



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

The control of a chiller plant system has generally been a custom engineered solution until now, PlantPRO provides a standard suite of tools and hardware based on a Wizard approach that is highly flexible, simple to install and has the engineering tools built for control of 1 – 10 chillers of any make, model or type.

Chilled Water Plant optimisation is the new frontier. Chillers are complex devices, refrigeration gas cycle and heat exchange efficiency are highly interdependent and critical to achieving optimum capacity, efficiency and reliability.



External Service Companies / Contractor

& Start-up

Building, Facility & Energy Managers

Local Maintenance and Technical Staff

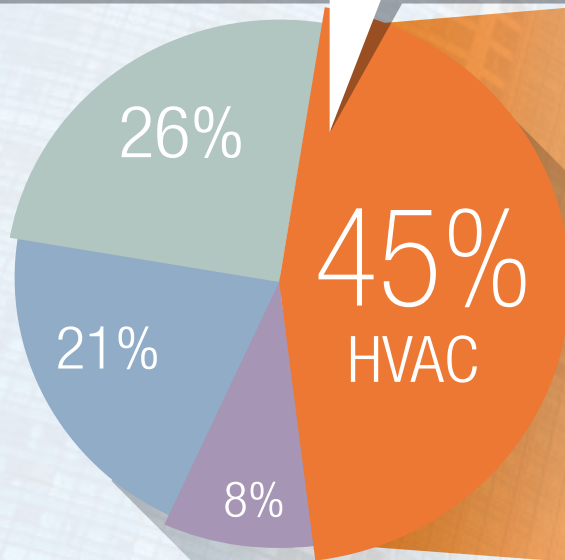
External Service

Companies / Contractor

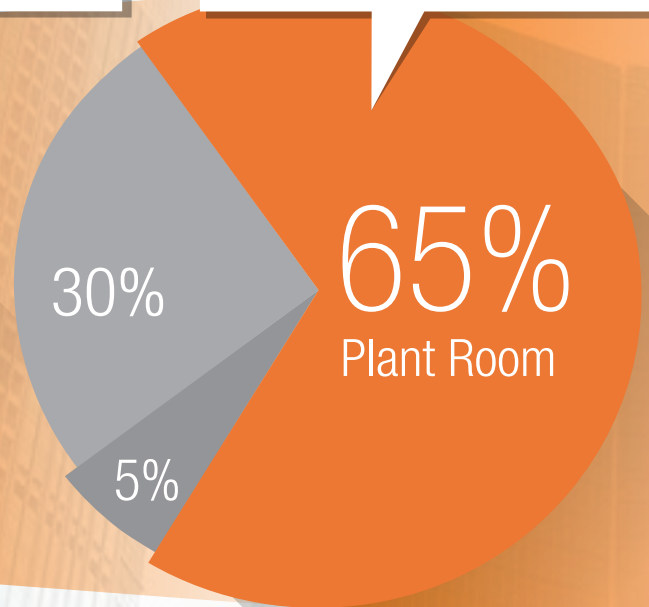
& Start-up

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

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



■ HVAC ■ Lighting ■ Other ■ Office



■ Plant Room ■ Air side ■ Other

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

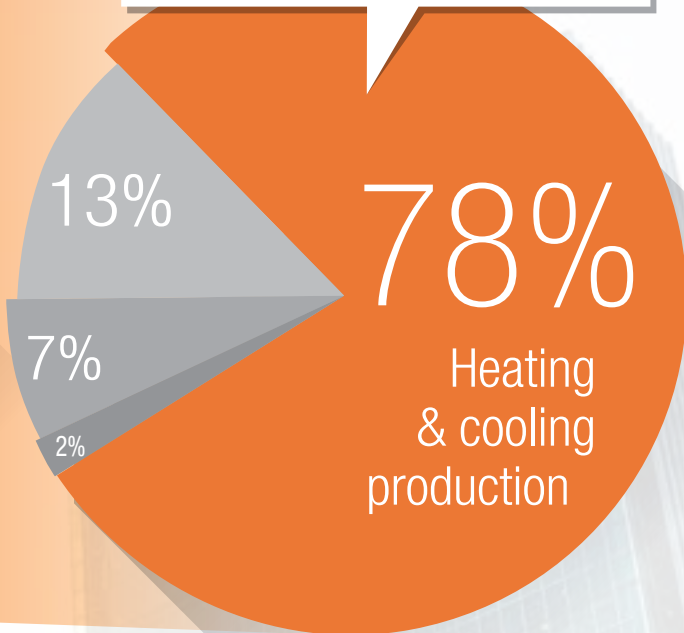
For this reason every efficiency improvement in HVAC performance can significantly reduce the energy profile of the building, turning HVAC optimisation into a value generating opportunity.

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.

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

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



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.

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.

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.

5

6

4

3

A U T O M

2

C O M P O N E N T

1

S Y S T E M

PlantPRO is the new 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.

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.

