

AIE Newcastle

Cogeneration Systems



cogen for dummies.

Cogeneration and trigeneration are proven technologies that are building market momentum and, with the right thermal demand and economic and regulatory environment, can be expected to provide sizeable demand management opportunities.

What is cogeneration?

Cogeneration is the simultaneous production of electrical energy and thermal energy, also referred to as combined heat and power (CHP).

What is trigeneration?

Trigeneration is the simultaneous production of electrical energy, thermal energy and cooling.



Source: Clean Energy Council

feasibility.

- ❑ \$470 million Charlestown Square redevelopment
- ❑ Expansion from 170 retail tenancies at 47,000m² GLA to 280 retail tenancies 90,000m² GLA with entertainment and leisure precepts.
- ❑ Target 30% reduction of carbon footprint
- ❑ Cogen design was completed by the development project manager and their consultants



for the boffins...

2.8MWe Generation Capacity, utilising 2 x 1400kWe Natural Gas Generators;

Centre Electrical loads range from **2.6MWe** during Winter and up to **5.1MWe** during Summer

Generating 11,000 Volts (11KV) Electricity to 7 x private (GPT) high voltage transformers on a privately (GPT) managed imbedded metering network.

107,000 GJ of natural gas per annum (107TJ)

Generating **11,420,000kWh** of **electricity** to the base building and retail tenancies or **72%** of total **embedded** centre consumption.

Thermal Cooling capacity 13,725kWr being

2 x 1,000kWr Absorption Chillers

1 x 225kWr Absorption Chiller (Solar Thermal)

1 x 1,500kWr Electric (415v) Chiller

2 x 5,000kWr High Voltage (11,000v) Chillers

the engine room...



the control room.

