

The Expanded HERS Score for the Rater

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Lighting in HERS

- Lighting incorporation in HERS score:
 - Add lighting kWh to reference and rated home
 - Consumption added to other end uses and used to determine rating score
- Assumption of 10% fluorescent lighting in base case (in reference home)
- Internal gains adjusted accordingly
- Raters rate the number of qualifying and non-qualifying light fixtures in qualifying locations

Light Fixture

- A complete lighting unit consisting of a lamp or lamps, and ballasting (when applicable) together with the parts designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply.
- For built-in valence lighting, strings of low-voltage halogens and track lights, each individual bulb shall count as a fixture.

Qualifying Light Fixtures

- Fluorescent hard-wired (pin-based) lamps w/ballasts (ENERGY STAR fixtures)
- CFL screw-ins in screw-base fixtures
- Light fixture controlled by photocell and motion sensor

Qualifying Light Fixture Locations

- Kitchen, dining room, living room, family room/den, bathroom, hallways, stairways, entrances, bedrooms, garage, utility rooms, home office, all outdoor fixtures mounted on a building or pole;
- Excludes plug-in lamps, closets, unfinished basement and landscape lighting.
- Captures ~80% of lighting kWh (various studies)

Rating Lighting

- Counting Light Fixtures:
 - # of Qualifying Light Fixtures in Qualifying Locations
 - # of all Light Fixtures in Qualifying Locations
 - Enter “Percent of Fluorescent Lighting” in REM/Rate or equivalent in other software
- Example:
 - 32 Qualifying Locations
 - 4 under-cabinet T-5 linear fluorescent tubes
 - 5 ENERGY STAR fixtures
 - 7 CFLs in screw-based hard-wired fixtures
 - Enter 50% in rating software

Refrigerators

- 775 kWh/yr. in reference home
- 25 ft³ automatic defrost, side-by-side, through-the-door ice model
 - Nearly the largest
 - Most popular model
 - Still some room for improvement
- Minimum Federal Standard is 659 kWh/yr
- Gain or lose points depending on kWh rating of rated refrigerator
- Internal gains adjusted by software

Rating Refrigerators

- Count all refrigerators
- Note make and model number of each unit
- Look up kWh/year consumption from:
 - California Energy Commission: Appliance Database at:
<http://www.energy.ca.gov/appliances/appliance/index.html>
 - Association of Home Appliance Manufacturers (AHAM) directories (www.aham.org)
 - www.cee1.org
- Enter total kWh listed value(s) in HERS software

Refrigerator Directory Example - EPA

Brand	Model	Configuration	Defrost Type	Compact	Ice	Volume	Adjusted Volume	kWh/year	Federal Standard (kWh/year)	Percent Better
Absocold	AFD7501MW	Upright Freezer	Manual	Yes	No	7.5	12.98	341	379	10%
Absocold	ARD1031F*10R/L	Top Freezer	Automatic	No	No	10.3	11.80	331	392	15%
Absocold	ARD298C*10R/L	Top Freezer	Partial	Yes	No	2.9	3.34	290	421	31%
Absocold	ARD482F*10R/L	Top Freezer	Automatic	Yes	No	4.8	5.71	329	428	23%
Absocold	ARD492AS10R/L	Refrigerator Only - Single Door	Automatic	Yes	No	4.9	4.90	316	417	24%
Absocold	GARD562MG10R/L	Refrigerator Only - Single Door	Manual	Yes	No	5.6	5.60	268	359	25%
Admiral	GSD2615HE*	Side-by-Side	Automatic	No	Yes	25.6	31.76	617	727	15%

Rating Dishwashers

- Based on Dishwasher Energy Factor (cycles/kWh)
- Note make and model number
- Resources for labeled dishwashers:
 - Federal Trade Commission's "Dishwasher Energy Data":
 - <http://www.ftc.gov/bcp/online/edcams/eande/appliances/data/2005/dwasher/brand.htm>
 - www.energystar.gov for ENERGY STAR dishwashers
- Enter dishwasher EF value in HERS software
- If no dishwasher EF is specified, Rated home is calculated to have same dishwasher energy use and internal gain factor as Reference home

Dishwashers con't

- Reference home dishwasher EF: 0.46
- ENERGY STAR EF: 0.58 (.65 in 2007)
- Software calculates adjustments based on dishwasher EF:
 - Hot water energy use
 - Internal gains

Rating Mechanical Ventilation Systems

- Equipment type
 - Exhaust only
 - Supply only
 - Balanced
 - Air cycler
- Daily Run Hours
 - Input controls-programmed run hours
- Wattage
 - “Certified Home Ventilating Products Directory” from Home Ventilation Institute (HVI)
 - www.energystar.gov for ENERGY STAR vent fans

Mechanical Ventilation in Reference Home

If present:

Bedrooms	Sq. Ft.	CFM	Annual KWh
2	1,500	37.5	148
3	2,000	50	197
4	3,000	67.5	266
5	4,000	85	335

Mechanical Ventilation con't

- Only considered in rating if present in Rated home
- If mechanical ventilation present, software sets ventilation rate at ASHRAE 62.2 rates in calculating energy use in Rated home
 - Accounts for increased ventilation loads on heating and cooling energy
 - Reference home is only electric consumption and not ventilation air

Rating Ceiling Fans

- Cfm/Watt at medium fan speed
 - www.energystar.gov for ENERGY STAR ceiling fans
 - Labeled Ceiling Fan Standardized Watts (LSFSW)
 - Manufacturer product literature
- If ceiling fans included in Rated home, then also included in Reference home
- Assumptions:
 - 3 fans in both homes
 - Reference home is 70.4 cfm/Watt
 - 14 full-load hours when operational during cooling season (>63 degreesF avg. monthly temp.)
 - Cooling thermostat adjusted up by 0.5 degreesF
 - Internal gains adjusted accordingly

On-Site Power Generation

- Total kWh generation
- Total site fuel used in production of on-site power generation
- Based on manufacturer's performance ratings, adjusted by software for climate conditions
- Photovoltaics
- Wind, micro-hydro (coming?)

Photovoltaics

- PV panel type:
 - Monocrystalline silicon
 - Amorphous silicon, etc.
- Orientation
- Array area (square feet)
- Rated peak power (watts)
- Tilt (degrees)
- Inverter efficiency (%)

How does it look in REM/Rate?

- Dave Roberts, Architectural Energy Corp.