A T I O N

S E L E C T I O N

D E S I G N

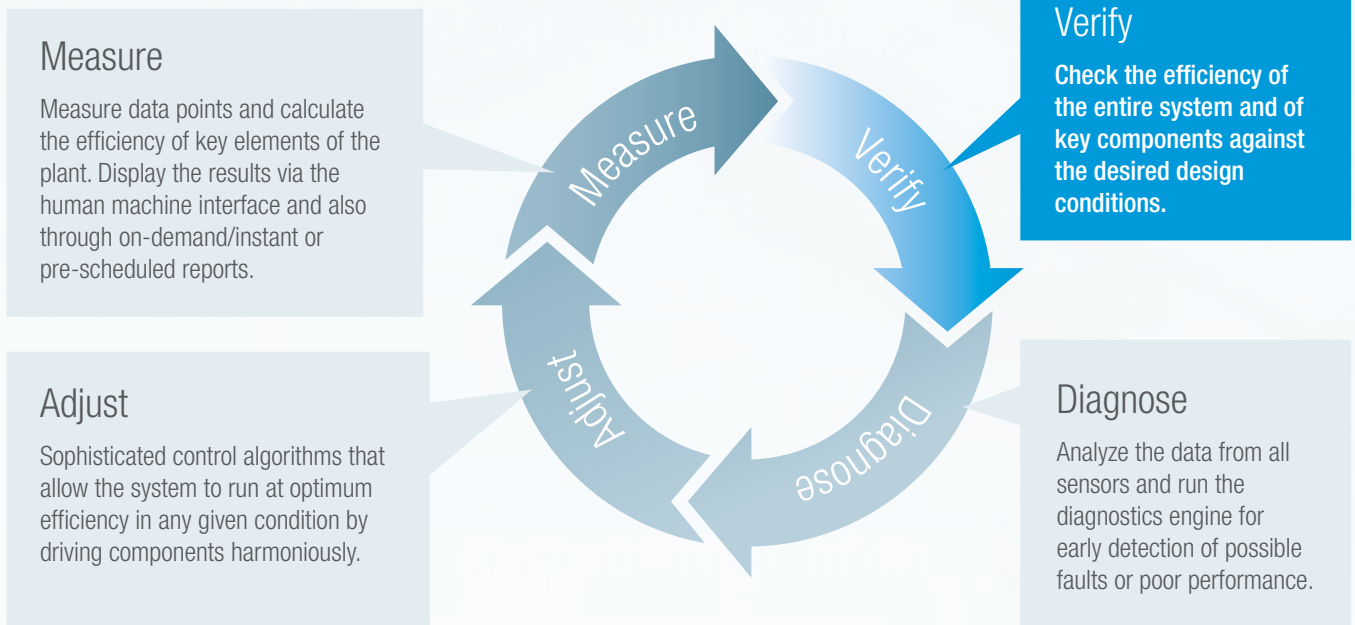
PlantPRO system architecture

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



1 Performance feed-back loop operating logic

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.



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

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



PlantPRO system architecture

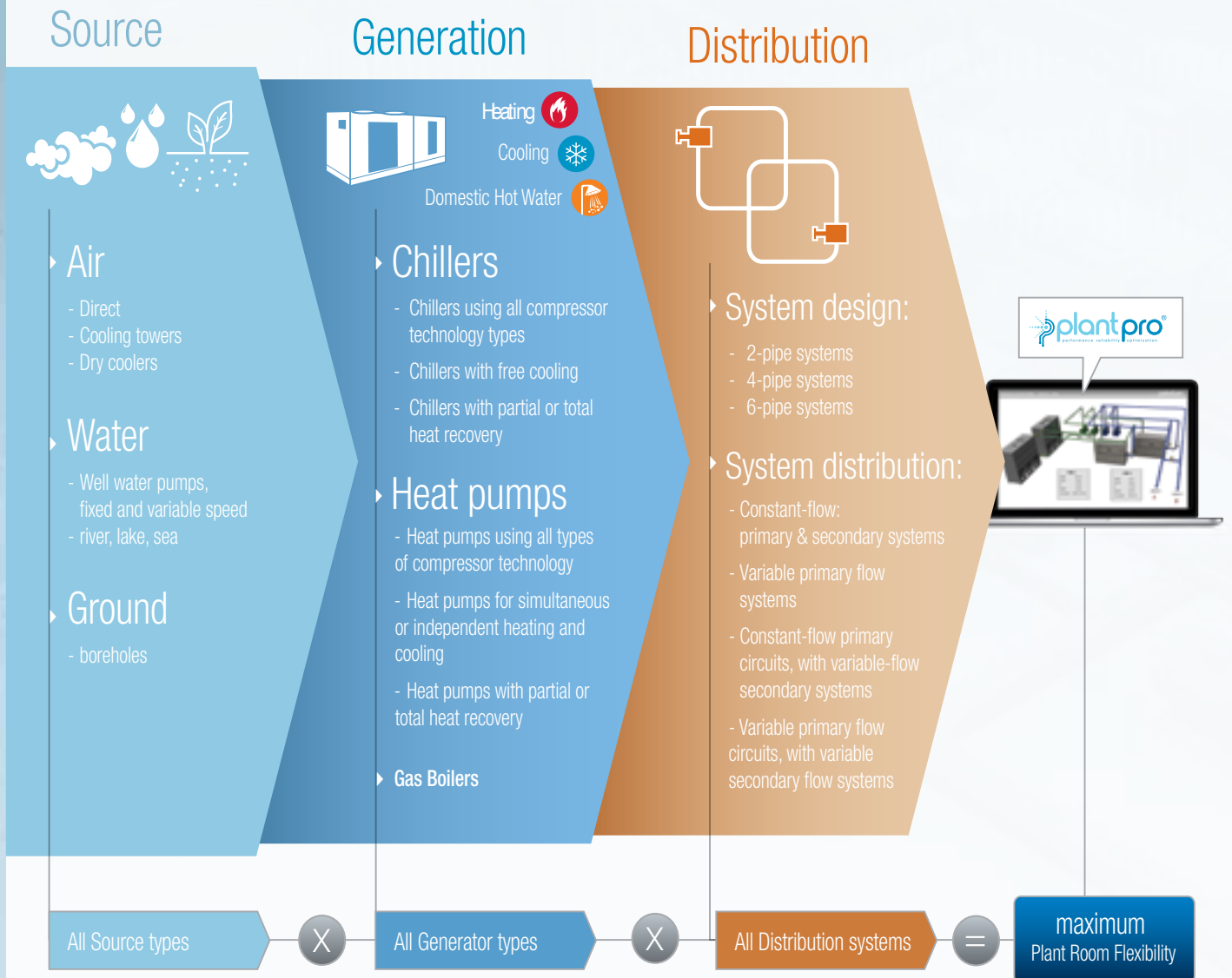
The real strength of PlantPRO lies in its advanced system architecture, based on the following 5 pillars:

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" ...

1 Performance feed-back loop operating logic

2 Complete control and accessibility

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4 State-of-the-art technology

5 Modular approach



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.

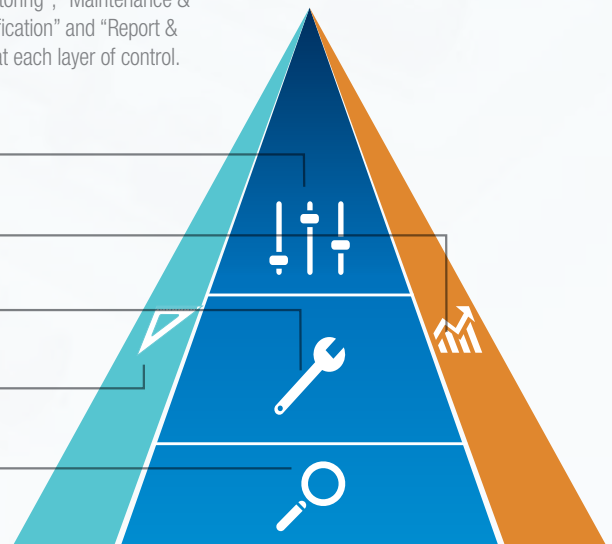
Control & Optimisation module

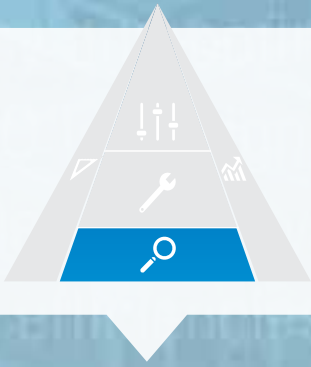
Reporting & Chart Building module

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

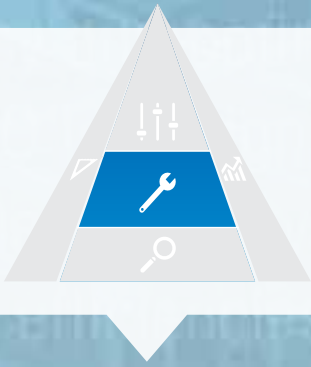
- Measure
 - cooling and heating capacity delivered
 - instantaneous free energy produced
 - energy absorbed
 - actual EER, COP and kW/Ton values.
- Compare actual efficiency values with the design efficiency at the same measured operating conditions
- Check validity for sensor calibration (available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

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.

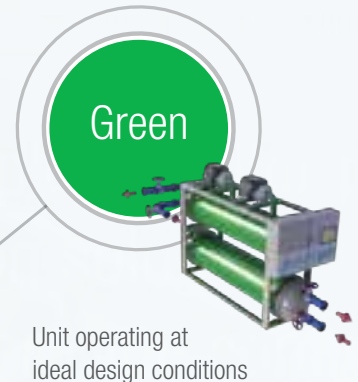
With PlantPRO typical scheduled maintenance regimes evolve into powerful condition based maintenance strategies, further preventing system downtime and efficiency losses.

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

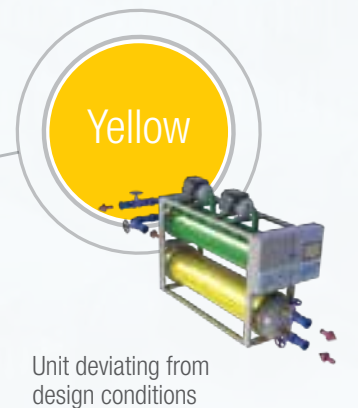
Units which appear in yellow or red are still running but not performing to design conditions.

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.

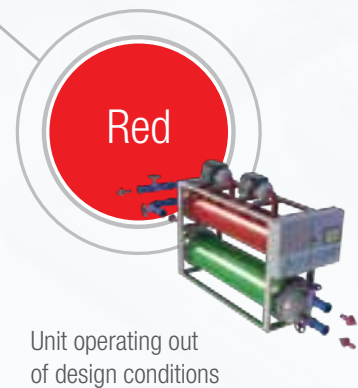
Advanced plant diagnostics integrates alarm acknowledgement in the Management module and downtime analysis in the Report module.



