

## Session 5

### TRIGENERATION AND TERTIARY INSTITUTION CARBON NEUTRALITY

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By now almost all universities have set some form of target for reductions in their carbon emissions, however it would appear that goals are sometimes set without a full appreciation of the challenge that may be involved in meeting these targets. For a majority of tertiary institutions operating in the current market, trigeneration represents the single largest economically feasible means for reduction in campus carbon emissions.

Through consumption of natural gas, and capture and reuse of waste heat for the purposes of heating and cooling, trigeneration has the ability to reduce the carbon footprint of a university by as much as 50% over standard grid electricity consumption. Trigeneration in its current commercialised form, is however still a fossil fuel based initiative. As tertiary institutions strive toward carbon neutrality, the dependence on a fossil fuel based initiative seems counter intuitive. As the grid electricity carbon footprint reduces over time, and the proposed carbon tax comes into effect, the benefit, and therefore cost effectiveness of trigeneration will change. Feasibility studies looking at trigeneration need to account for the changing electricity and carbon market, as well as considering how the initiative will suit the institutions wider carbon reduction targets.

The aim of this paper is to provide a current and future market view on the economic feasibility of trigeneration, looking at detail at the trigeneration feasibility process. This would cover discussion on the infrastructure required to implement trigeneration, how to go about sizing trigeneration and factors that influence lifecycle pay back periods/total carbon reductions. The paper also covers the future of trigeneration following the introduction of the proposed carbon tax and as tertiary institutions strive toward carbon neutrality.

Additional topics discussed include; trigeneration feasibility in differing states, the effects of trigeneration on total water consumption, trigeneration within the context of GreenStar, trigeneration compared to GreenPower and trigeneration connection agreements with local electricity providers.

The paper provides this discussion within the context of a case study on trigeneration feasibility carried out for a medium scale campus based tertiary institution.

#### **Presenters Biography**

**Nick Bamford** is a Senior Mechanical Engineer with AECOM, working in their Buildings group. Nick has been involved in a number of trigeneration and district energy projects including feasibility studies for RMIT City Campus and Dandenong Central Services Hub. Recent tertiary institution projects include RMIT Swanston Academic Building, Melbourne Universities' Baillieu Library and the UTS Chau Building designed by Frank Gehry.