



PlantPRO[®]

performance reliability optimisation

Turn your plant room into a value generating asset

Improve your property's value and its appeal to tenants

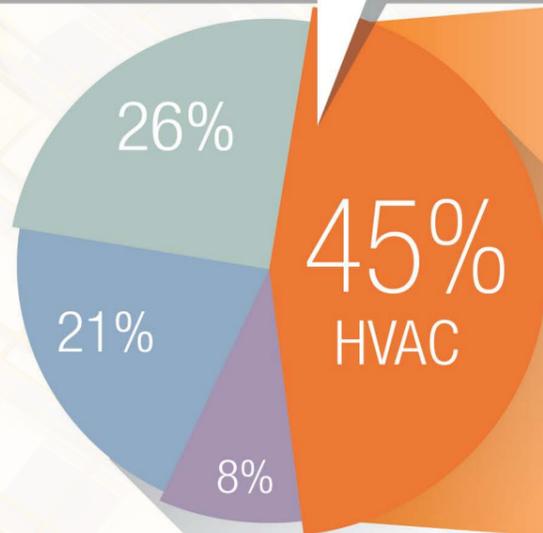
Improve uptime and maintenance levels

Run the plant room at optimum efficiency

Reduce maintenance related costs

Conserveit

In commercial buildings HVAC accounts for **45%** of total energy consumption

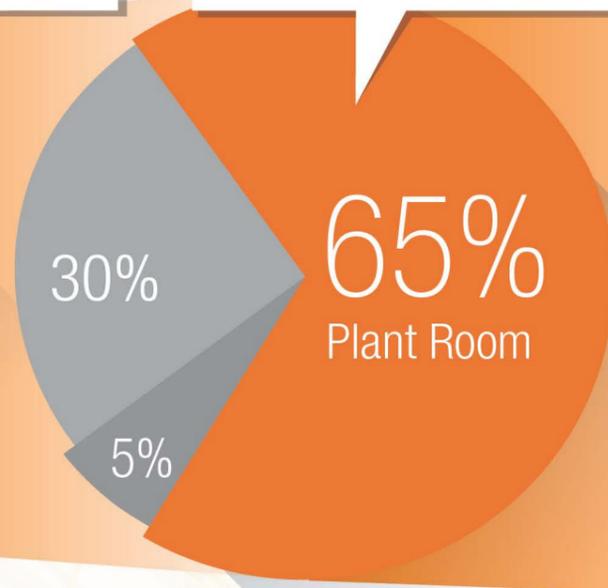


■ HVAC
 ■ Lighting
 ■ Other
 ■ Office

In commercial buildings, HVAC is by far the most energy intensive system, accounting for close to half of the total energy consumption.

For this reason every efficiency improvement in HVAC performance can significantly reduce the energy profile of the building, turning HVAC optimisation into a value generating opportunity.

65% of this is used in the plant room alone!

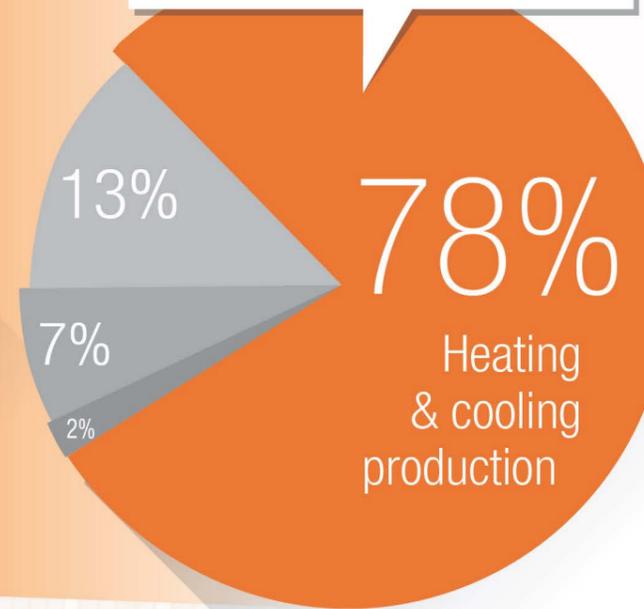


■ Plant Room
 ■ Air side
 ■ Other

Typically hidden away in plant rooms, HVAC systems can be complex, challenging and are frequently overlooked. No wonder that energy saving opportunities are missed in this complex technical arena

Dedicated, specialised control solutions are required to manage HVAC systems correctly and efficiently. By optimising the operation and maintenance of these systems, it is indeed possible to capture the true energy reduction potential available and to manage this over time.

78% of plant room energy is used in thermal fluid generation for Heating & Cooling systems!



■ Heating & Cooling production
 ■ Pumps
 ■ Cooling towers
 ■ Other

The Plant Room

The plant room can be considered the HEART of the HVAC system within the building. It is typically where hot and cold water is created for distribution to other HVAC subsystems throughout the building. Typical HVAC equipment in plant rooms include; chillers, heat pumps and boilers; heat rejection systems: air, water, ground source; and distribution equipment: pumps, valves and pipework.

Chillers and heat pumps are the heaviest energy using components, accounting for 78% of total plant room energy consumption. Optimisation of the energy used within the plant room is therefore critical to the overall building energy profile, and can only be effectively managed by suitably experienced technical experts

Can you really afford NOT to turn to the HVAC plant room specialists?

Conserve it can provide an effective and profitable way to improve the energy profile of commercial and industrial buildings. Following on from their vast experience as leading HVAC solution providers, Conserve it has designed PlantPRO: a highly specialised control and optimisation solution dedicated to plant rooms.

Created with an in-depth understanding of all thermodynamic variables involved in managing plant room HVAC equipment, PlantPRO enables optimum control of every device and its integration into a single synergistic system.

PlantPRO is therefore the best investment to harness the energy saving potential offered by HVAC plant room equipment, driving real energy saving routines and effectively reducing your total energy bill.

Source: US Department Of Energy (DOE). Office Building Environment, DHW minimal requirement provided by the main boilers through a heat exchanger. Boiler plant and pumping assumed to be a separate system. In some instance heating and cooling may be required instantaneously

Excellent system design and the use of high quality components are essential. However, without accurate M&V and continuous commissioning, even the best HVAC systems degrade over time.

PlantPRO is the proven plant room optimisation & control software system developed by Conserve it.

It provides a comprehensive, reliable and dynamic solution backed by Conserve it's proven experience and knowledge.

Optimisation is not achieved by the use of a single algorithm designed to ensure the best efficiency, but is rather a continuous process articulated through different levels of smart software functions, which contribute to ensure the best result.

The optimisation process can be represented by a pyramid divided into several layers, the base of which corresponds to the initial design phase of HVAC systems by consultant Engineers. Each project presents specific challenges. Designing the optimum system for each HVAC application and selecting the best plant room equipment, is the essential starting point and is also the key responsibility of the M&E Engineering consultant.

In order to achieve and maintain the high level of efficiency as per original design, optimised management of the plant room is essential. Every single element of the system involved in the production and the distribution of the energy must therefore operate in perfect harmony.

For this reason it is essential to use a dedicated optimisation & control software system which includes high-end logic, to ensure real energy savings as well as delivering long term reliability.

1 System Design

Integrating components into a good system design, which perfectly matches the building's requirements is the first crucial condition for performance optimisation.

2 Component Selection

Selecting high quality components, which integrate seamlessly, is the second condition to achieve a high performance system.

3 Automation

Enabling the automated control of all components is a further prerequisite to effectively tackle the challenge of improved plant room management.

4 Management & Monitoring

Ensuring complete control of all HVAC devices in the plant room through its user friendly interface, PlantPRO allows easy management of the plant room with continuous monitoring of its performance, thus creating the cornerstone for optimisation.

5 Measurement & Verification

"You can't manage what you can't measure". On a continuous basis, PlantPRO measures the process, enabling real-time comparisons of the measured actual efficiency versus design data. This is a fundamental demonstration of your actual progress on the journey towards optimum efficiency.

