EECA TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

[redacted]

15 December 2023

Dear [redacted]

Re: Official Information Act Request: Questions regarding NZ Steel Partnership

Thank you for your email of Monday 6 November 2023 in which you requested information under the Official Information Act 1982. You requested:

> *I am interested in seeing the application from NZ Steel for their recent GIDI funding approval. Most importantly I am interested in the Business Case that justified this investment and why NZ Steel required co-investment for this project?*
>
> *Particularly if there was a feasibility model (discounted cashflow model) employed I would like to see that.*

Following a phone conversation between yourself and Nicki Sutherland, Group Manager, Business on Thursday 9 November, EECA offered to send you contact information of GIDI recipients who would consent to participating in your research. With the recipients' permission, we sent you this information on Wednesday 11 November.

Following the phone conversation on Thursday 9 November, EECA reached out to ask if you would like to continue with the original request for information. On Sunday 19 November, you confirmed an amended request as follows:

> *Applications and/or business cases for the following projects:*
>
> 1. *NZ Steel GIDI Partnership for an electric arc furnace. Co-funding of up to $140,000,000.00.*
> 2. *Fonterra GIDI Partnership to cut coal use in six diary factories. Co-funding of up to $90,000,000.00*
> 3. *J S Ewers (Richmond, Nelson) project for Glasshouse heat demand reduction and low carbon fuel switching. Co-funding of $4,078,000.00*
> 4. *WoolWorks NZ Ltd (Timaru, Canterbury) project for Electrode boiler, high temperature heat pump, and demand reduction. Co-funding of $3,650,000.00 and*
> 5. *WoolWorks NZ Ltd (Napier, Hawkes Bay) project for high temperature heat pump and process heat optimisation. Co-funding of $455,00.00*

Please refer to Appendix One for EECA's response. Some information is being withheld pursuant to the following sections of the Act:

- 9(2)(a) - to protect the privacy of natural persons, including that of deceased natural persons.
- 9(2)(b)(i) – to protect information where making available of the information would disclose a trade secret.
- 9(2)(b)(ii) - to protect information where making available of the information would be likely unreasonably to prejudice the commercial position of the person who supplied or is subject to the information.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Please note that it is our policy to proactively release our responses to official information requests where possible. Our response to your request will be published shortly at https://www.eeca.govt.nz/about/news-and-corporate/official-information/ with your personal information removed.

Yours sincerely

Dr Marcos Pelenur
EECA Chief Executive

Appendix One

The tables below outline the documents identified as being in scope of your request.

We have consulted with the organisations concerned and are satisfied that much of the information in scope of your request is sensitive and its release has potential to cause undue harm, including possible financial losses.

Specific grounds for withholding information and explanatory notes are provided below.

1. NZ Steel GIDI Partnership for an electric arc furnace. Co-funding of up to $140,000,000.00.

Document Title	Decision
DOCUMENT One: NZ Steel GIDI Fund Application – Commercial Due Diligence Report 17 May 2023	Withheld in full under sections: - 9(2)(b)(ii)
DOCUMENT Two: NZ Steel – Electric Arc Furnace (EAF) – Business Case DRAFT 14102022	Withheld in full under sections: - 9(2)(b)(ii)
DOCUMENT Three: NZ Steel Wellbeing Assessment – Final	Publicly available here
Explanatory notes: The intention of the GIDI Partnerships programme is to negotiate bespoke arrangements with New Zealand's largest emitting businesses to support a tailored and flexible programme for decarbonisation. Projects under the GIDI Partnerships programme were developed on a case-by-case basis. Document 1 above, was produced by KPMG for EECA to support consideration of the proposed project. Documents 2 and 3 were provided to EECA directly by NZ Steel.	

2. Fonterra GIDI Partnership to cut coal use in six diary factories. Co-funding of up to $90,000,000.00

Document Title	Decision
DOCUMENT Four: Cabinet Paper - Engagement with very large emitters:	Publicly available here

investment package for second significant decarbonisation proposal and report back on New Zealand Steel	
Explanatory notes: The partnership with Fonterra was negotiated directly between the two parties and its elements are summarised in the relevant Cabinet Paper, linked in the table above. This deal was distinct in the sense that it represented a fixed-price pre-purchase of a specific volume of carbon abatement - across a portfolio of projects to be scoped and delivered over a number of years, rather than the delivery of any one specific project. The Cabinet paper outlines the very low abatement cost to the Crown and the claw back provisions put in place to protect the investment.	

3. J S Ewers (Richmond, Nelson) project for Glasshouse heat demand reduction and low carbon fuel switching. Co-funding of $4,078,000.00

Document Title	Decision
DOCUMENT Five: JS Ewers Limited GIDI Application	Release in part: - 9(2)(a) - 9(2)(b)(ii)
DOCUMENT Six: JSEL ETA report draft 04Dec20	Release in part: - 9(2)(b)(ii)
DOCUMENT Seven: JSEL Heating Assessment 07Mar2017	Release in part: - 9(2)(b)(ii)
Explanatory notes: This project was funded through 'GIDI 1.0' which was originally funded as a COVID-19 response initiative. Therefore, the application was assessed against a set of criteria in the GIDI 1.0 RFP, that was focused on economic stimulus, which is different to those in the GIDI 2.0 RFP, that was focused on decarbonisation.	

4. WoolWorks NZ Ltd (Timaru, Canterbury) project for Electrode boiler, high temperature heat pump, and demand reduction. Co-funding of $3,650,000.00

Document Title	Decision

DOCUMENT Eight: NZWSL-GIDI-Fund-Round1-RFP-Response-Form-December-2020	Withheld in full under sections: - 9(2)(b)(i) - 9(2)(b)(ii)
DOCUMENT Nine: NZWSL-Timaru-Site-Decarbonisation-Business-Case-October-2020	Withheld in full under sections: - 9(2)(b)(i) - 9(2)(b)(ii)
Explanatory notes: This project was funded through 'GIDI 1.0' which was originally funded as a COVID-19 response initiative. Therefore, the application was assessed against a set of criteria in the GIDI 1.0 RFP, that was focused on economic stimulus, which is different to those in the GIDI 2.0 RFP, that was focused on decarbonisation. After consulting with the affected party, it was determined that releasing the above documents in part was not a practical option due to the level of commercial sensitivity (including IP and trade secrets) within the application and business case. In addition, the business case was collected under a non-disclosure agreement with a third party, who were contracted to prepare the document for the sole purpose of WoolWorks' GIDI application.	

5. WoolWorks NZ Ltd (Napier, Hawkes Bay) project for high temperature heat pump and process heat optimisation. Co-funding of $455,00.00

Document Title	Decision
DOCUMENT 10: 03-018_RFPProposalWithAttachments	Withheld in full under sections: - 9(2)(b)(i) - 9(2)(b)(ii)
DOCUMENT 11: WoolWorks Heat Pump (Decarbonisation) Project Business Case - 141021 Final	Withheld in full under sections: - 9(2)(b)(i) - 9(2)(b)(ii)
Explanatory notes: This project was funded through 'GIDI 1.0' which was originally funded as a COVID-19 response initiative. Therefore, the application was assessed against a set of criteria in the GIDI 1.0 RFP, that was focused on economic stimulus, which is different to those in the GIDI 2.0 RFP, that was focused on decarbonisation. After consulting with the affected party, it was determined that releasing the above documents in part was not a practical option due to the level of commercial sensitivity (including IP and trade secrets)	

within the application and business case. In addition, the business case was collected under a non-disclosure agreement with a third party, who were contracted to prepare the document for the sole purpose of WoolWorks' GIDI application.

TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Government Investment in Decarbonising Industry Fund

Request for Proposals – Round 1

Response Form

November 2020

RFP released: Wednesday 11 November 2020

Deadline for Questions: 4pm, Thursday 26 November 2020

Deadline for Proposals: 12pm, Monday 14 December 2020

Completing the Response Form

If you have any questions about completing this form, please contact the EECA point of contact:

Dinesh Chand

GIDI Fund Manager

Email: GIDIFund@eeca.govt.nz

Proposal Checklist

Before you apply, be sure to complete the following:

☐ Read the RFP and any supporting information to ensure you have understood the funding process and criteria against which Proposals will be assessed.

☐ Check EECA Website for any updates relating to this RFP.

When filling out this form, please ensure:

☐ All answers are typed into the space provided for each section in Sitka, Calibri or Arial font no smaller than size 10.

☐ You meet the requirements of each question. These are outlined underneath each question within [ ] brackets. This includes any guidance on word limits that are specified. Word limits do not reflect any specific weightings or importance.

☐ All stated amounts are in New Zealand Dollars and excluding GST.

☐ You have read and understood the declaration details outlined in Section 6 and have signed the declaration.

☐ You have completed the form in full.

☐ You have completed the Project Assessment Template.

Once you have completed this form:

☐ Email a copy of the completed form to EECA's point of contact **GIDIFund@eeca.govt.nz** and ensure that you attach any supporting information you wish to provide.

☐ Do not include a zipped (.zip) or an executable (.exe) file with your Proposal.

☐ **If you do not receive EECA's emailed confirmation of receipt of your Proposal within 2 working days please contact EECA's point of contact.**

Please note: EECA will not accept Response Forms received by post, fax or hand delivery.

Deadlines

Completed Proposals must be received by email to **GIDIFund@eeca.govt.nz** no later than **12pm on Monday 14 December 2020.**

9(2)(a)

The Proposal Validity Period is six months from this date.

Section 1: Proposal and Applicant

Key Details

1.1 Proposal key details	
Title [A short title for your project, of no more than 10 words]	Glasshouse Heat Demand Reduction and Low Carbon Fuel Switching
Brief summary of your project [Maximum of 40 words. Note this may be used in media releases or other communications]	Reduce heat demand by retrofitting thermal screens in glasshouses growing protected crops. Also concurrently reduce CO_2 emissions by fuel switching to a low carbon alternative on all sites and replacing eight current coal boilers with an advanced biomass plant.
Location of the project [Outline the location of the project and any regions within New Zealand that will benefit from the investment in this project]	Nelson – specifically across three sites: 37 Blackbyre Road, Appleby, Richmond 19 Pugh Rod, Appleby, Richmond 95 Main Road Hope, Hope, Richmond
Existing carbon emissions [what is the total energy related carbon emissions by fuel type of the Applicant entity cumulated for all operating sites]	9(2)(b)(ii) onnes of CO_2
Estimated total capital cost of project [Do not include in-kind contributions, existing expenses such as current staff, or costs already incurred]	9(2)(b)(ii)
Incremental project capital cost [This is the difference between your business-as-usual scenario and the cost of this decarbonisation project. Refer to section 1.6 of the RFP]	9(2)(b)(ii)
Total amount of capital co-funding to be provided by you, any co-applicants and others [Cannot include in-kind contributions, existing expenses such as current staff, or costs already incurred]	9(2)(b)(ii)
Amount of capital funding sought	$5,000,000

9(2)(a)

[This should only be the amount required to enable the project to go ahead or be accelerated]	
Anticipated start date [Based on receiving approval for funding in this round. Note any factors such as plant/seasonal shutdown periods that influence when the project can start/occur]	March 2021
Anticipated completion date [When the plant will be fully commissioned and operational]	Thermal Screens May 2021 Pugh/ Main Rd Fuel Switching Oct 2021 Biomass fuel conversion May 2022

1.2 Lead Applicant key details	
Legal name	J S Ewers Limited
Trading as (if different)	
Type of organisation	Limited liability company ~~/ Incorporated society / Trust / Other (please specify)~~
NZ Business Number (NZBN)	9429039357755
Street address [Include postcode]	37 Blackbyre Road, Appleby, Richmond 7081
Website address (if applicable)	www.Jsewers.co.nz

Contact person details [This will be the *only* person who receives all the correspondence relating to the Proposal]	
Name [First and Last name]	Pierre Gargiulo
Job title or role	General Manager
Contact phone number	021 457990
Contact email address	Pierre.gargiulo@jsewers.co.nz

9(2)(a)

1.3 Co-Applicant key details (if applicable)	
Legal Name	
Trading as (if different)	
Type of organisation	Limited liability company / Incorporated society Trust / Other (please specify)
NZ Business Number (NZBN)	
Website address (if applicable)	
Relationship to Lead Applicant (e.g. co-funder, facility owner, process heat purchaser, technology supplier)	

Please duplicate table if you have additional co-applicants.

1.4 Primary suppliers key details	
Project Consultant/Designer	Fuel Switching/ Heat Plant: Enriva Pty Limited Sohum Ghandi Thermal Screens: Apex Greenhouses (NZ) Limited Peter Holwerda
Supplier name, location, and contact details	**Enriva Pty Ltd** PO Box 1759 Neutral Bay Sydney Australia **Apex Greenhouses (NZ) Ltd** 6 Hosking Place Waiuku Auckland

9(2)(a)

Project Implementation [project implementation manager]	Pierre Gargiulo
Supplier name, location, contact details	Fuel Switching/ Heat Plant: Enriva Pty Limited Sohum Ghandi Thermal Screens: Apex Greenhouses (NZ) Limited Peter Holwerda
Primary Technology 1 [For example boiler, heat pump]	Biomass Boilers, Buffer Tank
Supplier name, location, contact details	**Biomass Boiler – Polytechnik Biomass Energy Ltd** 81 St Andrews Road, Havelock North 4130 021 477202 **Buffer Tank – FH Crone** Grote Esch 400 (industrieterrein Gouwe Park) 2841 MJ, Moordrecht, Nederland +31(0)182-614 482
Primary Technology 2 [For example building, pumps, motors, fuel handling]	Thermal Screens
Supplier name, location, contact details	Apex Greenhouses (NZ) Ltd – Auckland Ludvig Svensson (screen manufacturer Holland)
Proposed renewable fuel	Biomass Fuel and Wood Pallets
Proposed supplier name, location, contact details	Azwood Energy Jonathan McKeown 03 547 4836

Please duplicate rows if you wish to add additional technologies and suppliers.

9(2)(a)

Section 2: Proposal Description

In order for the Panel to assess your Proposal, it needs to understand what it is you are trying to do and achieve. Use this section to describe your project and what you are seeking funding for.

2.1 Proposal summary

Provide a summary of the project

[Describe both the existing process and the decarbonisation proposal]

Currently all glassshouses are heated from energy derived from 13 coal-fired boilers, consuming 9(2)(b)(ii) tonnes of coal per annum. Due to the simple technology in these Morrow and Trivet boilers they are unable to utilize biomass fuel and so would require replacement and /or modification for us to fuel switch to full biomass or another low carbon alternative.

In conjunction with this, the project will replace coal fuel with lower carbon fuel being a mix of biomass and wood pallets depending on the site. To achieve this requires replacing eight standalone boilers at the Blackbyre Road site with an advanced Biomass energy plant comprising two high tech biomass boilers and a buffer tank system. The smaller sites that are leased would utilise wood pallets as an alternative fuel following some modifications to the existing plant at these two sites.

As part of our emission reduction pathway we have already completed the installation of approximately 60% of the glasshouse area at Blackbyre Road with retrofitted thermal screens which are providing approximately 7% reduction in emission compared to the remaining area. The project would see us complete the retrofitting of screens to the remaining areas that are owned by JS Ewers, thereby further reducing energy demand in the business.

Outline what specifically you would apply funding towards

Capital costs for:

- Acquisition and installation of thermal screens at Blackbyre Road glasshouses
- Acquisition and installation of biomass plant and buffer tank(s) and associated equipment at Blackbyre Road
- Modifications to smaller sites existing boilers to enable the switch to wood pellet fuel

2.2 Project Assessment Template

EECA needs to have confidence that a robust evaluation of project and operational costs support your proposal. To aide assessment of all projects EECA requires relevant information to be populated into the Project Assessment Template for the proposed project and the business-as-usual case.

This Project Assessment will allow EECA to compare all projects on a like for like basis and asses 9(2)(a) additionality and the incremental costs of your proposal.

[Your business-as-usual scenario may be the current operational case, or represent an existing project base case that would be implemented without support from the GIDI Fund]
Project Assessment Template Link: https://genless.govt.nz/assets/Business-Resources/GIDI-Fund-Round-1-RFP-Applicant-Project-Assessment-Template.xlsx

9(2)(a)

Section 3: Minimum Eligibility Conditions

Note: Any Proposals that do not meet all of the minimum eligibility conditions will not be assessed by the Assessment Panel. To see the eligibility conditions please refer to section 1.3 and 3.3 of the RFP document.

