

# SOLUTIONS BUSINESS





## WELCOME TO COMAP SYSTEMS

The new ComAp Systems brochure provides a detailed view of the range and scope of our services covering technical solutions, customer feedback and contact information for our various country located teams and subsidiaries.

Our operational reach is extensive. At any one time, over 50 experienced engineers are installing new systems or upgrading existing applications around the globe delivered by teams based in Australia, Czech Republic, Italy, Russia, Saudi Arabia, the United Kingdom and the USA providing effective and dedicated support.

I hope our brochure provides you with an informative insight into our services and capabilities, and along with our teams, we look forward to supporting your power energy requirements wherever in the world you need our assistance.

**Martin Malek**

Managing Director of  
ComAp Systems Group



## CONTENT

<b>Introduction</b>	<b>3</b>
<b>Solutions</b>	
▶ <b>Control Panel and Switchgear</b>	<b>4</b>
▶ <b>Conversions</b>	<b>6</b>
▶ <b>Installation</b>	<b>8</b>
▶ <b>Commissioning and Training</b>	<b>9</b>
▶ <b>Special Solutions</b>	<b>10</b>
<b>Common Applications</b>	<b>14</b>
<b>Case Studies</b>	<b>16</b>
<b>Applied Technology</b>	<b>36</b>
<b>About ComAp Systems Group</b>	<b>38</b>



## INTRODUCTION

**ComAp Systems is an established operating division within ComAp providing turnkey and customer focussed local power generation solutions. Our solutions are designed for both new energy applications and modernizing of existing diesel/gas engine driven applications and also includes upgrading of control panels and switchgear systems.**

We specialize in designing and manufacturing complete generator control solutions for the industrial, marine and cogeneration (CHP) markets and offer a complete turnkey service from initial site investigation, through engineering to installation and system testing.



In each project we primarily use established ComAp control products and dedicated power control software enabling customers to incorporate remote communication, remote start, full automatic mains failure and paralleling with the mains functionality as required.

The bi-fuel conversion is another service provided by ComAp Systems. It allows customers to upgrade rather than replace existing equipment by modifying the original diesel engine to bi-fuel operation – substantially reducing operating costs and minimizing capital investment.





## CONTROL PANEL & SWITCHGEAR

### General description

**ComAp Systems Group is a group of companies providing you the client with a solution which suits the application of your generator installation. Our control system solutions range from basic remote start through to multiple parallel applications. The control solutions are designed from our standard products or to a specification which accommodates your project requirements. Our solutions range from wall or gen-set mounting through to full floor standing multiple parallel generator set systems, incorporating automatic break transfer with mains, mains paralleling and distribution systems.**

### Benefits

- ▷ High integration allow cost saving during the manufacturing of the switchgear
- ▷ Fast production and modular design
- ▷ Programmable setting in a place of use
- ▷ Minimum time needed to configure on site
- ▷ Remote control – via modem – internet with feedback
- ▷ Price competitive solution for both standard and customized applications
- ▷ Experience from more than 2000 installations around the world



## EXAMPLE OF CONTROL PANEL

### Control section

### Power section



### Control panel content

- ▷ Fascia/door mounted modular controller
- ▷ LCD Screen HMI (optional sizes & colour available)
- ▷ Door mounted emergency stop button
- ▷ 3 amp 12 or 24v, DC battery charger, to suit lead acid batteries
- ▷ Engine heater output ( $2 \times 1.5\text{kW}$ )
- ▷ Current transformers, where applicable
- ▷ Fuses/MCB's to achieve the required application
- ▷ Relays to achieve the required application
- ▷ Top or bottom cable entry available by request



## CONVERSIONS

### General description

**ComAp Systems Group is a provider of generator control solutions. Within ComAp Systems Group is a dedicated branch of the business which provides conversions of existing generator control systems.**

- ▷ Industrial standby
- ▷ Baseload
- ▷ Peak lopping
- ▷ Remote start
- ▷ Automatic mains failure
- ▷ Combined heat + power (CHP)
- ▷ Marine
- ▷ Switchgear – transfer panels + distribution equipment

ComAp Systems Group provides a full service from the initial site survey and investigation work to the design, build and installation. Full switchgear and cable installations provide you with a comprehensive total solution followed up with commissioning and product training.

Your current standby equipment may require simple and a direct application replacement, but consider the potential of using the modern technology of ComAp products to provide remote access for monitoring and control or major upgrade such as parallel applications. This results in the bulk of the hardware being retained, with only a change to the control system required to provide a versatile solution with increased functionality.

### New life for a CHP plant



**Place:** Possagno Treviso, Italy  
**Customer name:** Industrie Cotto Possagno S.p.A.

Possagno is a town that has always produced roof tiles. Industrie Cotto Possagno is, today, the most important Italian manufacturer of roofing elements in clay. New technology and new work methods have now replaced ancient customs, not only in the production phase, but also changing the way the product is layed.

#### Description

- ▷ IntelliSys system is used to replace a old GE Fanuc PLC in a CHP power plant with a Waukesha engine installed in 1993 with only island operation
- ▷ As a result of replacing the PLC with the IntelliSys system the generator could be put in parallel with the network, avoiding the temporary black-out of the factory during the starting and stopping of the generator
- ▷ A system for temporary parallel application was also implemented to enable the customer to use the gen-set in island mode if required. In this case, instead of switching between the network and generator with black-out, you have a fast parallel and subsequent loading of the machine, following the opening of the switch network
- ▷ This technology allows switching between network load and generator without the interruption of supply



Conversion - before



Conversion - after



## INSTALLATION

### General description

**ComAp Systems Group provides a comprehensive service, including the initial site survey, design and manufacturing stages of a project.**

Then, when necessary, we can supply and install equipment or simply deliver and position to where it is needed on site. In addition, we can provide modifications to existing systems and cable work as required.

It may be that you require the equipment to be delivered, off loaded and positioned to the location within your business, it may be that you require the supplied equipment to be fully installed including the installation or modifications of existing systems, installation and modification of cable work.

ComAp Systems can provide you with a full start to finish project solution, or simply supply a control solution to your requirements, you decide the element and percentage of work to be completed by our team of engineers.





### General description

**ComAp Systems Group offers a complete commissioning + training package. Our solution provides you with the flexibility to choose how much involvement you need from our company.**

On completion of the installation or modifications, ComAp Systems Group team of engineers can provide you with on site assistance for commissioning and training of site operatives. Alternatively our experienced engineers can represent your company – completing the site commissioning requirements under your name.

Should the end user require, site and class based training can be provided for the standard control units and our site specific solutions.





## SPECIAL SOLUTIONS



### IntelIDrive Solutions

ComAp specialize in designing and manufacturing complete control for industrial engine driven applications solutions for the industrial markets and offer a complete turnkey service from initial specification created in cooperation with the customer, through engineering to installation and system testing.

#### General description

- ▶ The IntelIDrive family includes highly flexible sophisticated electronic controllers, which features outstanding control, monitoring and protection for diesel and gas engines as well as driven technology. The controllers offer a number of specific functions suitable for mobile and land-based industrial applications as hydraulic system control, communication with sensors and operational devices control
- ▶ Most commonly, these tailored applications meet the specific control requirements of engine driven compressors, pumps, crushers, drilling machines and mobile hydraulics
- ▶ These solutions are achieved by using ComAp products: IntelIDrive Lite, IntelIDrive DCU Industrial or IntelIDrive Mobile



### Bi-fuel (Dual fuel) Conversion Solutions

Bi-fuel conversion changes the operation and control of a diesel or liquid fuel engine to use two fuels (gas and diesel or heavy fuel oil) at the same time. Natural gas is introduced to the engine and becomes the main fuel whilst diesel oil is used for the ignition of the gas/air mixture inside the cylinder (a portion of diesel oil is injected at the end of the compression stroke, thereby maintaining the original diesel operation principle).

#### General description

##### ▶ High Speed Engine Conversion System

Gas is mixed with air by a common mixer installed before the turbocharger(s). The gas flow is controlled by a throttle valve, which is electronically operated by the ComAp control system IntelIDrive BF according to the required engine output and speed. In order to avoid knocking of the engine, the ComAp knocking detector/controller DENOX is installed, thus enabling engine operation at the most efficient gas/diesel ratio.

*This system is for the conversion of industrial diesel engines to bi-fuel operation by the substitution of typically 50 to 80% natural gas for diesel. It is suitable for all High Speed Engines, 1200-1800 RPM.*

##### ▶ Slow and Middle Speed Engine Conversion System

Gas is injected into the cylinder inlet manifold by individual ComAp gas electromagnetic valves installed as close to the suction valves as possible. The electromagnetic gas valves are separately timed and controlled by the ComAp injection control unit INCON. This system interrupts the gas supply to the cylinder during the long overlap of the suction and exhaust valves (typical for slow speed and middle speed engines - while the valve overlap cylinder scavenging is performed). This avoids substantial gas losses and prevents dangerous gas flow to the exhaust manifold.

*This system for the conversion of industrial diesel engines to bi-fuel operation by the substitution of typically 60 to 90% natural gas for diesel or HFO. It is suitable for engines with speed below 1000 RPM and output above 500 kW.*



## Protection System

**ComAp Systems designs and manufactures protection panels for wall, gen-set, loss of mains, mains disturbances and floor standing installations incorporating the appropriate protection device for your application.**

### General description

- ▶ Designed with the aim to satisfy the requirements of loss of mains and mains disturbances
- ▶ Our control panel solutions are used as a stand alone control/protection panel for solar arrays (photo voltaic) systems, embedded generator systems and CHP configured units and wind turbine protection
- ▶ Our panel solutions range from the simple protection relay mounted within a suitable enclosure wired to terminals ready for site installation to more comprehensive systems incorporating isolation, power switching and distribution
- ▶ Our products and solutions provide optional features such as history event logging, remote monitoring and site specific programming
- ▶ Solutions are based on ComAp NPU and IntelliProtec units



## Fire Pump Controller

**ComAp Systems UK have completed the first conversion of an existing Fire Pump installation which uses the NFPA 20 specification IntelliDrive controller. IntelliDrive can communicate bidirectional via a serial link using standard and proprietary CAN J1939 communication protocols to a wide range of EFI engines. The controller comes with LiteEdit PC software enabling the user to freely configure the inputs and outputs to suit individual requirements. Designed to be highly flexible, IntelliDrive can be expanded by means of additional modules to increase number of binary inputs and outputs.**

### General description

- ▶ The complete solution using ComAp IntelliDrive FPC controller (following the NFPA 20 standard) is designed for diesel driven fire pumps applications
- ▶ The solution is based around the hardware of a standard ComAp industrial engine controller, with a proven track record for flexible and reliable control of standby and synchronized gas or diesel generator applications
- ▶ The ComAp engine controller has an LCD screen for system information and fault indication plus control buttons for switching between automatic and manual operation
- ▶ Manual operation allows the diesel to be started using local buttons on the fascia of the controller or by external buttons on the control panel
- ▶ Automatic mode of operation provides starting by a remote digital input switch or system pressure switch
- ▶ The control system incorporates two battery starter systems; the controller monitors the voltage on both battery systems, automatically switching between battery sets on a cyclic basis or low battery voltage condition
- ▶ The controller has configurable digital inputs and outputs which are set up to suit the installation requirements. Set point parameters for engine control and system sequencing are adjustable from the fascia of the controller, which is password protected



### InteliSupervisor

**InteliSupervisor is the Windows 95/98/NT/ME/2000/XP/Vista based monitoring and control software for fleet of gen-sets equipped with InteliGen<sup>NT</sup>, InteliSys<sup>NT</sup>, InteliGen or InteliSys controllers using Internet communication via IG-IB unit or modem connection.**

#### Product features

- ▷ Gen-set fleet monitoring and control using internet or modem connection
- ▷ Supports InteliGen<sup>NT</sup>, InteliSys<sup>NT</sup>, InteliGen and InteliSys
- ▷ Optical indication of gen-set state
- ▷ Optical/sound indication of gen-set alarm
- ▷ Automatic data downloads
- ▷ Automatic e-mailing
- ▷ Graphical interface
- ▷ Detailed on-line alarms reports



#### Benefits

- ▷ Direct access to basic information about gen-set state, run-hours to next service and actual power
- ▷ Interface display: graphical/tabular
- ▷ Selectable graphical background (underlay bitmap)
- ▷ Regular and alarm-triggered download of gen-set data
- ▷ In case of gen-set alarm, e-mail notifies the service personnel
- ▷ Allows simple access to PC tools for gen-set control and setting (WinEdit, MultiEdit, InteliMonitor)
- ▷ Stores history into database (MDF, DBF) or XLS format

#### Usage options

- ▷ Operators of gen-set fleet:
  - Remote control of gen-sets
  - Monitoring of current status of gen-sets
- ▷ Service providers:
  - Information about run-hours of gen-sets
  - Analysis of gen-sets history – evaluation of gen-set condition and trends



## Air Fuel Ratio Specialist Application

ComAp AFR control system is a comprehensive solution for generating sets driven by lean burn gas engines.

