CARRIER
HOURLY ANALYSIS PROGRAM v5.0
NEW FEATURES GUIDE

Carrier Software Systems
Carrier Corporation
Syracuse, New York

Rev. June 22, 2016

Contents
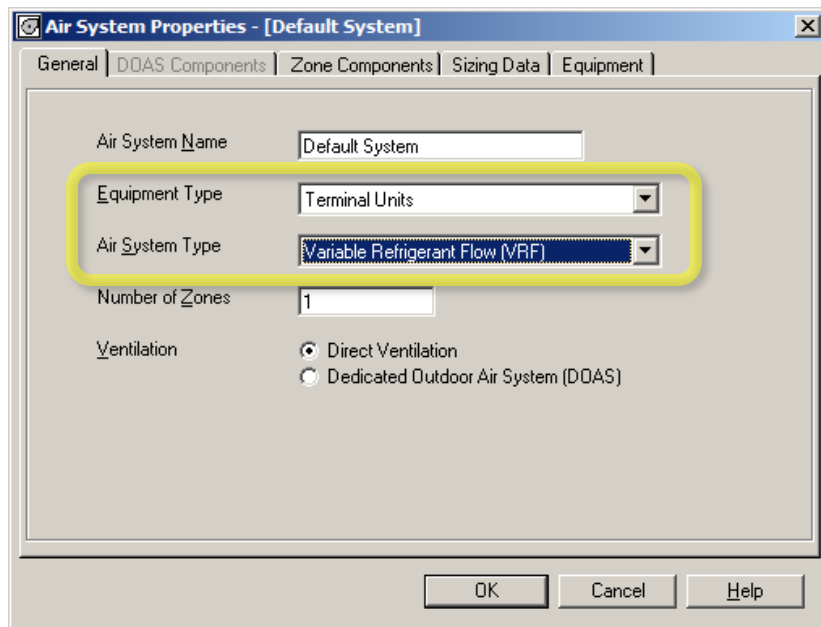
AIR-SIDE FEATURES

Variable Speed Rotary VRF

Details*: Added simulation performance curves for variable speed rotary compressor VRF condensing units. With this addition, HAP now offers three types of performance models for VRF: variable speed rotary, variable speed scroll, and digital scroll.*

Figures show the HAP detailed input screens.

Variable Speed Rotary VRF

HAP v5.0

***Details**: Inputs specify capacity, EER, COP, compressor type, and controls. During energy simulation HAP applies these inputs to the performance curves to create a scaled performance model for the VRF condensing unit. The model then calculates how efficiency changes each hour with changing operating conditions.*

Figures show the HAP wizard screens.

ASHRAE Std. 62.1-2013

Details: ASHRAE Standard 62.1-2013 ventilation defaults has been added, as well as Ventilation Rate Procedure sizing calculations.