3.1 Eligible entity and project	
Is the lead organisation associated with this project an eligible entity? [i.e. Be a New Zealand-based and NZBN registered private sector business. State and Public Sector organisations, Local Authorities, and Council controlled organisations are not eligible to access the fund.]	☒ Yes ☐ No
Will the project be delivered in New Zealand? [Projects that would be delivered in another country are not eligible to receive funding]	☒ Yes ☐ No
Is the project going to reduce carbon emissions from industrial processes or process heat? [The project must reduce carbon emissions from fossil fuels through energy efficiency, technology change of fuel switching to a renewable fuel source]	☒ Yes ☐ No
Will the project be delivered before 30 June 2023? [Projects need to be implemented before 30 June 2023 to be eligible for funding]	☒ Yes ☐ No
Has a business case or feasibility study been completed that assesses relevant options and why the specific option described in the application has been selected?	☒ Yes ☐ No
Does your project utilise commercially available and proven technologies? [technologies such as those at the research and development phase that are not commercially available either in New Zealand or internationally are excluded]	☒ Yes ☐ No

3.2 Commitment to Decarbonisation	
Can the lead organisation demonstrate their commitment to a decarbonisation pathway and illustrate a plan to deliver on this pathway? [You will have completed or will be required to complete a carbon reduction pathway and implementation plan in order to be eligible for GIDI Fund	☒ Yes ☐ No

9(2)(a)

support e.g. EECA's Energy Transition Accelerator programme or a suitable equivalent. If you are not able to demonstrate a suitable pathway and plan it will be a contractual requirement in order to receive co-funding.]	

Carbon reduction pathway and implementation plan

Please describe your businesses carbon reduction pathway including key targets that relate to your stationary energy usage? Please append relevant supporting documentation outlining your carbon reduction pathway and plan for implementation.

JS Ewers has developed a strategy for energy emission reduction, which will deliver improves sustainability and cost savings through reducing carbon emissions in our glasshouse operations. Our strategic pathway is focussed on:

1. Reducing heat demand by retrofitting thermal screens in our glasshouses, which has now been completed in 60% of the Blackbyre Road property in September 2019.
2. Improving energy efficiency by linking all glasshouses to an integrated energy buffering, storage, and distribution system, which was completed in December 2019.
3. Reducing emissions by fuel switching to a low carbon alternative and installing on our owned sites an advanced biomass plant to replace the existing eight standalone boilers that currently operate independently, all with varying output capacity, energy efficiency, age and condition. To date we have reduced the number of operational boilers from eight to three as part of the ring main and buffer tank project above.

The Energy Transition Accelerator report JSEL commissioned in November 2020 details recommendations for undertaking these next steps on this pathway, being the completion of thermal screen installation (1) and the fuel switching (3). The recommendations confirm that the above pathway will achieve a 99% carbon emission reduction from current levels.

3.3 Funding Principles

The project application meets the requirements of the Funding principles as outlined in section 1.2 of the RFP Document? [Total project cost must be at least $500,000 Funding requests should normally not exceed $5M per project Cumulative Group Projects (including the applicant's Group of Companies) must not exceed 25% of the total Fund ($17.25m) – Applications for funding must be for project capital costs, not for internal staff or operating costs NOTE; For the purpose of the Fund, a Group is defined as individual entities consolidated at the controlling shareholder level, including foreign ownership.]	☒ Yes ☐ No

If your Application does not meet any one of these principles, please provide justification as to why the application should be considered at the funding levels requested?

Applications may be considered that do not meet these funding principles, at the discretion of the EECA Board or Minister.

9(2)(a)

[Please limit answer to a maximum of 200 words]

3.4 Additionality	
Can you demonstrate that the project would not proceed or would occur at a much later date without the support GIDI Fund co-funding? [The project must demonstrate its additionality in terms of both carbon reduction and investment.]	☒ Yes ☐ No
Please outline any relevant information that helps demonstrate the additionality of your proposed Project. [Describe the incremental/additional aspects of the project which would require Government support. This could include attributes of the project such as choosing a sustainable fuel, an alternative technology compared to an existing business-as-usual; or significant acceleration of the project as a result of this funding being available. [Ensure the financial aspects of your application explicitly describe the incremental part of the project]	
Delivering on JSEL's Energy Strategy involves a substantial total capital investment 9(2)(b)(ii) and as such we have looked strategically to undertake these workstreams on a staged basis to manage both risk and financial commitment. The completion of the first two workstreams focussed on reducing heat demand have seen very positive outcomes, which combined have seen us achieve an increased level of energy efficiency represented by savings in coal consumption. To undertake the remaining workstreams within the strategic plan will require further capital investment of 9(2)(b)(ii) While we are committed to undertaking this, the timeframe for delivering these is dependent on securing the further full capital investment required, and the ongoing increase in cost of existing fuel under ETS. With securing external funding support the ability to deliver on these final recommendations and enable the acceleration of the pathway.	

3.5 Applicant approvals and sources of co-investment	
Do you (and your co-applicants, if applicable) have the ability to co-invest your share of the total project capital cost?	☒ Yes ☐ No
Identify the source of your co-investment (including individual amounts if multiple sources) [If there is funding which is not yet fully committed to the project, state this, and identify what conditions must be met (e.g. board approval, bank loan approval) for funding to be fully committed]	

9(2)(a)

The funding would be provided by way of a company group lending and is subject to final board approval of the final capital commitment.

Should GIDI funding be approved will your internal approvals to undertake the Project be completed in order for EECA to execute a funding agreement? [Applicant internal approvals must be completed within 30 days of notification of GIDI co-funding approval or the offer of funding will be withdrawn]	☒ Yes ☐ No
Please outline the remaining steps and timeline necessary to achieve your internal approvals?	
The Board has been briefed on the Energy Strategy and the final workstreams still to be completed. Subject to notification of the approval of the required co-funding final Board approval of the internal capital contribution will occur within 30 days of notification.	

3.6 Other central government funding	
Have you received any other central government funding for the proposed project?	☐ Yes ☒ No
If yes, please identify the amount of other government funding, and the source	$
Other than this proposal have you applied for, or do you have an agreement for funding from central government for parts of, or all of, the proposed project?	☐ Yes ☒ No
If yes, please identify the amount of funding, the source and stage of application process	$

3.5 Health, safety, reputation	
Are you committed to working safely, and ensuring the health and safety of workers and others affected by the proposed project work, and do you have appropriate systems and processes to undertake the work safely?	☒ Yes ☐ No

9(2)(a)

If your proposal is successful, do you agree to provide EECA with more detail relating to your health and safety policies, plans and procedures if required?	☒ Yes ☐ No
Are you committed to working in a manner that will not damage EECA's reputation with respect to, inter alia, environmental impact, employment conditions, public announcements, regulatory compliance?	☒ Yes ☐ No

9(2)(a)

Section 4: Assessment Criteria

The following sections include details of the assessment criteria that will be used by the Assessment Panel when assessing Proposals.

Your Proposal will be scored against your answers to these criteria. Aim to give answers that are relevant, concise and comprehensive.

Criteria	Weighting
Value for money carbon abatement	35%
Economic stimulus driving domestic employment	20%
Ability to deliver	15%
Speed of spending	10%
Integrated and optimised approach	10%
Level of innovation and co-benefits	10%

If you have made any assumptions about the delivery of the project, clearly state these assumptions.

EECA's intention is to gain sufficient information from each Applicant to fully inform the assessment and decision-making process. Please attach any further information or supporting documentation that will support or verify any statements made in response to these questions.

Please observe the guidance on maximum word count for each question.

4.1 Value for money carbon abatement	
Proposed projects need to demonstrate significant carbon abatement benefits and represent good value for money for any Government investment committed in support of successful projects.	
Please describe how your proposed project will result in significant carbon emissions reduction from industrial processes and process heat, relative to the amount of government funding you have requested in support of the project. [Relative to the level co-funding sought EECA will assess the value of government investment in terms of $/t CO_2 reduced by this project]	
As detailed in the ETA report the Group Energy Transition Pathway embodying the demand reduction and fuel switching workstreams show a potential route to energy emissions reductions of 99% by 2023. As further detailed in our ETA installation of the remaining thermal screens, and fuel switching from coal to biomass and wood pellets would achieve emission reduction of 9(2)(b)(ii) tonnes/ year. For the requested investment from GIDI of $5.0m this equates to $7.50 per tonne over the life cycle.	
Annual energy savings/increase (by fuel type)	*Blackbyre Road Coal to Biomass reduction* 9(2)(b)(ii) *Blackbyre Road Thermal Screens Reduction* 9(2)(b)(ii) *Main/ Pugh Rd Coal to Wood Pellets reduction* 9(2)(b)(ii)

9(2)(a)

Annual and Lifetime CO_2 equivalent reduction	*Annual CO2 reduction* 9(2)(b)(ii) *Over 25 years this would equate to* 9(2)(b)(ii)
Project Life (years)	*Thermal screens – 10 years* *Biomass plant and buffer tank – 25 years*

4.2 Economic stimulus driving domestic employment

The GIDI Fund has been established under the COVID-19 Response and Recovery Fund. Projects need to deliver economic stimulus to the New Zealand economy and supporting local employment.

Please demonstrate how your proposed project contributes to stimulating New Zealand's domestic economy and supports local employment. I.e. what level of the total project cost is invested within New Zealand's economy with New Zealand manufacturers and service providers? What regions of New Zealand most benefit from this investment?

Of the 9(2)(b)(ii) capital investment a significant portion is transacted through New Zealand contractors and suppliers.

Thermal screens:

Apex Greenhouses (NZ) approx 9(2)(b)(ii)

JS Ewers additional internal labour approx. 9(2)(b)(ii)

Biomass Plant:

Subject to final selected tender of supplier but will include Polytechnik (NZ), Windsor (NZ) and any other suitably qualified plant manufacturer/ supplier. Approx. cost 9(2)(b)(ii)

Buffer tank:

Due to the specialized nature of this type of plant and the technology and experience required in installation we would engage FH Crohn who are based in Europe (approx. 9(2)(b)(ii) The concrete foundation and crane hire would be from local businesses (approx 9(2)(b)(ii)

Other:

Building structures, fuel bunkers and electrical infrastructure will be provided from NZ companies (approx. 9(2)(b)(ii)

Designer/ Project Owners Engineer:

AS we have partnered with Enriva on the delivery of workstreams to date, and as they have demonstrated experience in NZ with installation of biomass plants and the existing buffer tank on site, we would look to continue to engage them for design and project engineering. Enriva are Australian based and approx. cost 9(2)(b)(ii)

Boiler modification (Pugh and Main Rd sites) to switch to wood pellets – Walker Engineering (Nelson) 9(2)(b)(ii)

Biomass & Wood Pallet Fuel Supply: Likely to create additional employment for the ongoing supply of both biomass and wood pellet fuels from local area.

Total project cost:	9(2)(b)(ii)

9(2)(a)

Total cost invested in the New Zealand economy:	9(2)(b)(ii)

4.3 Ability to deliver

EECA needs to have confidence that Successful Applicants have the track record, skills and core capabilities to carry out the proposed activities.

Resources and relationships

Please demonstrate your expertise, resources, relationships and commitment to deliver the project to the cost and timeframes stated within this application.

JSEL have already delivered several significant projects as part of undertaking workstreams on our Energy strategic plan. In 2019 we completed the installation of retrofitted thermal screens into 6Ha of glasshouses at the Blackbyre Road site. This was a three-month project costing 9(2)(b)(ii) NZD and was completed on-time and on-budget. Our post-implementation review identified some areas for further efficiency in installation which we would take into the next stage of proposed screen installation. We expect to continue to utilize the same contractors (Apex) who were involved in the original project due to their expertise and experience now with our site.

Following this project, we also embarked in the installation of a hot water transport ring main, 2m litre buffer tank and associated buildings. This project took four months at a cost of 9(2)(b)(ii) NZD and was delivered within the anticipated timeframe following delays in Immigration approval of one key contractor. The project was also delivered under-budget largely due to the work of the Owners Engineer (Enriva) who we propose to use again in the Biomass Plant installation.

Further we have appropriate skill and capacity within the JSEL internal team, proven relationships and history with local contractors, a strong H&S Focus, and assistance and support from MG Group Sustainability Manager and potential EECA Energy graduate.

Key personnel

Please provide contact details, role descriptions and brief profiles for each of the key personnel involved in delivering your proposed project (including any personnel to be provided by sub-contracted parties).

This should include each person's role, their relevant qualifications and experience, the extent of their involvement and their experience in providing services that you consider relevant to the objectives of the proposed project.

[Please only include key personnel who will materially influence the delivery of the project. Limit responses to a maximum of 100 words per person and copy and paste this cell for each person]

Name: Pierre Gargiulo
Organisation: JSEL
Contact details: pierre@jsewers.co.nz

Role: General Manager
Qualifications or relevant experience: 10 years+ experience in the construction and project management industry, qualified builder, managed the installation of glasshouses, buildings, and boilers as well as the on-site project management of the previous energy projects, chair of H&S Committee

9(2)(a)

Name: Ursula O'Donohue
Organisation: JSEL
Contact details: ursula@jsewers.co.nz

Role: Finance Manager
Qualifications or relevant experience: B.Com, Chartered Accountant, 20 years' experience in management accounting, responsible for financial oversight and budget of large capex projects to date

Name: Sohum Gandhi
Organisation: Enriva Pty Ltd
Contact details: sohum@enriva.com.au

Role: Owners Engineer/ Procurement
Qualifications or relevant experience: B.Eng. Acted as Owners Engineer on the JSEL Hot water transport main and buffer tank installation project in 2019. Enriva is an Australian Energy, Engineering, and Consulting Company with decades of experience delivering industrial energy solutions. Enriva's international partnerships enable the implementation of world leading technology and practice right here in Australia and New Zealand. Refer to website for project experience http://enriva.com.au/projects/

Name: Peter Holwerda
Organisation: Apex Greenhouses NZ
Contact details: peter@apexgreenhouses.co.nz

Role: Sales Manager NZ
Qualifications or relevant experience: over 30 years' experience in the NZ greenhouse industry. Apex design, manufacture and build turnkey greenhouse projects and provide a full range of greenhouse equipment including screens, heating, irrigation and computer systems. They are the Ludvig Svensson (thermal screen manufacturers in Holland) agent in NZ.

Track record on comparable projects

Please describe your track record of delivering projects of a comparable scale and complexity.

Installation and commissioning of retrofitted Thermal Screens to 6 Ha of glass in 2019 9(2)(b)(ii)

Installation and commissioning of Hot Water Transport Main and Buffer Tank 2019 9(2)(b)(ii)

Project Plan and Timeline for delivery

Please summarise your project delivery plan and timelines, outlining key milestones, start and completion dates.

[Append a sufficiently detailed project plan to your proposal]

9(2)(a)

Refer to attachment Project Plan & Timeline for Delivery

Risks and barriers to success

Please describe potential project risks and barriers to success and outline how they will be addressed.

4. Capital Investment requirements and access to capital funding across the group – confirmed Board support subject to co-funding
5. Covid-19 impacts on lead time of materials and access to specialist contractors entering New Zealand – where possible local contractors will be engaged however where skill or experience requirements prevent this, we will allow sufficient lead time for project commencement
6. Secure supply of low carbon alternative fuel in the volume, spec and price point required – we have formal quotes for supply from two local fuel suppliers who can deliver the required fuel
7. Availability of local contractors due to forward work lead times – RFP will confirm availability and capacity to undertake the projects and the preferred use of contractors engaged previously

4.4 Speed of spending

Cabinet approved the funding of the GIDI Fund under the COVID Response and Recovery Fund. It is important that investment in the economy as a result of the GIDI Fund occurs as soon as possible and it is a requirement that all **projects are to be fully implemented by 30 June 2023.**

Accelerated start date and timelines

Please describe how fast the investment will be injected into the New Zealand economy and provide details of where your project timelines have been accelerated.

[This could include bringing the start date forward significantly (i.e. a number of years) or measures to accelerate the project delivery as a result of this Government funding support.]

As we have already completed the ETA report and have confirmed design and specifications for the thermal screens and Biomass plant, procurement for the materials for these projects and confirmation of lead contractors can commence immediately the funding is approved. We anticipate the impact of the capital investment itself would be injected into the NZ economy largely in 2021 and would continue into mid-2022, with the on-going demand for biomass and wood pellet fuel supply.

Project timeline management and delay mitigation

Please outline project management strategies and mitigations you will deploy to ensure the project remains on track and potential delays are mitigated. Ensure these are specific to your project.

9(2)(a)

Project plans are well advanced and allow contingencies for the usual delays in securing contractors and materials. However, with the current Covid-19 global issues there are currently further delays in lead time in importing materials and overseas specialist contractors. This is due to shipping congestion and border control measures and so to mitigate this, we would use local materials and contractors in the first instance and also allow a sufficient project commencement time to build in contingency for such delays.

Following our post-implementation reviews of previous large-scale projects, we identified the increased skill and experience gained by local contractors through assisting with the specialized tasks involved and we are confident they could play a significant role in the proposed projects.

4.5 Integrated and optimised approach

EECA needs to understand that that appropriate due diligence has been undertaken and the solution is part of an optimised approach to energy usage at the site.

Feasibility studies and options analysis

Please describe what feasibility studies, or options analysis have been undertaken to determine the proposed project is the best solution identified?

[If appropriate append any supporting information or studies in support of your response to this question].

2017 Energy Audit by Enriva in conjunction with EECA, which outlined a decarbonisation pathway focused on demand reduction and fuel switching

2017 Thermal System Upgrade Glasshouse Monitoring by DETA in conjunction with EECA, which confirmed energy demand

2020 Energy Transition Accelerator report by DETA in conjunction with EECA, which confirmed the timing and order of individual debarbonisation projects on our pathway and the relative potential energy emission reduction associated with these.

Demand side is optimised

Please describe how this project contributes towards carbon abatement by optimising demand side energy usage?

