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Electrification Opportunities in Victoria's Industrial Sector

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Executive Summary

Industry – or the manufacturing sector – is an important element of Victoria's economy. At the end of July 2017, there were some 23,600 industrial enterprises in Victoria. While this represents only 3.8% of all enterprises in Victoria, industry accounts for 14% of large enterprises with 200+ employees, and 12.6% of those that turnover $10 million or more per year.

Industry consumed almost 114 PJ of energy in FY2017 and only 29% of that was electricity. Gas is the dominant fuel, with a 65% of total energy use in the sector. The average quantities of gas consumed varies greatly by enterprise and sub-sector. The largest energy users are in sectors such as petroleum and coal product manufacturing and primary metal and metal product manufacturing, but there are relatively few such enterprises in Victoria. Machinery and equipment manufacturing has the largest number of enterprises (over 4,600) but they are, on average, smaller energy users (0.3 TJ/year of non-electrical energy). The food and beverages sector is the second largest in terms of business counts (3,933), and average non-electrical energy use is higher at 4.7 TJ/year.

Gas is primarily used for steam raising in boilers, with the steam then distributed for use in a range of applications, at different temperatures, sometimes with heat recovery. Generally plants are highly integrated and designed for 'cascading' use of progressively lower temperature heat in a series of processes. The overall energy efficiency of such a system can be low, with boilers generating steam at higher temperatures than actually required for end-uses, and with significant losses in heat distribution and recovery processes. At the time, the integrated nature of plants can present a barrier to electrification, unless new investments or major reinvestments in existing plant are occurring.

Food and beverages is one sector of industry that is growing, where plants can be more modest in size (micro-breweries, industrial kitchens, etc) and where hot water or lower temperature steam is a key process input. These characteristics make it more likely that electrification opportunities will be taken up, but there will also be niche or less frequent opportunities in other sectors as well.

We identify at least 200 enterprises in the food and beverages sector, and also textiles, leather, clothing and footwear, that are estimated to have gas use that would be suitable for electrification via industrial heat pumps for hot water/low-temperature steam. On conservative assumptions, this electrification with renewable electricity could generate up to 400 kt CO2-e of emissions reductions. State-wide, there would be other sectors and enterprises where incremental electrification opportunities are available. Also, we have noted that large opportunities may arise with new plant or major re-investment points, but some of these investments are likely to be too large to be influenced by VEU.

Overall, recalling that gas can be only around one quarter of the cost of electricity (but both gas and electricity pricing vary widely by enterprise size), and that gas is the dominant fuel in the sector, electrification can be challenging from a financial perspective. Also, the integrated nature of many plants and, in some cases, a lack of new investment, may further hamper the uptake of electrification opportunities. That said, the high energy efficiency and modular nature of industrial heat pumps, combined with the dynamic nature of the food and beverages sector in Victoria in particular, make this a particularly attractive opportunity for VEU to focus on, at least in the first instance.

1. Background

1.1 Purpose

This study examines the potential for electrification of non-electrical energy use in the industrial sector in Victoria. The purpose is to determine whether it would be advantageous to support this activity under the Victorian Energy Upgrades program.

1.2 Context

Energy markets are undergoing rapid change in Australia, as indeed they are in many countries around the world. The changes are being driven by a mix of factors including:

- Significant reductions in the levelised cost of electricity generated from large-scale wind farms and from solar photovoltaic (PV) panels, to the point where generation from these renewable sources is no more expensive, and in some cases less expensive, than conventional sources and prices generally available for contract in the National Energy Market
- PV panels have additional value for customers when installed 'behind the meter' on buildings, as the value of this generation is equivalent to the avoided cost of electricity imports
- Low feed-in tariffs, relative to the cost of imported electricity, create an incentive for those with PV systems to use the electricity themselves rather than export it, and/or to store it for later use[1]
- Market prices for both electricity and gas in Australia have increased by around 200% over since 2000, increasing the demand for alternative supply sources and for energy efficiency
- There are growing concerns regarding the use, and in particular the development of new, fossil fuel resources due to climate change
- Investment risks in fossil fuel development have also been increased by policy uncertainty at the national level
- The use of electricity from renewable sources offers a 'fast track' for companies or organisations wishing to reduce their greenhouse gas emissions, and innovations such as renewable electricity power purchase agreements (PPAs) are making this easier and cheaper for customers to choose
- At the end-use level, the efficiency of many electrical technologies continues to out-pace that of gas technologies, through continuing advances in the co-efficients of performance of heat-pump based technologies (for space heating and cooling, hot water), in particular.

The effect of these factors has included rapid take-up of solar generation systems first in the residential sector and, more recently, in the commercial and even industrial sectors. Also, they create a context in which it is increasingly likely that customers may have a greater tendency to at least consider electrical solutions over gas-based solutions.

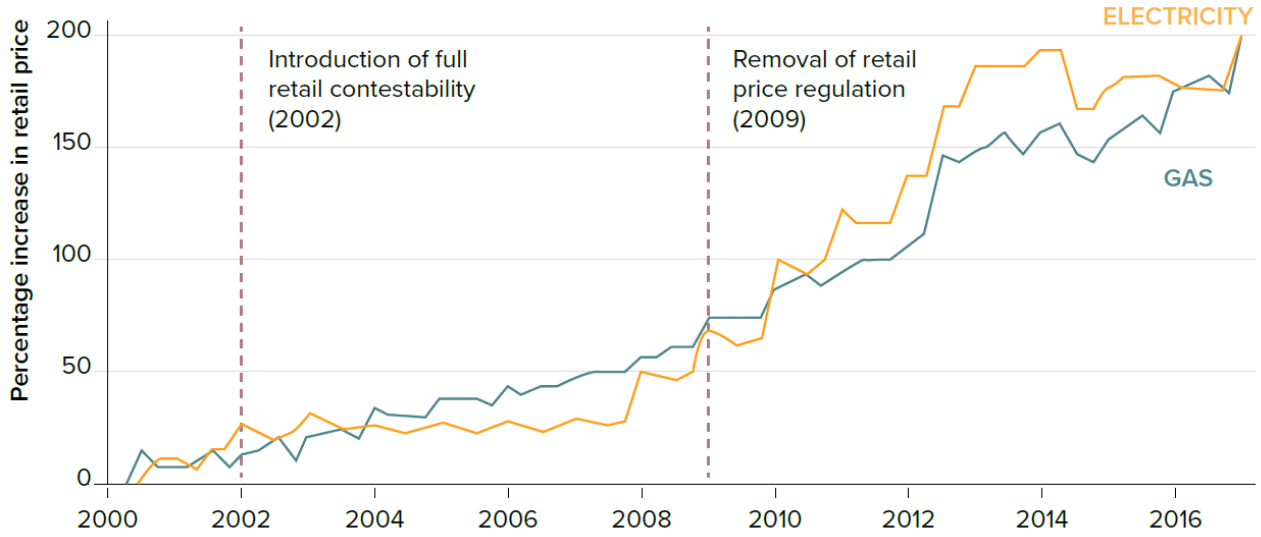
Unlike in the commercial sector, gas is the dominant fuel in the industrial sector in Victoria, accounting for 65% of total energy use in FY2017 (see Chapter 2 for details). Most industrial

[1] Although, despite falling battery storage costs, this remains an uneconomic choice for many consumers.

enterprises are relatively larger users of energy than in the commercial sector, and much of the energy use is for thermal processes, such as steam-raising, for which gas is suitable. Also, the delivered cost of gas remains *considerably* lower than electricity. While prices paid for both energy sources vary significantly from customer to customer – gas is likely to be one quarter of the cost of electricity on a GJ for GH basis. Based on analysis of data presented in the *Independent Review into the Electricity and Gas Retail Markets in Victoria* (2017), typical business customer costs for electricity may be around $101/GJ but only $26/GJ for gas. This price differential means that many industrial customers have a financial incentive to use gas wherever feasible.

Expectations regarding future costs are also very important for customer decision-making about fuel choice. The rapid changes in the energy market make this more difficult than usual to evaluate. On the one hand, the falling cost of renewable electricity generation will place downward pressure on electricity prices over time. However, there are also short-term price risks associated with the possible retirement of large coal-fired generation units at the end of their economic lives. There will also be a need to increase energy storage capacity, as part of the transition to a low carbon economy, and there will be costs associated with building this capacity. Figure 1 below indicates that in Victoria at least, and over the last 20 years, the retail prices of electricity and gas moved broadly in line with each other (to varying degrees, as shown), meaning that the relative cost of the two energy sources will not have changed greatly. Given that gas and electricity compete with each other, and also that gas can be used to generate electricity, there is an argument that broadly the same cost relativities between the two sources could persist for some time into future.[2] Therefore it seems likely that expectations about future relative costs of electricity and gas will not be a major factor weighing on fuel choice decisions in the near future.

Figure 1: Victorian Electricity and Gas Price Index, 2000 - 2017



[2] Barring policy developments such as carbon pricing.

1.3 Scope and Limitations

The study has a limited scope and timeline, and it has drawn primarily on a set of electrification opportunities identified in the *Electrifying Industry* report by Beyond Zero Emissions (BZE). BZE was a partner in this project and supplied opportunity data from that report/research for this project. However, this opportunity set will not cover every electrification opportunity in Victorian industry. The BZE report has a national focus, and not all the sectors covered in it are well-represented in Victoria.

Further, a challenge for any study of energy use in the industrial sector that is limited to public domain information, as this one is, is that energy consumption in the sector is generally considered commercially sensitive, and therefore limited data is published. Indeed, the major source of energy consumption statistical information in Australia – Australian Energy Statistics – only reveals in detail (at the 2-digit ANZSIC level) around half of total industrial energy consumption in Victoria. The energy use for some sub-sectors has therefore been estimated.

Finally, the nature of energy using processes in industry is highly diverse, depending upon the sub-sector, the nature of products produced, the original age/design of the plant, and its size and scale. To deepen this preliminary study, it would ideal to engage directly with key sub-sectors of industry in Victoria. This could help to characterise the extent of specific electrification opportunities, industry's perceptions of investment opportunities and barriers and, therefore, the opportunities for VEU support to influence investment outcomes.

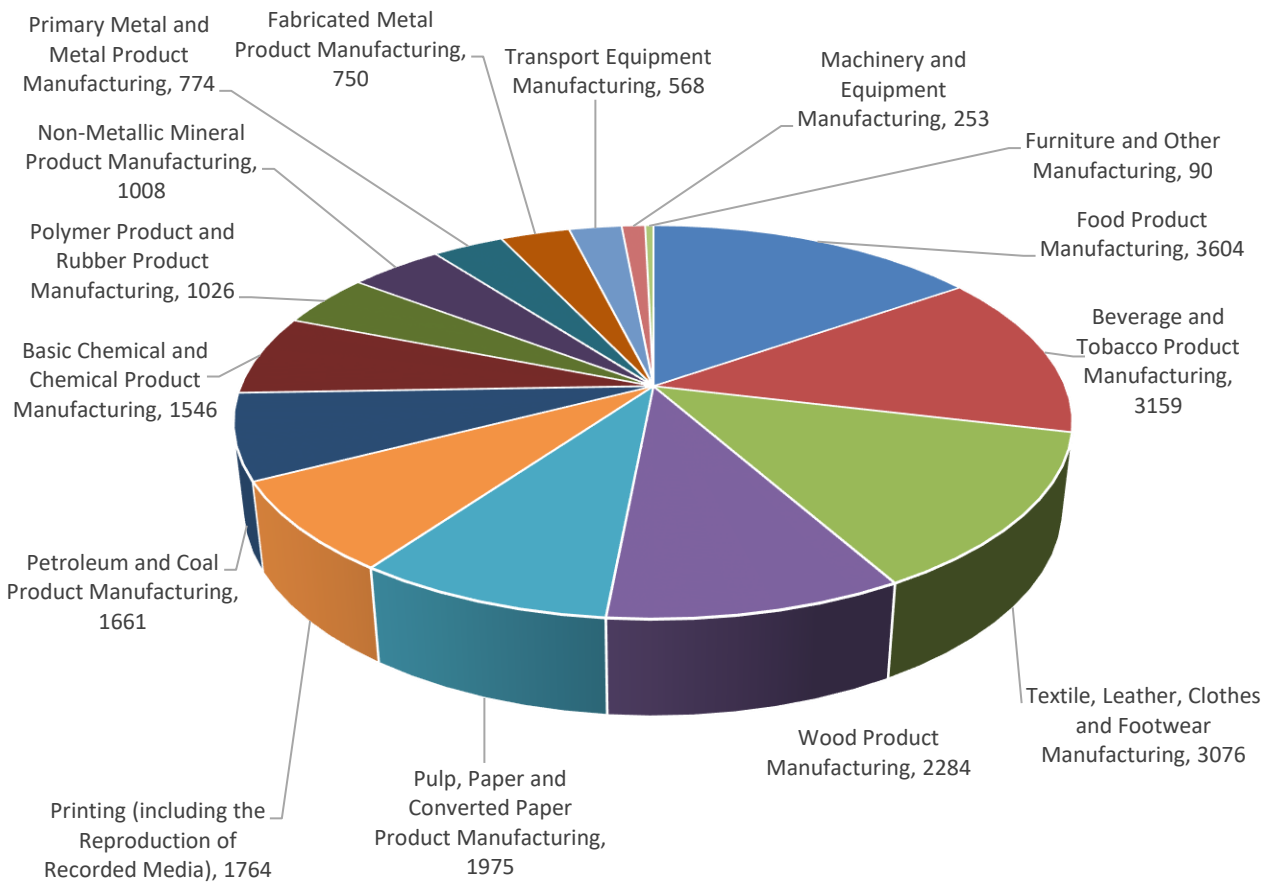
2. Victorian Industry Electrification Opportunities

2.1 Victoria's Industrial Sector

Industry in an important sector of Victoria's economy, with over 23,600 enterprises as at the end of July 2018. While the sector represents only 3.8% of all 618,000+ enterprises in Victoria, 14% of *large* enterprises, measured as those with 200+ employees, are to be found in this sector. In addition, 12.6% of Victorian enterprises that turnover $10 million or more per year are also to be found in the industrial sector.[3] Note that we define 'industry' in this report to mean 'manufacturing' – Division C in the ANZSIC framework, or those sectors classified between 11 and 25 at the ANZSIC 2-digit level.