Unit operating at ideal design conditions



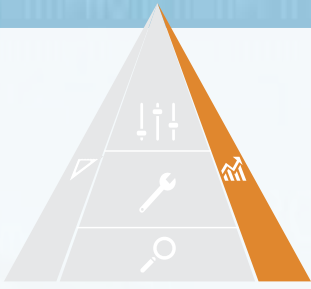
Unit deviating from design conditions



Unit operating out of design conditions

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

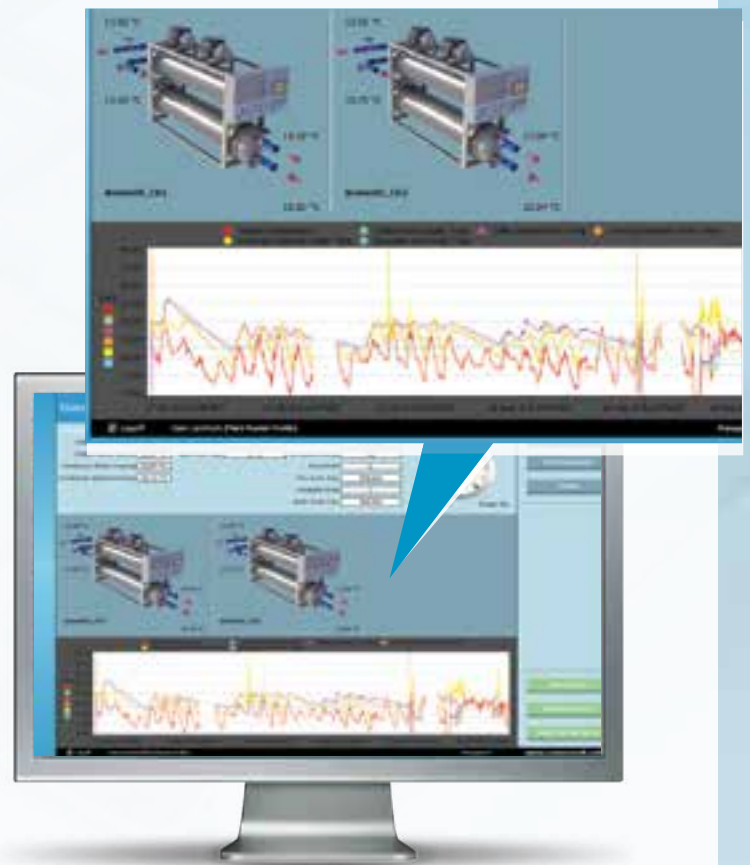
- Prepares and sends reports to individually selected users
- Presents information at the right level of detail according to various different user profiles
- Uniquely supports dynamic, real time system efficiency performance analysis and maintenance
- Includes system data and analysis of the main plant 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

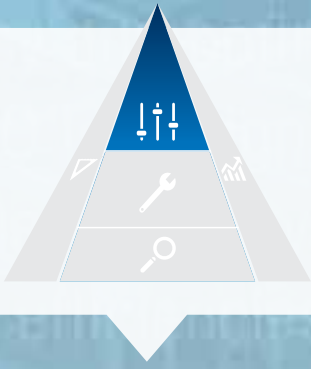
'Chart Builder' module

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

Monthly Plant Report			
PlantPRO Monthly Plant Report			plantpro
Ferrante Aporti			
2013-12-31			page 1
Plant Report			
	December 2013	No Yearly Data	TER
Electricity Used	54,062 kWh	82,113	7
Electricity Cost	3,784	5,676	6
Cooling Produced	21,024 kWh	31,536	5.25
Heating Produced	262,800 kWh	394,200	4
Total Free Energy	19,973 kWh	29,959	3
Run Hours	740	1,110	2
Avg TER	5.25	5.18	1
Unit Report			
Ericas_1	MTD	Diagnostics	MTD
Avg TER	6.75	lowCoolLoadDiag	60%
Electricity Used	21,024 kWh	Sensor Imbalance Circuit 1	10%
Electricity Cost	1,472	Fouled/Scaled Evaporator circuit 1	9%
Energy Cost	0,010	Low Refrigerant Level Circuit 1	7%
Cooling Produced	10,512 kWh	-	-
Heating Produced	131,400 kWh	-	-
Total Free Energy	9,986 kWh	-	-
Run Hours	180	-	-
Unit Starts	151	-	-





Control and Optimisation

Running the plant room at the optimal energy consumption rate

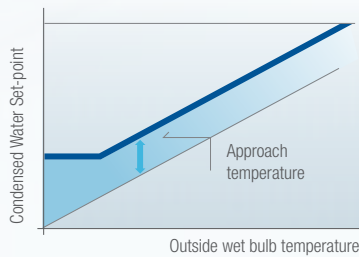
PlantPRO continuously optimises the plant working conditions by promptly adjusting equipment staging and sequencing, managing operating set-points as well as water flows throughout the entire HVAC system.

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.

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.

