Designed for Comfort: Efficient Affordable Housing Incentives Program

HERS Rater and Energy Consultant Handbook

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HMG Project # 0609

Policies and Procedures

Submitted by:

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INTRODUCTION

This document summarizes the steps involved with the energy analysis and HERS inspections for projects enrolled in the Designed for Comfort program. The target audience is energy consultants who will provide the Title 24 documentation and the HERS Raters who will be involved in inspecting the existing and rehab conditions of the enrolled projects.

Designed for Comfort (DfC), is an affordable multifamily and supportive housing incentives program, capturing one of California's most critical areas for energy savings – the older building stock. Funded by the California Public Utilities Commission (CPUC) in the Southern California Gas Company (SCG) and Southern California Edison (SCE) territory, this program offers a number of incentives to affordable multifamily housing owners to incorporate energy efficiency savings into their rehab projects, many of which were built before an energy code existed (pre-1978). Cash incentives are provided to owners who improve energy efficiency by at least 20% over existing conditions. Incentives for an energy consultant and a Home Energy Rating System (HERS) Rater is also offered to help offset the cost of analysis and verification.

1.1 Timeline for Program Implementation

The DfC program is a two year long program that started on August 3, 2006, with two participating utilities, SCG and SCE. The project enrollment started on August 3, 2006 and participation will be available on a first-come, first-served basis until December 31, 2008 or until funds are expended, whichever occurs first. All projects enrolled in the program are required to complete their rehab (as per the energy analysis document) and inspected and verified by a HERS rater prior to December 31, 2008. Payment of the incentives to enrolled participants will continue through till March 31, 2009.

2. PROGRAM REQUIREMENTS AND ELIGIBILITY

This section summarizes all the general program requirements and eligibility criteria that participants and their projects need to meet in order to enroll in the DfC program.

2.1 Financial Incentives Levels

Financial incentives are available to the owner to off-set the cost of efficiency upgrades based on the type of project. Owner incentives are also available to off-set the cost of hiring a HERS Rater. Additional incentives are available to the energy consultant who provides design and modeling assistance to document the level of energy efficiency improvement. Table 1 provides the owner incentive levels by project type and the other available incentives. All incentive amounts under "Owner incentives" listed in the table are 'maximum up to' amounts based on each dwelling unit of a multifamily project. For example, if the actual project upgrade cost is $650/unit, then DfC program will pay $650/unit for that project.

Incentive Description	Incentive Amount
Owner Incentive	
Small project (3-8 units)	Up to $1,500 per unit
Large project (9 units or more)	Up to $700 per unit
Supportive Housing	Up to $500 per unit
HERS Rater Incentive	$50 per unit ($6,000 per project cap)
Energy Consultant Incentive	$40 per unit ($5,000 per project cap)

Table 1 Financial Incentive Levels

3. ENERGY CONSULTANT ROLE AND DOCUMENTATION

The following section gives a detailed account of the role of an energy consultant in the DfC program and the documentation needed to meet program requirements.

3.1 Who can qualify as an Energy Consultant for the DfC program

Any person who can run a Title 24 Compliance analysis can be an energy consultant for the DfC program.

3.2 Energy Consultant Agreement with DfC (HMG) and/or the Building Owner

The energy consultant will receive a $40/unit incentive (with a cap of $5,000/project) through the DfC program. Payment can be arranged either directly through the DfC program and is paid after the project is completed, or with the project building owner and paid depending upon the agreement between the owner and the HERS Rater. The incentive payment may not be sufficient to cover the costs of the energy consultant's services. In that case, the energy consultant is responsible for reaching an agreement, directly with the owner, on additional fees for services.

3.3 Energy Consultant Role and Responsibilities

The energy consultant will create building simulation models using CEC-approved software, like EnergyPro and Micropas, in order to calculate the projected energy savings after a project retrofit. Alternate building simulation software, like Energy Checkup and TREAT, may be used by an energy consultant only after discussion and approval by DfC staff. The project procedures for the energy consultant shall be as follows:

- Receive *Existing Conditions take off sheet* from HERS Rater (see appendix for sample Existing Conditions take-off sheet).
- Create Existing Conditions Energy Model using approved software.
- Send Existing Conditions Energy Model to DfC staff for verification and filing.
- Create Altered Conditions Energy Model meeting 20% energy efficiency requirement.
- Discuss energy upgrade options with Owner. Teleconference if needed between EC, Owner and DfC staff.
- Finalize Altered Conditions Energy Model.
- Send Altered Conditions Energy Model to DfC staff for verification and for upload to HERS provider web site.

