

Appendix A: New Mexico Mortgage Finance Authority Energy Efficiency Guidelines

As stated in the New Mexico EnergySavers Program for Housing Development Notice of Funding Availability (NOFA), the New Mexico Mortgage Finance Authority (MFA) defines *energy efficiency improvements* as any measures taken in the construction or rehabilitation of housing units that will result in reduced energy consumption and thus utility costs in the home, including the production of alternative energy for use in the home. Greater energy efficiency in units of affordable housing financed by MFA will reduce the monthly cost of living for low-to-moderate income households served and will further state and local efforts to conserve energy. Financing is awarded in the form of loans and must be used only for costs that are directly attributable and traceable to energy efficiency improvements *that are affixed to real property* for affordable housing projects statewide. Such financing is available for projects who take a *prescriptive path*, conducting individual energy efficiency improvements according to minimum standards set forth here, or for projects who take a *performance path*, verified by a HERS Index. Guidelines for each option are described below, including minimum standards for individual energy efficiency improvements (Option A) and HERS ratings (Option B).

OPTION A: Prescriptive Path

Energy efficiency improvements proposed for EnergySavers Program financing must meet or exceed the minimum standards set forth below, or where local codes exceed these standards, energy efficiency improvements must surpass minimum local code requirements. Applicants must provide sufficient documentation that funds awarded will reimburse costs that are directly attributable to expenditures made on such energy efficiency improvements. In addition to such documentation, all committed items must be included in preliminary plans and specifications.

1. Energy Efficient Site Design

1.1 Landscaping – reduction of heat islands

Many New Mexicans, especially those living in urban or suburban areas, experience elevated temperatures compared to surrounding rural areas – an effect known as “heat islands.” In these areas, temperatures can be 2 to 10°F warmer than less developed areas. There are simple steps one can take to reduce the effect of heat islands. Shade trees and other landscaping elements, such as shrubs, ground cover, and “cool” paving surfaces can significantly lower temperatures surrounding the home, resulting in reduced energy demand and cooling costs.

Element	Specifications	Documentation
1.1a Landscaped vegetation	<ul style="list-style-type: none"> • Deciduous or evergreen trees; • Shrubs, ground cover, other vegetation; • Preference for native, or drought-tolerant species. 	<ul style="list-style-type: none"> • Scaled site plan with north arrow; • Landscaping plan, specifying types of vegetation to be planted and paving to be used; • Receipts for materials and labor.
1.1b “Cool” Paving	<ul style="list-style-type: none"> • Light-colored paving materials; • Permeable (porous) paving materials 	

1.2 Landscaping – shading of windows

Strategically placed deciduous or evergreen trees and other vegetation can effectively shade the east and west windows from solar gain in the warmer months. On the southern building exposure, deciduous trees can prevent solar gain in the warmer months, when they are fully leafed-out, and permit it in the cooler months, when they shed their leaves. Effective use of natural shading can reduce energy demand and heating/cooling costs.

Element	Specifications	Documentation
1.2a Landscaped vegetation	<ul style="list-style-type: none"> • Deciduous or evergreen trees on east and west sides of building; • Other shade-producing vegetation on east and west sides of building; • Deciduous trees only, placed at least 10 feet from any windows, on south side of building; • Preference for native, or drought-tolerant species. 	<ul style="list-style-type: none"> • Scaled site plan with north arrow; • Landscaping plan, specifying types and locations of vegetation to be planted; • Receipts for materials and labor.

1.3 Other fixed shading devices

A combination of well-designed, fixed roof overhangs on southern windows and adjustable shading devices on other windows can effectively block solar gain during the cooling season, while permitting it during the heating season, thereby reducing heating/cooling costs. The New Mexico Solar Energy Association notes that optimum southern roof overhang projections vary depending upon whether the building is located in northern, central, or southern New Mexico¹.

¹ New Mexico Solar Energy Association (www.nmsea.org). Also see Build Green New Mexico’s *Green Home Building Guidelines* (pp. 154-161) (<http://www.thegbi.org/residential/featured-projects/newmexico/resources.asp>).

