

Energy and water benchmarking and efficiency culture change

Energy and water intensity benchmarking, and the development of an efficiency culture in red meat processing

Project Code
2023-1008

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Date Submitted
20/09/2023

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Project Description

This project consisted of energy and water benchmarking sessions and efficiency culture change diagnostic sessions to help AMPC members to assess energy and water intensity improvements since the last report in 2020, and to build an initial understanding of the maturity of energy management systems and first steps towards achieving a strong culture in energy efficiency respectively. The major achievements of the benchmarking sessions are high levels of member engagement and interest in the results.

Project Content

Stage 1 – Energy and water benchmarking

The 2020 benchmarking tool was updated to replace information links and adjust business case calculations. Research was conducted to develop recent case studies that demonstrate the value of energy and water intensity improvement projects, and a presentation was developed for the introduction of the benchmarking sessions. A series of benchmarking workshops were held with AMPC members, and a benchmark report was provided to each AMPC member including energy and water intensity ratings, and a list of key projects with references and actions that AMPC members can take to improve energy, water, and carbon management. This is the same approach used in previous years.

Stage 2 – Energy efficiency culture maturity assessments

To achieve effective implementation and sustainable outcomes, businesses require a strong culture for change and to be led by a highly supportive and interested management team. The second stage of this project involves a diagnostic review to assess the level of maturity of the AMPC members' business management systems such as policy, targets, plans, training, people, and project implementation practices and identify areas of improvement. Especially those areas which are creating barriers to further improvement in energy and water management.

The intent of this work is to help AMPC members take the next step towards improving and maintaining energy and water intensity improvements using a structured management systems approach such as ISO50001.

Project Outcome

Energy and water benchmarking

The results of the 2022 and 2020 sessions are summarised in Table 1. This analysis is based 22 AMPC members who participated in the benchmarking sessions, 5 more than in 2020.

Table 1 Energy and water intensities and benchmark ratings

Resource intensity	2020 High	2020 Low	2020 Average (\pm variation)	2020 Benchmark ratings*	2022 High	2022 Low	2022 Average (\pm variation)	2022 Benchmark ratings*
Electrical intensity (kWh/tHSCW)	428	194	309 (\pm 39%)	15 G, 2 F	577	169	313 (\pm 84%)	19 G, 3 F
Thermal intensity (MJ/tHSCW) (rendering)	5,321	1,329	2,727 (\pm 95%)	7 G, 4 F, 3 P	3,701	1,171	2,458 (\pm 51%)	9 G, 7 F, 1 P
Thermal intensity (MJ/tHSCW) (non-rendering)	1,329	725	1,002 (\pm 33%)	3 G	2,293	791	1,266 (\pm 81%)	4 G, 1 F

Thermal intensity (MJ/tHSCW) (all sites)	3,772	725	2,186 (±73%)	10G, 4F, 3 P	3,701	791	2,187 (±69%)	13G, 8F, 1 P
Total energy intensity (MJ/tHSCW)	5,314	1,556	3,297 (±61%)	N/A	5,069	1,537	3,315 (±53%)	N/A
Water intensity (kL/tHSCW)	11.1	5.1	7.8 (±42%)	16 G, 1 F	16.3	3.8	9.0(±80%)	20 G, 2 F

*Good (G), fair (F), and poor (P) ratings are based on comparison to idealised model for a plant with the same processes.

The comparison of 2022 and 2020 results show the average energy intensities have not changed significantly and the water intensity has increased by 15%. Many of the 2022 minimum intensity values are lower than the 2020 values which indicates that some of the sites have improved significantly. The minimum energy and water intensity values are good indicators of best practice. This improvement is even more significant when we consider the average level of production capacity in 2020 was 95% and the average in 2022 was 82% (lower production capacity is usually associated with lower energy and water performance). These values are far lower than the benchmark model predicted which indicates the benchmark tool could include a new category for best practice.