6 Maintenance & Diagnostics

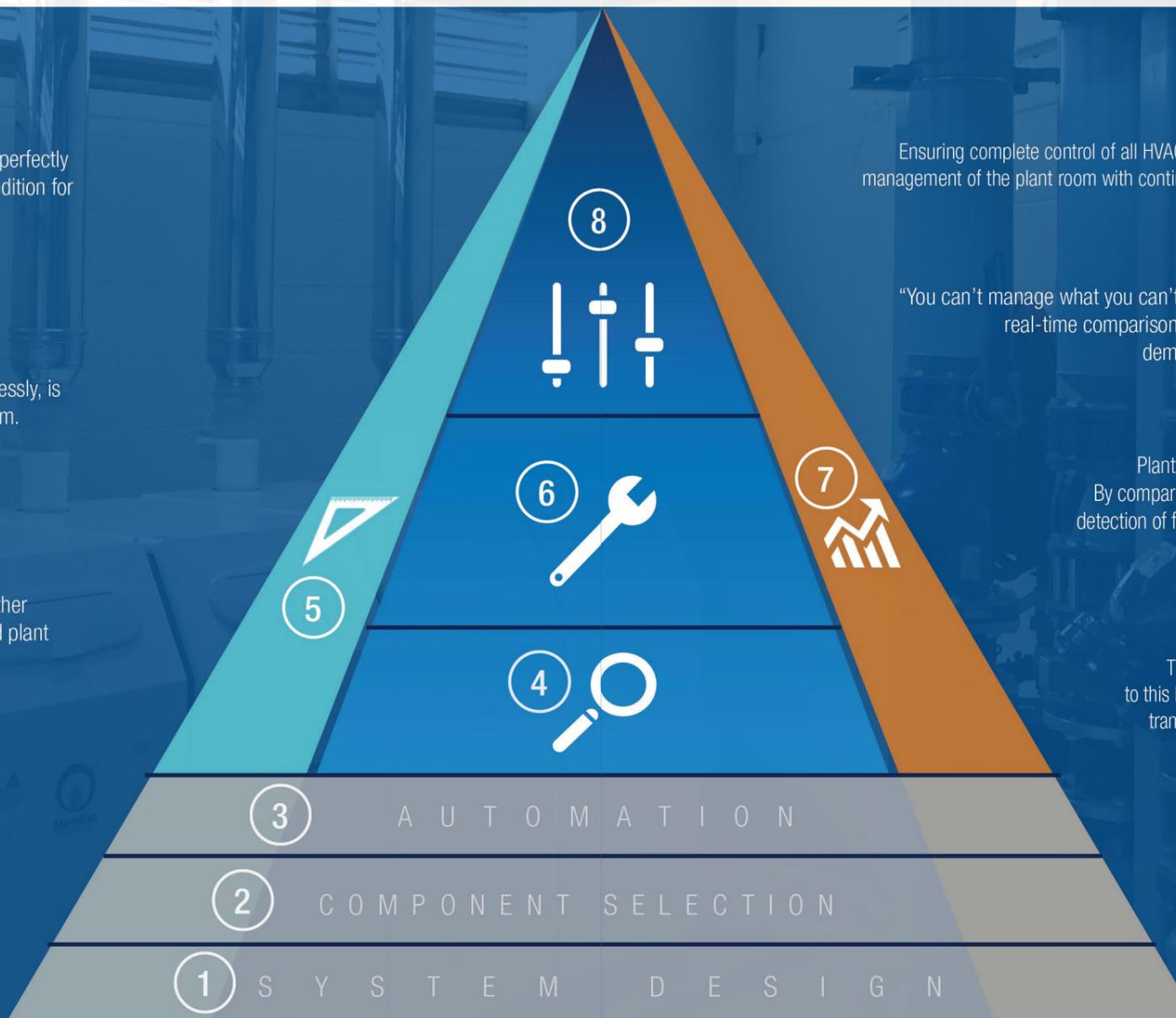
PlantPRO maintains levels of efficiency as designed even after many hours of operation. By comparing real values against design data and monitoring trends, this module allows early detection of faults, poor performance, and system degradation, providing excellent support for a condition based maintenance regime.

7 Report & Chart Builder

The masses of data managed by PlantPRO, is readily accessible and easy to use thanks to this Report & Chart Building function. This tool allows complex data to be quickly and easily transformed into useful information. Decisions can now be made based on real knowledge thanks to a full range of pre-scheduled and on-demand instant reports.

8 Control & Optimisation

PlantPRO is designed to run the plant room at the optimum efficiency, driven through real and measurable energy saving strategies, integrating advanced algorithms in the control of all main HVAC component plants.



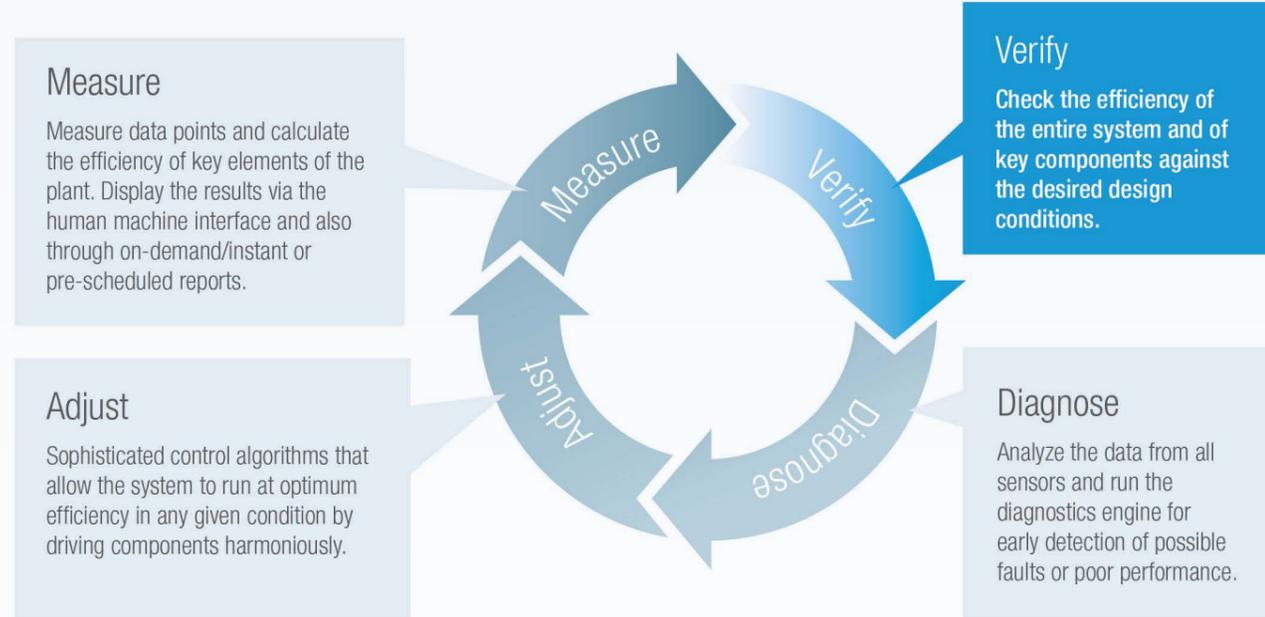
PlantPRO system architecture

The real strength of PlantPRO lies in its advanced system architecture, based on the following 5 pillars:

- 1 Performance feed-back loop operating logic
- 2 Complete control and accessibility
- 3 High configurability; "design once, apply many" approach
- 4 State-of-the-art technology
- 5 Modular approach

1 Performance feed-back loop operating logic

At the core of the PlantPRO engine is a performance feed-back loop; a continuous cycling control algorithm, which instantaneously detects changes to the plant, and modifies its actions accordingly. Each control phase (Measure, Verify, Diagnose and Adjust) is managed by specific software modules.



2 Complete control and accessibility

Making information easily available for all professionals involved on-site and remotely.

- ✓ Web based access
- ✓ User Profile based access, allowing individual visibility tailored to the specific user's needs: Building Management and Maintenance, System Design and Commissioning
- ✓ Powerful and intuitive graphical user interface