If the proposal is for a fuel switching project please describe what work has or will be completed to ensure an optimal solution is being proposed?

Demand reduction has occurred to date through installation of thermal screens in some glasshouses and the installation of the hot water transport main and buffer tank linking individual boilers to improve boiler efficiency.

The proposal is for further retrofitting of thermal screens into owned glasshouses to reduce energy demand further.

For the fuel-switching component of this project, the ETA report details fuel options and confirms the fuel type that is recommended to optimize both energy emission reduction with a satisfactory return on capital investment.

9(2)(a)

4.6 Level of innovation and co-benefits

EECA has long supported technology innovation where it enables energy efficiency and carbon reduction. Many solutions that are technically proven for application in New Zealand may still experience barriers to further uptake such as cost due to market size and available providers, or perceived operational risk due to available technical expertise. EECA would like to understand the level of technology innovation utilised in the project, and the potential for further uptake of these technologies to decarbonise industry.

Innovative Technology

Please describe the level of innovation in your proposed solution, outlining specific innovative or underutilised technologies selected for the project?

Highlight if you believe this technology or solution is underutilised in New Zealand, and what you see as potential barriers contributing to this?

The use of thermal screens is common oversees and the standard for new glasshouse builds. However due to the high level of original capital investment and extended useful life, older glasshouses have had limited uptake for retrofitting thermal screens in New Zealand which therefore still has replication potential.

As our fuel switching encompasses both biomass and wood pellets, we can demonstrate this replication potential to other NZ growers both large and small.

Replication and diffusion potential

Please describe the replication potential of this project or technology in the New Zealand market in terms of application by other business and the emissions reduction potential?

While we are specifically operating in the fresh vegetable market and while there remains significant replication potential within our own sector, there is opportunity for a wide range of businesses and sectors to also leverage off the principles we have followed on energy demand reduction and decarbonization through fuel switching. Our journey has allowed us to learn from other businesses experiences and work with EECA to refine our overall pathway and we believe this is of great value to many other businesses in New Zealand.

Co-benefits

Please describe any associated benefits of implementing this project. These could be tangible operational benefits such as reduced maintenance costs, lower particulate emissions; or broader market development benefits.

[Please ensure quantifiable financial benefits are captured in the Project Assessment template]

As a grower of produce for the New Zealand and oversees market our customers are increasingly wanting to know that we undertake sustainable growing practices in our business. Our decarbonization pathway is key our sustainability focus and gives us confidence that we will be a business here for many years to come. Environmental sustainability is crucial but we believe this goes hand in hand with providing jobs in our local community, engaging other local suppliers and providing produce across the country for all New Zealanders.

9(2)(a)

Section 5: Project Components

In order for the Panel to assess your Proposal, it needs to understand the different components of the project, their cost, and how performance and delivery would be measured. The milestones you provide here may be used to help inform the milestones in any Funding Agreement with EECA.

Major milestones of Project
This table must be completed. Please use the 'insert row' function if you wish to add more milestones.

	Project component [Provide a high-level description of key project components or deliverables]	**Key performance indicator(s) for completion**	**Estimated start date**	**Estimated end date**	**Total cost to deliver this milestone**	**Incremental Project cost compared to business-as-usual scenario**
1	Design Finalised	Equipment Ordered	April 2021	May 2021	9(2)(b)(ii)	
2	Retrofit Thermal Screens	Operational	March 2021	May 2021		
3	Biomass Boilers	Operational and not burning coal	April 2021	May 2022		
4	Associated Buildings	Code of Compliance	April 2021	April 2022		
5	Buffer Tank	Supplying hot water	May 2021	Feb 2022		
6	Main Road Boiler Mods for Pellets	Cease burning coal and burning Wood Pellets	May 2021	Oct 2021		
7	Pugh Road Boiler Mods for Pellets	Cease burning coal and burning Wood Pellets	May 2021	Oct 2021		
8						
9						
10						
11						
	Total Costs : 9(2)(b)(ii)					

9(2)(a)

Section 6: Proposed Funding Agreement

Together with the RFP document we have provided you with a Proposed Project Funding Agreement. We need to know whether or not you are prepared to accept the terms and conditions set out in the Proposed Project Funding Agreement.

Please indicate below your acceptance of the Proposed Project Funding Agreement.

Either:

Having read and understood the Proposed Project Funding Agreement, I confirm that the terms and conditions within the agreement are acceptable. If successful, I agree to sign a Funding Agreement based on the Proposed project Funding Agreement, or such amended terms and conditions of the Funding Agreement as are agreed with EECA following negotiations.	☑

Or:

If you have any points that you wish to make about the Proposed Project Funding Agreement this is where you tell us, and note below any suggestions or changes you wish to propose, referencing the appropriate clause number.

Having read and understood the Proposed project Funding Agreement, I have the following suggestions to make. If successful, I agree to sign a Funding Agreement based on the Proposed Project Funding Agreement subject to negotiating the following clauses:	☐

It is important that, if asked, you are able to explain why your changes are important to you.

Clause	Concern	Proposed solution
[insert number]	[briefly describe your concern about this clause]	[describe your suggested alternative wording for the clause or your solution]
[insert number]	[briefly describe your concern about this clause]	[describe your suggested alternative wording for the clause or your solution]

Please duplicate rows if you wish to add more clauses.

9(2)(a)

Section 7: Declaration

I declare on behalf of the Applicant, including any Co-applicants:

[Please check]

☒	that I have read this form and the RFP document and I fully understand the procedures, terms, conditions and criteria
☒	that this Response Form (Proposal) and the RFP document together outline the basis on which this Proposal is made and the procedures, terms, conditions and criteria for the technology demonstration funding
☒	that the statements in this Proposal are true and the information provided is complete and correct and there have been no misleading statements or omission of any relevant facts nor any misrepresentations made
☒	that all named key personnel have agreed to be included in this proposal
☒	that EECA and its advisers may disclose to or obtain from any government department or agency, private person or organisation, any information about the Applicant or project (except that marked as "Confidential") for the purposes of gaining or providing information related to the processing and assessment of this application
☒	that the Applicant will, if requested by EECA or its advisers, in connection with this funding process provide any additional information sought and provide access to its records and suitable personnel
☒	that if successful I consent to the public release, including publishing on the internet, of the name of the Applicant, the amount of grant sought, the amount of funding offered, contact details of the Applicant and a description of the activity/project, and undertake to cooperate with EECA on communications relating to this Proposal, which may be in the form of a media release, case study, web content, conference presentation or whitepaper, sharing via social media, or other form as agreed with EECA
☒	that I understand EECA's obligations under the Official Information Act 1982 and that, notwithstanding any relationship of confidence created as a result of this Proposal, the provisions of this Act apply to all of the information provided in this Proposal
☒	that all activities in the proposed project are lawful activities that will be carried out lawfully
☒	the Applicant is not in receivership or liquidation nor will the project be managed by someone who is undischarged as bankrupt or prohibited from managing a business
☒	where external providers are being employed as part of the project/activity, the relevant providers are not employees or directors of the Applicant, and nor do they have any other direct or indirect interest in the Applicant, whether financial or personal unless specifically stated in the Proposal
☒	that EECA has sole discretion to determine which Proposals (if any) will receive funding and that I understand that there is no agreement for EECA to provide funding until both parties have signed a Funding Agreement
☒	that no EECA funding in relation to any Project milestone , is payable until the Recipient has demonstrated to the satisfaction of EECA that the milestone has been successfully completed

9(2)(a)

☒	that all necessary internal approvals (CEO, Board etc.) for the project to proceed, subject to successful application, will be in place before a Funding Agreement is signed by EECA
☐	that I have considered any possibility for real or perceived conflict of interest as defined in section 6.14 of the RFP document and confirm that: ☒ I have no real or perceived conflict of interest OR ☐ I may have a real or perceived conflict of interest as detailed below: [insert details here]
☒	that I am authorised to make this Proposal on behalf of the Applicant (including any Co-applicant) identified in Section 1 of this form.

Signature **This declaration must be signed by a person with the legal and financial authority to commit your organisation to a transaction**		
Name	Peter Steward Hendy	Duncan John Pryor
Title	Director	Director
Organisation	J S Ewers Limited	
Signature	9(2)(a)	9(2)(a)
Date	14/12/2020	14/12/2020

JS Ewers

Energy Transition Accelerator

DRAFT OPPORTUNITIES ASSESSMENT REPORT

4 December 2020

EECA TE TARI TIAKI PŪNGAO ENERGY EFFICIENCY & CONSERVATION AUTHORITY

JS EWERS LIMITED

DETA CONSULTING
Christchurch | Tauranga | Wellington | Melbourne
Phone +64 3 338 5824 Visit www.deta.co.nz

Revision	Date	Revision Details	Author	Verifier	Approved
0.1	18 November 2020	Draft report	GC	JP	JP
0.2	04 December 2020	Revised draft	GC		

Contents

Executive Summary

JS Ewers is a leading producer of glass house tomatoes, egg plant and capsicum in NZ. It is owned by MG Marketing, a cooperative owned by 400 grower shareholders.

It operates on the Waimea Plains near Nelson with one large main site (Blackbyre Rd) and two small satellite sites (Main Rd and Hope Rd).

In FY19 JS Ewers energy emissions were close to 9(2)(b)(ii) tonnes. As glass house production of tomatoes and capsicum is an EITE eligible activity under the ETS the emissions cost was able to be partially offset by an industrial allocation of units. This allocation has been at 60% of the baseline emission, set when the ETS commenced in 2008. Recent legislation allows for the phased reduction of the industrial allocation to 50% at 2030 and at 0% by 2050.

In recent years, the business has made significant investment in improving energy performance, resulting in energy emissions declining by 20% over five years.

Based on the work undertaken, a potential Energy Transition Pathway is presented on the following page. This shows a potential route to a lower carbon future. The key points of note are:

- For Pugh Rd and Main Rd site the recommended option is conversion of existing boilers to wood pellets.
- For Blackbyre Rd the recommended option is new biomass boilers utilising hog fuel.
- With these options a **99%** reduction in energy emissions is achievable by 2023.
- The capital cost of the recommended transition is estimated to be approximately 9(2)(b)(ii)

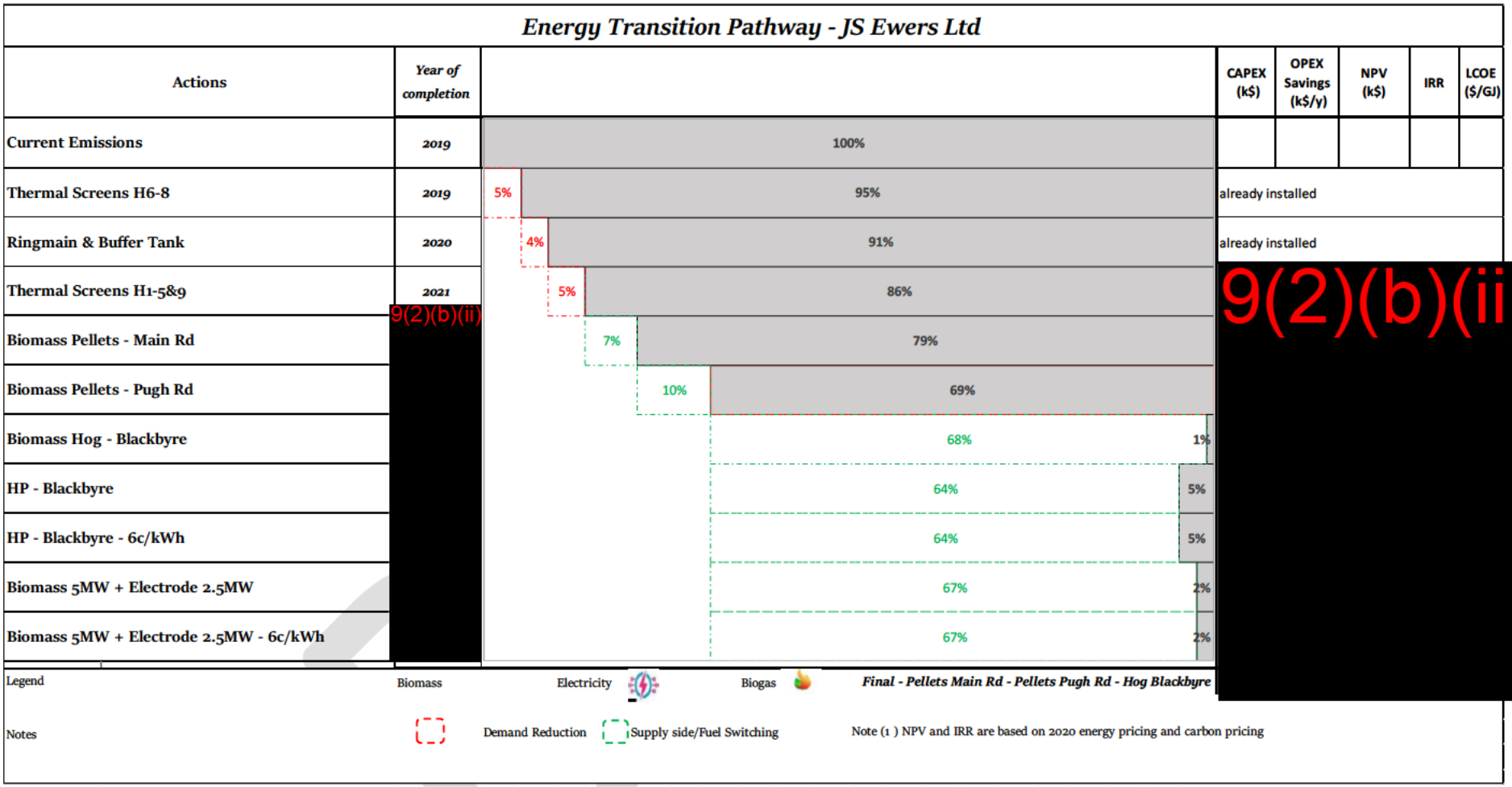


Figure 1: Proposed Group Energy Transition Pathway

This Opportunities Assessment report and the proposed pathway are a starting point based on the up to date information at the time of writing. However, it must be noted that operational changes, market conditions and new technology, will have an impact on the Pathway over the next 10 years. JS Ewers should treat this pathway as a living strategy document that anchors broad decision making, but is adapted as the needs of the business changes.

This ETA sets out a pathway for decarbonisation and there are priorities which should be actioned in the short-term to enable progress, chiefly:

1. **Appoint Board and Management level responsibilities** for the implementation of the Transition Pathway, including regular reporting of KPI's and milestones
2. Make pathway decisions for Blackbyre to enable an application for Round 1 of GIDI funding (by 14th December).

1. Abbreviations and Definitions

CAGR	Compound Annual Growth Rate
COP	Coefficient of Performance
EECA	Energy Efficiency and Conservation Authority
EITE	Emissions Intensive Trade Exposed
ETA	Energy Transition Accelerator
ETS	Emissions Trading Scheme
GHG	Greenhouse Gas
GIDI	Government Investment in Decarbonising Industry
HTHP	High Temperature Heat Pump
HW	Hot Water
LCOE	Levelised Cost of Energy
MAC	Marginal Abatement Cost
MACC	Marginal Abatement Cost Curve
MEB	Mass and Energy Balance
PFD	Process Flow Diagram
OEM	Original Equipment Manufacturer

2. Introduction

2.1 Introduction to EECA's Energy Transition Accelerator Programme

The Energy Transition Accelerator (ETA) programme aims to support New Zealand's largest businesses to make technically and economically viable decisions and investments which support their energy transition pathway to a low-carbon future. EECA is seeking to assist customers in taking a longer-term view of the opportunities and risks on the political and technological horizons. The ETA programme is designed to help them prepare to front-foot the future, by capitalising on the energy and carbon saving opportunities that are in the pipeline from right now, out as far out as 2030 and 2050. An overview of the ETA programme is shown in Figure 2.

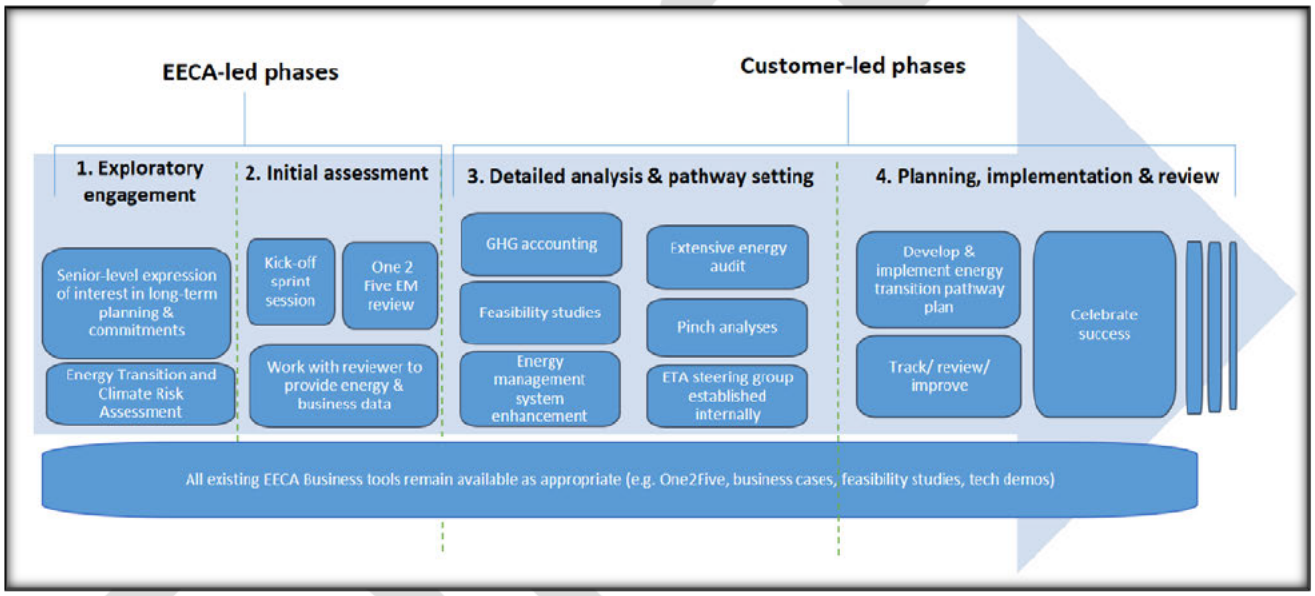


Figure 2: ETA Programme Overview.