- Produce project *Building Energy Data Sheet* (see appendix for sample Building Energy Data Sheet) and send to DfC staff.

The energy consultant is responsible for contacting the HERS Rater and arranging to get the completed Existing Conditions take-off Sheet and any digital photographs taken by the HERS Rater of the inspected existing conditions. In cases where the HERS Rater and the energy consultant are not the same person, information gathered at this inspection must be passed from the HERS Rater to the energy consultant. In this case, the HERS Rater is responsible for providing the energy consultant with a complete and accurate description of the building(s).

3.4 The Existing Conditions Energy Model (Existing Building)

This building energy model will be based on the current conditions of the building before any rehab activity has taken place. The specifications of the existing building energy components will be based on the *Existing Conditions Inspection Report* (see appendix for sample Existing Conditions Inspection Report) and the supporting documents from the HERS Rater.

When the equipment or energy component has been removed and/or there are no available specifications, the energy consultant must follow the Title 24 rules for modeling existing conditions. Use the Vintage Table R3-11 in Appendix B of the Residential Manual to provide the default values for that component. The vintage year will be based on either the year the equipment was manufactured, the year the equipment was installed, the year the building was built or last remodeled, in that order of preference. For these purposes the HERS Rater must provide, at the very least, the year the building was built, or last remodeled, as part of the *Existing Conditions Inspection Report*. The Existing Conditions Energy Model must have all the building features currently installed in the building (Improvements that have been made since the existing building was first constructed must be included in that model).

For DfC modeling purposes, when using Energy Pro software, specify the existing conditions energy model as “existing” and NOT as an alteration. When using Micropas software, specify the existing conditions energy model as “new” and NOT as “existing+add+alter”. For any other software model, contact DfC staff.

Once the Existing Conditions Energy Model has been created, the energy consultant will send it to DfC staff for verification and filing.

3.5 The Altered Conditions Energy Model (Retrofit Building)

The energy consultant must discuss various cost effective energy efficient strategies with the owner and should take into account the medium and long term plans for the building when making suggestions. The suggested energy efficiency measures (to be installed) should be a cost effective solution for the owner and are modeled in the Altered Conditions Energy Model. DfC staff will provide design assistance to the energy consultant, if requested, to help develop cost effective energy efficient measures.

Ideally, the energy consultant will present the owner with more than one set of measures that will improve the energy efficiency of the building by at least 20% over the existing conditions. In a multi-building project, each individual building must comply with the 20% improvement requirement.

The proposed energy efficiency measures must meet the Mandatory Measures required by the Title 24 Energy Code for Additions and/or Alterations. Section 8.7.3, in the T24 Residential Manual, outlines those Mandatory Measures plus additional requirements for attic insulation, glass windows/doors, thermostats and pipe insulation depending on climate zone. Contact the DfC staff for any additional requirements or exceptions.

For DfC modeling purposes, when using Energy Pro software, specify the altered conditions energy model as “new” and NOT as an alteration. When using Micropas software, specify the altered conditions energy model as “new” and NOT as “existing+add+alter”. For any other software model, contact DfC staff.

The 2005 T24 Code also states that multifamily buildings that use T24 Code HERS measures for compliance credit must be modeled using the “unit-by-unit” method instead of the whole building approach (Section 7.3, Residential Manual).

An important milestone in the DfC program process is a teleconference between the energy consultant, the owner and DfC staff before any final decisions to proceed with construction are made. Prior to the conference call with the owner, the energy consultant should send DfC staff a copy of the Altered Conditions Energy Model. This will also allow an opportunity for the energy consultant and DfC staff to discuss any issues regarding the proposed energy efficiency measures before presenting them to the owner.

3.5.1 Projects without Space Cooling

For projects that don’t have any space cooling in the existing building, the energy consultant should focus on gas saving measures in the rehab model to achieve the 20% above existing conditions. When calculating the energy savings for such projects, the space cooling budget from the simulation results should be input as “zero” (in table Appendix “cool” column for both existing and rehab models see table.

3.6 Calculation of Energy Savings

After the energy consultant and the owner come to agreement on a qualified set of energy efficiency measures, the energy consultant must create a *Building Energy Data Sheet* (see appendix for sample Building Energy Data Sheet). The Building Energy Data Sheet summarizes the results of the Existing and Altered Energy Models for all the buildings in a project and clearly shows that each building has made at least a 20% improvement over the existing conditions. DfC staff can provide an Excel spreadsheet template on request.