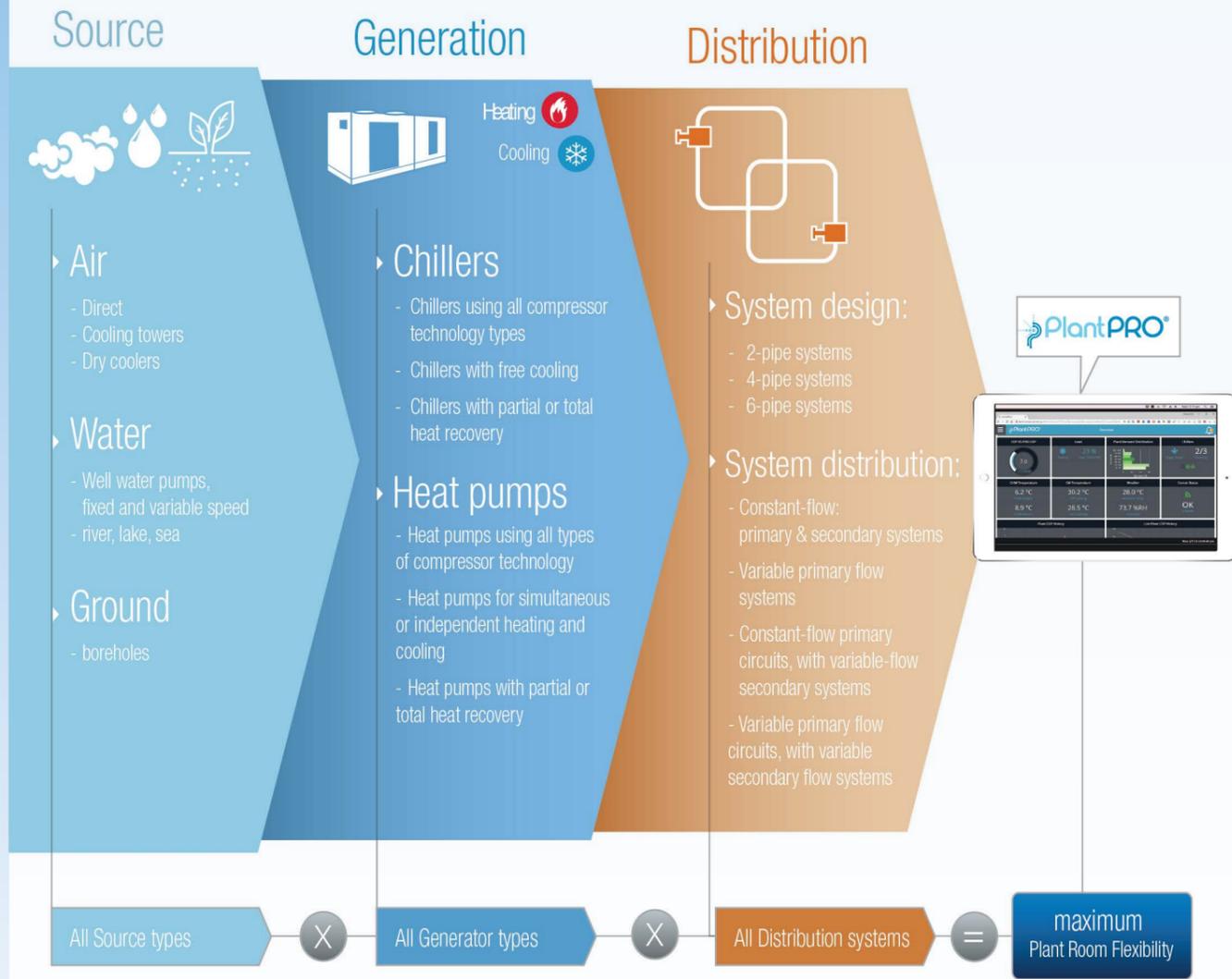
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3 High configurability; "design once, apply many" approach

Configuration by means of a powerful wizard, which supports parameter changes and helps to eliminate possible errors in programming.



"Design once, apply many"...

4 State-of-the-art technology

PlantPRO operates on the Niagara Framework by Tridium – a well established software & hardware integration platform amongst system integrators. PlantPRO communicates bi-directionally with the BMS through a high speed IP based communications network. It can receive scheduled and set-point modification commands from the BMS and provides complex control & optimisation routines, as well as detailed feedback information, from plant room HVAC equipment in a transparent way.

PlantPRO communicates with building management systems using industry standard protocols (MODBUS, LonWorks, BacNET and BacNET/IP). It uses this same open standard philosophy when connecting to HVAC equipment controllers (EIA-485 or TCP/IP)

PlantPRO enhances typical building management and monitoring activities

by providing a comprehensive list of data points, allowing full visibility of the critical operating values in the plant room.

This approach simplifies the integration with the BMS reducing on-site design activity and making PlantPRO the superior optimisation solution in the plant room.

- ▶ PlantPRO acquires real time feedback from field devices using serial EIA-485 communication lines as well as 0 - 10V or 4 - 20mA analogue signals.
- ▶ All data from on board microprocessor chiller control panels is made available to PlantPRO through Modbus, BacNet or Lon open protocols. Predefined chiller panel maps are available for some products which simplifies this data acquisition process. All of the available data points are exposed and made available within PlantPRO including read and write variables such as set points, fault status, unit enable, unit demand, operating pressures and temperatures.
- ▶ PlantPRO collects data from dedicated field devices installed in the unit and over different branches of the plant. More specifically, the system acquires:
 - electrical consumption of each unit
 - temperatures and differential pressures
 - water flows for calculating the cooling and heating energy produced by each single unit

5 Modular approach

The modular structure of PlantPRO software is reflected in the Optimisation Pyramid shown below. Each of the three main functional layers of the system ("Management & Monitoring"; "Maintenance & Diagnostics"; "Control & Optimisation") is supported by "Measurement & Verification" and "Report & Chart Building" software modules, both of which ensure the highest visibility at each layer of control.

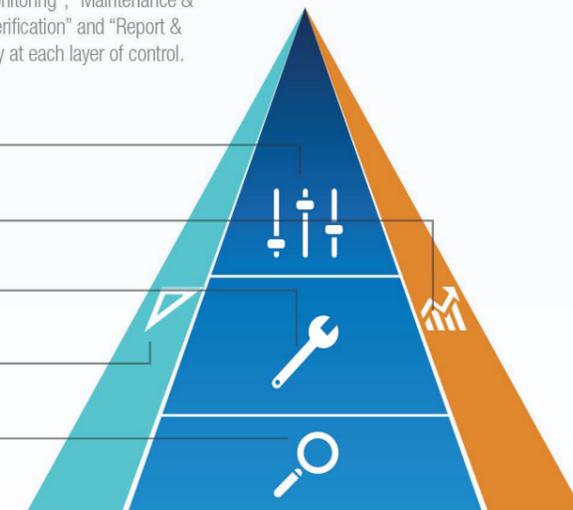
Control & Optimisation module

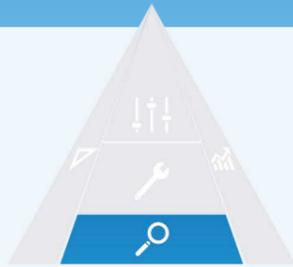
Reporting & Chart Building module

Maintenance & Diagnostics module

Measurement & Verification module

Management & Monitoring module





Management and Monitoring

Providing local and remote access as well as complete visibility of the plant room

User friendly graphic interface makes it intuitive to monitor and easy to set the parameters. PlantPRO can operate stand-alone or can be natively integrated into a new or existing BMS.

The powerful and intuitive GUI (Graphical User Interface) makes critical information promptly accessible, including all alarms & diagnostics. All acquired data is directly available and accessible both locally and remotely from any computer connected on the LAN (local area network) without the need to install expensive 3rd party proprietary licensed software.

This web-based technology ensures plant room accessibility anywhere by using any device equipped with a web browser connected to the internet, independently from the hardware or software platform it works with.

Operating over the Niagara Framework by Tridium, PlantPRO represents a proven and reliable solution that can be natively interfaced with the BMS or it can successfully perform all functions stand-alone.

PlantPRO simplifies the execution of the main building BMS system by carving out the operation of complex Plant systems. All data points & operations relevant to the plant room can be executed more efficiently by PlantPRO and management information is then seamlessly integrated back into the BMS.

PlantPRO replaces all the control functions and logic in the plant room, providing a superior optimisation solution. Through its suite of standardly available detailed graphics, PlantPRO avoids the development of expensive time consuming custom graphic pages.

All HVAC plant room data points within PlantPRO are made transparently available to the BMS

- If operating under the main building BMS, PlantPRO is able to manage the plant room according to occupancy schedules and/or simple set-point changes or on-off commands.
- When operating stand-alone, PlantPRO implements its own schedules and optimised control strategies to manage the entire plant room settings according to the building occupancy.



Immediate and clear understanding of the main operating variables



Measurement and Performance Verification

Calculating the actual system performance in real time whilst benchmarking against system design efficiency

At unit level, calculated efficiency is compared against design data. In particular PlantPRO provides specific real-time calculations.

The acquired data is accurately compared with the design data of each single unit at various working conditions to measure and calculate efficiency and performance indices of the whole plant room. In particular it provides specific real-time calculations:

Unit level

- Measure
 - cooling and heating capacity delivered
 - instantaneous free energy produced
 - energy absorbed
 - actual EER, COP and kW/Ton values.
- Compare actual efficiency values with the design efficiency at the same measured operating conditions
- Check validity for sensor calibration (available only over water-to-water units)

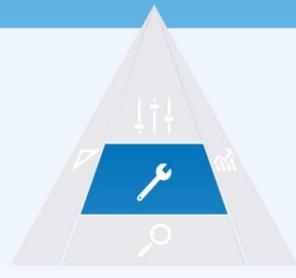
Plant room level

- Measure
 - total cooling and heating capacity delivered
 - instantaneous total free energy produced by the whole plant room
 - total energy absorbed
 - full plant room efficiency
 - cost for producing each kilowatt of cooling and heating capacity delivered by the plant room
 - plant CO₂ emissions



PlantPRO PROCOP
Real-time measured efficiency vs design data derived from the performance calculation engine





Maintenance & Diagnostics

Early detection of system faults for enhanced uptime and minimised efficiency losses

Turning data into actionable knowledge thanks to a dedicated high-end diagnostic engine, which allows access to the operation of main Plant equipment components.