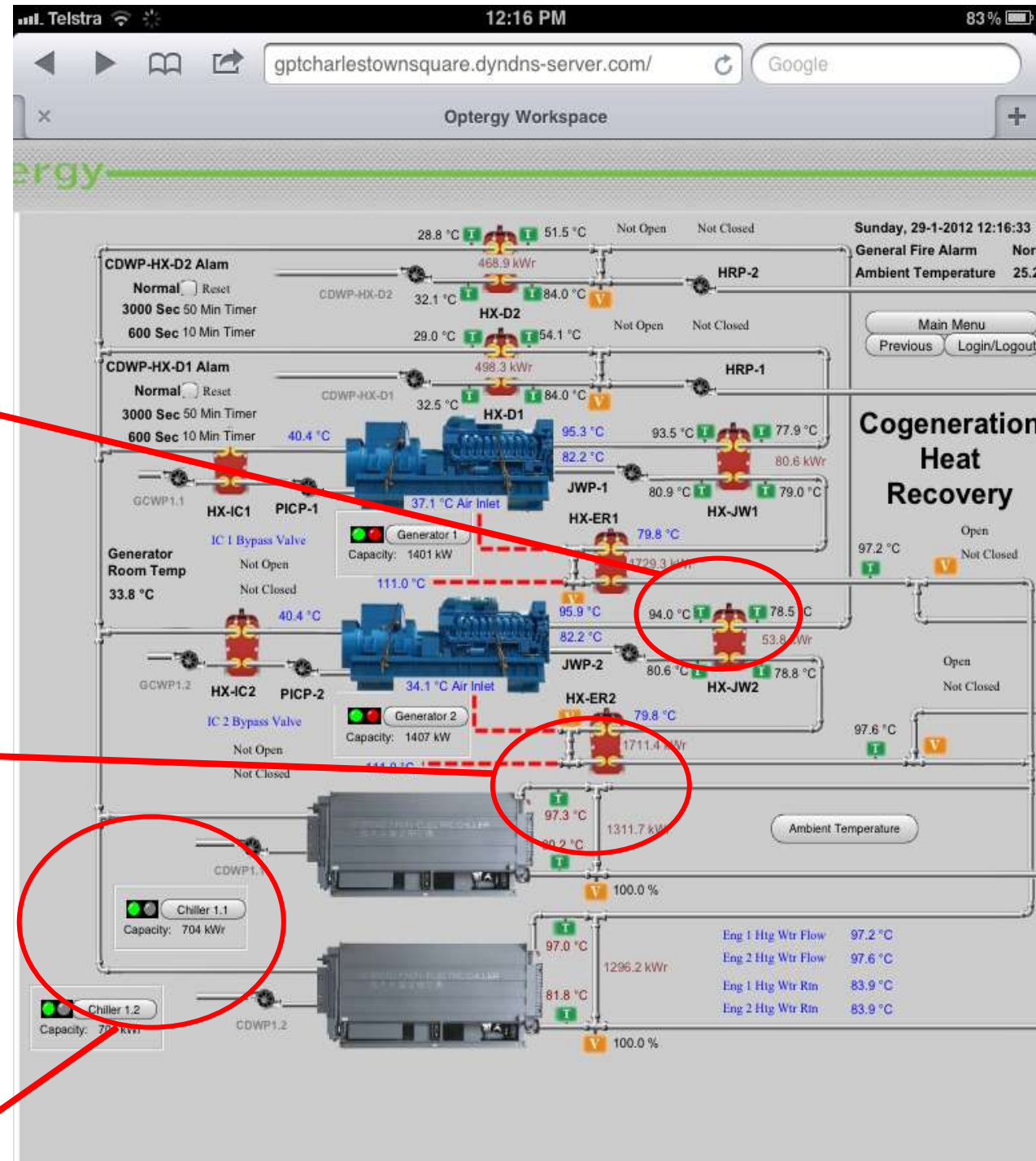


the icing on the cake...

Jacket Water Out
95oC

Hot Water In
97.3oC

Cooling 6oC out
Chilled Water 1,400kW



environmental benefits.

- **Half the carbon emissions** compared to coal power Electricity
- **Reduction of electricity** use by using generator engine waste heat on space cooling through use of **absorption chillers**
- **Up to 87% of energy used** compared to 44% for a typical power station