Element	Specifications	Documentation
1.3a Roof overhangs ² (southern exposures)	<ul style="list-style-type: none"> • <i>Cold Climates</i> (> 6,000 HDD65³): Locate shadow line at mid-window using the June 21 sun angle; • <i>Moderate Climates</i> (< 6,000 HDD65 & < 2,600 CDD65): Locate shadow line at window sill using the June 21 sun angle; • <i>Hot Climates</i> (> 2,600 CDD65): Locate shadow line at window sill using March 21 sun angle. 	<ul style="list-style-type: none"> • Scaled elevation and cross-section drawings showing the overhang dimensions and the sun angle permitted; • Documentation of costs associated with designing and building roof overhangs.
1.3b Shading devices (east, west, north exposures)	<ul style="list-style-type: none"> • Exterior: awnings, solar screens, roll-down blinds, shutters, vertical louvers • Interior: reflective blinds or louvers 	<ul style="list-style-type: none"> • Scaled drawings showing locations of shading devices; • Receipts for materials and labor.

2. Energy Efficient Building Envelope

2.1 Energy efficient windows, skylights and exterior doors

All windows, skylights, and exterior doors financed by EnergySavers must meet or exceed ENERGY STAR's minimum National Fenestration Rating Council (NFRC) ratings for U-Factor and Solar Heat Gain Coefficient (SHGC) for the particular geographic region.⁴ New Mexico's counties fall into three of the eight Climate Zones specified by the International Energy Conservation Code, on which these standards are based (See 2006 IECC Climate Zone table below).⁵

2006 IECC Climate Zone	New Mexico Counties
CZ3 (South/Central)	Chaves, Dona Ana, Eddy, Hidalgo, Lea, Luna, Otero
CZ4 (North/Central)	Bernalillo, Curry, De Baca, Grant, Guadalupe, Lincoln, Quay, Roosevelt, Sierra, Socorro, Union, Valencia
CZ5 (Northern)	Catron, Cibola, Colfax, Harding, Los Alamos, Mckinley, Mora, Rio Arriba, San Juan, San Miguel, Sandoval, Santa Fe, Taos, Torrance

² Specifications for roof overhangs used here conform to those provided by the U.S. DOE, Energy Efficiency and Renewable Energy Consumer's Guide (<http://www.eere.energy.gov/consumer/>).

³ Data on Heating Degree Days at base 65 F (HDD65) for New Mexico cities can be found in the 2003 New Mexico Energy Conservation Code, Appendix A, "Requirements by City" (pages 15-16). More information on HDD65 and CDD65 for New Mexico cities can be found at the Western Regional Climate Center website (<http://www.wrcc.dri.edu/summary/climsmnm.html>).

⁴ "Residential Windows, Doors, and Skylights Key Product Criteria," ENERGY STAR website, URL: http://energystar.gov/index.cfm?c=windows_doors.pr_crit_windows.

⁵ More information on the International Energy Conservation Code Climate Zones can be found at URL: <http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter/article/1420>.

Element	Specifications	Documentation
2.1a Windows and Exterior Doors	<ul style="list-style-type: none"> • CZ3: U-factor ≤ 0.40 and SGHC ≤ 0.40; • CZ4: U-factor ≤ 0.40 and SGHC ≤ 0.55; • CZ5: U-factor ≤ 0.35 and any SGHC. 	<ul style="list-style-type: none"> • Scaled site plan with north arrow, indicating location of all windows, skylights, and exterior doors; • Receipt for materials and labor, indicating brand, model number, and ratings.
2.1b Skylights	<ul style="list-style-type: none"> • CZ3: U-factor ≤ 0.60 and SGHC ≤ 0.40; • CZ4: U-factor ≤ 0.60 and SGHC ≤ 0.40; • CZ5: U-factor ≤ 0.60. 	

2.2 Roofing – “Cool” and “Green” roofs

The term *cool roof* refers to the use of roofing material with high *solar reflectance*, a measure of a material’s ability to reflect sunlight⁶. Materials with high reflectance often also perform with a high *thermal emittance*, which refers to the material’s ability to release absorbed heat. A *green roof* consists of vegetation and soil, or other growing medium, planted over a waterproofing membrane, often incorporating a root barrier and drainage and irrigation systems. Green roofs lower roof temperatures through *evapotranspiration*, the release of water from plants to the surrounding air, and can serve to reduce storm water runoff and air pollution, provide attractive habitat for birds and other small animals, and insulate a building from extreme temperatures. Two types of green roof systems are common – *intensive* (accessible, regularly maintained roof-top gardens with deep soil, large trees and shrubs); and *extensive* (low-maintenance ground cover and grasses planted in shallow soil, not designed to be accessible). Both *cool roof* and *green roof* systems reduce “heat island” effects and lessen cooling costs during warmer months by reducing solar heat gain.

Element	Specifications	Documentation
2.2a Cool roof ⁷	<ul style="list-style-type: none"> • Solar reflectance level of 0.65 or higher for low-slope ($\leq 2:12$ inches) roof applications and 0.25 or higher for steep-slope roofs, 	<ul style="list-style-type: none"> • Scaled rooftop plan and sections, with north arrow, indicating “cool” roofing products to be used; • Receipt for materials and labor, indicating product information and initial solar reflectance levels.