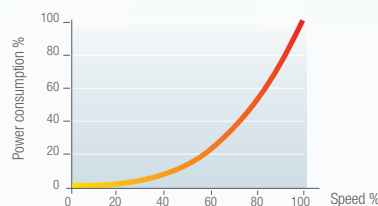


Distribution

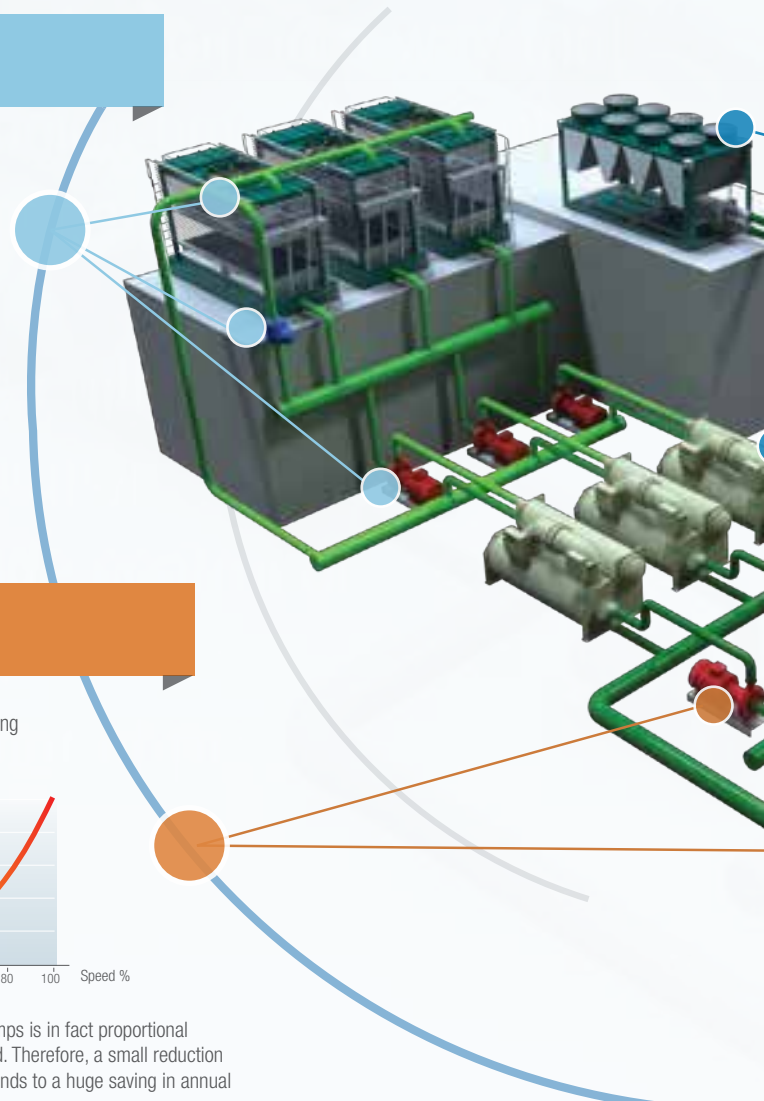
PlantPRO manages all possible piping configurations for distributing the cooling and heating energy over 2-pipe, 4-pipe and/or 6-pipe systems:

- ▶ 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.



by controlling all HVAC equipment and the main system devices

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)

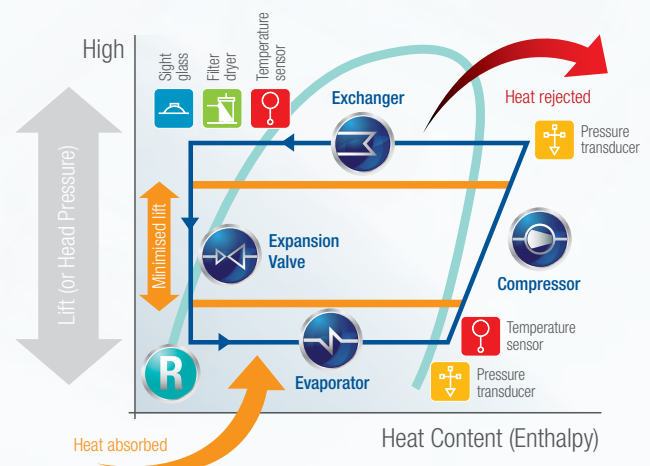
Generation

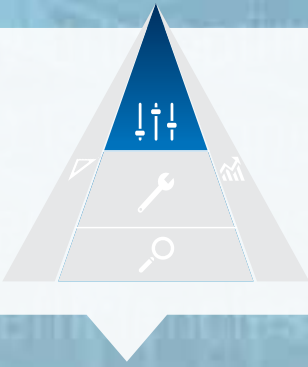
PlantPRO determines the best unit sequence to be activated according to the performance profile of each unit.

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.

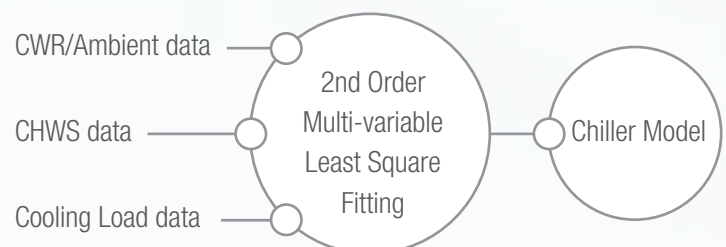
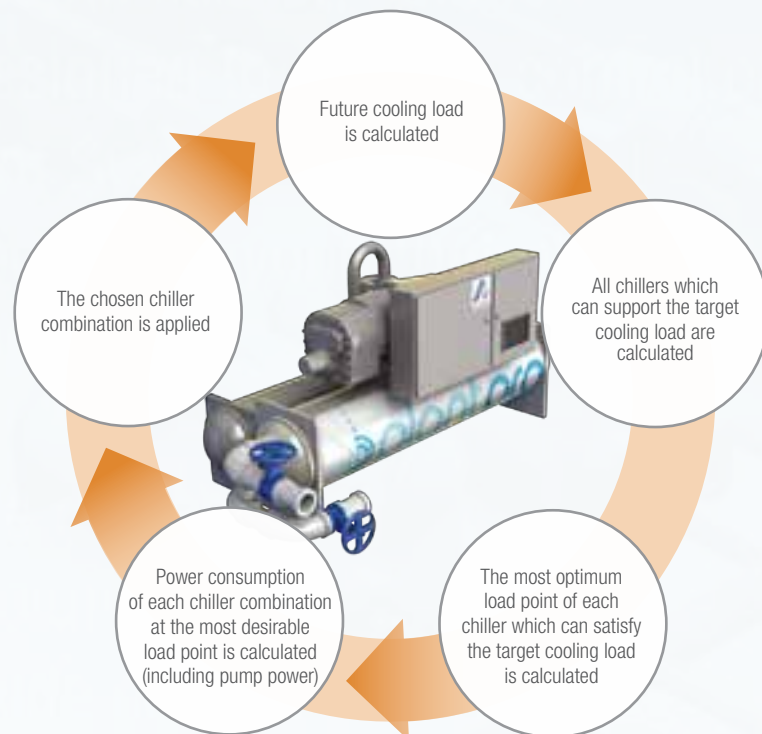
PlantPRO Smart Sequencing allows the chiller plant to run the most efficient combination of chillers for the given conditions even when some machines may be out of service.

