



## **Case Study:** Cameron Avenue, Canberra ACT



**Conserveit**  
CONSERVE IT PTY LTD

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## Introducing PlantPRO

PlantPRO is the first complete chiller and plant efficiency solution offering a suite of engineering tools that includes diagnostics, charting, reporting, and active controls.

Information is gathered through a dedicated data acquisition module that collects data from industrial grade calibrated sensors fitted to the equipment being monitored. This data is analyzed and processed then presented in an easy to read format either through a dedicated 17" touch screen or directly to any internet connected PC with a web browser. No special software is required.

### Chiller monitoring tool includes:

- Comprehensive charting and data analysis tools for all inputs for analysis of the complete system performance.
- Efficiency indicators to compare and benchmark chiller efficiency to that of design.
- Diagnostics of system issues.
- Manually generated chiller logs
- Automatic and manually generated monthly reports detailing standard statistics including power and water consumption, hours run, monthly diagnostics summary etc, plus a range of specific performance measures for benchmarking purposes with other sites and chillers.

### Plant monitoring tool includes:

- Plant trending and data analysis for analyzing overall system performance.
- Summary pages covering the status of all associate pumps and fans.
- Automatic and manually generated monthly reports.
- Tool to analyze and rank the relative performance of all operational chillers.
- Active Chiller Performance control module that will automatically select the most efficient combination of available chillers at their respective most efficient load points.
- Active CHW supply temp relief control module that will manage CHW supply

### Cooling Tower monitoring tool includes:

- Tools to analyze water consumption including cycles of concentration.
- Tools to benchmark and diagnose major leaks and other water consumption issues.
- Automatic and manually generated monthly report covering volume of cost of water supplied and disposed.
- Active Cooling Tower Optimization control module to optimize the overall system performance taking in account the type and number of chillers running as well as ambient conditions.
- The tower will nominally be setup to run independently from the chillers and will control themselves to deliver water at the temperature that will deliver the best COP irrespective of how many chillers are running. We can also set them up to control on wet bulb temperature as well if you choose. (If you have specific control ideas that you would like to incorporate, we can certainly include them during the programming phase. We will also be able to make changes remotely as well if required.)



## CASE STUDY: 40 Cameron Avenue, Canberra



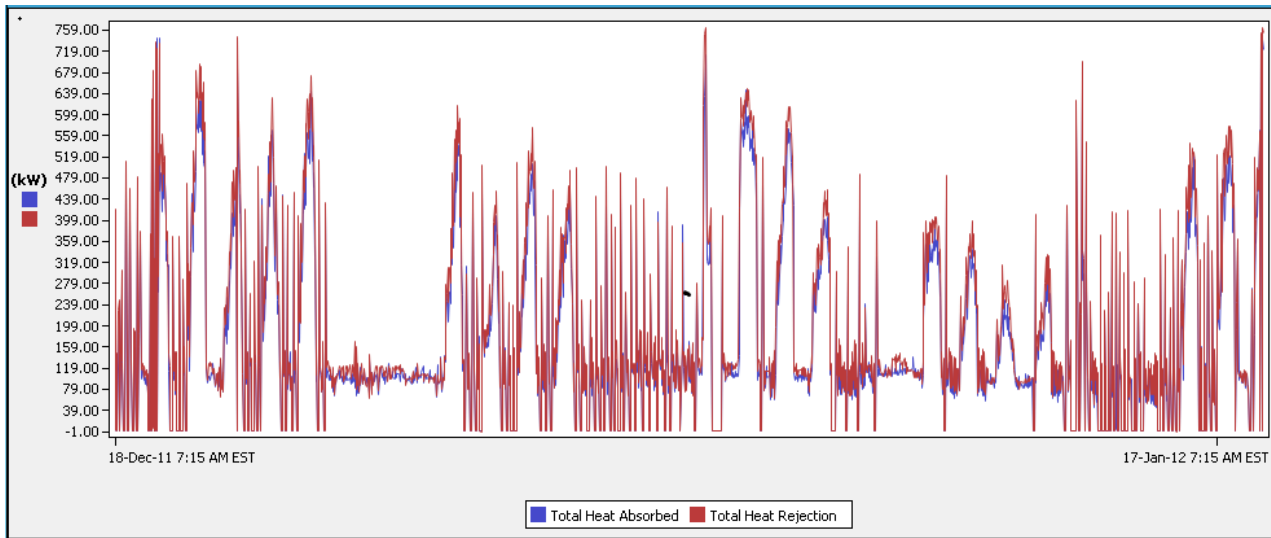
40 Cameron Avenue is a medium sized commercial building within the Canberra CBD that required mechanical retrofit to meet the strict government building guide lines for energy efficiency. Part of these retrofit works included the installation of a high efficiency Variable speed chiller set. This new chiller formed a significant part of the overall efficiency improvement strategy and as such verification of the chiller's performance was of paramount importance.