Figure 2 provides an overview of the count of manufacturing enterprises in Victoria at the 2-digit level, again observed as at end July 2018.

Figure 2: Number of Enterprises, Manufacturing, Victoria, ANZSIC 2-digit level, FY2017



[3] Australian Bureau of Statistics, *8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2014 to Jun 2018, Businesses by Main State by Industry Class by Turnover Size Ranges, June 2018 (a)*, February 2019; and *Businesses by Main State by Industry Class by Employment Size Ranges, June 2018 (a)*, February 2019.

Enterprise statistics are available down to the 4-digit level in Australia (which, for example, distinguishes between Ice Cream Manufacturing (1132) and Cheese and Other Dairy Product Manufacturing (1133). However, there are 143 such categories in the manufacturing sector alone, (and 55 categories at the 3-digit level), which is too many to present graphically or in table form. However, enterprise data at the 3- and 4-digit levels have been summarised in an accompanying workbook. Further, since this report is interested in the energy use of Victoria's industrial enterprises, there is little value in resolving enterprise counts at a scale for which energy data is not generally available. As discussed below, energy consumption data is published primarily at the 2-digit level in Australia, although we have been able to estimate the gas (and coal) consumption of some 237 industrial sites identified at the 4-digit level in Victoria. This is also provided to the Department in the accompanying workbook but not published here, as the data could be considered sensitive.

2.2 Energy Use in Victoria's Industrial Sector

As noted above, *Australian Energy Statistics* is a key source of information on energy use in Victoria's industrial sector. The Office of the Chief Economist works closely with the Australian Bureau of Statistics to compile this data, drawing on surveys, industry data sources and other data, but also balancing its model of energy production and use in Australia with data on imports and exports, and accounting for conversions of primary to secondary energy sources. AES generally publishes consumption data (annually, by jurisdiction) at the ANZSIC 2-digit level. However, in Division C Manufacturing, some sectors are combined, including:

- 11 (food product manufacturing) is combined with 12 (beverage and tobacco product manufacturing)
- 15 (pulp, paper and converted paper product manufacturing) is combined with 16 (printing including the reproduction of recorded material)
- 23 (transport equipment manufacturing) is combined with 24 (machinery and equipment manufacturing).

In addition, some values left blank where there is in fact energy consumption, to protect the identity of large sites whose energy use may be able to be discerned if data were published in a more disaggregated form. Where there are too few enterprises in a sector for data for that sector to be published, the consumption is instead added to the state totals, by fuel, for the Division. As a result, total and actual energy use is significantly greater than the sum of energy use shown for each sector. Figure 3 shows that less than 10% of total LPG use, up to 100% of coal briquette use, and just over half of gas use, is identified by sub-sector in AES.

As we are interested in the total (non-electrical) energy use of all sectors, we estimate fuel use for all sectors. This requires allocating the unallocated energy, which do primarily by estimation, but also informed by data from the National Pollutant Inventory that provides and indication of the volume of fossil fuel combustion at around 250 specific industrial sites in Victoria. NPI data is identified at the 4-digit level and thus enables at least an impression of the gas use (primarily – a new sites also use coal) at that level, as discussed further in Section 3.1 below. However, we stress that the totals modelled below by sub-division are estimates only. We allocate the unallocated fuels in the following proportions:

- Petroleum and coal product manufacturing (17): 20%
- Basic chemical and chemical product manufacturing (18): 20%

- Polymer product and rubber product manufacturing (19): 20%
- Primary metal and metal product manufacturing (21): 35%
- Fabricated metal product manufacturing (22): 10%
- Furniture and other manufacturing (25): 5%.

These assumptions can be altered by the user if desired.

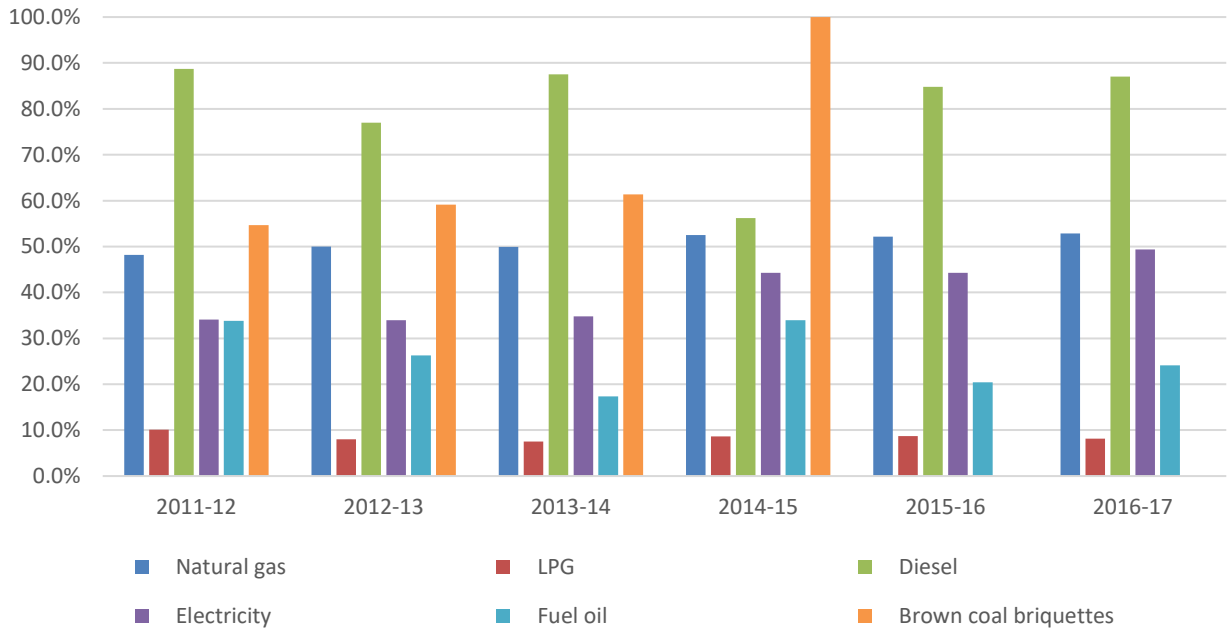


Figure 3: Shares of Total Industry Energy Use in Victoria Allocated to Sub-Divisions in Australian Energy Statistics

For projections, we apply the observed rate of change in fuel consumption at the 2-digit level over the FY2012 – FY2017 and assume, as a default, that the same rate of change will apply to FY2025. In some cases – generally where totals are very small – this approach can lead to counter-intuitive rates of growth or shrinkage, and so the model enables the user to override these defaults and apply a user-preferred growth rate.

Figure 4 shows that total and, to a lesser degree, non-electrical energy consumption have both fallen in the sector since FY2012, and we project this to continue, albeit at a slowing rate over time. This figure also illustrates that, increasingly over time, non-electrical energy (and primarily gas) accounts for the largest share of industrial energy use in Victoria.

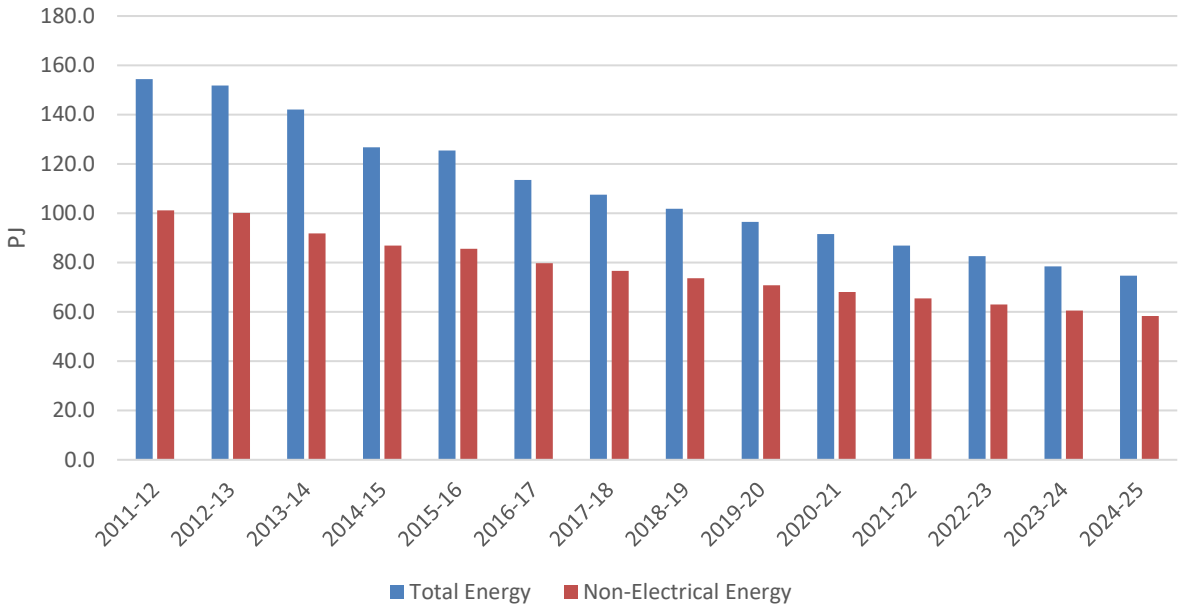


Figure 4: Historical and Projected Total Energy, and Non-Electrical Energy, Consumption, Industrial Sector, Victoria

2.2.1 Non-Electrical Energy Use

In FY2017, some 71% of total energy use in Victoria's industrial sector was non-electrical. Gas dominates the total and non-electrical energy use, with 65% of the total – see Figure 5. While there may well be opportunities for electrification of fuel oil, briquette, LPG and diesel end-uses in Victorian industry, we have not investigated these in this study, but rather focused on gas use and electrification opportunities.

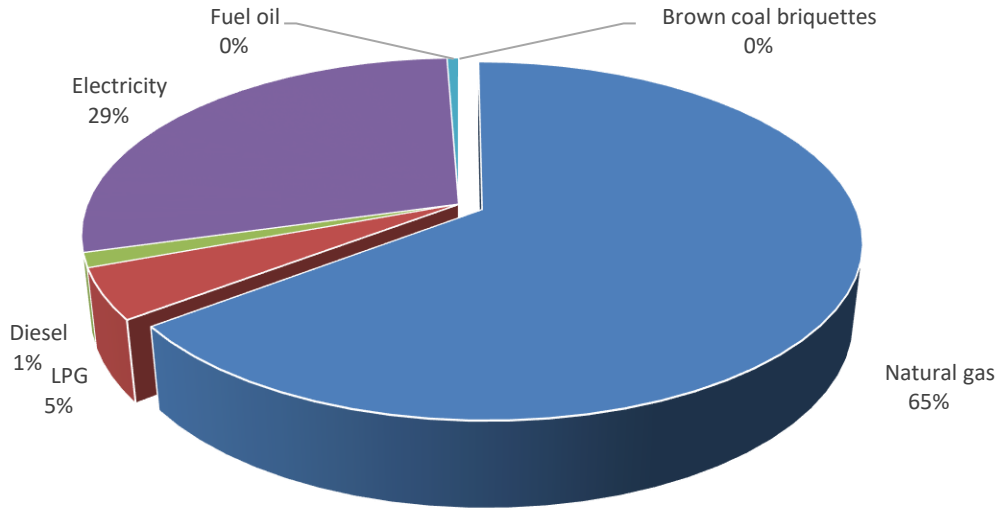


Figure 5: FY2017 Fuel Mix, Manufacturing, Victoria

2.2.2 Non-Electrical Energy Use by Sector

Drawing on the energy model described above – that is, including the estimated consumption of sectors not resolved in AES – Figure 6 shows the estimated distribution of non-electrical energy consumption at the 2-digit level in Victoria's industrial sector. The major sub-sectors are estimated to include:

- Food, beverages and tobacco (23%)
- Primary metal and metal products (17%)
- Non-metallic minerals (12%)
- Pulp, paper and printing (11%).

