Log Joule Heating Project
June 2019

Overview

Joule heating of *Pinus radiata* logs has been investigated as an alternative phytosanitary export treatment to chemical fumigation. It has been shown to be effective, with the team's findings now in the peer-reviewed literature. It is also being considered for fast veneer log conditioning. Publications include:

- Efficacy on insects (Journal of Pest Science)
- Electrothermal properties of timber (Wood Science & Technology)
- System control methods (Advanced Materials Letters)
- Laboratory-validated computational process modelling (Applied Thermal Engineering)

The project is now moving to the next stages with the objective of building a relocatable pilot production machine for industrial-scale trials in both applications.

Pilot production machine concept

Key features:

- Relocatable, mobile plant (containerised)
- Continuous operation
- Autonomous operation
- Adjustable log length
- Runs from 500 kVA, 400V, 3 phase supply

Electrical capacity of various scales of plant

From pilot stage to nationwide maximum phytosanitary requirements:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Electrode Pairs</th>
<th>Power</th>
<th>Throughput</th>
<th>Annual Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot</td>
<td>1</td>
<td>330kW</td>
<td>8-10 m³/hour</td>
<td>2MWh</td>
</tr>
<tr>
<td>Large Wharf</td>
<td>36</td>
<td>12MW</td>
<td>2M m³/year</td>
<td>76GWh</td>
</tr>
<tr>
<td>Nationwide</td>
<td>360</td>
<td>120MW</td>
<td>20M m³/year</td>
<td>760GWh</td>
</tr>
</tbody>
</table>

- Each electrode pair draws sinusoidal current at unity power factor
- Multiple electrode pairs are interleaved to give almost ideal load levelling

Contract for next phase

The EPECentre has signed a contract (starting 1st July 2019) with Stakeholders in Methyl Bromide Reduction (STIMBR) to derisk the building of a relocatable pilot production machine (concept shown below).