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# Modeling Guide for Daikin VRV in EnergyPro 6

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## Introduction

This modeling guide contains step-by-step instructions for modeling Daikin VRV IV, III and WIII systems in EnergyPro version 6.7. To purchase and learn more about EnergyPro, please visit <http://www.energysoft.com/>.

Please visit Daikin city website <https://www.daikincity.com/> following the path: [Library Home](#) > [07 VRV/LC Sales Partners](#) > [Sales Tools & Applications Resources](#) > [Sales and Applications Tools](#) > [Energy Simulation](#) for new products information update.

The product library in the tool includes all the currently active Daikin VRV outdoor and indoor units in the US market. The calculation is based on the heating and cooling performance curves (capacity corrections, power input correction and part load data) for both outdoor and indoor units.

This document and its associate library file are intended to provide necessary data to help designers optimize the design of Daikin VRV systems based on building energy cost. This guide should be used as a guideline only. The modeling accuracy is highly dependent on the user input data and it is the users' responsibility to understand how the input data will affect the program output.



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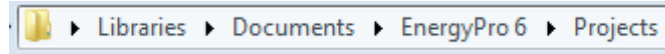
## **Program Installation**

Please purchase the software first and then follow the instructions provided by the sales.

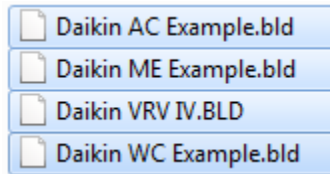
## Importing Designated VRV Product File

This session demonstrates how to import the designated Daikin VRV products into the working project file.

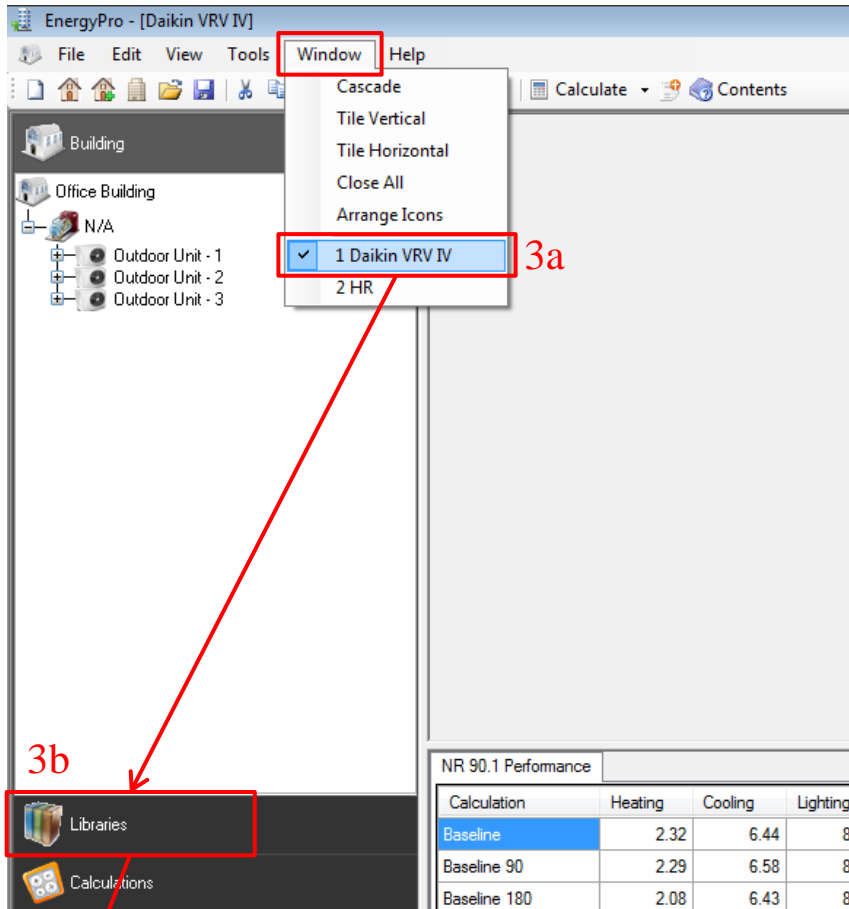
1. After installing the software, the product library is installed automatically and can be found at the path:



2. There are four .bld files in this 'Projects' file folder: Daikin AC Example, Daikin ME Example, Daikin VRV IV and Daikin WC Example.
  - a. Daikin AC Example includes all the VRV III air-cooled products and indoor units.
  - b. The products included in Daikin ME Example are not available in the US market.
  - c. Daikin VRV IV includes all the VRV IV air-cooled products, with and without the VRT feature, and an updated library of currently active indoor units.
  - d. Daikin WC Example includes all the VRV III water-cooled products and indoor units.

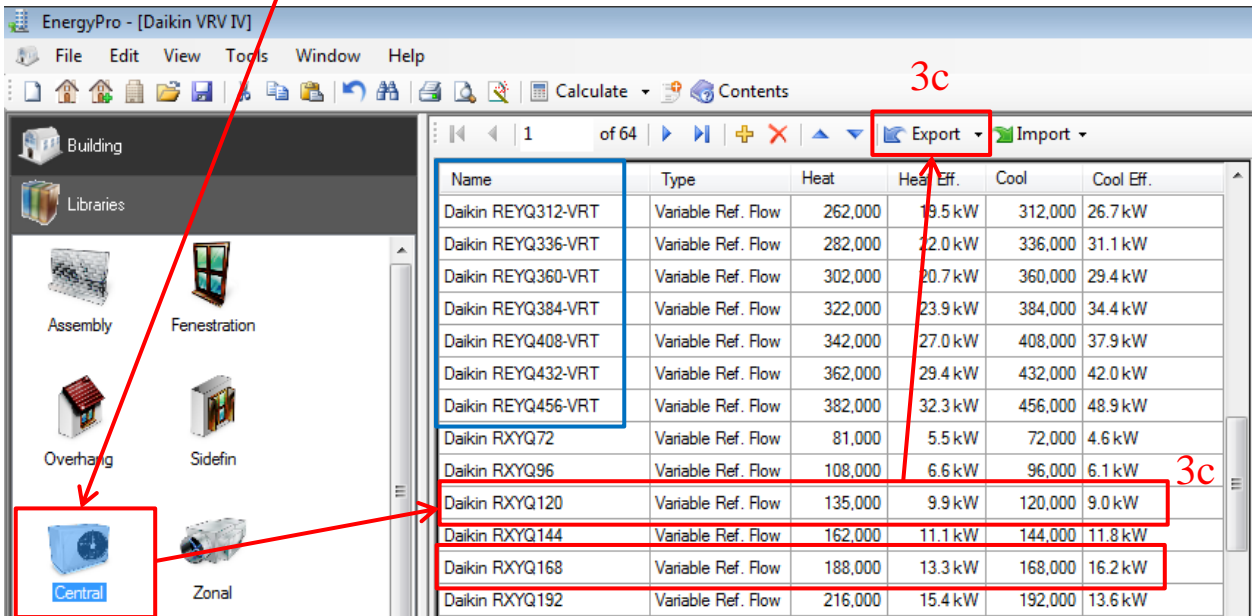


3. Normally for one project, only several products are used. To import the designated products, open both one of the example .bld files mentioned above and the working project file. Taking Daikin VRV IV library as an example: the project needs RXYQ120 and 168 as outdoor units and FXFQ07, FXFQ12, FXFQ24 as the indoor units.
  - a. Select 'Daikin VRV IV' in the 'Window'. The 'HR' is the working project.
  - b. Click on 'Libraries'.
  - c. Select 'Central'. The list of outdoor units will be shown in the right. Ctrl select the designated outdoor units RXYQ120 and 168, and click 'Export'. The entries with 'VRT' in the end of the name mean this outdoor unit operates with the VRT feature.