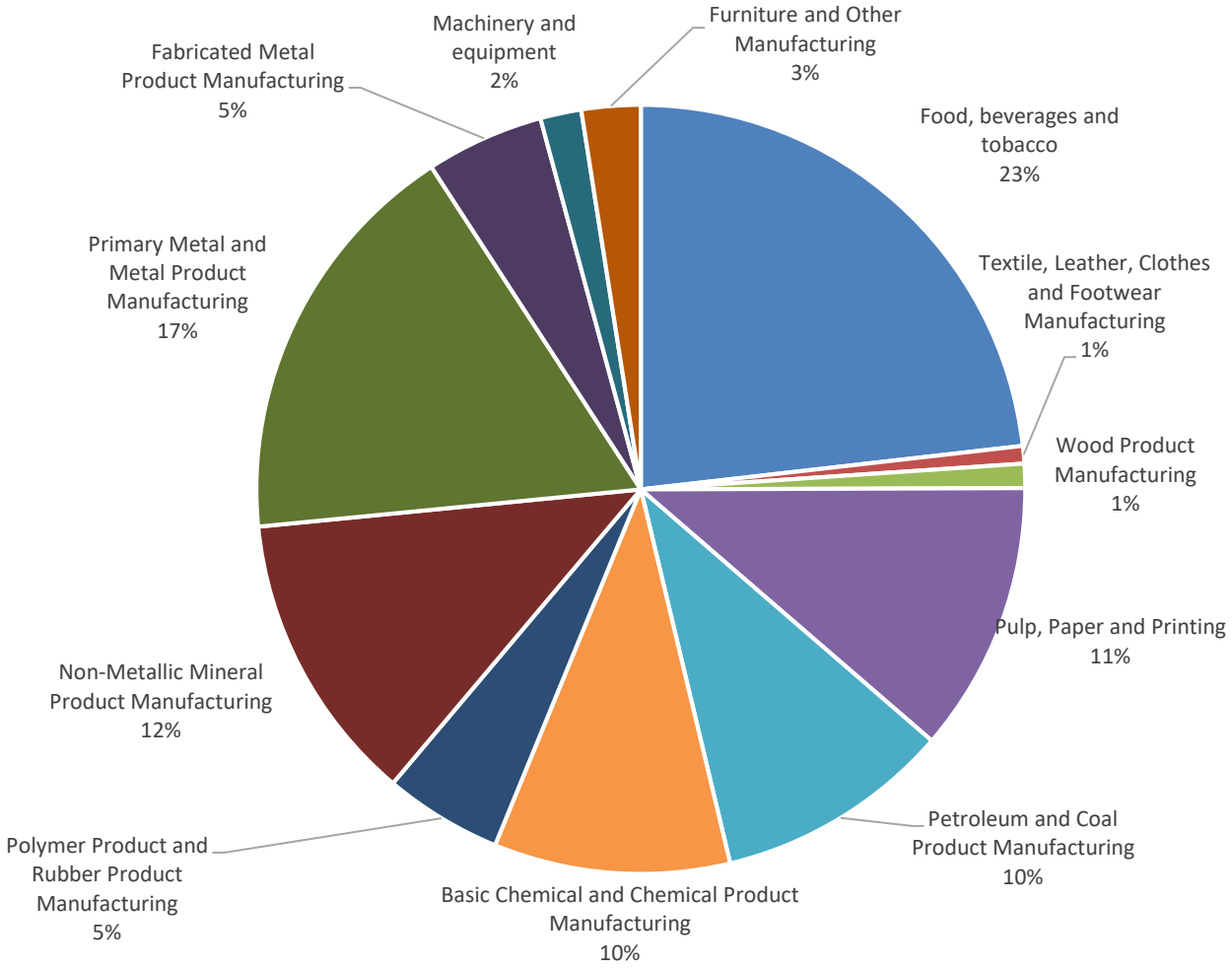


Figure 6: Estimated Non-Electrical Energy Consumption by Sector (ANZSIC 2-digit level), Manufacturing, Victoria, FY2017

As noted in Section 2.1, the number and also the average size of enterprises varies significantly by sub-sector. In addition, the energy consumption of enterprises within a given sub-sector will vary significantly depending primarily upon the size of the operation they are running. Figure 7 provides some indication of this diversity. It shows the number of enterprises in a sub-sector (at the 2-digit

level) on the vertical axis, and the average use of non-electrical energy in terajoules (TJ) per enterprise on the horizontal axis. It shows, for example, that while there are relatively few enterprises in the petroleum and coal product manufacturing sector, each one is, on average, a much larger energy user than in other sectors. It also shows that even though the food, beverages and tobacco sector leads total non-electrical energy use in Victoria, the average energy consumption of these enterprises is smaller, at 4.7 TJ in FY2017, as there are many more of these enterprises (3,933 in FY2017). While this figure shows the difference in the average non-electrical energy consumption per enterprise within a sector, it still does not show the variation within sectors.

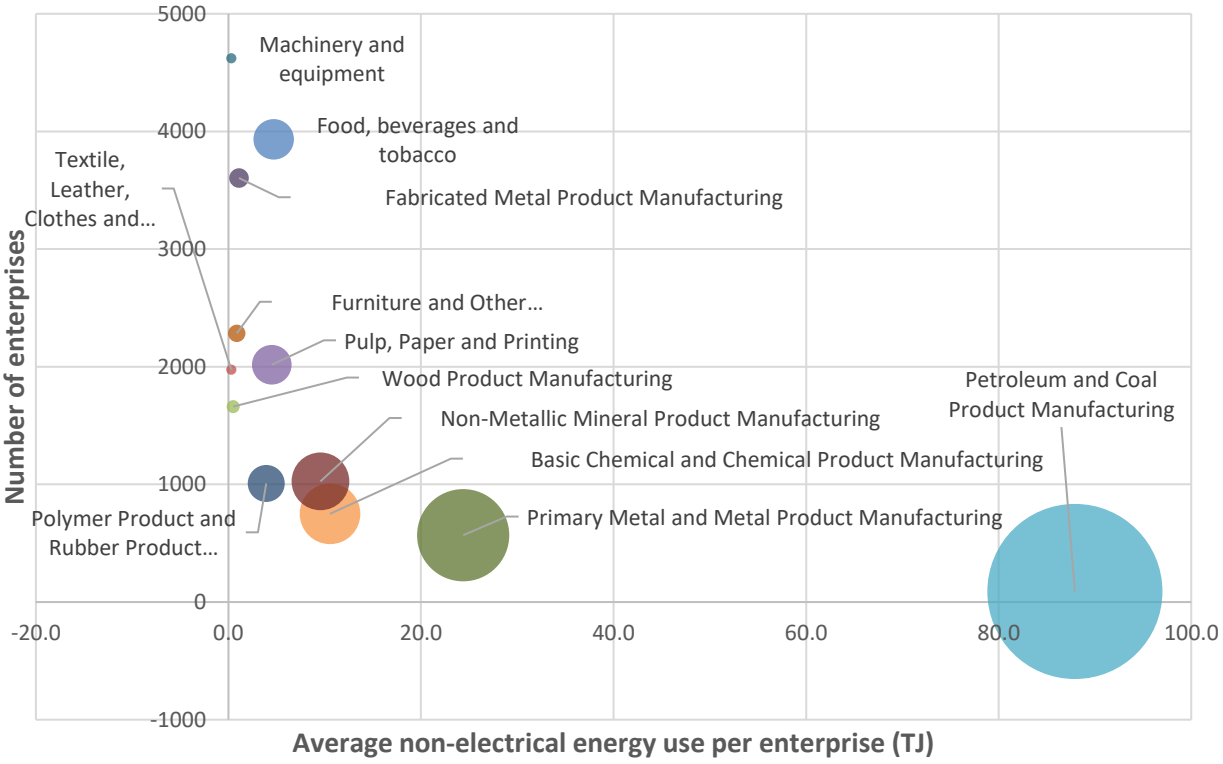


Figure 7: Victorian Industry - Number of Enterprises and Estimated Average Non-electrical Energy Use per Enterprise (TJ), 2017

2.2.3 Energy End-Use in Manufacturing

Most manufacturing processes require some use of thermal energy (heat); many require very large quantities of heat. Thermal energy used directly or indirectly in an enormous variety of manufacturing processes is the major use of natural gas by the manufacturing sector. Natural gas is a fuel which can be very easily controlled in combustion equipment and is much cleaner than alternative fossil fuels to store, handle and burn. It is for these reasons that once natural gas became widely available in Australia, during the 1970s, it replaced the fossil fuels previously used (fuel oil, heating oil, coal and coal briquettes) almost as quickly as gas distribution networks could be built. This was particularly the case in Victoria, where natural gas was cheaper and more abundant than anywhere else in Australia. Use of coal is now confined to a relatively small number of mostly large

manufacturing establishments, in situations where it still has a cost advantage and where its more demanding handling and pollution control requirements can be accommodated.

Until very recently, large scale use of electricity to provide heat (or, more precisely, non-motive energy) for manufacturing has been confined to a few specialist applications. These include electrolysis, for some chemical and metallurgical processes, notably aluminium smelting, and electric arc furnaces, for secondary steel making and a few other metallurgical processes.

Recent years, however, have seen a rapid development of industrial heat pump technology, capable of heating water in small/medium industrial scale volumes to temperatures above 100 deg. C. There have also been significant developments in other technologies capable of delivering process heat at higher temperatures. However, a recent report by BZE, together with additional analysis undertaken by BZE for this report, have made it clear that, with the exception of a few special applications, such as microwave drying, these higher temperature electric technologies are currently less economically attractive than heat pump hot water/steam production. Accordingly, the examination of the manufacturing sector in this report focusses almost exclusively on opportunities to use heat pumps to supply hot water and low-pressure steam for manufacturing processes.

As it happens, this is a particularly good match to the structure of the Victorian manufacturing sector. Compared with all other Australian states, a much larger share of industrial gas consumed in Victoria is used in boilers to produce hot water and low/medium pressure steam, and a much smaller share is used to produce high temperature heat in kilns, furnaces and similar types of equipment.

2.2.4 Gas Consumption in the Industrial Sector in Victoria

As noted, natural gas supplies almost all of the energy used as heat by manufacturing businesses in Victoria. According to *Australian Energy Statistics*, the last use of brown coal briquettes by Victorian manufacturing industry occurred in 2014-15, though there is still some small use of coal by-products and coke, derived from black coal. Very small quantities of LPG are also used. Wood and wood waste are also used in those industries which use timber as a raw material.

Table 1 shows Australian Energy Statistics figures for energy use by manufacturing in Victoria in 2016-17, the most recent year for which detailed Australian energy consumption data are available.

ANZSIC Subdivision	Gas	Wood etc.	LPG	Coal etc.	Diesel	Electricity	Total excl. electricity
11, 12 Food and beverage Product Manufacturing	17.1		0.1	0	1.2	6.1	18.3
13 Textile, Leather, Clothing and Footwear Manufacturing	3.4	0	0	0	0	0.4	3.4
14 Wood Product Manufacturing	0.8	1.8	0	0	0	0.5	2.5
15 Pulp, Paper and Converted Paper Product Manufacturing	9.0				0.0	4.2	9.0

ANZSIC Subdivision	Gas	Wood etc.	LPG	Coal etc.	Diesel	Electricity	Total excl. electricity
16, 17, 18, 19 Printing, oil refining, chemical products	*confidential*						
20 Non-Metallic Mineral Product Manufacturing	9.5		0.2		0.1	2.1	9.8
21, 22, 23, 24, 25 Metals, metal products, all other manufacturing	*confidential*						
Total manufacturing	72.2	1.8	5.3	0.7	1.6	33.8	81.6
Total manufacturing excl. ethane feedstock	61.2	1.8	5.3	0.7	1.6	33.8	70.6
Hence, total of 16, 17, 18, 19, 21, 22, 23, 24, 25	32.4	0.0	5.1	0.7	0.3	20.5	38.5
Total of 16, 17, 18, 19, 21, 22, 23, 24, 25 excl ethane feedstock	21.4	0.0	5.1	0.7	0.3	20.5	27.5

Table 1: Energy consumption by manufacturing in Victoria, by major sector, in 2016-17 (PJ)

Several explanatory notes are needed to fully understand these data.