This *Opportunities Assessment Report* represents the first step in the process towards identifying the suite of investments that could realise JS Ewers' low-emissions future. It contains a high-level assessment of energy and heat demand, and preliminary identification of demand-side and supply-side options to reduce energy-related emissions over the long-term, e.g. heat pumps, and heat recovery. It also presents the first draft of an example *Energy Transition Pathway* available for JS Ewers, mapping the opportunities along a realistic energy transition pathway including high-level estimates of capital costs and timeframes for implementation. This report concludes with a list of recommended next steps required to explore these opportunities further and start JS Ewers moving toward meeting a robust carbon reduction target. Those steps would consitute the "Detailed analysis and pathway setting" phase of the ETA programme, where JS Ewers can develop the building blocks for its own long-term energy transition.

2.2 Methodology

The focus of the analysis is on 'stationary' energy-related emissions reduction and therefore will predominantly focus on the main thermal energy use at site. The general approach for the analysis is to first

examine and minimise energy demand (e.g. process demand) followed by optimisation of energy supply and fuel switching opportunities (e.g. utilities). After compiling a long-list of options, incorporating novel and innovative technologies, a short list of most suitable technology options for this particular site is then analysed in more detail.

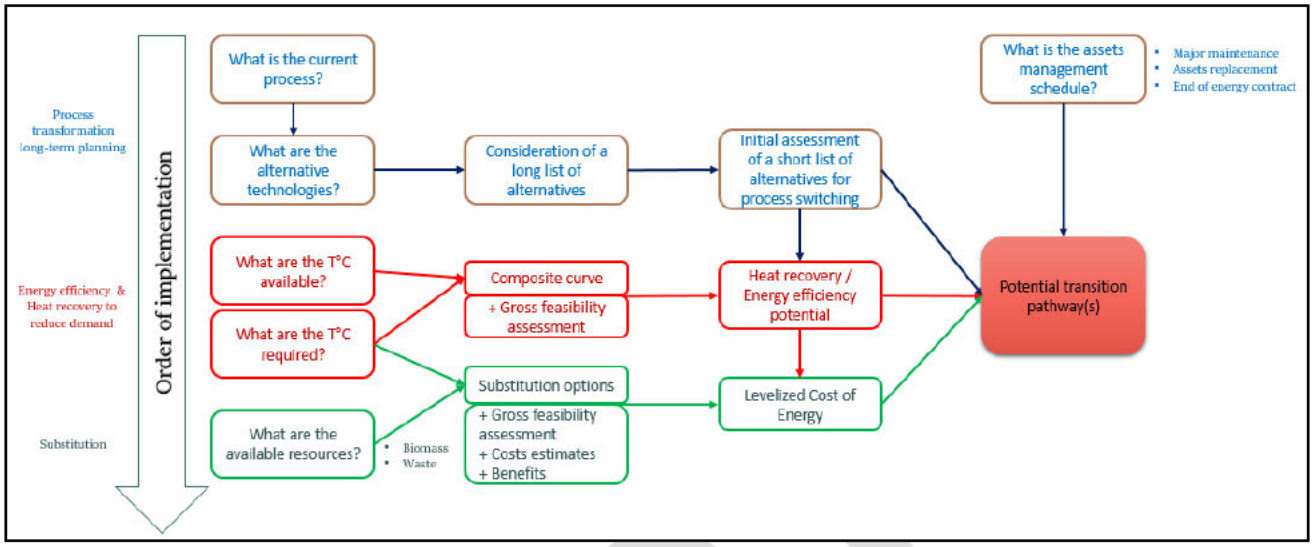


Figure 3: Initial Assessment Process Flow

2.3 Sources of Information

In order to complete the ETA, a variety of data and information was collected and used as the foundation for the project. Specific key sources of information include:

- JSEL Heating Assessment, by Enriva Pty Ltd, 7th March 2017.
- JSEL reports and proposals for thermal screens, ring main and thermal storage.
- Stage 1 Glasshouse Monitoring Report, by DETA Consulting, 3rd November 2017.

3. The New Zealand Context

3.1 Climate Change Response (Zero Carbon) Amendment Act 2019

On 13th November 2019 the Government passed the Climate Change Response (Zero Carbon) Amendment Bill with bipartisan support from almost all political parties (ensuring continuity regardless of future election results).

At its core, the Act does four key things:

- Sets a new greenhouse gas emissions reduction target to:
  - Reduce all greenhouse gases (except biogenic methane) to net zero by 2050
  - Reduce emissions of biogenic methane within the range of 24–47 per cent below 2017 levels by 2050 including to 10 per cent below 2017 levels by 2030.
- Establishes a system of a series of emissions budgets to act as stepping stones towards the long-term target.
- Requires the Government to develop and implement policies for climate change adaptation and mitigation.
- Establishes a new, independent Climate Change Commission to provide expert advice and monitoring to help keep successive governments on track to meeting long-term goals.

The full, day to day impact of the Act for business in New Zealand is yet to be fully established. However, it is clear that business will be required to take considered and substantial action in order for the country to achieve the emissions reduction targets. This report represents a further step taken by JS Ewers on the path to achieving the reductions and targets required by the Act.

3.2 Carbon and the Emissions Trading Scheme

As part of a wider decarbonisation transition pathway, it is appropriate to consider any long term economic decisions against the backdrop of the growing momentum towards reducing carbon emissions and the increasing costs of the New Zealand Emissions Trading Scheme (ETS).

The New Zealand ETS began in 2008, aspiring to be an all-gases, all-sectors scheme linked to international carbon markets. The link to international markets led to a sharp and undesirable fall in the effective carbon price, which undermined incentives to reduce net domestic emissions. The international link ceased, and the NZ ETS became a domestic-only scheme from 2015, and the price has since risen to the government imposed ceiling price of NZ$25 per tonne of carbon dioxide equivalent (CO_2e).

More recently the New Zealand government has made further changes to reform the ETS to give more control over permit supply, a process for setting emissions caps and possible price floors, re-introducing the possibility of international trading, and cross-party agreement on the policy and institutional framework. These changes are effectively setting the scene for increasing the influence of the ETS on investment decisions around decarbonisation, energy efficiency and fuel choices. The current price of emissions has now risen above NZ$30 per tonne.

A recent report by the Productivity Commission[1] suggested that "New Zealand's emissions prices have been too low to incentivise meaningful reductions in emissions. All evidence points to the prospect that emissions prices may need to rise to at least $75 a tonne, and possibly, if new emissions-reducing technologies are slow to emerge, to more than $200 a tonne, over the next three decades".

Applying a variable carbon price to current prices for a range of energy sources is useful in visualising at what level the carbon price may begin to influence fuel switching. This is shown in the following chart, based on current fuel prices. In order to provide a real comparison, this analysis allows for efficiency losses from the conversion of heat to steam in a boiler for the solid fuels and is presented on the basis of net heat value.

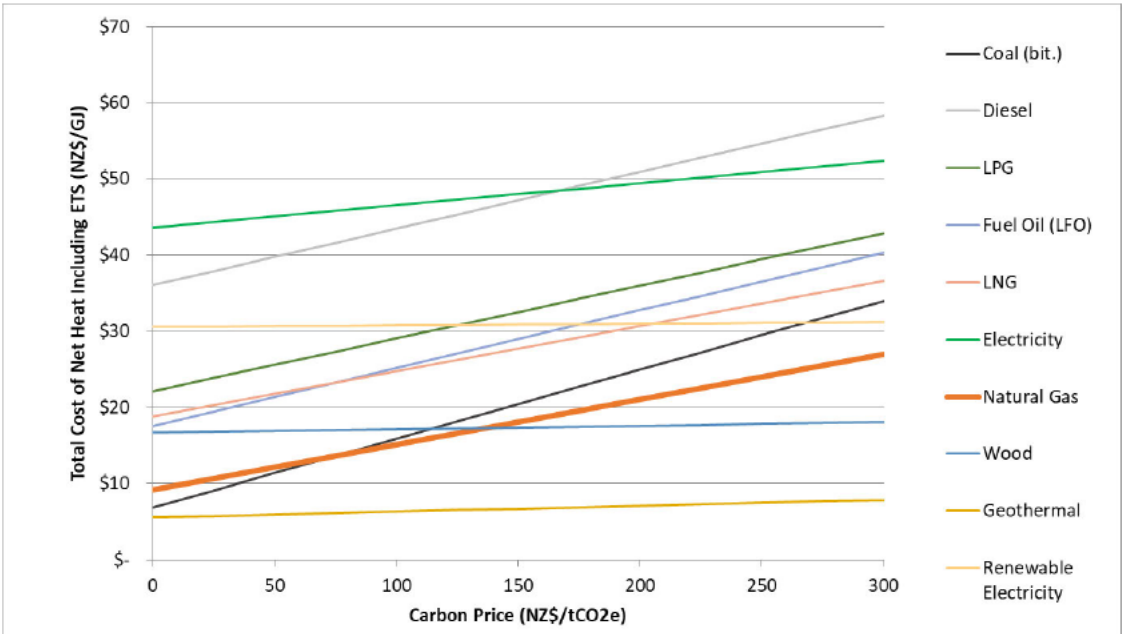


Figure 4: Influence of carbon pricing on the net cost of heat from a variety of process heat sources

3.2.1 Emissions Intensive Trade Exposed

Glass house tomato and capsicum production is considered a trade exposed industry and classified as Emissions Intensive Trade Exposed (EITE) under the NZ ETS. NZ ETS costs are unable to be passed on to consumers as the goods produced face competition from countries that do not have similar emissions costs. To maintain the competitiveness of the NZ industry, a business classified as EITE receives an allocation of free ETS units.

Through EITE, JS Ewers currently receives an allocation of 9(2)(b)(ii) NZ units per tonne of fresh tomatoes (or 1.56 units/t) and 9(2)(b)(ii) units per tonne of fresh capsicum (or 9(2)(b)(ii) The 2019 changes to the ETS include the phasing out industrial allocation from 2021. The rate of phase-out is set at 1 per cent each year from 2021 until 2030, increasing to 2 per cent from 2031-2040 and to 3 per cent from 2041-2050. This will lead to the allocation dropping to 50% at 2030, 30% at 2040 and 0% at 2050.

[1] Productivity Commission Low-emissions Economy https://www.productivity.govt.nz/sites/default/files/Productivity%20Commission_Low-emissions%20economy_Final%20Report_FINAL.pdf

3.3 Government Investment in Decarbonising Industry Fund[2]

The Government has recently announced a $69 million fund that will allow business and industries to access financial support (co-funding) to switch away from boilers run on coal and gas, to cleaner electricity and biomass options.

EECA administers the GIDI Fund on behalf of the Government through a contestable.

The Fund is available to New Zealand-based private sector businesses who have committed to decarbonising their business and industrial processes, where Government co-investment will help remove barriers to accelerating their decarbonisation goals.

Round 1 of the fund is now open, with a minimum of $15M in Government capital grants available for co-investment in eligible projects that are successful in this contestable RFP process.

An organisation must have committed to a carbon reduction pathway and have a plan to deliver on it. This ETA meets this requirement so on completion of this work JS Ewers will be eligible to apply.

Applications to the first round must be in by the 14th December 2020.

Recommendation
JS Ewers be in a position to complete a GIDI application by the 14th December.

[2] https://genless.govt.nz/running-a-business/co-funding-and-support/business-co-funding-and-support-programmes/government-investment-in-decarbonising-industry-gidi-fund/about-the-fund/

4. JS Ewers Context

4.1 JS Ewers company background

JS Ewers is part of the MG Marketing Group. It grows and supplies fresh produce and is one of the largest producers of both indoor and outdoor produce in New Zealand. The company, which is based on the Waimea Plains near Nelson, grows tomatoes, capsicums and eggplant in glasshouses, and also has outdoor vegetable fields. JS Ewers has 9 glasshouses at the Blackbyre Rd site, which cover over 10Ha of land. There are two smaller leased sites nearby (Pugh Rd 1 Ha, Main Rd 0.8 Ha).

Figure 5: Site Layout

4.1.1 Energy and Emissions Background

From an emissions perspective, the main GHG emitting sources are the boilers from combustion of coal.

Over recent times, JS Ewers has been committed to reducing thermal fuel consumption. Improvements in emissions performance were recognised as being needed, with energy being a major expense for the company. As a result of this focus, has implemented a variety of projects/measures including:

- Thermal screen installation into glass houses.
- Hot water ring main and buffer storage.
- Heatflow meters.

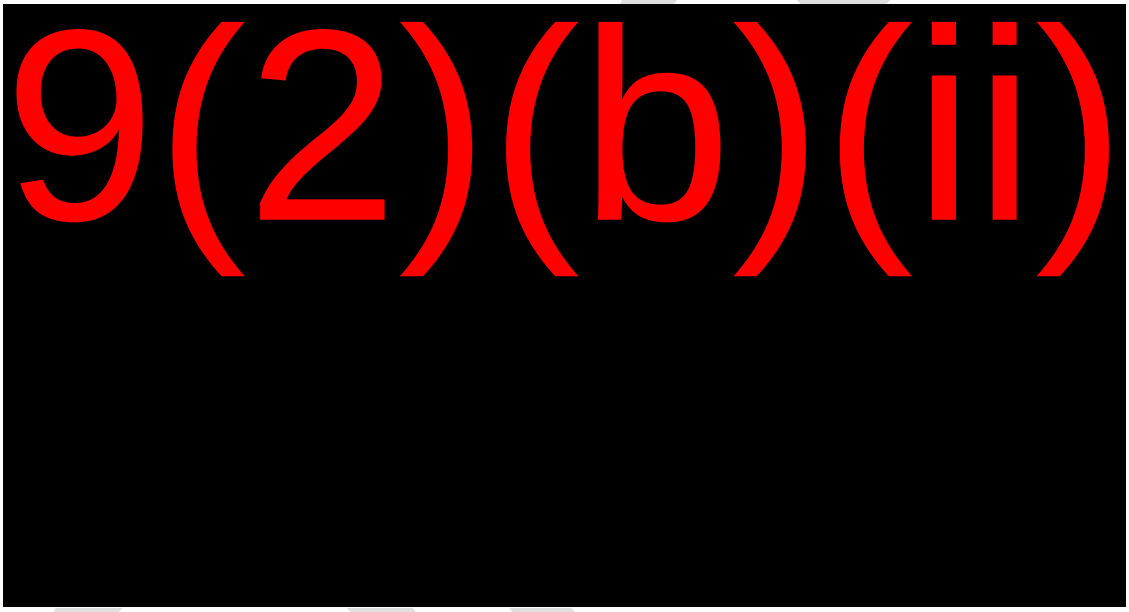


Figure 6: JS Ewers GHG emissions history

Emissions have been steadily declining over the last six years. Emission intensity has been improving over the last three years. These trends reflect the actions of JS Ewers to improve thermal fuel consumption and efficiency.

That said, there remains significant base GHG emissions.

4.1.2 Emissions Intensive Trade Exposed

JS Ewers receives an industrial allocation of NZ ETS units as it is classified as an EITE business. Based on production in FY19 of 9(2)(b)(ii) .

4.2 Emissions Reduction Commitment

JS Ewers has yet to make a public commitment to emissions reduction and expects to use the outcome of the ETA work to help determine a suitable commitment.

9(2)(b)(ii) [redacted]

Recommendation
JS Ewers make a public commitment to emissions reduction

4.3 Current Process

JS Ewers grows and supplies fresh produce. The site, which is based in Nelson, grows tomatoes, capsicums and eggplant in glasshouses, and also has outdoor vegetable fields. JS Ewers has 9 glasshouses, which cover over 10Ha of land. The glasshouses range from 0.13Ha to 2Ha and each glasshouse is individually heated using coal hot water boilers. A summary of the glasshouses is shown below in Table 1. The large 2Ha glasshouses all have 2 environments (two areas with different temperature setpoints), which allows the glasshouses to grow 2 types of produce.