⁶ Definitions used here were derived from the U.S. Environmental Protection Agency’s “Cool Roofs” web page (<http://www.epa.gov/heatisland/strategies/coolroofs.html>) and “Green Roofs” web page (<http://www.epa.gov/hiri/strategies/greenroofs.html>).

⁷ For lists of “cool roof” products, see http://www.epa.gov/heatisland/strategies/level3_roofproducts.html; or see http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products; or see <http://www.coolroofs.org/products/search.php>.

<p>2.2b Green roof</p>	<ul style="list-style-type: none"> • <i>Intensive:</i> <ul style="list-style-type: none"> - ≤ 1 foot of soil - trees & shrubs - regular garden maintenance required - resident access permitted - 80-150 pounds per square foot load added to building structure - complex irrigation and drainage systems; • <i>Extensive:</i> <ul style="list-style-type: none"> - 1-5 inches of soil - ground cover and grasses planted - resident access not permitted - little maintenance required - 12-50 pounds per square foot load added to building structure - simple irrigation and drainage systems; • Preference for native, or drought-tolerant species. 	<ul style="list-style-type: none"> • Scaled rooftop plan and sections, with north arrow, showing types of vegetation to be planted, soil depth, waterproof membrane system, and irrigation and drainage systems. • Receipt for materials and labor.
----------------------------	---	---

2.3 Insulation

Appropriate levels of insulation in the exterior walls, ceilings/attic/roof, and floors/slab foundation of a residence will raise the R-value of the building envelope, helping to minimize heat flow, in the form of heat loss in the winter and heat gain in the summer. Proper insulation will not only increase comfort in the home but also reduce heating and cooling costs year-round. Minimum R-value for insulation used will vary depending upon the region of New Mexico (See 2006 IECC Climate Zone table above for regional zone designation).

Element	Specifications	Documentation
2.3a Ceiling/Attic/ Roof Insulation	<ul style="list-style-type: none"> • CZ3: ≥ 30 R-value⁸ • CZ4: ≥ 38 R-value • CZ5: ≥ 38 R-value 	<ul style="list-style-type: none"> • Scaled cross-section(s) indicating insulation system used; • Receipts for materials and labor, indicating R-value of products used; • Builder-certified.
2.3b Wood Frame Wall Insulation	<ul style="list-style-type: none"> • CZ3: ≥ 13 R-value • CZ4: ≥ 13 R-value • CZ5: ≥ 19 R-value 	
2.3c Slab Foundation Insulation (at 2 feet depth)	<ul style="list-style-type: none"> • CZ3: ≥ 0 • CZ4: ≥ 10 R-value • CZ5: ≥ 10 R-value 	

⁸ R-values are for insulation only, not whole wall, and are derived from ENERGY STAR Builder Option Package standards for climate zones (http://www.energystar.gov/index.cfm?c=bop_pt_bop_newmexico).

Additional insulating construction materials and techniques, such as insulating concrete forms (ICFs) and straw bale construction, may be eligible for EnergySavers financing. Please include these items under “Other” (See 5 below).

2.4 Thermal Mass

To aid in utilizing solar energy to reduce heating costs, *thermal massing* of wall and/or systems is a technique that incorporates high-mass materials (such as stone, brick, or adobe masonry, rammed earth, and tile or concrete flooring) to absorb and store heat during warmer hours and slowly release it as temperatures drop, dampening the effects of outdoor air temperature fluctuations and moderating indoor air temperatures. In combination with south-facing windows that allow direct solar gain at strategic times of the day and months of the year, thermal massing of walls can effectively reduce the cost of heating a home. These techniques will work best in northern (CZ5) and north/central (CZ4) regions of New Mexico, where heating demands are greater than in southern New Mexico.

Element	Specifications	Documentation
2.4a Thermal Mass	<ul style="list-style-type: none"> Thermal mass walls (interior and exterior) should have a surface area of 6-8 times the surface area of south-facing, direct-gain window area;⁹ The bulk of thermal mass surfaces should be within the line-of-sight of sunlit surfaces; The following guidelines specify allowable mass wall thickness range for various materials¹⁰: Concrete 8-24 in. Concrete Block 7-18 in. Clay Brick 7-16 in. Lwt. Concrete Block 6-12 in. Adobe 6-12 in. 	<ul style="list-style-type: none"> Scaled wall sections, indicating massing material, thickness and surface area of mass walls compared with direct gain glass surface area; Receipts for materials and labor.