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.

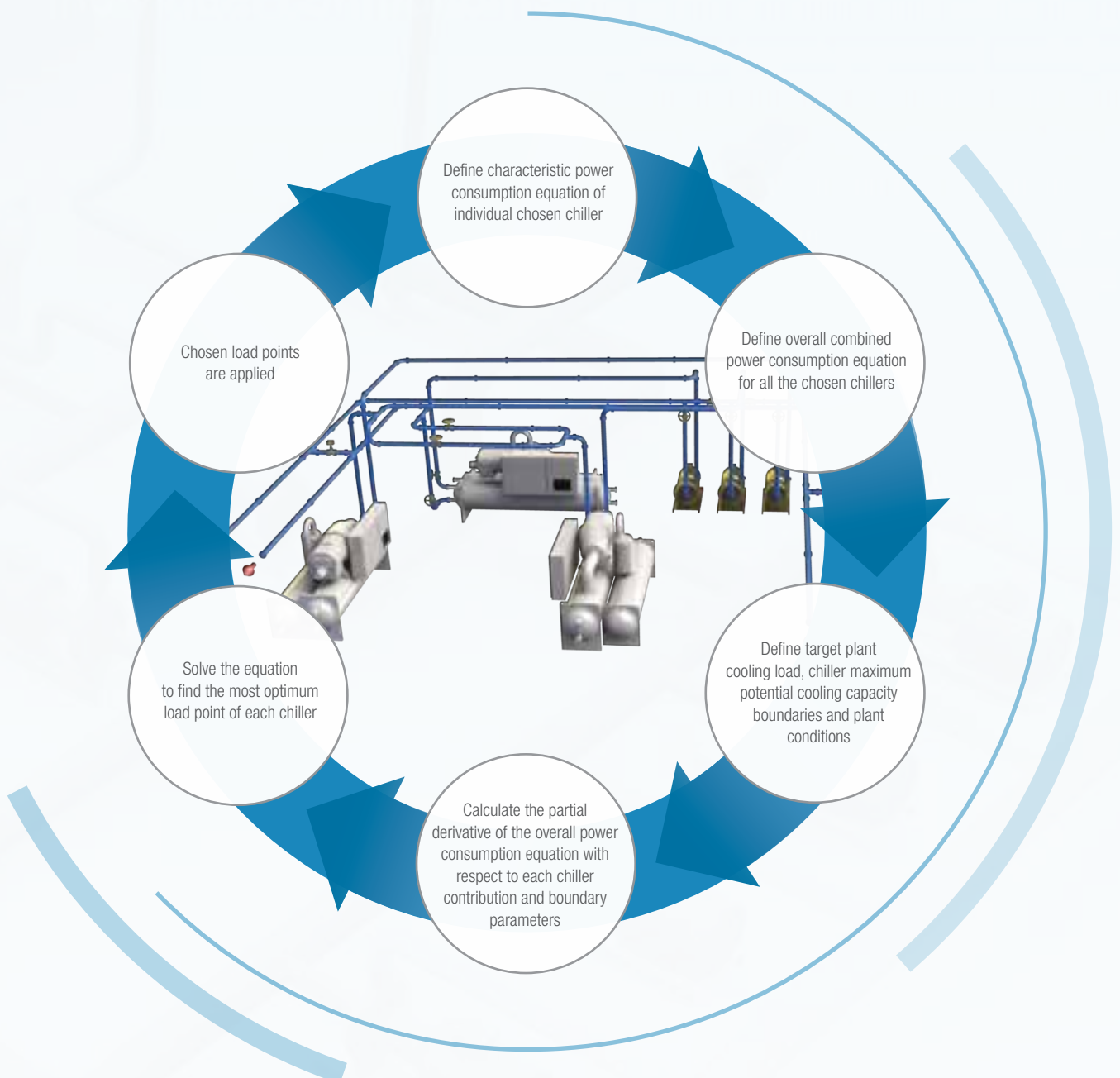
SMART SEQUENCING and LOAD BALANCING is conducted using the *ASHRAE* chiller model as its basis. (*American Society of Heating, Refrigeration and Air Conditioning Engineers).

