





C & D WASTE

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Treated Timber Waste Minimisation Project

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Why undertake this project?

- Difficult waste stream to address
- Consider environmental impacts – burying, burning, stockpiling
- Earthquake-related C&D waste
 - Demolitions
 - Rebuild
- Waste as a resource

Primary Project Objectives

- Identify and create a business case, supply chain and financial model, and end use for the collection, reuse, recycling and recovery of up to 20% (5,000 tonnes) of waste treated timber in Canterbury in such a way that it presents compelling economic and/or brand benefits to all participants in the supply chain
- Increase collaboration between timber waste minimisation stakeholders

Project Methodology

- Assessing real-world feasibility of solutions:
 - Economics
 - Risks
 - Barriers
- Move away from science-led solutions
- Generate momentum within the sector

Project Milestones

1. Industry Overview
2. International Industry Trends
3. Part 1 – Potential Scenarios
Part 2 – Timber Identification Tool Development
4. Detailed Business Cases and Stakeholder Collaboration
5. Pilot Trials (due 20 December, 2013)

Milestone 1 - Waste Treated

Timber sources

| Waste Source | Approx. Expected Tonnage (per annum) | Approx. Expected Tonnage (15 year total) |
|---|---|---|
| Earthquake-related demolition | 1,600 * | 24,000 |
| Earthquake-related residential construction | 1,600 | 24,000 |
| Earthquake-related commercial construction | 150 | 2,250 |
| Non-earthquake-related activity | 13,500 | 202,500 |
| Totals | 16,850 | 252,750 |

* Assuming the stockpile is used evenly over the fifteen year period

Milestones 1 & 2 Findings

- Considered various processing technologies and end uses in New Zealand and internationally
- Concluded that pyrolysis, torrefaction, cement kiln fuel, hydrothermal processing and wet oxidation were most feasible
- No additional solutions found internationally
- Disconnect between academic research and commercial application

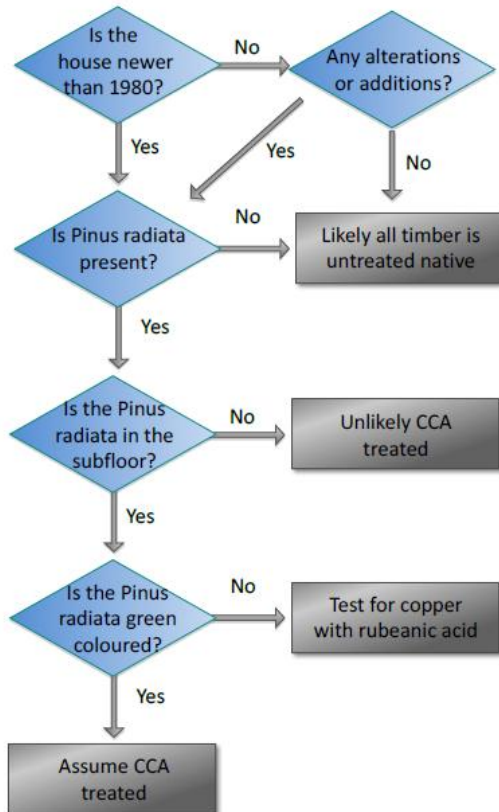
Milestone 3 – Potential Scenarios

- Solvent Rescue Limited (using hydrothermal processing to create lignin and biofuels)
- Scion Research (using TERAX wet oxidation to create methane gas)
- Waste Transformationz Limited (using slow pyrolysis to create carbon-based products)
- AES Bioenergy Limited (using fast pyrolysis to create biofuels)
- Holcim Cement Limited (cement kiln fuel and/or using torrefaction to create cement kiln fuel)

Milestone 3 – Potential Scenarios

- Key focus on feasibility of saleable outputs
- What are the quality requirements, especially around fuels?
- How will the market react to competition?
- Will there be sensitivity around the origin of the outputs?
- How 'pure' do outputs need to be?
- How engaged is the operator with end-use markets?
- How volatile and sustainable are the markets?

