

Energy & Water Benchmark Survey

- PRELIMINARY SUMMARY OF 12 MONTHS

Robert Kemp

Food & Bio-based Products Group
AgResearch Ruakura
Hamilton, New Zealand



Why benchmark an industry

Benchmarking is done to:

- Provide a comparison point for past and future
- Provide comparison within and across an industry

Benefits?

- Illustrate the benefits (or not) of changes in processing and technology
- Provide evidence of efficiency
- Provide data for pan industry betterment / market access programs



Reasons for greater efficiency

1. Are you interested in reducing your plant's operating costs and improving profitability?
2. Does your plant incur high costs for energy (fuel, electricity)?
3. Does your plant incur high costs for water?
4. Is your plant facing stricter air emission standards?
5. Are you interested in product diversification?
6. Can your plant gain any advantage in the market place from an improved environmental image?
8. Does your plant incur high costs for solid waste disposal (packaging, paunch manure etc.)?
9. Is your plant required to develop a waste management or waste minimisation plan?
10. Would you like to improve relations with environmental regulators?

Source: "Checklist of possible reasons for adopting eco-efficiency"
Eco-efficiency manual for meat processing, Meat & Livestock Australia



What uses energy in a process plant?

Fuel usage in a typical plant that renders:

- Rendering process heat 75%
- Hot water 35%*
- Other uses (space heating, etc.) 25%

Electricity usage in a typical plant that renders:

- Refrigeration plant room 40%
- Freezers and stores 18%
- Services (air, hot water, etc.) 12%
- Air conditioning process areas 12%
- Meat Chillers 8%
- Rendering 8%
- Other 2%

*gained via heat recovery from rendering vapour and/or steam condensate



How much energy during the survey year?

The surveyed plants (42% of NZ export meat plants) used:

- 1,933,000 GJ of fuel
- 1,082,000 GJ of electricity

TOTAL ENERGY used = over 3 million GJ



Putting that into context

The average NZ home uses 11,400 kWh (41 GJ) of
electricity per year

If the survey TOTAL ENERGY used was ALL electricity

The plants surveyed used the energy equivalent of

73,415 average homes

For a year



Electricity cost & potential savings

Why electricity?

Because it is a single energy type, so it is easy to provide an estimate of:

- Cost
- Potential savings



Now, the potential to save

Consider the 24 surveyed plants and their specific electricity use (i.e. GJ electricity to process 1 tonne of meat (dressed weight))

| | |
|-----------------------------------------------------------------|----------------------------|
| Average Specific Electricity Consumption (SEC) | 1.9 GJ/t dressed wt |
| Number of process plants using more than 1.8 GJ/T | 10 |
| Amount of Electricity saved if these 10 plants used the average | 206,979 GJ |
| Value of electricity saving at \$0.10/kWh (\$27.78/GJ) | \$5.75 M /year |



Remember:

The estimated saving of \$5.75 M is:

- Based on data from 24 / 56 (43%) of NZ meat export plants
- Total meat processed by these plants = 585,927 t

Requires 10 process plants indicating greater than 1.8 GJ/t (average SEC of all plants surveyed) to adjust

Note: for some processors there may be variables that have not been considered in this basic estimation.



The 2010-2011 energy & Water Benchmarking Survey



Current NZ Meat process industry

| Export (ME) Plants ONLY | |
|-----------------------------|-----------|
| Beef only | 15 |
| Beef+Sheep | 7 |
| Beef+Sheep+Calf | 12 |
| Beef+Calf | 1 |
| Sheep only | 12 |
| Sheep+Calf | 8 |
| Calf only | 1 |
| Total Process Plants | 56 |

Data from: Beef + Lamb "Meat Processing in New Zealand
(www.beeflambnz.com/guide/index)



Note regarding Summary data

This presentation provides summary data for:
October 2010 to September 2011

Please Note:

The data only covers the 24 process plants included in the survey
– i.e. 43% of export plants, not the whole industry



