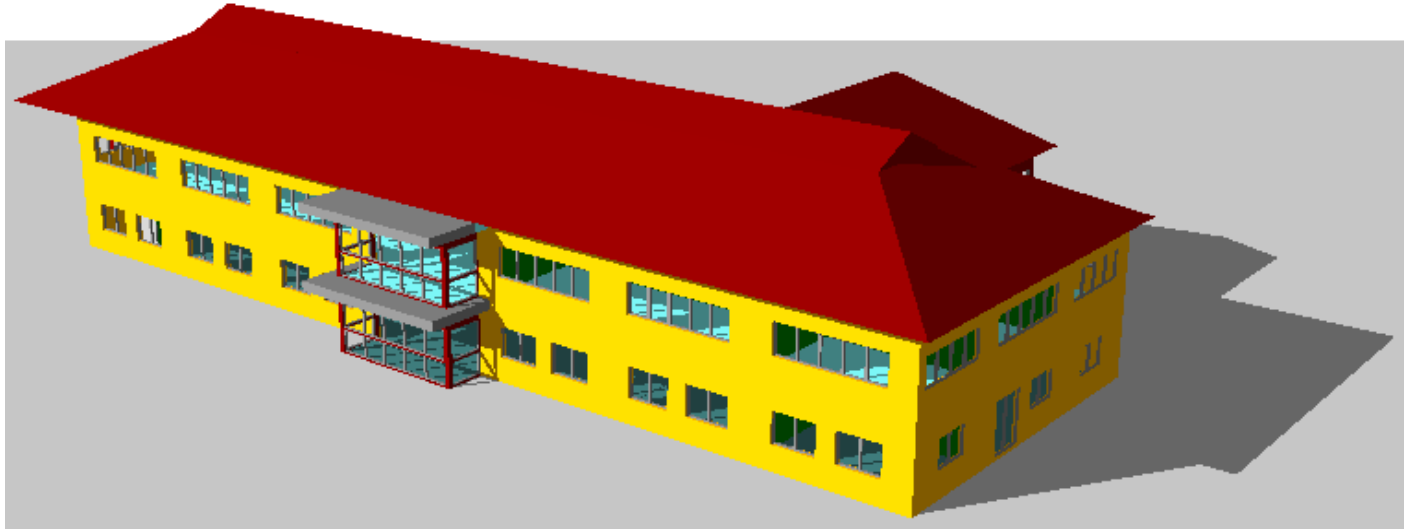
FAST AND ROBUST BUILDING SIMULATION SOFTWARE

Equipment Efficiency Analysis
Chelmsford, UK

Green BIM & Sustainable Design

Validation & Prediction

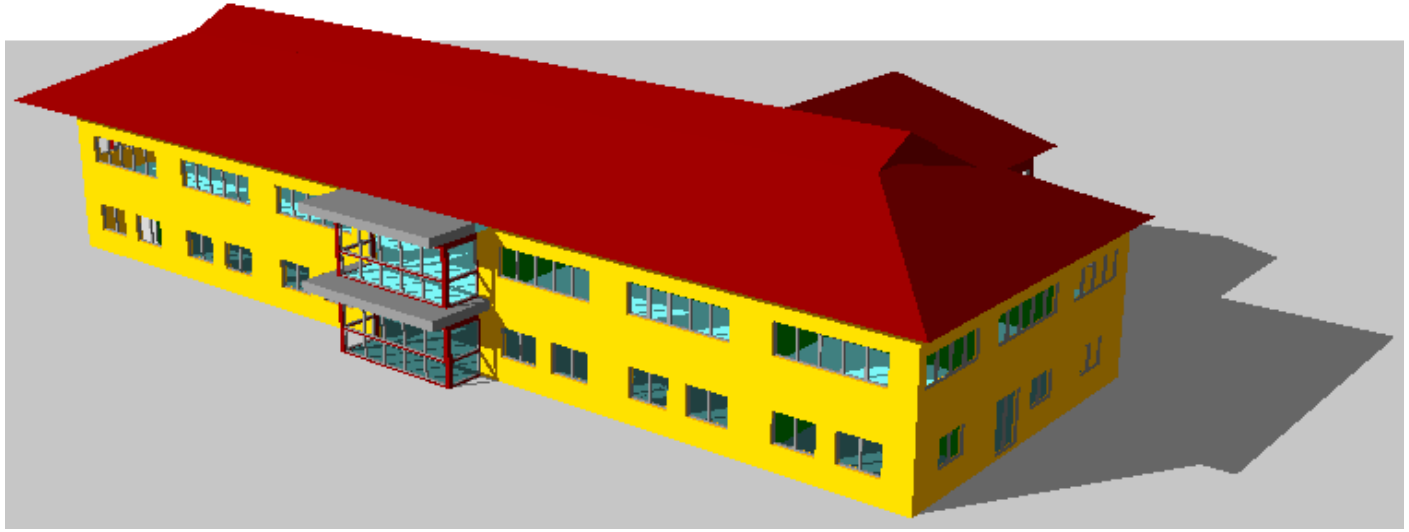
- UK Chelmsford Office Validation Study
- Currently using equipment installed in 2006
- Performance Comparison with 2011 Equipment
- City Multi R2 system vs a fancoil system with heat recovery



