# Australia's First Trigeneration Precinct For Commercial Buildings

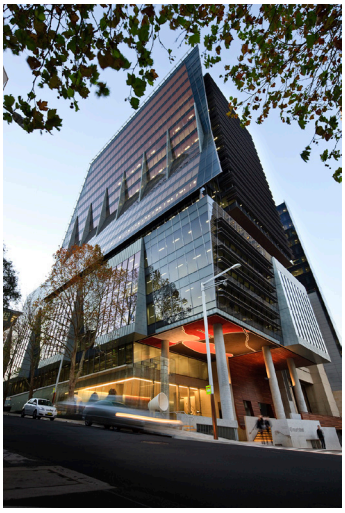
## FACT SHEET

Investa Property Group and Cogent, a subsidiary of Origin, have established a trigeneration facility that reduces the carbon footprints of two commercial buildings in Sydney.

The recently installed trigeneration plant at Coca-Cola Place in North Sydney supplies lower-carbon electricity, hot water and chilled water to the base building and now exports surplus electricity via Ausgrid's electricity distribution network, so the benefits can be shared with another Investa building (Deutsche Bank Place, 126 Phillip Street, Sydney).

This is a first for a commercial building in Australia; paving the way for precinct-based trigeneration systems that can serve multiple buildings.

This new precinct is formed via an arrangement between Cogent and Investa which overcomes operational challenges and will enable other organisations to share surplus lower-carbon benefits between buildings.



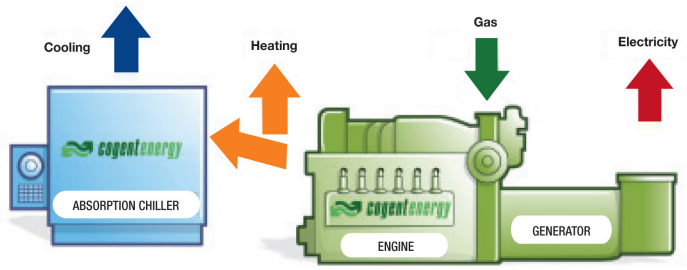
COCA-COLA PLACE
40 MOUNT STREET, NORTH SYDNEY

DEUTSCHE BANK PLACE
126 PHILLIP STREET, SYDNEY


TRIGENERATION PLANT

### WHAT IS COGENERATION AND TRIGENERATION?

Cogeneration uses natural gas-powered engines to generate on-site electricity. The waste heat from the engine is captured to provide heating, or for conversion to chilled water for cooling through an absorption chiller. When an absorption chiller is used, the solution is often referred to as trigeneration. Using gas as a fuel offers a significant reduction in carbon emissions when compared to coal-fired power generation.




### CHALLENGES

The commercial property sector is striving to make buildings greener to meet increasing government, tenant and shareholder standards. Trigeneration is a recent addition to the Australian property market however some technical challenges must be overcome to realise all the benefits, namely:

- When buildings are being designed and constructed it is difficult to estimate the final energy demands, because they depend on the types of tenants that move in.
- As with any large energy user, there are peaks and troughs in demand throughout the day and throughout the year, however trigeneration systems are designed to run at maximum capacity.
- Responsible building operators strive to use as little energy as possible. This can compromise the benefits of a plant if demand falls below efficient operating parameters.
- For commercial building owners it is not economically viable to sell co- or tri-generated power into the electricity grid, so direct export of electricity is not usually an option.

**This is a first for a commercial building in Australia; paving the way for precinct-based trigeneration systems that can serve multiple buildings**

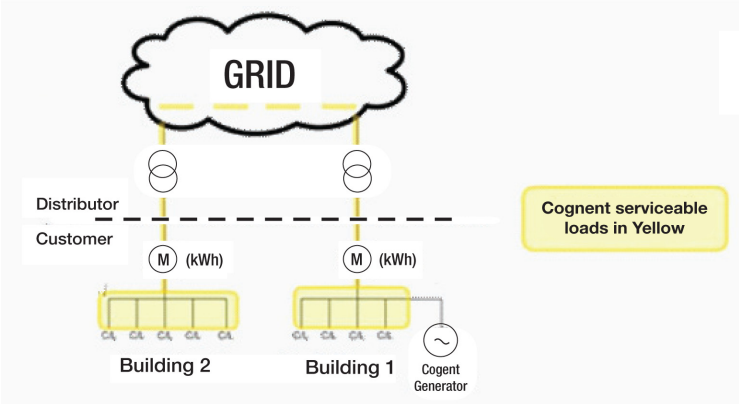
cogentenergy origin

INVESTA

## SOLUTIONS

Origin's *cogentpower* addresses the challenges that have been limiting the use of other cogeneration plants at large commercial sites. *cogentpower* creates a 'virtual private energy network' overlaid with the Ausgrid network to balance the energy demand between the two buildings. This solution allows Coca-Cola Place's trigeneration plant to operate at maximum capacity and efficiency all year-round.