How Smart Sequencing Works

Chiller Selection



Load Balancing

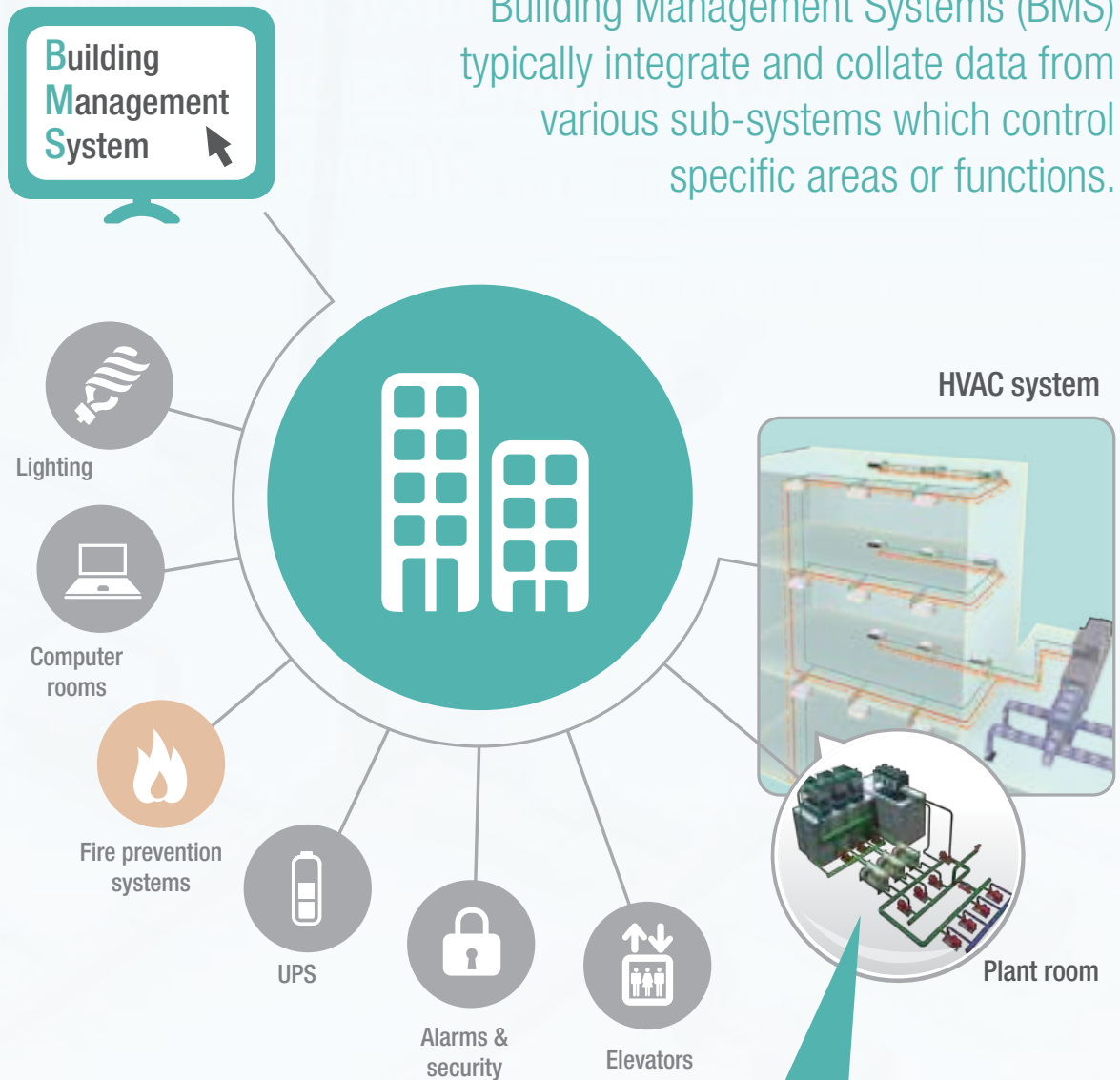


PlantPRO plant room optimiser: all the advantages of a specialised, state-of-the-art, proven,

FUNCTIONS / FEATURES In the PLANT ROOM	BMS When applied to PLANT ROOM	plantpro [®] When applied to PLANT ROOM	PlantPRO main <i>benefits</i>
"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" <small>instead of the usual scheduled maintenance typically offered by most BMS</small>
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 easily 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

“design once, apply many” solution

Building Management Systems (BMS) typically integrate and collate data from various sub-systems which control specific areas or functions.



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.



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

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

! identify the most relevant and easy-to-address improvement areas,

✓ 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,

! keep track of progress and continuously building on achieved improvement,

✓ offering immediate, direct savings thanks to the optimisation of HVAC equipment operations and of the plant room as a whole,

! approach maintenance wisely and effectively,

✓ supporting a condition-based maintenance approach, beyond the normal “fix-and-forget” regimes,

! comply with all major green certification programmes, which recognise efficiency performance measurement as a key aspect of energy management.

✓ 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



Bowe St

Canberra (Australia)

Application

Office building - Retrofit installation

Type of system

4-pipe

Installed units

700 kW total cooling capacity
2 water cooled NECS-W chillers
2 cooling towers
1 PlantPRO plant room optimisation system

Project

Located in Australia's capital city of Canberra 15 Bowes Street houses a number of Australian Federal Government departments. Minimum energy standards for Government tenanted buildings required a major upgrade of services for this 30 year old site.

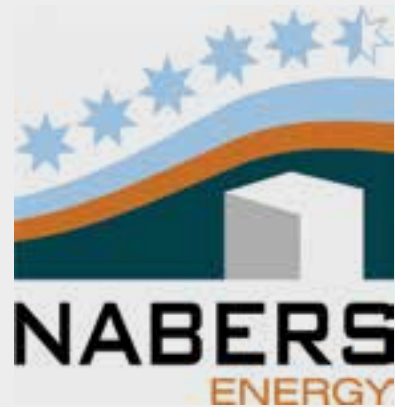
Challenge

Existing plant and equipment consisting of NECS water cooled chillers, constant volume pumps, single speed cooling towers all controlled by electronic controls allowed for good energy efficiency but did not allow for the minimum energy standards to be met. A solution to meet a Nabers 4.5 Star operational efficiency target was needed.