Ventilation Sizing Summary Report

HAP v5.0
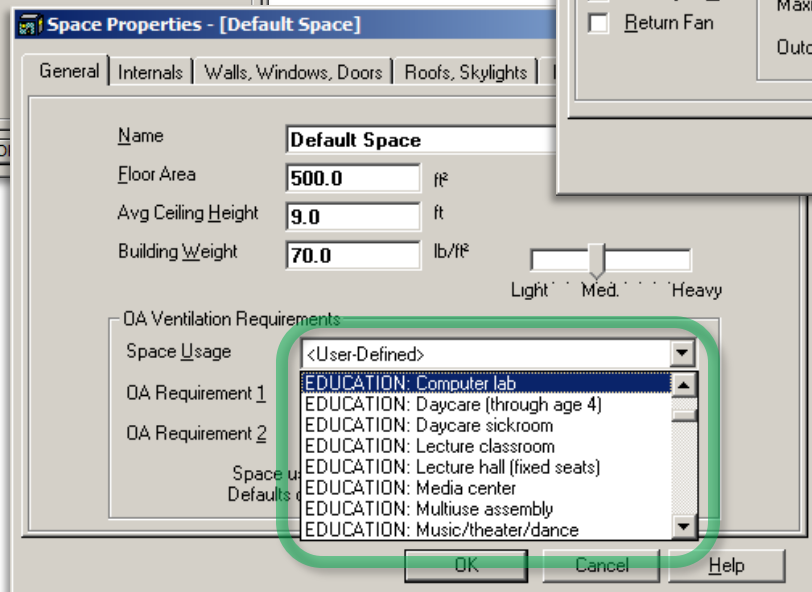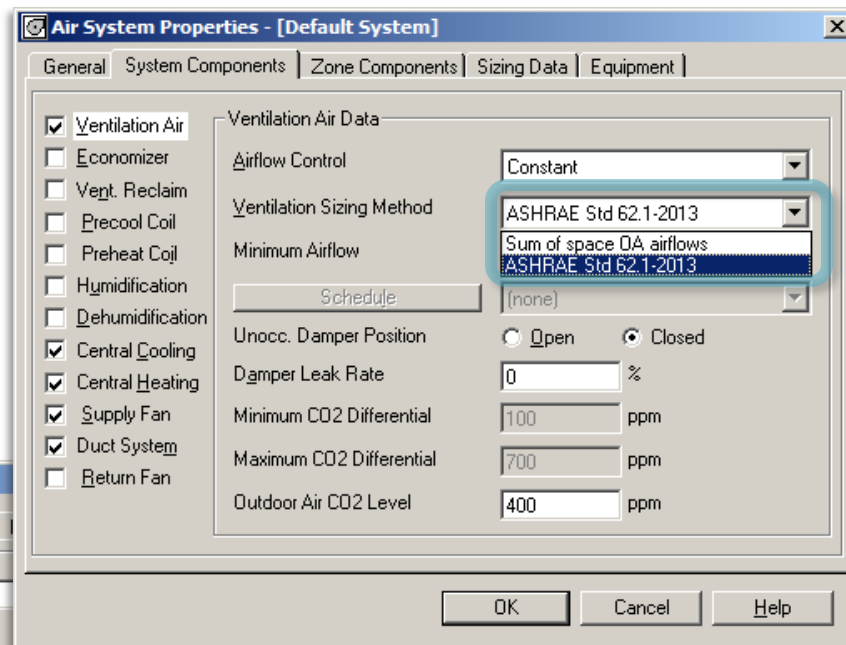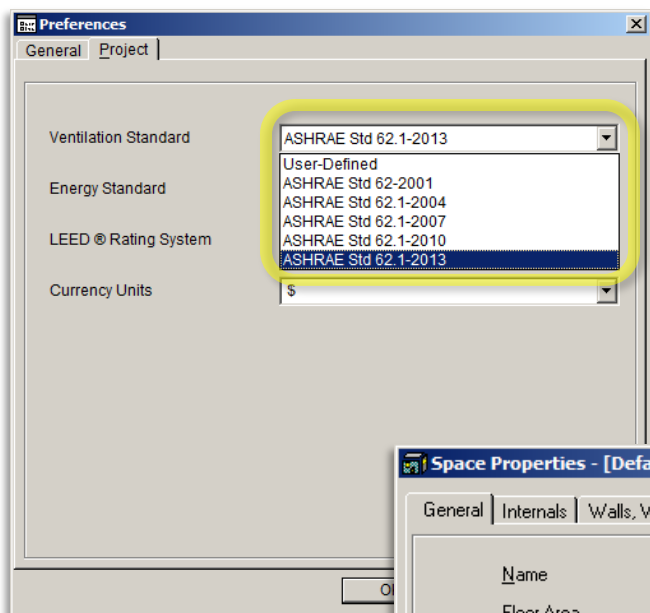
Details*: New layout for terminal systems clarifies sizing of zone ventilation airflow and DOAS airflow:*

New table summarizes system ventilation requirements

Zones now listed separately, with individual per-zone totals. This better reflects actual sizing calculation procedures.

Ventilation Sizing Summary

Project Name: VSS
Prepared by: carrier corporation

1. Summary
Ventilation Sizing Method .... ASHRAE Std 62.1-2007
Design Condition .... Heating operation

Zone Name	Zone Outdoor Airflow (CFM) (Voz)	Uncorrected Outdoor Air Intake (CFM) (Vou)	Ventilation Efficiency (Ev)	Outdoor Air Intake (CFM) (Vot)
BLD1-F001-Z01		606	0.929	652
BLD1-F001-Z02	191		1.000	191
BLD1-F001-Z03		1014	0.852	1190
BLD1-F001-Z04	112		1.000	112
System Total				**2144**

Note: For terminal systems, Standard 62.1 considers each terminal unit to be a "ventilation system". Standard 62.1 calculations are performed separately for each terminal unit zone. Outdoor air intake flow rates for all terminal zones are summed to determine the total system outdoor air flow rate.