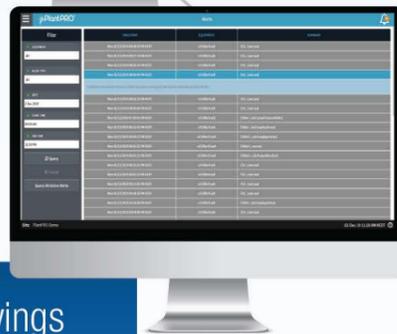
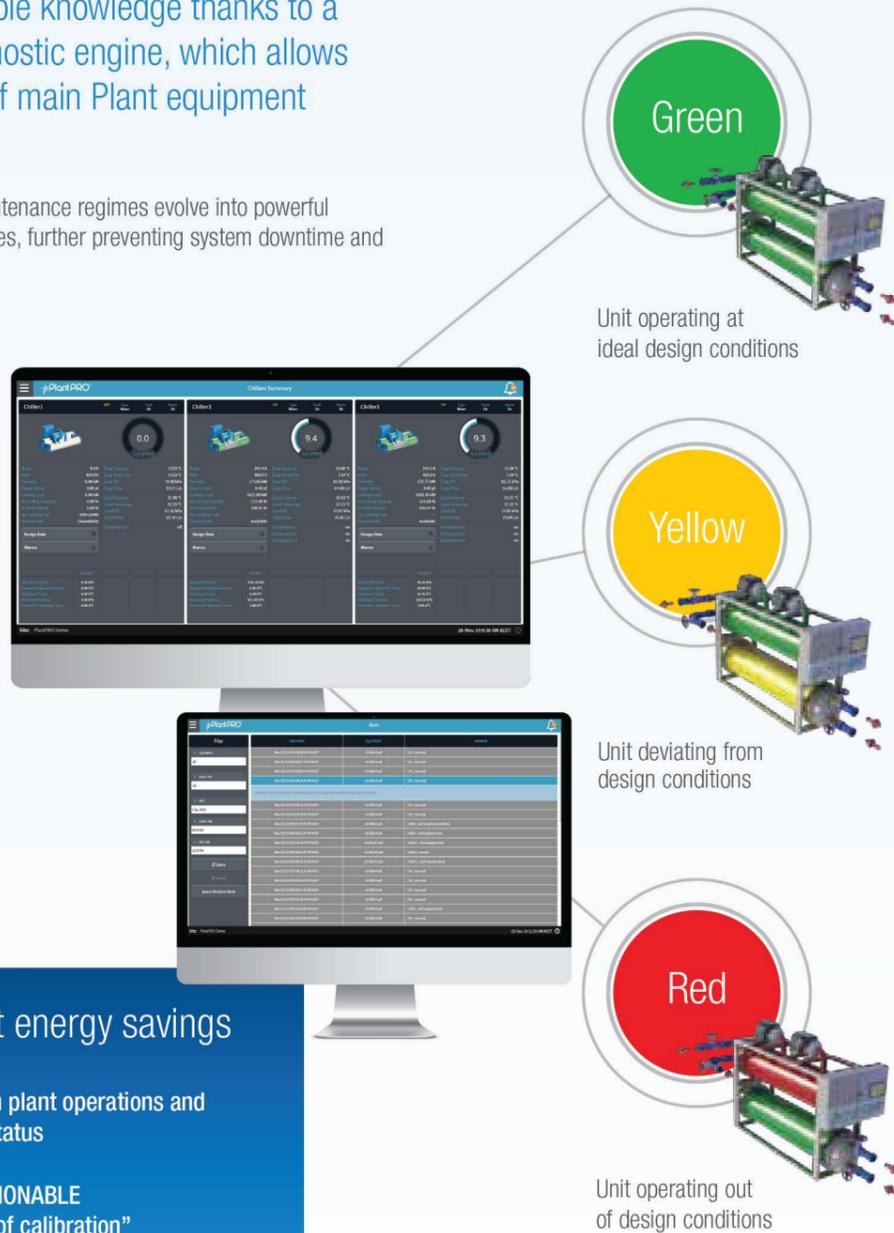
With PlantPRO typical scheduled maintenance regimes evolve into powerful condition based maintenance strategies, further preventing system downtime and efficiency losses.

Through simple, easy to read colour graphics, PlantPRO automatically displays the effective performance of key components in each individual Chiller.

Units which appear in yellow or red are still running but not performing to design conditions.

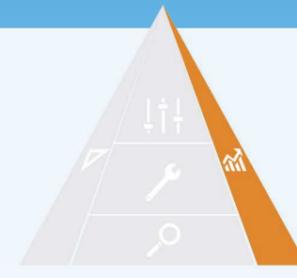
This provides a simple but effective early warning system for service and maintenance activity, thereby enabling the rectification of any problems and allowing the unit to be restored to its design performance conditions.

Advanced plant diagnostics integrates alarm acknowledgement in the Management module and downtime analysis in the Report module.



Large potential indirect energy savings

- PlantPRO detects variations in plant operations and provides info on the system status
- PlantPRO turns DATA into ACTIONABLE KNOWLEDGE i.e. "Sensor out of calibration" or "Low refrigerant charge"



Report and Chart Builder

Turning data into valuable, easy-to-read, actionable system knowledge

PlantPRO incorporates a powerful and comprehensive report & chart builder module. Key operating and performance data, dynamic efficiency indices and trends are displayed in an intuitive way.

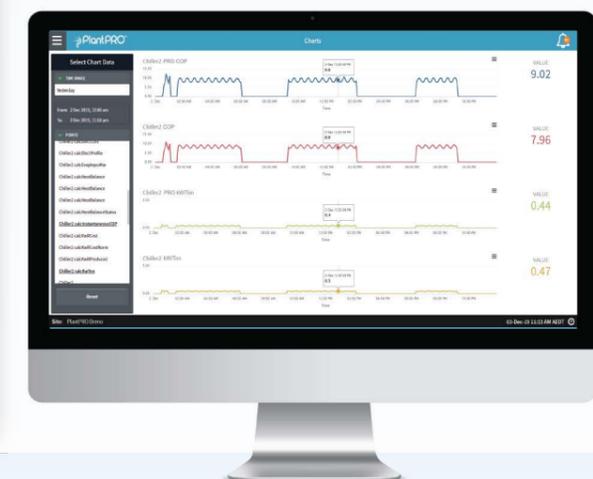
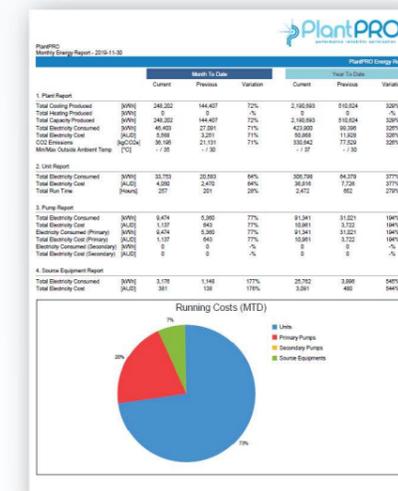
'Report' module

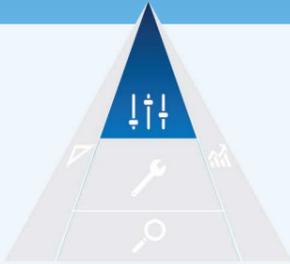
- Prepares and sends reports to individually selected users
- Presents information at the right level of detail according to various different user profiles
- Uniquely supports dynamic, real time system efficiency performance analysis and maintenance
- Includes system data and analysis of the main plant room devices as well as the energy indices for each single unit and the entire chiller plant:
 - production cooling and heating capacity (for each HVAC unit and also for the whole plant)
 - absorbed electrical energy (for each HVAC unit and also for the whole plant)
 - cost of electricity for producing each kilowatt of cooling and heating energy
 - total free energy delivered by the plant room,
 - efficiency of each HVAC unit and by the whole plant room (average month-to-date)
 - HVAC unit run hours
 - HVAC unit no. of start/stops
 - downtime analysis with root cause in ABC form
 - automatic fault monitoring and calibration-check over a set period of time

'Chart Builder' module

In addition to the standard and customised report creation, PlantPRO also includes the following Chart Builder functions:

- A large set of pre-configured charts are available as standard to allow quick and easy to read graphical representations
- Certain user profiles can easily create their own customised charts by selecting any/all variables





Control and Optimisation

Running the plant room at the optimal energy consumption rate

by controlling all HVAC equipment and the main system devices

PlantPRO continuously optimises the plant working conditions by promptly adjusting equipment staging and sequencing, managing operating set-points as well as water flows throughout the entire HVAC system.