Unlike a standard Title 24 run, the DfC program does not make a comparison to Title 24 Standard building budget. Because of this, two separate building energy models are required. In the first, the existing conditions are modeled with all of the existing building’s energy features incorporated. In the second, the altered conditions are modeled

with all of the improved building's energy features incorporated. Energy savings are calculated by comparing the Proposed budget results from the Existing Conditions Energy Model with the Proposed budget results from the Altered Conditions Energy Model. To calculate the % margin, subtract the total of the altered model from the total of existing model, divide by total of existing model, and multiply by 100. For an example, see table given in Appendix 3.2.

4. THE HERS RATER ROLE AND DOCUMENTATION

The following section gives a detailed account of the role of a HERS Rater in the DfC program and the documentation needed to meet program requirements.

4.1 Who can qualify as a HERS Rater for DfC program:

A person who is certified (by a CEC approved HERS Provider) as an "existing homes" Rater and/or a "new construction home" Rater can qualify as a HERS Rater for the DfC program.

4.2 HERS Rater Agreement with the Owner

The HERS Rater is responsible for reaching an agreement, directly with the owner for doing their inspections. Both the owner and the HERS Rater will be informed that the owner will receive a $50/unit incentive (with a cap of $6,000/project) to help pay for the HERS Rater's services. The HERS Rater may choose to get paid directly by the owner. The HERS Rater must clearly communicate with the owner that any additional standard HERS inspections, beyond the DfC HERS inspections, may be needed to meet the DfC program requirements and that there would be an additional charge in that case.

4.3 HERS Rater Role and Responsibilities

The HERS Rater will provide the energy consultant with a complete and accurate description of the building(s). When the HERS Rater and the energy consultant are NOT the same person, information gathered at this inspection must be passed from the HERS Rater to the energy consultant. The project procedures for the HERS Rater shall be as follows:

- Request, from the project building owner, a list of HVAC and hot water heating equipment for each dwelling unit in the enrolled project.
- Perform an "existing conditions" inspection of the enrolled project building(s) and provide the *Existing Conditions Inspection Report* (see appendix for sample Existing Conditions Inspection Report) to the DfC staff with supporting documents.
- Provide digital photos of the project building conditions (e.g. exterior elevations, existing water heater or wall furnace model numbers, etc.) to the energy consultant with a copy to DfC staff.
- Complete an *existing conditions take-off sheet* (see appendix for sample Existing Conditions take-off sheet) and draw building geometry sketches if no plans are available.
- Send a completed existing conditions take-off sheet to the energy consultant.

- Perform an Altered Conditions HERS Inspection on measures installed to meet DfC program requirements (more than one inspection may be necessary).
- Upon final completion of the Altered Conditions HERS Inspection for the project, provide PDF documentation of the inspection certificate to DfC staff, along with supporting documents like insulation installation certificate and photos.

4.4 Required HERS Inspections

There are a minimum of two DfC program HERS inspections per project:

- The Existing Conditions HERS Inspection establishes the basis on which the energy efficiency improvements are calculated.
- The Altered Conditions HERS Inspection establishes the new energy efficiency measures were installed.

DfC program HERS inspections will include measures that are not typical HERS T24 compliance credit measures. For example, inspecting the make/model numbers of a water heater to verify the efficiency or verification the attic insulation was upgraded to an R-38 is a DfC program HERS inspection measure. Normal HERS testing and/or inspections would be required if those measures (e.g. duct testing) were used to meet the 20% better than existing conditions DfC program requirement.

4.5 The Existing Conditions HERS Inspection (Existing Building)

The Existing Conditions HERS Inspection establishes the basis on which the energy efficiency improvements are calculated.

If needed, the DfC staff can provide the HERS Rater with a sample existing conditions take-off sheet to assist in the uniform and consistent collection of existing building data. On projects where there are no plans, the HERS Rater must provide a dimensioned floor plan sketch for each story of the building. The North direction must be indicated on the plan. The sketch does not need to be to scale, but it does need to accurately represent the building geometry. When stories are identical a separate sketch for each story is not necessary, but identical stories must be clearly notated. Areas of unconditioned space (e.g. mechanical rooms) and/or conditioned non-residential occupancies (e.g. recreation rooms) must be clearly marked. Conditioned and/or unconditioned corridors must also be clearly marked. Elevation sketches for all orientations, with orientation indicated, showing all windows and doors must be provided.