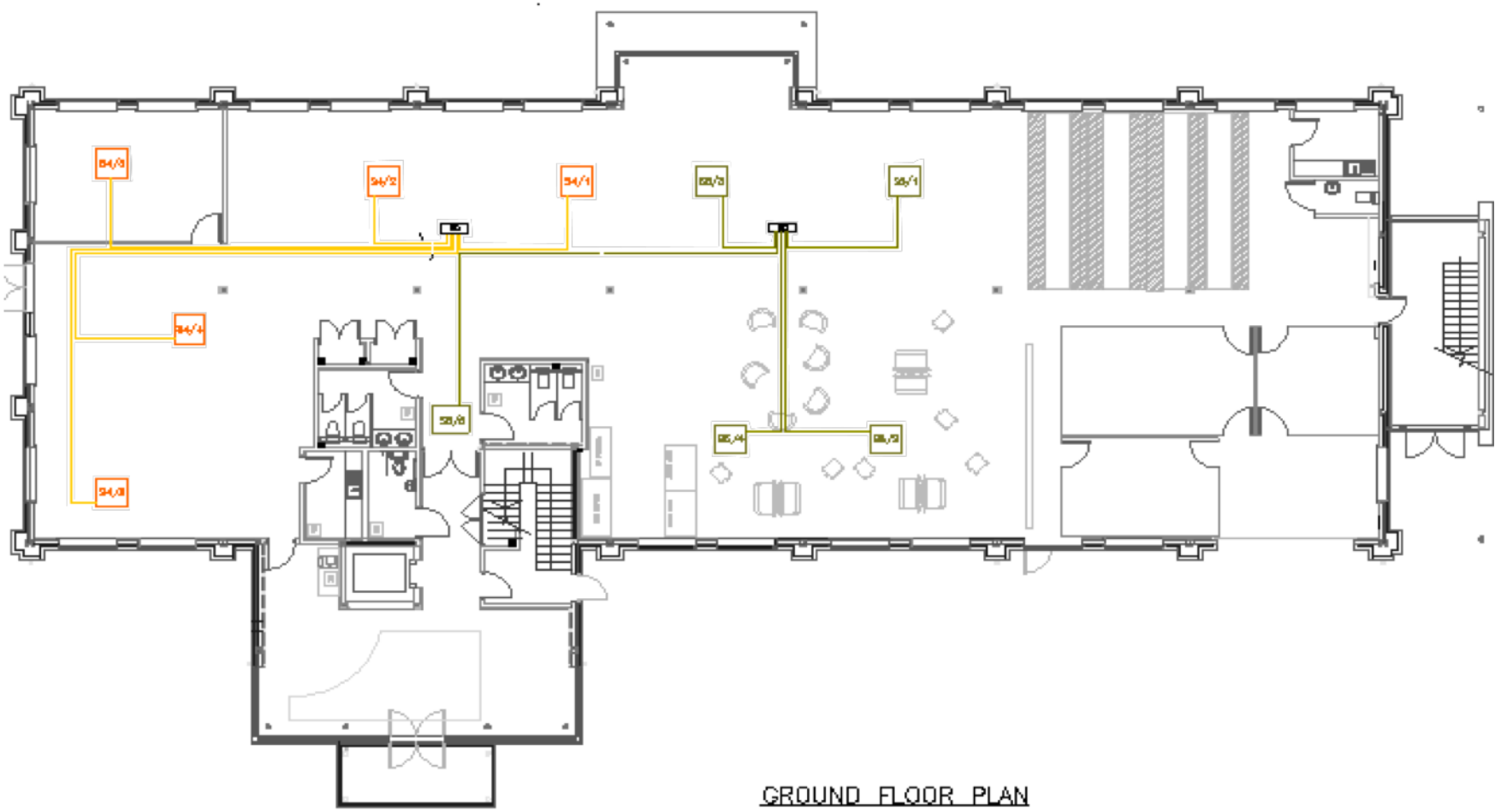
Green BIM & Sustainable Design

Existing Building

- Purpose built office
- 5 City Multi R2 Outdoor units and 25 indoor units
- 2 Lossnay heat recovery units providing fresh air
- Monitored consumption data for an annual period