Additional materials and techniques demonstrating high thermal mass, such as rammed earth or cob construction, may be eligible for EnergySavers financing and should be included with “Other” (See 5 below).

⁹ See the New Mexico Solar Energy Association’s (NMSEA’s) “Passive Solar Guidelines for Northern New Mexico” at http://www.nmsea.org/Education/Homeowners/Detailed_Passive_Solar_Guidelines.php.

¹⁰ Materials not included here must exceed the minimum mass wall thickness required by the 2003 New Mexico Energy Conservation Code (2003 IECC), or local codes, whichever requires a higher level of energy efficiency.

2.5 Reduction of air infiltration – sealed building envelope

If a home's building envelope is not well sealed, air will leak into and out of the home, causing unwanted drafts, noise, moisture and pollutants to seep into the indoor home environment and resulting in elevated heating and cooling costs. According to ENERGY STAR, 25 to 40% of energy used to heat and cool a residence can be saved by properly sealing a home, making the reduction of air infiltration one of the most critical factors in improving energy efficiency.¹¹ The following measures, recommended by the Home Builders Association of Central New Mexico, Build Green New Mexico guidelines, will improve the extent to which a home's building envelope is sealed¹²:

- Sill sealer between foundation and sill plate;
- Caulk bottom plate of exterior walls;
- Air seal band joist cavities between floors;
- Ensure air barrier continuity at all framed cavities such as air chases, soffits, coffered or dropped ceilings, and behind tub/shower units on exterior walls. Utilize either an interior or exterior air barrier as per local practice;
- Caulk/foam all electrical, plumbing, heating penetrations between floors (including attic, basement, crawl space, and garage) and to exterior;
- Block and seal cantilevered floors and kneewalls;
- Weatherstrip attic hatches, kneewall doors;
- Insulate, caulk, or foam between window/door jambs and framing;
- If installing recessed lights in ceilings adjacent to unconditioned space, use rated, air-tight Type IC housings;
- Caulk/foam HVAC register boots that penetrate the building envelope;
- If a fireplace is installed, install a gas fireplace that is sealed combustion or a wood-burning fireplace with gasketed doors.

Element	Specifications	Documentation
2.5a Air Sealing Package	<ul style="list-style-type: none"> • Perform all of the above measures that apply to the project; and • CZ3 & CZ4: < 6.0 ACH50¹³ • CZ5: < 5.0 ACH50. 	<ul style="list-style-type: none"> • Builder-certification of air sealing measures; • Third-party verification (blower door test).

¹¹ See ENERGY STAR's "Air Sealing Fact Sheet" at URL:

http://www.energystar.gov/ia/home_improvement/home_sealing/AirSealingFS_2005.pdf.

¹² Air Sealing Package measures were taken from the Home Builders Association of Central New Mexico's "Build Green New Mexico, Green Home Building Guidelines" at URL:

<http://www.thegbi.org/residential/featured-projects/newmexico/resources.asp>.

¹³ Standards are derived from ENERGY STAR minimum requirements. Blower door tests will find and measure air leakage, in air changes per hour at 50 Pascals differential pressure (ACH50).

3. Energy Efficient Systems

3.1 Heating, Ventilation, and Air Conditioning (HVAC)

Up to half of all energy used in the average home goes to heating and cooling. Therefore, taking steps to ensure that one's heating, ventilation and air conditioning systems are energy efficient can result in direct savings of both energy and money. To qualify for EnergySavers financing, HVAC systems must be properly sized and installed according to industry standards and must meet or exceed ENERGY STAR's minimum criteria for HVAC products. Additionally, if your HVAC system relies on duct-work, all ducts must be sealed and insulated to prevent energy loss through leakage and heat flow.