Number of Process Plants in Surveys

| | 2010/11 | 2001/02 | 1994/95 | 1993/94 |
|---------------|---------|---------|---------|---------|
| All surveyed | 24 | 18 | 20 | 23 |
| Rendering | 12 | 10 | 11 | 14 |
| Non-rendering | 12 | 8 | 9 | 9 |
| South Island | 13 | 8 | 14 | 16 |
| North Island | 11 | 10 | 6 | 7 |



Meat Processed ('000 tonnes)

| | 2010/11 | 2001/02 | 1994/95 | 1993/94 |
|--------------------|---------|---------|---------|---------|
| Industry aggregate | 690* | 983 | 1024 | 944 |
| All surveyed | 586 | 334 | 417 | 388 |
| Rendering | 359 | 243 | 294 | 302 |
| Non-rendering | 227 | 91 | 123 | 86 |
| South Island | 331 | 149 | 268 | 260 |
| North Island | 255 | 186 | 149 | 127 |

* Export ONLY

(YE Aug 2011. Data Source: Statistics New Zealand, Overseas Merchandise Trade, via Infoshare database & MIA)



Total Energy Consumed (TJ):

| | 2010/11 | 2001/01 | 1994/95 | 1993/94 |
|----------------|---------|---------|---------|---------|
| All surveyed | 3074 | 2084 | 2295 | 2306 |
| Rendering | 2449 | 1876 | 2059 | 2172 |
| - South Island | 2083 | | | |
| - North Island | 366 | | | |
| Non-rendering | 625 | 217 | 235 | 134 |
| - South Island | 183 | 741 | 1049 | 1178 |
| - North Island | 442 | 1352 | 1245 | 1129 |



Total Energy Consumed: Average / Plant (TJ):

| | 2010/11 | 2001/02 | 1994/95 | 1993/94 |
|---------------|---------|---------|---------|---------|
| All surveyed | 128 | 116 | 115 | 100 |
| Rendering | 204 | 188 | 187 | 155 |
| Non-rendering | 52 | 27 | 26 | 15 |