System Layout



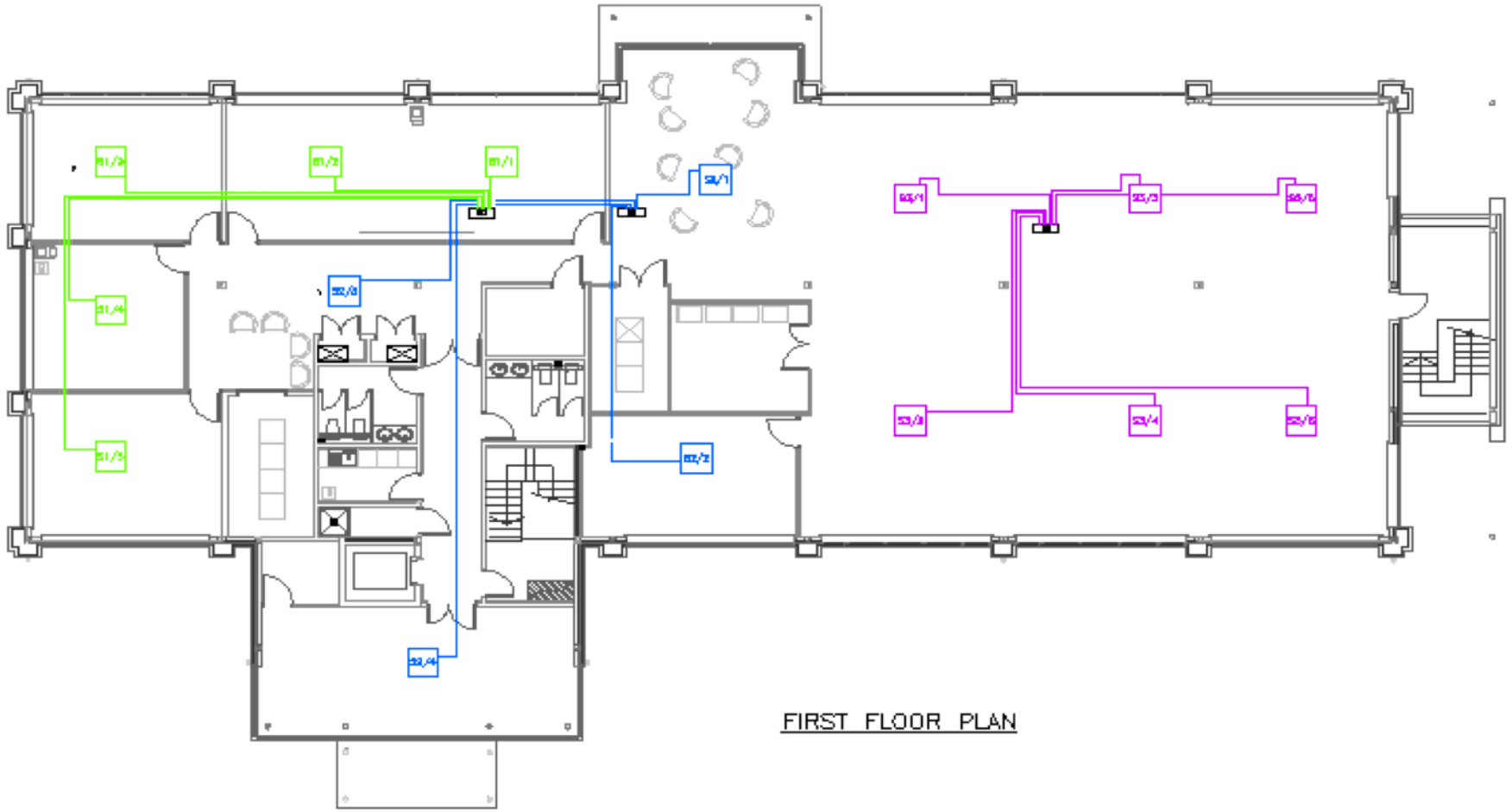
Ground Floor

- Systems: Olive and Yellow
- Mitsubishi Lossnay Fresh Air Heat Recovery Unit

Systems:

- Olive
- Yellow
- Magenta
- Blue
- Green

System Layout



First Floor

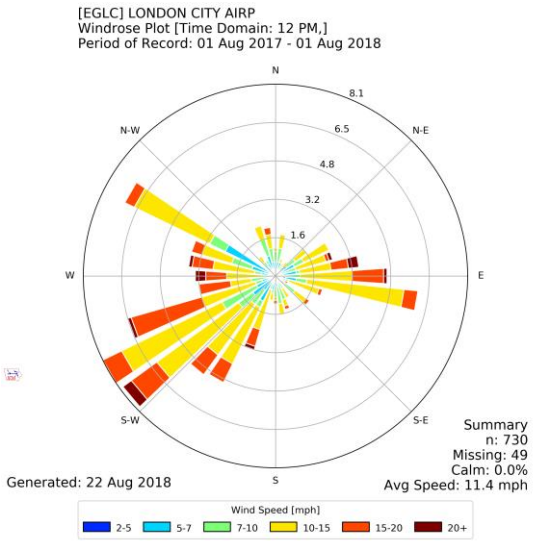
- Systems: Magenta, Blue, Green
- Mitsubishi Lossnay Fresh Air Heat Recovery Unit

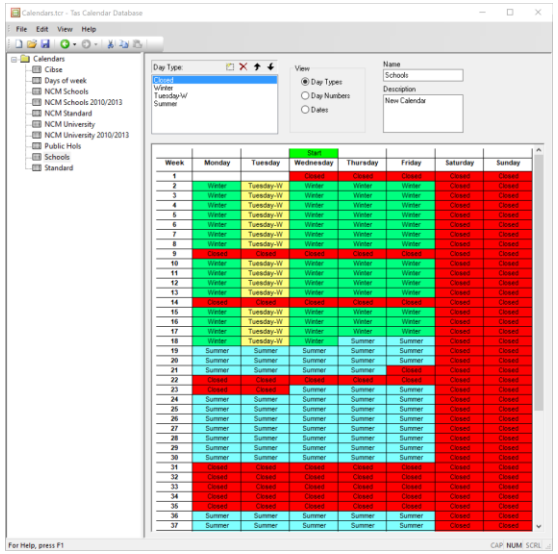
Systems:

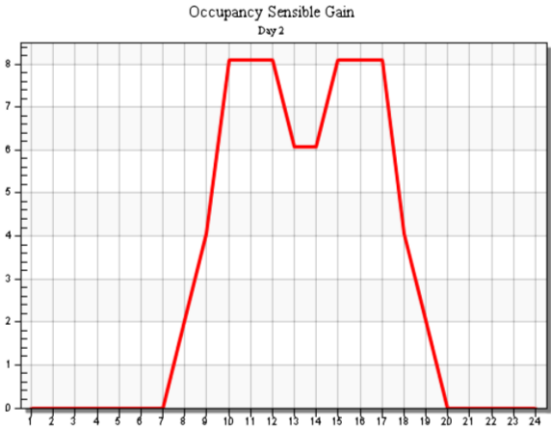
- Olive
- Yellow
- Magenta
- Blue
- Green

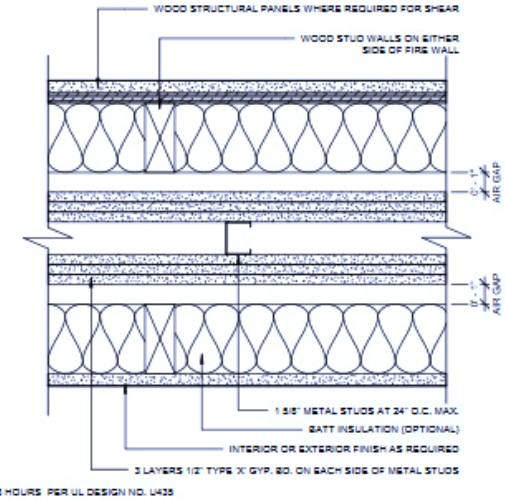
Building Simulation Inputs

- Weather Data (London)
- Calendar of occupation
- Internal Conditions
  - Infiltration
  - Occupancy Gain
  - Equipment Gain
  - Fresh Air Requirement
- Construction details



