

Maitland City Bowls Sports & Recreation Club

Trigeneration and Electric Duct Heating Retrofit



Background

Formed in 1937 Maitland City Bowls Sports and Recreation Club was founded to facilitate the game of Lawn Bowls in the Maitland City area. Throughout the years, the Club has grown the operation to include a 33 room motel, a boxing gym, beverage, catering and gaming service, as well as function facilities. The Club employs 45 staff.

The Club has one main community building in the Regional Suburb of Rutherford and is currently the home base to most local sporting clubs, and community organisations, including cricket, football and AFL. The Club's vision is to become the "Centre of the Community" for the West Maitland area.

In 2011/12 the Club embarked on an energy audit in response to all time high electricity consumption following the last round of major renovations in 2009. This audit identified the HVAC system which consisted of electric duct heating across 6 air handling units as a large consumer of energy. A key conclusion was the need to move away from electric duct heating to hot water based heating.

At the same time, Club representatives attended a Simons Green Energy, energy efficiency seminar at Castle Hill RSL Club. The seminar identified the energy reduction opportunities that Cogeneration and Trigeneration could provide the club.

For Trigeneration to be effective at the Maitland club, both the heating (in winter) and cooling (in summer) had to be provided.

The change from electric duct heating to a hot water based system would provide the heat requirement in winter and the Trigeneration system's Absorption Chiller would supplement the existing Electric Chiller plant in summer.

Maitland City Bowls Sports and Recreation Club applied for, and was successful in securing a grant from the Australian Government's **Community Energy Efficiency Program (CEEP)** in the first round of the program. The proposed solution included a 150 kW Trigeneration system along with retrofitting five electric duct heating units and piping the system for a new hot-water based system. The removal of the electric duct heating system has eliminated 120 kW of electric heating load. The new Trigeneration system now provides heating from waste heat from the Cogeneration unit's engine. This was a leap forward for the Club with the Trigeneration system providing both supplementary heating and cooling for present demand and for foreseeable future expansion that will increase demand to cater for a further 2000 square metres of gaming, catering and function areas in 2013/2014.

Thanks to the Government's contribution of approximately 50% of the total cost of the project, the resulting payback period is less than 5 years, with a return on investment of over 20%. Grid-based electricity consumption was been heavily reduced, along with a significant carbon emissions reduction and increased profits that are re-invested into the Club and the local community.

Project Name: Maitland City Bowls Sports & Recreation Club - Trigeneration and Electric Duct Heating Retrofit

Site Owner: Maitland City Bowls Sports & Recreation Club

System Supplier: Simons Green Energy

Integrated Trigeneration system consisting of:

Cogeneration system details: ENER-G 150 Natural Gas Cogeneration System

- Total Electrical Output 150kW (e)
- Total Thermal Output 236kWth

Absorption Chiller system details: Shuangliang RXZ38H2 absorption chiller

- Total Thermal Output 135 kW(t)

Estimated payback period with CEEP funding: 4.5 years

Estimated Carbon Reductions per year:

Approx. 500 Tonnes per annum

First Year Cost Savings: Approx. \$50,000

System Applications:

- Base load electricity supply for modern sport and recreation club
- Space heating for club via cogeneration system providing hot water to in-duct radiators
- Preheating of domestic hot water to reduce load on existing hot water heaters
- Gas hot water boiler boost system to provide heat during off peak periods when the cogeneration system is not operating
- Cooling for club via absorption chiller providing chilled water to cooling system, alongside existing electric chiller.



Australian Government

Department of Resources, Energy and Tourism

This activity received funding from the Department of Resources, Energy & Tourism as part of the Community Energy Efficiency Program.



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“The Trigeneration project has been made significantly more viable with the CEEP grant. The project will allow us to continue seeking other revenue generating and expense saving opportunities associated with energy and environmental efficiency. Having already completed an Office of Environment and Heritage energy audit, installing a large solar system, completing as much recycling as possible and employing efficient building design, the deployment of an embedded energy system was a natural progression that will save around \$2million dollars over the life of the equipment.” said Ian Martin, CEO Maitland City Bowls Club.