- The table excludes the use of petroleum products to provide energy at the Altona and Geelong oil refineries, and also the use of propylene and other petroleum by-products used as both feedstock and thermal energy at several petrochemical manufacturing plants at Altona and Geelong. This energy use is extremely large, but detailed numbers are commercially confidental. Because of the size and nature of this energy use, it is not considered further in this report.
- Natural gas consumption as reported in Australian Energy Statistics includes ethane with natural gas in its statistics for gas consumption. Ethane, produced in the Gippsland basin oil and gas fields, is supplied to Qenos Altona as feedstock for the manufacture of polyethylene and related plastics. Data on the Qenos website can be used to estimate that approximately 11 PJ of ethane is used as feedstock at Altona. We have therefore subtracted 11 PJ from the reported total consumption of natural gas, to obtain a figure for total natural gas consumption for thermal energy.
- Australian Energy Statistics reports the estimated quantities of fuels used to produce electricity, at cogeneration facilities located on industrial sites under the electricity supply industry Subdivision of ANZSIC, meaning that these quantities are not included in this table. This omission covers gas used at a number of establishments, and also wood and wood waste used at the Maryvale paper mill. It follows that quantities of gas and other fuels reported by Australian Energy Statistics as being consumed in the various manufacturing sectors is less than the total quantities of fuels supplied to manufacturing sites in each sector, whenever sites falling within a sector include cogeneration.

Of the fuels shown in Table 1, natural gas, wood and biofuels, LPG, and coal and coal by-products are used predominantly to provide heat. Of these, natural gas is by far the most important. The

use of natural gas by the various sectors of manufacturing shown in Table 1, is shown graphically in Figure 8.

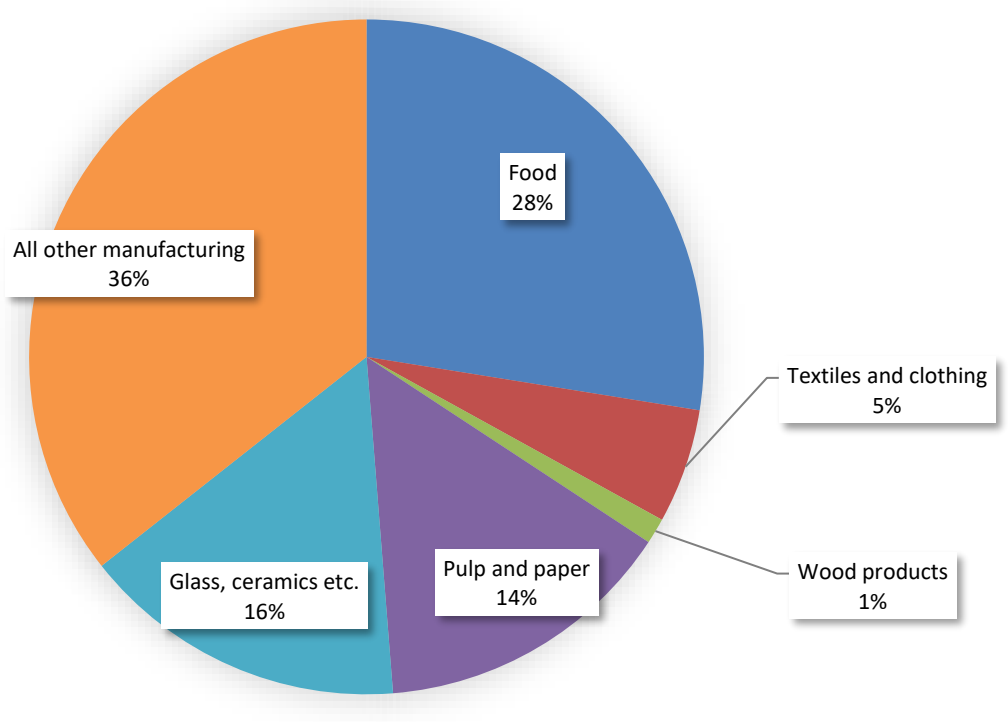


Figure 8: Natural gas used to supply energy to manufacturing industry in Victoria, 2016-17 (PJ)

Source: Australian Energy Statistics, 2018, Table F

The data in Table 1 show that, across all sectors of manufacturing in Victoria (excluding, as noted, petroleum products used in oil refining and petrochemicals), natural gas is by the most important fuel used to supply heat. In 2016-17 it accounted for 87% of all fuels used. This is a higher fraction than in Australia as a whole, because elsewhere black coal is also an important source of thermal energy in a number of sectors, and bagasse (sugar cane waste) supplies very large quantities of thermal energy in the sugar milling industry. Victoria also differs from other states because its total use of fuels for heat (again excluding oil refining) is, in absolute terms, considerably less than half as much as the corresponding totals for Queensland, NSW and WA, though more than for SA and Tasmania. The main reason for this difference is that a number of the most energy intensive manufacturing activities do not occur at all in Victoria, including the production of alumina, primary steel, ammonia, other metals produced by thermal smelting, cement clinker, and raw sugar.

Figure 9 is the equivalent for Australia of Figure 8 (for Victoria), showing shares of natural gas used in the various sectors of manufacturing.

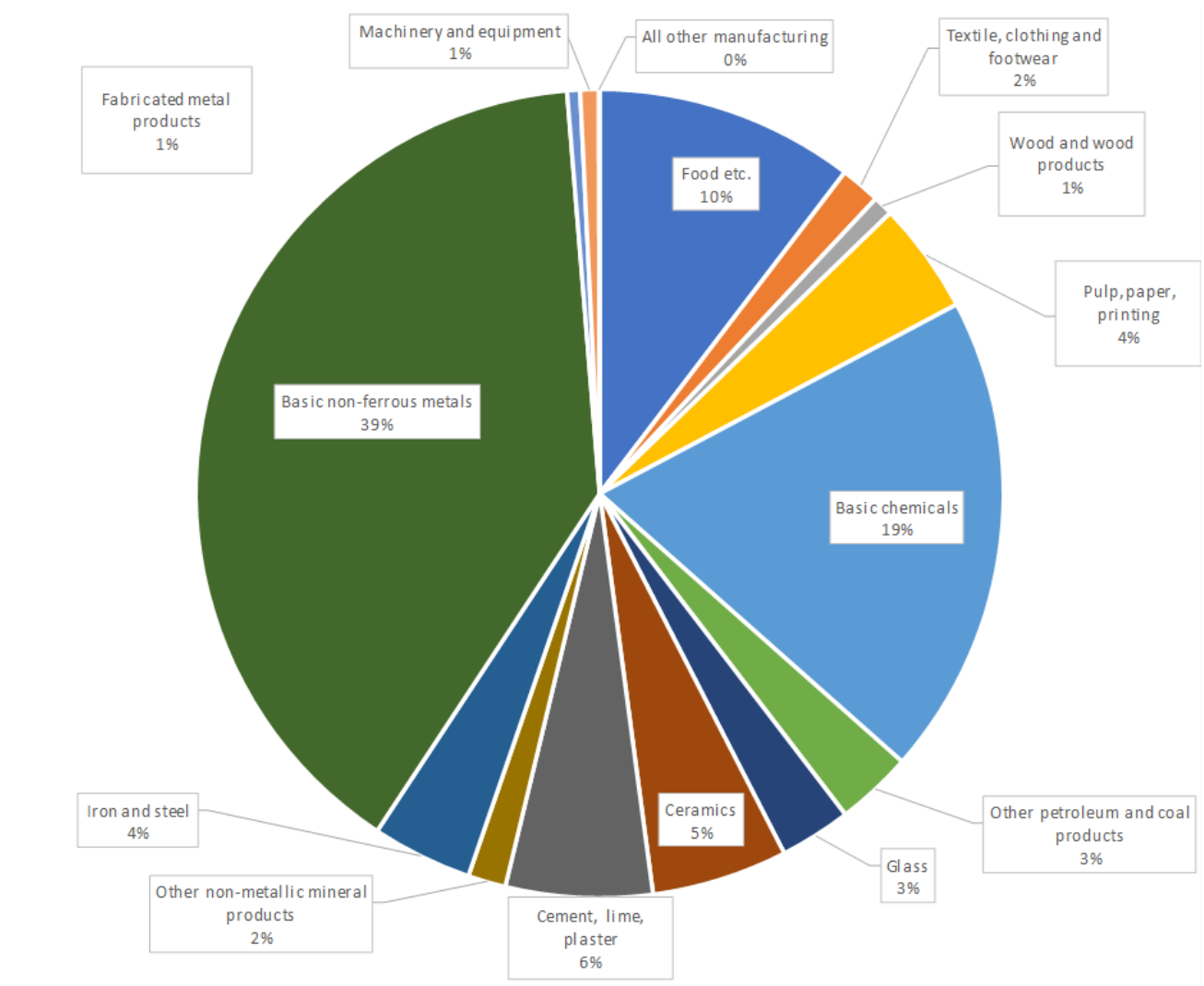


Figure 9: Natural gas used to supply energy to manufacturing industry in Australia, 2016-17 (PJ)

Source: Australian Energy Statistics, 2018, Table F

Figure 3 shows how gas use by manufacturing in Victoria has changed since 2008-09. (The classification of the various sectors of manufacturing as used by Australian Energy Statistics was changed in that year, meaning that sectoral data for earlier years are not directly comparable with data for the years since 2008-09.) Note also that the totals includes for each year include gas used as petrochemical feedstock and so are also not directly comparable with the total consumption shown in Table 1 and Figure 9.

It can be seen that, with the exception of 2011-12, gas consumption by manufacturing has decreased in every year since 2008-09. The decrease has particularly large in the "All other manufacturing" category. It is likely that most of this decrease has occurred in large, energy

intensive chemical products production, though lack of detailed data makes it difficult to be categorical about this. It can also been seen that there has been a large decrease in energy used by the non-metallic mineral products sector, which includes manufacture of cement, ceramic products and glass products. The closure on 2013 of the only cement clinker plant in Victoria, at Waurn Ponds, contributed to the fall in gas consumption in the sector, but was not the only factor.

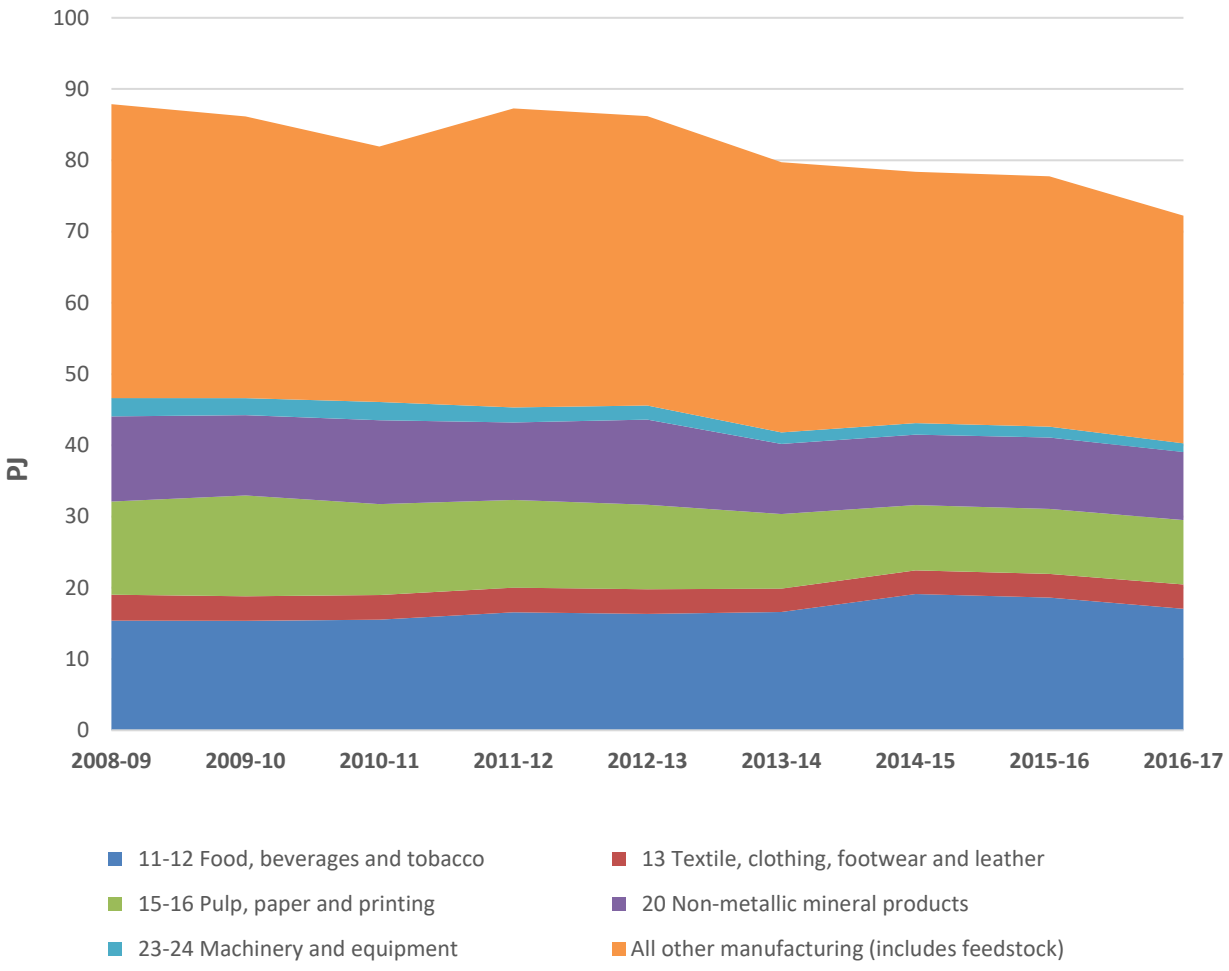


Figure 10: Annual natural gas used by manufacturing industry in Victoria since 2008-09, "stacked" format (PJ)