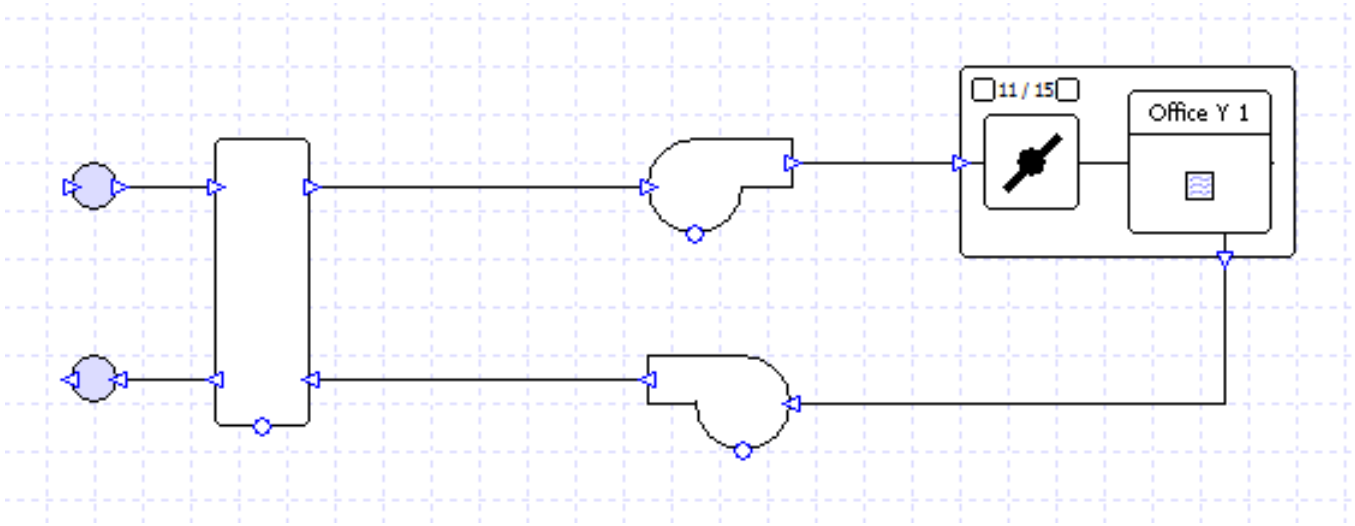




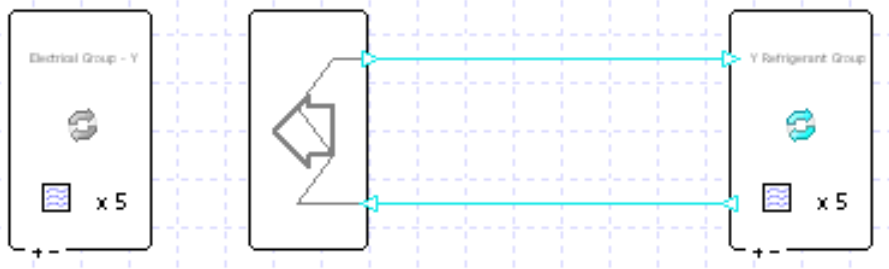


HVAC Simulation Inputs

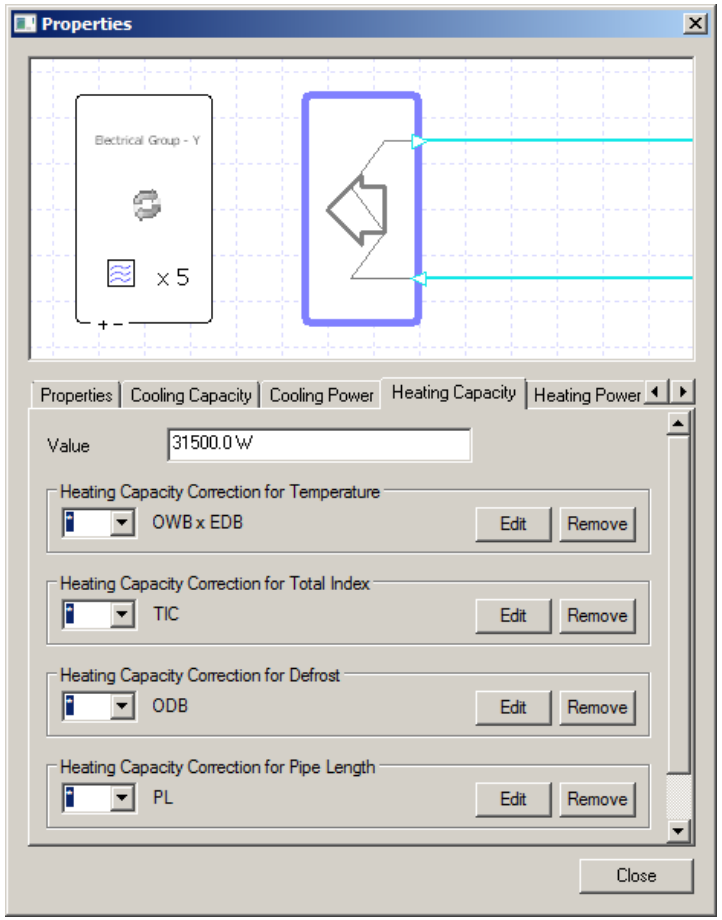
Air Side Schematic



Plant Side Schematic



Manufacturer Data Import



