Final report

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Investigation into refrigeration system optimisation & expansion at Wodonga Rendering

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Abstract

Wodonga Abattoirs engaged Minus40 and Namsat Systems Accounting to work with their refrigeration contractors and engineers on this project. After data capture and analysis Minus40 undertook project scoping of refrigeration upgrade options. This included, looking at the greatest opportunity for savings in energy and carbon emissions against capital expenditure required and provide an Energy Efficiency Opportunities Report. This report provided input into application for Grant Funding under the Clean Technology Investment Program. Pre and post production levels and energy usage was calculated and forecast to provide unit cost improvements due to energy efficiencies. This will provide up to 2MW of electricity to the plant that has a lower carbon emission factor than grid supplied electricity. The spread sheet tool developed could be used by abattoirs to quickly assess refrigeration energy efficiency opportunities within their plants.

Executive Summary

The specific report for Wodonga Rendering produced by Minus40 was endorsed by management and used to make an application for CTIP funding. The CTIP application is attached for MLA's information. As of today the application has been put on hold by AusIndustry subject to instructions from the new government on the future of the program. This application used a combination of energy efficiency opportunities available to Wodonga Rendering including the implementation of Plate Freezers. The Plate Freezers although superior in Energy Efficiency to Blast Freezers were not in the top 10 factors for energy efficiency and correspondingly are not contained in the spread sheet tool. The Plate Freezers benefits of labour cost savings, quicker cycle times, higher quality carton presentation and stowage, etc. were critical in the investment decision and not reliant on energy efficiency in itself.

The Final Milestone was the design and development of the Energy Efficiency Spread sheet Tool. This was developed through analysing data collected at many abattoir plants and statistically analysing the factors impacting energy efficiency/capital costs in regards to refrigeration plant at those sites. Factors that had a high correlation in energy efficiency along with a significant potential saving against the capital cost required to implement were determined. This research determined the key energy efficiency opportunities for refrigeration plant. These factors were then listed as 10 questions, along with electrical usage, cost per kWh and tonnage of Hot Carcase Weight Production. These inputs provide a resulting range of:

1. Refrigeration plant power consumption (RPPC)
2. Potential viable savings expressed as % reduction in RPPC, MWh/year and $/year in savings
3. Upfront capital cost to implement these savings
4. A payback time range in years

These results are not a highly accurate measurement but provide a "ball-park" indication for the quantum of savings achievable. They give management a quick view of energy efficiency opportunities in terms of savings, capital cost to implement and paybacks. If these potential savings and corresponding capital costs are to be verified then a site-specific plant energy audit should be undertaken as a next step.

Contents

1 Project Objective

The objective of the project was to identify energy saving opportunities for the existing refrigeration system, in addition to determine the most operationally efficient design (taking into account refrigeration efficiencies in regards to energy, operations, quality and flexibility requirements) for the proposed refrigeration system expansion. This was achieved by

- Detailed measurement of current energy usage at the site level and also the refrigeration system
- Detailed modelling of energy efficiency opportunities for the current refrigeration system
- Full technology options appraisal for the proposed plant upgrade
- Develop a calculator (spread sheet) tool that will allow any plant to model their current and projected refrigeration technology

2 Success in achieving milestone

All milestones have been achieved successful.

A simple but powerful spread sheet tool has been developed that allows abattoir sites to quickly estimate possible energy efficiency savings from their refrigeration plant.

3 Recommendations

MLA publish and promote the spread sheet tool for use by Abattoirs so that they can quickly assess refrigeration energy efficiency opportunities.

4 Appendices

1. CTIP Application (excluding supporting attachments)

Form Downloaded at: 02/05/2013 09:39:50

WODONGA RENDERING PTY LTD
Mr Tas Davies
Accounting and Systems Consultant

AusIndustry
BUILDING BUSINESS · POWERING PRODUCTIVITY

working together for a cleanenergyfuture

CLEAN TECHNOLOGY INVESTMENT PROGRAM AND CLEAN TECHNOLOGY FOOD AND FOUNDRIES INVESTMENT PROGRAM - APPLICATION FORM

Who should complete the Application Form?