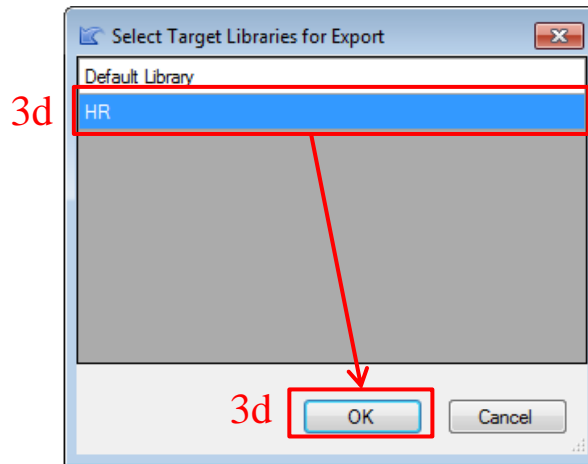


NR 90.1 Performance

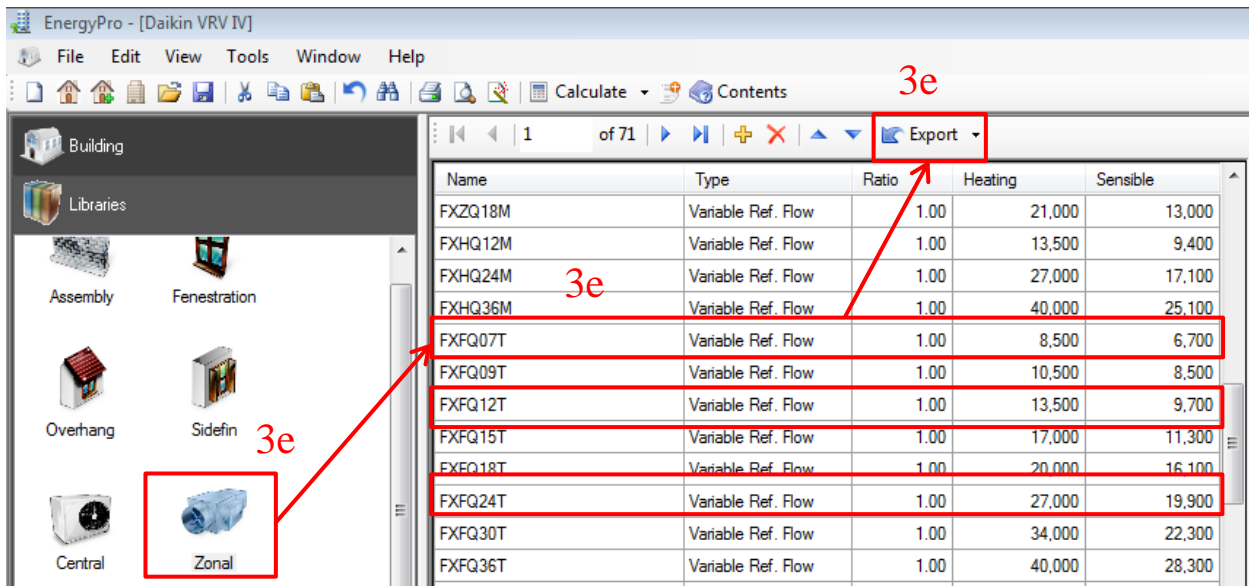
Calculation	Heating	Cooling	Lighting
Baseline	2.32	6.44	8.0
Baseline 90	2.29	6.58	8.0
Baseline 180	2.08	6.43	8.0



- d. A window will pop out and select the working project 'HR' in that window. Then click 'OK'. A window will pop out and inform that 'Export Operation Complete'. Click 'OK' to close the window.



- e. Then select 'Zonal' to choose the wanted indoor units. Ctrl select the designated indoor units FXFQ07, 12 and 24, and click 'Export'. Repeat the **Step 3d** and then the importing process is finished.