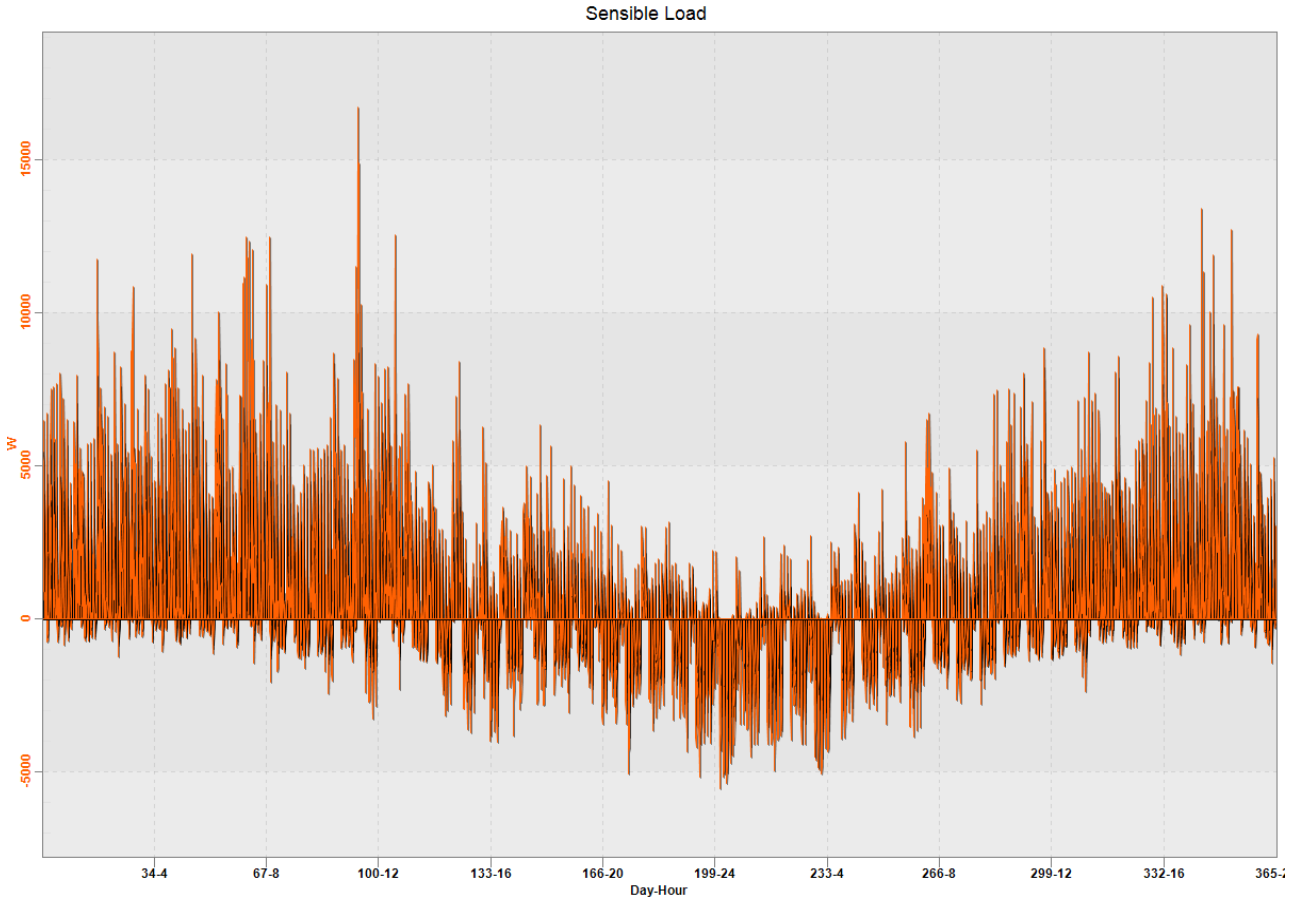
Dedicated import function brings manufacturer data into Tas

Tas matches sized systems components to manufacturer-specific equipment

Exchanges system component data with manufacturer-level detail for accurate simulation

