



Protection Solutions for  
Embedded Power Plants  
& Renewables

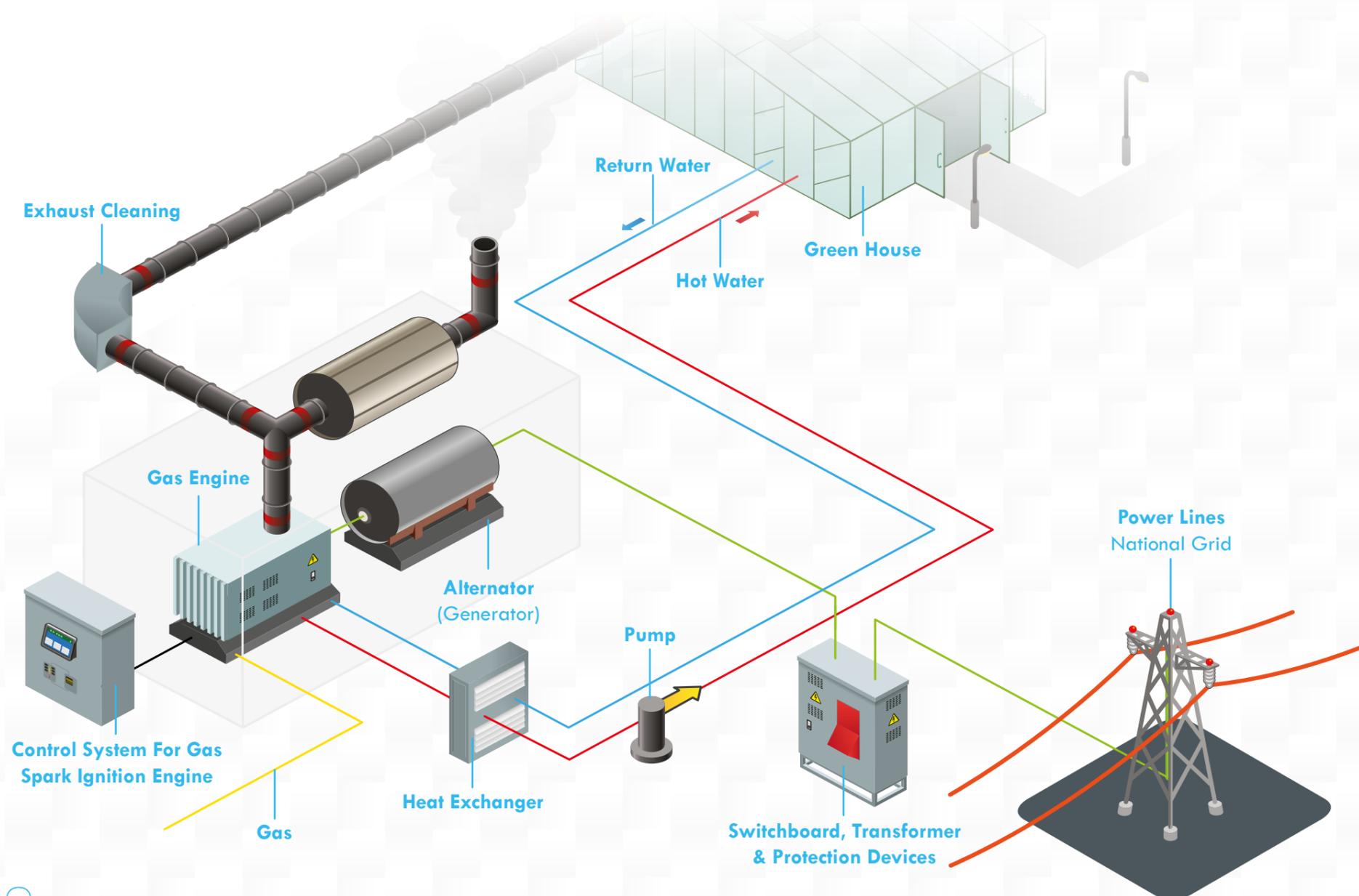
# Combined Heat & Power

Combined heat & power (CHP) consists of an engine or turbine as its prime mover, driving an alternator (electrical generator). The CHP principle is to harness heat from the prime mover, its exhaust system and the alternator. In the right application useful heat can be recovered while generating electricity simultaneously, add cooling to the application to achieve tri-generation (CCHP) system.