### General description

The system consists of several specific control and interface modules:

- ▶ IntelliSys<sup>NT</sup> AFR – Highly configurable, expandable gen-set controller with built-in PLC functions
- ▶ ECON-3 – digital speed governor with detection of misfiring
- ▶ I-Step – interface to stepper motor actuator controlling variable gas/air mixer
- ▶ DENOX-20 – anti-knocking system with 20 channels
- ▶ I/O modules – inputs and outputs for various analog and binary signals. Optimal set of modules depends on engine size and number of cylinders

Control modules are fully integrated via CAN bus. The key parameters from all modules are accessible via main display on IntelliSys<sup>NT</sup> AFR.

All key algorithms are field proven on many installations:

- ▶ AFR algorithm keeps air to fuel ratio on the optimal level, ensuring the right exhaust gas emissions with minimum of AFR readjusting
- ▶ Knocking and misfiring detections protect engine from severe damage when the gas quality exceeds the expected limits or when some defect on engine makes combustion unreliable



### Customer quote

*"As a Landfill Gas operator we require a control system to provide a complete solution to satisfy all our units regardless of the Prime Mover, our gen-sets are powered by CAT, Deutz, Jenbacher. In partnership with ComAp Systems UK and their experienced team of site engineers we have provided retrofit controls to our fleet of engines, this included the Air Fuel Ratio system which has demonstrated its flexibility to operate with our engine fleet."*

**Robert Tomlins**, Novera Energy

### Benefits

- ▶ Fully integrated system – all parts and parameters are monitored and accessible from single point
- ▶ Simple and robust AFR algorithm does not require lambda sensor
- ▶ Solution for various types of gases – natural gas, landfill gas, biogas, with possible utilization of the CH<sub>4</sub> content of the gas
- ▶ Built-in PLC functions and high configurability of IntelliSys<sup>NT</sup> enables the system to be built to meet the exact needs of customers
- ▶ Gen-set performance log stored in IntelliSys<sup>NT</sup> AFR is invaluable tool for troubleshooting
- ▶ Excellent remote monitoring features backed by sophisticated PC programs are ready for fleet owners. They help to plan maintenance and trace production of heat and energy for each gen-set from the fleet



## SPM

### Single Prime Mover

- For a gen-set installation which has the requirements of a single generator for constant running or standby remote start application
- This application is based on a single generator set with no mains requirements. The generator system can be started from the fascia of the control panel solution by the operation keys, by a remote start signal from other equipment or a remote start push button

- The choice of controller is normally decided by the complexity of the installation, the number of binary & analogue signals required by the operator
- Application supported by:
  - InteliLite<sup>NT</sup> MRS 10, 11, 15 & 16 controllers
  - InteliGen<sup>NT</sup> controller
  - InteliSys<sup>NT</sup> controller

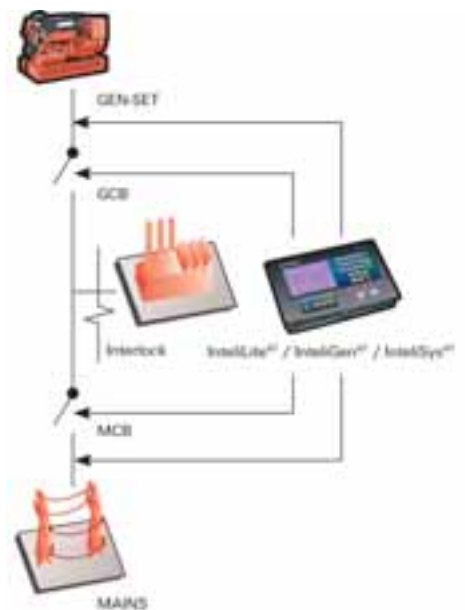


## SSB

### Single StandBy – AMF

- For a gen-set installation which has the requirements of a single generator for AUTOMATIC MAINS FAILURE
- This application is based on an installation that has two sources of power, in the event that the primary source fails (this could be mains or primary generator set) the secondary source of supply will be switched to the site load
- The generator control solution can be started manually from the fascia of the control panel, its normal mode of operation is AUTOMATIC

- The control solution monitors the primary power source and in the event of a failure or out of limits the primary source is switched from the load, the secondary source (gen-set) is started and switched to load automatically
- The control solution includes all phase sensing and timers to provide a fully automatic break transfer system
- The choice of controller is normally decided by the complexity of the installation, the number of binary & analogue signals required by the operator
- Application supported by:
  - InteliLite<sup>NT</sup> AMF 20 & 25 controllers
  - InteliGen<sup>NT</sup> controller
  - InteliSys<sup>NT</sup> controller



## SPtM

### Single Parallel to Mains

- This application is for two sources of supply, the primary source being the mains and the second being a single generator set, the control solution provides a fully automatic mains failure system with the facility for 'No Break – Soft Transfer' of the load from generator to mains on power restoration
- The AMF control has the standard control functions as with SSB, on mains restoration the operator can decide to have a fully automated system with a 'No Breaker' operation, manually initiating the control sequence prior to paralleling or provide a breaker transfer of the supplies

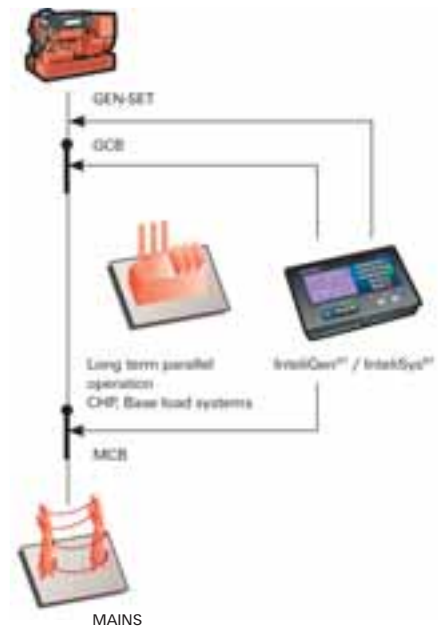
- The control solution provides the operator with 'TEST', this allows a 'No Break' transfer of the site load between two healthy supplies
- The generator can remain in parallel in a 'Base load' mode or 'Import / export' mode of operation
- Alternatively the mains supply can be separated from the load allowing the operator to choose the power source for the business without a failure or break in supply and disrupting the business power
- Full AMF support; both MCB and GCB are controlled
- Application supported by:
  - InteliGen<sup>NT</sup> controller
  - InteliSys<sup>NT</sup> controller



## SPI

- ▶ **Single Parallel Island**
- ▶ An application based around the design and manufacture of control solutions for the landfill gas, waste gas and CHP market
- ▶ The single parallel software allows a gen-set to run in constant parallel with the mains supply with a facility to operate in island mode if required
- ▶ The control solution differs from the standard SPtM application mode of operation in that SPI does not have control of the primary source feeder breaker, in this case the mains, MCB

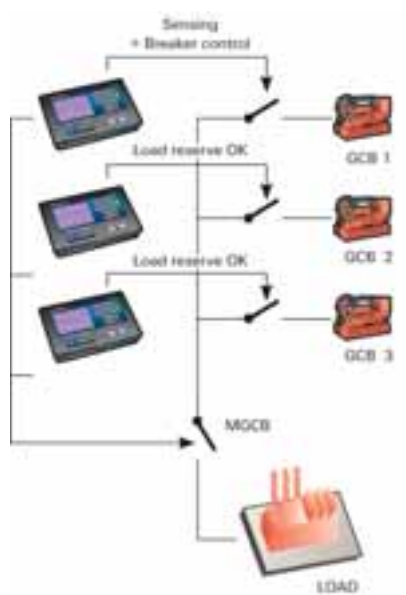
- ▶ The generator can be run in 'Base load' parallel operation, the software functions allow the load to be controlled by an external signal such as ambient or water temperature
- ▶ The control system is based around the IntelliSys<sup>NT</sup> controller, providing the design engineer to fully satisfy the requirements of valve control required for more complex CHP applications



## MINT

- ▶ **Multiple INTernal**
- ▶ Multiple application with internal control loops for speed and voltage bias, internal synchronising, load sharing and VAR sharing
- ▶ These features, which are normally external bolt-on-devices within the control system design, are all internal component features of the controller
- ▶ This application is designed for multiple gen-sets in island parallel or mains parallel operation
- ▶ The control solution allows parallel operation of a group of generators for constant running, alternatively the gen-set can be used as a secondary source

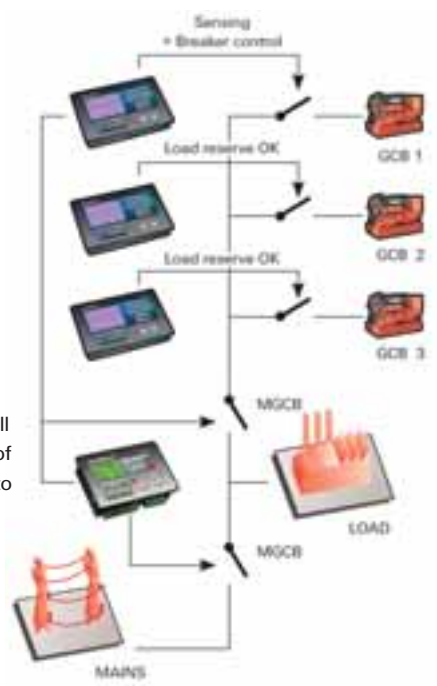
- ▶ of supply in a AMF design with the introduction of an AMF controller to provide mains detection and mains breaker control
- ▶ Multiple engine arrangements can be configured with various specific site criteria
- ▶ Starting and operating configurations are possible to suit the site and business conditions, engines running can also be controlled by load
- ▶ Application supported by:
  - IntelliGen<sup>NT</sup> controller (IGS-NT-LSM+PMS dongle required)
  - IntelliSys<sup>NT</sup> controller (IGS-NT-LSM+PMS dongle required)