Source: Australian Energy Statistics, 2018, Table F

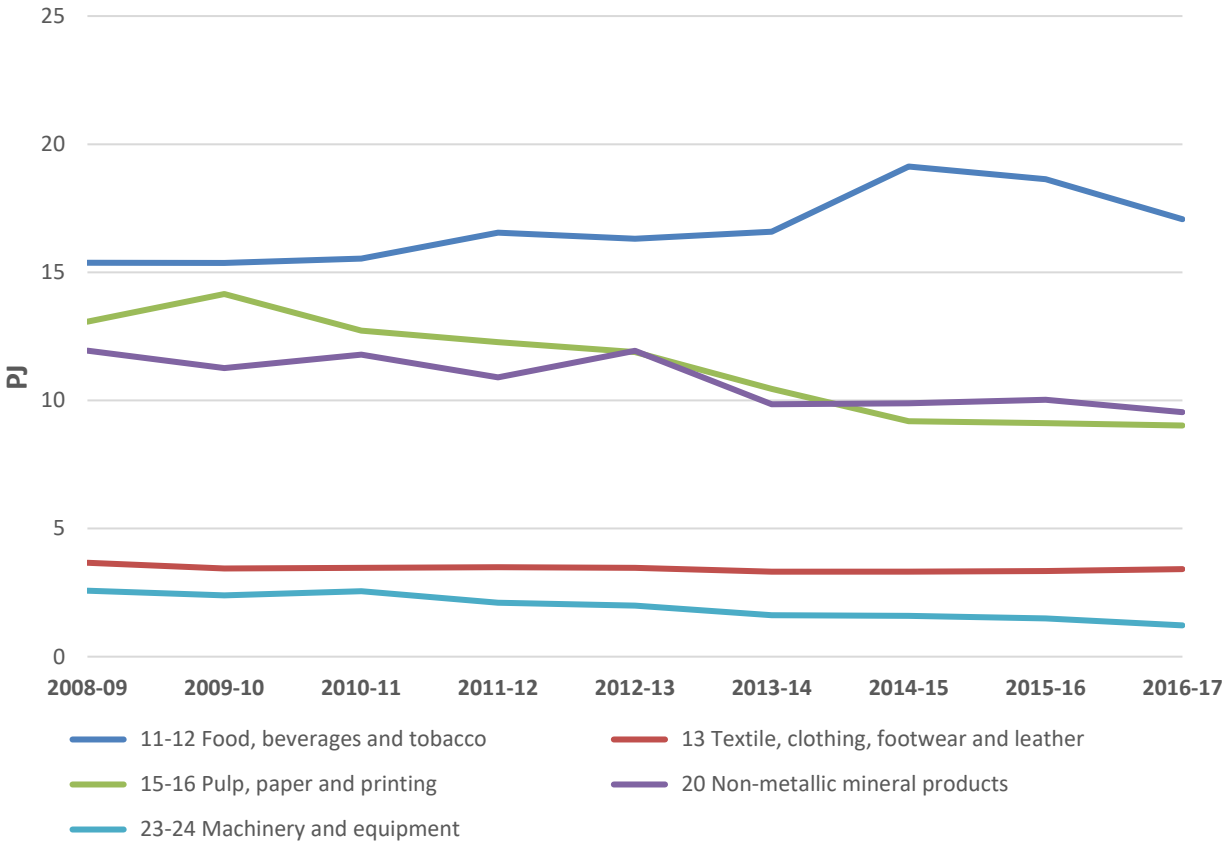


Figure 11: Annual natural gas used by selected manufacturing industry sectors in Victoria since 2008-09 (PJ)

Source: Australian Energy Statistics, 2018, Table F

It can be seen from Figure 11 that gas consumption has been on a steadily falling trend in both the pulp and paper and non-metallic mineral products sectors, as well as in the (relatively small gas consuming) machinery and equipment sector. The data suggest that much of this decrease has probably been caused by structural changes, such as the closure of Waurn Ponds and of the Holden and Ford motor vehicle manufacturing plants, classified in the Machinery and equipment sector. However, gas consumption by the food and beverages sector has shown a different trend, with increases up to 2014-15, followed by two decreases in the two years since then. It is possible, perhaps probable, that responses to higher gas prices may have contributed to the decrease in2017-18, though lack of recent data makes it difficult to be certain. *Australian Energy Statistics* usually becomes available in early July each year, meaning that 2017-18 may soon be available. However, in 2018 the release was held back for several months.

What is certain is that there has been no significant fuel substitution, either away from or towards natural gas. Figure 12 shows trends in total consumption of all forms of energy by the same sectors for which gas consumption only is shown in Figure 11. The trends are very similar to the trends for gas consumption alone, with food and beverages the only sector for which energy consumption did not decline during the years from 2008-09 to 2014-15. During the two most recent years included in the data, however, consumption of total energy fell, more or less in parallel with gas consumption,

suggesting that similar factors are affecting all types of energy used by manufacturing establishments in Victoria.

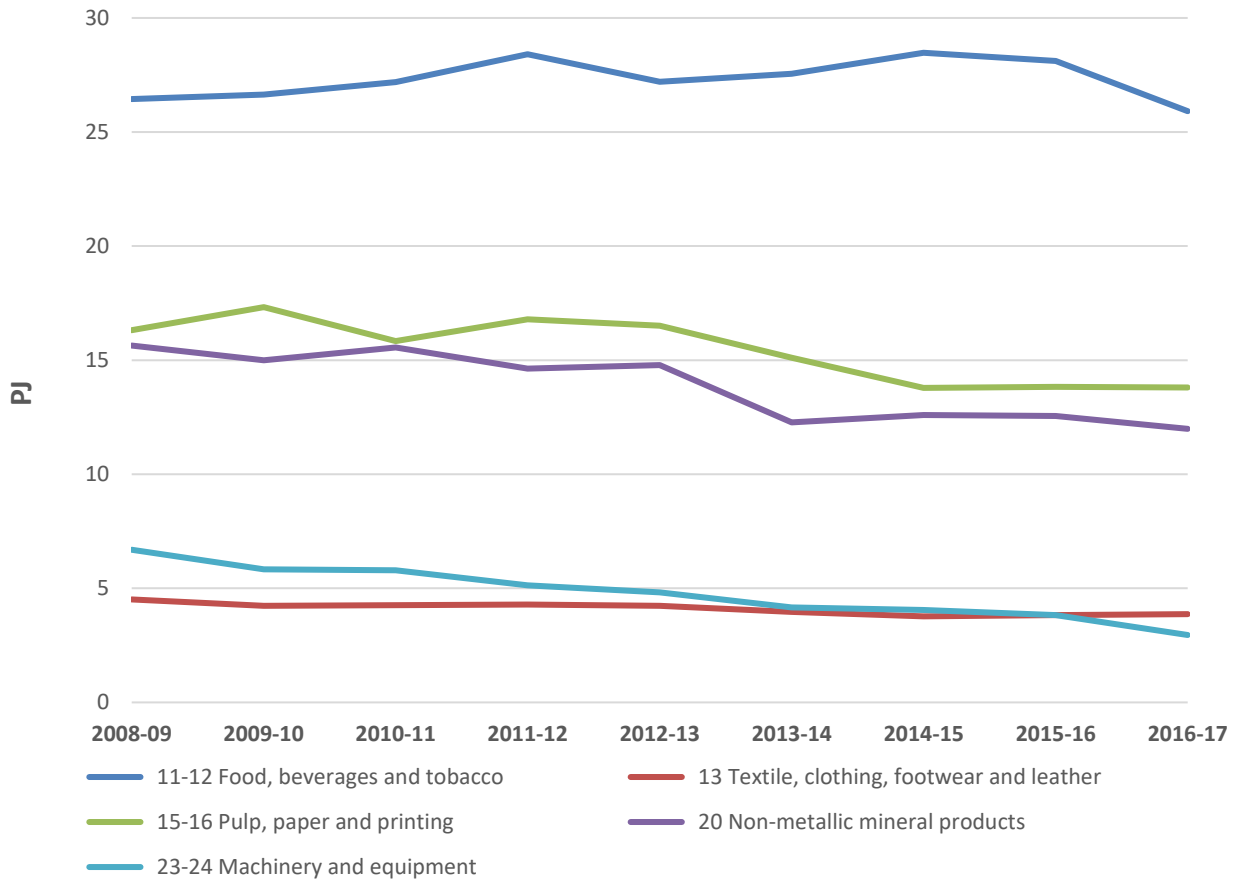


Figure 12: Annual total energy consumption by selected manufacturing industry sectors in Victoria since 2008-09 (PJ)

Source: Australian Energy Statistics, 2018, Table F

2.2.5 Characteristics of Gas Consumption by Individual Manufacturing Sectors

Looking more closely at the various manufacturing Subdivisions shown in above figures, it is instructive to sort them in terms of the temperatures at which they require heat energy to be supplied. Production of non-metallic mineral products, which include ceramic products, such as bricks and tiles, cement, lime and glass products, requires very high temperatures (350 deg. C or higher), as do oil refining and production of petrochemicals. Most primary metal production using thermal processes, i.e. excluding electrolytic smelting and refining of metals such as aluminium, copper and zinc, also requires high temperatures.

The sectors for which energy consumption in Victoria is confidential are those for which most energy is consumed by so few individual businesses that publication of sectoral consumption would make it possible for users of the published data to deduce, with a fairly high degree of accuracy, annual energy consumption by individual businesses. By implication, most energy consumed in these

sectors is used by a small number of very large energy users. As implied above, most of the thermal energy use by these businesses requires very high temperatures, for which electric technologies are currently not an economically attractive option.

By contrast, production processes for food and beverages, textiles and clothing, wood products, and pulp and paper require much lower temperatures, almost entirely below about 250 deg. C, and much if below 100 deg. C. Typically, manufacturing establishments in these sectors use steam and/or hot water as energy carriers, delivering heat at the required temperatures for a variety of different processes. As the data in Figures 1 and 2 show, these sectors are relatively more important in Victoria than in other states. For example, in 2016-17, Victoria accounted for 59% of all fuel consumption for heat in the textiles and clothing sector, 41% in food and beverages (excluding sugar milling), and 35% in pulp and paper (but 49% of fossil fuel use, since large quantities of wood waste are used in other states). The most promising electric technologies of providing heat for industrial processes are those which provide heat at lower temperatures, as hot water and low pressure steam. Consequently, Victoria has more opportunities than other parts of Australia to replace natural gas used by industry with electric technologies.

Short descriptions of each of these sectors follow.

2.2.5.1 Food and beverage industries

ANZSIC classifies Food product manufacturing as Subdivision 11, under Division C, Manufacturing, and further divides it into the following Groups:

111 Meat and meat processing

112 Seafood processing

113 Dairy product manufacturing

114 Fruit and vegetable processing

115 Oil and fat manufacturing

116 Grain mill and cereal product manufacturing

117 Bakery product manufacturing

118 Sugar and confectionary product manufacturing

119 Other food product manufacturing.

In addition, Group 121, Beverage manufacturing, includes the manufacture of cordials, beer and spirits, all of which require low temperature thermal energy input.

Manufacturing establishments in these sectors use thermal energy in a wide variety of processes, such as scalding, cooking, drying, cleaning, disinfecting, baking, evaporating, pasteurising and many others. A common arrangement is to have a single, large gas fuelled boiler and a steam distribution system round the whole plant, from which energy can be drawn at the required temperatures for the various processes and equipment. In terms of the prospect for replacing gas with electrical technologies, this arrangement has the potential for both improved efficiencies and reduced energy losses, meaning lower costs, but also for higher costs of converting to electric technologies.

The cost reductions would arise from reducing leakages and direct heat losses in the steam distribution systems, and also for the potential to better match heat delivery temperatures to the temperature requirements of individual processes. Higher costs would arise from the need to

completely re-engineer the plant from a centralised or modular arrangement of supplying heat energy.

As noted above, there are a large number of manufacturing establishments in the food and beverage industries in Victoria, including many large plants, but also a great many smaller establishments.

