Energy Portfolio Information Management System Technical Specifications

1. Introduction

Energy Portfolio Information Management System (EPIMS) is a web application designed for energy program portfolio data management and reporting.

EPIMS was designed using ASP.NET/VB.NET using NET. Framework 4.0 and SQL Server 2008 R2. It also uses the Telerik Ajax Control Toolkit components as well as SpireXLS (for Excel file processing), JavaScript, HTML and CSS3.

2. Application Infrastructure Overview

Database: Microsoft SQL Server 2008 R2

Programming Languages and Frameworks: ASP.NET, VB.NET, JavaScript, CSS3, HTML, SQL, VBScript, Net. Framework 4.0, Telerik ASP.Net Ajax, SpireXLS, SoftArtisans OfficeWriter

Web and Application Servers: Microsoft Windows Server 2008, Microsoft Windows Server 2012

Business Intelligence & Reporting: Microsoft Reporting services, Microsoft Excel

Office tools: Microsoft Office 2013, Microsoft Office 2016

Compatible Browsers: Internet Explorer, Chrome, Firefox, Safari, Opera, Microsoft Edge

3. Hosting Requirements

Server Software

The EPIMS is built on Microsoft .NET Framework version 4.0 with a database backend stored in Microsoft SQL Server 2008.

- Microsoft Windows 2012 Server operating system
- Microsoft Internet Information Server 7 Note: this component is included with Microsoft server operating systems but must be installed and configured separately.
- .NET Framework version 4.0
- Microsoft SQL Server 2008 R2

Server Hardware

Web Server

- Intel Xeon at 2 GHz or better
- 1 GB RAM or better
- Website files are approximately 30 MB. There are items that can make this grow. For example, users are able to upload project files. Those files exist on the server with references to them in the database.

Database Server

- Intel Xeon at 2 GHz or better

- 1 GB RAM or better (a minimum of 2 GB recommended)
- 40 GB hard drive – This is a high estimate for space required. Actual space needed depends on number of projects and measure specific data.

4. Development Platform

These are the software requirements for modifying or enhancing the source code.

- .NET Framework 4.0 – Provides the managed code runtime and development platform.
- ASP.NET – Feature rich web application platform built in to .NET 4.0.
- Telerik ASP.NET AJAX – Advanced third party component required for file upload, dynamic content and enhanced user interface
- Visual Studio 2010 – Advanced developer toolset for building rich applications rapidly and with high quality. Upgrading to Visual Studio 2015 and ASP.NET 4.5 is possible; we tested the upgrade using the Visual Studio conversion tool and did not encounter any issues.
- SpireXLS – third party software required for processing advanced Microsoft Excel formulas. Microsoft Excel does not need to be installed on the server.
- SoftArtisans OfficeWriter – Advanced third party ASP.NET component required to fill in Microsoft Word template files
- SQL Server 2008 R2 – Advanced relational database management system provides high performance storage, processing, and retrieval of complex business information.

5. Software Requirements for End Users

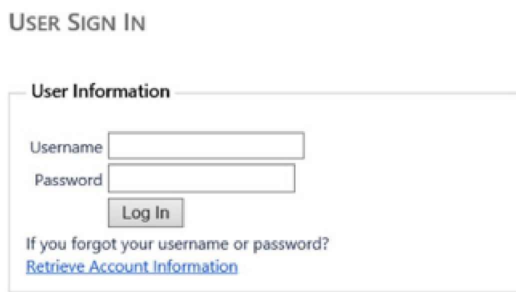
These are the requirements for using the EPIMS application:

- Internet browser – we recommend using the following browsers:
  - Internet Explorer version 9 or higher
  - Mozilla Firefox version 20 or higher
  - Safari version 3 or higher
  - Chrome version 32 or higher
  - Microsoft Edge
- Microsoft Office Excel 2003 or higher – for reading downloaded files.
- Microsoft Office Word 2003 or higher – for reading downloaded files.
- Screen resolution – we recommend a minimum of 1024 x 768.

6. Application Interface

Note that the application interface screen shots shown below reflect customization applicable to a particular energy program portfolio. All system modules and data fields are customized for each energy program portfolio.