Table 1: JS Ewers Summary of Glasshouses

9(2)(b)(ii) [redacted]

A Process Flow Diagram of a typical glass house operation, an annual Mass and Energy Balance for the company, and Blackbyre Rd site energy flow diagram are presented below. The MEB identifies raw material inputs, major resource use, production volumes, emissions and some key metrics by site and Group and is based on the 2019 year.

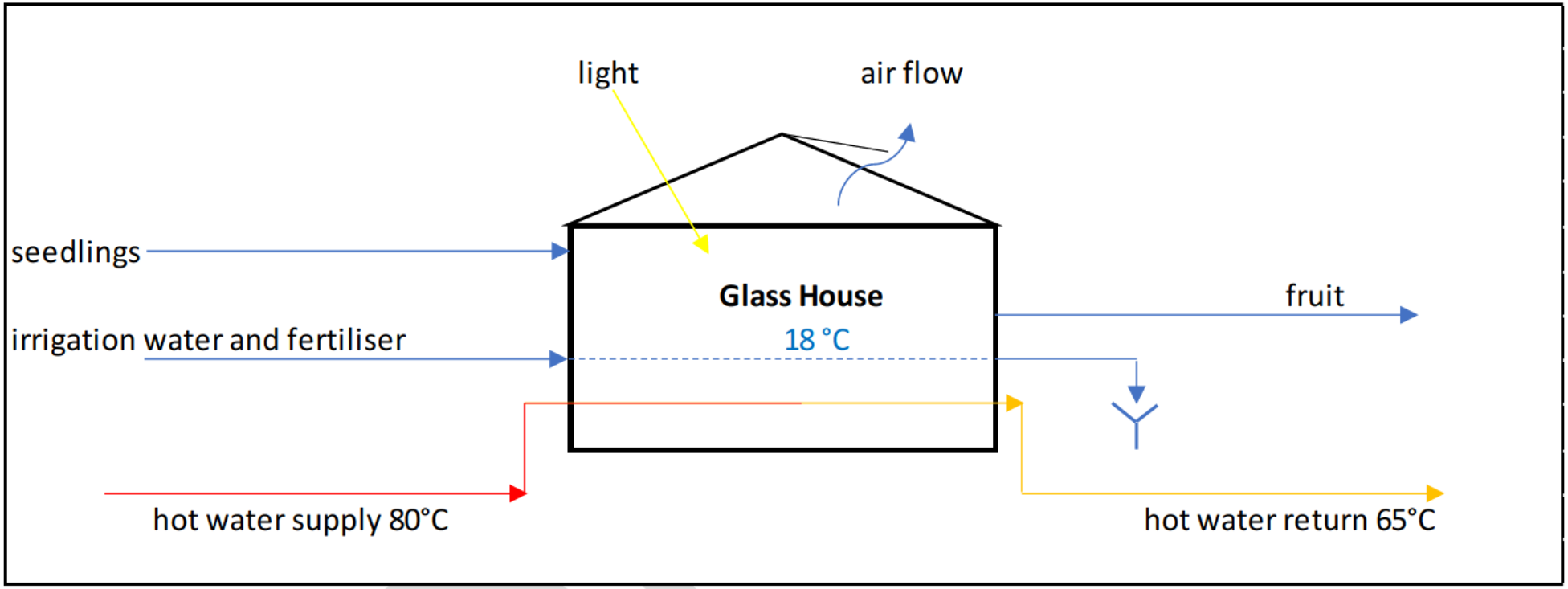


Figure 7: Company Process Flow Diagram - Typical Glass House

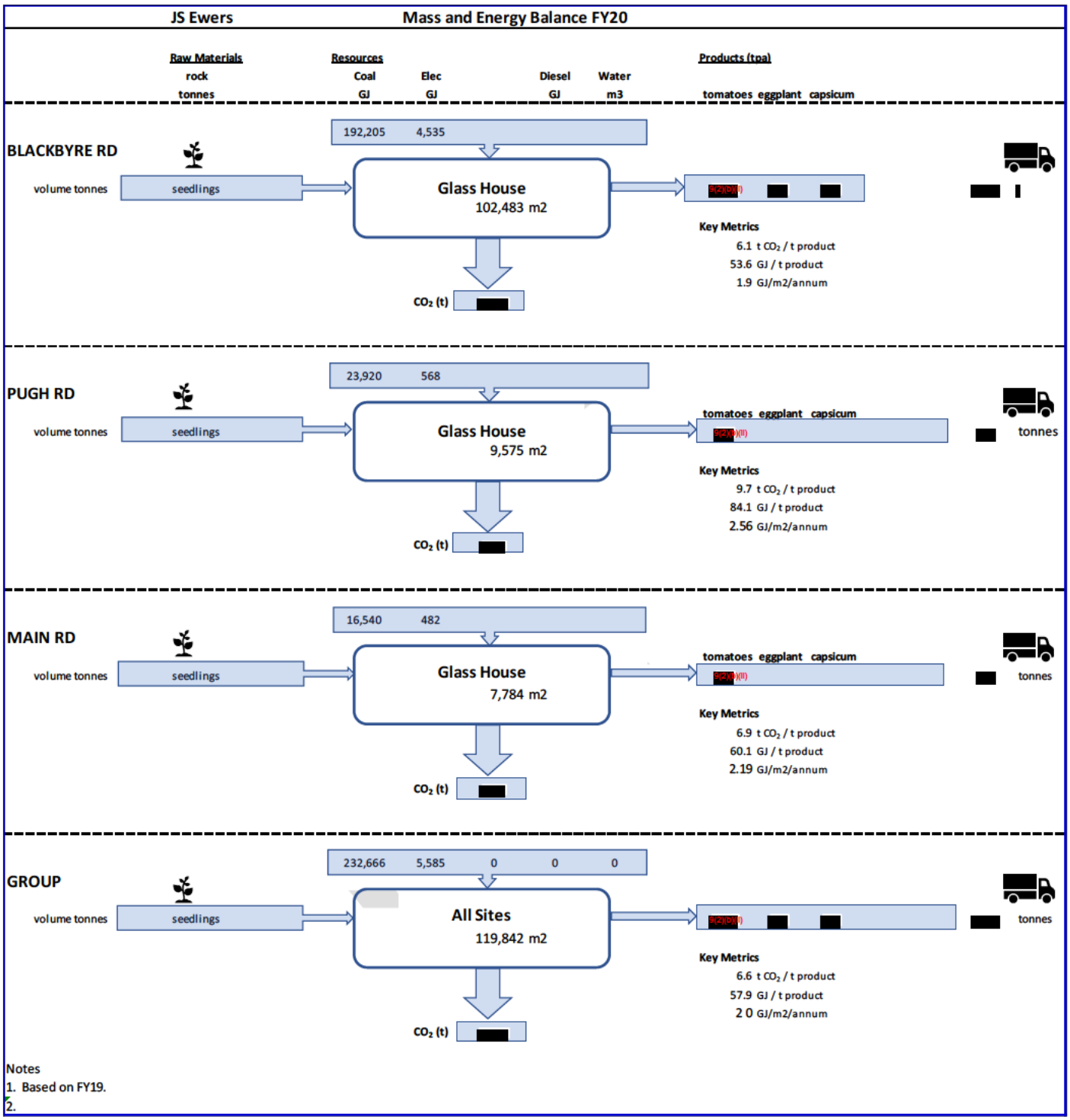


Figure 8: Company Annual Mass and Energy Balance

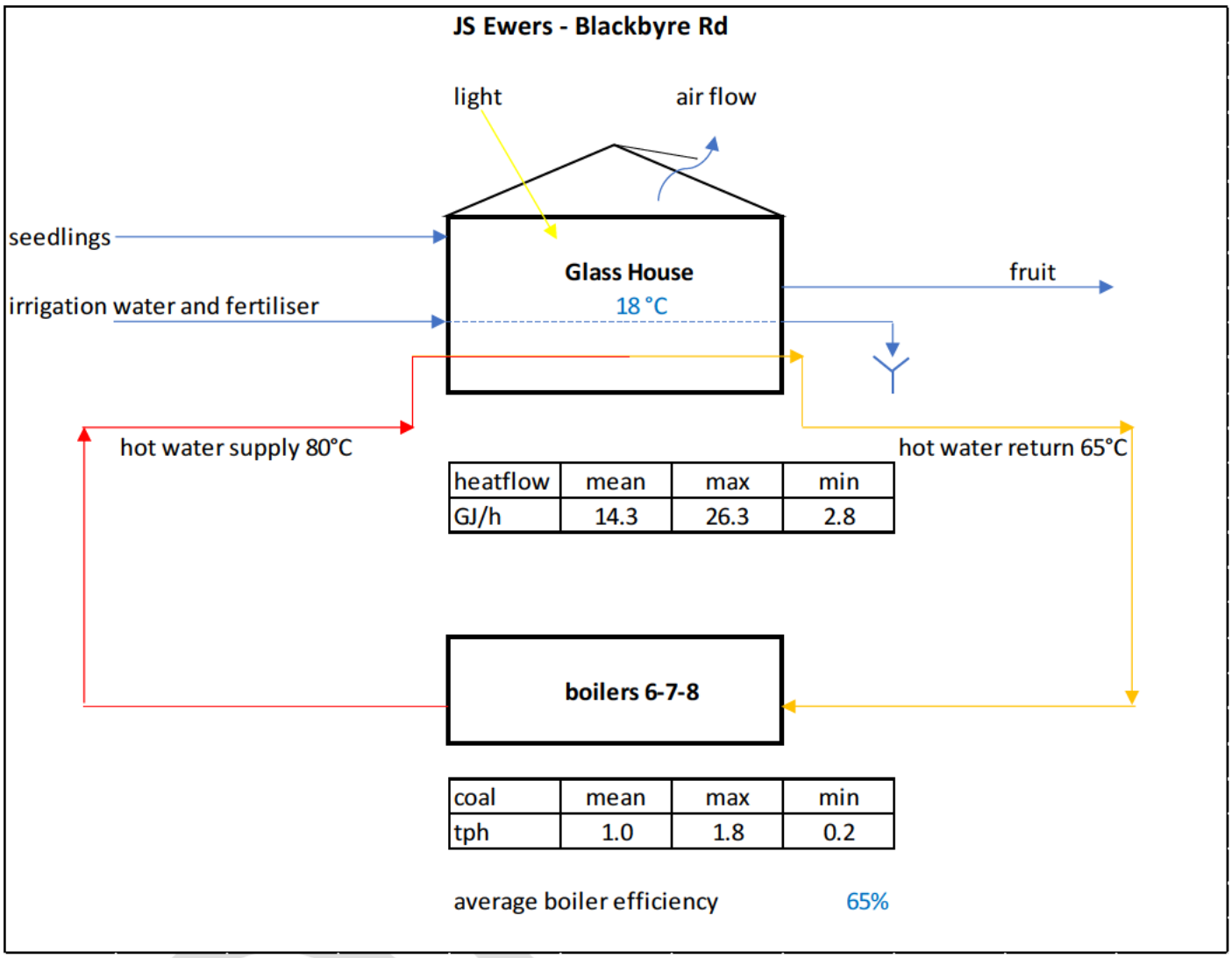


Figure 9: Blackbyre Rd Site Energy Flows

4.3.1 Energy Use and Emissions

The baseline year is FY19. Energy emissions and energy use are summarised in the following table and graphs.

Table 2: JS Ewers Energy and Emissions FY19

Site	Fuel	Thermal Energy Use		Electricity Use	Energy Emissions	Emissions
		tonnes	GJ	kWh	$tCO2_e$	%
Blackbyre	Coal	9(2)(b)(ii)				83%
Pugh	Coal					10%
Main Rd	Coal					7%
Group						100%

Emissions were a little over 9(2)(b)(ii) tonnes.

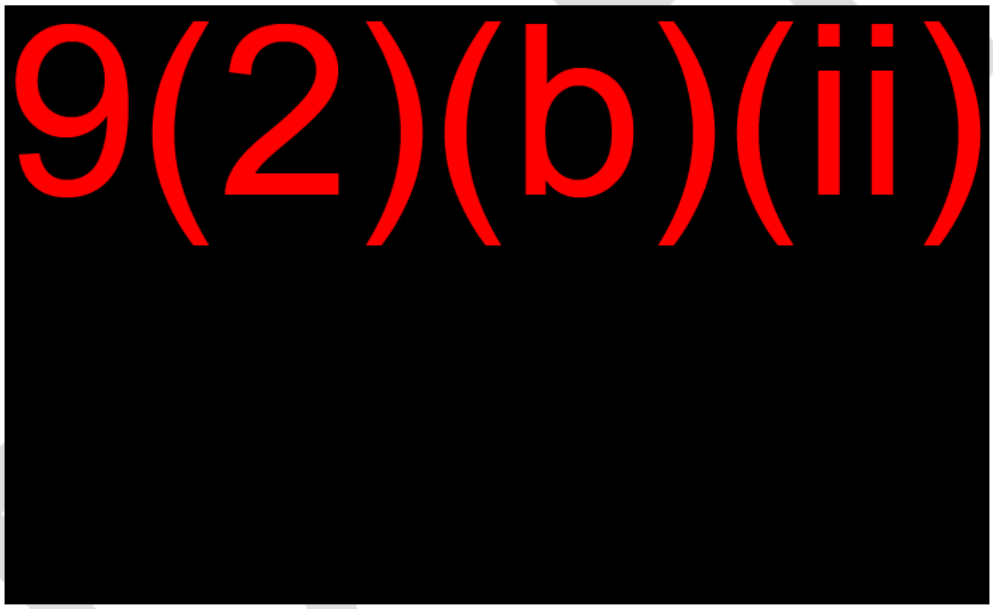


Figure 10: JS Ewers Emissions FY19 By Energy Type

The vast bulk of emissions are due to coal use for hot water heating.

Emission and Energy Benchmarking

Energy benchmarking data for glass house production of tomatoes and other fruit is not readily available. Analysis of JS Ewers performance has the Blackbyre Rd operations as clearly the most efficient. This is likely the benefit of scale and recent investment in efficiency improvements.

Table 3: JS Ewers Energy Benchmark data

Site	Energy GJ/m2/annum	Emissions t CO_2/t product
Blackbyre	1.9	6.1
Pugh	2.6	9.7
Main	2.2	6.9
Average	2.0	6.6

4.3.2 Asset Management

Major Energy Assets

System	#	OEM/Type	Capacity	Installed	Asset Plan major actions + notes
Hot water	Blackbyre Boiler 6	Morrow	6 MW	2005	
	Blackbyre Boiler 7	Morrow	6 MW	2008	
	Blackbyre Boiler 8	Morrow	4.6 MW	2009	
	Main Rd	Eco	1.5 MW		
	Pugh Rd	Travet Taylors	2 x 0.4 MW 1 x 0.6 MW		
Power supply	Blackbyre FY20 peak: 277 kW Supply capability: 150 kVA x 2, 100 kVA				
	Main Rd FY20 peak: 22 kW Supply capability: kVA				
	Pugh Rd FY20 peak: 22 kW Supply capability: kVA				

Discharge to Air Consents

The consents for discharge to air by the Blackbyre Rd site expire late in this decade (JS Ewers expires 31Dec28, Blackbyre Horticulture expires 31Dec29). They will not have any meaningful influence on investment to lower emissions.

4.4 Future Development Plans

The Waimea dam is forecast to come on-stream in early 2022. The dam will improve the security of water supply to JS Ewers which is critical to any Glasshouse growing operation.

There is a planned roll-out of thermal screens for glass houses 1-5 & 9 in early 2021. Discussed below.

Main Rd and Pugh Rd sites are both lease sites. Main Rd has around four years remaining on the lease and Pugh Rd has around three years. The remaining term will be a key factor in any decision on investment in decarbonisation with it being possible that JS Ewers will leave the leased sites at the conclusion of the current terms.

5. Emission reduction options

The options for emission reduction are considered in three areas.

- Firstly, demand reduction through technology.
- Secondly, demand reduction or energy efficiency for process heat to reduce the use of energy.
- Finally, process heat fuel switching from high carbon to low carbon fuel at the reduced demand level.

5.1 Demand Reduction

5.1.1 Process technology options for demand reduction

Developments in process technology generally have the potential to make inroads into the generation of emissions.

CO_2 Addition to Glass House

The addition of CO_2 to the glasshouse environment has productivity benefits (JS Ewers suggest a 10% improvement in production) providing an effective improvement in energy and emissions intensity. This technology is in commercial operation in NZ now, using the exhaust gas from natural gas combustion (for water heating) . The technology is not possible with coal combustion due to the hazardous components in the exhaust. Vyncke[3], a biomass technology provider to Windsor Engineering, is offering CO_2 recovery from the exhaust gas from biomass combustion. Further information has been requested.

Not in the pathway.

Recommendation
Investigate the recovery of CO_2 from biomass combustion for addition to the glass house for application to JS Ewers glass house operations

Humidity Control of Glass House

Conventional control of humidity in a glass house relies on venting of air, followed by heating as replacement cold air lowers the temperature. EECA has provided support to a project in the Waikato where a heat pump is used to dehumidify glass house air[4] to reduce venting and heating. A dehumidifier was installed in a 300m^2 glass house where capsicums are grown. The reported benefits in the first year of operation were a 25% reduction in fuel oil usage and a 15% increase in production output. This will be a technology worthy of further investigation for many glass house growing operations in NZ.