2.2.5.2 Pulp and Paper

This sector is also a large user of steam and hot water, and most use of gas is for this purpose. Pulp and paper plants are individually much larger, and much fewer in total numbers than food manufacturing establishments, and each establishment uses very large volumes of gas. Some sources suggest that the Maryvale mill in the Latrobe Valley is the largest individual industrial, i.e. exclusive of electricity generators, consumer of gas in Victoria. Maryvale also uses large quantities of waste biofuels to raise steam from which electricity is generated for use within the plant. Australian Energy Statistics reports this fuel consumption under electricity generation, not under manufacturing consumption, meaning that all of the gas consumption reported against the pulp and paper sector is used directly for manufacturing processes. (Interestingly, this is not the case at paper mills in some other states, where Australian Energy Statistics data suggest that wood waste materials are used to produce steam used for both electricity generation and other manufacturing processes.) Some of the other paper mills, all of which are secondary manufacturers of paper and cardboard, using pulp and paper waste as raw materials, use gas to produce steam used for both the manufacturing process and on-site electricity generation.

2.2.5.3 Textiles, Clothing and Footwear

As with food manufacturing, this sector is much larger, both relatively and absolutely, in Victoria than in any other state. The textiles part (ANZSIC Groups 131, 132 and 133) uses hot water, and steam to produce hot water for a relatively small number of processes, including scouring raw fibres, including wool, prior to processing to textiles, dyeing, washing, and some other specialist processes for treating particular fabrics and leather.

2.2.5.4 Wood and Wood Products

Most heat energy is used in this sector in the manufacture of the various composite wood products, such as particle and fibre board, and laminates, now widely used for both construction and joinery. Temperatures required are relatively low, since higher temperatures would damage the wood. Table 1 shows that enterprises in Victoria which fall into this sector use more wood waste products than natural gas to provide the energy that they require. This may be because some of these establishments, most of which are located outside the metropolitan areas, do not have access to natural gas.

2.2.5.5 Commercial Laundry Services

This industry does not form part of the manufacturing sector. It is classified in ANZSIC in Subdivision 95, Personal and other services. We include it here because the use of gas in commercial laundry services has more in common with use of gas by manufacturing processes which use large volumes of steam and hot water. This is shown by the fact that ten commercial laundry facilities are included amongst facilities in Victoria required to report under the NPI in 2016-17. Our understanding is that

commercial laundries use large centralised gas fuelled boilers to provide the energy required for washing, drying and pressing the laundered items.

2.2.5.6 Other Sectors

As explained above, most of the thermal energy used by other sectors of manufacturing in Victoria requires much higher temperatures, for which currently available electric technologies are not well suited. However, the chemical products sector, which includes the large, energy intensive manufacturers of basic products, also includes a great many less energy intensive establishments making a wide variety of products, including paints, pharmaceuticals, cleaning products, plastic products, and many others. It is certain that many of these establishments use relatively modest quantities of thermal energy at lower temperatures. However, the great diversity of manufacturing processes and lack of readily available public information about this sector of manufacturing, not to mention data on how much energy is in total consumed, precludes any more detailed examination of this sector. It is certain, however, that total thermal energy used by establishments in this sector in Victoria is much less than consumption by the food and beverage sector.

Another sector with some establishments in the list of facilities reporting under the National Pollution Inventory (see below) is Printing. It appears that the facilities concerned use heatset printing which is a process requiring the evaporation of organic ink solvents from fresh printing. This is a low temperature thermal process, but we have no data on the quantities or types of energy used to provide the required heat. It is, though, fairly certain, that total quantities of energy are much less than is used by the sectors discussed above.

2.2.5.7 *Electrifying Industry* Data

Beyond Zero Emissions published a report in 2018 entitled *Electrifying Industry*, that examines electrification potentials in a number of sectors including processed food, beer making, milk powder production, paper production, aluminium casting, plastics recycling, glass manufacturing bricks, steel and ammonia.[4] The report describes in detail many specific electrical technologies and processes than can be used to replace gas- or other-fuel-using processes in manufacturing. Some offer particular advantages such as more precise control of temperatures, direct heat transfer into materials (eg, microwaves, induction, infra red) at the point of use, with reduced waste and system losses.

As discussed above, and also noted in Electrifying Industry, some of opportunities are modular and scaleable, such as the use of industrial heat pumps, and these are most likely to be taken up in incremental upgrades or refits. Other opportunities described that would involve replacing a centralised gas boiler, or whole new production processes, are most likely to occur in brand new plants, which could be expansions at existing sites, or otherwise when a very large re-investment and renewal of an existing plant occurs. These will be large opportunities for electrification, but they are likely to occur only relatively infrequently. When the do, the scale of the investment involved may be too large for VEU assistance to greatly influence outcomes.

2.3 Conclusion

The combination of factors discussed here leads to the conclusion that the most prospective sector for initial activity directed towards substituting electricity for natural gas in industry in Victoria is the

[4] Beyond Zero Emissions, Zero Carbon Industry Plan – *Electrifying Industry*, September 2018.

food and beverages manufacturing sector. Not only does it account for well over a quarter (28% in 2016-17) of all natural gas used by manufacturing in Victoria, but virtually all of this gas is used to deliver thermal energy at temperatures for which suitable electric technologies are commercially available and gaining increased acceptance.

For the same reason, the textiles sector, although it uses much less gas than the food and beverages sector, should also be classed as highly prospective. The pulp and paper sector, while it also uses large quantities of gas to supply low temperature heat, is less prospective because, as shown below, it consists of a small number of large establishments, each of which uses enormous volumes of steam. In general, the electric technologies are currently much less scaleable than conventional gas fuelled boiler technologies, and therefore less well suited to the supply of large volumes of steam, despite the relatively low temperature requirement.

Finally, if more information becomes available about the various manufacturing establishments in the general chemical products sector, and the processes they use, this sector may also be prospective.

3. State-wide Outcomes

As noted in Chapter 2, two sources of public data have been used to compile information on the numbers and sizes of the various businesses and establishments in the identified sectors of manufacturing. These are the National Pollutant Inventory and the ABS series 8165, *Counts of Australian Businesses*, which it uses as the population for all of its publications containing data collected by surveying businesses. These data are then linked to the estimates of possible energy and emissions savings by sector and technology type, as discussed above, to give estimates of possible total savings in Victoria.

3.1 Estimating the Relevant Enterprise Population

In this section we first describe the nature of data available from each of the two sources specified above, and then summarise the results of analysing the data they provide.

The National Pollutant Inventory (NPI) is a national compilation, prepared by the Commonwealth Department of the Environment in close collaboration with counterpart agencies in each state and territory. It contains data reported annually by individual facilities (establishments) which emit more than a specified minimum quantity of one or more of a specified list of air and water pollutants. The Department states that there are more than 4,000 reporting facilities. The analysis for this report is based on data for 2016-17. Data for 2017-18 has recently been published, but was not available at the time the analysis was undertaken.

The list of pollutants required to be reported does not, unfortunately, include carbon dioxide, which is of course the main product of fossil fuel combustion. Nor does it include methane, the other greenhouse gas emitted in small quantities from fossil fuel combustion as a result of incomplete combustion and/or side reactions. On the other hand, the NPI does report emissions of carbon monoxide and oxides of nitrogen (NOx). Most emissions of both of these serious air pollutants are associated with fossil fuel combustion, which means that they are an indirect indicator of fossil fuel combustion. Further, the relative volumes of each is a very approximate indicator of the type of fossil fuel being combusted (coal, petroleum or natural gas). Published NPI data also contains the business name, facility name, physical address and geolocation of the reporting establishment, its industry type (based on ANZSIC), its self-described major activity, and number of employees at the site. It is thus a very useful source of information about each reporting facility.

Unfortunately, however, for two major reasons the NPI is by no means a reliable indicator of quantities of fossil fuel being consumed. Firstly, fossil fuel combustion, while it is the major source, is not the only source of emissions of these gases. Secondly, and more importantly, the volumes of either carbon monoxide or oxides of nitrogen being emitted (and reported, assuming accurate and complete reporting by liable parties) is affected by the type of combustion equipment, and whether it is operating efficiently and correctly, and is also affected by the type and operation of pollution control equipment fitted to combustion flues. It is quite possible that a facility with large gas consumption, but also with high performing combustion and/or emissions control equipment, would not be required to report under the NPI, or would report low emission levels, while another facility with less modern or less well performing control equipment, but smaller gas consumption, would report higher emissions.

Subject to these qualifications, the Appendix to this report lists all the facilities in Victoria which reported emissions of carbon monoxide and nitrogen oxides in 2016-17, organised by ANZSIC sector. The list covers only those sectors of manufacturing for which electrification potential is identified above. In summary, the list includes:

- 96 establishments in the food manufacturing sector (ANZSIC sub-division 11);
- 7 establishments in beverage manufacturing (ANZSIC sub-division 12);
- 9 establishments in textiles, clothing and footwear (ANZSIC sub-division 13);
- 8 establishments in wood products (ANZSIC sub-division 14);
- 12 establishments in pulp. paper and converted paper products (ANZSIC sub-division 15);
- 11 establishments in printing (ANZSIC sub-division 16);
- 23 establishments in chemicals and polymer products (ANZSIC sub-divisions 17, 18 and 19);
- 10 commercial laundry establishments (ANZSIC Group 951).

Under each ANZSIC sector separately identified, establishments are listed in decreasing order of gas consumption, as estimated from the emissions of carbon monoxide and oxides of nitrogen, as reported by the NPI. For reasons explained above, these calculations are unavoidably subject to considerable uncertainty. Specifically, a handful of reporting entities had what appeared to be anomalously high emissions, presumably because of the sorts of equipment operation issues discussed above. The list should therefore be interpreted as rough guidance only as to the level of gas consumption at the site, and for that reasons neither actual emissions reported, nor the calculated numbers flowing from the emission figures, are shown in the list against the reporting facility.

The ABS data set contains far more names of businesses. Each business is characterised by the ANZSIC sector in which it operates at the 4-digit (Class) level, number of employees and annual turnover. The majority, even in manufacturing, where businesses might be expected to be somewhat larger, are small to very small, with annual turnover less than $2 million and/or fewer than 20 employees. The very important difference between the two data sets is that the NPI is based on facilities/establishments, i.e. unique individual physical sites, whereas the ABS is based on businesses. Some, possibly many facilities are likely to be owned jointly by several different businesses, while other businesses may be inactive at a particular time.

That said, the numbers in the ABS data set are consistently larger than those in the NPI. Using as criteria businesses with more than 20 employees and with annual turnover of more than $10 million (the rough level at which it might be reasonable to expect a business could consider embarking on a major re-investment project), numbers of businesses in the ABS data set are as follows:

- 219 businesses in the food manufacturing sector (ANZSIC sub-division 11);
- 16 businesses in beverage manufacturing (ANZSIC sub-division 12);
- 29 businesses in textiles and leather (ANZSIC groups 131, 132 and 133);
- 37 businesses in other wood products (ANZSIC group 149);
- 30 businesses in pulp. paper and converted paper products (ANZSIC sub-division 15);
- 51 businesses in printing (ANZSIC group 161);
- 161 businesses in non-bulk chemical and polymer products (ANZSIC groups 184 to 192).

Finally, depending on the objectives and design of the program, it is important to point out that at the small to very small business end of the scale, not included in the above numbers, hot water requirements may be of much the same volume as residential hot water. Consequently, residential scale heat pump or electric boosted solar water heaters may be an entirely feasible and

economically acceptable replacement for gas water heaters. Obviously, however, supporting a small business to replace its water heater is a very different activity to supporting a larger manufacturing business to replace its entire steam system.

3.2 Total Potential Emission Reductions in the Near/Medium Term

As the previous discussion and analysis has explained, the most likely businesses to switch from gas to electric heating in the near term are those which use large amounts of hot water, rather than steam. Most of these are in the food manufacturing and textiles sectors. There are no systematic or comprehensive data on how much industrial energy is used for hot water, in these, or any other sectors.

Of the 219 businesses in the food and beverage sector, as listed in the ABS data set, with annual turnover of more than $5 million and more than 20 employees, there are 163, i.e. about 75% for which 1) hot water consumption is likely to be significant, and 2) is unlikely to be associated with major steam consumption, i.e. where there is unlikely to a need for large high pressure steam boiler capacity. These businesses fall not the following sub-sectors – see Table 2.

ANZSIC Class	Description	Number of businesses
1111	Meat Processing	34
1112	Poultry Processing	9
1113	Cured Meat and Smallgoods Manufacturing	7
1131	Milk and Cream Processing	3
1132	Ice Cream Manufacturing	6
1133	Cheese and Other Dairy Product Manufacturing	29
1199	Other Food Product Manufacturing n.e.c.	54
1211	Soft Drink, Cordial and Syrup Manufacturing	9
1212	Beer Manufacturing	12
Total of these		163

Table 2: Estimate Enterprises using Significant Quantities of Hot Water

Assume, for example, that these businesses use in a total of, say, 5 PJ to produce hot water, out of the 17.1 PJ of natural gas used by the total food and beverages sector in 2016-17. Assume also that heat pump water heaters have a Coefficient of Performance of 4 and are replacing gas water heating with efficiency 85%. If all the electricity used is supplied from renewable generators, Victoria's annual greenhouse gas emissions would be reduced by a not insignificant 260 kt CO2-e. However, if the gas were replaced by electricity at the assumed 2025 emissions intensity of 0.7 kt CO2-e, the emissions reduction would be a more modest 50 kt CO2-e.