CHP captures heat which is distributed into a process for manufacturing or used to replace standard boiler arrangements for building heating and hot water.

CHP is a well-practised application for commercial use, i.e. leisure centres, hotels and district heating schemes. Other less common applications require the heat as the primary requirement, electricity is the by-product. Consider installations and applications such as nurseries / plant growers where the heat is recovered and regulated within green housing for plant growth. In some cases exhaust discharge from the engine is cleaned and diverted from the normal exhaust route to the green house to enhance plant growth and electricity is the waste product, exported off site as a possible revenue stream.

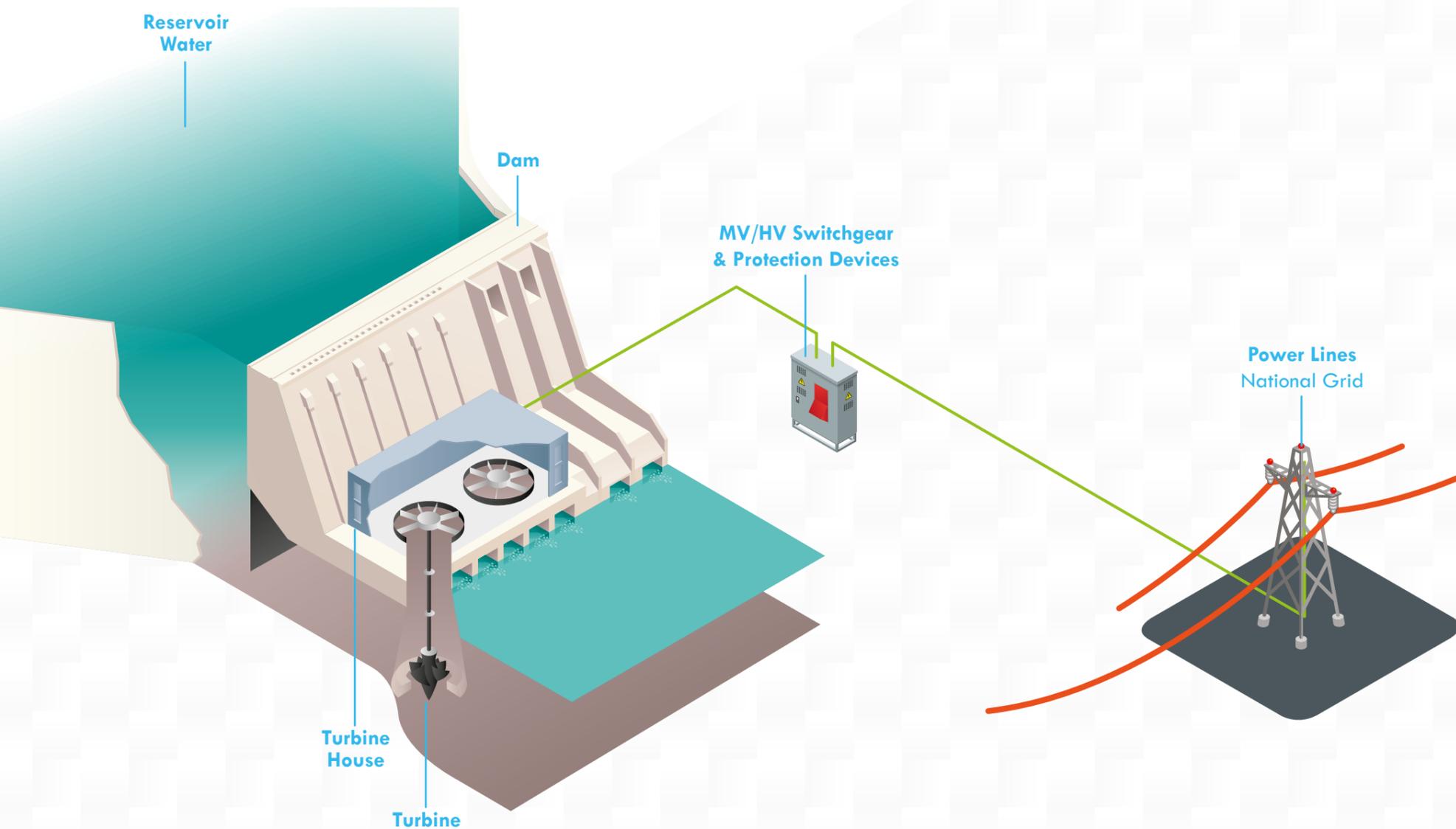
Anaerobic Digestion (AD) applications are complimentary to a CHP spark ignition gas engine. The process of AD plants produces a waste gas, Methane gas (CH<sub>4</sub>), a good fuel for a gas engine. The organic materials used within the AD plant such as sewage need heat for the biological process, the CHP uses the otherwise wasted methane gas, provides the heat for the process with electricity as a cost effective by-product.