The sample existing conditions take-off sheet includes sections where information about the envelope, HVAC and DHW equipment must be provided. The HERS Rater is responsible for collecting all the information and providing this information to the energy consultant in a timely manner.

On projects where the existing equipment has been removed and/or there are no available specifications, the HERS Rater must provide, at the very least, the year the building was built, or last remodeled, as part of the existing conditions take-off sheet.

If a current existing, or "as built", mechanical plan is unavailable or insufficient, the HERS Rater must request from the owner, a list of HVAC and hot water heating equipment for every apartment in the project. Then the HERS Rater shall inspect the project using the following sampling procedures:

- Inspect one of each unique floor plan that occurs in the project. (equivalent to the model home in a single family development)
- Inspect one in seven floor plans thereafter. (HERS Rater's are encouraged to spread the samples across buildings and unique floor plans)

The HVAC and hot water heating equipment are energy components that substantially affect the building energy model and are more likely to vary as the buildings get older and individual water heaters, furnaces or AC units are replaced. Because of this, the HERS Rater shall inspect these components, using sampling procedures, against the provided list or plan from the owner. This should result in a reasonably accurate inventory of these important building energy components without need for the HERS Rater to inspect every unit.

Inspection by sampling of the other major building energy components, like windows and insulation, is more straightforward. These components are less likely to vary and are usually more accessible for inspection. Generally, windows will be quite consistent throughout a project, unless a partial retrofit has occurred, and in most cases can be visually inspected from the outside. Attic insulation is also relatively easy to inspect and likely to be consistent throughout a project. Inspection of wall insulation is only required when the walls are opened up as part of general construction activity. When a building energy component value cannot reasonably be obtained, the HERS Rater shall inform the energy consultant. In these cases, the energy consultant shall use the Vintage Table R3-11 in Appendix B of the T24 Residential Manual to provide input values for the Existing Conditions Energy Model.

4.6 The Altered Conditions HERS Inspection (Retrofit Building)

The Altered Conditions HERS Inspection establishes the new energy efficiency measures were installed on the DfC project. This post-retrofit inspection may involve more than one visit, depending on the measures to be inspected and the construction schedule. From the HERS Provider web site (CHEERS, CalCerts or CBPCA), the rater will download the "To Do List" or "Completion List" for the project which will contain the upgraded measures.

The HERS Rater shall use the following sampling procedures:

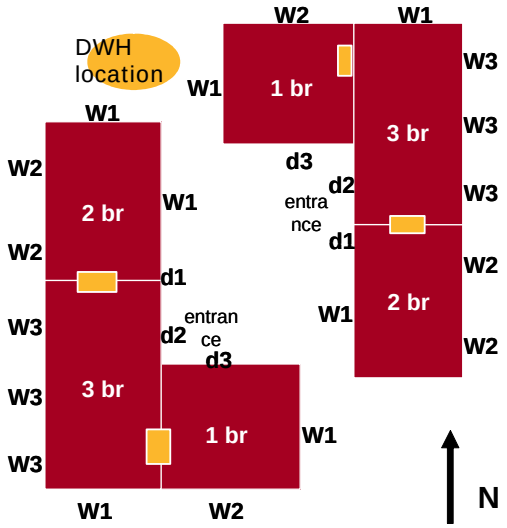
- Inspect one of each unique floor plan that occurs in the project (equivalent to the model home in a single family development)

- Inspect one in seven floor plans thereafter
  (HERS Rater's are encouraged to spread the samples across buildings and unique floor plans)

Upon final completion of the Altered Conditions HERS Inspection for the project, provide PDF documentation of the inspection certificate to DfC staff along with supporting documents like insulation installation certificate and photos.

5. APPENDIX

5.1 Sample Existing Conditions take-off Sheet



Existing Conditions Floor Plan Sketch

Windows door Specifications							
Window type	***No. of panes***	***Frame type***	***Dimensions***	***Orientation***	***U Factor***	***SHGC***	***Manu. Name***
W1	single	Aluminum	5' W x 5' L	N	0.6	0.5	Milgard
W2	single	Aluminum	5' W x 5' L	N	0.6	0.5	Milgard
W3	single	Aluminum	5' W x 5' L	S	0.6	0.5	Milgard
W4	single	Aluminum	5' W x 5' L	E	0.6	0.5	Milgard