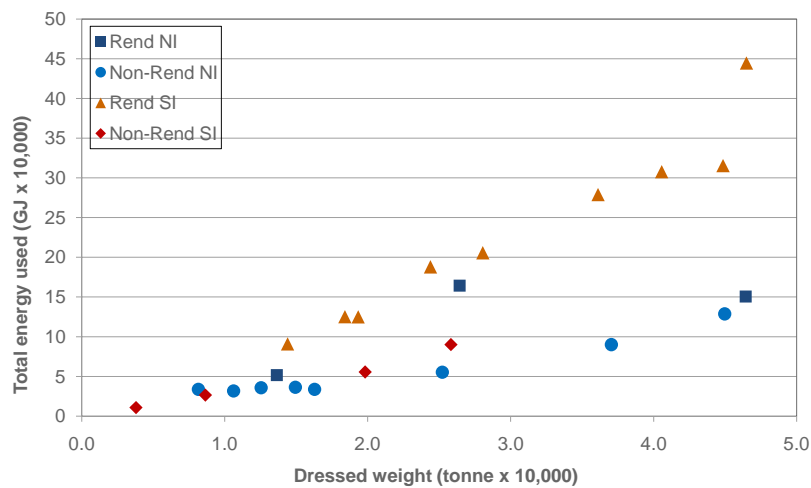


Specific Energy Consumption (SEC) – GJ/t

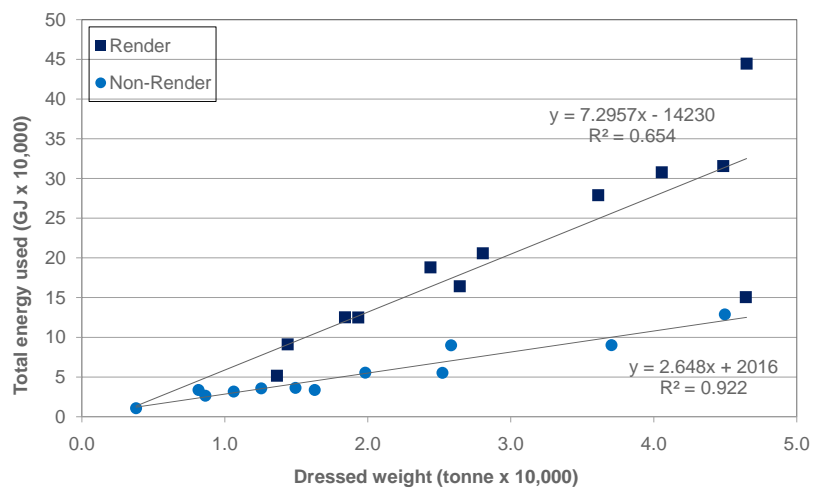
| | 2010/11 | 2001/02 | 1994/95 | 1993/94 |
|---------------|---------|---------|---------|---------|
| All surveyed | 5.2 | 6.2 | 5.5 | 5.9 |
| Rendering | 6.8 | 7.7 | 7.0 | 7.2 |
| Non-rendering | 2.8 | 2.4 | 1.9 | 1.6 |
| South Island | 6.9 | 5.0 | 3.9 | 4.5 |
| North Island | 3.2 | 7.3 | 8.4 | 8.9 |



Total Energy Use



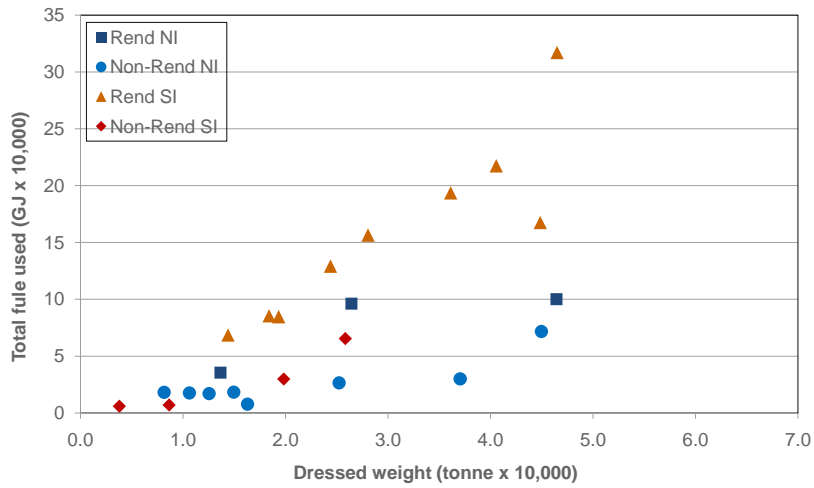
Total Energy Use Trends



Specific Fuel Use (SFC), GJ/t

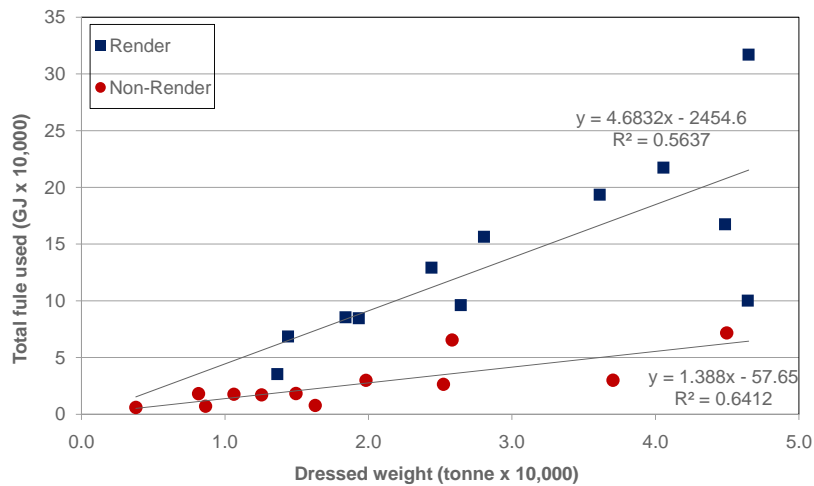
| | 2010/11 | 2001/02 | 1994/95 | 1993/94 |
|---------------|---------|---------|---------|---------|
| All surveyed | 3.4 | 4.0 | 3.9 | 4.2 |
| Rendering | 4.6 | 5.2 | 5.1 | 5.2 |
| Non-rendering | 1.4 | 0.7 | 1.1 | 0.5 |
| South Island | 4.6 | 3.0 | 2.6 | 3.0 |
| North Island | 1.7 | 4.7 | 6.2 | 6.5 |