Element	Specifications ¹⁴	Documentation	
3.1a Furnaces	<ul style="list-style-type: none"> • Proper sizing and installation¹⁵; • <i>Oil Furnaces</i>: AFUE rating of > 83%; • <i>Gas Furnaces</i>: AFUE rating of > 90%. 	<ul style="list-style-type: none"> • Receipt with brand and efficiency ratings; • Installer-certified. 	
3.1b Boilers	<ul style="list-style-type: none"> • Proper sizing and installation; • AFUE rating of > 85%. 		
3.1c Air-Source Heat Pumps	<ul style="list-style-type: none"> • Proper sizing and installation; • <i>Split systems</i>: ≥ 14 SEER / ≥ 8.2 HSPF / ≥ 11.5 EER; • <i>Single package systems</i>: ≥ 14 SEER / ≥ 8.0 HSPF / ≥ 11 EER. 		
3.1d Geothermal Heat Pumps	<ul style="list-style-type: none"> • Proper sizing and installation; • <i>Open Loop</i>: ≥ 3.6 COP (H); ≥ 16.2 EER (C); • <i>Closed Loop</i>: ≥ 3.3 COP (H); ≥ 14.1 EER (C); • <i>Direct Expansion</i>: ≥ 3.5 COP (H); ≥ 15 EER (C). 		<ul style="list-style-type: none"> • Receipt with brand and efficiency ratings; • Installer-certified.
3.1e Central Air Conditioners	<ul style="list-style-type: none"> • Proper sizing and installation • <i>Split systems</i>: ≥ 14 SEER / 11.5 EER; • <i>Single package systems</i>: ≥ 14 SEER / 11 EER. 		

¹⁴ All HVAC systems must meet or exceed ENERGY STAR minimum performance standards. See website at URL: http://www.energystar.gov/index.cfm?c=heat_cool.pr_hvac. All measures of performance are given in the following standard terms: AFUE, Annual Fuel Utilization Efficiency; SEER, Seasonal Energy Efficiency Rating; COP, Coefficient of Performance; EER, Energy Efficiency Ratio.

¹⁵ HVAC sizing must be in accordance with the latest editions of ACCA Manuals J and S, ASHRAE 2001 Handbook of Fundamentals, or an equivalent procedure. See recommendations by ENERGY STAR, at URL: http://energystar.gov/index.cfm?c=heat_cool.pr_properly_sized.

3.1f Duct Insulation	<ul style="list-style-type: none"> • Insulate ducts in attics or other unconditioned areas to an R-value of 6 or higher. 	<ul style="list-style-type: none"> • Receipts, indicating R-value of products used; • Builder-certification.
3.1g Programmable Thermostats	<ul style="list-style-type: none"> • Product must have a default energy saving program that is capable of maintaining two separate programs (to address the different comfort needs of weekdays and weekends) and four temperature settings or more for each day. 	<ul style="list-style-type: none"> • Receipt with brand and programming capabilities.
3.1h Ventilation Fans ¹⁶	<ul style="list-style-type: none"> • <i>Range hoods</i> (up to 500 cfm): maximum allowable sound level of 2.0 sones; minimum efficacy level of 2.8 cfm/Watt; • <i>Bathroom and utility room fans</i> (10 – 80 cfm): maximum allowable sound level of 2.0 sones; minimum efficacy level of 1.4 cfm/Watt; minimum rated airflow at 0.25 static w.g. 60% of 0.1 static w.g. airflow; • <i>Bathroom and utility room fans</i> (90 – 130 cfm): maximum allowable sound level of 2.0 sones; minimum efficacy level of 2.8 cfm/Watt; minimum rated airflow at 0.25 w.g. 70% of 0.1 static w.g. airflow; • <i>Bathroom and utility room fans</i> (140 – 500 cfm [max]): maximum allowable sound level of 3.0 sones; minimum efficacy level of 2.8 cfm/Watt; minimum rated airflow at 0.25 w.g. 70% of 0.1 static w.g. airflow; • <i>In-line fans</i> (single-port & multi-port): no sound or airflow requirement; minimum efficacy level of 2.8 cfm/Watt. 	<ul style="list-style-type: none"> • Receipt, indicating brand and sound, efficacy, and airflow ratings/levels.

3.2 Water heating

According to ENERGY STAR, water heating can account for up to 15% of all home energy use. Homeowners can save on utility bills by installing

¹⁶ See ENERGY STAR product criteria for ventilation fans, at URL: http://energystar.gov/index.cfm?c=vent_fans.pr_crit_vent_fans.

high efficiency water heaters, which use anywhere from 10 to 50% less energy than standard models.¹⁷

Element	Specifications	Documentation
3.2a Water Heaters	<ul style="list-style-type: none"> • <i>Electric Resistance Storage Water Heaters</i>: Not eligible; • <i>Gas Storage Water Heaters</i>: minimum Energy Factor of 0.65, minimum First-Hour Rating of 67 gal/hour, and 6-year warranty; • <i>Whole-home Gas Tankless Water Heaters</i>: minimum Energy Factor of 0.82, minimum of 3.0 gal/min at 77 F rise, and 10-year warranty; • <i>Heat Pump Water Heaters</i>: minimum Energy Factor of 2.0, minimum First-Hour Rating of 50 gal/hour, and 6-year warranty; • <i>Gas Condensing Water Heaters</i>: minimum Energy Factor of 0.80, minimum First-Hour Rating of 67 gal/hour, and 8-year warranty; • <i>Advanced Non-Condensing Gas Storage Water Heaters</i>: minimum Energy Factor of 0.70, minimum First-Hour Rating of 50-gal/hour, and 8-year warranty. 	<ul style="list-style-type: none"> • Receipt with brand, warranty and efficiency ratings; • Installer-certified.