One of the core strengths of PlantPRO lies in its dedicated "Performance feed-back loop", a specially designed cycling control logic which adjusts the system on the basis of data continuously acquired from the plant.

PlantPRO holistic approach to optimisation:



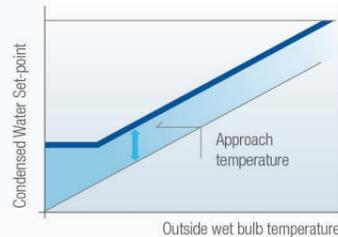
One of the strengths of PlantPRO is derived from the simultaneous, synergistic integration of advanced optimisation logic:

- Intelligent staging and sequencing of chillers and heat pumps over homogenous (similar unit types and models) and non-homogeneous (integration of different unit types and models) multi unit systems
- Chilled water and hot water flow optimisation
- Re-set of chilled and hot water set-points when conditions allow so as to optimise lift within each unit
- Advanced control of any type of source-side loop (e.g. well water, river, ground or air source loops, cooling tower basin and dry coolers)

Source side (Heat Rejection)

PlantPRO manages the source-side driving down the condenser water temperature over the source-side loop, whenever possible. PlantPRO also actively manages the cooling towers by controlling their pumps, the fans as well as the Tower by-pass valves.

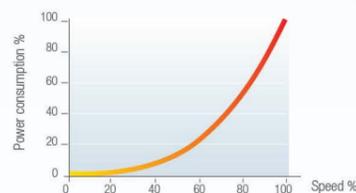
More specifically, the Cooling Tower set-point is automatically calculated on the basis of the wet bulb outside air & condenser water temperatures.



Distribution

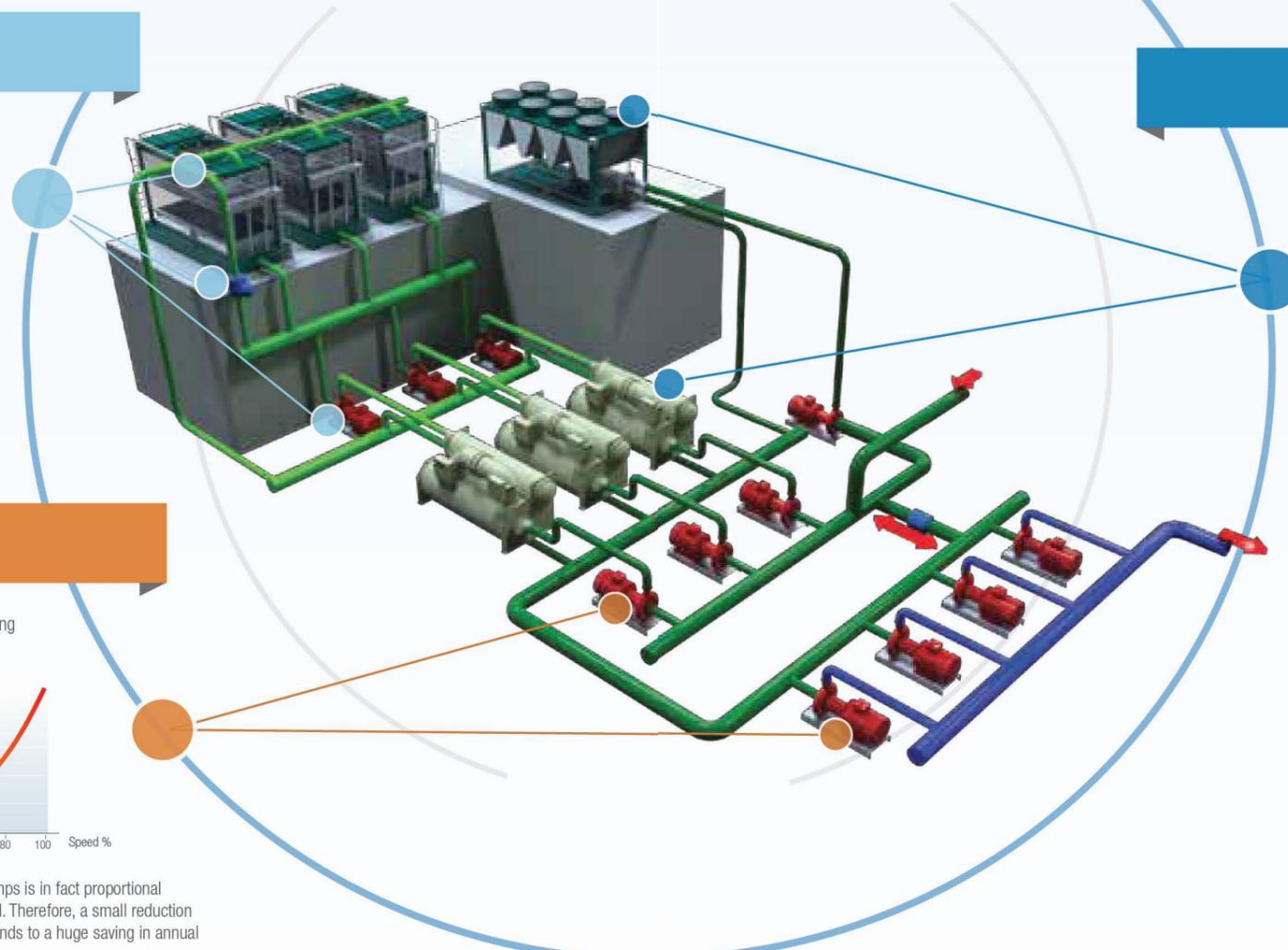
PlantPRO manages all possible piping configurations for distributing the cooling and heating energy over 2-pipe, 4-pipe and/or 6-pipe systems:

- ▶ Constant-flow primary circuit and constant-flow secondary circuit (CPF)
- ▶ Variable primary flow (VPF)
- ▶ Constant-flow primary circuit, variable-flow secondary circuit (CPVSF)
- ▶ Variable primary flow and variable secondary flow (VPVS)



Accurate control of the plant energy demand, allows PlantPRO to perform more effective control of the pump-sets, thus saving large amounts of energy.

The power consumed by pumps is in fact proportional to the operating speed cubed. Therefore, a small reduction in water flow speed corresponds to a huge saving in annual energy consumption.



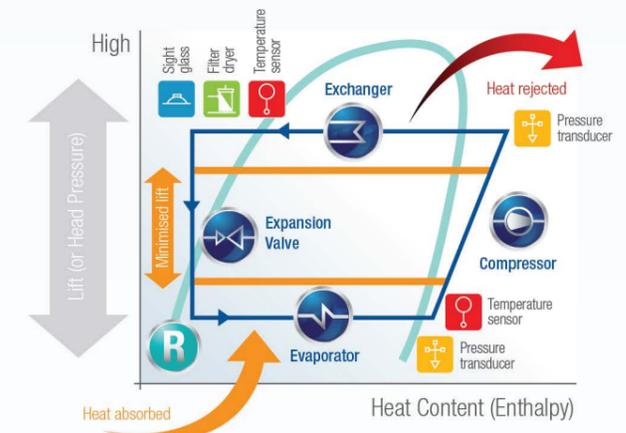
Generation

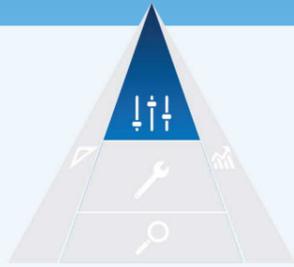
PlantPRO determines the best unit sequence to be activated according to the performance profile of each unit.

Such an intelligent staging and sequencing strategy is strongly recommended when different types of chillers and/or heat pumps are required to cooperate within a unique plant room system.

PlantPRO also manages the best operating condition of each unit in order to reduce the "lift", or head pressure, thus maximizing the energy consumption for producing the cooling and the heating energy required by the plant.

Furthermore, PlantPRO also drives up the chilled water set-point (drives down the hot water set-point) temperature without compromising comfort conditions.





PlantPRO Smart Sequencing

Automatic chiller staging, sequencing and load balancing



PlantPRO Smart Sequencing is fully focused on selecting the best combination of chillers to run for the observed conditions.

PlantPRO learns the chiller performance characteristics using the data provided by the manufacturer or through data collection in real time. It then uses the learned chiller performance to pick the most efficient chiller combination for the given conditions and the most efficient load points of each chiller to satisfy the cooling demand.