Total Fuel Use (GJ/t)



agresearch

Total Fuel Use Trends



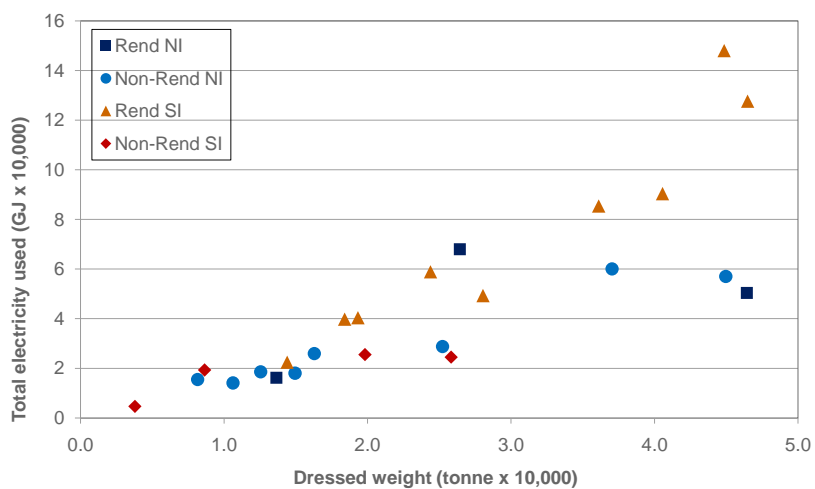
agresearch

Specific Electricity Consumption (SEC), GJ/t

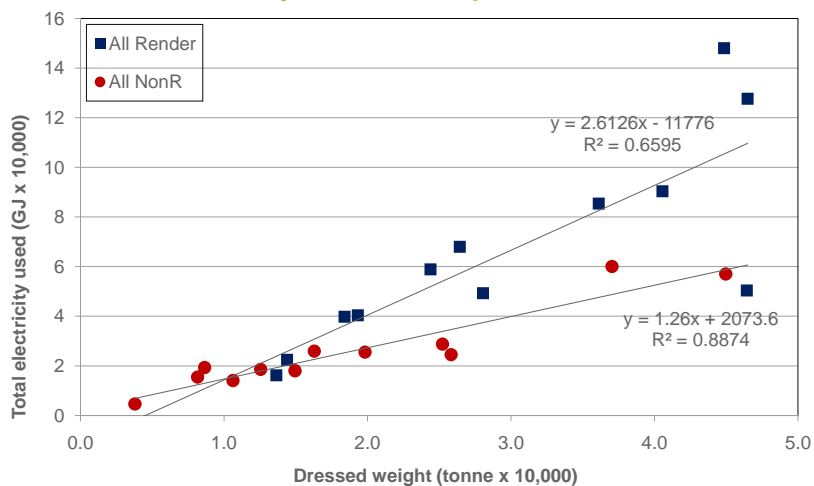
| | 2010/11 | 2001/02 | 1994/95 | 1993/94 |
|---------------|---------|---------|---------|---------|
| All surveyed | 1.9 | 2.3 | 1.6 | 1.8 |
| Rendering | 2.2 | 2.5 | 1.9 | 2.0 |
| Non-rendering | 1.4 | 1.7 | 0.8 | 1.0 |
| South Island | 2.2 | 2.0 | 1.3 | 1.5 |
| North Island | 1.5 | 2.5 | 2.2 | 2.4 |