Please complete this form if you undertake manufacturing activities and wish to apply for either:
- The Clean Technology Investment Program (CTIP); or
- The Clean Technology Food and Foundries Investment Program (CTFFIP).

Before You Start

Please ensure you have read the Customer Guidelines to determine your eligibility before applying for either program. These documents are available at ausindustry.gov.au.

- You can save a copy of this form to your computer by clicking the button located at the Adobe Reader tool bar at the top of the form. **Using the File, Save As menu item from your browser will not save the form.**
- Ensure you are connected to the internet as you complete this Application Form. There are fields and functions within the Application Form that require internet access. You may encounter errors if you are not connected to the internet.
- Click on the button for more information about that specific question or part of the form.
- The Application Form will prompt you for answers in certain fields. If you answer a question that indicates you are ineligible, a popup will appear to prevent you from moving forward or submitting the application. If this occurs, you should go back to the Customer Guidelines and ensure you meet the eligibility requirements. If appropriate, you can then change the answer in your Application Form to progress further.

Completing this form

The Application Form contains the following sections:
- Program Selection and Eligibility
- Applicant Information and Organisation Background
- Project Details and Project Funding
- Project Milestones and Key Activities
- Merit Criteria
- Contact Details

The following three calculators are available at ausindustry.gov.au:

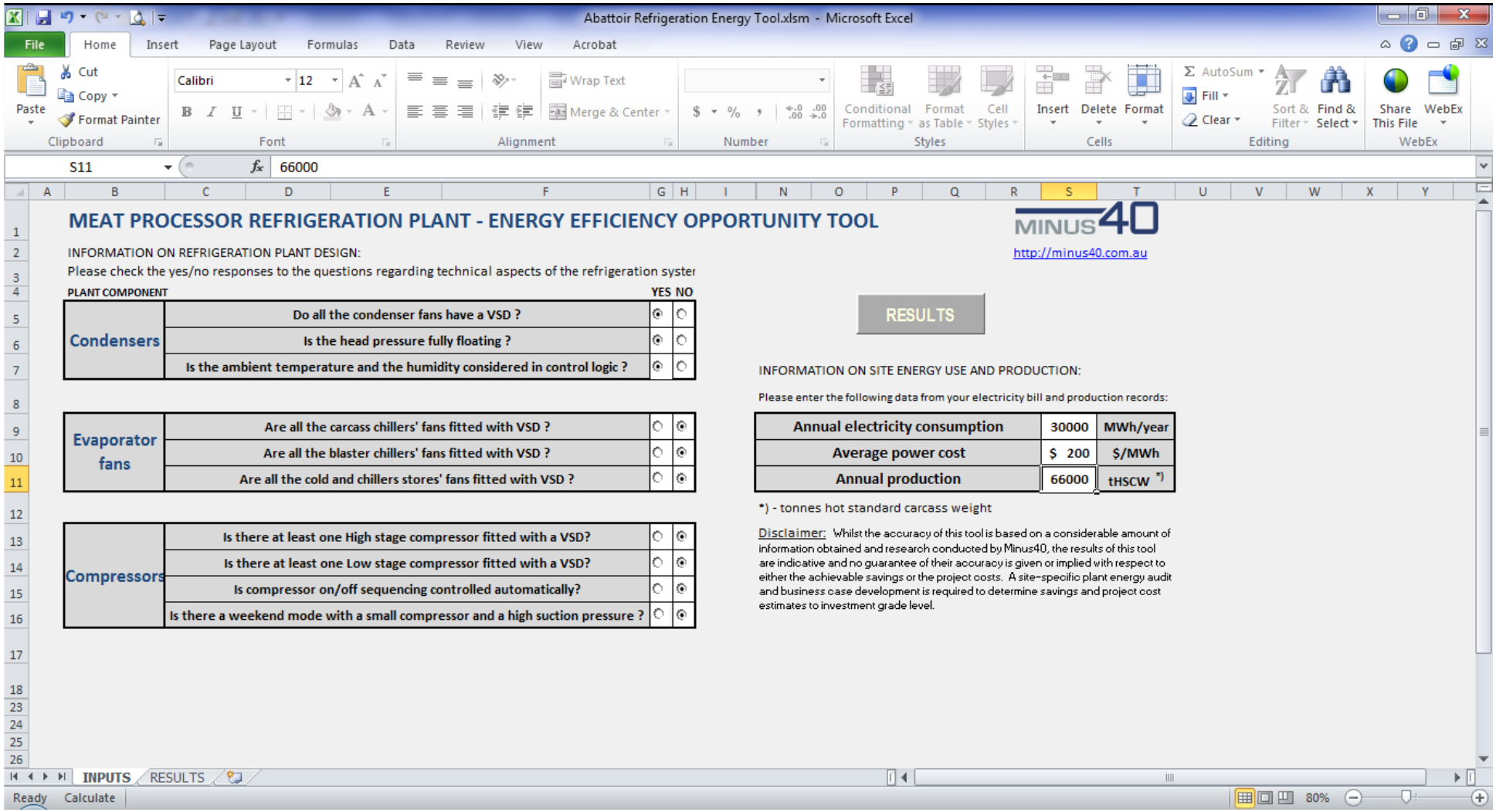
- Energy Threshold Calculator - This will assist in determining if you meet the minimum energy consumption thresholds to apply for the Clean Technology Investment Program.
- Carbon and Energy Savings Calculator - This is mandatory for all applicants to complete and attach as part of the application.
- Return on Investment (ROI) Calculator - This is mandatory for all applicants requesting a grant amount of $1.5 million or more to complete and attach as part of the application. Applicants for grants of less than $1.5 million may find the ROI Calculator useful for estimating a payback period and other financial indicators and may complete and attach the Calculator if they choose to.

