Analysis

Prototype (8 units, 7616 sf)					
WSEC Climate Zone		Zone 1 (WSEC)		Zone 2 (WSEC)	
Code Year		2009	2012	2009	2012
Heating fuel		Electric Zonal		Electric Zonal	
Energy Use	kWh (1000)	70	66	84	82
Energy Saved	kWh (1000)		4		2
Cost	\$		729		-5636
Benefit	\$/yr		333		150
Cost \$/unit	\$/unit		91		-705
Savings	\$/unit/yr		42		19

Table 3 combines the effect of the code comparison across the entire state. In this analysis the Zone 1 and Zone 2 counties are weighted separately based on the relative population of multi-family residences derived from the 2010 Census. In this case the Zone 1 multi-family runs were given a weight of .92 and the Zone 2 multi-family runs were given a weight of .08

Table 3: Combined Impact, both Climate Zones

Statewide							
Statewide		Mid Rise				Low Rise	
Code Year		2009	2012	2009	2012	2009	2012
Heating Fuel		Gas		Electric			
Energy Use	kWh(1000)	261	245	292	280	71	67
	Therms (10)	151	167				
Energy Saved	kWh(1000)		16		12		4
	Therms (10)		-16				
Cost	\$		306		306		221
Benefit	\$/yr		1102		978		318
Cost \$/unit	\$/unit		10		10		28
Savings	\$/unit/yr		34		31		40