Total Electricity Consumption



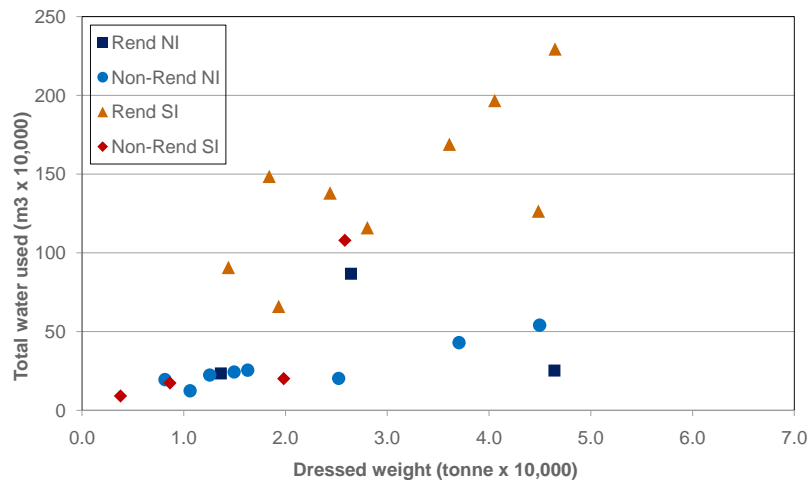
Total Electricity Consumption Trends



Specific Water Use, m³/t

| | 2010/11 | 1995/96 | 1994/95 |
|-------------------|---------|---------|---------|
| Potable water | 21.4 | 26.7 | 25.8 |
| Non-potable water | 9.2 | 31.3 | 37.2 |
| Total | 30.6 | 37.4 | 42.2 |

Total Water Use



Opportunities

There is room for improvement – always

More efficient use of resources IS being driven by our markets

- LCA of lamb, beef and venison done
- Water foot-printing is now under way

Overall:

- Specific energy use is marginally improved
- More efficient use of resources impact directly on the bottom line

Observations

Process and operational changes compared to previous surveys:

- Increasing proportion of chilled vs frozen
- Greater degree of cutting and packaging
- Many newer plants or significant upgrades
- Closures of many plants and rationalisation in general
- Increasing pressure from shipping
 - Reduced pick-up points (hubs)
 - Slow-steaming



Acknowledgements

THIS PROJECT WAS:

Organised and overseen by Richard McColl (MIA)

Funded by EECA and the participating plants

SPECIAL THANKS TO:

Marlon dos Reis, (AgResearch) for support, data analysis and
plant reports

Industry staff for collating and returning the required data

THE END

DISCUSSION

What is needed to improve on this information?

