

What if the Dunedin Energy Centre converted to wood fuel?

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Dunedin Energy Centre (DEC)

- Internationally district heating is regarded as a sustainable, low-cost method of supplying heat¹
- NZ's largest district heating plant (30 MW capacity)
- Supplies ~60 GWh/year of heat to:
 - University of Otago
 - Dunedin Hospital
 - Cadbury
- Burns 13 thousand tonnes of coal per year
- From 2010 to 2016 carried out trials to burn wood fuel instead of coal
 - No technical constraints!
 - Similar results found internationally²

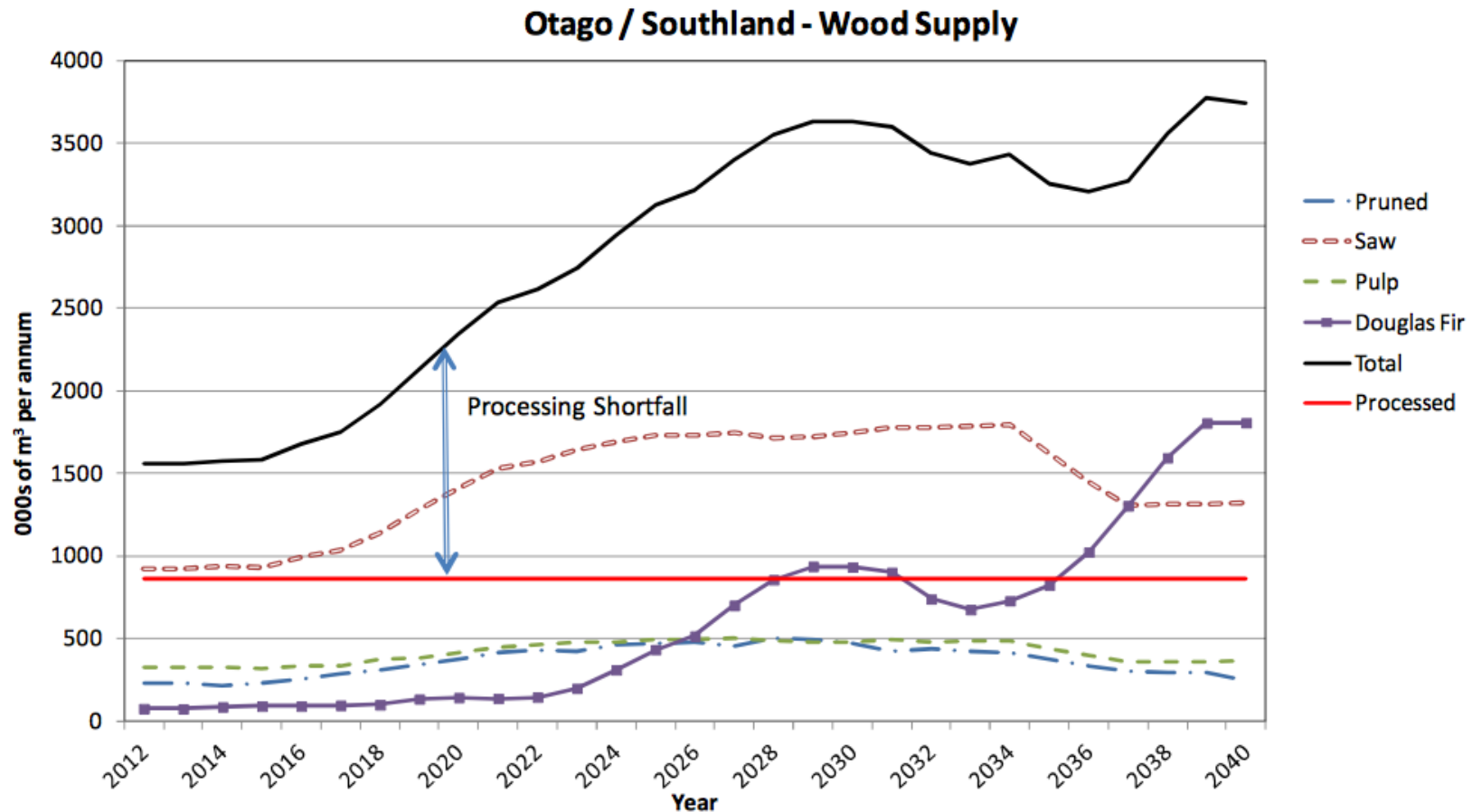
¹http://www.ieabcc.nl/publications/IEA_Task32_DHS_Cost_Analysis.pdf;
http://www.ieabcc.nl/publications/IEA_Task32_DHS_Status_Report.pdf
²http://www.ieabcc.nl/publications/IEA_Bioenergy_T32_cofiring_2016.pdf



What if the DEC converted to wood fuel?