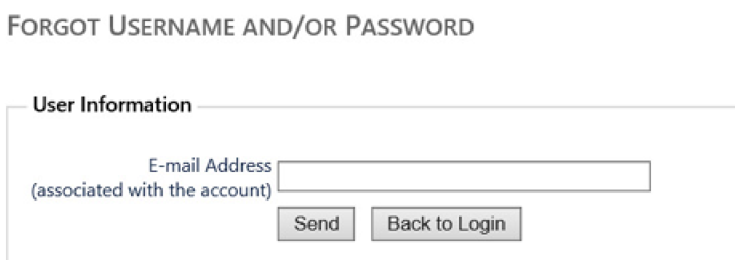
A. Login



User authentication is performed by checking an encrypted database password field corresponding to the connecting user. Once the user is authenticated by the decryption algorithms the information is stored in session variables that are validated throughout the user session during page refreshing. Users are automatically logged out after 20 minutes of inactivity.

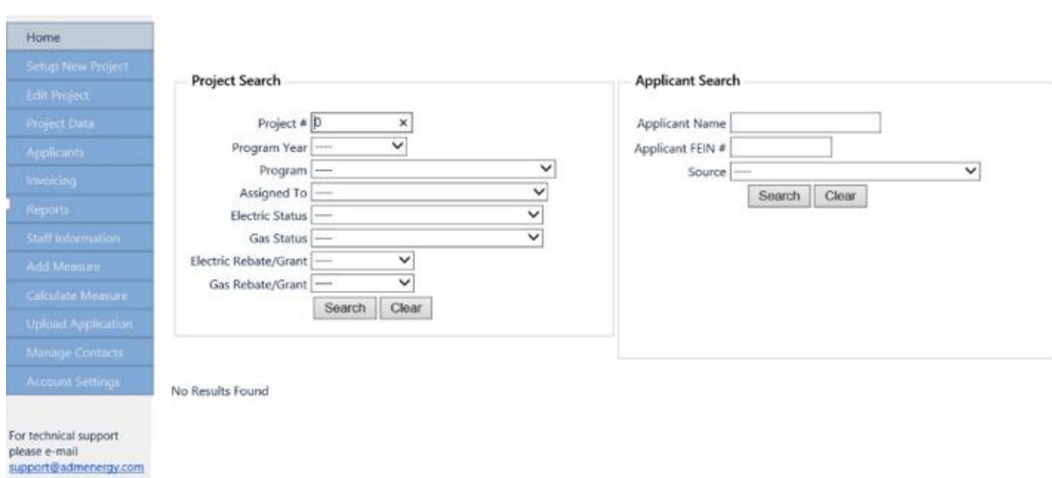
As a general rule user passwords must be a minimum of 8 characters long and contain letters and numbers. To avoid potential database security threats, no special characters are allowed in password fields.

Users have the option of retrieving their account login information directly by e-mail.



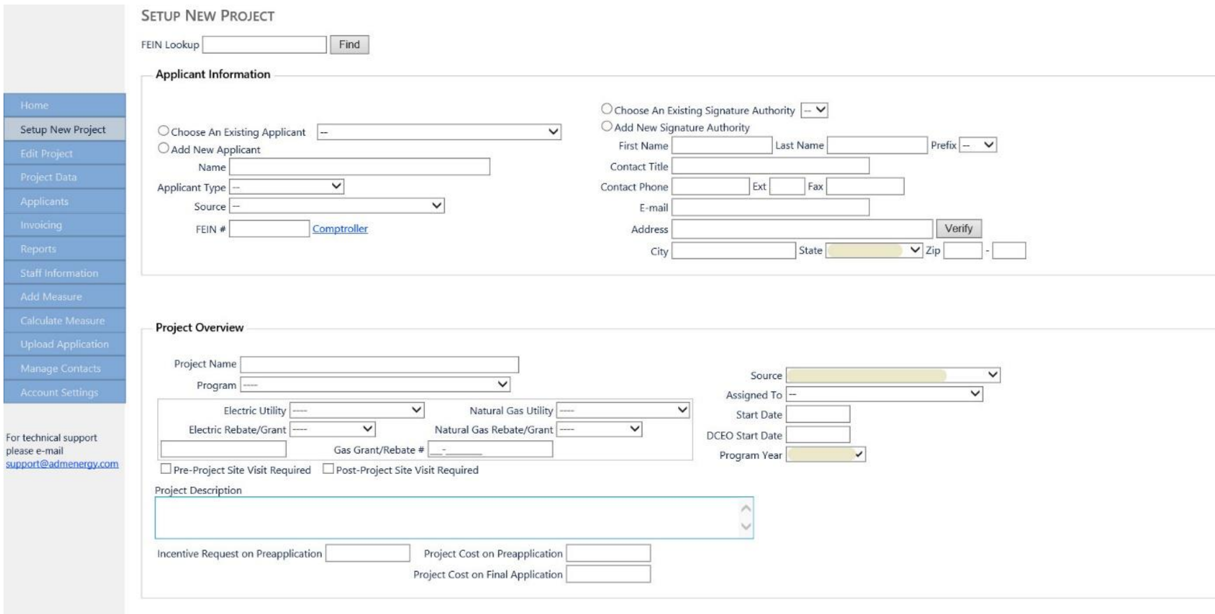
If the e-mail address provided is found in the database the username and password information is sent to the specified e-mail address. The users will be advised to change their password upon login.