3.3 Lighting

Energy savings resulting from the use of ENERGY STAR (or equivalent) lighting fixtures in the most frequently used locations can be significant for residents. These fixtures use Compact Florescent Light (CFL) bulbs, which 75% less energy and last up to 10 times longer than standard incandescent bulbs. However, homeowners or renters who operate ENERGY STAR fixtures should be made aware of proper disposal procedures for CFL bulbs.¹⁸

¹⁷ See ENERGY STAR's "Residential Water Heaters: Draft Criteria Analysis" (October 2007), at URL: http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/WaterHeaterSecondDraftCriteriaAnalysis.pdf

¹⁸ See ENERGY STAR's fact sheet on CFL's and mercury (http://energystar.gov/ia/partners/promotions/change_light/downloads/Fact_Sheet_Mercury.pdf).

Element	Specifications ¹⁹	Documentation
3.3a Light Fixtures	<ul style="list-style-type: none"> • Fixtures that meet or exceed ENERGY STAR criteria in all high-use indoor areas; and • Daylight sensors or timers on all outdoor lighting; OR • ENERGY STAR Advanced Lighting Package. 	<ul style="list-style-type: none"> • Receipt with brand and efficiency ratings.

4. Use of Renewable Energies

4.1 Integrated passive solar design

An integrated approach to passive solar design utilizes sunshine to heat and light homes while minimizing the use of nonrenewable energy. There are several key components to an integrated passive solar home design, all of which must be present to qualify for EnergySavers financing for passive solar design. The table below lists these necessary components and describes specifications for each. In addition to the documentation specified, passive solar design plans must be architect-certified, and Passive Solar Checklist must be submitted.²⁰

Element	Specifications	Documentation
4.1a Orientation	<ul style="list-style-type: none"> • House orientation, such that the long axis of a roughly rectangular building runs east-west, thus maximizing south-facing wall area; • South-facing walls should be oriented $\leq 15^\circ$ of true South, correcting for declination. 	<ul style="list-style-type: none"> • Scaled site plan with North arrow, indicating building orientation and building footprint.
4.1b Windows	<ul style="list-style-type: none"> • All windows must meet or exceed the energy efficiency levels specified above (2.1a); • East windows: $\leq 4\%$ of Finished Floor Area (FFA) on East face; • West windows: $\leq 2\%$ of FFA on West face; • North windows: $\leq 4\%$ of FFA on North face; • South windows: 7-12 % of FFA on South face. 	<ul style="list-style-type: none"> • Scaled elevations and building plan and with North arrow, indicating placement and sizing of windows and FFA for each building face; • Receipts for windows, indicating brand and efficiency ratings.
4.1c Skylights	<ul style="list-style-type: none"> • Skylights must meet or exceed energy efficiency ratings 	<ul style="list-style-type: none"> • Scaled elevations and building plan and with

¹⁹ See ENERGY STAR's lighting specifications (http://energystar.gov/index.cfm?c=fixtures.pr_light_fixtures) and Advanced Lighting Package Criteria (http://www.energystar.gov/ia/partners/product_specs/program_reqs/ALPEligibilityCriteria_only.pdf).

²⁰ Two sets of passive solar guidelines are recommended – 1) New Mexico Solar Energy Alliance (www.nmsea.org); and 2) Sustainable Buildings Industry Council (www.sbicouncil.org).