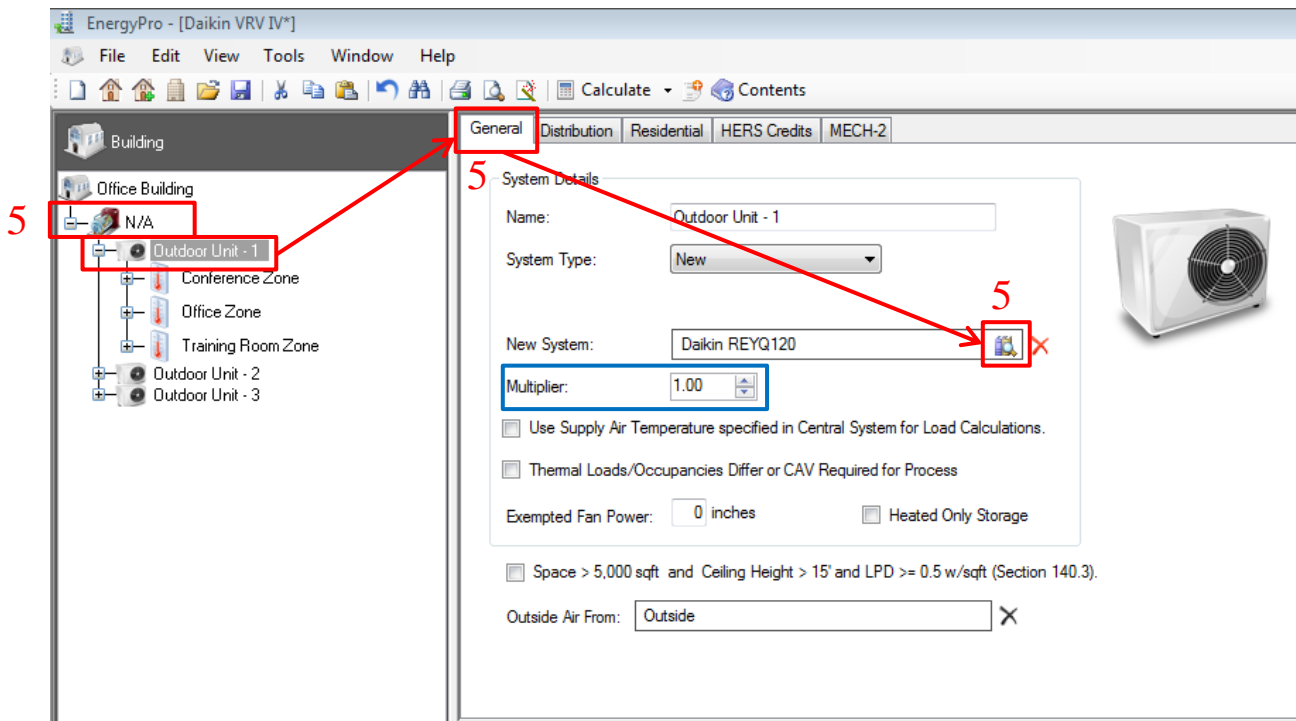


## System Modeling

This session demonstrates how to model the VRV system in EnergyPro 6. The example files mentioned in **Step 2** are good examples to properly set up the building and system. This session only provides the necessary steps to set up the VRV system in the tool. Users should make their own choices and inputs on the other variables that are not mentioned in this guide.

### Modeling air-cooled outdoor units

4. Setting up the building and HVAC systems in EnergyPro starts with creating a plant. In the tabs under the Plant, there are options to set up the water system and renewable energy systems. For air-cooled VRV system, no heating hot water and chilled water system is needed.