B. Home



Once users are authenticated they will be redirected to the home page of the application. The home page serves as an advanced database search for projects and applicants. The user recent search criteria is stored in the database and populated on the home page for easy navigation. The user project history is also present on the Project Data page in the left side panel.

C. Setup New Project



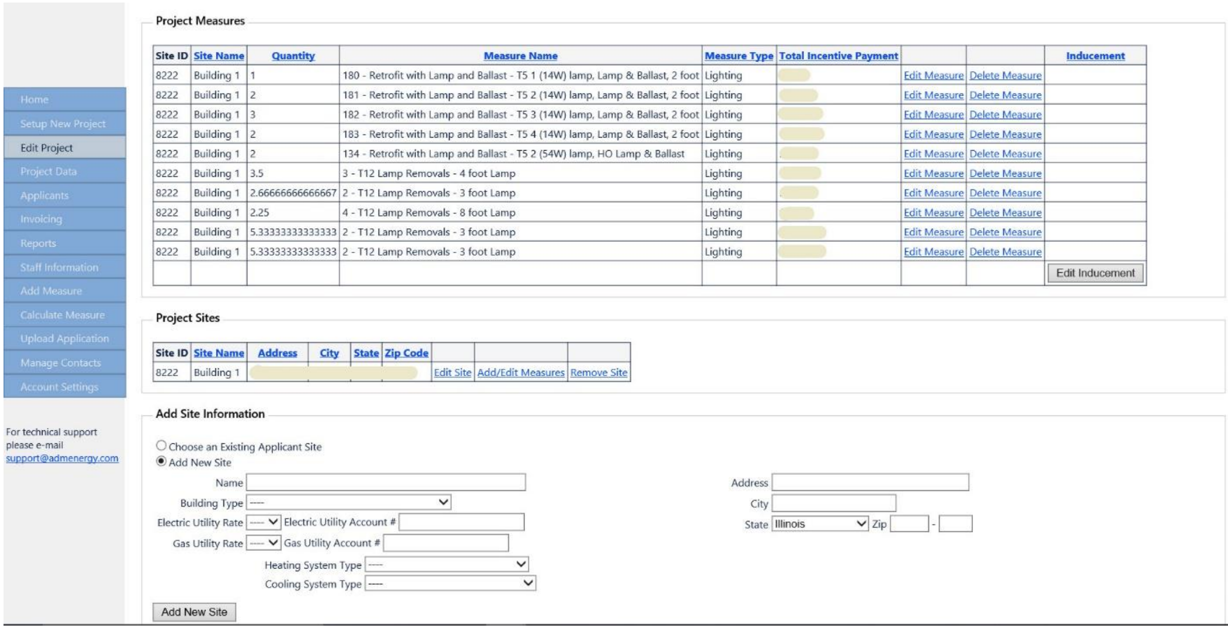
A new project can be added through the Setup New Project interface or by using the Upload Application interface. Setup New Project allows the user to add basic project information that can be later edited in the Edit Project page. When setting up a new project the project number is automatically assigned. The project number must be unique and can be changed only by high level user accounts.

The application has a built in address verifier that compares the data contained in the address fields and returns the correct information from the USPS API portal.

D. Edit Project

Under Edit Project a user can modify any project basic information, add/edit utility information, external funding and much more.

One of the most essential features of the application is the measure creation and management. The measure interface has been built using advanced Excel formulas that are controlled by the application mechanisms to produce the expected saving and incentive values.



