



Home Innovation

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Equivalency Between IECC Prescriptive Path
and IECC Energy Rating Index:
Alternate High Efficiency
Appliances Scheme - HERS Indices

Prepared For

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HERS INDICES, ALTERNATE HIGH EFFICIENCY EQUIPMENT SCHEME

In a separate report, Home Innovation Research Labs reported the predicted HERS indices for over 300 typical house configurations simulated to meet the 2015 International Energy Conservation Code (IECC) minimum requirements¹ for both federal minimum and high-efficiency heating and cooling equipment.

In order to identify the energy conservation opportunities associated with high-efficiency lights, appliances and balanced mechanical ventilation, modifications were made to a subset of the modeled configurations from that report: Medium Standard Rated Homes on slab basements in Climate Zones 1, 4 and 7.

Appliances and lighting efficiencies were increased according to the following table:

Table 1. Increased Appliance Efficiencies

Equipment	Standard	High Efficiency
Refrigerator (side-by-side) total annual consumption, kWh/yr	691	601
Dishwasher, Energy Factor	0.46	0.46
Range, type	Elec coil	Induction
Oven, type	Elec coil	Convection
Clothes Washer, Energy Star	no	yes
Clothes Washer, MEF	3.41	.817
Clothes Washer, LER	96	704
Clothes Washer, Capacity, cubic feet	2.874	2.874
Clothes Dryer, Efficiency Factor	3.01	3.01
Clothes Dryer, moisture sensing	no	yes
Lighting, Interior	75% CFL/10% pin	100% CFL
Lighting, Exterior	0% CFL	100% CFL
Lighting, Exterior	0% CFL	100% CFL

Balanced ventilation was added: an energy recovery ventilator (ERV) for Standard Rated Homes in Climate Zones 1 (Miami) and 4 (Baltimore); a heat recovery ventilator (HRV) for Standard Rated Homes in Climate Zone 7.

The Home Ventilating Institute Certified Products Directory² was used to determine HRV/ERV efficiencies, airflows, and power consumption for a typical market choice. The reference equipment incorporated an ECM motor. The whole house infiltration rate was reduced to 1.5 ACH₅₀ per typical builder practice when a highly-efficient mechanical ventilation system is installed. (Table 2)

¹ Equivalency Between IECC Prescriptive Path and IECC Energy Rating Index, October, 2016

² http://www.hvi.org/proddirectory/CPD_Reports/section_3/index.cfm

Table 2. High-Efficiency Balanced Ventilation

CZ	Type	State	City	Ventilator Type	SRE - Sensible Recovery Efficiency, %	Total Recovery Efficiency, %	Power, Watts
1	Moist	Florida	Miami	ERV	77	70	28
4	Moist	Maryland	Baltimore	ERV	77	70	28
7	N/A	Minnesota	Duluth	HRV	91	40	18

The resulting HERS Indices are shown in the following table:

Table 3. Data Subset: HERS Indices with Full Suite of Energy Conservation Measures Applied

ID	Climate Zone	2015 IECC HERS Target	Standard Rated Home Predicted HERS INDEX	Standard Rated Home Predicted HERS INDEX with ECMs
1MSLFEC	1	52	71	64
1MSLFGC	1	52	70	63
1MSLMEC	1	52	74	66
1MSLMGC	1	52	73	66
1MSLFEH	1	52	62	56
1MSLFGH	1	52	63	57
1MSLMEH	1	52	65	58
1MSLMGH	1	52	66	59
4MSLFEC	4	54	75	65
4MSLFGC	4	54	74	64
4MSLFEH	4	54	65	56
4MSLFGH	4	54	63	54
7MSLFEC	7	53	73	61
7MSLFGC	7	53	73	60
7MSLFEH	7	53	65	53
7MSLFGH	7	53	59	50

Table 4. Configuration Naming Convention

Parameter	Range	Values
Climate Zone	CZ 1 thru CZ 7/8	1-7
Building Size	SMALL	S
	MEDIUM	M
	LARGE	L
Foundation Type	SLAB	SL
	COND BSMT	CB
	UNCOND BSMT	UB
	COND CRAWL	CC
	VENTED CRAWL	VC
Above-Grade Wall Type	MASS WALL	M
	FRAME WALL	F
Fuel Type	ELEC	E
	GAS	G
Equipment Efficiency	Fed Min EFF (per code)	C
	HIGH EFF	H

The iterative nature of the application of various energy conservation measures (ECMs) in REM/Rate allows for examination of the resulting HERS Indices at intermediate junctures.

With respect to lights and appliances, the Standard Rated Homes had RESNET default values for most entries (Table 1), except that 75% of the interior light fixtures were modeled as compact fluorescents. Four steps were implemented to achieve the total package of ECMs:

1. The first ECM modification applied was 100% CFL interior lights and an Energy Star top-freezer refrigerator (363 kWh/yr).
2. The second modification adjusted most values in the Lights and Appliances input screen: for example, moisture sensing was added for the clothes dryer and an Energy Star preset was chosen for the clothes washer. The refrigerator was changed from the Energy Star top-freezer model to a more conservative Energy Star side-by-side model (601 kWh/yr). The garage and exterior lighting fixtures were changed to 100% CFL.
3. The third modification replaced EA-only ventilation with high-efficiency balanced ventilation appropriate to each climate zone (Table 2).
4. The final modification reduced the infiltration rate to 1.5 ACH₅₀ to conform to typical builder practice when energy recovery ventilation is implemented.

Table 5. Iterative HERS Indices Due to ECMs

ID	Climate Zone	2015 IECC HERS Target	Standard Rated Home HERS INDEX	Refrigerator (top freezer: 363 kWh/yr); Lights (100% CFL, interior only)	Refrigerator (Side-by-Side: 601 kWh/yr); range; oven; W/D; DW; 100% CFL int, ext & gar	Add hi-eff Bal'd Vent: ERV CZ1 & CZ4; HRV CZ7	Reduce Infiltration to 1.5 ACH
1MSLFEC	1	52	71	67	65	64	64
1MSLFGC	1	52	70	67	65	64	63
1MSLMEC	1	52	74	70	68	67	66
1MSLMGC	1	52	73	70	68	67	66
1MSLFEH	1	52	62	59	57	56	56
1MSLFGH	1	52	63	60	58	57	57
1MSLMEH	1	52	65	62	60	59	58
1MSLMGH	1	52	66	63	61	60	59
4MSLFEC	4	54	75	74	71	67	65
4MSLFGC	4	54	74	73	70	66	64
4MSLFEH	4	54	65	63	61	58	56
4MSLFGH	4	54	63	62	59	56	54
7MSLFEC	7	53	73	72	70	65	61
7MSLFGC	7	53	73	72	70	65	60
7MSLFEH	7	53	65	64	62	57	53
7MSLFGH	7	53	59	59	57	53	50



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