In the Nelson area however, the humidity is significantly lower and there are minimal issues with humidity in glass houses. As an example the average relative humidity for the last six years was 79.5% for the Waimea Plains (Appleby 2 weather station) compared to 86.0% for the Matamata Piako District (Matamata Hinuera weather station).

Not in pathway.

[3] https://www.vyncke.com/industries/agro-food/greenhouses/
[4] https://drygair.com/vegetables-dehumidification/

5.1.2 Process Heat Options

Thermal Screens

Thermal screens in glass houses have been used for a many years for shading (to reduce heat input at hot times during the day) and insulation (to reduce heat loss during the night). Well managed modern screens are able to achieve reductions in energy use ranging from 15% to 40% depending on the technology employed and screen usage. New glass house installations will invariably include thermal screens in the original build. Retrofitting can be challenging.

JS Ewers completed the retrofit installation of thermal screens in Houses 6, 7 and 8 in the first half of 2019. This project has been included in the pathway as it occurred after the baseline year.

JS Ewers has plans to roll-out retrofit of thermal screens in Houses 1-5 and 9 in early 2021. This has been included in the pathway.

site	Project	Year of completion	Emission Reduction (t/y)	Emission Reduction (%)	Estimated Capex ($)	Opex Saving ($/y)	Simple Payback (y)	NPV[1] ($)	IRR[1] (%)	LCOE ($/GJ)	MAC ($/tCo2e)
Blackbyre	Thermal Screens H1-5&9	2021	1,404	5.1%	$ 9(2)(b)(ii)	9(2)(b)(ii)					

Note (1) NPV and IRR are based on 2020 energy pricing and carbon pricing

Hot Water Buffer Storage

Buffer storage for hot water enables smoother operation of boilers with the buffer storage taking the variation in heat demand instead. This can improve boiler efficiency and avoid the boiler ramping up and down.

JS Ewer installed a site HW Ring Main and Buffer Tank in December 2019. This project has been included in the pathway as it occurred after the baseline year.

5.2 Fuel Switching

Fuel switching involves changing from a high carbon fuel to a lower carbon fuel or to a renewable fuel source to reduce emissions from the combustion of the fuel. At the present time JS Ewers use coal for all hot water generation. The fuel switching options that can be usefully considered for the JS Ewers sites are:

- Biomass.
- Grid electricity.

An overview of the thermal fuel outlook is presented in appendix B.

5.2.1 Biomass

The wider Nelson area is well placed for biomass resources usable as fuel. Local supply of hog fuel, wood chip and wood pellets are present.

Hog fuel is readily available locally. A current price offer of 9(2)(b)(ii) is used in the analysis.

Wood pellets are available locally but there are limits to the volume available. A current price offer of 9(2)(b)(ii) is used in the analysis.

Blackbyre Rd

Hog fuel is included as the biomass option for the main Blackbyre site. New boilers and fuel handling system will be required. A two boiler installation is proposed, 5MW and 2.5MW, to enable more efficient boiler operation (closer matching of production to demand).

site	Project	Year of completion	Emission Reduction (t/y)	Emission Reduction (%)	Estimated Capex ($)	Opex Saving ($/y)	Simple Payback (y)	NPV[1] ($)	IRR[1] (%)	LCOE ($/GJ)	MAC ($/tCo2e)
Blackbyre	Biomass Hog - Blackbyre	2022	18,544	67.8%	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Note (1) NPV and IRR are based on 2020 energy pricing and carbon pricing

Pellets were considered and excluded given insufficient local supply and being a more expensive fuel.

Pugh Rd and Main Rd

Hog fuel is not considered for the satellite sites due to the limited remaining life in the leases on these sites.

Pellets can often be considered as a drop-in replacement for coal – meaning with limited changes to the fuel supply system and boiler controls the coal can be swopped out for the pellets. Pellets are included as the biomass option for Main Rd and Pugh Rd sites. The capital allowed is a nominal value for fuel supply system and control system modifications.

site	Project	Year of completion	Emission Reduction (t/y)	Emission Reduction (%)	Estimated Capex ($)	Opex Saving ($/y)	Simple Payback (y)	NPV[1] ($)	IRR[1] (%)	LCOE ($/GJ)	MAC ($/tCo2e)
Main Rd	Biomass Pellets - Main Rd	2021	1,920	7.0%	9(2)(b)(ii) [redacted]						
Pugh Rd	Biomass Pellets - Pugh Rd	2021	2,777	10.2%							

Note (1) NPV and IRR are based on 2020 energy pricing and carbon pricing

5.2.2 Grid Electricity

Electricity can be used to meet the process heat demand using heat pumps or electrode HW boilers.

Electricity is generally considered an expensive fuel (JS Ewers current variable price is 9(2)(b)(ii)) but EECA are aware of some much lower prices being offered in the region. To test this option a price of 6c/kWh is allowed as a sensitivity.

Back-up Power

Full electricity back-up (genset) is required by JS Ewers. It has a policy that heat must be available on demand at all times to avoid the loss of the glass house crop.

Power Supply

Existing power supply systems would need to be upgraded to meet the demand from electrification of process heat.

For Blackbyre Rd a new 11kV feeder cable from the Hope Substation to the site would be required. This would be routed along SH60 and will be an underground cable. NTL have commented that consenting challenges

should be expected and that it is unlikely to be a quick process. A maximum capacity of 4MW is possible without other major network upgrades being required. There will also be on-site 11kV cabling, switchgear, and transformer installation.

For Pugh Rd and Main Rd the power supply upgrade is relatively straightforward. On-site 11kV cable changes and transformer installation are the main requirements.

Heat Pump

There are very limited sources of heat available at Blackbyre Rd and none at the other sites meaning heat pumps options are restricted to air source and ground source. A ground source heat pump would pull heat from the Waimea River aquifer. JS Ewers have indicated that, based on previous experience, they would expect local opposition to this, including from Iwi. Some reluctance to going down this path and with there being other more straightforward solutions the ground source option is not considered further.

The heat pump has to deliver 80°C water without fail and must be sized to meet heat demand for the coldest day in winter. Based on NIWA data covering the last ten years the design minimum is -5°C.

Analysis give the following results.

site	Project	Year of completion	Emission Reduction (t/y)	Emission Reduction (%)	Estimated Capex ($)	Opex Saving ($/y)	Simple Payback (y)	NPV[1] ($)	IRR[1] (%)	LCOE ($/GJ)	MAC ($/tCo2e)
Blackbyre	HP - Blackbyre	2022	17,528	64.1%	9(2)(b)(ii)						
Main Rd	HP - Main Rd	2022	1,816	6.6%							
Pugh Rd	HP - Pugh Rd	2022	2,627	9.6%							
Blackbyre	HP - Blackbyre - 6c/kWh	2022	17,528	64.1%							

Note (1) NPV and IRR are based on 2020 energy pricing and carbon pricing

Electrode Boiler

A standalone electrode boiler is not a possible option with the limitations on power supply.

A hybrid solution of a biomass boiler for the baseload and an electrode boiler for the variable/peak load is included. The biomass boiler is sized at 5MW and the electrode boiler at 2.5MW.

site	Project	Year of completion	Emission Reduction (t/y)	Emission Reduction (%)	Estimated Capex	Opex Saving ($/y)	Simple Payback	NPV[1] ($)	IRR[1] (%)	LCOE ($/GJ)	MAC ($/tCo2e)
Blackbyre	Biomass 5MW + Electrode 2.5MW	2022	18,205	66.6%	9(2)(b)(ii)						
Blackbyre	Biomass 5MW + Electrode 2.5MW - 6c/kWh	2022	18,205	66.6%							

Note (1) NPV and IRR are based on 2020 energy pricing and carbon pricing

6. Energy Transition Pathway

6.1 Group Energy Transition Pathway

A proposed Energy Transition Pathway has been developed for the sites individually and combined for the Company. The activity on sites is phased by consideration of the following:

- regulatory (resource consent) requirements,
- asset management requirements,
- demand reduction first,
- supply side optimisation second,
- fuel switching third.

The pathway shows a potential route to energy emission reduction of **99% by 2023**.

It assumes wood pellets are used as a drop-in replacement for coal Pugh Rd and Main Rd. This is clearly the best option for these sites, and it is recommended this conversion be undertaken in 2021.

Recommendation
Proceed with Pugh Rd and Main Rd conversion to wood pellets in 2021

Blackbyre Rd has a number of options (biomass, HP, hybrid biomass and electrode boiler) with some sensitivity analysis on electricity price. The recommended option is biomass with hog fuel. This is based on biomass being the lowest capital, no need for a locally disruptive major upgrade of power supply, best economics (highest IRR, lowest LCOE, lowest MACC) and lowest resultant emissions.

Recommendation
Conversion of Blackbyre site to hog fuel in 2022.

As the Energy Transition programme advances, future analysis and changing asset plans may well change what JS Ewers considers to be the best option.

Energy Transition Pathway - JS Ewers Ltd

Actions	*Year of completion*		CAPEX (k$)	OPEX Savings (k$/y)	NPV (k$)	IRR	LCOE ($/GJ)
Current Emissions	*2019*	100%					
Thermal Screens H6-8	*2019*	5% 95%	already installed				
Ringmain & Buffer Tank	*2020*	4% 91%	already installed				
Thermal Screens H1-5&9	*2021*	5% 86%	9(2)(b)(ii)				
Biomass Pellets - Main Rd		7% 79%					
Biomass Pellets - Pugh Rd		10% 69%					
Biomass Hog - Blackbyre		68% 1%					
HP - Blackbyre		64% 5%					
HP - Blackbyre - 6c/kWh		64% 5%					
Biomass 5MW + Electrode 2.5MW		67% 2%					
Biomass 5MW + Electrode 2.5MW - 6c/kWh		67% 2%					

Legend: Biomass; Electricity; Biogas; ***Final - Pellets Main Rd - Pellets Pugh Rd - Hog Blackbyre***

Notes: Demand Reduction; Supply side/Fuel Switching; Note (1) NPV and IRR are based on 2020 energy pricing and carbon pricing

Figure 11: JS Ewers Energy Transition Pathway

The above phasing is indicative. Timing can be readily flexed to account for changing site priorities for, for example, asset management purposes.

The build-up of the Energy Transition Pathway uses the following activities and timing.

Table 4: JS Ewers Energy Transition Pathway projects

YEAR	Demand Reduction	Energy Supply (Fuel Switching)	Supporting Work / Asset Commentary
2020	GH 1-5 & 9 screens		
2021		Pugh Rd and Main Rd conversion to pellets	
2022		Blackbyre Rd conversion to hog fuel	Waimea dam on-stream
2023			
2024			
2025			
2026			
2027			
2028			JS Ewers air discharge consent expires
2029			Blackbyre Horticulture air discharge consent expires
2030			

This proposed pathway is a starting point, to be updated as JS Ewers develops and moves forward with its Energy Transition programme. It should be seen as a living document that changes as new information becomes available, investigations are completed, and decisions are made.

6.2 Assumptions and Information Sources

The key assumptions and information sources contributing to the Energy Transition Pathway are:

- Site processing volume remains as it is now.
- No cost escalation is allowed for (project costs, energy costs, carbon costs).
- Current energy unit costs:

Energy type	Current Cost
Coal	9(2)(b)(ii)
Electricity	

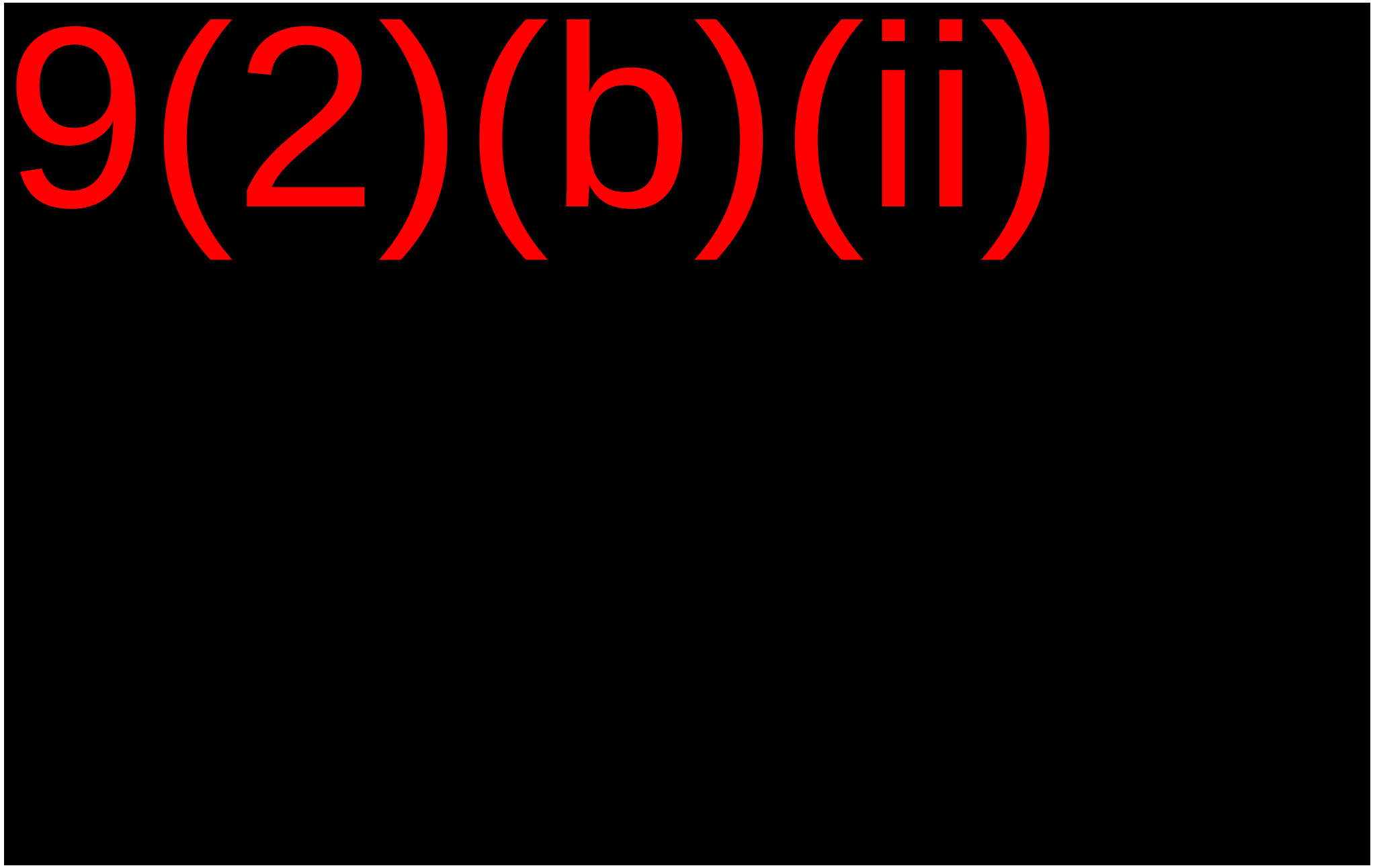
- Emission cost included in energy cost with current cost of \$25/t_{CO2e} assumed (FY19 average).
- A current emission cost of \$35/t_{CO2e} is used for project analysis.
- NPV 10% discount rate, 20 years.
- IRR 20 years.
- LCOE[5] 20 years, 10% discount rate, O&M cost as % of capital invested; 1% electrode boiler, 2% heat pump, 3% biomass.
- Capital cost estimates are based on indicative pricings from similar project scopes combined with known equipment cost data, factored pricing and measured judgement of analogous scopes. Some costs have been provided by JS Ewers from other consultants' work. While significant effort has been made to factor in considerations specific to the JS Ewers environment, the potential remains for unforeseen site and operational factors to present themselves during the detailed design scope definition phase. The costs presented are recommended to be used for project screening purposes only.
- Capital cost accuracy is generally type 1 (+50%/-30%), except where stated otherwise.
- Biomass fuel costs; wood hog 9(2)(b)(ii)

6.3 Marginal Abatement Cost Analysis

The Marginal Abatement Cost (MAC) is the carbon value that generates a project NPV of zero. Simplistically, a negative MAC represents a project that has a strong payback in the absence of a carbon price. The higher the MAC is, the higher the equivalent carbon price needs to be in order to provide an economic return. This graph has been used to assist prioritisation of opportunities for improvement based on likely future costs of carbon.

The Marginal Abatement Cost Curve for the above Energy Transition Pathway is shown in the following figure. This presents the various projects in a graphical form to help demonstrate the relative carbon reduction effectiveness.

[5] Formula used was equation 4-11 from "A manual for the Economic Evaluation of Energy Efficiency and Renewable Energy Technologies" dated March 1995 by NREL


9(2)(b)(ii)

6.4 Pathway Economics

Another way to view the investment in the Energy Transition Pathway is presented in Figure 13 and Figure 14.

Note that this analysis makes no allowance for the value of the free issue industrial allocation of ETS units – this is seen as an independent value stream not affected by what JS Ewers does with emission reduction.