Site ID	Site Name	Quantity	Measure Name	Measure Type	Total Incentive Payment			Inducement
8222	Building 1	1	180 - Retrofit with Lamp and Ballast - T5 1 (14W) lamp, Lamp & Ballast, 2 foot	Lighting		Edit Measure	Delete Measure	
8222	Building 1	2	181 - Retrofit with Lamp and Ballast - T5 2 (14W) lamp, Lamp & Ballast, 2 foot	Lighting		Edit Measure	Delete Measure	
8222	Building 1	3	182 - Retrofit with Lamp and Ballast - T5 3 (14W) lamp, Lamp & Ballast, 2 foot	Lighting		Edit Measure	Delete Measure	
8222	Building 1	2	183 - Retrofit with Lamp and Ballast - T5 4 (14W) lamp, Lamp & Ballast, 2 foot	Lighting		Edit Measure	Delete Measure	
8222	Building 1	2	134 - Retrofit with Lamp and Ballast - T5 2 (54W) lamp, HO Lamp & Ballast	Lighting		Edit Measure	Delete Measure	
8222	Building 1	3.5	3 - T12 Lamp Removals - 4 foot Lamp	Lighting		Edit Measure	Delete Measure	
8222	Building 1	2.66666666666667	2 - T12 Lamp Removals - 3 foot Lamp	Lighting		Edit Measure	Delete Measure	
8222	Building 1	2.25	4 - T12 Lamp Removals - 8 foot Lamp	Lighting		Edit Measure	Delete Measure	
8222	Building 1	5.33333333333333	2 - T12 Lamp Removals - 3 foot Lamp	Lighting		Edit Measure	Delete Measure	
8222	Building 1	5.33333333333333	2 - T12 Lamp Removals - 3 foot Lamp	Lighting		Edit Measure	Delete Measure	
								Edit Inducement

Site ID	Site Name	Address	City	State	Zip Code			
8222	Building 1					Edit Site	Add/Edit Measures	Remove Site

Measures reside in individual Excel files containing formula calculations based on input variables. Measures are also mapped in the database in specific tables that trigger various stored procedures that calculate project total energy savings and incentives, measure and location allocations and other required amounts.

E. Project Data

Contains project information related to sites and measures, documents, payment records, site visits, important project contacts, milestones and notes added by project managers.

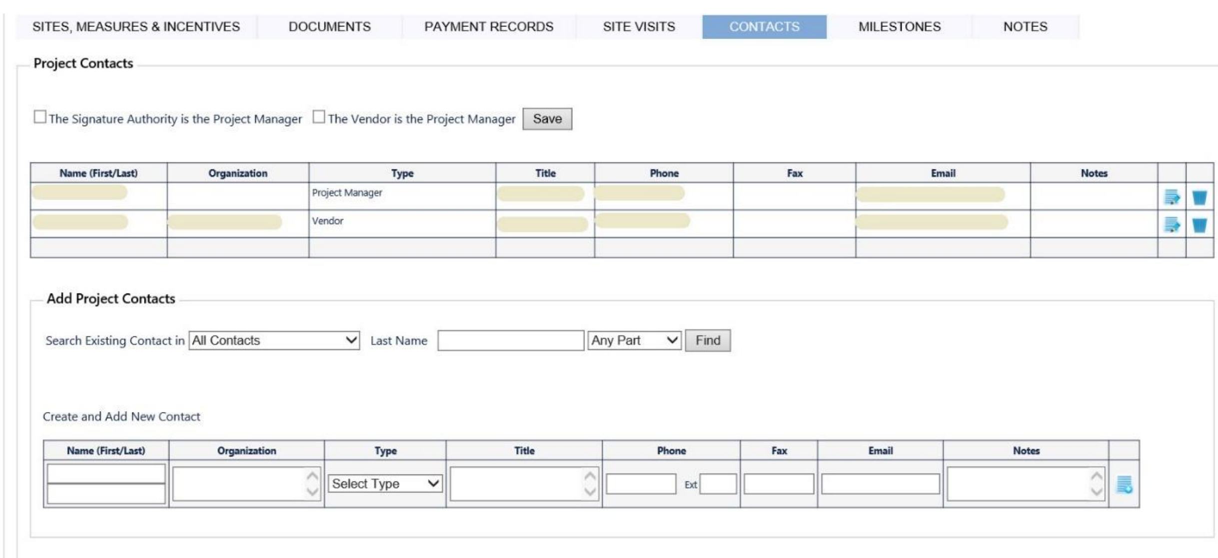
Site	Measure	End Use	Program	Annual Electric Savings (kWh)	Electric Peak Demand Reduction (kW)	Annual Gas Savings (Therms)	Non-Countable Negative Electric Savings (kWh)	Non-Countable Negative Gas Savings (Therms)	I
Building 1	180 - Retrofit with Lamp and Ballast - T5 1 (14W) lamp, Lamp & Ballast, 2 foot	Lighting	Standard/Custom						1
Building 1	181 - Retrofit with Lamp and Ballast - T5 2 (14W) lamp, Lamp & Ballast, 2 foot	Lighting	Standard/Custom						2
Building 1	182 - Retrofit with Lamp and Ballast - T5 3 (14W) lamp, Lamp & Ballast, 2 foot	Lighting	Standard/Custom						3
Building 1	183 - Retrofit with Lamp and Ballast - T5 4 (14W) lamp, Lamp & Ballast, 2 foot	Lighting	Standard/Custom						2
Building 1	134 - Retrofit with Lamp and Ballast - T5 2 (54W) lamp, HO Lamp & Ballast	Lighting	Standard/Custom						2
Building 1	3 - T12 Lamp Removals - 4 foot Lamp	Lighting	Standard/Custom						3.
Building 1	2 - T12 Lamp Removals - 3 foot Lamp	Lighting	Standard/Custom						2.
Building 1	4 - T12 Lamp Removals - 8 foot Lamp	Lighting	Standard/Custom						2.
Building 1	2 - T12 Lamp Removals - 3 foot Lamp	Lighting	Standard/Custom						5.
Building 1	2 - T12 Lamp Removals - 3 foot Lamp	Lighting	Standard/Custom						5.
			Total						