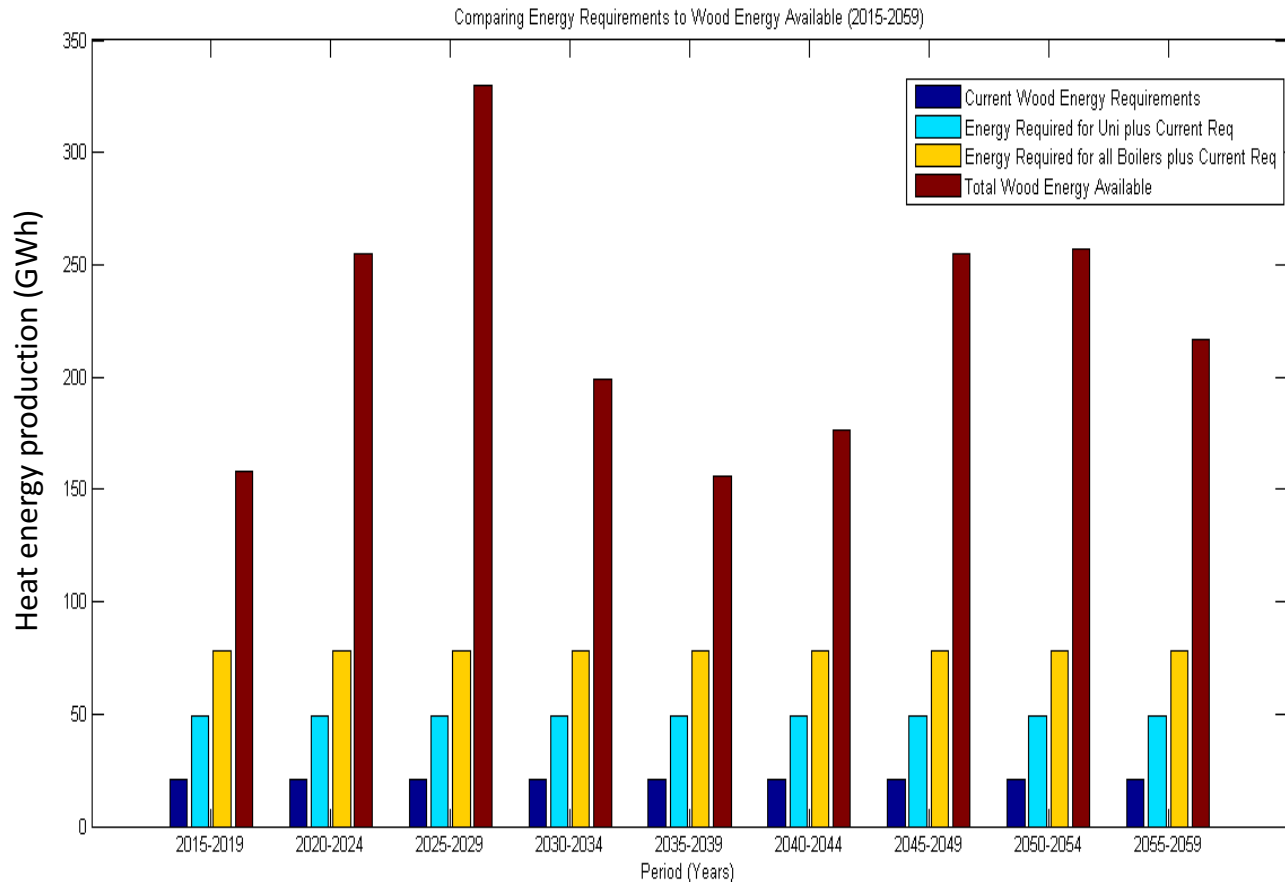
- Are there sufficient supplies of wood?
- What would the Greenhouse emission reductions be?
- What would the impact on the local environment be?
- What are the economic consequences for Dunedin?
 - Jobs?
 - Marketing?

Wood fuel availability



Growing harvest volumes → plentiful supplies of residues long term

Wood fuel availability



Based on historic plantings, more than enough sustainably-managed plantation wood waste available for fuel in the Dunedin area (estimates include only cost-effective landing site recovery)

Greenhouse gas emissions

- The DHC currently burns 13 thousand tonnes of coal per year
- Combusting this coal releases 27 thousand tonnes of CO₂ per year¹ – 1/2 of the CO₂ emissions from coal in Dunedin²
- In contrast, wood fuel has zero CO₂ emissions (as long as trees are replanted). All CO₂ is reabsorbed by growing trees.
- There are also small amounts life-cycle emissions associated with both coal and wood (e.g. from extraction, harvesting and transport).