The base energy cost (current cost and current emissions) is projected to 2030 adjusting only for the emission cost. The emission cost is derived using the Productivity Commission pathway 'Policy Driven Decarbonisation Net Zero', sourced from the Low Emissions Economy report[6]. The emission cost starts at \$30/t CO_{2e} in 2020, rising to \$80/t in 2030.

The ETA Forward Energy cost is projected to 2030. The Forward Energy Cost is below the Base Energy Cost over the whole period to 2030.

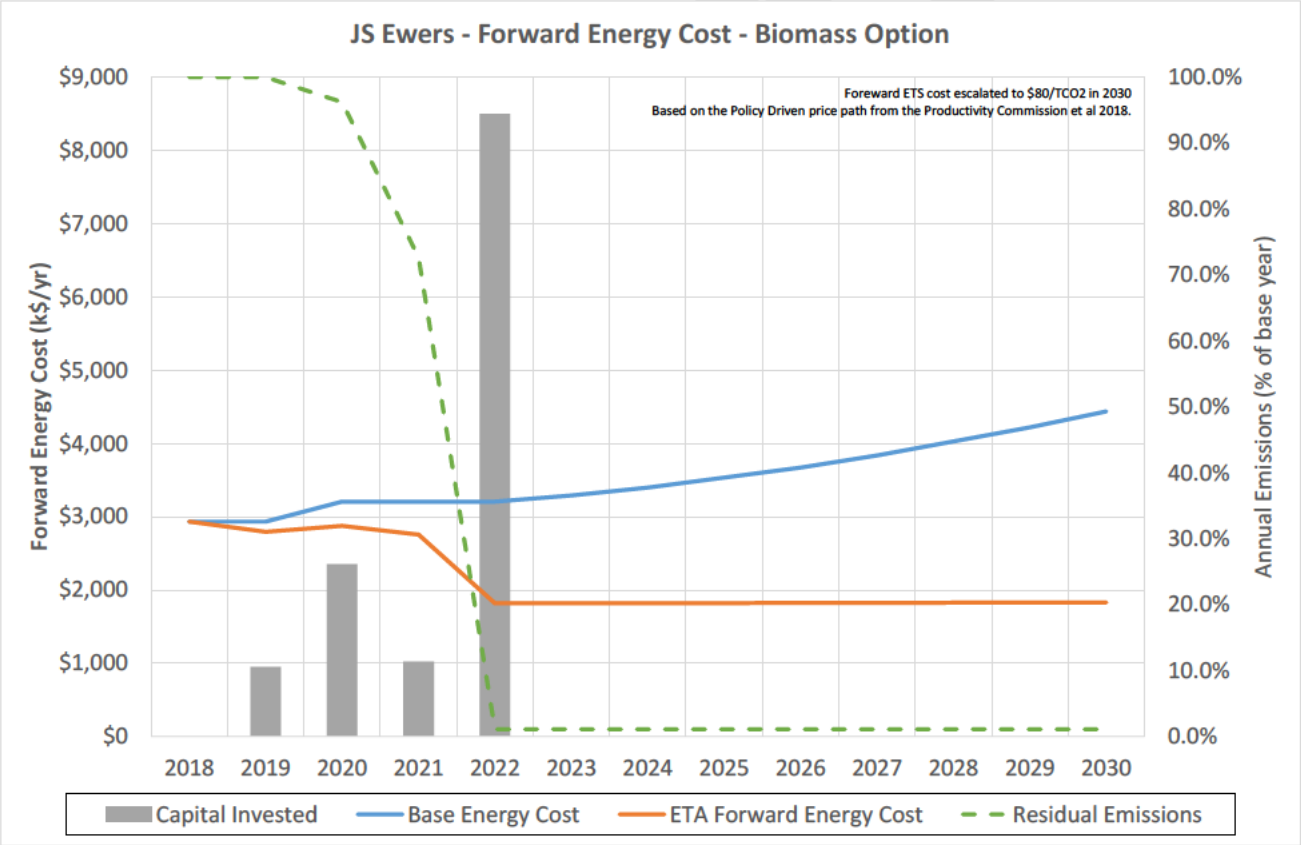


Figure 13: Forward Energy Cost

[6] https://www.productivity.govt.nz/assets/Documents/lowemissions/4e01d69a83/Productivity-Commission_Low-emissions-economy_Final-Report_FINAL_2.pdf

Figure 14 uses the same data as Figure 13, however the savings and capital investment are presented on a cumulative basis from 2020. By 2028 the savings match the capital expended. Over the 10 year period to 2030 the cumulative energy savings picture is of a $5m gain when compared to the capital invested.

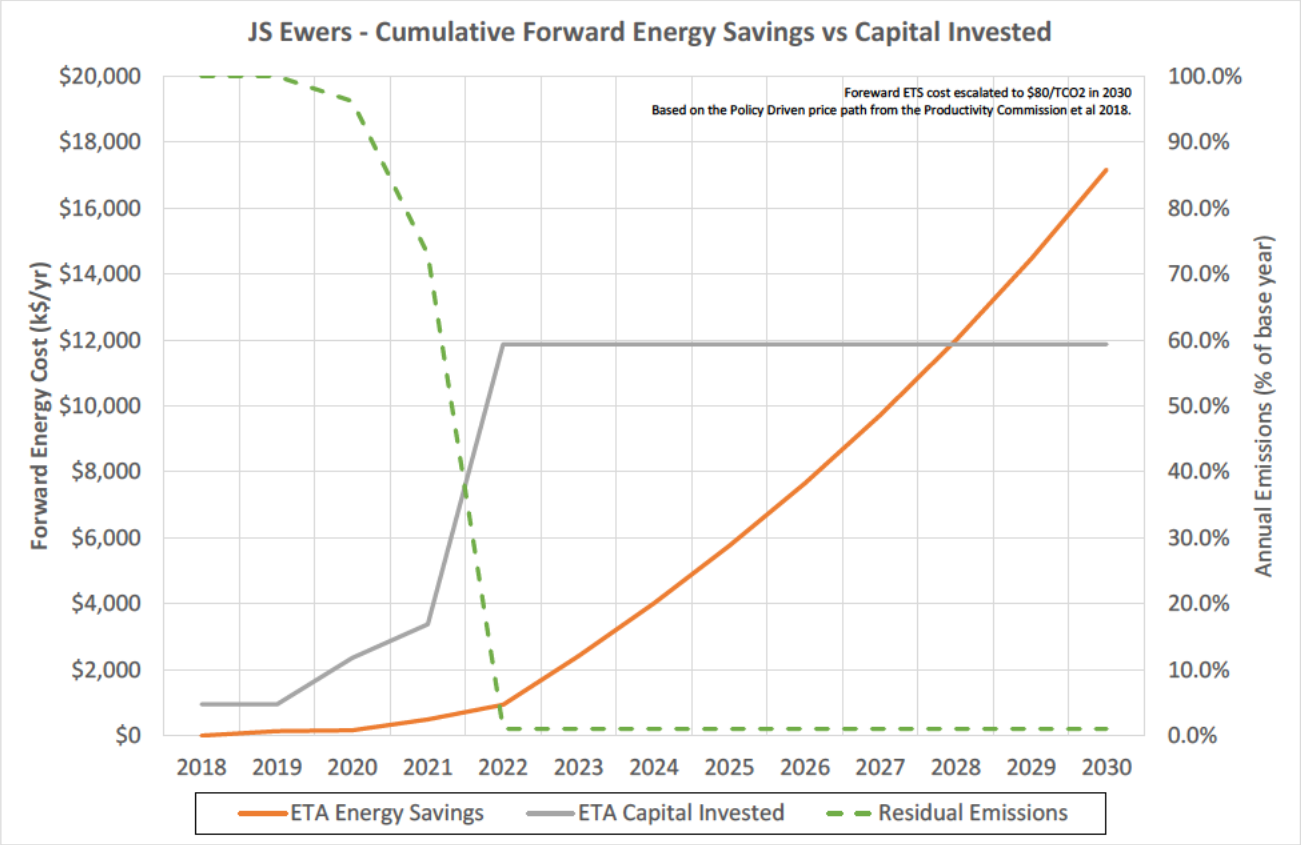


Figure 14: Cumulative Forward Energy cost vs Capital Invested

6.5 Implementation

For effective implementation of the pathway JS Ewers will need to build the ETA programme into its business and governance processes.

Recommendations
Review and confirm the Transition Pathway at Management level
Review and confirm the Transition Pathway at Executive level
Develop a process to regularly (6 monthly minimum, quarterly recommended) review and report on the execution of the Transition Pathway back to Senior Management
Develop a process to regularly (annually recommended) update the ETA based on the latest information, business decisions, and broader external developments (such as legislation changes, consumer demand, availability of new technology, etc.)

EECA offers continuing support for the ETA programme to JS Ewers as it develops, refines and implements the pathway. The tools available include One2Five, Energy Graduate Programme, business cases, feasibility studies and technology demonstrations.

Recommendation
Review and confirm resourcing requirements for the execution of the Transition Pathway, including the use of the EECA Graduate programme
Undertake an EECA One2Five programme to further review and refine broader organisational effort

7. Next Steps

7.1 Immediate Actions for 2020-2021

Target actions for the next 12 months include:

ACTION	OWNER	TARGET DATE
Governance:		
1. Review and confirm the Transition Pathway at Management level. Ref 6.5		
2. JS Ewers make a public commitment to emission reduction. Ref 4.3		
3. Review and confirm the Transition Pathway at Executive level. Ref 6.5		
4. Develop a process to regularly (6 monthly minimum, quarterly recommended) review and report on the execution of the Transition Pathway back to Senior Management . Ref 6.5		
5. Develop a process to regularly (annually recommended) update the ETA based on the latest information, business decisions, and broader external developments (such as legislation changes, consumer demand, availability of new technology, etc). Ref 6.5		
6. Review and confirm resourcing requirements for the execution of the Transition Pathway, including the use of the EECA Graduate programme. Ref 6.5		
7. Undertake an EECA One2Five programme to further review and refine broader organisational effort. Ref 6.5		
Pathway Implementation:		
8. JS Ewers be in a position to complete a GIDI application by the 14th December. Ref 3.3		
9. Investigate the recovery of CO_2 from biomass combustion for addition to the glass house for application to JS Ewers glass house operations. Ref 5.1.1		
10. Proceed with Pugh Rd and Main Rd conversion to wood pellets in 2021. Ref 6.1		
11. Conversion of Blackbyre site to hog fuel in 2022. Ref 6.1		

7.2 Future Actions

As indicated in elsewhere in this report, this Transition Pathway needs to evolve and develop as the needs of the business and the broader market environment changes. The focus of the recommendations and next steps has been on the immediate actions for 2021. A key part of the 2021 programme of work is to review and confirm the actions for 2022.

Appendix A - Projects list

site	Project	Year of completion	Emission Reduction (t/y)	Emission Reduction (%)	Estimated Capex ($)	Opex Saving ($/y)	Simple Payback (y)	NPV[1] ($)	IRR[1] (%)	LCOE ($/GJ)	MAC ($/tCo2e)
9(2)(b)(ii)											

Note (1) NPV and IRR are based on 2020 energy pricing and carbon pricing

Figure 15: JS Ewers Project List

Appendix B - Thermal Fuel Outlook

Whilst the New Zealand ETS will be a key influencing factor in the forward pricing and availability of fuels for business. The downstream impact of policy intervention and consumer tolerance for high carbon fuels will impact and influence both price and availability of thermal fuel.

DETA's view of the outlook for the four key thermal fuel options available to JS Ewers is as follows (up to date at the time of writing – August 2020):

B.1 Coal

Coal has been the mainstay of thermal heat generation in New Zealand, particularly in the South Island with the absence of reticulated natural gas systems, for the last 100 years. Coal is plentiful, with an estimated known resource in excess of 16 billion tonnes[7] (approximately 8,000 years of coal at current domestic consumption levels) and relatively low cost to extract and deliver to site.

Despite the availability and low extraction cost, coal is facing significant market pressure as emissions pricing and consumer awareness transitions towards low carbon fuels. As shown in Figure 4, coal has the highest carbon intensity of all thermal fuel options in New Zealand, resulting in the most significant price sensitivity when taking into account future ETS price increases. The longer term scenario is that coal will no longer be the lowest cost fuel source for South Island consumers, as other lower carbon fuels become more mainstream and cost effective.

Facing uncertainty about their longer term viability, coal suppliers are now in a position of reevaluating their business models and mine development plans in the short term. Already some suppliers have indicated unwillingness to increase mine production, or take on additional customers, adversely impacting competition and supply price. In some cases, this may lead to increased coal costs to consumers in the near term over and above the direct impacts of the ETS.

OVERALL TREND – Moderate Risk:

- Plentiful energy supply in New Zealand.
- Significant forward price risk due to upward pressure on carbon pricing.
- Significant customer and stakeholder pressure to exit coal.

B.2 Electricity

The electrification of process heat in New Zealand is being promoted by various parties, including grid operator Transpower, as an important contributor to moving toward a low carbon future. This is based on the premise that most of the country's electricity is generated from renewable sources. Despite this, because of the significant residual use of coal and gas for dry year firming, peaking, and baseload duties, the emissions factor for electricity is currently still reasonably high as shown already in Figure 4. This is likely to reduce in the medium term however as generator Genesis Energy is encouraged through climate change policy to eliminate coal consumption, a stated target by 2035.

[7] https://www.nzpam.govt.nz/our-industry/nz-minerals/minerals-data/coal/

Low Temperature application <100°C

Electricity is a considerably more economic proposition for low temperature heat (<85°C) where new generation High Temperature Heat Pump (HTHP) technology can be used. HTHPs are a relatively new iteration of standard technology, where a refrigeration system takes low grade heat at approximately 30°C and upgrades it to a higher temperature (typically 70-85°C). These systems operate with a Coefficient of Performance (COP) of 4 to 5 and therefore have very low carbon emissions and operating costs. However, there are operational considerations such as high temperature limits, heat source availability and system capacities which must be tailored on a site by site basis. It is noted that higher temperature heat pumps (90°C+) are being offered in Europe and these are expected to be available in New Zealand in the not too distant future.

A key consideration of any transition to large scale electric thermal systems is the localised network capacity/constraint in the area. Many areas of New Zealand, particularly those areas with large industrial processing plants, are already faced with periods of electricity constraint when demand is high. This issue will be exacerbated further through the large-scale increase of electricity demand for steam/hot water generation. Capital costs to alleviate these constraints can be significant and result in poor economic comparisons compared to other low carbon fuel options.

***Electricity** – OVERALL TREND – Low-Moderate Risk:*

- Nationwide supply risk is low-moderate, with many unconsented renewable generation options available for development.
- Local supply risk in areas depending on level of network development required to deliver the required capacity. This issue can be solved but requires investment.
- Some overall demand uncertainty due to Tiwai smelter situation, uptake of electric vehicles and electrification of process heat.
- Low forward price risk due to upward pressure on carbon pricing.

B.3 Wood/Biomass

Woody biomass is used extensively in boilers in New Zealand to provide steam heating both in large scale commercial and industrial applications. Most of these are located at wood processing sites which can supply most or all of their fuel from onsite waste. There are also operators providing wood chip and hog fuel to supplement this onsite fuel and supply non-wood industry boilers from forest residue timber. Technically, the use of onsite biomass material for steam/hot water generation is very similar to coal.

Wood pellets are a newer wood energy product, manufactured from wood waste and by-products. They are considered close to interchangeable with coal in many applications. Wood pellets cost more than other biomass fuels, and must be stored out of the rain, but offer several significant advantages:

- They have low moisture content (<10%) and high calorific value (~18 GJ/t) giving them a relatively low transport cost.
- The pellets are small and uniform making fuel handling systems compact and simple.
- They produce minimal ash making ash handling systems compact and keeping disposal costs down.
- They are highly consistent.
- There are at least four manufacturers of wood pellets from waste, a significant expansion of capacity in the last couple of years.

In the short term, the main challenge of wood conversion is one of supply chain confidence and reliability. In response to growing demand, the biomass supply industry is facing a rapid scale-up. This scale-up is causing localised quality and availability constraint as production rates increase to meet demand. It is anticipated that this issue will be resolved over the medium term. Shorter term risks are typically resolved through the close working relationship between the end consumer and credible, reliable biomass suppliers.

In the medium term it is expected that the New Zealand demand for biomass fuel will increase due to the large scale transition from hydrocarbon fuels to woody biomass fuels for thermal system. This will likely increase the security of supply and provide firmer pricing since there will be more infrastructure and the development of an industry around the fuel supply chain that does not currently exist on a large scale. On the other hand, these factors may also lead to an increase in prices as demand for the fuel increases. It is worth noting however that New Zealand currently exports the majority of its biomass material in raw log or wood chip form. As a result, the effective biomass price is capped by the equivalent export wood price (i.e. biomass material would be diverted into the domestic biomass market if the prices significantly exceeded the export price).

Security of supply is an issue that biomass suppliers look to manage through long term contracts. These could be 10 + 10 years, 5 + 5 + 5 + 5 years or similar. The biomass fuel supply contract will most often will be back-to-back with fibre supply contracts.