Users can add an unlimited number of files to any project. The maximum file size allowed is 100MB. For security reason, only files with extensions specified in the database are allowed for upload.

Invoices with obligation dates and amounts are automatically added in the Payment Records tab based on project status and other client specific information.

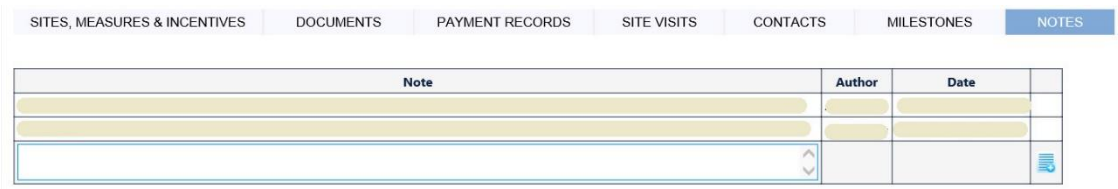
Site visits contain visit type, location, date, staff information and description.

The Contacts section includes all project contacts associated with the project such as vendors, project managers or other entities.



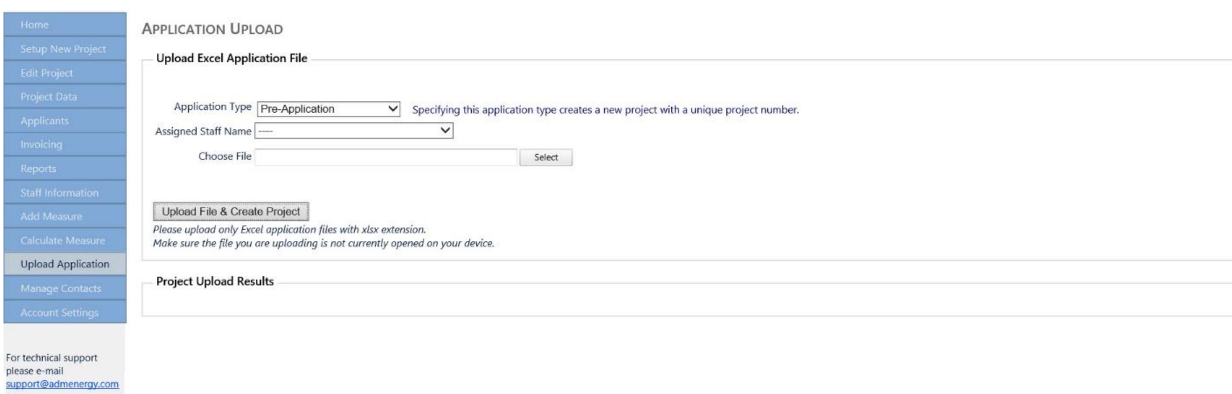
Milestones represent important dates triggering automatic project status changes and invoicing.