	<p>specified above (2.1b);</p> <ul style="list-style-type: none"> • Skylights: $\leq 2\%$ of Finished Ceiling Area (FCA); and • Shades and insulated wells. 	<p>North arrow, indicating FCA, placement and sizing of skylights and shading and well insulation systems;</p> <ul style="list-style-type: none"> • Receipts for skylights, indicating brand and efficiency ratings.
4.1d Shading	<ul style="list-style-type: none"> • No obstructions (including fences) are permitted within 60' horizontally from the south from both south corners of the building and within 10 ft of the building on this side. • Shade windows with natural and fixed shading devices (see 1.2 and 1.3 above). 	<ul style="list-style-type: none"> • Scaled site plan with North arrow, demonstrating absence of obstructions on south building face and showing placement of shading devices and dimensions of overhangs; • Landscape plan, indicating natural shading elements; • Receipts for materials and labor.
4.1e Thermal Mass	<ul style="list-style-type: none"> • Thermal mass walls must exceed the 2003 New Mexico Energy Conservation Code minimum mass wall allowances; • Recommended thicknesses are provided above (2.4a). 	<ul style="list-style-type: none"> • Scaled wall sections, indicating massing material, thickness and surface area of mass walls compared with direct gain glass surface area; • Receipts for materials and labor.
4.1f Insulation	<ul style="list-style-type: none"> • Walls: R-value ≥ 21; • Ceilings/Attics: R-value ≥ 34; • Perimeter: R-value ≥ 15 (below grade on outside of foundation walls and under the outer 2ft of slab, or if floor is built over crawl space, floor must be insulated to the above value) 	<ul style="list-style-type: none"> • Scaled cross-section(s) indicating insulation system used; • Receipts for materials, indicating R-value of products used; • Builder-certified.

Additional passive solar design elements, such as *trombe walls*, *water walls*, and *sunspaces* may also be eligible for EnergySavers funds, and should be included with "Other" (see 5 below).

4.2 Photovoltaic (PV) systems

Photovoltaic (PV) systems utilize semi-conductor technology to produce dc electricity from sunlight and then use an inverter convert it to ac power for domestic use. The use of on-site renewable energy systems, such as photovoltaics, results in reduced impacts from utility energy production and use and utility bill savings. To qualify for EnergySavers financing, PV

systems installed must generate at least 10% of the project's estimated annual energy load.²¹

Element	Specifications	Documentation
4.2a Photovoltaic (PV) Systems	<ul style="list-style-type: none"> • PV systems installed must provide at least 10% of the project's estimated annual energy load (given in kilowatt hours per year); and • PV equipment must carry all applicable IEEE and UL certifications and be installed in accordance with local codes. 	<ul style="list-style-type: none"> • Estimation of annual energy load and savings resulting from installed PV system; • Receipts for products used, indicating certifications; • Installer certified.

4.3 Solar hot water heating

Solar hot water heaters utilize solar energy to heat water and are typically designed to serve as pre-heaters for conventional storage or tankless water heating systems. The Solar Rating and Certification Corporation (SRCC) provides a standard measure to certify solar water heater performance.

Element	Specifications	Documentation
4.3a Solar Water Heaters	<ul style="list-style-type: none"> • Minimum Solar Fraction of 0.50; • OG-300 certification from the SRCC; • Minimum 10-year warranty. 	<ul style="list-style-type: none"> • Receipt with brand, certification, warranty, and efficiency ratings; • Installer-certified.

4.4 Wind turbines

A wind turbine collects kinetic energy from the wind and converts it to electricity that is compatible with a home's electrical system. If wind speeds are below cut-in speed (7-10 mph) there will be no output from the turbine and all of the needed power is purchased from the utility. As wind speeds increase, turbine output increases and the amount of power purchased from the utility is proportionately decreased. Residential wind turbines can lower utility bills and reduce impacts from energy production and use. However, a residential wind turbine can be a relatively large device and is not suitable for urban or small-lot suburban homes. Except for very small wind turbines (i.e., with rotors one meter or less in diameter) on very small towers, a property size of one acre or more is desirable.

Element	Specifications	Documentation
4.4a Wind Turbines	<ul style="list-style-type: none"> • Wind turbine systems installed must provide at least 10% of the project's estimated annual energy load (see "PV Systems") 	<ul style="list-style-type: none"> • Estimation of annual energy load and savings resulting from installed PV system;

²¹ According to the New Mexico Solar Energy Association, a typical home uses 5-15 kWh per day (1825 – 5475 kWh per year). Annual electric load for the project must be determined using the procedures specified in the 2006 Mortgage Industry National Home Energy Rating System (HERS) Guidelines.

	above) and conform to industry standards and local codes for performance and installation.	<ul style="list-style-type: none"> • Receipt for equipment used; • Installer-certified.
--	--	---

5. Other

Other energy efficiency improvements not listed here, particularly those techniques and materials that are compatible energy saving strategies and principles described above, may be eligible EnergySavers financing. Please provide sufficient documentation of the energy efficiency ratings for and estimated energy savings resulting from activities performed and products used. MFA will evaluate the eligibility of such activities on a case-by-case basis.

OPTION B: Performance Path

An integrated approach to energy efficient building design and construction, as evidenced by a HERS Index, may qualify a project for long term financing through MFA's EnergySavers Program.