2. Space Ventilation Analysis

2.1 Zone: BLD1-F001-Z01

Zone Name / Space Name	Mult.	Supply Air (CFM) (Vpz)	Space Floor Area (ft²) (Az)	Area Outdoor Air Rate (CFM/ft²) (Ra)	Time Averaged Occupancy (Occupants) (Pz)	People Outdoor Air Rate (CFM/person) (Rp)	Air Distribution Effectiveness (Ez)	Space Outdoor Air (CFM) (Voz)	Breathing Zone Outdoor Air (CFM) (Vbz)	Space Ventilation Efficiency (Evz)
BLD1-F001-Z01										
BLD1-F001-Z01	1	342	225.0	0.06	1.1	5.00	0.80	24	19	1.020
BLD1-F001-Z02	2	1190	1800.0	0.06	9.0	5.00	0.80	191	153	0.929
BLD1-F001-Z03	1	279	225.0	0.06	1.1	5.00	0.80	24	19	1.004
BLD1-F001-Z04	1	1114	1050.0	0.06	5.3	5.00	0.80	112	89	0.990
BLD1-F001-Z05	1	368	225.0	0.06	1.1	5.00	0.80	24	19	1.025
BLD1-F001-Z06	1	2251	1800.0	0.06	9.0	5.00	0.80	191	153	1.005
Totals (incl. Space Multipliers)		**6735**							**606**	**0.929**

2.2 Zone: BLD1-F001-Z02

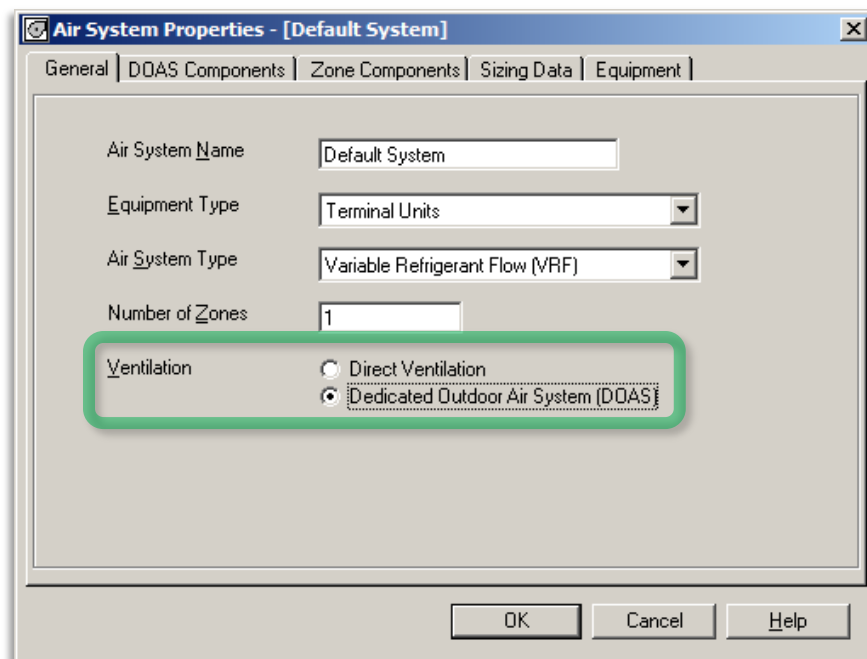| Zone Name / Space Name	Mult.	Supply Air (CFM) (Vpz)	Space Floor Area (ft²) (Az)	Area Outdoor Air Rate (CFM/ft²) (Ra)	Time Averaged Occupancy (Occupants) (Pz)	People Outdoor Air Rate (CFM/person) (Rp)	Air Distribution Effectiveness (Ez)	Space Outdoor Air (CFM) (Voz)	Breathing Zone Outdoor Air (CFM) (Vbz)	Space Ventilation Efficiency (Evz)
BLD1-F001-Z02										
BLD1-F001-Z02	1	1190	1800.0	0.06	9.0	5.00	0.80	191	153	1.000
Totals (incl. Space Multipliers)		**1190**							**153**	**1.000**