Predicting the future cooling load

PlantPRO Smart Sequencing predicts the future cooling load of the chiller plant so the chiller staging can accommodate and adapt to the future chiller plant needs smoothly.

Smart Sequence therefore eliminates premature or unwanted plant transitions.

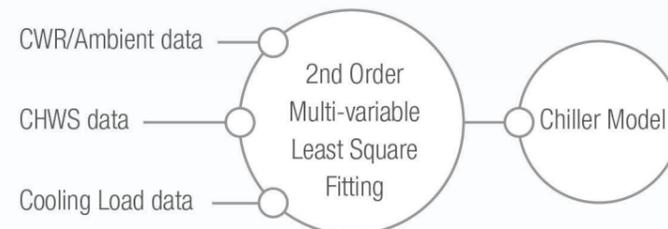
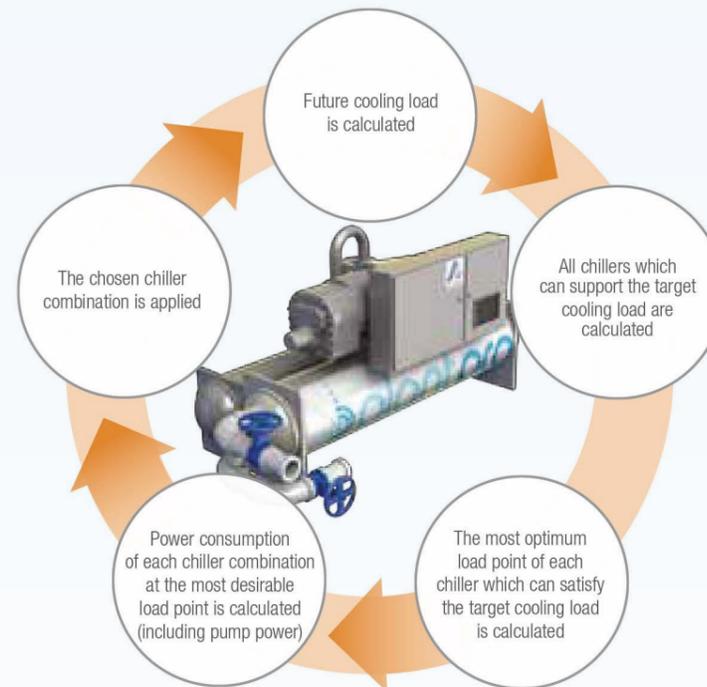
PlantPRO Smart Sequencing allows the chiller plant to run the most efficient combination of chillers for the given conditions even when some machines may be out of service.

PlantPRO Smart Sequencing selects the most efficient load point for each chiller running. If a chiller goes below the nominal efficiency of that chiller, the chiller can be proactively checked by service personnel minimising electrical energy waste and avoiding compounding service issues that can be costly.

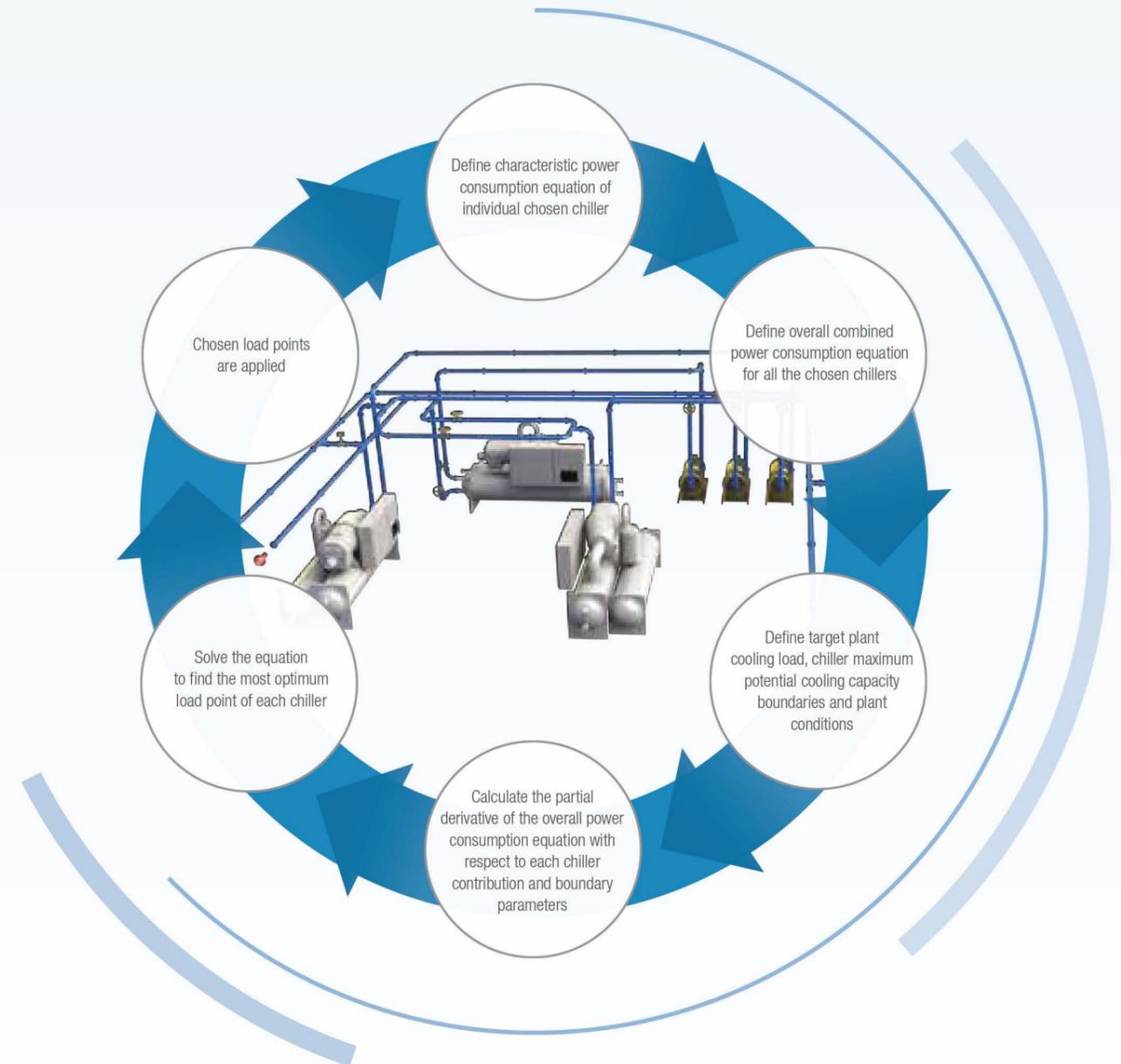
SMART SEQUENCING and LOAD BALANCING is conducted using the "ASHRAE" chiller model as its basis. (*American Society of Heating, Refrigeration and Air Conditioning Engineers).