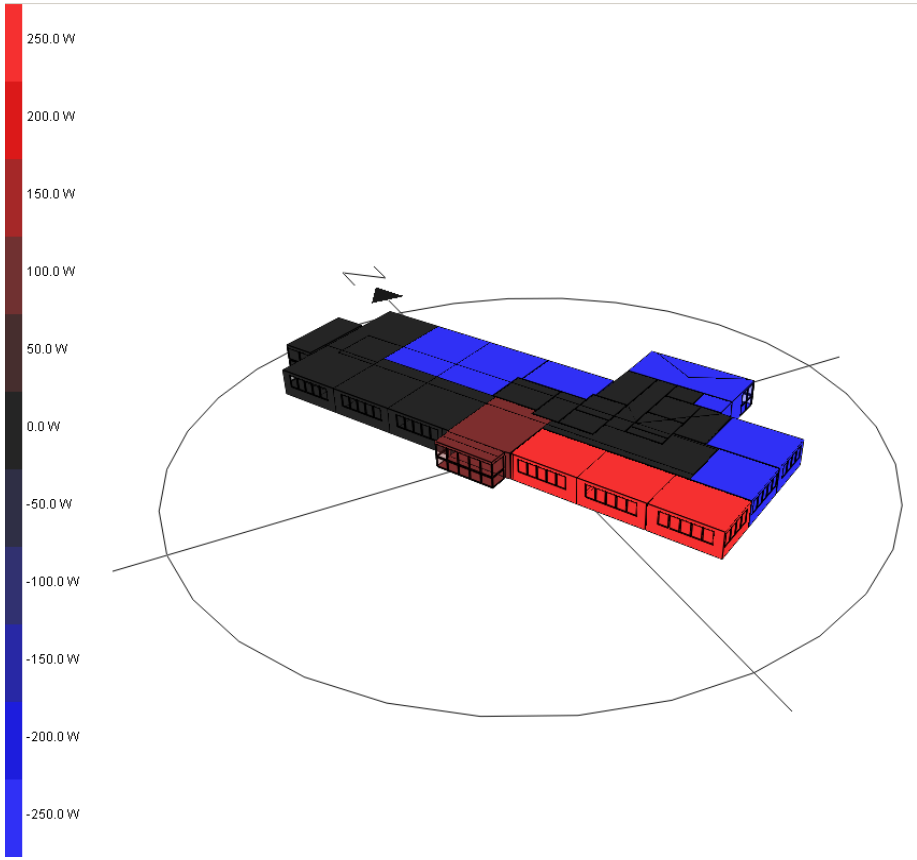
Building Simulation Results

Hourly Building Demand



First Floor – Hourly Sensible Load Results

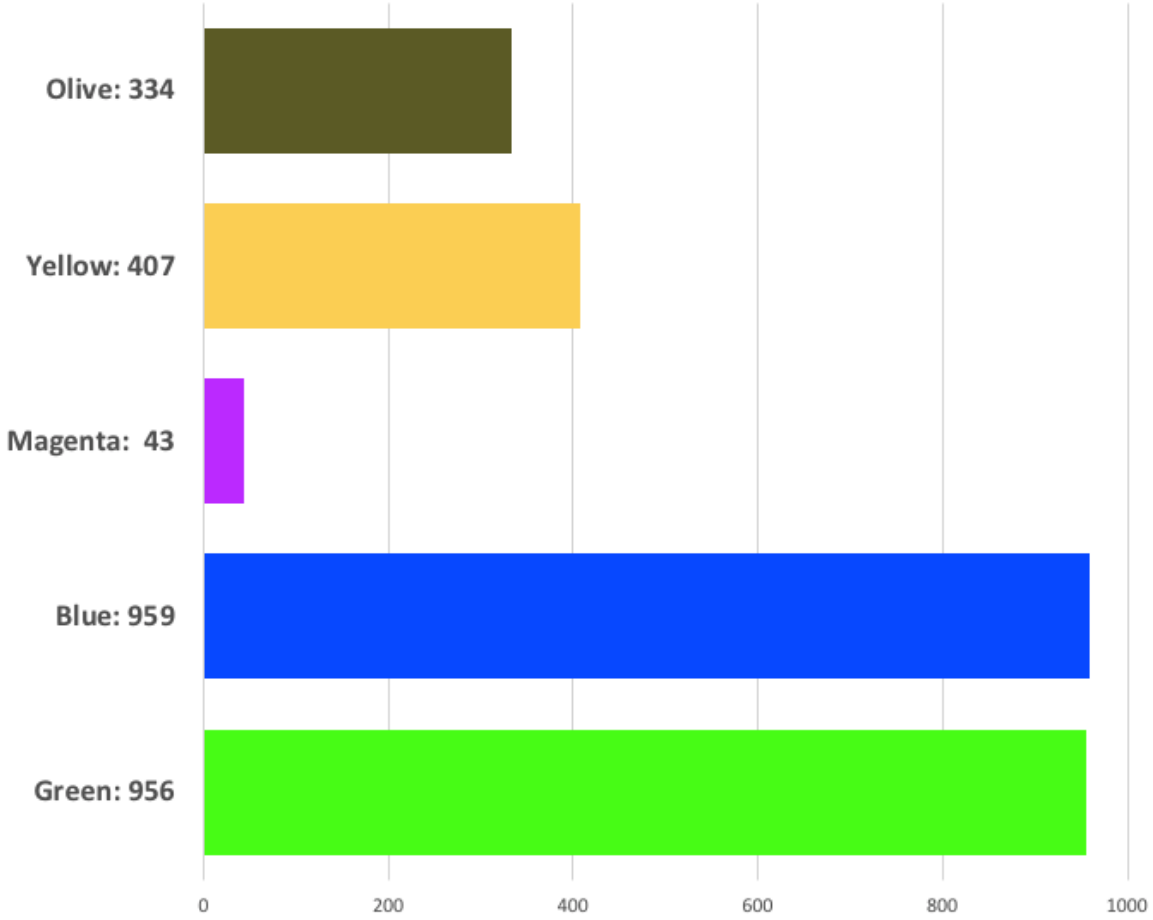
3D Results Visualisation

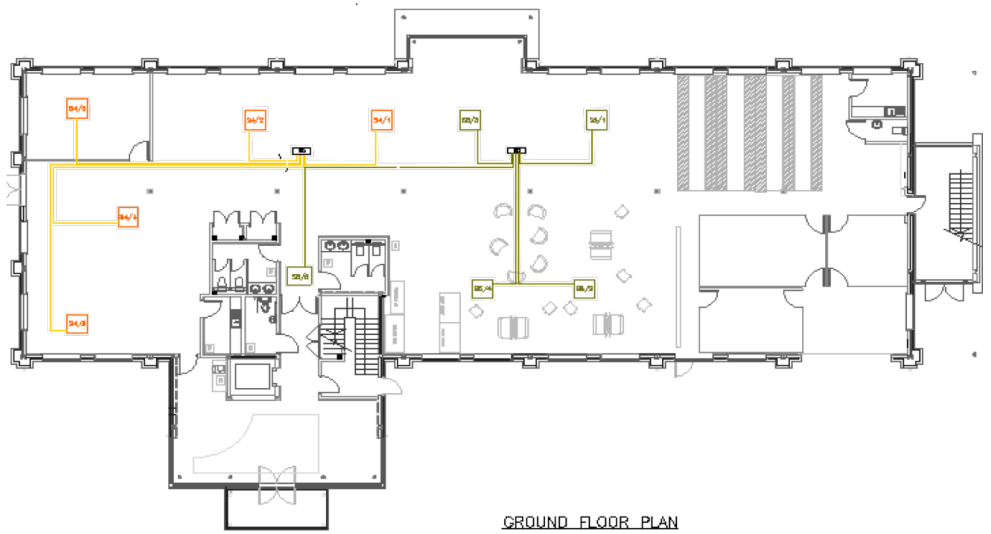