To carry out this verification task, a PlantPRO chiller efficiency monitoring system was installed to take performance measurements over wide range of operating conditions and then compare this against the manufacturer's data. This type of data can be extremely difficult to obtain out in the field with the chiller operating under real world operating conditions.

Data accuracy is naturally of major importance. All PlantPRO Systems use Industrial grade calibrated sensors. In addition to this, PlantPRO continually verifies its sensor calibration through a heat balance calculation whereby the heat absorbed plus the heat of compression is measured against the heat rejected. These figures must equal each other. If PlantPRO sees an imbalance, it immediately alerts the operator of a possible sensor calibration issue. The Graph below produced by PlantPRO clearly shows an excellent heat balance profile on this system.



**Note that both lines run constantly very close to each other**



Chiller performance was measured in two ways using PlantPRO. The first was to gather instantaneous data readings directly from the touch screen mounted adjacent to the chiller. This process was witnessed by the consultant appointed by the Building Managers to ensure that consistent and accurate data was gathered. As this data was gathered over the relatively short time frame of 4 hours, only part of the required data could be recorded. However the process provided the consultant the confidence to use the 12000 points of historical data collected by PlantPRO over previous month's operation to complete the task. This data was down loaded in Excel format for further analysis by the consultants however, PlantPRO also carried out its own analysis directly through its dedicated analytical engine.

Using basic Excel spread sheet sorting and collating tools, the 12000 points of data were quickly sorted into usable data groups. In this case, it was important to see how the chiller performed against its 4 point ARI study. Best fit data was sorted and collated into the 4 tables documented below. Although this data doesn't align exactly with ARI conditions, data was certainly close enough to make an accurate assessment of the chiller's performance at the 4 specified load points.


**Measured data @ 100% load and highest available condensing temp**

Timestamp	CWT In	COP	% Power	% Cool Capacity
03-Jan-12 9:15:01 AM EST	27.13	4.94	94.78	97.41
19-Dec-11 8:00:01 AM EST	27.34	4.77	92.85	92.03
18-Jan-12 11:45:00 AM EST	27.71	4.84	102.75	100.69
03-Jan-12 9:30:01 AM EST	27.82	4.89	97.04	98.68
19-Dec-11 10:45:00 AM EST	28.32	5.04	98.97	103.59
19-Dec-11 12:00:01 PM EST	29.18	4.91	100.94	103.06
19-Dec-11 10:15:01 AM EST	29.51	4.48	98.52	91.67
<b>Average COP</b>		<b>4.84</b>		

**Measured data @ 75% load and highest 25 deg C condensing temp**

Timestamp	CWT In	COP	% Power	% Cool Capacity
22-Dec-11 1:15:01 PM EST	24.48	6.56	55.13	75.11
18-Jan-12 10:15:01 AM EST	24.52	6.88	52.26	74.71
27-Dec-11 3:45:00 PM EST	24.69	5.97	61.16	75.9
05-Jan-12 1:30:01 PM EST	24.82	5.76	62.2	74.4
21-Dec-11 4:00:01 PM EST	24.98	5.87	61.2	74.65
17-Jan-12 2:30:01 PM EST	25.19	5.83	61.99	75.09
04-Jan-12 5:00:01 PM EST	25.32	5.78	61.82	74.23
<b>Average COP</b>		<b>6.09</b>		

**Measured data @ 50% load and 24 deg C condensing temp**

Timestamp	CWT In	COP	% Power	% Cool Capacity
06-Jan-12 1:15:01 PM EST	23.35	8.02	29.67	49.47
16-Jan-12 5:30:01 PM EST	23.82	7.07	34.63	50.92
13-Jan-12 3:15:01 PM EST	24.13	6.8	35.65	50.36
30-Dec-11 11:15:01 AM EST	24.18	7.19	33.47	50.01
23-Dec-11 5:45:00 PM EST	24.18	6.6	37.02	50.75
19-Dec-11 9:00:01 PM EST	24.2	7.6	32.07	50.67
<b>Average COP</b>		<b>7.21</b>		

**Measured data @ 25% load and lowest available condensing temp**

Timestamp	CWT In	COP	% Power	% Cool Capacity
11-Jan-12 7:45:01 AM EST	17.72	12.22	9.73	24.71
12-Jan-12 10:15:01 AM EST	18.07	11.09	10.57	24.38
13-Jan-12 7:15:00 AM EST	19.28	10.03	11.94	24.89
27-Dec-11 8:15:00 PM EST	20.11	12.65	9.73	25.57
22-Dec-11 2:00:01 AM EST	20.46	12.33	10.09	25.84
19-Dec-11 6:15:01 AM EST	20.49	11.86	10.19	25.11
<b>Average COP</b>		<b>11.7</b>		

Results of the analysis showed the chiller to be performing within allowable limits. PlantPRO did highlight some operational issues with the chiller including a refrigerant control valve fault and an issue with the chillers set point calibration. These issues were quickly rectified by the manufacturer under warranty leaving both the consultants and Property Managers confident in the new chiller's overall performance.