For the textiles and leather sector the number of businesses in sub-sectors with large hot water use, which meet the employee number and annual turnover threshold levels are as follows - Table 3.

ANZSIC Class	Description	Number of businesses
1311	Wool Scouring	3
1312	Natural Textile Manufacturing	3
1313	Synthetic Textile Manufacturing	3
1320	Leather Tanning, Fur Dressing and Leather Product Manufacturing	3
Total of these		12

Table 3: Estimate of Textiles and Leather Enterprises with Significant Hot Water Use

Assume, for illustrative purposes, that they use 2 PJ of the total 3.4 PJ of gas used by the sector as a whole. Converting them all to renewable electricity driven heat pump water heater would then reduce greenhouse gas emissions by 104 kt CO2-e, using the same equipment efficiency assumptions as for the food and beverages sector. Using grid electricity would provide lower emissions savings of 21 kt CO2-e. Combining savings for both sectors, savings approaching 400 Kt CO_2-e could be possible via electrification with renewable electricity in these sectors alone.

4. Summary and Conclusions

4.1 Summary

Industry is an important sector of Victoria's economy, consisting of over 23,600 enterprises at the end of July 2018. While this represents only 3.8% of all enterprises in Victoria, industry accounts for 14% of *large* enterprises with 200+ employees and 12.6% of those that turnover $10 million or more per year.

Industry consumed almost 114 PJ of energy in FY2017, and only 29% of that was electricity. Gas is the dominant fuel with a 65% of the total. Gas, and indeed other energy, consumption varies greatly by sub-sector and enterprise. The largest energy users are in sectors such as petroleum and coal product manufacturing and primary metal and metal product manufacturing, but there are relatively few enterprises in these sectors in Victoria. Machinery and equipment manufacturing – which is likely to capture small metal fabricators – has the largest number of enterprises (over 4,600) but, on average, they are small energy users (0.3 TJ/year of non-electrical energy). The food and beverages sector is the second largest in terms of business counts (3,933) and average non-electrical energy use is higher at 4.7 TJ/year.

Gas is primarily used for steam raising in boilers, with the steam then distributed for use in a range of applications, at different temperatures, sometimes with heat recovery. Generally plants are highly integrated and designed for 'cascading' use of progressively lower temperature heat. The energy efficiency of such processes can be low, with boilers generating steam at higher temperatures than actually required for end-uses, and with significant losses in heat distribution and recovery processes. At the time, the integrated nature of plants can present a barrier to electrification, unless new investments or major reinvestments in existing plant are occurring.

Food and beverages is one sector of industry that is growing, where plants can be more modest in size (micro-breweries, industrial kitchens, etc) and where hot water or lower temperature steam is a key process input. These characteristics make it more likely that electrification opportunities will be taken up, but there will also be niche or less frequent opportunities in other sectors as well.

We identify at least 200 enterprises in the food and beverages sector, and also textiles, leather, clothing and footwear, that are estimated to have gas use that would be suitable for electrification via industrial heat pumps for hot water/low-temperature steam. On conservative assumptions, this electrification with renewable electricity could generate up to 400 kt CO2-e of emissions reductions. State-wide, there would be other sectors and enterprises where incremental electrification opportunities are available. Also, we have noted that large opportunities may arise with new plant or major re-investment points, but some of these investments are likely to be too large to be influenced by VEU.

4.2 Conclusions

Overall, recalling that gas can be only around one quarter of the cost of electricity (but both gas and electricity pricing vary widely by enterprise size), and that gas is also the dominant fuel in the sector, electrification can be challenging from a financial perspective. Also, the integrated nature of many plants and, in some cases, a lack of new investment, may further hamper the uptake of electrification opportunities. That said, the high energy efficiency and modular nature of industrial heat pumps, combined with the dynamic nature of the food and beverages sector in Victoria in particular, make this a particularly attractive opportunity for VEU to focus on, at least in the first instance.

Appendix 1: Data Tables

Table 4: Example of Detailed Analysis by Opportunity: Hotels: Incremental Cost Scenario

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
11	Food Product Manufacturing									
	111	Meat and Meat Product Manufacturing	MIDFIELD MEAT PROCESSING PTY LTD	Midfield Meat Group	Warrnambool	Meat Processing	3280	Abattoir	15006971508	550
			GEORGE WESTON FOODS LIMITED	Don KRC	Castlemaine	Cured Meat and Smallgoods Manufacturing	3450	Bacon, ham and smallgoods manufacturing	45008429632	1000
			JBS AUSTRALIA PTY LIMITED	Brooklyn	Brooklyn	Meat Processing	3012	Red meat processing (abattoir)	14011062338	980
			WODONGA RENDERING PTY LTD	WODONGA RENDERING PTY LTD	Wodonga	Meat Processing	3690	Processing beef, goats, sheep and deer in the abattoir for the export market. Rendering abattoir material to produce tallow, meat meal and dried blood for the export market	67074885457	450
			JBS AUSTRALIA PTY LIMITED	Cobram	Cobram	Meat Processing	3644	Red meat processing (abattoir)	14011062338	150
			MIDFIELD CO-PRODUCTS PTY LTD	Midfield Co-Products	Warrnambool	Meat Processing	3280	Rendering Plant	58005186434	30
			ASHTON PTY LIMITED	Swan Hill Abattoirs	Swan Hill	Meat Processing	3585	Meat processing & rendering	84007206680	194
			OZTEK HOLDINGS PTY LTD	OZTEK HOLDINGS PTY LTD	Barnawartha	Meat Processing	3688	Rendering	83080871343	5

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			G & K O'CONNOR PTY LTD	G & K O'CONNOR PTY LTD	Pakenham	Meat Processing	3810	Meat Processing	49005934029	(blank)
			AUSTRALIAN MEAT GROUP PTY LTD	AUSTRALIAN MEAT GROUP DANDENONG	Dandenong	Meat Processing	3175	Meat Processing	75168396316	180
			AUSTRALIAN LAMB (COLAC) PTY LTD	Australian Lamb (Colac) Pty Ltd	Colac	Meat Processing	3250	Meat Processing	56087919944	650
			H. W. GREENHAM & SONS PROPRIETARY LIMITED	H. W. GREENHAM & SONS PROPRIETARY LIMITED	Tongala	Meat Processing	3621	Meat Processing - Abattoir	26054461415	200
			FREWSTAL PTY LTD	Frewstal Pty Ltd	Stawell	Meat Processing	3380	Sheep, lamb and goat abattoir	69004967800	380
			DIAMOND VALLEY PORK PTY LTD	Laverton North	Laverton North	Meat Processing	3026	Meat Processing	17095045695	180
			M.C. HERD PROPRIETARY LIMITED	M.C. HERD PROPRIETARY LIMITED	Corio	Meat Processing	3214	Beef and lamb slaughtering and processing	80004289927	220
			ALINDARE PTY. LTD.	Ararat Abattoir	Ararat	Meat Processing	3377	Processing sheep and goats	62062233569	230
			FREW (KYNETON) PTY LTD	Frew Kyneton Pty Ltd	Melton	Meat Processing	3777	Meat processing and packaging		1111
			MACKAY CASINGS PTY LTD	Mackay Casings	Wangaratta	Meat Processing	3677	Sausage casings manufacturer		50
			AUSTRALIAN TALLOW PRODUCERS PTY LTD	AUSTRALIAN TALLOW PRODUCERS PTY LTD	Brooklyn	Poultry Processing	3012	Rendering of animal by-products to produce tallow/oil and meat meals	28007046059	16

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			INGHAMS ENTERPRISES PTY LIMITED	Somerville Processing Plant	Somerville	Poultry Processing	3912	Poultry Processing Facility	20008447345	870
			LUV-A-DUCK PTY LTD	Luv-a-Duck Processing, Nhill	Nhill	Poultry Processing	3418	Duck processing plant	30005277412	170
			HAZELDENE'S CHICKEN FARM PROPRIETARY LIMITED	Lockwood Processing Plant	Lockwood	Poultry Processing	3551	Poultry processing	72004381346	740
			TURI FOODS PTY LTD	La Ionica	Thomastown	Poultry Processing	3074	Poultry processing	29057142971	400
			INGHAMS ENTERPRISES PTY LIMITED	Thomastown	Thomastown	Poultry Processing	3074	Processing poultry	20008447345	250
			TURI FOODS PTY LTD	Geelong Processing	Breakwater	Poultry Processing	3219	Poultry processing	29057142971	500
	112	Dairy Product Manufacturing	MURRAY GOULBURN CO-OPERATIVE CO LIMITED	COBRAM SITE	Cobram	Milk and Cream Processing	3644	Food processing plant. Dairy	23004277089	372
			TATURA MILK INDUSTRIES LIMITED	Tatura Milk Industries	Tatura	Cheese and Other Dairy Product Manufacturing	3616	Milk, cream cheese, butter and milk powder manufacture	66006603970	432
			MURRAY GOULBURN CO-OPERATIVE CO LIMITED	KOROIT SITE	Koroit	Milk and Cream Processing	3282	Food processing plant. Dairy	23004277089	138
			MURRAY GOULBURN CO-OPERATIVE CO LIMITED	MURRAY GOULBURN LEONGATHA	Leongatha	Milk and Cream Processing	3953	Food processing plant. Dairy	23004277089	333

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			WARRNAMBOOL CHEESE AND BUTTER FACTORY COMPANY LIMITED	Warrnambool Cheese & Butter Factory	Allansford	Cheese and Other Dairy Product Manufacturing	3277	Milk powder, Whey protein concentrate, Bulk cheese, Butter, Cream, Market milk manufacture, Lactoferrin	48004032053	558
			FONTERRA AUSTRALIA PTY LTD	Darnum	Darnum	Milk and Cream Processing	3822	Dairy product manufacturing	52006483665	148
			MURRAY GOULBURN CO-OPERATIVE CO LIMITED	Maffra	Maffra	Milk and Cream Processing	3860	Food processing plant. Dairy	23004277089	155
			MURRAY GOULBURN CO-OPERATIVE CO LIMITED	MG Rochester Site	Rochester	Cheese and Other Dairy Product Manufacturing	3561	Food processing plant. Dairy	23004277089	102
			FONTERRA AUSTRALIA PTY LTD	Cobden	Cobden	Milk and Cream Processing	3266	Dairy product manufacturing	52006483665	298
			BURRA FOODS PTY LTD	Burra Foods Factory	Korumburra	Milk and Cream Processing	3950	Dairy product manufacturing	58007119904	150
			FONTERRA AUSTRALIA PTY LTD	Stanhope	Stanhope	Milk and Cream Processing	3623	Dairy product manufacturing	52006483665	96
			FONTERRA MILK AUST PTY LTD	Dennington	Dennington	Milk and Cream Processing	3280	Receiving fresh milk and processing into milk powder for packing and distribution to domestic and export markets	12114326448	105
			NESTLE AUSTRALIA LTD	Nestle Foods	Tongala	Milk and Cream Processing	3621	Manufacturer of liquid condensed, evaporated and cream milk products	77000011316	70

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			PARMALAT AUSTRALIA PTY LTD	ROWVILLE	Rowville	Milk and Cream Processing	3178	Processing and Packaging of Dairy and Juice Products	56072928879	325
			LION-DAIRY & DRINKS PTY LTD	Dairy Foods	Morwell	Milk and Cream Processing	3840	Dairy product manufacture	65004486631	200
			BEGA CHEESE LIMITED	Strathmerton Site	Strathmerton	Cheese and Other Dairy Product Manufacturing	3641	Manufacture of processed cheese.	81008358503	300
			REGAL CREAM PRODUCTS PTY LTD	Connor St	Colac	Ice Cream Manufacturing	3250	Ice cream manufacturing	11005144481	350
			PARMALAT AUSTRALIA PTY LTD	Bendigo	Bendigo	Milk and Cream Processing	3550	Processing and packaging of dairy and Soy products	56072928879	170
			MURRAY GOULBURN CO-OPERATIVE CO LIMITED	Murray Goulburn Kiewa Site	Tangambalanga	Milk and Cream Processing	3691	Food processing plant. Dairy	23004277089	171
			GREAT OCEAN INGREDIENTS PTY LTD	GREAT OCEAN INGREDIENTS PTY LTD	Allansford	Cheese and Other Dairy Product Manufacturing	3277	Dairy product manufacturing	50124185566	17
			BEGA CHEESE LIMITED	Coburg	Coburg North	Cheese and Other Dairy Product Manufacturing	3058	Manufacture of dairy products	81008358503	33
			PARMALAT AUSTRALIA PTY LTD	Echuca	Echuca	Milk and Cream Processing	3564	Production of yoghurts and dairy desserts	56072928879	120
			LION-DAIRY & DRINKS PTY LTD	Lion Dairy & Drinks - Chelsea Heights	Chelsea Heights	Milk and Cream Processing	3196	Milk and Cream Processing and Warehouse	65004486631	220
			REGAL CREAM PRODUCTS PTY LTD	Forest St	Colac	Milk and Cream Processing	3250	Dairy product manufacturing	11005144481	120