Notes can be added by project managers and evaluators. Notes can be deleted only by the applicable authors.



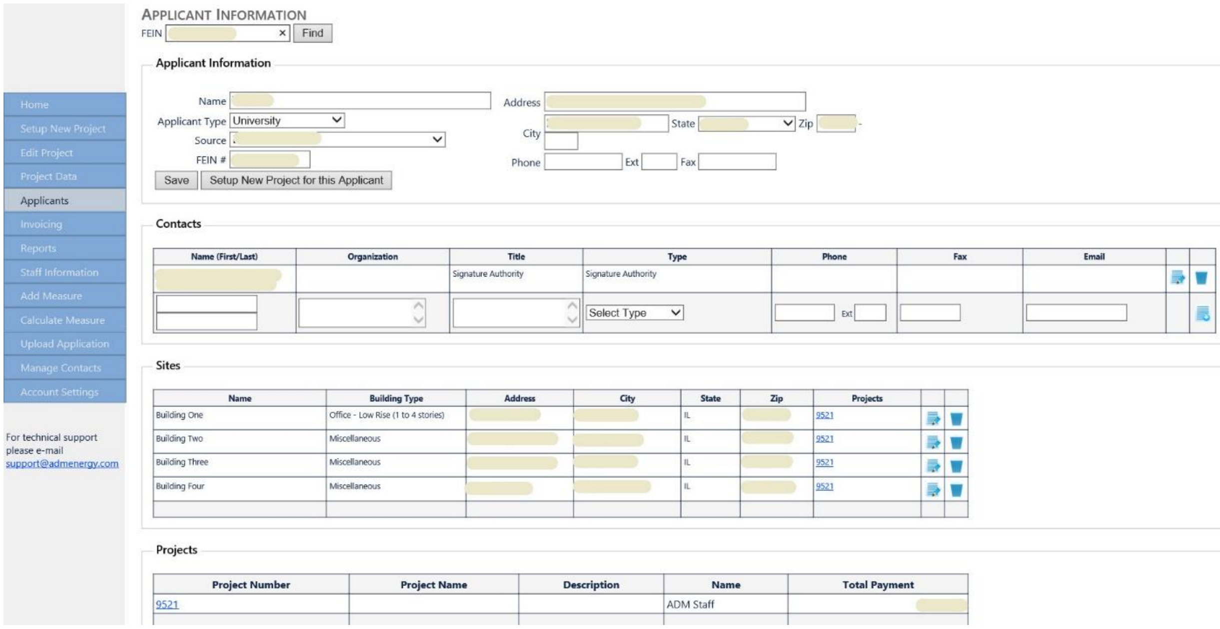
F. Upload Application Form

The most recent addition to the application is newly added component that uploads information from Excel program application forms and creates a program project. This process significantly decreases the time required for adding projects and project data from individual application forms. Custom-designed algorithms are used to read data from Excel applications, compare existing database information to eliminate any potential duplication, and add measures and measure data calculated through elaborated formulas. A complex combination of ASP.NET code, SQL triggers and stored procedures as well as advanced Excel algorithms are used to produce the expected results.



G. Applicant

The applicant page contains basic applicant information as well as contacts, sites and projects associated with an applicant.

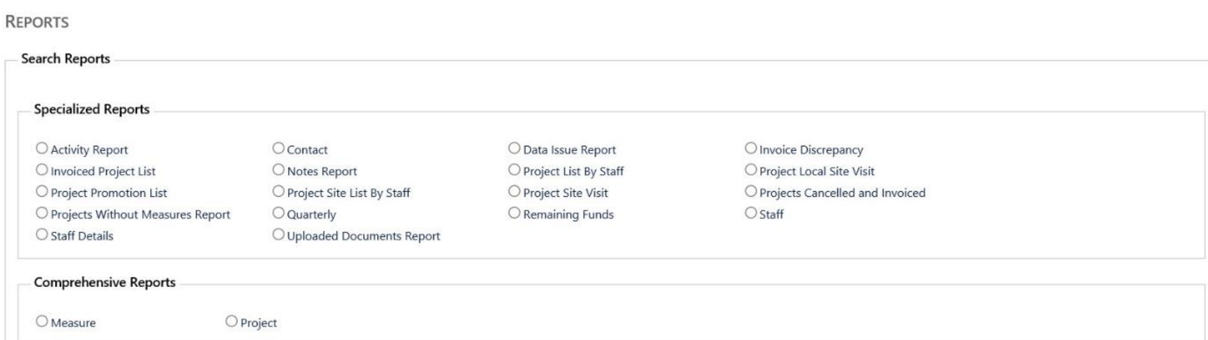


H. Invoicing

Where applicable, this module's interface allows specified users to manipulate invoicing.