HVAC									
Type	***Type of system***	***Gas/Electric***	***Manu. Name***	***Model No.***	***Capacity***	***HSPF***	***AFUE***	***SEER***	***EER***
Heat 1	Wall furnace	Gas	Williams	24567ADG			50%		
Heat 2	Wall furnace	Gas	Williams	24567ADG			50%		
AC 1	Room AC	Electric	Carrier	5AFK282	10,000Btu				7.6
AC 2	Room AC	Electric	Carrier	5AFK283	10,000Btu				7.6

5.2 Sample Building Energy Data Sheet

Building D			Heat	Cool	Fans	Pumps	DHW	Total	% Margin
1800 Central	North Facing	Existing (1959)	20.87	16.37	3.9	9.44	28.02	78.6	30.1%
		Altered	12.27	9.73	2.35	9.44	21.18	54.97	
	% of total margin		36.4%	28.1%	6.6%	0.0%	28.9%	100.0%	

> 20%, hence qualifies for DfC program

List of Measures	Existing Rating	Rehab Rating
Central WH	0.6	0.8
Attic Insulation	R-0	R-30
Wall Furnace	0.58	0.75

Calculations:

Total Existing Building Energy Budget - Pre Upgrades = 78.6

Total Rehabed Building Energy Budget - Post Upgrades = 54.97

Reduced Energy Budget = 78.60-54.97

Percentage Reduction in Energy Budget = $\frac{\text{Reduced Energy Budget}}{\text{Total Existing Energy Budget}} \times 100$

$= \frac{(78.60-54.97)}{78.6} \times 100 =$ 30.1%

If > 20% Project *Meets* DfC requirements

If < 20% Project *Fails* DfC requirements

5.3 Existing Conditions HERS Inspection Report

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www.designedforcomfort.com

PROJECT EXISTING CONDITIONS INSPECTION REPORT

This inspection report is to be completed by the HERS Rater and submitted to the DfC staff along with the following supporting documents:

- A Project Site Plan with North arrow, building locations and identifying designations (e.g. Bldg A, Bldg 101, etc).
- A Building Plan: a sketch or drawing indicating conditioned and unconditioned spaces.
- An "Existing Conditions" Take-off Sheet including information about the building envelope, HVAC and DHW equipment.
- Photos of Existing Building Conditions.

Email or Fax the Project Existing Conditions Inspection Report and related documents to Linda S. Murphy. Email: Murphy@h-m-g.com Fax: 916-962-1010

Name of HERS Rater _____ HERS Certification #_____

Business Phone_____-_____-_____ E-mail address_____

Name of Project _____ Name of Project Owner_____

Project Address_____

I certify that I have inspected the pre-rehab (existing) building(s) for the _____

Project on _____, 20__.

Building/Unit Name/Number _____

Building/Unit Name/Number _____

Building/Unit Name/Number _____

Building/Unit Name/Number _____

Building/Unit Name/Number*_____

_____ _____
Signature of HERS Rater Date

*Use as many of these forms as may be necessary.

5.4 Resources List

5.4.1 California Energy Commission T24 Standards Web Site

At the CEC web site downloads are available for the 2005 Residential Manual. Go to: http://www.energy.ca.gov/title24/index.html.

5.4.2 California Energy Commission Energy Code Online Training Website

For online videos regarding the T24 Residential Energy Code, HVAC and Building Envelope, go to: http://www.energyvideos.com/index.php

5.4.3 Partnership for Advancing Technology in Housing (PATH)

The Partnership for Advancing Technology in Housing (PATH) is dedicated to accelerating the development and use of technologies that radically improve the quality, durability, energy efficiency, environmental performance, and affordability of America's housing. Go to: http://www.pathnet.org/

5.4.4 Solar Water Heating

Solar water heating offers substantial compliance credits for projects in mild climates. While still not as cost effective as some other measures, interest in solar is high and for building owners interested in “greening” their projects, solar water heating can be a viable option. With Investment Tax Credits (ITC) for systems “placed in service” in 2006 and 2007, the economics of solar is more attractive now than is has been for years. For more information, go to http://www.energytaxincentives.org/tiap-commercial-solar-energy-systems.html.

Compliance documentation for solar water heating is now flexible and simple, with the new CEC calculator for systems that use SRCC OG 100 solar water heating collectors. (http://www.energy.ca.gov/title24/swh_calculator/index.html) For systems that are SRCC OG 300 rated, form CF-SR, located in Appendix A of the Residential Manual, can be used. Mandatory requirements for pipe insulation and storage tank insulation apply, as described in Section 5.4.2 of the Residential Manual.