## MINT+IM

- ▶ **Multiple INTernal + IntelliMains<sup>NT</sup>**
- ▶ This application is designed for multiple gen-sets in island parallel and mains parallel operation
- ▶ The control solution allows parallel operation of a group of generators for constant running, alternatively the gen-set can be used as a secondary source of supply in an AMF design. Introduction of ComAp's IntelliMains<sup>NT</sup> controller provides mains failure detection and mains breaker (MCB) control
- ▶ All standard "MINT" features are retained with added features and flexibility
- ▶ The addition of IntelliMains<sup>NT</sup> has the ability of synchronising the generator group to the mains supply for forward and reverse paralleling (short or long-term) and therefore "no break return" of the load to mains supply following an outage

- ▶ Use of the IntelliMains<sup>NT</sup> controller also creates the opportunity for testing of the gen-set group on site load without interruption to critical loads, giving you peace of mind by ensuring that your standby power generation equipment is always in full working order without the costly and disruptive use of load bank testing
- ▶ For more details on this or any of our other applications or systems, please call our technical support department, one of our experienced engineers will be glad to assist





## 3 × MINT + "H"



**Place:** Northampton, United Kingdom  
**Name:** Bank data centre

### Description

- ▷ Introduce an additional engine to an existing scheme
- ▷ Replace the existing but obsolete PLC
- ▷ The final solution/decision was made to replace all the existing products with the NT family, as it was a quicker and more cost effective solution than making PLC software changes
- ▷ New NT solution does not require an external PLC
- ▷ All power cables and controls changed plus commissioning in 7 days

### Scope of supply

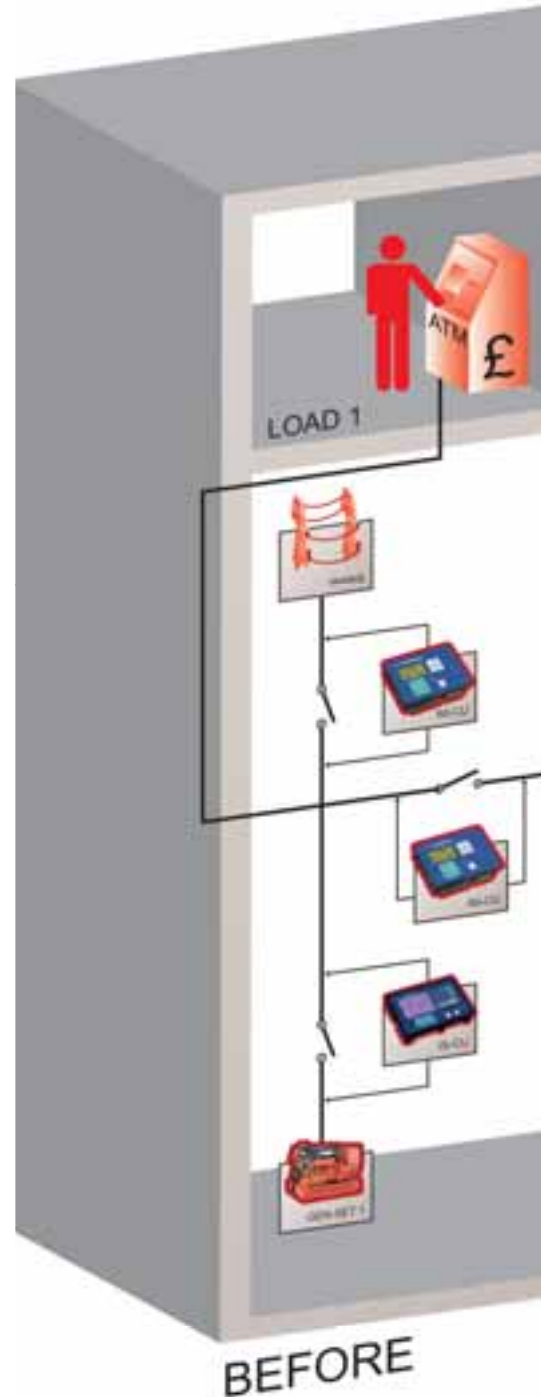
- ▷ The conversion of an existing power generation system from a "H" configuration to incorporate an additional new third engine
- ▷ Replace obsolete PLC



before



after



### Customer quote

*"The initial installation converted to ComAp controls some years ago had proven to be a very reliable system with regular operation being carried out on building load throughout the years. Based on the already proven system the client looked to increase the amount of available standby power to meet his now increased demand with as little disruption and risk to the business as possible. ComAp Systems increased the available standby power with the introduction of an additional generator set into the existing system. This included the removal of the existing PLC and providing an integrated system based totally on the ComAp controls."*

**Roger Lott**, Project Consultant – BMT





## 3 × SUS + IntelliMains<sup>NT</sup>



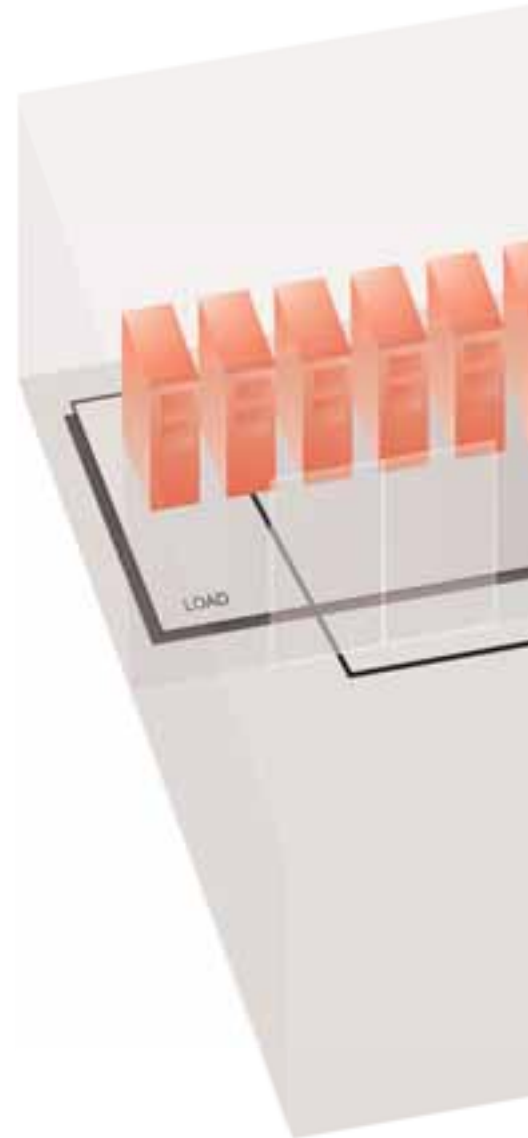
**Place:** Kuala Lumpur  
**Customer name:** UPS company

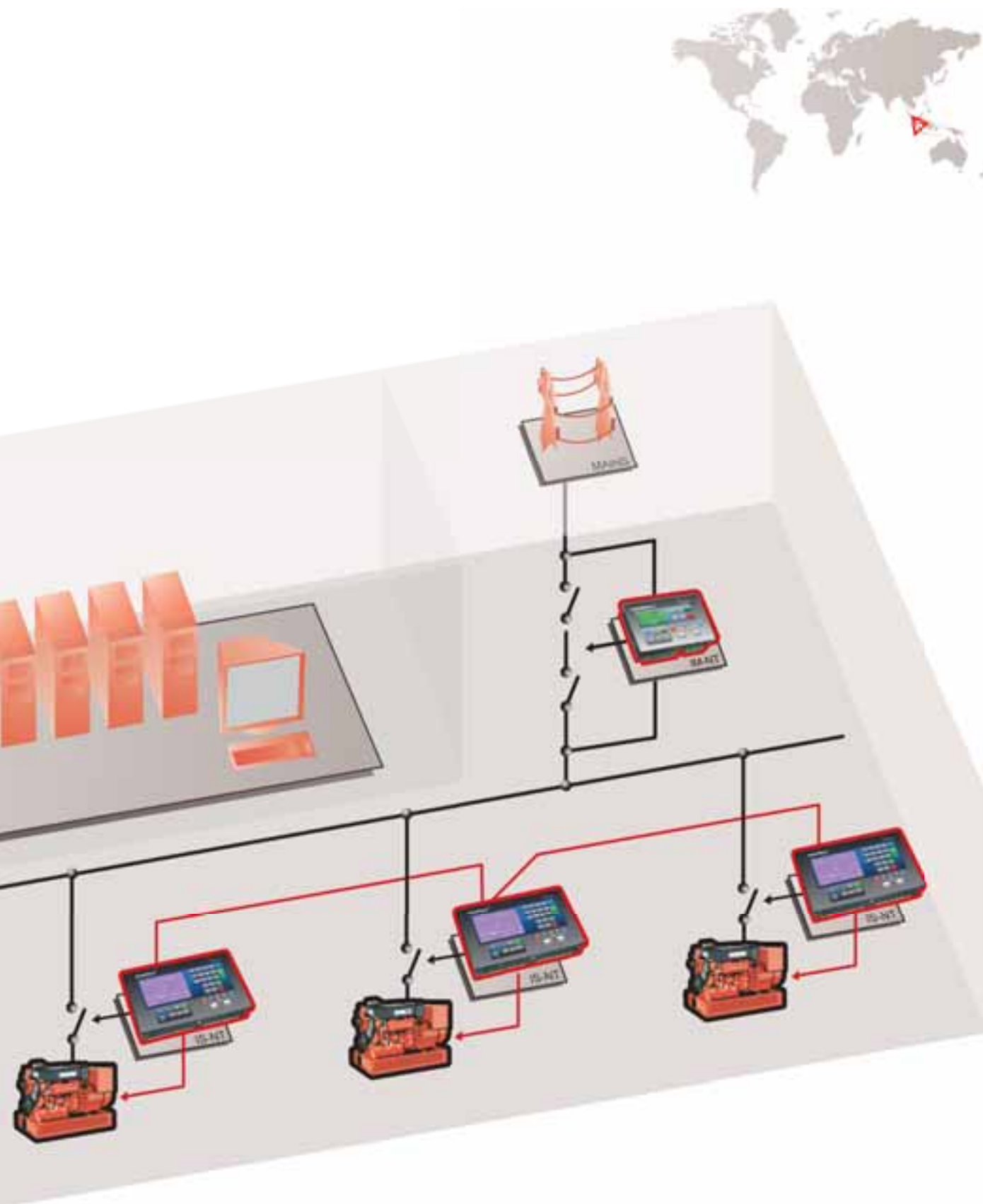
### Description

- ▶ This project and single line in the initial state does not look complicated, appearance is standard MINT (Multiple INTERNAL) + IntelliMains<sup>NT</sup> application
- ▶ The ComAp Systems UK SUS project for the IntelliSys<sup>NT</sup> range of controllers was a 12 month development in partnership with a UPS company, providing a quick start generator solution
- ▶ The system operates as a non excitation start arrangement providing electrically connected multiple generators running and loaded in 6 – 10 seconds. The project was initially tested on two 100kVA generator units of different engine plus alternator configuration followed by two 1250kVA diesel CAT generators. Various and rigorous testing were concluded and a final version was issued for an installation to a site with three Mitsubishi powered generator sets. The control system was built and commissioned on site by ComAp Systems engineers