Simons Green Energy was engaged to design, supply, install and maintain the Trigeneration system and worked closely with East Coast Air Conditioning to ensure a smooth integration with the HVAC system.

Project Scope – Combined Heat, Power & Cooling

Maitland City Bowls Sports and Recreation Club main building uses, on average, 127,690KWh of electricity per month. A large amount of this electricity is for the electric duct heating system. To cost effectively increase the efficiency of the building, the Club replaced this inefficient HVAC system with a 150 kW natural gas fired Trigeneration system. The system generates electricity, hot water, for space heating and chilled water to reduce the operation (and expense) of the Club’s current electric chillers.

With the government’s contribution of \$403,606 and a total investment of just over \$1 million, the resulting payback period is less than 5 years.

Simons Green Energy was appointed as the prime contractor for the project in November 2012. Simons worked closely with East Coast Air Conditioning, who carried out the retrofitting of the electric duct heaters to a water based system. The Cogeneration unit was built to Simons’ specification by ENER-G PLC in the UK and a matching Absorption Chiller was built by Shuangliang, in China. Installation commenced in May 2013 with system components delivered to site on 16th June. The System was successfully commissioned and launched in August 2013

Delivering Results

The Trigeneration system comprises a ENER-G 150 Cogeneration unit, a Shuangliang Absorption Chiller, a hot water storage tank, a dump heat radiator, an adiabatic water cooler and a gas fired hot water boiler.

The Cogeneration system was supplied as a complete factory tested packaged unit with engine, generator sets, controls and heat recovery system.

What is Co & Trigeneration?

Cogeneration, also known as Combined Heat and Power (CHP), is the simultaneous production of two forms of energy - electricity and heat - from a single fuel source. Cogeneration uses a natural gas-powered engine to generate electricity on site and converts the waste heat from the engine into usable heat for space heating, process heat for manufacturing, domestic hot water, heating for swimming pools and similar applications. On site Cogeneration Systems have a total efficiency of up to 85%, as compared to the 30% efficiency of coal-fired grid- supplied electricity.

Trigeneration is the combination of a Cogeneration system and an Absorption Chiller which converts gas into electricity, heating and cooling. The waste heat from the Cogeneration system is converted into chilled water for air conditioning, refrigeration or other cooling purposes.

On site electricity generated by a Cogeneration & Trigeneration system is cheaper and cleaner than coal-fired grid-supplied electricity. Cogeneration and Trigeneration thereby provides substantial cost savings, significantly improved energy



Benefits

- Reduces energy costs by approximately \$50,000 per year
- Produces 752 MWh of electricity each year when operated 15 hours per day
- Provides 236 kW(t) of thermal output in the form of hot water as a “free” by-product from the engine’s waste heat stream
- Reduces carbon emissions by 500 tonnes which is equivalent to planting 5000 trees per year
- Provides expanded heating capacity for future club development
- Results in a payback period of less than 5 years with a return on investment of over 20% per annum

Derek Simons, CEO of Simons Green Energy said *“The Trigeneration System at Maitland Bowls and Recreation Club is a great platform for others to follow, and demonstrates the leadership of the Club’s management. We are very proud to be part of the Club’s project and it reinforces the commitment to sustainability within the Clubs industry”.*

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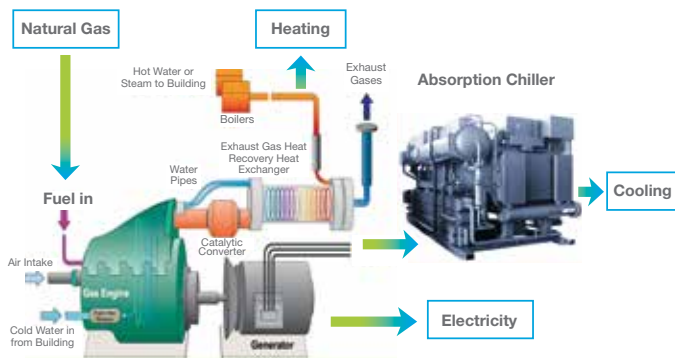


Diagram: Trigeneration system