# Hydro Power

As the UK's power requirements increase, many new avenues of power generation are being explored. One of the oldest, water power, is experiencing something of a renaissance. The link between water and power goes back hundreds of years, from waterwheels to the steam that powered the Industrial Revolution, water has been inextricably linked to all areas of UK industry.

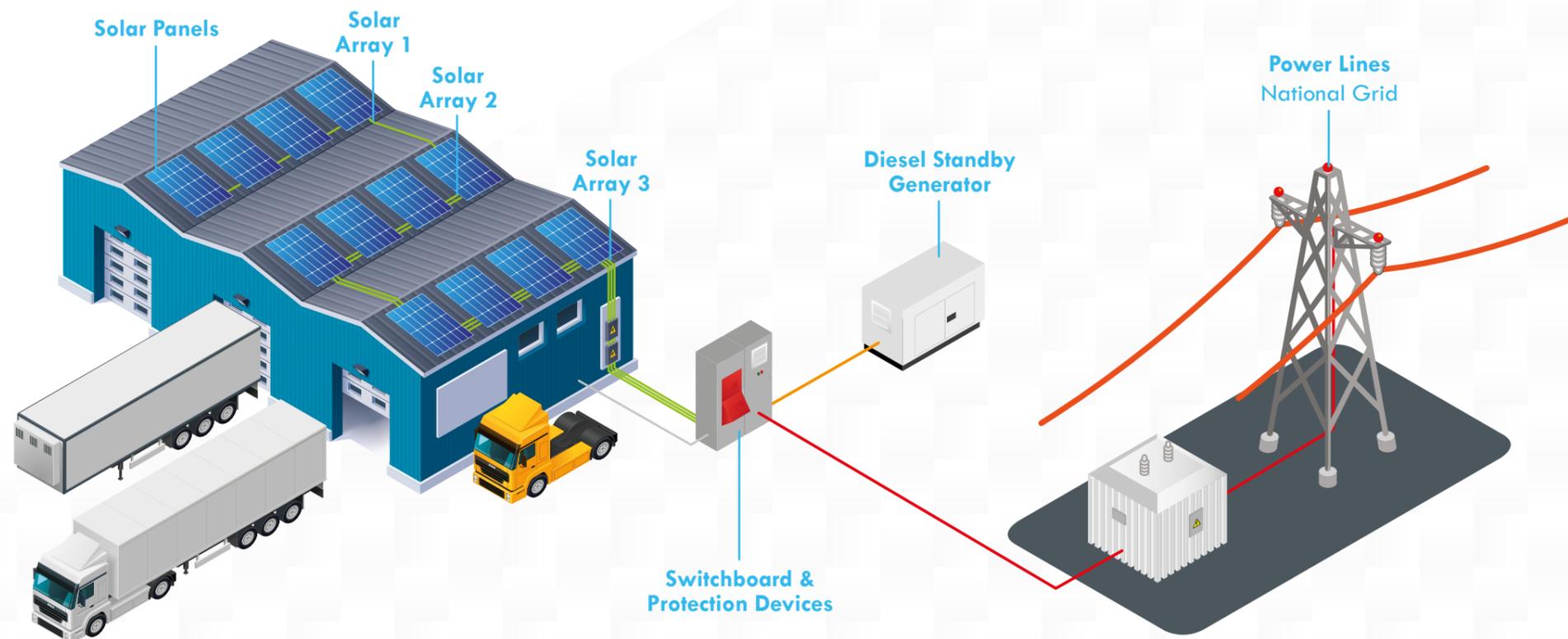
In today's market, water is still being used to generate electricity for the grid and is one of the most reliable and environmentally friendly ways of generating power. APE offer new and replacement control systems for new and existing hydro installations, a new replacement system or retrofit panel solution, all complimented with our proven mains protection solutions, G83, G10, G59/1, G59/2 & G59/3.