### Scope of supply

- ▶ Generator SUS panels with switchgear interface







## 2 Complete Systems for King Fahad Hospital



**Place:** Al Baha City, Saudi Arabia  
**Customer name:** King Fahad Hospital

**End User:** Ministry of Health

**Contractor:** Al Sayed Group Construction Co.

**Application:** Retrofit project replacing the old existing distribution panel boards with a new system

### Scope of supply

- ▶ 1 × Synchronization switch gear of 8 Detroit diesel generators each 1MW/380V/60Hz QGCB 1600A and 2 × Feeders 1600A the dead bus (common busbar) assembled with 8000 Amps capacity (InteliSys<sup>NT</sup>+ InteliVision 8 + pControl SCADA)
- ▶ 1 × Synchronization Control Cabinet of 3 diesel generators (InteliSys<sup>NT</sup> + IS-Display)
- ▶ 5 × 2500Amps Automatic Transfer Switches (InteliMains<sup>NT</sup> Controllers)
- ▶ 3 × Bus Coupling Panels of 2 × City Transformers (PLC Control)
- ▶ 1 × (2 × Transformers) panel on dead bus with i-Protect Controllers
- ▶ Diesel generators Speed Governor and AVR Modification

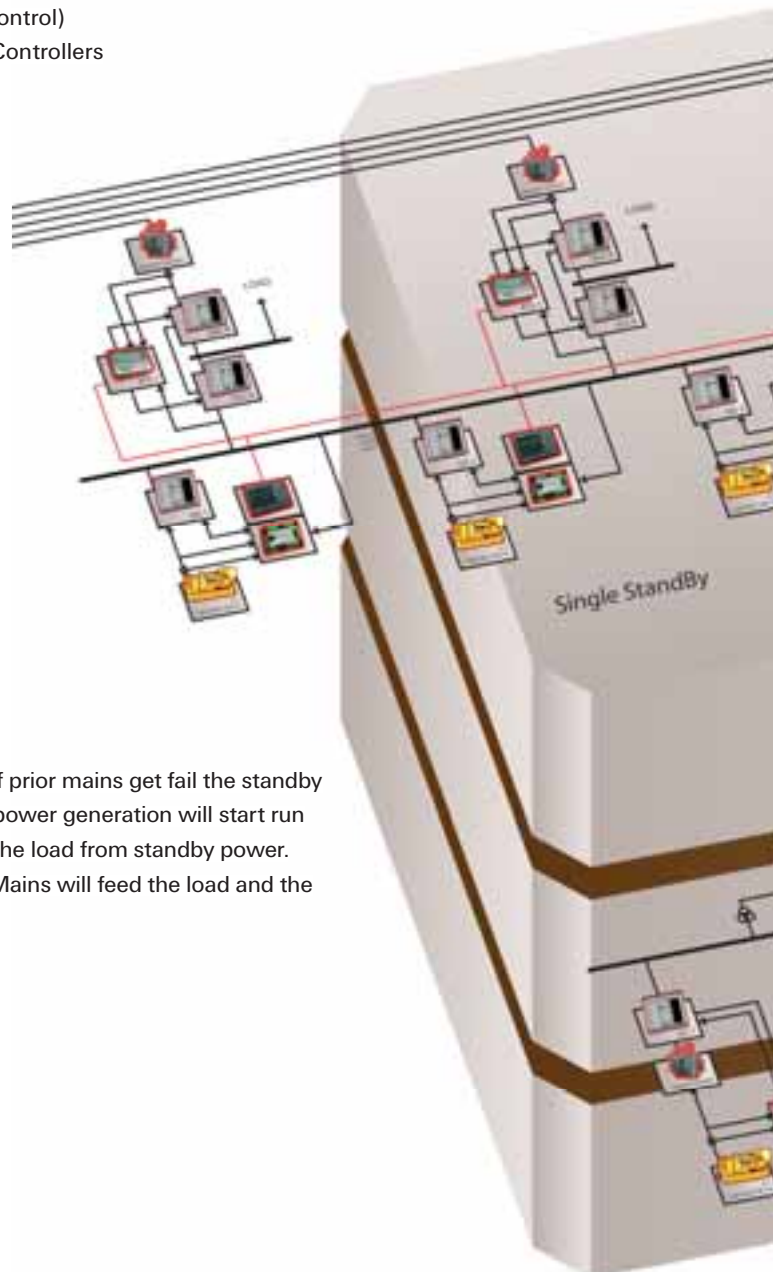
### Sequence of operation:

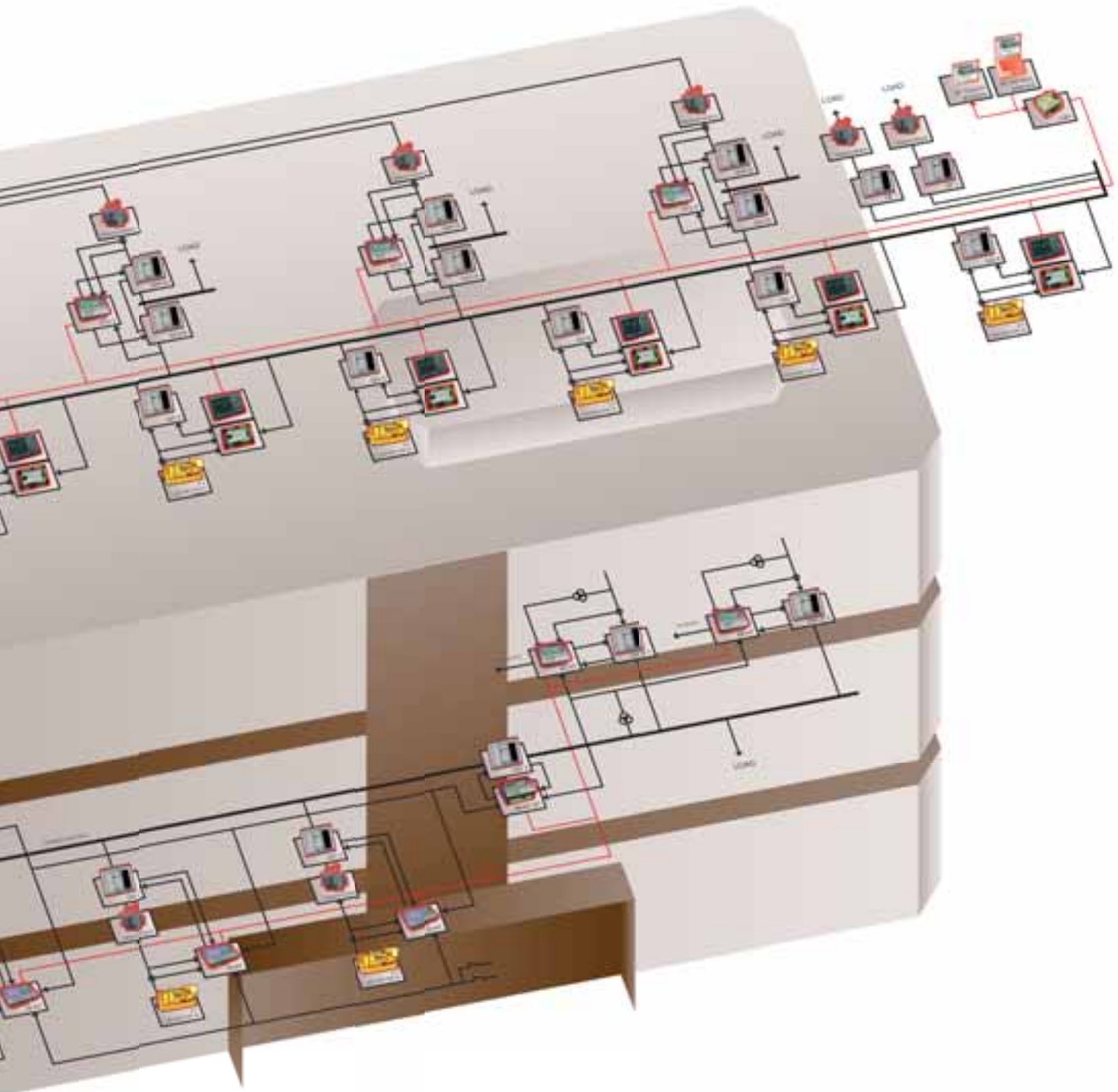
#### First system:

If one, two or all of the ATS(s) experience AMF, a command from the synch system is sent to start over, synchronize and get ready to supply the failed ATS(s). The mains breaker will be tripped and the ATS bus breaker will close to the load providing the power supply from the standby synch switchgear. This will start a load sharing process and start or stop the number of working gen-sets upon load demand. When the failed ATS(s) are restored, the ATS will change over from standby synch power supply back to mains supply. The gen-sets will be commanded by the ATS controllers to cool and shut down when required.

#### Second system:

One Mains is prior feeding the load and 2<sup>nd</sup> Mains is standby if prior mains get fail the standby will feed the load and if the 2<sup>nd</sup> also get fail, then the standby power generation will start run and synch on dead bus after what the BTB will close feeding the load from standby power. If one of Mains restored, the BTB will open and the Restored Mains will feed the load and the Standby Power will cool down and stop.







## Wadi Al-Dawasir Water Treatment Plant



**Place:** Wadi Al-Dawasir, Saudia Arabia  
**Customer name:** Bin Jarallah contractor

### Description

- ▷ On normal operation of power system, both 13.8kV SWGR incoming supplies (QMCB 1 & QMCB 2 are closed) will supply the power. Bus tie breaker (QBTB) is normally opened
- ▷ If either 13.8 kV SWGR incoming supply is failed (QMCB 1 or QMCB 2 is opened), bus tie breaker (QBTB) will be closed by PSWG control panel after failed incoming breaker is opened
- ▷ If both 13.8 kV SWGR Mains 1 & 2 supplies are failed, PSWG will do as the following procedure:
  - Both 13.8 kV incoming CB (QMCB 1 & QMCB 2) is opened
  - Bus tie CB (QBTB) will be opened on dead bus condition
  - The circuit breaker of fast generator will be closed
  - The generator CB (QMCB 1 or QMCB 2) of faster generator will be firstly closed on dead bus condition
  - The next generator will be synchronized and the bus tie will be closed. The faster of either two will be closed. The second will be synchronized and closed. PSWG panel will check the time delay to start both generators and check load demand
- ▷ If both 13.8 kV SWGR Mains 1 or 2 supplies are healthy, PSWG will do as the following procedure:
  - Open both CB QGCB 1 and QGCB 2
  - Close bus tie CB QBTB
  - Close incoming CB QMCB 1 or CB QMCB 2
  - Generators stop after cooling time delay