Under the *cogentpower* model the plant at Coca-Cola Place in North Sydney runs at maximum capacity and sends surplus power to the grid, sharing the benefits with Investa's Deutsche Bank Place Building at 126 Philip Street in the Sydney CBD. The North Sydney building can achieve its sustainability targets and also share the lower carbon benefits with the Phillip Street building. This is the first step in the creation of a precinct-based trigeneration system where buildings are connected within the same distribution network and surplus, lower-carbon electricity can be exported to the electricity grid.




## KEY BENEFITS

- Major energy efficiencies and carbon emission reductions for buildings.
- More than 1,000 tonnes of $CO_2$ per annum[1] is expected to be saved between Coca-Cola Place and Deutsche Bank Place.
- Increases the NABERS energy rating of both buildings.
- 'Waste heat' captured from the plant is used on site for heating and cooling, significantly reducing the operation of boilers and electric chillers, thereby increasing efficiency and reducing energy use and $CO_2$ emissions.
- In the event of a black out, the trigeneration plant at Coca-Cola Place would still provide power, heating and cooling to the tenants.
- Surplus energy is exported to the grid, maximising efficiency and allowing the benefits to be shared between buildings.
- As waste heat is harnessed, trigeneration provides up to 80 per cent efficiency, a significant increase on conventional coal-fired power stations which convert only 30-40 per cent of their fuel energy into electricity.[2]
- The generation of electricity using natural gas produces significantly less greenhouse gas emissions than the generation of electricity using coal.
- When electricity is generated inside the CBD and shared into the grid locally, energy is not lost via the high-voltage transmission network.

[1] $CO_2$ savings estimates are calculated on information from the Australian Government National Greenhouse Accounts Factors July 2010. Calculation methodology externally reviewed by PAE Holmes.

[2] http://www.aph.gov.au/library/pubs/rn/1998-99/99rn21.htm, see Table 1, Electricity Generation Efficiencies for Coal Power Stations and Cogeneration.

**More than 1,000 tonnes of $CO_2$ per annum is expected to be saved between Coca-Cola Place and Deutsche Bank Place.**

## KEY COMPONENTS OF THE ARRANGEMENT

- Cogent leases Coca-Cola Place's trigeneration energy centre from Investa increasing the building's capital value and the overall rental returns for Investa.
- Two Energy Service Agreements (ESA) allow Investa to purchase electricity, hot water and chilled water from Cogent, as well as top-up peak and off-peak electricity for both sites.
- Cogent will purchase the gas consumed by the plant and provide the monitoring, operation and maintenance of the plant for the duration of the long-term agreement.

## THE SYSTEM AT COCA-COLA PLACE

### The trigeneration plant at Coca-Cola Place consists of:

- 774kW MWM, low NOx, gas fired reciprocating engine coupled to a 415V generator located on level B2 which provides power to the base building.
- 650kW single-double effect broad absorption chiller located on B1 mezzanine level. The absorption chiller utilises both engine jacket and exhaust heat and can supply either chilled or hot water to the building.
- Control, metering and switch gear that will manage the plant and interface to the site's main switch boards and the grid for safe operation.

### Plant Operation

- The trigeneration plant provides 774 kWe of power to the base building and 650 kWR of cooling to the air conditioning system when running at full capacity.
- Exhaust gas from the genset rises via the exhaust flue system to the mezzanine floor to either vent or divert to the absorption chiller based on air conditioning requirements.
- The bypass valve modulates exhaust flow through the absorption chiller based on actual chilled water load.
- The trigeneration system is configured as the primary boiler and chiller in the Building Management System (BMS) if available.
- The trigeneration plant can operate as a standby set during a grid failure, delivering a large portion of the base building's power and is capable of a black start with no external power required.
- The trigeneration plant will run in parallel import/export mode with the incoming Ausgrid grid feeder and is synchronized to this feeder. Cogent operates the generator where a portion of the power is fed to the base building, any excess power which cannot be utilised by the base building will be exported out of the building to 126 Philip Street using the Ausgrid Network.
- The trigeneration plant will operate between 7am and 10pm during the working week (peak/shoulder period) and uses grid energy for top up and off peak periods. The plant's operation is determined by the combined base building load for the two buildings. It is estimated that the plant will run 2500-3000 hours per annum.