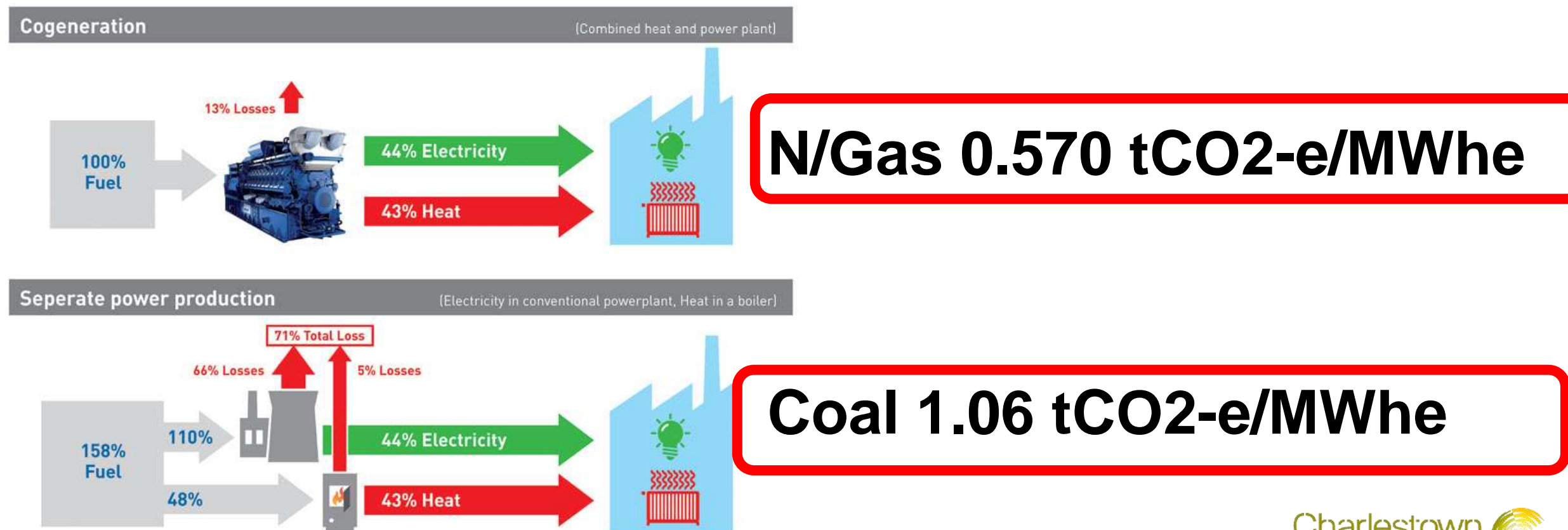


Image source MWM

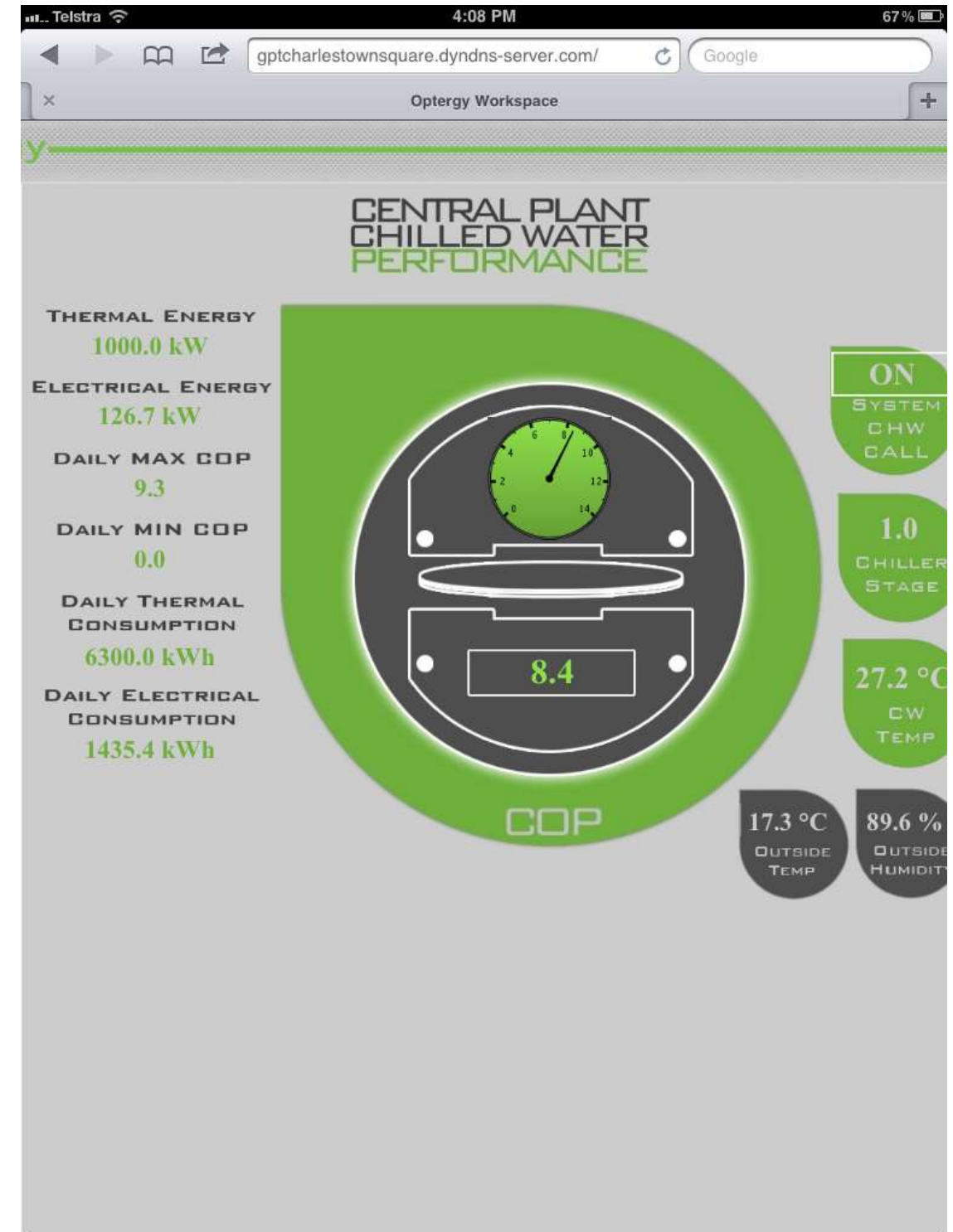
improved efficiency.

- Central Plant **COP's of greater than 10**

Coefficient of performance or COP.

E.g. 300kWe (Electricity) input for output of 1,500kW_r (Cooling) = COP of 5

- Absorption Chillers use up **to 90% less Electricity** than electric chillers (almost energy free cooling)
- Absorption Chiller **reduce Electricity demand**
- High Voltage Chillers **COP 6.25** compared to Low Voltage chiller COP 5 which is 25% more energy efficient



operating stakeholders