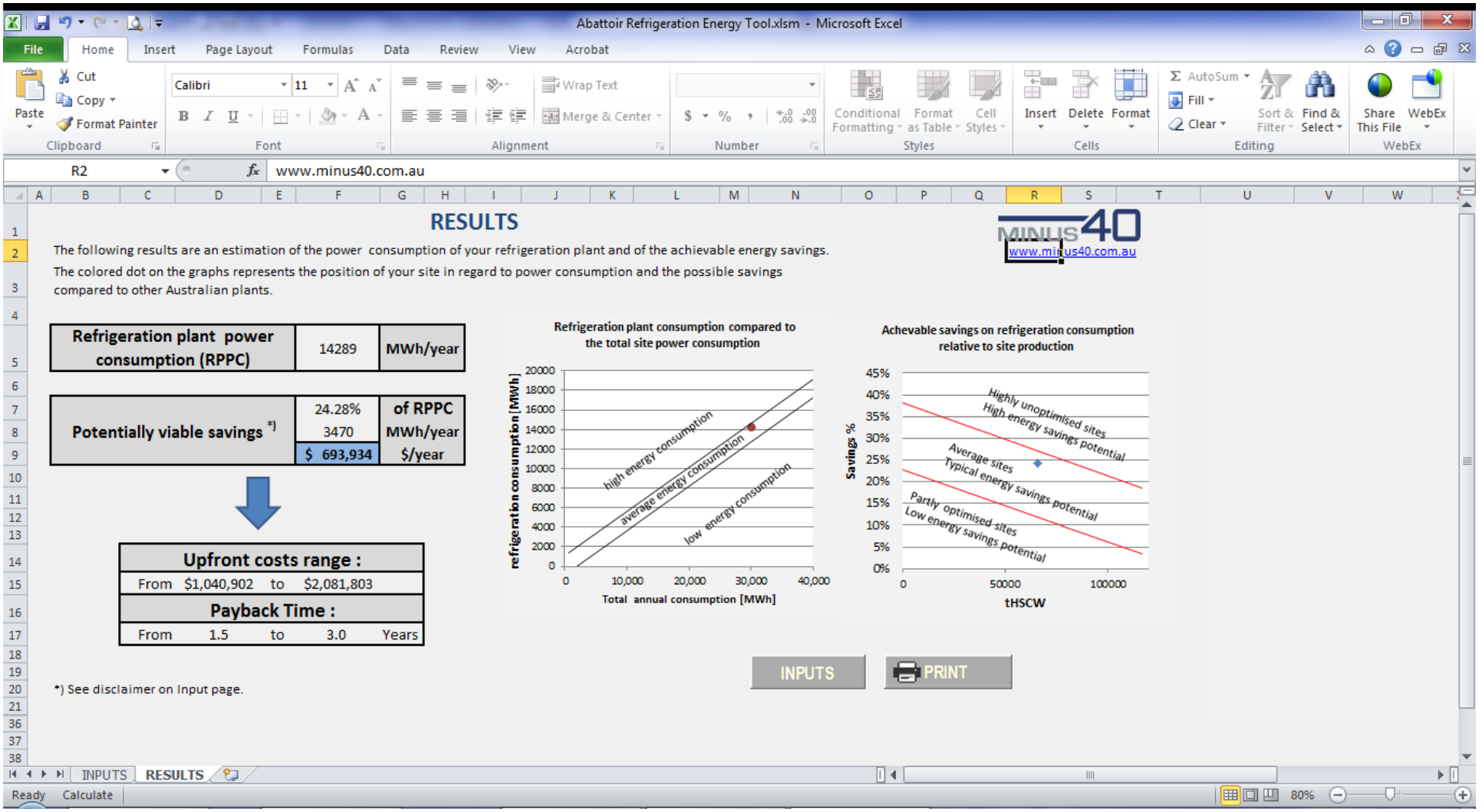
Throughout the form you will be required to attach a number of other documents. Attachment files can be up to 2MB in size.