2.3 Zone: BLD1-F001-Z03

Zone Name / Space Name	Mult.	Supply Air (CFM) (Vpz)	Space Floor Area (ft²) (Az)	Area Outdoor Air Rate (CFM/ft²) (Ra)	Time Averaged Occupancy (Occupants) (Pz)	People Outdoor Air Rate (CFM/person) (Rp)	Air Distribution Effectiveness (Ez)	Space Outdoor Air (CFM) (Voz)	Breathing Zone Outdoor Air (CFM) (Vbz)	Space Ventilation Efficiency (Evz)
BLD1-F001-Z03										
BLD1-F001-Z03	1	279	225.0	0.06	1.1	5.00	0.80	24	19	1.061
BLD1-F001-Z07	1	406	225.0	0.06	1.1	5.00	0.80	24	19	1.087
BLD1-F001-Z08	1	1279	1050.0	0.06	5.3	5.00	0.80	112	89	1.059
BLD1-F001-Z09	1	3034	8400.0	0.06	42.0	5.00	0.80	893	714	0.852
BLD1-F002-Z01	1	387	225.0	0.06	1.1	5.00	0.80	24	19	1.084
BLD1-F002-Z02	1	1552	1800.0	0.06	9.0	5.00	0.80	191	153	1.023
Totals (incl. Space Multipliers)		**6937**							**1014**	**0.852**

Carrier
United Technologies

DOAS Terminology

Details: Updated terminology to consistently use "Dedicated Outdoor Air System" (or DOAS) throughout the program.