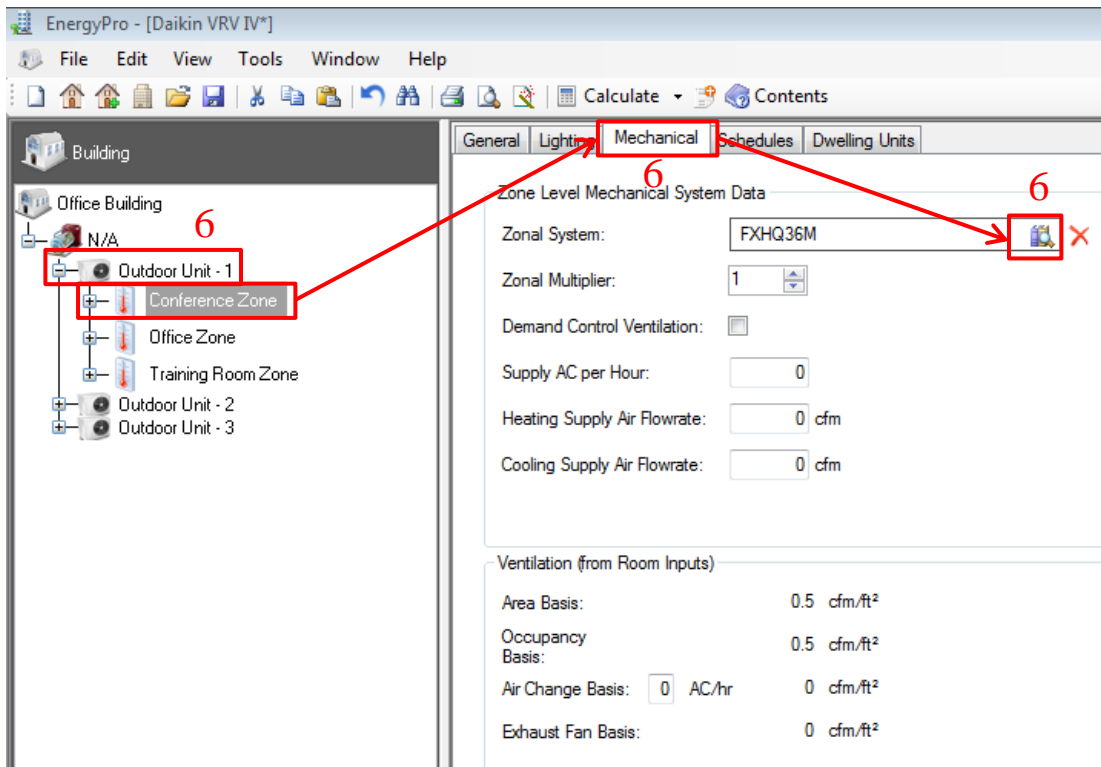
5. Right click the *Plant* to 'Add System'. One system is corresponding to one outdoor unit. Then in the 'General' tab, click the icon to select the wanted outdoor unit imported from the library.

**\*NOTE:** Please be cautious when define the multiplier larger than 1. Unlike chiller or VAV systems, one VRV outdoor unit and its connected indoor units form a complete refrigerant cycle, so in reality it is very unlikely that several