Solution

The chiller plant was upgraded using two 364 kW Climaveneta water cooled scroll chillers. Variable speed chilled water control with bypass, constant speed condenser water pumps and cooling towers with variable speed fan control were also installed. Although a new building automation system was installed throughout the building, PlantPRO was used to provide a sophisticated plant management solution that combined sequencing and staging strategies, condenser water optimisation and variable primary chilled water flow and set-point reset strategies driven by the field chilled water valve demand.

Its advanced high level interface management provided a simple method to exchange data with the building management system using Modbus protocol. PlantPRO's advanced plant management has resulted in a Nabers 5 star energy rating, a 40% increase in energy efficiency, almost 12% greater than the minimum government requirements.



plant pro[®]
performance reliability optimisation

Achievements

- ✓ From Nabers 3 to Nabers 5 star rating
- ✓ Optimised use of the cooling towers and condenser water temperature
- ✓ 40% increased energy efficiency
- ✓ Optimised use of the pumping energy
- ✓ Increased rental potential



A selection of PlantPRO installations



Aporti Palace Milan (Italy)

Application

Office building - retrofit installation

Type of system

4-pipe

Description of the plant

2,4 MW cooling and heating

4 x Climaveneta ERACS 2-Q

2 pump set per unit (primary loop)

2 common pumps on secondary loop

1 PlantPRO plant room optimiser

Project

High end office property resulting from the renovation of the historic home of Italy's post office into a modern landmark building in Milan, offering premium accommodation for major brands, such as Valentino, Patrizia Pepe, Amazon corporate or Italian head offices.

Challenge

As far as HVAC is concerned, the project had two main objectives. The first aim was to provide all year round heating and cooling for perfect comfort. On the other hand a key aspect was to guarantee high energy efficiency and to minimise carbon emissions.

Solution

The project is an example of best practice in HVAC system design. The 4-pipe system is based on the highest quality components,

including 4 Integra air source heat pumps for the generation of heating and cooling. These all-in-one heat pump units allow a significant system simplification and energy efficiency increase due to their capability to synergistically integrate heating and cooling production, often at the same time. In case of a simultaneous request for heating and cooling, Integra units unfold their full energy saving potential, actually performing the lower request for free! Design calculations on the advantages of this technology predicted a potential 55% yearly energy reduction. PlantPRO plant room optimiser was adopted to turn this potential energy savings into a tangible result and enhancing it with additional savings in the process. Thanks to its advanced optimisation functions, PlantPRO ensures that the system always runs at optimal conditions, providing an additional 10% yearly savings on HVAC related energy consumption.



Achievements

- ✓ Increases the level of optimisation
- ✓ Rationalises costs of maintenance activities and improves service levels
- ✓ Detailed measurement of the electrical power consumption of the plant room
- ✓ Supports the local "Energy Manager" with a reliable tool for calculating cost vs occupancy





Sheraton Mirage Resort Gold Coast (Australia)

Application

Hotel - retrofit installation

Type of system

4-pipe

Description of the plant

- 3 Megawatt total cooling and heating capacity
- 2 high efficiency TECS units
- 1 ERACS-W heat pump for combined production of heating and cooling
- 4 Cooling Towers
- 1 PlantPRO plant room optimiser

Project

Located in Australia's famous Gold Coast region the Sheraton Mirage Resort and Spa is strategically located among 3,4 hectares of sparkling lagoons and tropical gardens overlooking the Pacific Ocean. The resort consists of 295 newly refurbished suites and rooms, stunning lobby, restaurants, Porte Cochere, and a magnificent pool. All spaces have been specifically rejuvenated combining distinctive architecture and exquisite luxury.

Challenge

An extensive refurbishment of the hotel rooms and guest areas requires sophisticated services such as air-conditioning, lighting and communications to match. Energy efficiency and high levels of comfort are paramount in delivering a 5 star guest experience. An upgrade of the resorts chilled water and heating water services provided an opportunity for innovation.

Solution

For the air conditioning system of the hotel, a 3 megawatt system consisting of 2 high efficiency TECS water cooled chillers with magnetic levitation technology were combined with one ERACS water source 4 pipe unit for the simultaneous production of heating and cooling water. This combination was made possible by using the extensive water lagoons as the heat sink source. Such an innovative and highly efficient plant solution required a plant management solution to match. PlantPRO was used to deliver the complex management of hot and cold water conditions used throughout the resort for air conditioning, hot water production and heating of the guest pool. The advanced optimisation capabilities utilise sophisticated sequencing and load control along with free cooling or heating production from the ERACS unit to drive lowest cost of production of both the hot and cold water systems. PlantPRO combines variable primary flow control, chilled water set-point and advance condenser water optimisation to drastically reduce energy consumption. This has so far reduced gas consumption by over 60% and electrical energy by 30% compared to the years before.



Achievements

- ✓ Increases the level of optimisation
- ✓ Detailed measurement of the electrical power consumption of the plant room
- ✓ Rationalises costs of maintenance activities and improves level of services
- ✓ Supports local "Energy Manager" with a reliable tool for calculating cost vs occupancy



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