# Base Load Measures

# Weatherization Energy Auditor Single Family

Learning Objectives

By attending this session, participants will be able to:

* Define base load measures.
* Recognize base load measures allowable in the WAP based on Appendix A.
* Discuss how to use utility bill analysis to determine base load usage.
* Identify tools useful for calculating energy and money savings associated with common base load measures.

Key Terminology

Association of Home Appliance Manufacturers (AHAM)

Base load

Color rendering index (CRI)

Color scale

Compact fluorescent lamps (CFLs)

Consumption analysis

Decommission

Heat pump water heater

Kelvin temperature

Lumen

Refrigerator Info Toolkit

Solar water heater

Tankless water heater

Supplemental Materials

Handouts & Resources

Armanda, Larry, and Steve McCarthy. “A Recessed Can of Worms.” *Home Energy* Jan./Feb. 2001. <www.homeenergy.org>.

Belshe, Rana. “Electric Baseload Presentation.” Presented at 2009 National Weatherization Training Conference. July 2009.

Benware, Richard. “Understanding CFLs*.*” *Home Energy* Nov./Dec. 2007. <www.homeenergy.org>.

Blasnik, Michael. *Measurement and Verification of Residential Refrigerator Energy Use: Final Report: 2003-2004 Metering Study*. 2004.

CFL Retrofit Savings Calculator.

Code of Federal Regulations, Title 10 – Energy, Part 440 – Weatherization Assistance for Low-Income Persons (10 CFR 440), Appendix A. <http://www.waptac.org/Rules-and-Regulations/Federal-Regulations.aspx>.

“Consumer Education Series: Lighting 101.” WxTV. Montana Weatherization Training Center. <www.wxtvonline.org>.

“Consumer Education Series: Solar Water Heating.” WxTV. Montana Weatherization Training Center. <www.wxtvonline.org>.

Energy Star. *Frequently Asked Questions: Information on Compact Fluorescent Lightbulbs (CFLs) and Mercury.* July 2008.

Kavallo, James and James Mapp. “The Avocados, the Golds – The Replaceables?” *Home Energy* Jan./Feb. 2003. <www.homeenergy.org>.

Kinney, Larry. “Refrigerator Monitoring, a Sequel.” Home Energy Sept./Oct. 2000. <www.homeenergy.org>.

Knoll, Thom. “Taking the Pain Out of Testing.” *Home Energy* May/June 2003. <www.homeenergy.org>*.*

Refrigerator Info Toolkit.

U.S. Department of Energy. Weatherization Assistance Program. "Refrigerator Replacement Video." 2009. <www.waptac.org>.

Water Heater Info Toolkit.

Online Platform Lessons

Use these online interactive training modules as prerequisites before students attend the course or as in-class computer lab sessions. To access the lesson, users must first create an account at [www.nterlearning.org](http://www.nterlearning.org).

a- 2.6 Water Heater Inspection

c- 10.2 Identifying Hot Water Systems

Relevant Standard Work Specifications

7.8001 – Refrigerators/Freezers

7.8003 – Lighting

7.8101 – Water Use Reduction

7.8102 – Installation and Replacement

7.8103 – Maintenance Inspection

Classroom Props & Activities

Approved refrigerator metering device

CFL packaging indicating CRI and/or Kelvin temperature

2 light sockets (table lamps) and CFLs of various color temperatures (including one very high ~ 6,500K, one very low ~ 2,700K)

Faucet aerator

Flow bag and stopwatch

Pipe and blanket insulation

**Refrigerator Metering**: Plug the refrigerator meter into a unit on-site before class starts. During that part of the presentation, retrieve the meter and show students the reading. Apply whatever corrections (noted in tables on slides) apply. Have students calculate estimated energy usage. Does the unit qualify for replacement? How efficient and inexpensive would the replacement unit have to be for it to qualify?

**Lighting Demonstration**: With the different CFLs screwed into the table lamps, explain how the color temperature affects the light quality and ultimately whether clients will keep the bulbs. Hold a green or red object under each light to demonstrate the different appearance of colors under the different lights. (Test this before class. It may be necessary to turn off classroom lights to get desired effect.)

**Flow determination**: Let students use a timer and a flow bag or other receptacle with a known volume to measure the flow of a showerhead or a faucet near the classroom. Convert the results into gallons per minute.

Class Overview

* Use the presentation to introduce the concept of base load energy use and the characteristics of weatherization clients’ bills. Ask students what base load reduction methods they are familiar with. Discuss that while some base load use relies on appliance efficiency and cannot be significantly changed by resident behavior, client education can lead to substantial reductions; for example, if the client currently leaves windows open while A/C is running or practices other wasteful behavior.
* During the bill analysis examples, give the students time to figure out the lowest and highest usage months before clicking ahead to reveal the answers. Ask students to determine whether the bills indicate heating- or cooling-dominated climates.
* Display or pass around various materials associated with base load energy reduction: aerators, pipe insulation, etc.
* Meter and calculate usage of various appliances and electronics in the classroom to illustrate the cost-effectiveness of various measures.
* Show students the Water Heater Info Toolkit spreadsheet tool, and explore cost-effectiveness of various replacements based on local prices and family size.