¹[Emission factor of 2.08 tCO₂-e/t coal](#), MfE

²EECA End Use Database

Local environmental impact

- Wood produces less particulate emissions (P10).
- In practice, particulate emissions are relatively easily controlled for large modern coal and wood heat plants (less easy for small boilers and domestic fires)
- Other harmful air emissions are significantly higher for coal than wood
 - NO₂ (30% greater)
 - SO₂ (5x greater) – difficult to control in coal heat plant
 - heavy metals
- Ash: Coal produces x10 the ash of wood and it is not compostable

http://www.ieabcc.nl/publications/Nussbaumer_et_al_IEA_Report_PM10_Jan_2008.pdf

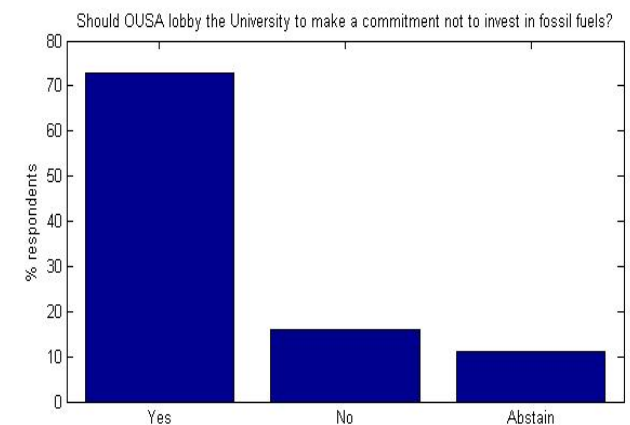
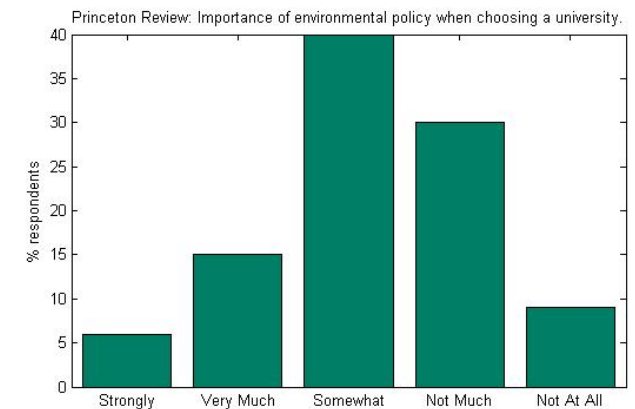
http://file.dnr.wa.gov/publications/em_forest_biomass_and_air_emissions_factsheet_8.pdf

Economic impact

- International studies found that wood fuel requires 4 FTE for every FTE for coal¹. E.g. conversion of DEC could possibly result in ~17 additional jobs¹.
- Benefit to local economy - no coal mines in Dunedin but *local* plantation forests.
- Marketing Dunedin's Clean Green Image
 - Environmental status of NZ worth > \$900 M in tourism
 - In US >60% of students take sustainability into account when choosing a University² – NZ likely to follow suit
 - Closer to home a Otago University Association survey found >70% of students want the University to reduce investment in fossil fuels

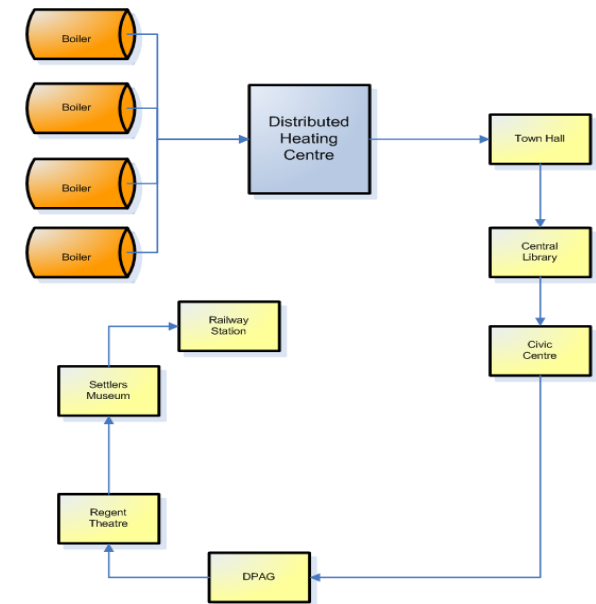
¹<http://www.sciencedirect.com/science/article/pii/S0961953497100058>

²Princeton Review 2016 College Hopes & Worries Survey Report



Looking to the future

- **Dunedin Energy Centre:** 50 year old boilers – Opportunity for new modern wood boilers (10 year time frame)
- **Otago University** - seeking to move towards carbon neutral campus – Largest opportunity to reduce emissions is from DEC moving to wood fuel
 - no technical barriers to this happening today!
- **Hospital rebuild** – Opportunity to continue with low-cost, sustainable heat source (if DEC moves to wood fuel)
- **Possibility of expanding heat pipe network** to other parts of Dunedin (e.g. central city)– most cost-effective, sustainable heating solution for large users



Conceptual plan of central city district heating scheme.
Courtesy of Neville Auton

What if the DEC converted to wood fuel?

- Are there sufficient supplies of wood? **Plentiful supplies of wood fuel driven by long-term increases in harvest volumes**
- What would the Greenhouse emission reductions be? **27 thousand tonnes per year - ½ Dunedin's total emissions from coal (in one easy hit!)**
- What would the impact on the local environment be? **Less particulates, less NO_x, SO_x and heavy metals. Large-scale heat plants minimize air emissions.**
- What are the economic consequences for Dunedin?
 - Jobs? **Increase in local jobs and benefits to local economy**
 - Marketing? **Significant marketing benefits**