How Smart Sequencing Works

Chiller Selection



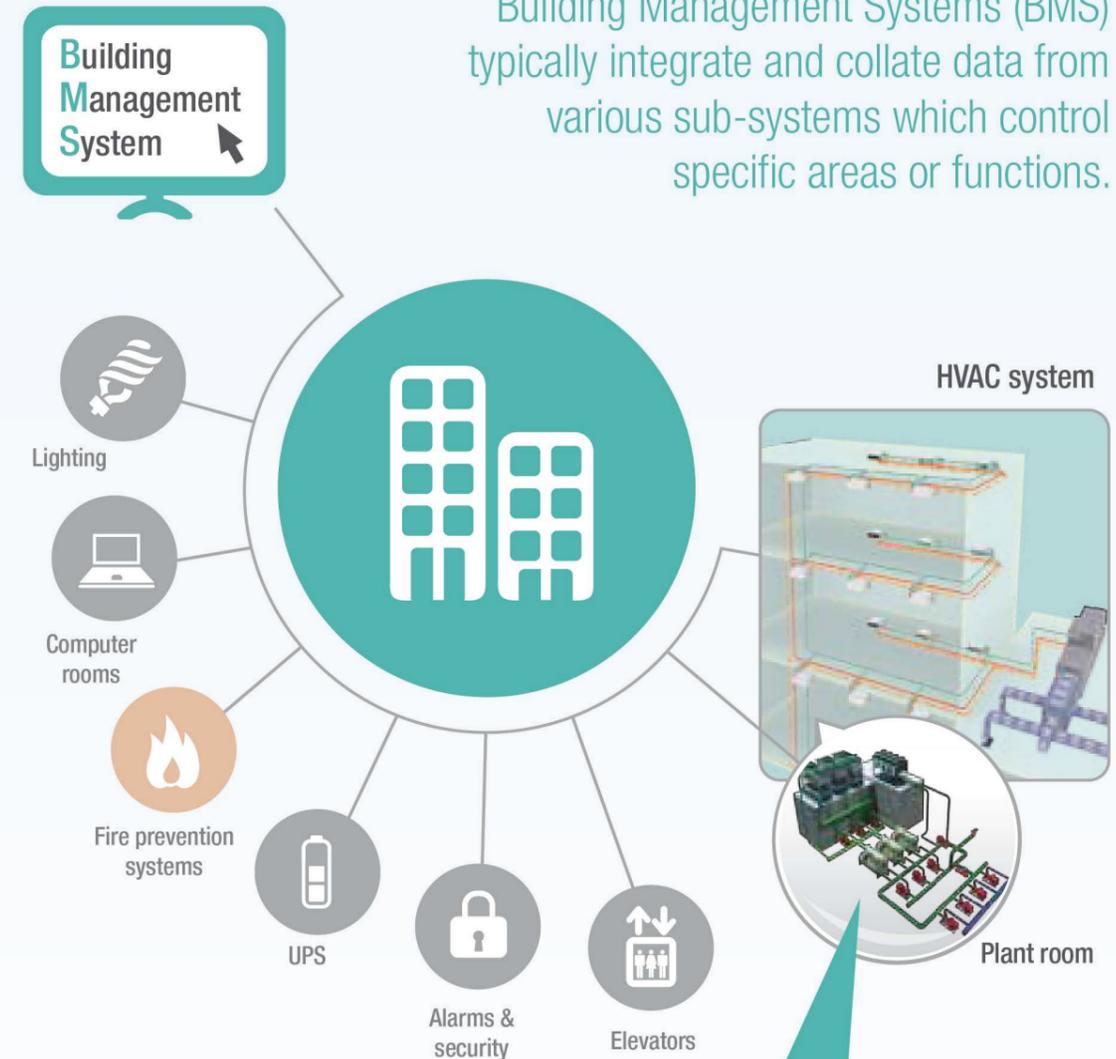
Load Balancing



PlantPRO plant room optimiser: all the advantages of a specialised, state-of-the-art, proven,

“design once, apply many” solution

FUNCTIONS / FEATURES In the PLANT ROOM	BMS When applied to PLANT ROOM	PlantPRO When applied to PLANT ROOM	PlantPRO main benefits
“Design once, apply many”	ad hoc customisation necessary	✓ + highly configurable proven, standard solutions	Tailored customisation only required for very special plant room designs or to accommodate unique needs
Factory tested features	not available	✓	
Management	✓	✓	Scheduling, temperature settings and management functions dedicated to the plant room
Monitoring	✓	✓	3D graphics and user friendly dash board
Web accessibility	possible	✓ native embedded	Licence-free full accessibility from anywhere
Communication and transparency to other systems	possible	embedded	Niagara Framework by Tridium offers native open protocol integration into BMS
Possible plant room configurability	all types, by means of custom programming	most types standard, all types possible. “Design once, apply many”	Certain tailored, one-off plant configurations may require some custom programming
Time to complete commissioning	long	short	“Design once, apply many” approach, all functionality is factory tested
Configurability	ad hoc custom programming	✓	Configuration of main parameters by means of powerful wizard, proven standard functions, all factory tested
Support for maintenance	limited	✓ in-depth advanced	Advanced diagnostics offer “Condition based maintenance” instead of the usual scheduled maintenance typically offered by most BMS
Advanced Diagnostics	not available	✓	Turns data into easy-to-read, actionable system knowledge. PlantPRO automatically assigns and displays a colour rating at which each HVAC unit is operating (well- or under- performing)
Performance Measurement	possible	✓	User friendly dashboard
Efficiency Verification	not available	✓	Benchmark actual performance of each HVAC unit when compared to design data in real-time and then monitor this data over time
Sensor auto check	none	✓ for water cooled	By means of “heat balance” calculation
Charts	limited	✓ powerful	Standard charts come with the system, chart builder function enables users to easy produce customised charts for all measured values
Reports	possible	✓ powerful, including energy and downtime	Comes with a set of standard reports, incorporates functions for easy creation of customised reports
Produced energy cost calculation	optional	✓	Available in real-time and also by means of dedicated energy reports
CO ₂ emissions calculations	possible	✓ standard	
Control	to be developed ad hoc	✓ standardised, proven, tested	For all type of units (heat recovery, free cooling, HP, 4pipe, full and partial recovery)
Optimisation	limited	✓ high level	holistic approach integrating source, generation and/or distribution hydraulic configurations



PlantPRO is THE dedicated solution for optimal control over the entire plant room.

Thanks to its advanced system architecture, PlantPRO offers additional, unique functions that allow you to carve out the control of the plant room HVAC equipment from the BMS, thereby

achieving an unchallenged quality of optimisation.

Its state-of-the-art technology infrastructure is designed to be completely transparent to the BMS, enabling full control and operation of the system in the easiest and most intuitive way through a standard, interoperable BMS interface.

“You can’t manage if you can’t measure!”

PlantPRO is the most effective tool for enabling and executing a successful energy reduction strategy, in both new and existing installations.

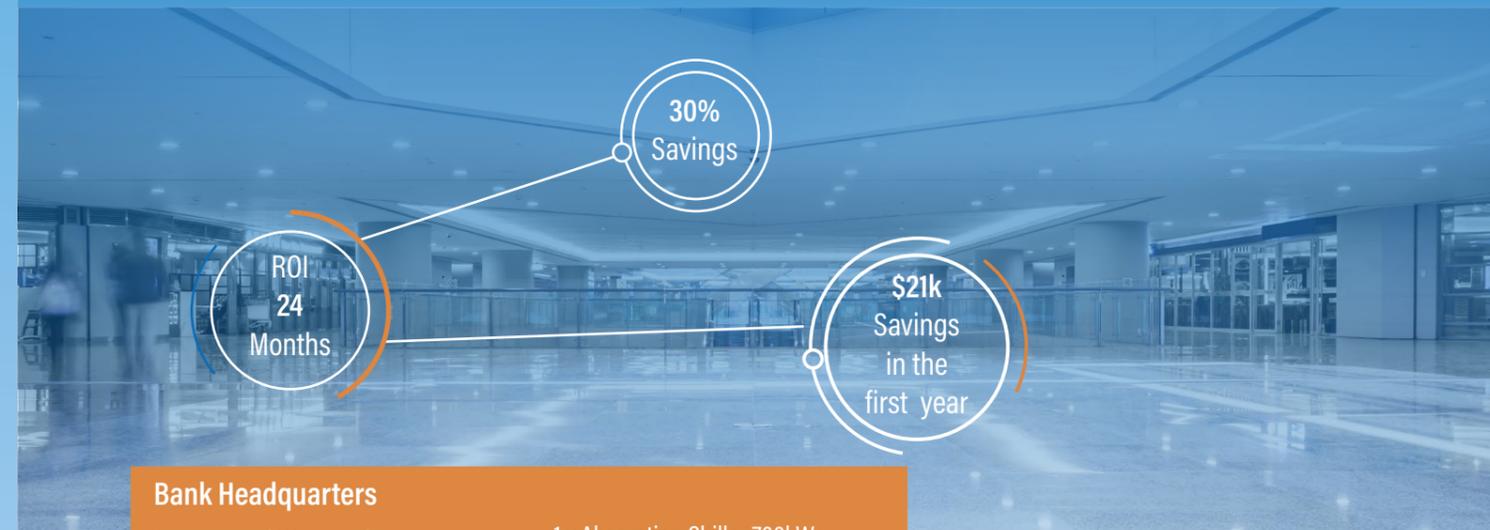


PlantPRO, thanks to its advanced system architecture is the ideal solution to address these needs in a rational way, by:

In-depth, precise measurement of the performance of the building is a key factor in every successful energy reduction strategy, in order to:

- ! identify the most relevant and easy-to-address improvement areas,
 - ! keep track of progress and continuously building on achieved improvement,
 - ! approach maintenance wisely and effectively,
 - ! comply with all major green certification programmes, which recognise efficiency performance measurement as a key aspect of energy management.
- ✓ providing complete, reliable and easy-to-access measurement of the performances of key plant room components,
 - ✓ facilitating the identification of critical components, supporting the prioritisation of refurbishment activities according to the real advantages they offer,
 - ✓ offering immediate, direct savings thanks to the optimisation of HVAC equipment operations and of the plant room as a whole,
 - ✓ supporting a condition-based maintenance approach, beyond the normal “fix-and-forget” regimes,
 - ✓ providing building managers with a complete, advanced and effective plant room control and optimisation solution,
 - ✓ offering immediate and significant potential improvements to all main green certification protocols.