# Solar Power

Solar installations are on the increase as an alternative source of power, supplying electricity for commercial and residential buildings. Operating in parallel with a local mains supply enables solar arrays to generate power for their own commercial or domestic use, surplus power flowing back to grid for use elsewhere.

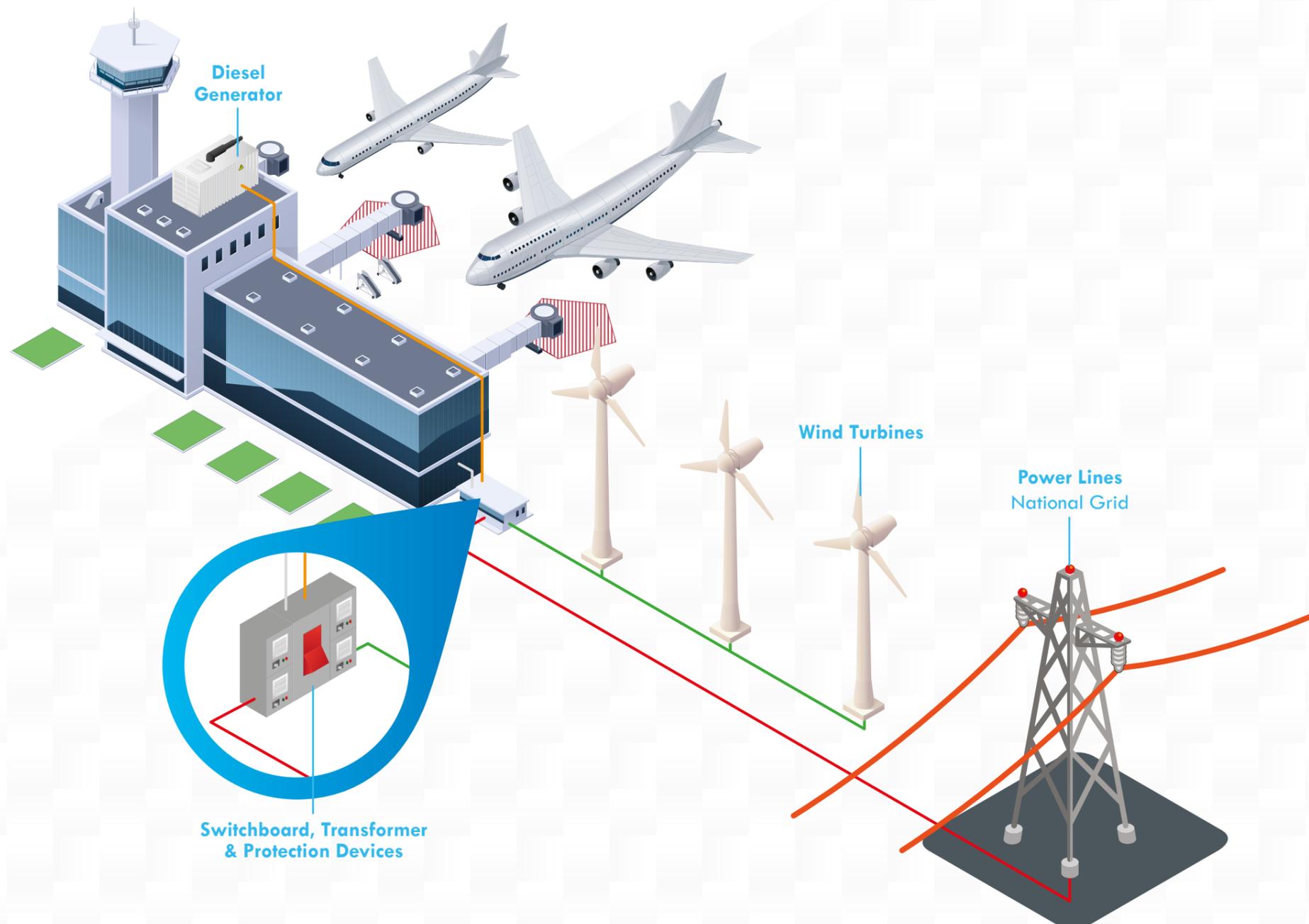
Over the last 12 years Applied Power Engineering (APE) have provided mains protection panels to leading companies to meet Distribution Network Operator (DNO) approvals. We provide standard, bespoke protection and switchgear panels to meet specific requirements and satisfy the DNO standards. Our services include; design, manufacture, installation, commissioning and injection testing.