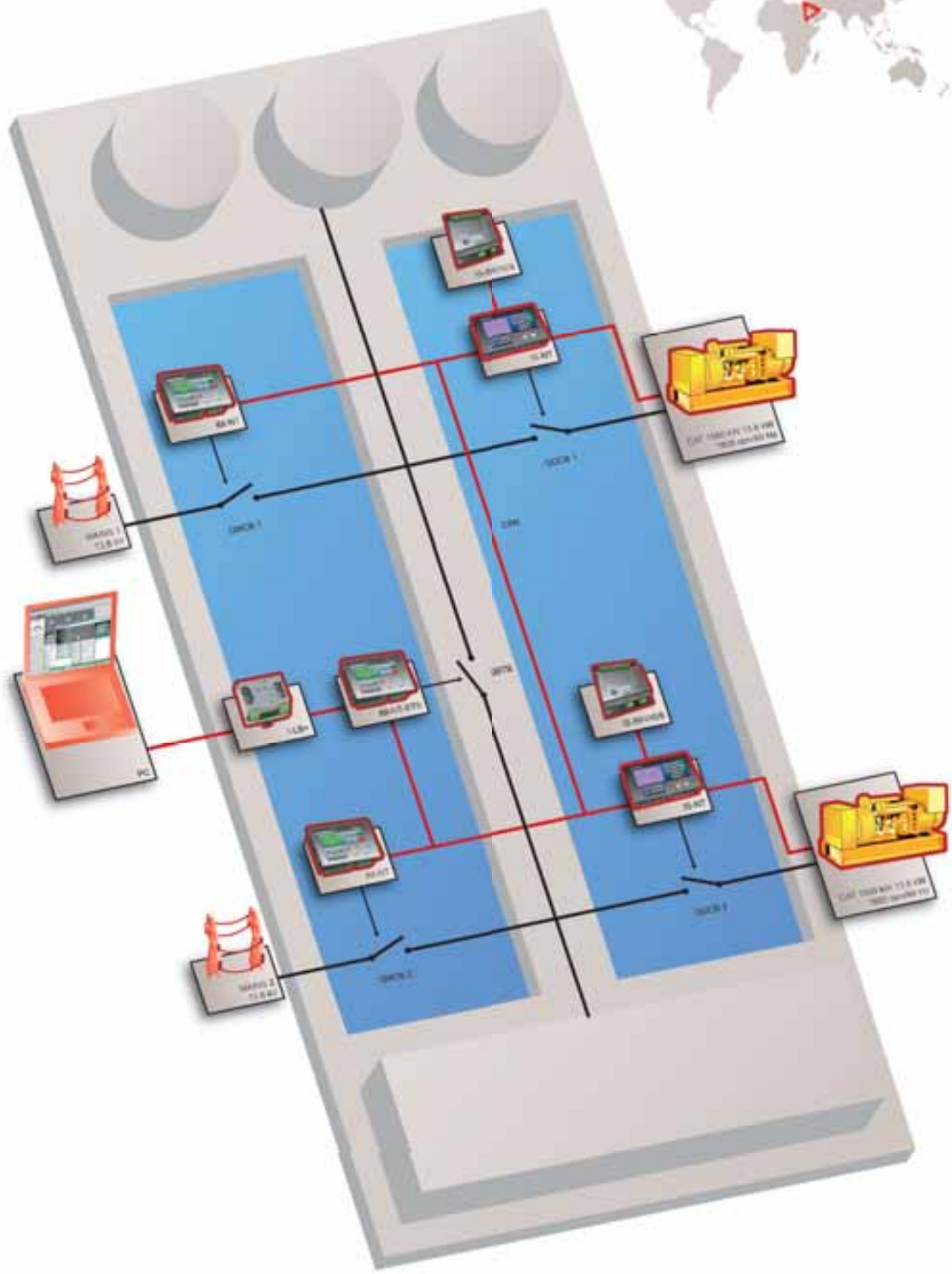
### Scope of supply

- ▷ 2 × IntelliSys<sup>NT</sup>
- ▷ 2 × IG-AVRi
- ▷ 2 × IG-AVRi-TRANS/LV
- ▷ 2 × IS-BIN16/8
- ▷ 2 × I-CB/CAT DIESEL
- ▷ 1 × I-LB+
- ▷ 2 × IntelliMains<sup>NT</sup>
- ▷ 1 × IntelliMains<sup>NT</sup> BTB

### Gen-set type

- ▷ Caterpillar EMCP 3, AVR: DVR6







## Cost effective control package upgrade for back-up system



**Place:**  
**Name:**

**Prague, Czech Republic**  
**Sazka, a. s.**

### Description

- ▶ With the gradual increase in the power consumption of office building, Sazka, the largest lottery operator, raised the requirement to increase the power of the back-up system. Because adding another unit is economically more advantageous than replacing the original, a new 800kVA unit was installed to work alongside the existing 600kVA diesel generator. It is worth mentioning even partial interchangeability of units
- ▶ The ComAp system provides full mains and gen-sets monitoring and protection. Single line diagram included a total of 8 electronically controlled breakers. Four breakers were controlled by standard ComAp functions and 4 breakers required customized control created in ComAp internal PLC – totaling in 90 PLC blocks
- ▶ System operation was conducted with one user Mode selector switch on the panel door
- ▶ Power back-up system provides these functions:
  - Standby power
  - No break transfer to generators when black-out announced in advance
  - No break transfer to mains
  - Gen-set soft load test-on-load during normal building operation
  - Power supply of critical loads in case of one machine failure

### Scope of supply

- ▶ Stand alone standing control switchboard:
  - DIN rail mounted controllers
  - Mode/operation selector switch
  - Mimic diagram shows real single line diagram with indicators
- ▶ Replacing of current ATS control system
- ▶ Installation of ComAp control for original and new additional engine
- ▶ Installation carried under normal building operation
- ▶ Installation of power cables for 800kVA

### Benefits

- ▶ Intuitive use with just 1 selector switch fully automatic operation
- ▶ Synchronization achieved in range of seconds. Fine-tuned on site using ComAp WinScope
- ▶ Loadsharing and VAr sharing of different engines sizes + oldschool and top-notch model
- ▶ Internet connectivity, system visualized on customized IntelliMonitor screen

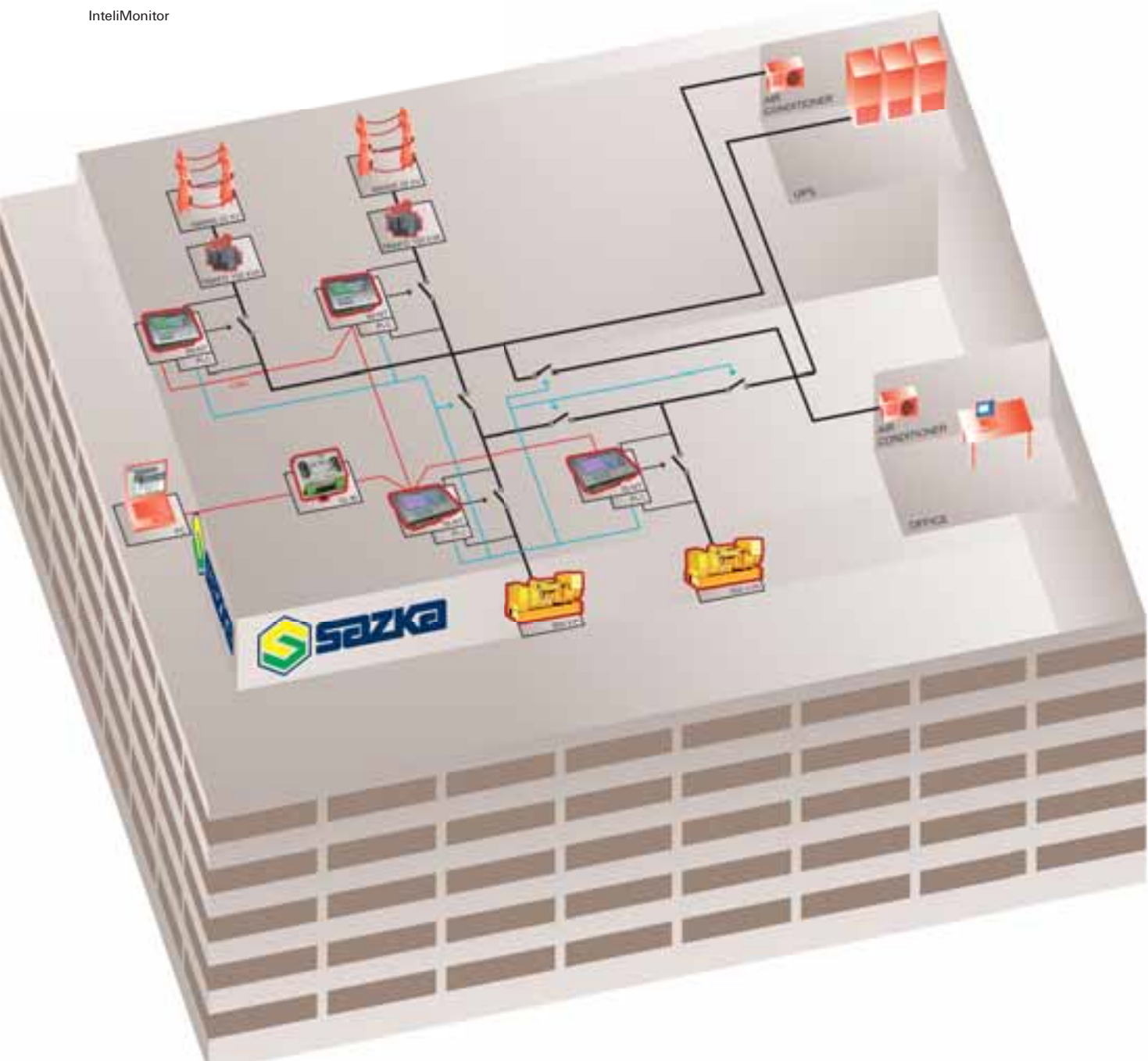
### Gen-set type

- ▶ Caterpillar 600kVA, 800kVA with EMCP II





IntelliMonitor





## Complete control system for major university hospital



**Place:** Geneva, Switzerland  
**Name:** University Hospital Geneva

**Carried out by:** 42technology Ltd. and ComAp Systems CZ

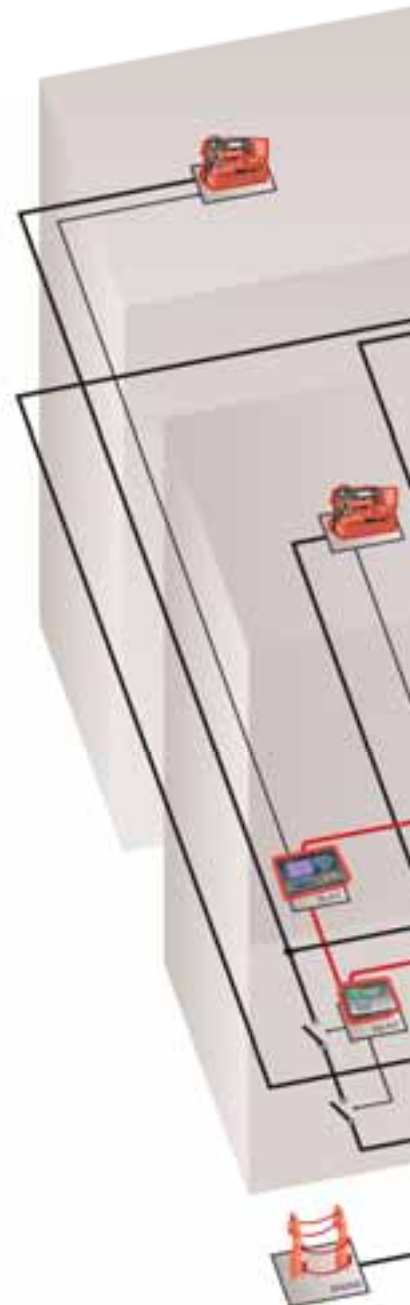
42technology Ltd. is an independent and progressive, Swiss based engineering company operating in the field of switchboards and control panels for the energy industry with close working relationship with ComAp Systems division in the Czech Republic.