The cost of wood waste biomass currently varies from approximately $3/GJ for low cost wood residue from sawmill by-product and waste material such as pallets, to about $12/GJ for graded wood chip. Modelling by SCION has demonstrated that there is a significant volume of forest residue biomass available for large scale process heat uptake, and that the cost range for biomass sourced from forestry within an 80km radius would have a price range of $8 - $12 per GJ.

Azwood Energy have published a Wood Energy Market Guide[8] which gives a broader overview of the subject.

***Wood/Biomass** – OVERALL TREND – Low-Moderate Risk:*

- Improving consistency and reliability of the wood/biomass supply market.
- Low short-term supply risk due to an abundance of wood material, with regional variation.
- Moderate longer-term supply risk with rising uptake of biomass for process heat uses, with regional variation.
- Low forward price risk due to upward pressure on carbon pricing.

[8] https://www.azwood.co.nz/Industrial+Energy/WEMG.html

JSEL HEATING ASSESSMENT

Client: JS Ewers Limited

Site: Appleby, New Zealand

Report Date: 07 March, 2017

By: Enriva Pty Ltd

www.enriva.com.au

Contents

Overview

JS Ewers Limited has requested a glasshouse heating assessment for their site at **Blackbyre Road**. This site has organically grown over 23 years and now contains 9 separately heated glasshouses covering just over 10 hectares. JSEL would like to understand options around reducing energy costs in their current system and cost / benefit implications of new biomass energy plant.

Climate Study – Appleby

A climate study was done using data from the New Zealand national climate database. The entire 2015/16 financial year was analyzed using hourly temperature and radiation data from the weather station: Appleby 2 Ews, Latitude -41.3173, Longitude 173.0948.

Assumptions:

- Internal year round set-point of 18C for 102,304m^2
- Full-time minimum pipe of 35°C

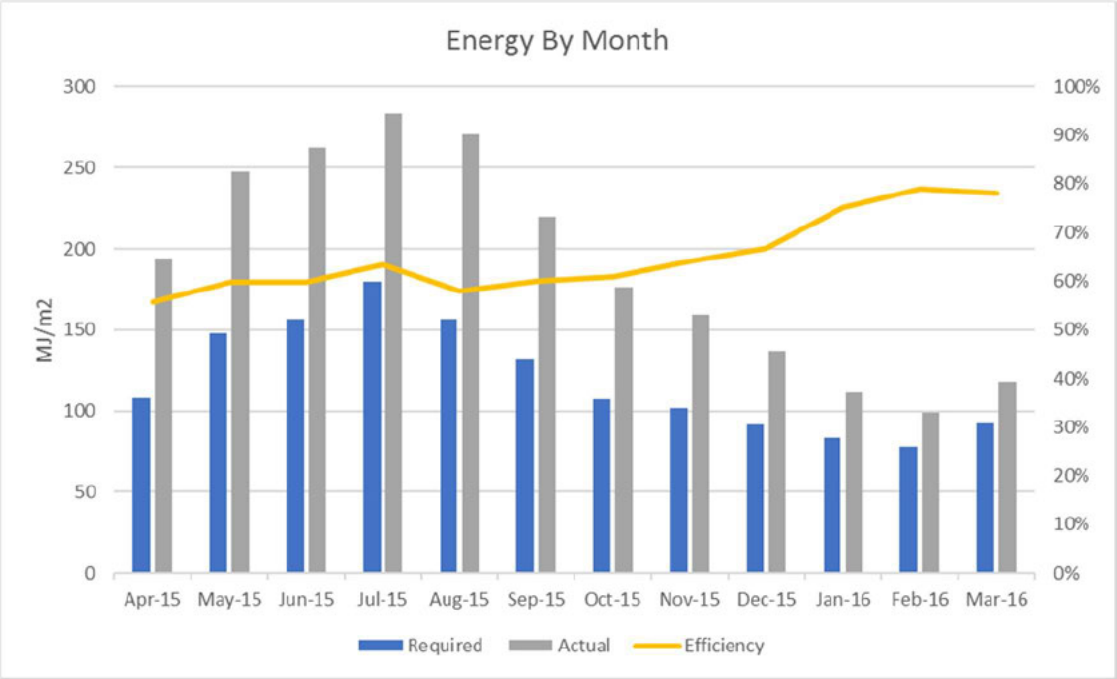


Figure 1

Figure 1 shows the energy "required" by each m^2 of greenhouse to achieve the internal air temperature set-point based on the external environmental conditions. This is compared against the "actual" energy consumed by the coal plant which is given by the JSEL monthly coal tonnage figures. The "efficiency" is therefore the overall system efficiency in using coal to create the target greenhouse temperatures. For the remainder of the report 65% is used as the current average overall efficiency. Key data from this section:

- Current annual energy usage: 2.24 GJ/m^2 = 9(2)(b)(ii)
- Current annual energy required: 1.45 GJ/m^2
- Current average overall efficiency: 65%
- Realistic average overall efficiency (advanced plant): 80%

Energy Usage Equivalents By Fuel Type (FY 15/16)

Current Usage

9(2)(b)(ii)

Figure 2

Figure 2 shows a hypothetical system where the site energy usage remains unchanged. We list annual tonnage and cost of biomass and coal, each with two different cost bases. The forward coal price is an estimate for 2-3 years in the future. The purpose of **Figure 2** is to show that there is an inherent cost savings when using a cheaper fuel even if energy usage remains unchanged. This is a hypothetical scenario only, as high moisture content biomass cannot be successfully swapped into the existing plant technology.

**Note: JSEL recorded coal volume for FY 15/16 is slightly less, however the numbers shown compensate for a two week shutdown of a 2Ha greenhouse in Jan 2016.*

Usage with 15% Energy Screen

9(2)(b)(ii)

Figure 3

Energy screen selection encompasses various tradeoffs such as light diffusion, transmission, ventilation and thermal control. Typical rated savings vary from 15% to 40% depending on technology employed and screen usage. **Figure 3** shows no other change apart from the impact of implementing a screening system that achieves a 15% energy savings across the entire 10Ha.

Usage with 15% Efficiency Improvement

9(2)(b)(ii)

Efficiency improvement of 15%-20% would be achieved with an advanced biomass plant, including an appropriately designed and integrated energy buffering, storage and distribution system. Although both screen and efficiency improvement are shown here as "15%" figure 3 differs from figure 4 as they act on energy required and energy used respectively. Coal values are comparative only as coal should not be used in most modern advanced biomass plant.

Usage with 15% Energy Screen AND 15% Plant Efficiency Improvement

Figure 5

In **Figure 5** we account for the energy screen and an improvement in overall system efficiency of 15% (65% to 80%) generated by installation of an advanced biomass combustion plant with an integrated energy buffering, storage and distribution system.

Existing System Inefficiencies

The existing system has inefficiencies which are broken down into two sections. Those that can be improved by user intervention and those that cannot be improved due to plant limitations and safety implications.

Inefficiencies – For Improvement or Consideration

- Flue temperature / firetube cleaning; Install temperature gauges on back end of each plant with a "max pointer" to show peak back end temperature. Monitor these gauges to determine optimal firetube cleaning cycles. After cleaning firetubes note max back end temperature and re-clean tubes before this increases past an acceptable point. High back end temperature can be a sign of dirty tubes which means more energy is being wasted through the stack.

- Minimum pipe; see separate section on this topic.
- Climate control; Eliminate any possible overlaps between heating and ventilation. Ensure minimization of temperature overshoot and oscillation about set point by employing modulating mixing valve control.

Inefficiencies – Inherent to Technology and System

- Ash removal; Plant must cool down so ash can be safely removed on a daily basis. The cooling and subsequent reheating of the entire refractory and thermal mass of each plant every day is a significant inefficiency.
- Unburnt fuel; In the daily ash removal process, unburnt fuel is also taken to the site ash bin. Here the hot ash and unburnt fuel dissipate heat for many hours every day which signifies energy which has left the system.

- Plant hot surfaces; Parts of the plant are poorly lagged and parts of the plant are not lagged at all. This represents heat wastage. This type of plant may suffer from load control and overshoot issues without these energy leakage (load shedding) points.

- Air bypass; Plant has retrofitted air bypass openings to allow air leakage through the furnace and out the chimney at all times even when no load is required. This represents energy wastage. These permanent air openings may have been employed to prevent the buildup of explosive gas.

- Hot expansion vessel; The fill and dump expansion system represents a heat loss as it is uninsulated.

- Multiple units; The 8x separate energy plants are inherent to the organic growth of the business overtime however leads to more hot surface area, starts and stops, ash cleanouts, etc.
- Oversized outputs; The combined output of the 8x plant is nearly 30MW which is greatly oversized for the application. It is suspected the rated output is not a reflection of the true output which can be measure accurately with a heat flow meter or approximately with a fuel rate weight test. Oversized output leads to inefficiency due to poor turn-down ratio and excessive starts and stops.
- Load shedding; The existing system suffers from poor load control and therefore dumps unwanted heat into the greenhouse to prevent a dangerous overtemperature situation. This energy is wasted in instances when the greenhouse is not otherwise calling for heat.
- Manual tube cleaning; This relates to efficiency decrease between cleanings. Increasing cleaning frequency can improve efficiency however has a labour cost implication. Automatic cleaning systems are employed on advanced energy plants to ensure negligible degradation.

General Comments on Existing Plant

- Pressure relief valves should be piped to ground so an overpressure event doesn't create a hot water and steam shower.
- Consider ducting or shielding permanent air intake openings in a way that prevents an explosion event from causing bodily harm without compromising the purpose of the said openings.
- Add water meters to all expansion vessel fill points and monitor water usage. Attempt to reduce any water usage by repairing leaks as soon as possible.

- Test and monitor system water quality and chemical addition to maintain the internal health of the mild steel system.

Minimum Pipe

Minimum pipe is a useful growing technique and is industry standard practice preferred by most growers. Minimum pipe by definition means that even when greenhouse air temp setpoints are exceeded the pipe temperature is kept at a minimum temperature (eg. 35C). The greenhouse often elevates far above its set point and attempts to compensate by ventilation. If there are opportunities to turn off minimum pipe in these conditions without impact to crop and load shedding requirements of plant then they should be considered for energy saving purposes.

Biomass Fuel Specification

While this is by no means a conclusive fuel specification, it is an example of the capabilities of a modern biomass plant. Based on the assessment of the Nelson local area it seems realistic that a wide fuel specification similar to this will allow a low cost and abundant supply. While biomass plant can handle a range of fuels, it is important that it is designed specifically for the local resource.

Fuel specification according to EN 14961-1:2010 - Table 1
Classification and origin of solid biomass:

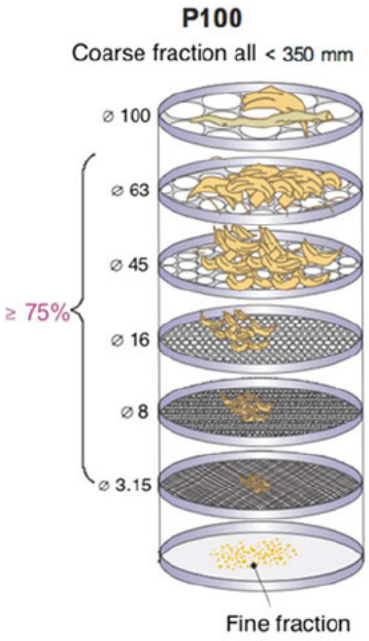
1.1 Forest and plantation wood
1.1.1 Whole trees without roots
1.1.2 Logs
1.1.3 Forest residues
1.1.5 Bark (from timber industry)
1.2 Wood as by-products and residues from wood processing industries
1.2.1 Wood residues with no chemical treatment
1.2.1.1 Wood without bark
1.2.1.2 Wood with bark
1.2.1.3 Bark (from wood and timber industry operations)

Traded Form	Dimension	Acceptable Blend Ratio
Bark	P100	0-50%
Wood Chips	P100	0-100%
Hog Fuel	P125	0-100%
Sawdust	2-10mm	0-30%




Fuel Size Profile (P100)

(all dimensions based on maximum dimension of particle)
Main fraction (>75%): between 3.15 and 100mm
Coarse fraction: <10% between 100 and 350mm
Exceptions up to 600mm: single pieces
Fine fraction: <4% (<3.15mm)



Fuel Parameters	Nominal / Guarantee	Range
Fuel moisture [w-% as received]	M 55*	20 to 60*
Ash [w-% of dry basis]	A 2.0	<3
NCV [kWh/kg as received]	1.95	1.7 to 3.6
Nitrogen [w-% of dry basis]	N 0.4	< 0.5
Chlorine [w-% of dry basis]	Cl 0.03	< 0.03
Sulphur [w-% of dry basis]	S 0.03	< 0.03
Bulk density [kg/m3 as received]	300	250 to 350
Energy density [kWh/m3]		> 600
Ash deformation temperature [°C]		> 1150

*only with combustion air preheater

**Needles and leaves to be max 1% by weight as received of the blend fuel mix. Higher quantities will have to be designed for and the total amount of acceptable fines (< 3.15 mm) in the blend fuel mix to be limited to < 4%. Incombustible elements from the harvesting and fuel manipulation (no chemical treatment) are included in the total amount of ash and it's recommended to keep these contaminants to less than 1%. Other fuel specifications (if deviating) and the guarantee fuel must be reviewed and approved (the use of Table 15 acc. to EN14961-1:2010 is recommended).

Biomass Investment Scenario

A full detailed design is not within the scope of this report. However for the purpose of decision making an investment scenario is outlined here based on the climate profile and site parameters. Detailed design and careful procurement will further specify many requirements including but not limited to: maximum rated output, heat storage volume, mainline routing, preferred suppliers, technology choices, automation, etc. This indication range below is based on a guaranteed output of 8MW combined with an energy management and distribution system including a 4000m^3 insulated heat storage tank. These criteria are indicated to maximize the investment benefit based on the local climatic conditions. The investment range would naturally tighten as design decisions are made, technology is chosen, and site specific quotations are requested from major technology providers.

Item	Low NZD	High NZD
9(2)(b)(ii)		
Total	$ 9(2)(b)(ii)	$ 9(2)(b)(ii)

Advanced Plant cost estimate includes main items of plant such as push and pull floor, fuel feeding conveyors and hydraulics, furnace and FD fans, hot water heater, automatic cleaning and de-ashing into one container, air preheater, multicyclone, ID fan, FGR system, ducting, chimney, control panels and instruments, switchboards, air compressor.

Balance of Plant Room cost estimate includes items such as transport to site, installation, crane hire, commissioning, cabling, galleries, lagging and cladding of fans and ductwork, plant room piping and pumping, plant room building.

Heat Storage Tank cost estimate includes items such as preformed mild steel tank components, rock wool and cladding insulation kit, delivery to site, welding, concrete slab.

Pre-Insulated Transport Main cost estimate includes items such as mild steel pipe with HDPE casing and PU insulation, bends, fittings and joiner kits, transport to site and installation.

Conclusion

With rising fossil fuel cost, it is relevant for JSEL to look at both efficiency improvements and alternative fuels. Biomass is a renewable fuel, and the most cost effective renewable available for the thermal requirement of the site. It is evident that the main components to this decision are: 1. Rising coal costs and fossil fuel usage penalties, 2. Available efficiency improvements and fuel swapping on current plant, 3. Biomass availability, security of supply and cost, 4. Cost and design of advanced biomass plant

Governments like New Zealand's are taking steps to move businesses away from fossil fuels. At the same time coal consumption in other parts of the world is steady or increasing. This puts an inevitable upwards pressure on the cost of coal. There is also a negative public perception on fossil fuel users that may have an economic effect in the future. Conversely to this is a positive marketing impact for products produced through carbon neutral measures.

JSEL's existing plant is not suitable for safe and efficient low grade biomass combustion. There are some efficiency improvements mentioned in the report that would be worth considering however the major bottom line impacts will be thermal screens, modern biomass plant implementation, and maintenance of low cost biomass price points.

If a biomass project is in the cards, then fuel logistics and ultimately the landed cost of the fuel will be of utmost importance. The Nelson area is rich in biomass resource. The bottleneck in supply (if there is one) is more likely related to logistics and delivery, not the availability of the raw fuel. There seems to be one or two obvious players in the business of waste biomass collecting, grading, hogging and delivery. And like any smart business they are positioning their price based on market value which in this case is cost of coal or other biomass options. Like any supply and demand based pricing it will be important for JSEL to entertain long term options such as competing providers, internally managed on site biomass collection and processing, or externally managed off site collection and processing. In this way biomass pricing can be kept low for many years to come.

From the charts contained in this report JSEL can determine a range of return on investments (ROI's) based on their decisions. For example a low ROI scenario will see an expenditure of 9(2)(b)(ii) with a 9(2)(b)(ii) per year energy savings. Conversely a high ROI scenario will see an expenditure of 9(2)(b)(ii) with a 9(2)(b)(ii) per year savings. Intelligent design, procurement, project management, technology selection, energy price negotiation and logistics will move the outcome towards a better return. In conclusion Enriva recommends JSEL to calculate ROI range based on their business parameters and cost of capital. If this range is within JSEL's investment criteria, then investment should be made with careful attention to fuel sourcing arrangement and long term cost, technology selection and procurement and overall system design and implementation while avoiding pitfalls such as over investment and/or under specification.

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JS Ewers A4 (1:3000) - Site Overview

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Site Representation