National Residential Efficiency Measures Database

Guide for Application Developers

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Executive Summary

This document provides guidance to users of the National Residential Efficiency Measures Database, sponsored by the U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE). The database project is being developed and maintained by the National Renewable Energy Laboratory (NREL).

The genesis of the project was to integrate several existing DOE databases of building retrofit measures and costs into a unified national database. The resulting integrated database contains regularly updated and expanded information about the performance parameters and costs of residential retrofit technologies that improve the energy efficiency of residential buildings. This information is made available to all DOE projects and to the public in a standardized format.

This document provides guidance to users and application developers utilizing data from the database. It contains a detailed description of data and instructions for exporting data from the database.
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1 Introduction

1.1 Purpose

This document provides specifications and instructions that facilitate using the National Residential Efficiency Measures Database, sponsored by the U.S. Department of Energy (DOE). The database project is being designed and developed by the National Renewable Energy Laboratory (NREL).

1.2 Intended Audience

This document is intended for software application developers and other users of the database. It provides instructions and details useful to those utilizing the database contents in other applications.

1.3 Contact Information

The database is being developed at the National Renewable Energy Laboratory:

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1.4 Background

The focus of this project is to provide regularly updated performance parameters and associated estimated costs of retrofit technologies that improve the energy efficiency of residential buildings. In order to support external building science R&D organizations, ensure technical accuracy, and enhance government transparency, this information is available to all DOE projects and to the public in a standardized format. NREL hosts the database and coordinates the update process.

Figure 1 shows the overall concept for the project.
Figure 1. Overall project concept.
2 Database and Data

2.1 Overview

The retrofit measure database is comprised of two basic objects: Components and Actions (see Figure 2 and Figure 3). These are combined to create Measures, which consist of a before-Component, an after-Component, and an Action to move from before to after (see Figure 4). Components (i.e., materials) have Properties, Lifetimes, Costs, and Cost Drivers; Actions (i.e., labor) have Costs (see Figure 5).

NREL has constructed, and made available via the web interface and XML feed, a measure set from these objects. Each retrofit measure has Components and Actions associated with it. A Component provides the physical description of a particular building or system element including, but not limited to, any properties that affect the energy use of the home and the expected useful life of the measure. The database is designed to accommodate an unlimited number of Properties and Costs for a Component and unlimited number of Costs for an Action. At this time there are three Cost records for each Component and each Action. These costs reflect the mean, 10th percentile and 90th percentile of the raw costs collected and processed for the database. References can be assigned to Components, and Actions. At this time there are no References in the database, but anticipated examples of References include best practice instructional documents, case studies, datasheets, etc.

Figure 2. Detailed database schema overview: Components.
Figure 3. Detailed database schema: Components/Actions.

Figure 4. Database schema overview: Measures.
Figure 5. Detailed database schema: Component/Action costs.
2.2 Field Descriptions

A data dictionary is available via the database website using the following uniform resource locator (URL):

http://www.nrel.gov/ap/retrofits/data_dictionary.cfm

A sample of the data dictionary is shown in Figure 6.

2.3 XML Feeds

Two database content XML feeds are provided – one provides the data organized into the pre-defined measures displayed in the UI; the second feed provides the data organized per the underlying database schema. The measure-centric feed is larger because the data are organized in a hierarchical manner, and data are repeated as they are used in multiple measures. In the second XML feed, organized by data table, data are only included once.
In addition the XML feeds, the XML schemas are provided as XSD files. These files provide the schemas in W3C XML format. The XML and XSD feeds can be accessed using the following URL:

http://www.nrel.gov/ap/retrofits/data_disclaimer.cfm

When using a web browser to access the XML, the data can be saved to a file by utilizing the Save As command in the browser application.

Figure 7 shows schematically the XML schema for the measure-centric XML feed. A snippet of the measure-centric XML feed is shown in Figure 8.
Figure 7. Measure-centric XML feed schema overview.
Figure 8. Measure-centric XML snippet.
3 Additional Information

3.1 Component Properties

Not all applications will require or utilize all properties associated with a component. For example an application may utilize air-conditioner SEER or it may use COP coupled with performance curve coefficients. The application developer will need to determine which data are meaningful and useful for their application.

3.2 Costs

Cost data may be provided in a variety of formats. In some cases the cost is total cost for the measure, but in other cases it could be normalized by surface area, equipment capacity, etc. In some cases there may be multiple cost records that will need to be processed to obtain the total cost for the measure. For example, a constant cost and a normalized cost. Developers should check CostUnits to determine if the cost can be used directly or if it needs to be scaled and/or totaled appropriately for the measure.

3.3 Other

Additional details and background information can be found in the Development Document. This includes sources and calculation of measure costs, rules utilized to generate the measure set present in the UI and measure-centric XML feed.