Application Note 2027:
VRF Energy Comparison Tool

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Table of Contents

Introduction 3
How it works 3
HVAC system types are available for comparison 3
Minimum requirements to complete a comparison 3
Outputs that the Tool can generate 4
How to Begin and Complete a Report 4

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Introduction

This Application Note provides an overview related to the VRF Comparison Tool. The VRF Comparison Tool is a web-based application that provides a customized comparison of Mitsubishi VRF against other existing or proposed HVAC systems. This web-based tool was developed by The Weidt Group, an industry leader in energy software modeling tools and energy benchmarking. The tool is currently available only to Mitsubishi employees. Please contact your Mitsubishi representative if you are interested in an energy comparison for your project.

How it works

The VRF Comparison Tool uses a sophisticated building simulation called WeidtSim that performs thermal and illuminance calculations on an hour-by-hour basis, using DOE II as the calculation engine. The Tool allows for comparison of VRF systems by utilizing custom VRF algorithms provided by EnergySoft. An ASHRAE 90.1 baseline, Mitsubishi Electric VRF, and up to 3 alternate systems may be selected for comparison. Depending on the project location, the Tool can generate the average utility rates or specific utility rates can be used if known. The focus of the analysis is to show the impact of the HVAC system choice on the energy use of the building with generated output reports such as estimated system energy use and costs as well as a life-cycle cost. Actual energy use of any of the schemes will depend on further detailed design and operation of the building.

HVAC system types are available for comparison

- Mitsubishi VRF – R2-series, R2 h2i-series, Y-series, or Y h2i series
- Generic VRF – Heat Pump or Heat Pump with Heat Recovery
- Variable Air Volume
- Packaged Single Zone
- Fan Coil: 2-Pipe by Season, 2-Pipe by Temperature, or 4-pipe
- Water Source Heat Pump

Minimum requirements to complete a comparison

- Project Location (city, state)
- Building Type (for example: office, school, hotel, etc.)
- Is this a New or an Existing Building? If existing, need year built and existing HVAC system type.
- ASHRAE 90.1 version (for building baseline)
- Total Building Area (ft²)
- HVAC Systems for Comparison

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Outputs that the Tool can generate

The VRF Comparison Tool can generate three types of PDF reports: an executive summary, a detailed analysis, or both the summary and detailed analysis in one PDF file.

How to Begin and Complete a Report

Here is a step-by-step process on how to get started and how to generate a report for your customer.

1. Using a PC or tablet that supports Internet Explorer 10, FireFox, Safari, or Chrome internet browsers; Go to www.mitsubishielectricadvantage.com
2. Log in using your Extranet credentials. User name and password for the tool is the same as your Extranet account.
3. Once logged in, start by clicking on the *Add Project* button.
4. You will be prompted to enter the project name, stakeholder name and role. The stakeholder is the client of interest for whom the report is created and the stakeholder's name and role will appear in the reports. Click the *Create* button to complete and continue.

   *****Note***** You will notice a gray question mark symbol (?) next to some input fields. If you click on the ? symbol, a popup text will describe the purpose of the input field. The ? symbol can be found throughout the input fields of the tool and can be used as a guide to help you provide the correct information. Missing information or an error in the input will be always be highlighted in yellow with an explanation of the error in a yellow box will appear at the top right hand corner.

5. You will now see the ***Building Definition*** page where you can define your building by providing the building type, location, total area, etc. Provide the building information and click *Done*. The tool will then generate "space asset areas" that pertain to the building type you have selected. The building area you defined will be apportioned to each space asset area. A space asset area (SAA) is similar to a zone in the building. Multiple space asset areas of the same type in the building may be needed if they have different occupancy schedules, HVAC configurations, etc. When the space asset areas look complete, click on the *HVAC Configuration* button to continue.

   *****Note***** You will notice that the project menu is located at the left hand side of the page. You can activate the menu option by moving your mouse cursor over the menu or by clicking on it. The Project Menu is where you can activate the *Advanced Configuration* or save the progress of your project file. The *Advanced Configuration* is optional and once selected, will allow you to change advanced settings such as the shape of the building, efficiency values of HVAC systems, or maintence costs for the life cycle cost analysis.

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6. At the ***HVAC Configuration*** menu, you can adjust the ASHRAE baseline, modify the Mitsubishi Electric VRF system, or add/remove up to 3 more alternate systems for comparison. The tool will automatically assign the space asset areas for HVAC system and this can always be modified. Once complete, click on the *Financials* button to continue.
7. At the ***Financial*** menu, you can define the utility rates. The tool will automatically generate the average utility rates based on the project location but this can always be modified. If the *Advanced Configuration* mode is selected, you will be able to view and adjust variables that affect the life cycle cost analysis. Once complete, click on the *Results* button to continue.

   *****Note***** We recommend increasing the VRF equipment life to 20 years and cutting the VRF maintenance costs in half for each VRF system in the advanced financial settings. Mitsubishi VRF systems are built with the highest quality and have an expected life of well over 20 years. Due to the lack of published data on VRF maintenance, the tool currently uses a 4% of first cost maintenance which is very high for any VRF system. Half or 2% of first cost is a more realistic maintenance cost for VRF.

8. You must save the project before running the simulation. Click on the *Save & Run Simulation* button. After the simulation, the tool will produce a results summary on the browser page. You will be able to see the Life Cycle Costs, Energy Use, Energy Costs, potential LEED points, and carbon emissions of the building and HVAC systems. On the *Results* menu, you will also be able to generate PDF reports by clicking on the *Create Report* button. You will be able to create an Executive Summary, a Detailed Analysis, or a Summary & Details PDF report. The PDF report can be saved and shared. The actual project file is saved on a cloud server so it is accessible from anywhere through your personal account. Project files cannot be saved or shared locally.

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