The major categories of energy projects discussed during the benchmarking sessions included solar PV, batteries, refrigeration upgrades, biomass boilers and heat pumps. Nearly all sites have installed or are considering solar PV systems and in some cases batteries. Water improvement projects included hot water systems optimisation, upgrade of sterilisers, use of water recycling, cattle wash studies, new cattle wash plants, automation to reduce water use in non-production periods.

Efficiency culture change

Efficiency culture maturity was assessed using a management systems diagnostic called One2Five Express Energy. This tool is an Energetics propriety tool which follows the ISO 50001 International Energy Management Systems (EnMS) Standard. This tool provides a rating of one to four stars in the express version and up to five stars in a more comprehensive tool. Five AMPC members participated in the management systems diagnostic sessions and the results provided a good initial glimpse of the level of maturity of management systems and the potential opportunity for efficiency culture improvement for AMPC members. The star ratings ranged from 4-star demonstrating formal systems in place to 2-star indicating basic systems with one member achieving a 3-star indicating strong progress towards formal systems (see Table 2).

The results of the management systems diagnostic sessions indicate that AMPC members in the red meat processing industry are like most those in other industrial sectors assessed by One2Five where management systems are generally in their formative stages at a 2-star rating. The good news is that there is a lot of potential savings to be made by implementing effective well-structured management systems (demonstrated through ISO50001 accreditation). A study¹ in the US found that companies which achieved ISO 50001 certification as part of the US Department of Energy Superior Energy Performance programme, delivered average savings of 10% within 18 months. Furthermore, 75% of the savings delivered were low-cost measures requiring no capital investment.

¹ Assessing the Costs and Benefits of the Superior Energy Performance Program

Table 2 Efficiency culture diagnostic results compared to energy and water intensities.

AMPC member	One2Five express energy Star rating**	% score	Thermal intensity (MJ/tHSCW)	Electrical intensity (kWh/tHSCW)	Water intensity (kL/tHSCW)
1	4	88%	1,171	312	3.8
2*	3	64%	929	169	3.9
3	2	40%	2,364	577	6.2
4	2	35%	1,497	244	8.0
5	2	29%	1,550	372	6.9

*Non rendering

**See Table 3

Table 3 One2Five Express Energy star ratings

One2Five Express Energy star rating	Star Rating description
4	Your organisation has developed formal systems for energy management
3	Your organisation has made substantial progress in developing processes for energy management
2	Your organisation has started to address energy management
1	Your organisation has yet to address the management of energy

Benefit for Industry

Energy and water benchmarking

The benchmarking sessions, workbooks and the reports were well received by members. The benchmarking project has become a standard way of measuring energy and water performance which is used by members to help gauge how well they are improving performance. The benefits of the benchmarking workbook and sessions are:

- ◆ Raised levels of awareness in new technologies, renewable energy options and electrification.
- ◆ Comparison of benchmark results with 2020 benchmarking project allowed members to see how well they have progressed or not.
- ◆ For those members with multiple sites, comparison of benchmarking results helps to build collaboration between sites where learnings from a good performer can be transferred to less advanced sites.

Energy efficiency culture development

The results of the management systems diagnostic indicate that the red meat processing industry has started the development of an energy efficiency culture. Nolan Meats (site 1 in Table 2) achieved a 4-star rating and demonstrated a strong efficiency culture with high performance in both energy and water intensity. Further development of an efficiency culture may provide an important part of the on-going management of energy and

decarbonisation projects. An effective management system will provide cost savings, reduce capital, and resource costs for energy management and help build a sustainable result.

Useful resources

AMPC, 2022 Environmental Performance Review for the red meat processing industry, September 2023, <[2022 Environmental Performance Review for the red meat processing industry \(ampc.com.au\)](https://www.ampc.com.au/2022-Environmental-Performance-Review-for-the-red-meat-processing-industry)>

Ernest Orlando Lawrence Berkeley National Laboratory, Assessing the costs and benefits of the Superior Energy Performance program, July 2013, <<https://www.energy.gov/eere/amo/articles/assessing-costs-and-benefits-superior-energy-performance-program>>