

# Setting the standard for green energy performance



A US university has adopted environmentally-friendly solutions through analyzing and reporting on its sustainability progress. Using this analysis, the university purchases 100% of its energy from sustainable sources and has worked steadily to reduce energy consumption by almost one third.



## Higher learning with higher energy standards

The US university wanted to set the standard for green energy performance in education by installing sustainable technology.

It appointed clean technology experts, Centrica Business Solutions, to deliver a \$6.3 million energy services contract at its city center campus. Centrica Business Solutions partnered with several local contractors and consultants on the nine-month program.

30%  
SAVINGS

Overall  
reduction in  
energy costs

30%  
CUT

Overall reduction  
in carbon  
footprint

100%  
SUSTAINABLE

All energy  
purchased is  
completely  
sustainable

\$0  
UP FRONT

No upfront  
capital cost to  
university

### Electricity supply with free, efficient by-products

After reviewing solar and turbine-based generating equipment, the university partnered with Centrica Business Solutions to build a trigeneration system based on natural gas reciprocating engines. The vision was to use a natural gas generator set to produce electricity for the university, while using the free by-products of the system (heat) to simultaneously produce steam, chilled water, and hot water.

### The results

The university will generate its own 2,454 MWh secure supply of electricity from three natural gas driven 160 kW Centrica Business Solutions trigeneration units – achieving more than twice the efficiency of conventional power generation.

Together with the installation of a 269 kW solar photovoltaic system, this will reduce the university's dependence on grid generated power. This highly efficient combined cooling, heat and power (CCHP) system, working in conjunction with a new 200 RT absorption chiller, will also supply 13,110 MM BTU of heat – generating hot water for winter heating, and chilled water for use in the air conditioning systems during the warmer summer months.

This project was carried out in two phases. Both Phase 1 and 2 helped to reduce the university's electric consumption by 3,694,640 kWh/year from CHP and 301,340 kWh/year from solar. A total reduction of 1,010,470 kWh/year from upgrades through EMS & VFD controls, lighting efficiency and a building management system.

There is no upfront capital cost to the university, with Centrica Business Solutions funding the \$6.3 million capital program. This is partially offset by two substantial grants from a Clean Energy Program, which in combination with Federal Tax Credits awarded to solar power and CCHP projects, total \$1.86 million. Guaranteed energy savings over a 15-year contract are being underwritten by Centrica Business Solutions.

#### System description

- Three trigeneration units
- Natural gas reciprocating engines
- Generates free by-products like steam, hot and chilled water

#### System size

- 480 kW (3x 160kW)

#### System production

- 2,454 MWh of secure electricity
- 13,110 MMBTU of heat for hot water

#### Environmental benefits

- 10 - 30% reduction in carbon footprint
- Lowered emissions by 2,888 tons per year equivalent to removing 671 cars from the road
- Equivalent to the carbon saving benefits of a 615 acres of pine forest

The systems can be powered by a variety of different fuels including: natural gas, biogas, propane, biodiesel or pure plant oil (PPO). The applied cogeneration technology enables the organization to generate its own electricity, radically reducing carbon emissions. This method is highly energy efficient (85%), as it recovers heat created in the electricity generation process and – being locally sourced energy – automatically eliminates transmission losses.

Cogeneration is almost twice as efficient as conventional power generation as most heat is recovered and used on site, rather than wasted into the atmosphere.