The Residential Energy Services Network (RESNET) is an industry not-for-profit organization that acts as a national standards-making body for building energy efficiency rating systems²². RESNET standards are recognized by the federal government in verification of energy performance for programs like EPA ENERGY STAR, by numerous for minimum code compliance, and by the mortgage and finance industries. Certified RESNET rating providers conduct Home Energy Rating System (HERS) assessments of proposed or as-built projects, resulting in a HERS Index rating, which gages the relative energy efficiency of the project as compared with the American Standard New Home (HERS Index=100). In order to qualify for long-term EnergySavers financing, a project must provide proof of a HERS rating of 70 or better for new construction, demonstrating at least 30% higher energy efficiency than the standard new home, or a HERS rating of 75 for acquisition/rehabilitation projects, showing at least 25% improvement over the standard new home. In locations where local code exceeds these standards, projects must exceed local code requirements.

To qualify for EnergySavers financing under Option B, applicants must provide the following documentation:

- One page narrative describing the energy saving measures proposed to achieve a HERS Index of 70 or better for new construction and 75 or better for acquisition/rehabilitation;

²² URL: <http://www.natresnet.org/>.

- Name and contact information of the certified RESNET provider who will conduct the HERS assessment²³;
- Architect or RESNET provider certification that the project will be able to achieve a the minimum HERS Index specified here;
- Evidence of project costs associated with energy efficiency improvements;
- Upon project completion, documentation of HERS Index in the form of a HERS report, certified by the above specified RESNET provider.

²³ To locate a HERS rater, contact the Foundation for Building, the primary RESNET provider for the State of New Mexico. URL: <http://www.foundationforbuilding.org/>

New Mexico EnergySavers Program for Housing Development Prescriptive Path Checklist

OPTION A: PRESCRIPTIVE PATH	Item	ENERGY EFFICIENCY IMPROVEMENTS CHECKLIST	Check if committed.	Check if additional documentation is provided.	MFA use only
	1. Energy Efficient Site Design				
	1.1a	Landscaped Vegetation (heat island reduction)			
	1.1b	“Cool” Paving			
	1.2a	Landscaped Vegetation (shading of windows)			
	1.3a	Roof Overhangs			
	1.3b	Shading Devices			
2. Energy Efficient Building Envelope					
	2.1a	Windows and Exterior Doors			
	2.1b	Skylights			
	2.2a	“Cool” Roof			
	2.2b	“Green” Roof			
	2.3a	Ceiling/Attic/Roof Insulation			
	2.3b	Wood Frame Wall Insulation			
	2.3c	Slab Foundation Insulation (at 2 ft. depth)			
	2.4a	Thermal Mass			
	2.5a	Air Sealing Package			
3. Energy Efficient Systems					
	3.1a	Furnaces			
	3.1b	Boilers			
	3.1c	Air-Source Heat Pumps			
	3.1d	Geothermal Heat Pumps			
	3.1e	Central Air Conditioners			
	3.1f	Duct Insulation			
	3.1g	Programmable Thermostats			
	3.1h	Ventilation Fans			
	3.2a	Water Heaters			
	3.3a	Light Fixtures			
4. Use of Renewable Energies					
	4.1a-f	Integrated Passive Solar Design (see Passive Solar Checklist)			
	4.2a	Photovoltaic (PV) Systems			
	4.3a	Solar Hot Water heaters			
	4.4a	Wind Turbines			
5. Other (please list and provide documentation)					
	5a.				
	5b.				
	5c.				

New Mexico EnergySavers Program for Housing Development Passive Solar Checklist

4.1 INTEGRATED PASSIVE SOLAR DESIGN	Item	ENERGY EFFICIENCY IMPROVEMENTS CHECKLIST	Check if committed.	Check if additional documentation is provided.	MFA use only
	4.1a	Orientation <ul style="list-style-type: none"> • long E-W axis • south-facing walls $\leq 15^\circ$ of true S 			
	4.1b	Windows <ul style="list-style-type: none"> • energy efficiency • proper proportion of FFA 			
	4.1c	Skylights <ul style="list-style-type: none"> • energy efficiency • proper proportion of FCA • shades and insulated wells 			
	4.1d	Shading <ul style="list-style-type: none"> • absence of obstructions on south face • proper window shading 			
	4.1e	Thermal Mass <ul style="list-style-type: none"> • proper thickness • proper surface area 			
	4.1f	Insulation <ul style="list-style-type: none"> • proper levels of wall insulation • proper levels of ceiling/attic/roof insulation • proper levels of perimeter insulation 			
	4.1g	Other (list and provide documentation) <ul style="list-style-type: none"> • • • 			