

BIOMASS AT THE DUNEDIN ENERGY CENTRE

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Commerical Biomass Boiler Symposium

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THE DUNEDIN ENERGY CENTRE

- Located in the heart of Dunedin CBD
- Largest district energy scheme in New Zealand
- 6 major customers
- 4 coal fired boilers totalling 28 MW capacity
- Supplies over 120,000 t/y steam, winter weighted profile



A BRIEF HISTORY OF DEVELOPMENT



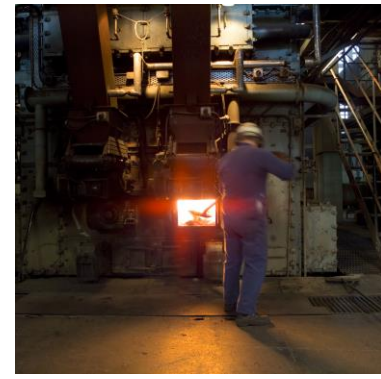
- 1960s – commissioned as part of Dunedin Hospital complex
- 2002 – purchased the DEC business from SDHB.
- 2003 / 2004 – completed major upgrades incl. new bag house and control systems
- 2008 – trials for the co-firing of various woody biomass fuels.
- 2010 – plant upgrade for operation on lignite
- 2010 – trials for the sole use of wood chip fuels
- 2011 / 2012 – conversion to dual coal and wood chip fuel
- 2012 – extended DEC ownership to 2027

Strategic drivers: institutional knowledge, reference site, customer value proposition, supply chain support and future proofing



BOILER SYSTEM

- 2 off 7 MW Daniel Adamson, 2 of 7.5 MW John Thompson boilers
- Conventional water tube configuration
- Louver type dumping grate – manual de-ashing
- Spreader stoker type volumetric feeders
- Above boiler storage hoppers – 2 per boiler
- Single fuel handling system – grizzly, reception hopper, vibrating transfer, bucket elevator, overhead screw
- Baghouse emissions control
- Fly ash and grate ash systems



WOOD FUEL TRIALS

- Co-firing of biomass and coal – EECA funded.
- Dry, seasoned and green wood chips, green sawdust and pellets
- Dry and seasoned fuel successful
- Blending, storage and feeder capacity main issues
- Following lignite upgrade, sought to re-validate co-firing and investigate seasoned wood chip only
- Season wood chip only a success – excellent combustion, reduced ash, reduced emissions
- Minor mods to feeders, feed rates, boiler tuning and combustion air
- Committed to wood chip over summer



BOILER CONVERSION

- Few teething problems – feeder jams, cross-contamination, capacity still an issue
- Existing feeders limited wood fuel use to 50,000 GJ/y, half of annual target.
- Jams an operator nuisance, potential security of supply issue
- Proposal to install pneumatic feeders (air swept spouts)
- Total project cost of \$160k incl. new feeders, mods to existing feeders and chutes, software changes and tuning
- Huge success – boiler performance exceeding expectations (and coal), no reliability issues, operator preference, reduced emissions
- Only remaining issues are fuel handling capacity and fuel cost



KEY MESSAGES

Converting coal boilers to wood fuel can be done successfully:

- It's not particularly difficult or costly
- Trials build operational knowledge and confidence
- Fuel type and quality is important
- As are aspects of the boiler system – boiler and feed system type, storage and redundancy all help.
- Wood fuel volumes are a major consideration
- Performance can exceed expectations – output, efficiency, operability and emissions
- Enhanced value proposition