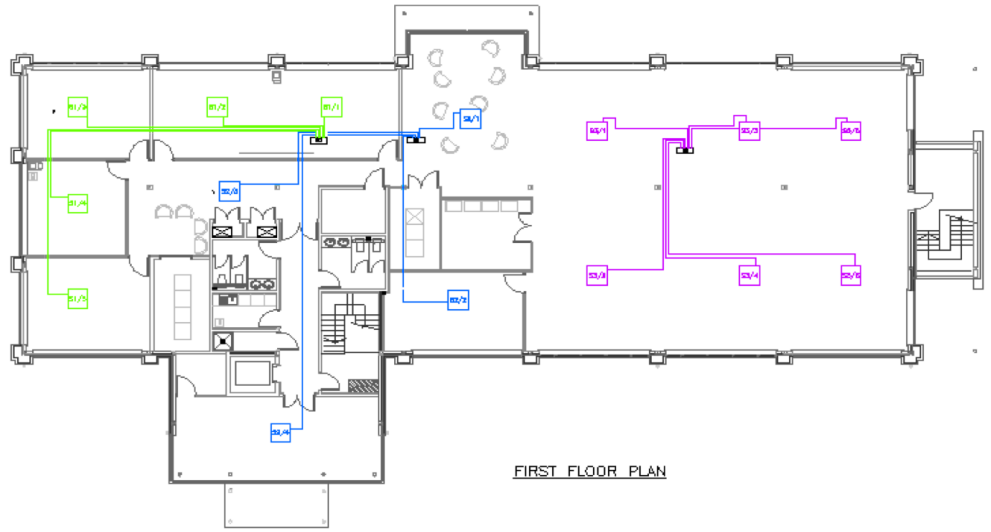
First Floor - Sensible Load - Day 50, Hour 12

Mitsubishi Lossnay Heat Recovery:

Usage Hours







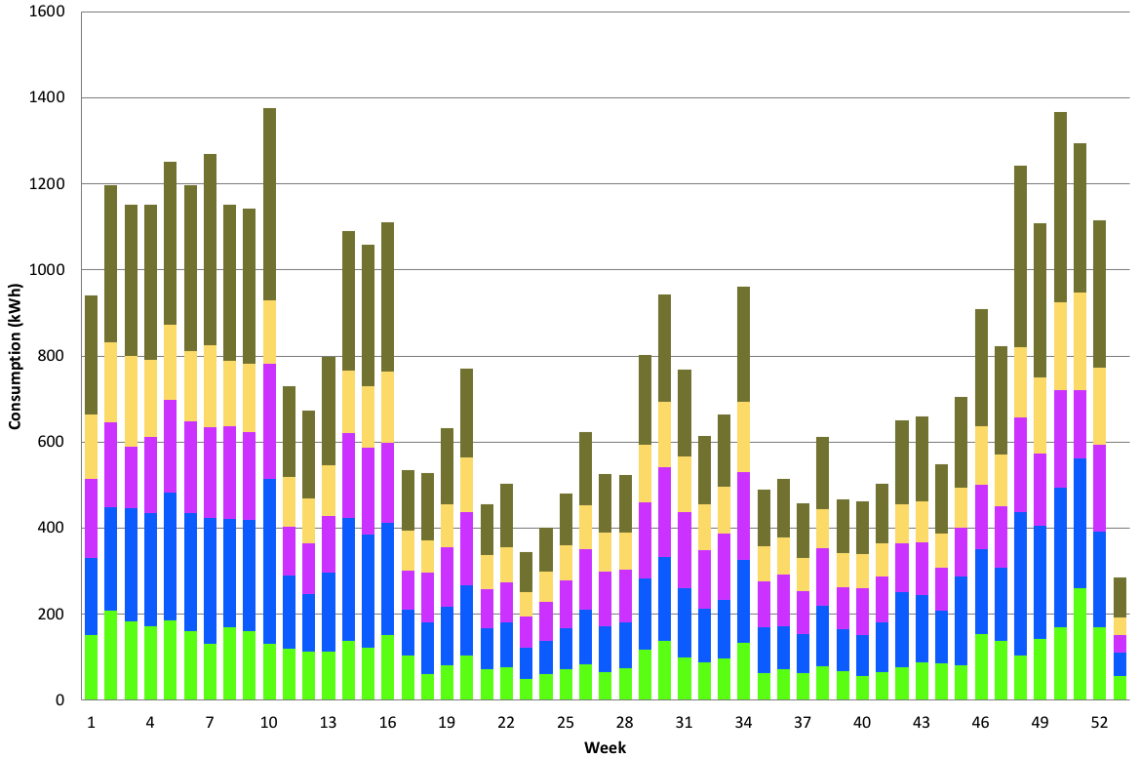
HVAC System Consumption Comparison:

2006 Equipment

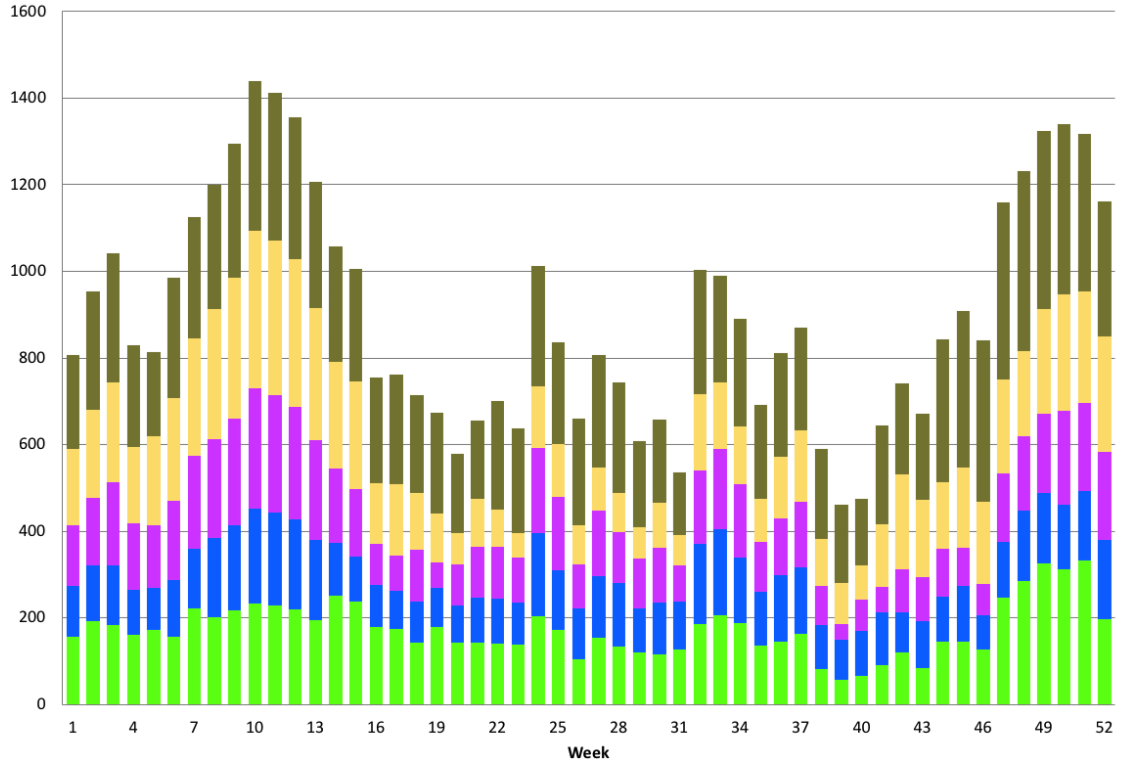
Systems:

- Olive
- Yellow
- Magenta
- Blue
- Green

Simulated Consumption (installed equipment)



Measured Consumption

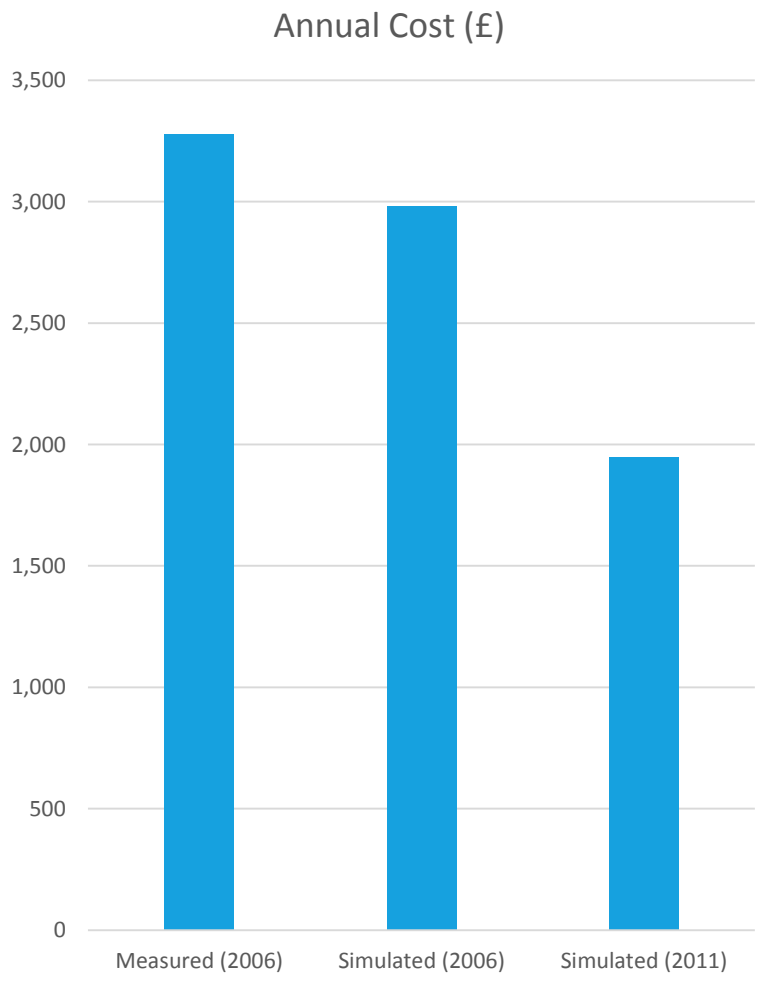


Summary & Conclusion

Summary:

The 2011 equipment shows a 34.6% improvement on simulation of the installed 2006 equipment.

	Annual Consumption (kWh)	Annual Cost (£)	Improvement (%)
Installed Equipment: Measured (2006)	46,821	3,277	-
Installed Equipment: Simulated (2006)	42,494	2,982	-
Replacement Equipment: Simulated (2011)	27,810	1,947	34.6%



Conclusion:

Detailed simulation of building and plant leads to simulation consumption figures indicative of those seen in the real world application.

‘Good enough’ qualitative agreement between the predicted & measured data to make sound future predictions