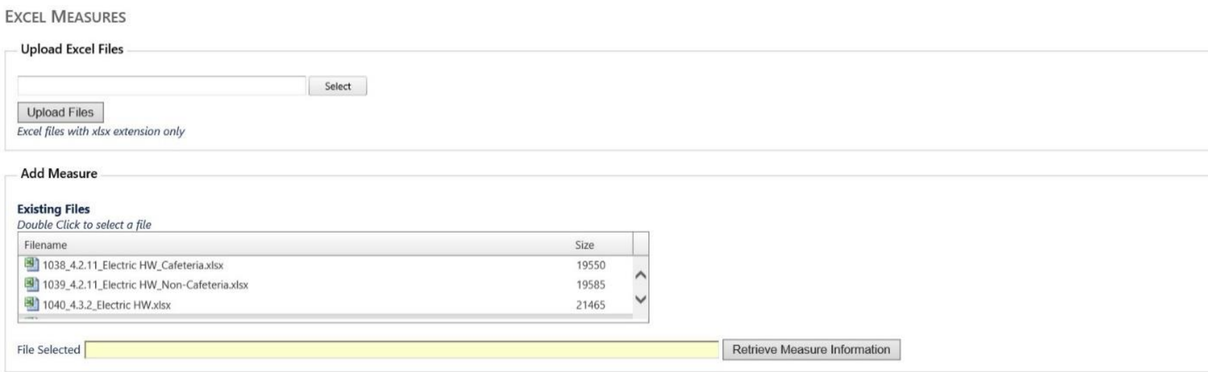
I. Reports

This interface contains a number of custom-designed simple and complex reports for data preview and analysis. Two of the major reports contained in this section are the Measure report which allows for a comprehensive analysis or the measures entered for all or specific program years and the Project report which allows for previewing the total project energy savings and incentives.



J. Add Measure

This interface allows high level users to upload new program measures in the system based on individual Excel measure files containing information to enable calculation of measure-level, project-specific incentive and energy savings amounts. This interface is intended for high level user accounts with sufficient knowledge to create Excel measure files based on predefined templates.



K. Calculate Measure

This interface allows recalculation of measure energy savings and incentives across multiple projects, measures contained in specific projects or specific measures contained in a project. This interface is extremely useful when measure information needs to be changed and recalculation of energy savings and incentives is required across the database.

L. Manage Contacts

This interface is used to determine contact duplication and creates an overview of all the contacts contained in the database. Duplication of contacts can be easily removed by merging duplicate contact data into one entry.

M. Staff Information

This interface is available to high level user accounts and allows adding and managing all the user accounts contained in the database.

N. Account Settings

This interface allows the connected user to make changes to their account information such as changing the current password.

7. User Accounts

IT/Admin Level

Designed for select staff who need access to all web application pages, functionality, and IEN projects.

Project Manager Level

Designed for users that require full access to the database similar to the IT/Admin level, with the exception of: managing measure incentives, viewing or editing user levels and user passwords, and performing project invoicing.

General Staff (View Only) Level

This user can view all projects in the system, even those outside of their designated staff source. However, like the View Only user level, they would not be able to edit projects, applicants, or locations outside of their designated staff source.

General Staff Level

Designed for users who must have their project access restricted to projects within their own staff source.

View Only Level

Designed to give users viewing rights to the data, including reporting, but cannot edit or add data to the database.

8. Application Security

The application security was designed by the following guidelines:

- Access to the application is made through username and password information stored in the database. User passwords must be a minimum of 8 characters long and contain letters and numbers. To avoid potential database security threats, no special characters are allowed in password fields.
- Users are automatically logged out after 20 minutes of inactivity
- The database authentication is performed through a SQL user account
- Validation of all input parameters to prevent attacks such as SQL injection and cross-site scripting attacks
- The application only accepts data containing a strictly limited and expected set of characters.
- Sensitive session values are kept on the server to prevent client-side modification
- The end-user account only has specific privileges to access the functions that they are authorized to access, restricting access to the backend database, or to run SQL commands, and operating system commands.
- Folder mapping is used as a filtering layer to prevent access to the actual file directory paths.