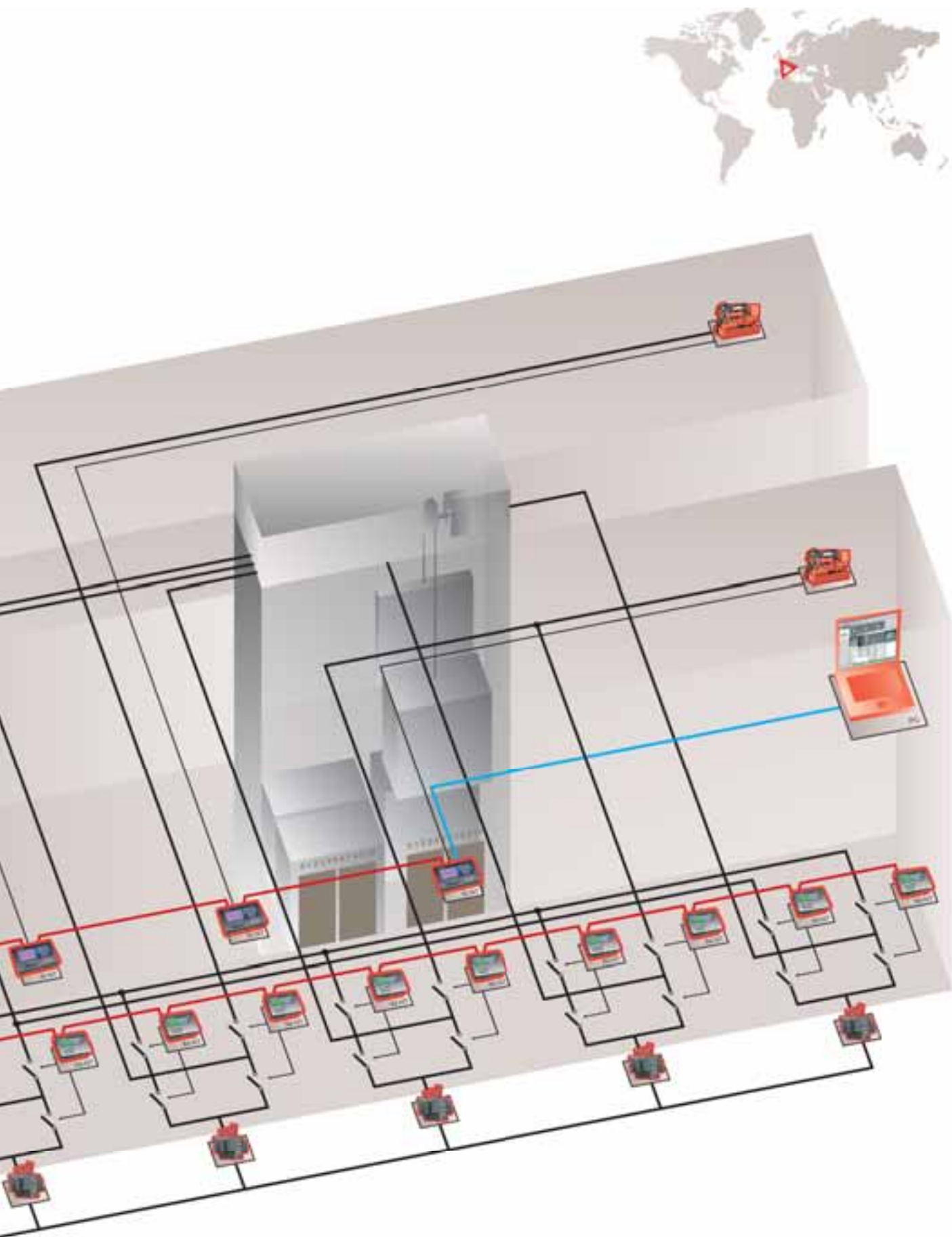
### Description

- ▶ The 12 storey building is supplied by 5 transformers and 10 redundant feeders
- ▶ The power is provided by 4 standby generators where one is redundant to the others
- ▶ Depending on the mains fail scenario 3 generators are feeding multiple sections
- ▶ Our system controls 4 gen-sets, 5 transformers and 20 breakers via a 1km CAN line
- ▶ The installed cables are 17kms, as we cross 12 storeys from control to power section

### Scope of supply

- ▶ 4 IntelliSys<sup>NT</sup> control and synchronisation panels for GEP550 Olympian gen-sets
- ▶ 10 IntelliMains<sup>NT</sup> Mains control trays prepared for mounting in existing switchboards
- ▶ 2 flame proof panels, functional endurance EI60, surrounding the control panels







## High technology control solutions for critical applications



**Place:** Baar, Switzerland  
**Name:** Hospital Baar

**Carried out by:** 42technology Ltd. and ComAp Systems CZ

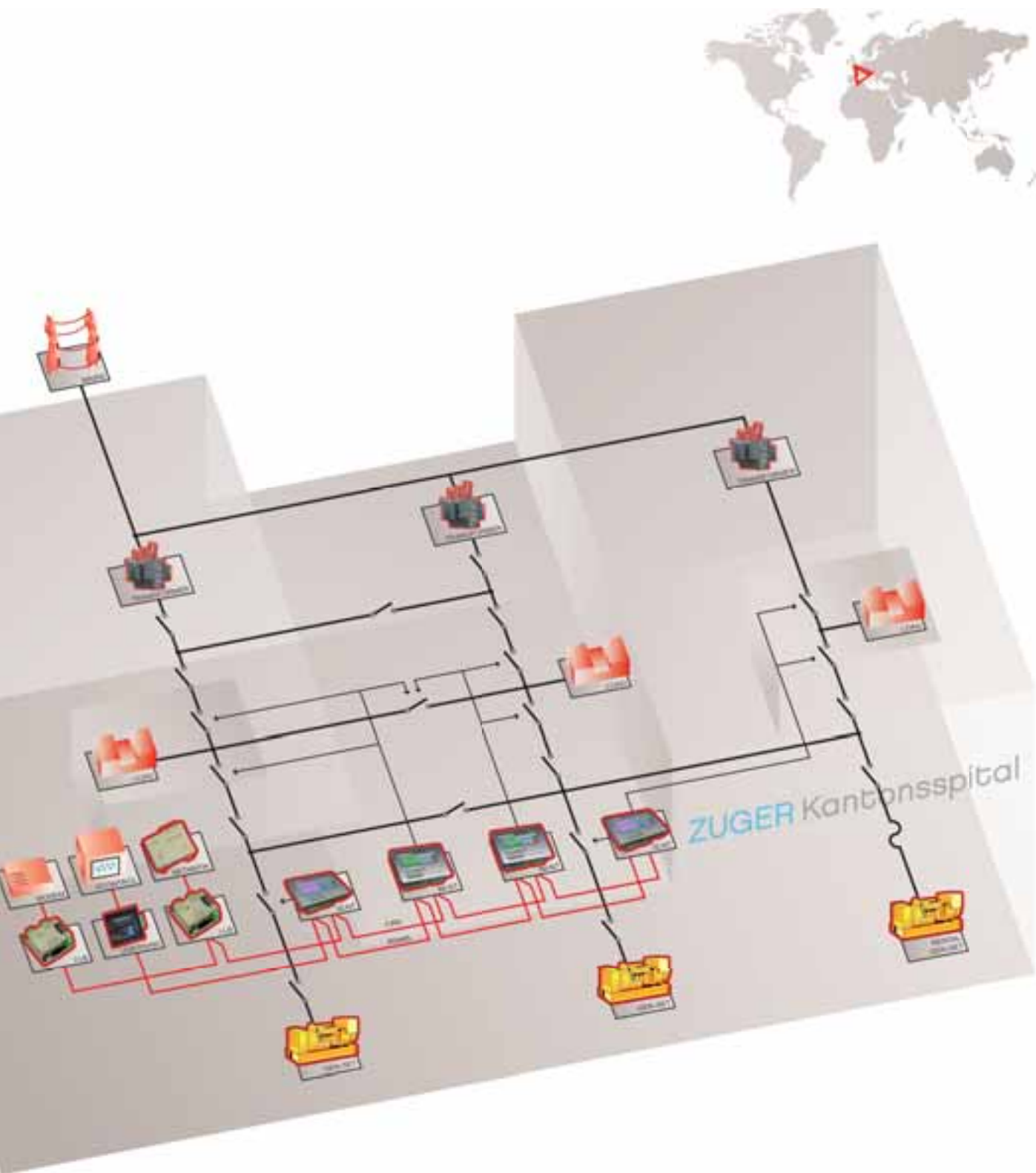
### Description

The hospital is fed by 2 × 1MVA transformers in parallel onto one busbar with coupler. If Mains fails, the Mains breaker open, the sets start and synchronise to their busbar. The load management system memorizes the load before the Mains failed and keeps the feeders closed whose load the gen-sets can carry. The others are opened. As soon the gen-sets are ready the busbar couplers are closed and feed the load. The loads are priority (2×7) re-connected as long as there is enough remaining power. Loads with lower priority are re-connected, if the one with higher priority is too big. The pControl SCADA system gives the overview of the system with > 40 breakers.

### Scope of supply

- ▷ 2 × IntelliSys<sup>NT</sup> control and synchronisation panels for CAT3412 STA 810kVA generators
- ▷ 1 × control panel with 2 IntelliMains<sup>NT</sup> for Mains supervision including pControl SCADA system
- ▷ 1 × NetMatik microcontroller for the load management with direct controller interface







## Flexible solution for CHP with remote communication capability



**Place:** Novedrate, Como, Italy  
**Customer name:** Sime Energia S.r.l. (Energy Service Company)

**Final customer and Power station:** Freudenberg Politex S.r.l.

### Installation:

The installation comprises a combination of main and auxiliary plants. The main plant is a CHP power station featuring a Rolls-Royce BV12 5.1 Mwe engine, linked to a complex process of heat recovery by steam, hot water and overheated water. The auxiliary plant features a back-up 6 ton/h steam gas boiler, 10 mc/h demineralised water production and 35 bar air compressor.

### CS customer information:

Sime Energia is part of the SIME Group dedicated to innovative energy services. The company's core activity is the design, implementation and management of self financed and owned cogeneration plant and district heating, with the aim of fulfilling its mission of providing electricity, heat and cooling cheaper than the average market cost. Sime Energia core markets are industrial, commercial and residential where customers benefit from complete implementation and management without the burden of making a major capital investment.

### Final customer information:

Freudenberg Politex is a multinational company with its headquarters in Italy at Novedrate (Como). The Group's core business is the production of polyester non-wovens, made using both staple and spun bonded technology. The company is the world leader in the roofing sector, where non-wovens are sold as reinforcement for bituminous waterproofing membranes. On the Novedrate site, the production process is integrated upstream, with polyester produced internally from recycled PET bottles.

### Power station description:

The Politex power station is a modern CHP plant based on a Rolls-Royce BV12 5.1Mwe engine. The 6.3kV generator is protected, controlled and synchronized to the public network by the IntelliSys<sup>NT</sup> controller. A complex heat recovery system, controlled by PLC, is able to produce steam, hot water and overheated water, each of which are used in the process of plastic recycling and polyester non-wovens production, resulting in a significant saving of energy and money.