WIZARD FEATURES

Waterside Economizer for Air-Cooled Chiller Plants

Details: *This feature models a cooling tower used for direct cooling duty alongside air-cooled chillers, when ambient conditions allow. Integrated and non-integrated configurations are supported. This complements existing features for water-cooled chiller plants.*
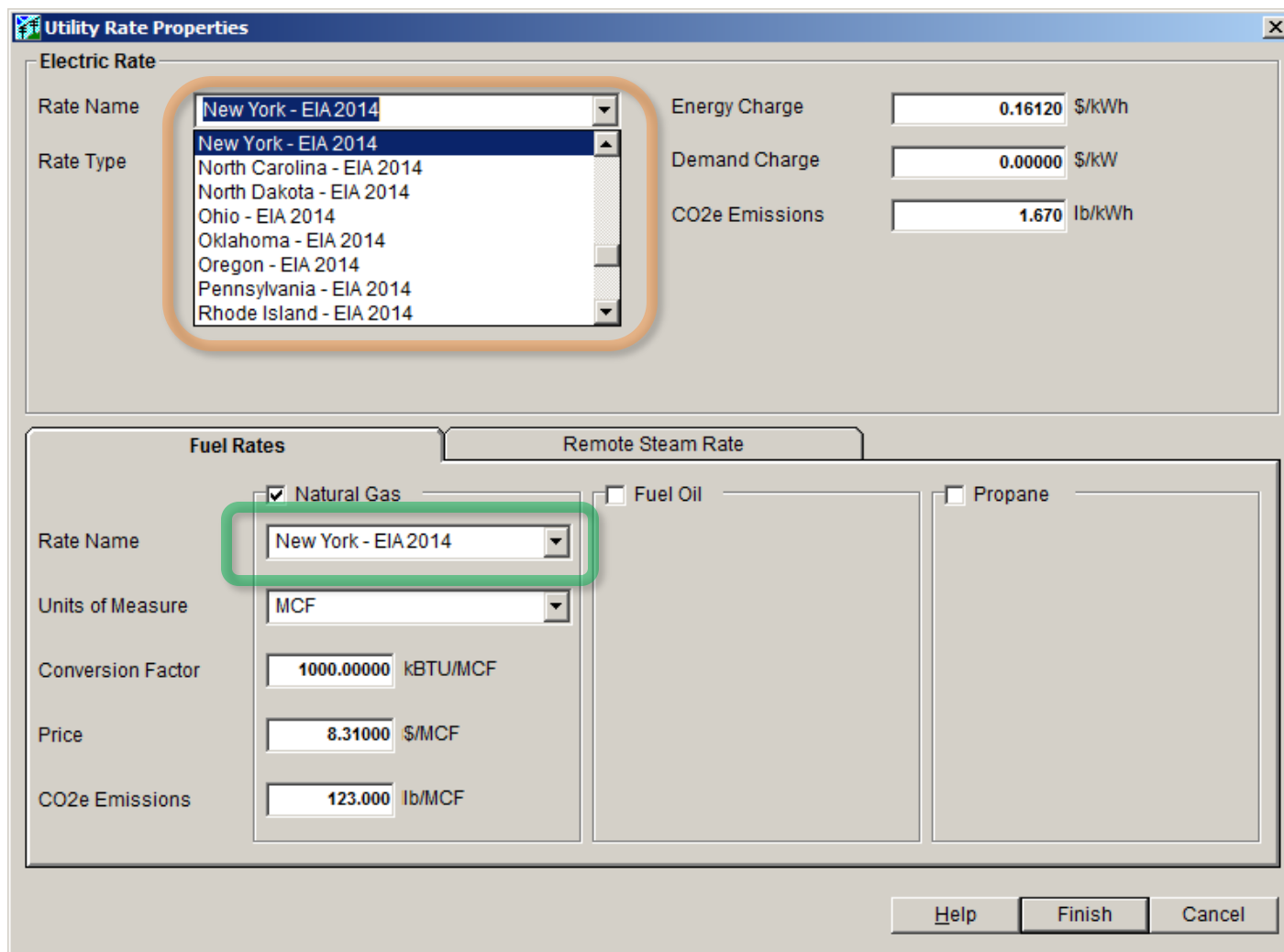
US Energy Information Administration (EIA) Rates
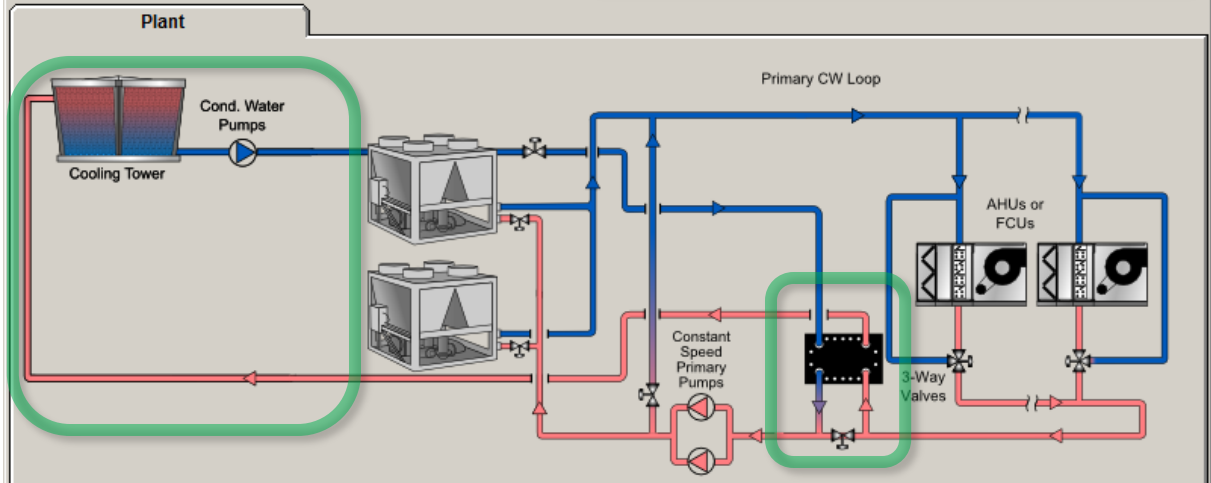
Details: *The Utility Rate Wizard has been updated with 2014 EIA rates for gas and electricity. (2014 data was the latest available at time of release).*
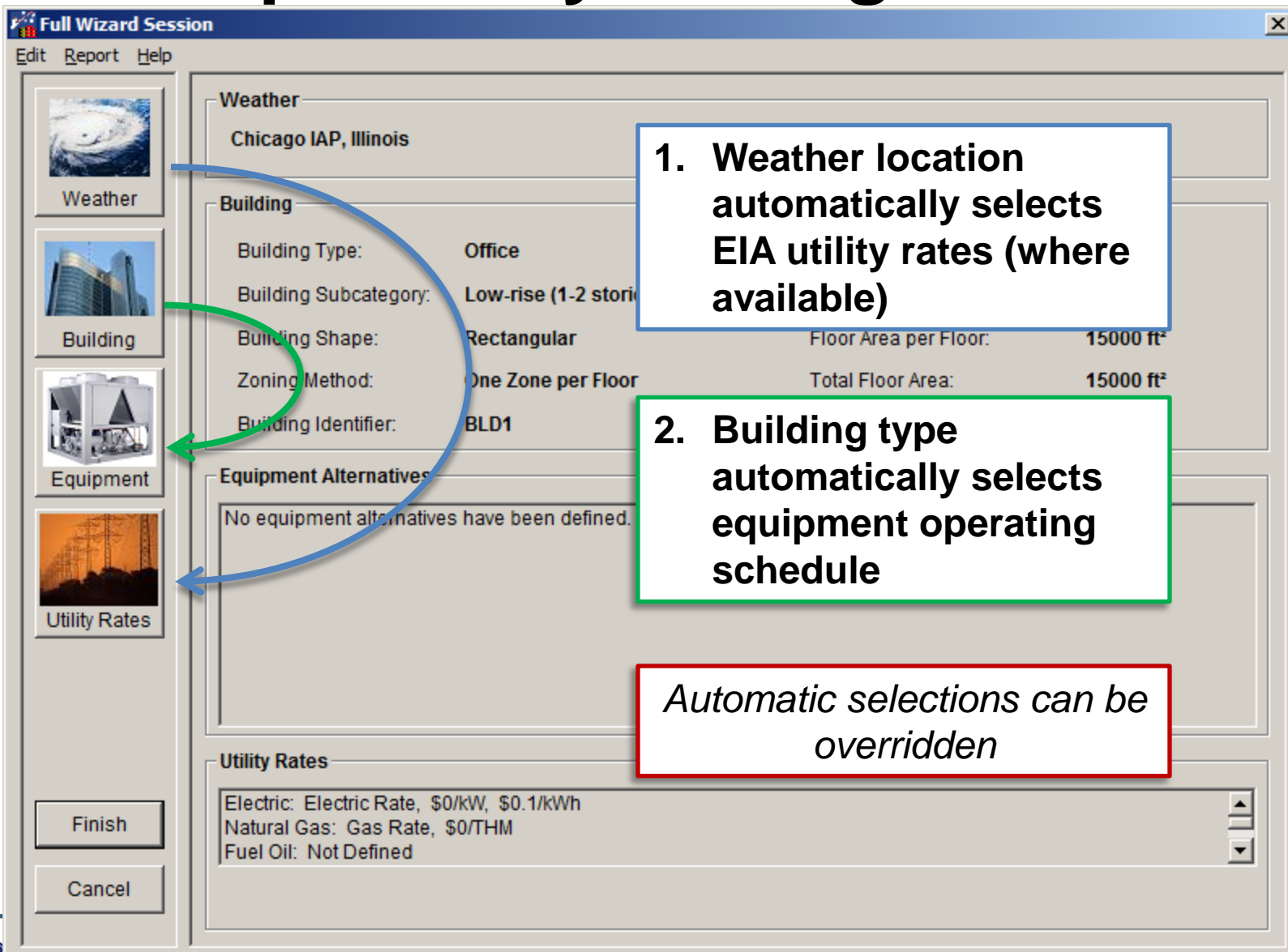
Interoperability Among Wizards