There is a validation tool at the end of the form. This will highlight mandatory fields that you may have missed, including sections where a mandatory attachment is required. These fields must be completed before you can submit the form.

Clean Technology Investment Programs Application Form March 2013 v.7 Page 1 of 24

2. Refrigeration Energy Efficiency Spread sheet Tool




Abattoir Refrigeration Energy Tool.xlsm - Microsoft Excel
www.minus40.com.au
RESULTS
The following results are an estimation of the power consumption of your refrigeration plant and of the achievable energy savings.
The colored dot on the graphs represents the position of your site in regard to power consumption and the possible savings compared to other Australian plants.
Refrigeration plant power consumption (RPPC)
14289
MWh/year
Potentially viable savings *)
24.28%
of RPPC
3470
MWh/year
$ 693,934
$/year
Upfront costs range :
From $1,040,902 to $2,081,803
Payback Time :
From 1.5 to 3.0 Years
*) See disclaimer on Input page.
Refrigeration plant consumption compared to the total site power consumption
refrigeration consumption [MWh]
Total annual consumption [MWh]
high energy consumption
average energy consumption
low energy consumption
Achevable savings on refrigeration consumption relative to site production
Savings %
tHSCW
Highly unoptimised sites
High energy savings potential
Average sites
Typical energy savings potential
Partly optimised sites
Low energy savings potential
INPUTS
PRINT
INPUTS
RESULTS
Ready
Calculate

3. SUPPORT DOCUMENTATION for Refrigeration Energy Efficiency Spread sheet Tool

MINUS40 Pty Ltd, ABN 30 093 492 552

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Castle Hill, NSW 2154

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Web: www.minus40.com.au

REFRIGERATION ENGINEERS
Consultants, Designers, Project Managers

SUPPORT DOCUMENTATION
ABATTOIR REFRIGERATION ENERGY TOOL

REFERENCE: SUPPORT DOCUMENT-

11 October 2013

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