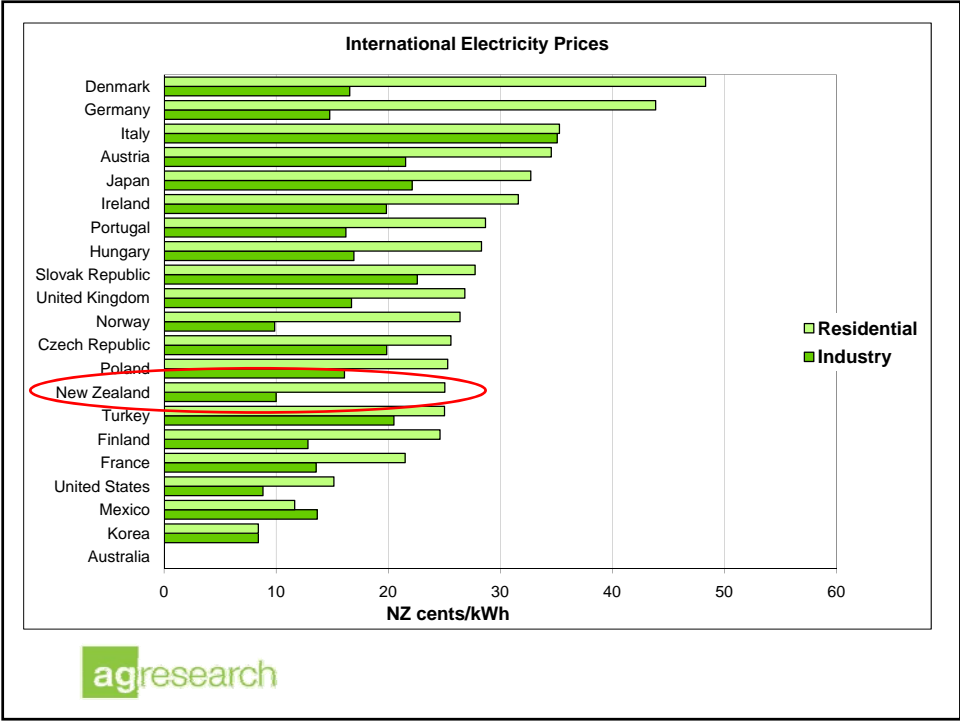
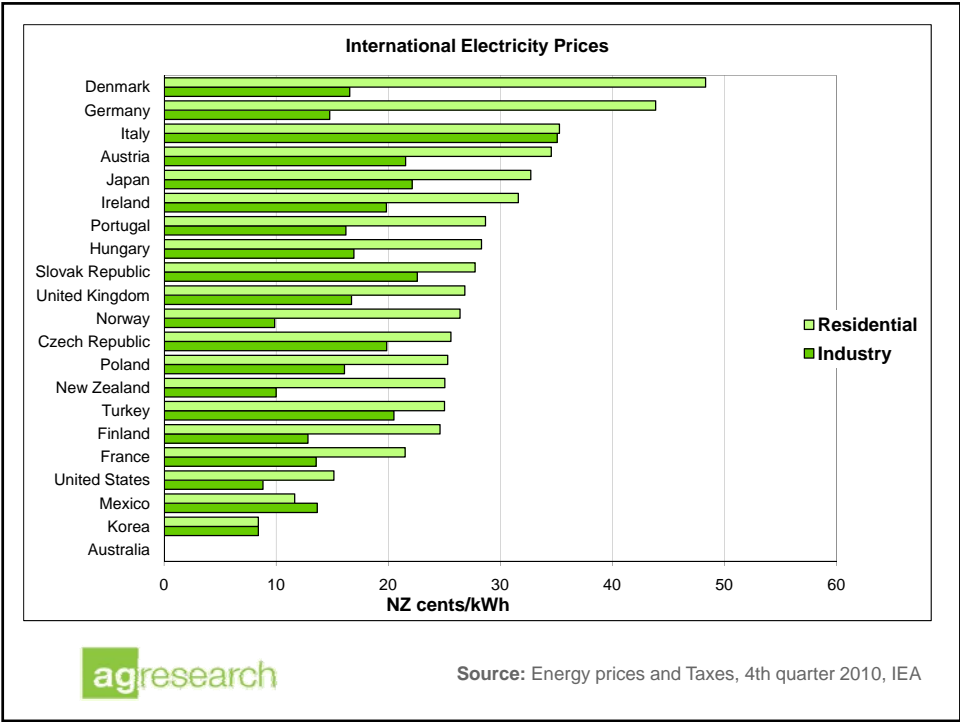
This survey is based on a process plant overview approach – an “umbrella approach”

- Data on energy, water and animals going in
- Meat, by-products and waste going out

What is required to improve efficiency is to:

- Break the process down into “cost-centres”
- Evaluate each “cost centre”
- Monitor and target to improve efficiency
- Compare cost centres across plants
- Bring the worst performing up to the average

Trying to achieve this on a “whole of plant” basis is not practical



Zooming in on NZ....