Full Wizard Session

Edit Report Help

Weather

Chicago IAP, Illinois

Building

Building Type:	Office
Building Subcategory:	Low-rise (1-2 stori
Building Shape:	Rectangular
Zoning Method:	One Zone per Floor
Building Identifier:	BLD1

Floor Area per Floor: 15000 ft²
Total Floor Area: 15000 ft²

Equipment Alternatives

No equipment alternatives have been defined.

Utility Rates

Electric: Electric Rate, $0/kW, $0.1/kWh
Natural Gas: Gas Rate, $0/THM
Fuel Oil: Not Defined

Weather
Building
Equipment
Utility Rates
Finish
Cancel

1. **Weather location automatically selects EIA utility rates (where available)**

2. **Building type automatically selects equipment operating schedule**

Automatic selections can be overridden

OTHER FEATURES

Import from Carrier Building System Optimizer
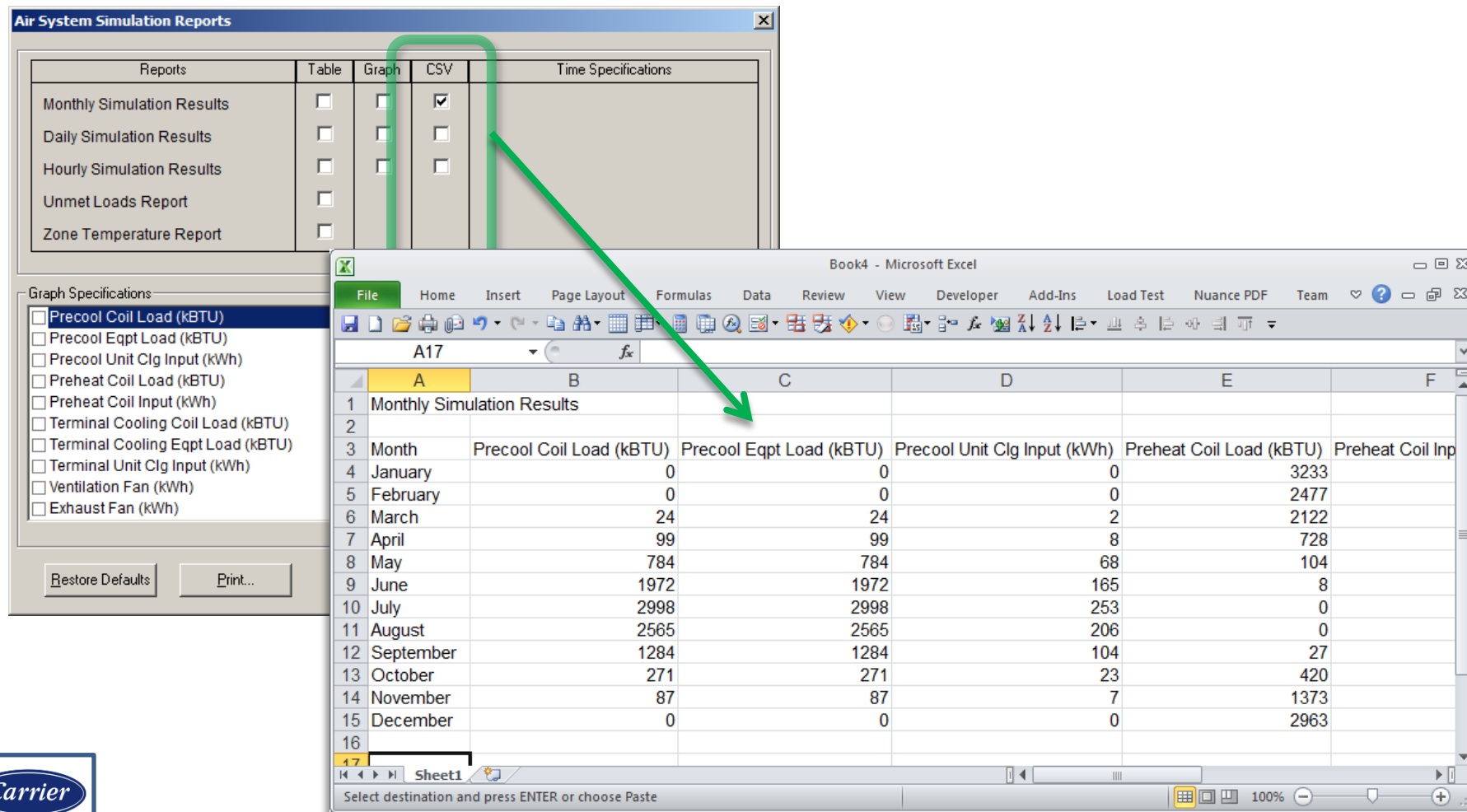
Details: *Projects created in Building System Optimizer (BSO) can now be loaded into HAP. Once imported, full HAP capabilities can be used.*