Milestone 3 – Timber Identification Tool



| <i>Preservative</i> | <i>Code Number</i> |
|--|--------------------|
| Copper Chrome Arsenate (CCA) - Oxide | 01 |
| Copper Chrome Arsenate (CCA) - Salt | 02 |
| Boron | 11 |
| Bis-(tri-n-butyltin) oxide (TBTO) | 56 |
| Copper Azole (CuAz) | 58 |
| Bis-(tri-n-butyltin naphthenate (TBTN) | 62 |
| Iodo propynyl butyl carbamate (IPBC) | 63 |
| Copper Naphthenate (CuN) | 57 |
| Propiconazole + Tebuconazole | 64 |
| Permethrin | 70 |
| Alkaline Copper Quaternary (ACQ) | 90 |

- Sorting not feasible based on time and labour cost
- Automated sorting not proven at scale

Milestone 4 – Detailed Business Cases

| Description | SR* | SCION* | WTL* | AES* |
|---|--------------------|-------------------|-------------------|-------------------|
| Summary and profitability | | | | |
| Annual volume of wood processed (tonnes) | 29,600 | 50,000 | 45,000 | 31,500 |
| Revenue per tonne of wood processed | 599 | 212 | 357 | 180 |
| Expenditure per tonne of wood processed | 334 | 147 | 220 | 101 |
| Profit per tonne of wood processed | 265 | 65 | 138 | 79 |
| Total annual revenue | 17,730,400 | 10,589,989 | 16,079,625 | 5,670,000 |
| Total annual expenditure | 9,888,600 | 7,362,494 | 9,884,000 | 3,184,050 |
| Annual profit | 7,841,800 | 3,227,496 | 6,195,625 | 2,485,950 |
| Total profit over lifespan of solution | 196,045,000 | 64,459,916 | 61,956,250 | 37,289,250 |
| Annual return on subsidised capital investment | 11% | 46% | 248% | 30% |
| Total return on subsidised capital investment (lifetime) | 179% | 822% | 2378% | 352% |

Milestone 4 – Detailed Business Cases

| Risk | SR | SCION | WTL | AES |
|-------------------------------|----------------------|-----------------------|----------------------|-----------------------|
| Overall business model | HIGH RISK | MODERATE TO HIGH RISK | LOW TO MODERATE RISK | MODERATE RISK |
| Financial viability | HIGH RISK | MODERATE TO HIGH RISK | LOW TO MODERATE RISK | MODERATE TO HIGH RISK |
| Primary output sales revenue | HIGH RISK | HIGH RISK | LOW TO MODERATE RISK | LOW TO MODERATE RISK |
| Supply chain | MODERATE RISK | MODERATE TO HIGH RISK | LOW TO MODERATE RISK | LOW TO MODERATE RISK |
| Deployment plan | HIGH RISK | HIGH RISK | LOW RISK | MODERATE RISK |
| Time till commence operation | 3 years | 4 years | 0.5 years | 1.5 years |
| Time till fullscale operation | 4.5 years | 4 years | 1.5 years | 3.5 years |
| Testing plan | LOW TO MODERATE RISK | MODERATE RISK | MODERATE RISK | MODERATE TO HIGH RISK |

Current Status and Conclusions

- All solutions are dependent on testing of CCA and other treatments/contaminants
- The project has generated strong private sector action and investment
- Real disparity in terms of deployment timeframes
- Technology-led vs. Market-led solutions

Next Steps

- Complete Milestone 5 - report on process testing and complete feasibility analysis
- Continue working with solution providers
- Continue fostering collaboration and assisting in connecting market operators

Acknowledgements

- Waste Minimisation Fund
- Canterbury Waste Joint Committee
- BRANZ
- Scion
- Ministry for the Environment

Project reports can be found at:

<http://ecan.govt.nz/advice/your-land/waste/projects/Pages/treated-timber.aspx>