# Wind Power

Wind generation has become one of the most recognised methods of accessing free energy, making a significant contribution to the country's power requirements. From large scale offshore wind farms to smaller regional developments, wind is providing the power for households, farms and businesses across the UK.

APE already co-operate with leading renewable companies, offering a wide range of control and power solutions at low and medium voltage. Our expertise in the power generation industry, our ability to provide flexible solutions for the standard and complex applications, make APE a "ComAp & Motortech Authorised Solutions Provider" for the UK power generation market, an ideal partner to any business.



# Protection Panels



Applied Power Engineering (APE) design and manufacture switchgear, controls and protection panels for hydro, solar, wind, combined heat & power (CHP), tri-generation (CCHP), industrial gen-set applications.

Our protection solutions may be incorporated into a complete solutions or supplied as a standalone protection panel to satisfy embedded power generation schemes.

Expandability, design flexibility and product option features allow the complete package to be designed to your specification. A design and functionality alternation can be easily implemented to most changes, including an unexpected change request during start up and witness testing.

# Testing

APE carry out a full design, manufacture, mechanical and electrical installation and injection testing services. APE use the recognised and calibrated injection testing equipment for all our G59 & G10 testing. Single and three phase current injection testing, along with single phase failure tests for Current Unbalance as detailed in G59/2 testing schedule (as an alternative to sensing fuse tests) are also available to provide the witnessing body with a comprehensive test regime.

Our dedicated team is trained on the injection and witness testing of G59/1, G59/2, G59/3 and G10 equipment for various applications and products.



APE benefit from extensive knowledge of embedded power generation market, paralleling applications with power generation equipment is our speciality. We are conversant with the latest requirements for embedded generator; G83, G10, G59/1, G59/2 & G59/3.

Our protection panels include a distribution board as a base entry level solution, incorporating a ComAp MainsPro relay providing:

Protections	ANSI
Dual Under Voltage	27
Dual Over Voltage	59
Dual Under Frequency	81L
Dual Over Frequency	81H
Vector Shift	78
R.O.C.O.F	81R

### Power generation for paralleling applications comes in many forms, our services include:

- Diesel and Gas short & long term paralleling
- Hydro, Solar, Wind, CHP and CCHP Systems
- Natural, Bio Gas and Bio Mass fuel installations

ComAp MainsPro module is designed to fit a general single or three phase distribution board for wall fixing as well as being DIN rail mounting, APE package the complete wall mounted distribution board solution.

Our solutions can be complimented with sensing circuit breakers, distribution circuit breakers, adjustable time re-close to a voltage free contact for field use, power switching and metering to suit design requirements.

As a solution provider for power generation and protection systems we understand the requirements needed in products and select suitable hardware for the application in order to satisfy control philosophies and tests regularly required by the witnessing body.

### 3 Phase Injection Testing includes:

- Single or Dual stage Voltage
- Single or Dual stage Frequency
- Vector Shift
- Rate of Change of Frequency (R.O.C.O.F)
- Current Unbalance (Single Loss of Phase)
- Directional Over Current
- Negative Phase Sequence
- Directional Power



Our assemblies can be provided for self-calibration, APE can provide onsite injection testing by trained technicians, alternatively your panel can be dispatched complete with an injection test certificate to customer specified nominal values, or to standard documented G59 protections settings.



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