### Scope of supply:

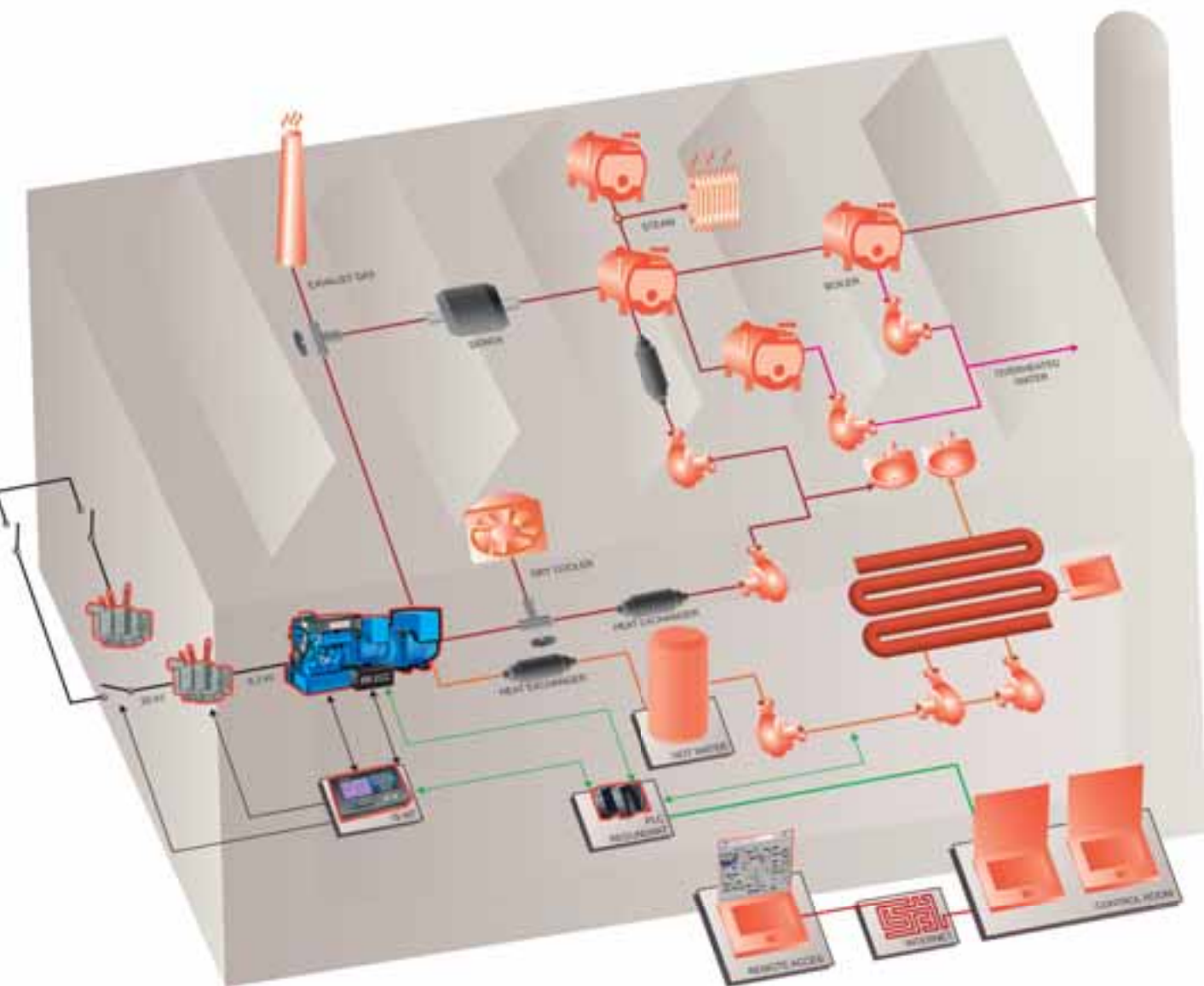
- ▶ Generator protection and synchronizing panel with ComAp IntelliSys<sup>NT</sup>
- ▶ Process control panel with Siemens S7-400H redundant
- ▶ Scada software – Wonderware Intouch
- ▶ 145 analog input 198 digital input controlled

### On this project ComAp Systems IT designed, implemented and provided all the control systems and supervision software for:

- ▶ Generator
- ▶ System of heat recovery
- ▶ Auxiliary services of the power plant

ComAp Systems IT followed and co-ordinated all phases of the plant commissioning.







## Bi-fuel conversion project



**Place:** Osborne, Queensland, Australia  
**Name:** Osborne Mine

**Carried out by:** ComAp Systems CZ in cooperation with Greenbird Technology

In December 2008 ComAp completed a very prestigious bi-fuel conversion project at Osborne Mine site in Australia. The Osborne underground copper-gold mine is located in the state of Queensland in north-eastern Australia 195 kilometres southeast of the inland town of Mount Isa. The mine site has 5 x Wartsila 12V32E powered, 3850 kilowatt generating sets that were operating solely on Diesel fuel oil before the conversion; the diesel generators provided all power to the mine site for their operations that has large varying load swings. ComAp then converted all 5 engines to bi-fuel operation.

By simply replacing large percentages of the engines diesel use with the available natural gas on site, the Osborne site now benefits from substantial financial savings because of the lower cost of natural gas compared to diesel fuel.

The project was completed by ComAp specialist engineers without any major engine modifications and without the mine site losing power or suffering any downtime which was a critical aspect of the project. The engines can now be run in Bi-fuel mode or be switched back to the original diesel mode at any time even under current loading.

### Original parameters (before conversion)

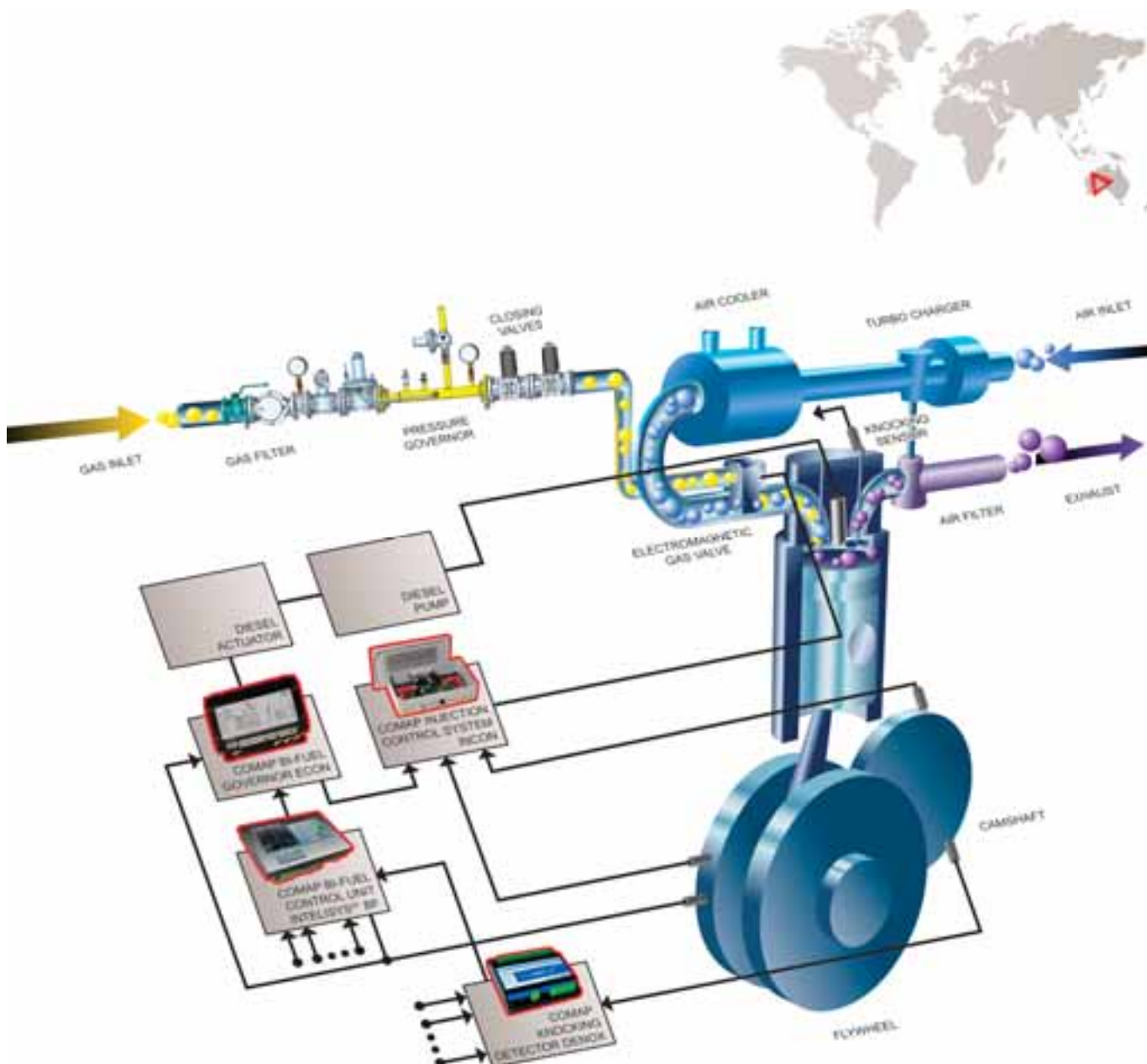
- ▷ Fuel: Diesel
- ▷ Nominal gen-set output: 3850 kW
- ▷ Real output on site: 3300 kW

### Parameters after conversion (dual fuel)

- ▷ Fuel: Gas + Diesel
- ▷ Gas / Diesel ratio: 75 / 25 %
- ▷ Nominal gen-set output: 3850 kW
- ▷ Real output on site: 3300 kW

**Investment payback period:** 3 months





### Customer quote

"In conjunction with ComAp's Bi-Fuel division, we recently completed a conversion of a 20MW Diesel Engine Power station in Australia. ComAp designed, commissioned and supervised the installation of the conversion. Bi-Fuel conversion requires no engine modifications with the mechanical additions limited to sensors and the gas control and injection system. ComAp's own electronic control system constantly monitors and manages the operation of the engine and dynamically adjusts gas to diesel ratio to achieve optimal performance. The ability to adjust diesel gas ratio instantly according to engine load was a key benefit for the client and a feature which ensures engine safety when compared to other gas conversion systems available. A further advantage of the system is the reduction in risk, should gas supply be interrupted the engine can return to 100% diesel operation – without even the need to shutdown first. We wouldn't hesitate to engage ComAp on future conversions and our client has achieved very significant savings in running costs and a payback period of less than twelve months for the project."

**Nigel Watson**, Greenbird Technology



## Dredge project



**Place:** Bairnsdale, Victoria, Australia  
**Customer name:** Gippsland Ports

**Carried out by:** Greenbird Technology

### Description

The ComAp IntelliDrive DCU Industrial was selected for this project due to the need for operation of additional devices (clutch), speed control and interface to electronic engines. The operator was some 500m away on the main dredge, operating the booster pump using radio modbus links.

