Distributed Energy:

An energy company perspective

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Agenda

- Who is Cogent Energy?
- What is DE (Distributed Energy) & Cogeneration
- EU verses Australia for market take-up
- What makes DE viable?
- DE solution & operation
- DE management and control
- DE technical considerations
- Summary
Who is Cogent Energy?

- Cogent is a distributed energy company - we build, own & operate cogeneration plants for large sites – commercial buildings, hospitals, shopping centres, government complexes and industry.

- Cogent provides cogeneration plants that integrate into site distribution systems – control, electrical, hot water, chilled water, steam and condenser water.

- Cogent rolling out about 200 MW over next 4-5 years - 1,000,000 tonnes carbon abatement.

- 5 plants in service. Contracts/LOIs for another 4.

- Cogent 100% owned subsidiary of Origin Energy, Australia’s largest gas integrated generator retailer.
What is DE and Cogeneration?

• DE (Distributed Energy) also called on-site generation, embedded generation, or decentralized energy, generates electricity from many small energy sources.

• Cogeneration (CHP) is associated with DE and is simultaneous production and use of electricity and heat energy to provide high energy efficiencies (> 80%).

• Trigeneration (CCHP) involves an absorption chiller (electricity, heating & cooling from a single plant).
2006 penetration of DE/cogeneration in EU at about 14%:
- 6% commercial – includes “district heating”
- 8% industrial
DE/cogeneration target for 2010 set at 20%
DE/Cogeneration in Australia

• 2006 penetration of DE/cogeneration in Australia - 4%.
  • 4.0 % - Industrial
  • 0.1% - Commercial

• Industrial DE/cogeneration in Australia has primarily been developed in the sugar industry – 80%.

• Commercial DE/cogeneration restricted to a few commercial buildings and hospitals in Melbourne and Sydney – but this is starting to change!
DE viability relies on cost containment and achieving economy of scale to ensure:

• Low plant cost – buying volume of common “plant modules”.
• Low gas cost – buying gasin volume that ensures the lowest cost.
• Low maint & ops cost – central maint & ops for multiple sites.
DE/Cogeneration Advantages

- **Competitively priced energy** – can be competitive to grid.
- **Energy efficiency** – up to 80% energy efficient.
- **Carbon abatement** – up to 60% reduction in carbon emissions - improves Green Star & NABERs energy ratings by up to 2 stars.
- **Emergency back-up** – can be configured to displace back-up diesels.
- **Energy security** – many distributed sites provide security of energy supply.
DE/Cogeneration Solution Overview

- **gas engine & generator** – for electricity and heat recovery
- **switch gear** – to distribute energy to site load & switch to grid for off peak
- **metering equipment** – to record and bill energy usage
- **control equipment** – monitoring, plant operations & maintenance.
- **absorption chiller** – convert thermal energy into chilled water
Access & Spatial Requirements

- Ideally located in plant room near HVAC plant and main switch boards.
  - Containerised rooftop / external solution also available.
- Plant room will require ventilation, noise attenuation & exhaust extraction
- Ceiling height of 4.5m usually required

Plant Room Solution

External / Rooftop Solution
Peak/Shoulder Operation Profile
Remote Management

- Remote monitoring
- Metering & billing
- Operations
- Maintenance
Technical Considerations

• Control Considerations
  • Integrated control
  • Parallel import/export operation
  • Load shedding/build-up for island mode operation
  • Plant room auxiliaries

• Grid Considerations
  • grid protection
  • grid synchronization
  • grid fault current – biggest issue today!

• Emergency Back-up Considerations
  • Gas engines don’t have same load capability as diesel engines
  • Main switch boards & BMS will need to be set-up for load build-up & shedding
Summary

- Cogent is DE company that provides electricity, hot & chilled water to a BOO (Build, Own & Operate) scheme.
- Australia has very low penetration of DE compared to EU even though conditions seem promising.
- Advantages of DE include energy efficiency, cost of energy and up to 60% reduction in carbon emissions.
- Successful DE relies on economy of scale in terms of plant purchase, gas purchase and cost of operations & maintenance.
- Opportunity for DE changing in Australia due to CPRS/ETS and concerns about climate change.