This facilitates scenarios where schematic design was done in BSO but further detailed design or analysis is required.
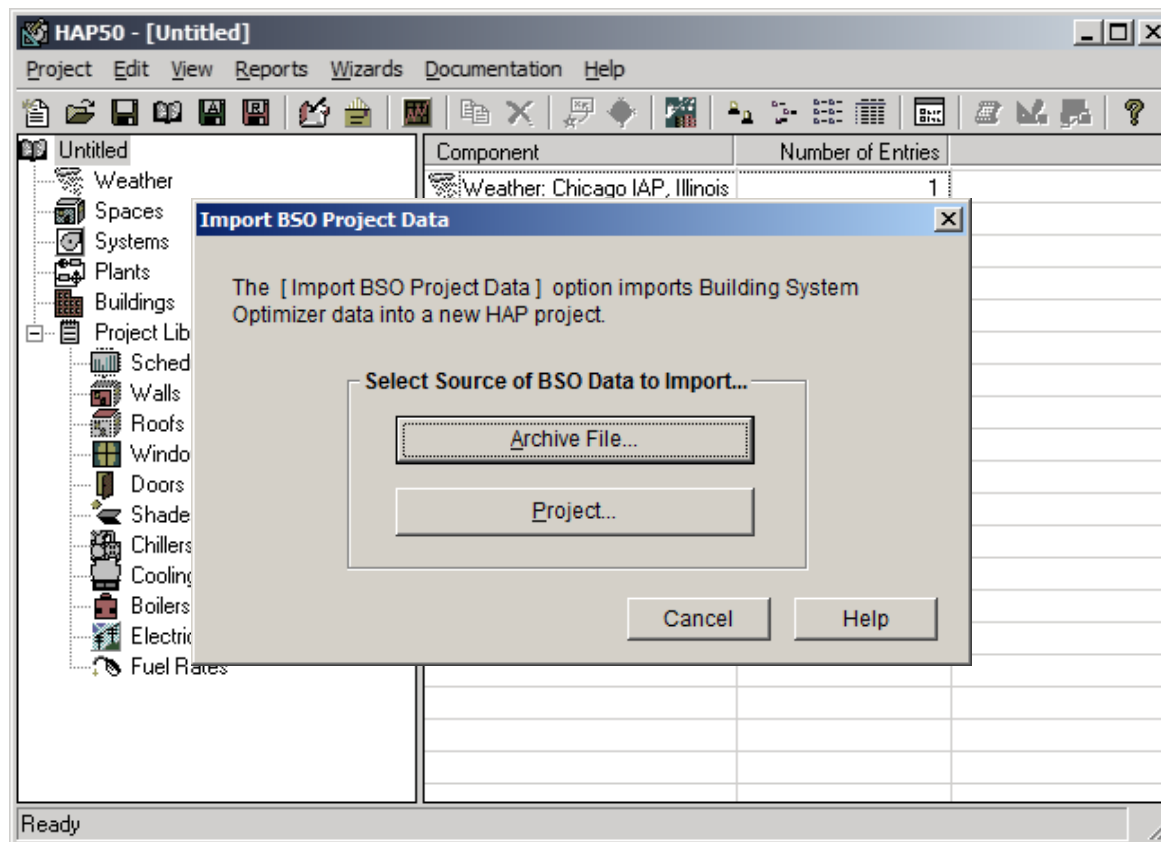
Export to Comma Separated Values (CSV) Files

Details: *CSV is a common file format compatible with spreadsheets such as Microsoft Excel and other software. Energy simulation results for air systems, plants, and buildings can now be output in this format.*

Bugs / Corrections

The following problems were corrected:

1. **Air System Inputs** – When the "90.1 Appendix G Fan kW" option was selected for supply fan performance, the button to display the A-Factor Calculations input screen appeared in the wrong position on the screen, obscuring other inputs.

2. **System Design Reports** – For an induction beam or active chilled beam system in which a zone contains multiple spaces, and in which the zone primary airflow is set by induction supply requirements rather than outdoor air ventilation requirement, the Ventilation Sizing Summary report showed incorrect Voz values for spaces in that zone. This was a cosmetic error. Calculation of ventilation airflow requirements for the system was correct.

3. **Building Simulation I** – It was possible to create a complex electric rate with zero energy charge steps. If that electric rate was used in a building simulation an error message appeared.

4. **Building Simulation II** – The unmet load hours shown on the LEED EAc1 report incorrectly included unmet loads for service hot water (SHW), but should only contain data for space conditioning. This only occurred for projects modeling a standalone SHW system.

5. **Building Wizard** – When a wall, roof, or window assembly created in the detailed user interface was selected in the Building Wizard, the overall U-value was shown as zero. In addition, an error occurred when generating the Building Wizard input report. These were cosmetic errors; inputs were successfully transformed into spaces, assemblies and schedules for the detailed HAP interface and were reliable for use in load calculations and energy simulations.

6. **Utility Rate Wizard** – When price data for remote steam was entered, it was incorrectly assigned to the remote hot water meter in the building.

7. **Reports** – Under specific conditions an "Error 521: Unable to open clipboard" error occurred when generating certain reports.

8. **gbXML Import** – For a very specific set of conditions the gbXML Import feature linked the wrong window or door assembly to spaces. This only occurred when window names exceeded 30 characters, and the first 30 characters of each name matched other names.

9. **Example Problem Results PDF** – Example problem results listed in the *Example Problems Results* PDF document did not match results produced by the HAP v4.9 example problem. This PDF document is used by customers performing validation of the program.

QUESTIONS?

If you have any questions about Carrier Hourly Analysis Program v5.0 please contact Carrier Software Systems at

software.systems@carrier.utc.com

Thank you!