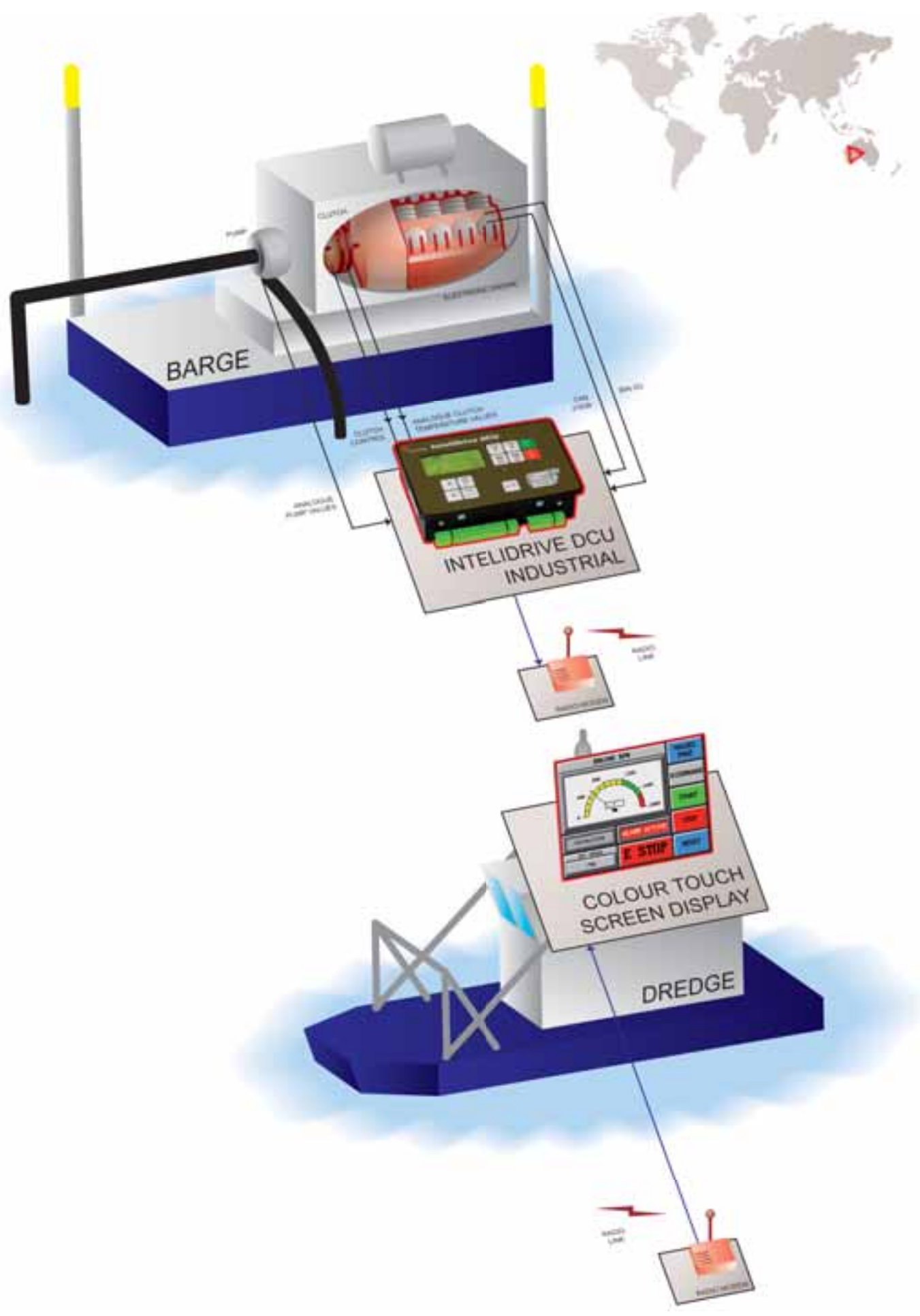
The system also had an AUTO mode whereby the pump maintained constant suction pressure. The ability for the IntelliDrive DCU Industrial to operate using standard and engine specific J1939 and modbus gives it great flexibility in these sorts of applications as control and engine data can easily be transmitted back and forth to the remote operator.

Remote displays gave the operator duplicate, up to the second information from the remote pump and the ability to change the operating speed remotely. A range of safety, fault detection and protection devices ensured there was no risk to personnel or the engine when operating un-supervised.

### Scope of supply

- ▶ IntelliDrive DCU Industrial







## APPLIED TECHNOLOGY

### InteliSys<sup>NT</sup>



InteliSys<sup>NT</sup> is an expandable controller for both single and multiple gen-sets operating in standby or parallel modes, especially in cogeneration (CHP) and other complex applications.

Detachable construction (consisting of IS-NT-BB and IS-Display or InteliVision 8) allows easy installation with the potential for many different extension modules designed to suit individual customer requirements.

A built-in synchronizer and digital isochronous load sharer allow a total integrated solution for gen-sets in standby, island parallel or mains parallel. Native cooperation of up to 32 gen-sets is a standard feature.

InteliSys<sup>NT</sup> supports many standard ECU types and is specially designed to easily integrate new ones.

A powerful graphic display with user-friendly controls allows any user whatever their ability to find the information they need. The display on the basic version is capable of displaying graphical languages (e.g. Chinese).

ComAp is able to offer customized firmware solutions.

#### Benefits

- ▶ Support of engines with ECU (Electronic Control Unit)
- ▶ Excellent configurability to match customers' needs exactly
- ▶ Complete integrated gen-set solution incorporating built-in PLC and signal sharing via CAN bus – minimum external components needed
- ▶ Many communication options – easy remote supervising and servicing
- ▶ Perfect price / performance ratio
- ▶ Gen-set performance log for easy problem tracing

### InteliGen<sup>NT</sup>



InteliGen<sup>NT</sup> is a comprehensive controller for both single and multiple gen-sets operating in standby or parallel modes. Compact construction is optimized for these purposes and various HW modifications allow the customer to select the optimum type for a particular application.

### InteliMains<sup>NT</sup>



InteliMains<sup>NT</sup> is designed for multiple (up to 31) gen-sets operating in parallel to mains. InteliMains<sup>NT</sup> controller connects the group of gen-sets to the mains. It can serve as a bus-tie synchronizing controller between two groups of gen-sets.

### NPU-FUV



NPU is a 3-phase mains protection unit for applications with generators operating in parallel to mains. It provides adjustable voltage, frequency and vector shift protection to safeguard both the power supplier and the generators.

### InteliProtec



InteliProtec is a modular panel-mounted protection for generators operating in parallel to mains applications. It incorporates a wide range of protection features which include: voltage, frequency, vector shift, rate of change of frequency (ROCOF), overcurrent, earth fault, current, NVD, reverse power etc.

### InteliMonitor

InteliMonitor is a free PC SCADA software for on-line supervision of most Inteli and Mains brand controllers. The software is focused on comfortable monitoring of a group of controllers.

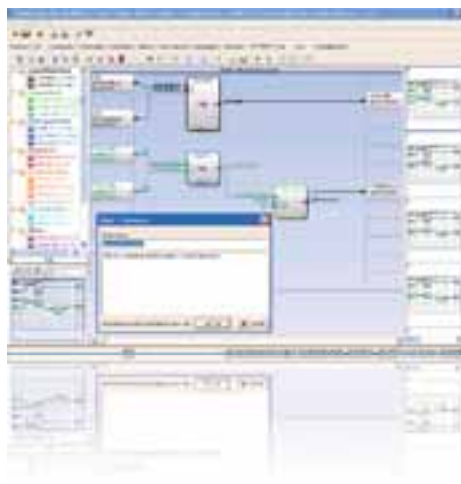


#### Features

- ▶ Configurable site structure
- ▶ Easy site overview
- ▶ Values, setpoints, history display
- ▶ Statistics setting (kW hours, number of starts, ...)
- ▶ User administration
- ▶ Direct, modem or Internet connection

### GenConfig

GenConfig is an off-line PC configuration tool for InteliGen<sup>NT</sup>, InteliSys<sup>NT</sup> and InteliMains<sup>NT</sup> controller customizing.



#### Features

- ▶ Allows full configuration of an NT controller and its peripherals:
  - peripheral modules and ECU support
  - inputs/outputs
  - setpoints
  - commands
  - protections (for analog inputs/values)
  - PLC
  - history record
  - user sensors
  - languages
- ▶ Offers expert mode, consistency check and configuration cloning

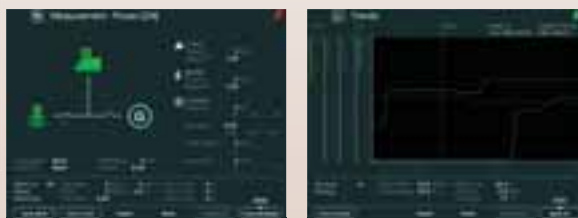
### InteliVision 8



## InteliVision 8

InteliVision 8 is a new generation colour display unit for either InteliGen<sup>NT</sup>, InteliSys<sup>NT</sup>, InteliMains<sup>NT</sup> or InteliDrive controllers. It is designed as a simple, easy to use Plug and Play solution, which also features our unique TRENDS monitoring as a standard feature helping you evaluate past events easily on the screen.

The new InteliVision 8 screen features many significant improvements such as the large high-resolution colour TFT display, which helps visibility and definition for onscreen information. The control interface has also been updated with user-friendly intuitive active buttons – giving users access to more information in less time.



➔ [www.comap.cz/intelivision8](http://www.comap.cz/intelivision8)

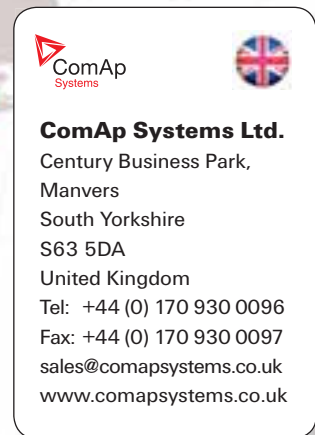




## ABOUT COMAP SYSTEMS GROUP



**ComAp Systems LLC**  
5352 Mainsail Drive  
Roscoe  
IL 61073  
United States  
Tel: +1 815 636 2541  
Fax: +1 815 636 0887  
joel.dewall@comapsystems.com  
www.comapsystems.com/us



**ComAp Systems Ltd.**  
Century Business Park,  
Manvers  
South Yorkshire  
S63 5DA  
United Kingdom  
Tel: +44 (0) 170 930 0096  
Fax: +44 (0) 170 930 0097  
sales@comapsystems.co.uk  
www.comapsystems.co.uk

**ComAp Systems Group delivers global coverage through regionally based subsidiaries, all geared to provide responsive and professional service, wherever and whenever customers need our help. Each of our regional support businesses encompasses a committed team of specialist engineers with in-depth knowledge and practical experience of our full range of products and typical customer applications. With this kind of support and expertise always close to hand, you can be assured of informed advice, dedicated resources and the right solution for your power control application.**

**ComAp Systems CZ**

Kundratka 2359/17  
 180 00 Prague 8  
 Czech Republic  
 Tel: +420 246 012 111  
 Fax: +420 266 316 647  
 info@comap.cz  
 www.comapsystems.cz

**ComAp Systems**

Elektrozavodskaja 24/220  
 Moscow  
 107023  
 Russia  
 Tel: +7 495 787 5633  
 Fax: +7 495 787 7438  
 info@comapsystems.ru  
 www.comapsystems.ru

**ComAp Systems S.r.l.**

Vicolo Verdi 2  
 Paese  
 31038  
 Italia  
 Tel: +39 042 245 3080  
 Fax: +39 042 295 1610  
 p.piccolotto@comapsystems.com  
 www.comapsystems.com/it

**ComAp Systems**

P.O.Box 365185  
 Riyadh  
 11393  
 Kingdom of Saudi Arabia  
 Tel: +966 1 499 5603  
 Fax: +966 1 499 5607  
 info@comapsystems.com  
 www.comapsystems.com/sa

**GREENBIRD TECHNOLOGY**

P.O. Box 295  
 Unit 3, 7 Stephen Street  
 Melrose Park, SA, 5039  
 Australia  
 Tel: +61 (08) 8177 0333  
 Fax: +61 (08) 8177 0311  
 info@greenbird.com.au  
 www.greenbird.com.au



**[www.comapsystems.com](http://www.comapsystems.com)**

Local Distributor / Partner

---



© ComAp. 2009-12/CSCESOBU. All rights reserved.

Specifications in this Solutions Business brochure are subject to change without notice.