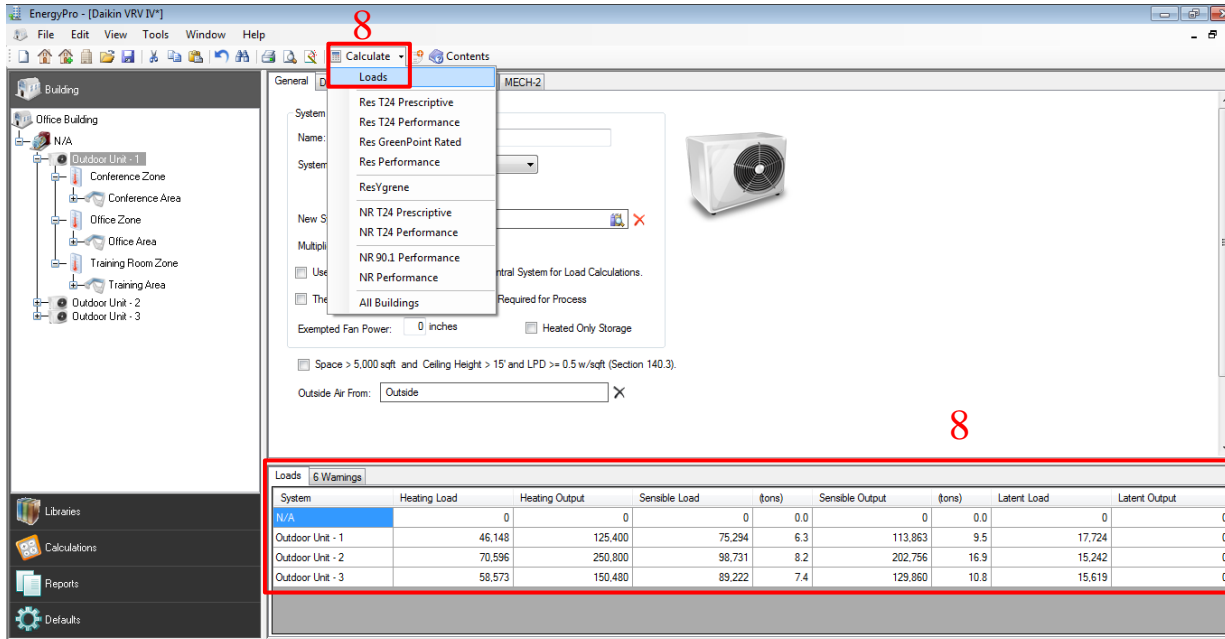


outdoor units connect with the same indoor units. But in simulations, simplifications are made sometimes that an entire floor is served by one 'System' that has several outdoor units (multiplier larger than 1). Please be noted that it will not happen in reality and it may cause errors in calculation and wrong system sizing for the building.

6. Right click on the System to 'Add Zone'. Select the wanted indoor unit as the Zonal System under the 'Mechanical' tab.



7. Repeat the process for each indoor and outdoor unit design.
8. Since EnergyPro does not have auto-sizing function, after the indoor and outdoor unit selection, calculate the loads first to make sure all the selected outdoor unit capacity can meet the building load. Since there is no latent capacity is defined for the outdoor units, the latent output is always zero as it appears.



9. Also, after performing NR90.1 or NR T24 calculation, the 'Zone Load Summary' report should be pulled out to make sure all the indoor unit capacity has met the zone load.

\*NOTE: Due to the restrictions of the software, the benefits of the VRT feature cannot be properly presented at sometimes. This is because the efficiency boost using the VRT feature is based on a sacrifice of the capacity. The idea is to adjust the evaporator and condenser temperature to achieve higher efficiency when less capacity is needed by the building. In reality the evaporator and condenser will automatically select a proper temperature to provide enough capacity based on the building load, while in the performance curves used in the software has already preset the possible capacities under certain temperatures. Therefore, when the building load is high at certain temperatures, the software cannot change the capacity to meet the load and there are a lot of unmet load hours to trigger the auxiliary cooling, and then lead to higher energy consumption. So when the benefit of the VRT feature is not presented during the simulation, please check the hours using the auxiliary cooling. If a high value (more than 1000 hours) is found, it means a larger outdoor unit should be applied to meet the building loads.

## Modeling water-cooled outdoor units

The water-cooled outdoor units can be set up following the same procedure. Please make sure that water-cooled products are selected in **Step 5**. The only difference is that in the *Plant*, a boiler should be selected under the 'Heating Hot Water' tab and the 'Ground Coupled System' should be checked if geothermal system is applied or a 'Cooling Tower' should be selected under the 'Hydronic' tab.

The screenshot displays two panels of the software interface. The top panel is titled 'Heating Hot Water' and shows a tree view on the left with 'Cooling Tower/Boiler' selected. The main area contains configuration fields for a 'Cooling Tower/Boiler' with 'New Boiler' set to 'Laars JVH160ND(I/L)'. The bottom panel is titled 'Hydronic' and shows 'Ground Coupled System' checked. The main area contains configuration fields for a 'Cooling Tower' with 'Cooling Tower' set to '30 Ton Tower/3 HP'. Red arrows point from the text in the previous block to these specific configuration elements.