A selection of PlantPRO installations



Bank Headquarters

- 2,150 / 7550 kW capacity
- 3 x Daikin WC VSD Centrifugal 2000kWR each
- 1 x Daikin WC Turbocor Chiller 800 kW
- 1 x Absorption Chiller 700kW
- 5 x Dedicated CHW and CW pumps
- 4 x Secondary Pumps
- 3 x Cooling Towers

The Challenge //

Built with a heavy focus on energy efficiency, this Bank Headquarters is recognised as a Green Star rated building and utilises best practice design throughout including a fully operational Tri Generation Plant. Other environmental efficiencies include a facade coefficient, specialised lighting systems, natural light harvesting, blackwater recycling, solar panels, rainwater harvesting, and landscaped roofing. To further continue the building's high energy efficiency standards, it was recommended that the operating plant be reviewed to ensure full optimisation. This review would not only maintain energy savings but would also provide the client with measurement and verification of the plant's performance, detailed reporting, and plant diagnostics.

The Solution //

The PlantPRO Value Added Reseller deployed the award-winning plant optimisation solution at this site to both optimise the operation of the central plant and to provide advanced measurement and reporting capabilities to the facility. Control strategies included active lift optimisation through a combination of chilled water and condenser water reset and further enhanced with variable speed primary pumping control. In addition to this, optimised chiller sequencing was employed to ensure the best fit chiller is always sequenced for the given building load. The deployment of PlantPRO at this Bank's Headquarters was the first integration with a Siemens Building Management System (BMS). Integration was seamless and used BACNet IP for communications between the two systems.

The Results //

Comparative operating data for two 12-month contract periods illustrate a continued downward trend in total plant energy consumption resulting in significant energy savings across the total two-year period. For the most recent 12-month period, PlantPRO realised a reduction in total plant energy consumption of 198,443 kWh equating to a cost saving for the previous 12 months of \$21,569. These are based on the Q4 2018 Vic Commercial Buildings Retail Blended Supply Rates.

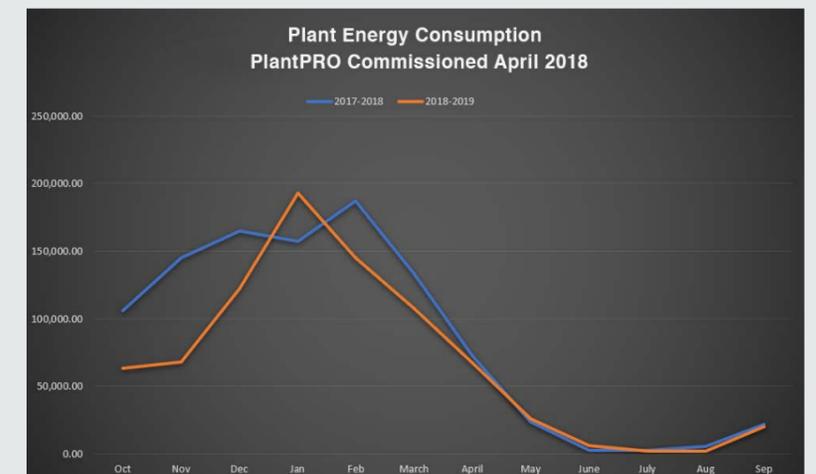


Figure 1- Total Plant Energy Consumption 2017-2018 vs 2018-2019. It should be noted that at the following times, the plant was operating under BMS control: prior to April 2018 (PlantPRO was newly commissioned in April 2018) and January 2019 (in order to facilitate the repair of chillers).

A selection of PlantPRO installations



University Medical Research Facility

3150kW/900tons
 2 x Daikin low load AC chiller
 1 x Daikin mid load chiller
 1 x Trane high load AC chiller
 8 x Primary CHW Pumps, 5 Sec CHW Pumps
 Installed over the top of a new Schneider StruxureWare

The Challenge //

This University Medical Research Facility is a special purpose building designed to combine a public interface with state-of-the-art secure research and laboratory facilities, and supports the pioneering medical work undertaken by the students and researchers. The client needed to ensure that critical environmental conditions were maintained within these spaces. PlantPRO VAR worked closely with Conserve It to deploy the award-winning PlantPRO® - Plantroom Performance Reliability Optimisation Solution on a CI-DEG-3000 to deliver reliable 24/7 operation, and to ensure stable conditions are always maintained for the building's critical research functions. The PlantPRO Plant Room Optimisation Solution controls the facility's four air-cooled chillers located in the main plantroom. These include two Daikin McQuay low load chillers, one Daikin McQuay mid load chiller and one Trane high load chiller featuring a total cooling capacity of up to 3150 kW / 900 tons. Eight primary chilled water pumps and five secondary chilled water pumps serve these chillers. PlantPRO was installed as part of a chilled water plant controls upgrade process.

The Solution //

PlantPRO uses intelligent self-learning algorithms that optimise a chiller plant by running the most efficient combination of chillers for the given conditions, even when some machines may be out of service. It selects the most efficient load point for each running chiller. If a chiller goes below the nominal efficiency of that chiller, it can be proactively checked by service personnel minimising electrical energy waste and avoiding compounding service issues that can be costly.

The Results //

Although optimisation is always a key factor for any PlantPRO installation, reliability and plant stability was the first priority on this plant. This KPI has already been proven with zero down time or loss of conditions since the completion of final commissioning.

With regards to plant efficiency, even under low load conditions, an improvement in running costs has been shown. As the plant is placed under higher ambient loads, it is predicted greater savings will be extracted from the plant. Using an IPMVP study, it has been measured that PlantPRO has achieved 11.06% saving on energy consumption during the period from July 2018 to Dec 2018. The energy consumption for the Chiller Plant reduced from 907,555 kWh to 807,209 kWh during that period. Based on a special electricity tariff of 17 c/kWh which ANU has negotiated with their electricity retailer, it can be estimated that PlantPRO by Conserve It has saved ANU AUD 17,058.82 in 6 months or this can be extrapolated to annually savings of AUD 34,117.64.

Customer Benefits

- Improved plant operation reliability
- 24/7 uninterrupted Operation
- Full Plant Control and Automation with optimisation
- Ongoing Measurement and Verification
- Regular Diagnostics and Reporting
- Full visibility of plant operation
- Easy to use system
- High energy and cost savings



Resort Hotel

Air-cooled Climaveneta ERACS chiller
 2 x 1220kW TECS water-cooled main chillers
 640kW ERACS unit
 Tridium I/O controllers

The Challenge //

Built over 30 years ago, this Hotel Resort had lost its five-star edge and become an expensive and inefficient hotel to operate by 2011. Recognising the need for refurbishment, the resort's new ownership approved a \$26 million refurbishment program to take in all public spaces as well as guest rooms, bars and restaurant. Originally the resort's ageing mechanical services plant was not included in the scope of works, nor was the building management system (BMS) – an old, proprietary system that had received limited upgrades over the years and progressed to obsolescence. But following a BMS failure prior to the busy Christmas period, these issues were quickly brought to a head. Not only did this place undue pressure on the management and maintenance team during a peak occupancy period, but it also resulted in a hefty repair bill.

The Solution //

The PlantPRO Value Added Reseller was called on to conduct a Level 3 Energy Audit, among the problems identified were a failing BMS and an existing chiller plant that was inefficient, prone to issues and had reached the end of its useful life. The chillers were also operating on obsolete, ozone depleting refrigerants. Although a like-for-like replacement promised an immediate performance improvement, the PlantPRO Value Added Reseller identified opportunities to deliver further savings through the installation of two water-cooled chillers combined with an air-cooled Climaveneta ERACS chiller. The audit also identified the method used to heat the resort's pool as being highly inefficient, required to be maintained at a constant 27.5°C year-round. To optimise energy efficiency, the PlantPRO Value Added Reseller's design shifted the balance between high load and part load among the three chillers. The two incumbent high-load 1290kW chillers were replaced with two 1220kW TECS water-cooled main chillers, while the incumbent low-load 580kW chiller was replaced with the slightly larger 640kW ERACS unit.

The Results //

Six months after the installation of the new chiller set, and PlantPRO Value Added Reseller design had already exceeded expectations. Ongoing commissioning and fine-tuning through the defects period continued to improve the performance of the entire site.

According to ongoing energy analysis being conducted by a Third Party Analytics Provider, a 13 per cent reduction was experienced compared to the same period in the year prior. This represents a monthly electrical energy saving of 93,255kWh. These energy savings have also been delivered in the face of increased cooling load, with higher resort occupancy levels and above-average temperatures experienced on the Gold Coast with a higher number of cooling degree days.



PlantPRO[®]

performance reliability optimisation



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