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			AUSTRALASIAN FOOD GROUP PTY LTD	Peters Ice Cream	Mulgrave	Ice Cream Manufacturing	3170	Ice cream manufacturing	11154314913	420
	114	Fruit and Vegetable Processing	SPC ARDMONA OPERATIONS LIMITED	SHEPPARTON SITE	Shepparton	Fruit and Vegetable Processing	3630	Canning and other thermal processing of fruit and vegetable products	60004077105	626
			CEDENCO AUSTRALIA PTY LTD	KAGOME Foods Australia Pty Ltd	Echuca	Fruit and Vegetable Processing	3564	Tomato paste manufacturing	98144695867	50
			SIMPLOT AUSTRALIA (PROPERTIES) PTY LIMITED	Simplot Echuca Plant	Echuca	Fruit and Vegetable Processing	3564	Fruit and vegetable processing	68070579485	200
			UNILEVER AUSTRALIA TRADING LIMITED	Tatura	Tatura	Fruit and Vegetable Processing	3616	Manufacture of iced tea, Mayo, dry soup and side dishes.	65136885651	220
			H.J. HEINZ COMPANY AUSTRALIA LIMITED	Heinz Watties	Echuca	Fruit and Vegetable Processing	3564	Baby food manufacture	87004200319	90
			SPC ARDMONA OPERATIONS LIMITED	KYABRAM SITE	Kyabram	Fruit and Vegetable Processing	3620	Canning and other thermal processing of fruit and vegetable products	60004077105	62
	115	Oil and Fat Manufacturing	RIDLEY AGRIPRODUCTS PTY LTD	CSF Proteins Melbourne	Laverton North	Oil and Fat Manufacturing	3026	Processing inedible animal byproducts to produce fat (used in the soap, chemical and stockfeed industries) and protein meals (used in the stockfeed industry)	94006544145	57

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			PEERLESS HOLDINGS PTY LIMITED	Peerless	Braybrook	Oil and Fat Manufacturing	3019	Processing edible fats and oils	74004280979	179
			GRAINCORP OILSEEDS PTY LTD	Numurkah	Numurkah	Oil and Fat Manufacturing	3636	Oilseed Crushing	79006772578	51
			GRAINCORP LIMITED	West Footscray Fats and Oils	Footscray West	Oil and Fat Manufacturing	3012	Edible oil production	60057186035	130
			CARGILL PROCESSING LIMITED	CARGILL PROCESSING LIMITED	Footscray West	Oil and Fat Manufacturing	3012	Oilseed Processing Plant - crushing canola to produce vegetable oil and high protein meal for stockfeed.	39008456399	31
	116	Grain Mill and Cereal Product Manufacturing	BARRETT BURSTON MALTING CO PTY LTD	Geelong Malthouse	Geelong North	Grain Mill Product Manufacturing	3215	Barley and wheat processing and germination to Produce Malt	39050142526	22
			NESTLE AUSTRALIA LTD	Uncle Tobys	Wahgunyah	Cereal, Pasta and Baking Mix Manufacturing	3687	Snacks & Cereal Production	77000011316	450
			CARGILL MALT ASIA PACIFIC PTY LTD	Malt Delacombe	Delacombe	Grain Mill Product Manufacturing	3356	Malting barley for production of malt	62004287352	12
			BARRETT BURSTON MALTING CO PTY LTD	Burnley Malthouse	Burnley	Grain Mill Product Manufacturing	3121	Barley and wheat processing and germination to Produce Malt	39050142526	11
	117	Bakery Product Manufacturing	GEORGE WESTON FOODS LIMITED	Tip Top Dandenong	Dandenong	Bread Manufacturing (Factory based)	3175	Bread manufacturing and packing	45008429632	330

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			GRUMA OCEANIA PTY LTD	Mission Foods	Epping	Bread Manufacturing (Factory based)	3076	Food manufacturing (tortillas)	35117976002	350
			QUALITY BAKERS AUSTRALIA PTY LIMITED	Clayton (Fairbank) Bakery	Clayton	Bread Manufacturing (Factory based)	3168	Bakery	45004205449	168
			ARYZTA AUSTRALIA PTY LTD	ARYZTA Australia PTY LTD	Lyndhurst	Bread Manufacturing (Factory based)	3975	Bread manufacture	39100106107	130
	118	Sugar and Confectionery Manufacturing	MARS AUSTRALIA PTY LTD	Mars Chocolate Australia	Wendouree	Confectionery Manufacturing	3355	Chocolate Confectionery Manufacturing	48008454313	550
			SUGAR AUSTRALIA PTY LIMITED	Sugar Australia Yarraville Refinery	Yarraville	Sugar Manufacturing	3013	Refining of raw sugar into refined sugar products. Raw sugar bulk ship discharge and storage. Warehousing and distribution of bulk and packaged refined sugar products.	82081245169	150
			NESTLE AUSTRALIA LTD	Nestle Confectionery	Campbellfield	Confectionery Manufacturing	3061	Confectionery manufacturing	77000011316	360
			MONDELEZ AUSTRALIA PTY LTD	Cadbury - Scoresby	Scoresby	Confectionery Manufacturing	3179	Sugar confectionery manufacture	78004551473	120
			MONDELEZ AUSTRALIA PTY LTD	Cadbury - Ringwood	Ringwood	Confectionery Manufacturing	3134	Confectionery manufacture	78004551473	1000
			NESTLE AUSTRALIA LTD	Nestle Confectionery & Snacks	Broadford	Confectionery Manufacturing	3658	Production of jelly confectionery	77000011316	254

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	119	Other Food Product Manufacturing	MCCAIN FOODS (AUST) PTY LTD	Ballarat	Wendouree	Other Food Product Manufacturing n.e.c.	3355	Food Manufacture	96000629587	800
			MALTEUROP AUSTRALIA PTY LTD	Geelong Plant	North Geelong	Other Food Product Manufacturing n.e.c.	3215	Production of malt for the beverage and food industries.	48068420244	25
			CAMPBELL AUSTRALASIA PTY LTD	CAMPBELL AUSTRALASIA PTY LTD	Lemnos	Other Food Product Manufacturing n.e.c.	3631	Manufacture of food products	28004456937	230
			MONDELEZ AUSTRALIA PTY LTD	Port Melbourne Site	Port Melbourne	Other Food Product Manufacturing n.e.c.	3207	Manufacture of processed foods - major products are peanut butter, vegemite, salad dressings.	78004551473	130
			VITASOY AUSTRALIA PRODUCTS PTY LTD	VITASOY AUSTRALIA PRODUCTS PTY LTD	Baranduda	Other Food Product Manufacturing n.e.c.	3691	Plant beverage manufacture.	18088959835	65
			SAKATA RICE SNACKS AUSTRALIA PTY LTD	Sakata Rice Snacks	Laverton North	Potato, Corn and Other Crisp Manufacturing	3026	Manufacture of baked snacks	94064157026	177
			LESAFFRE AUSTRALIA PACIFIC PTY LTD	Fermex Dandenong	Dandenong	Other Food Product Manufacturing n.e.c.	3175	Manufacturing Bakers Yeast	20061508825	44
			SIMPLOT AUSTRALIA (PROPERTIES) PTY LIMITED	Gippsland Food Company	Pakenham	Other Food Product Manufacturing n.e.c.	3810	Frozen food manufacturing	68070579485	200

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			MARATHON FOOD INDUSTRIES PROPRIETARY LIMITED	Marathon Food Industries Pty Ltd	Kensington	Other Food Product Manufacturing n.e.c.	3031	Manufacturing Food.	80004763777	90
			SELECT HARVESTS FOOD PRODUCTS PTY LTD	Select Harvests Food Products	Thomastown	Other Food Product Manufacturing n.e.c.	3074	Process and pack nut, health and muesli products. Processes include sorting, blanching, roasting and frying and packing.	17058752846	110
			MARS AUSTRALIA PTY LTD	Mars Petcare Australia	Wodonga	Prepared Animal and Bird Feed Manufacturing	3690	Petfood manufacturing	48008454313	570
			RIDLEY AGRIPRODUCTS PTY LTD	Ridley AgriProducts - St Arnaud	St Arnaud	Prepared Animal and Bird Feed Manufacturing	3478	Stockfeed manufacturing and distribution	94006544145	43
			RIDLEY AGRIPRODUCTS PTY LTD	Ridley AgriProducts - Terang	Terang	Prepared Animal and Bird Feed Manufacturing	3264	Stockfeed manufacturing and distribution	94006544145	26
			RIDLEY AGRIPRODUCTS PTY LTD	Ridley AgriProducts - Pakenham	Pakenham	Prepared Animal and Bird Feed Manufacturing	3810	Stockfeed manufacturing and distribution	94006544145	50
			RIDLEY AGRIPRODUCTS PTY LTD	Ridley AgriProducts - Gunbower	Gunbower	Prepared Animal and Bird Feed Manufacturing	3566	Stockfeed manufacture and distribution	94006544145	20
			INGHAMS ENTERPRISES PTY LIMITED	Clyde Feedmill	Clyde	Prepared Animal and Bird Feed Manufacturing	3978	Poultry Feed Manufacturing	20008447345	15
			RIDLEY AGRIPRODUCTS PTY LTD	Ridley AgriProducts - Bendigo	Bendigo	Prepared Animal and Bird Feed Manufacturing	3550	Stockfeed manufacturing and distribution	94006544145	45

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			RIDLEY AGRIPRODUCTS PTY LTD	Ridley Agriproducts - Mooroopna	Mooroopna	Prepared Animal and Bird Feed Manufacturing	3629	Stockfeed manufacture and distribution	94006544145	26
			RIDLEY AGRIPRODUCTS PTY LTD	Ridley AgriProducts - Maffra	Maffra	Prepared Animal and Bird Feed Manufacturing	3860	Stockfeed manufacture and distribution	94006544145	45
	12	Beverage Manufacturing	AUSTRALIAN TARTARIC PRODUCTS PTY LTD	Australian Tartaric Products	Colignan	Wine and Other Alcoholic Beverage Manufacturing	3494	Recovery of wine tartrates and distillation of grape spirit.	92008275554	40
			CUB PTY LTD	Abbotsford Brewery	Abbotsford	Beer Manufacturing	3067	Manufacturing and packaging beer	76004056106	379
			TREASURY WINE ESTATES LIMITED	Lindemans Karadoc Winery and Packaging	Karadoc	Wine and Other Alcoholic Beverage Manufacturing	3496	Wine manufacturing and packaging	24004373862	107
			SCHWEPPES AUSTRALIA PTY LIMITED	Tullamarine	Tullamarine	Soft Drink, Cordial and Syrup Manufacturing	3043	Manufacture of carbonated and non-carbonated beverages.	51004243994	500
			ASAHI PREMIUM BEVERAGES PTY LTD	Laverton	Laverton	Wine and Other Alcoholic Beverage Manufacturing	3028	Manufacturer of alcoholic and non-alcoholic beverages	49077568480	140
			COCA-COLA AMATIL (AUST) PTY LTD	CCA Moorabbin	Moorabbin	Soft Drink, Cordial and Syrup Manufacturing	3189	Soft Drink, Cordial and Syrup Manufacturing.	68076594119	113
			LION PTY LTD	Little World Beverages - Geelong	Geelong South	Beer Manufacturing	3220	Manufacture of beer	50128004268	100

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
13	Textile, Leather, Clothing and Footwear Manufacturing		BRUCK TEXTILES PTY LIMITED	Australian Textile Mills	Wangaratta	Textile Finishing and Other Textile Product Manufacturing	3677	Manufacture of apparel and furnishings fabrics for Australian and overseas markets. Weaving, dyeing, finishing, coating and printing.	61074170988	190
			VICTORIA WOOL PROCESSORS (AUST) PTY LTD	VICTORIA WOOL PROCESSORS (AUST) PTY LTD	Laverton North	Wool Scouring	3026	Wool scouring	38050032356	40
			GODFREY HIRST AUSTRALIA PTY LTD	GODFREY HIRST AUSTRALIA PTY LTD	Geelong South	Textile Floor Covering Manufacturing	3220	Carpet manufacturing	58000849758	100
			E.P. ROBINSON PTY. LIMITED	Riversdale Mill	Newtown	Wool Scouring	3220	WOOL SCOURING AND CARBONISING	44004942572	30
			THE VICTORIA CARPET COMPANY PROPRIETARY LIMITED	Bendigo	Bendigo	Textile Floor Covering Manufacturing	3550	Manufacturing carpets	14004304956	91
			BEKAERT (AUSTRALIA) PTY. LIMITED	BEKAERT (AUSTRALIA) PTY. LIMITED	Dandenong South	Textile Finishing and Other Textile Product Manufacturing	3175	Manufacture of woven and knitted fabrics (textiles)	19004327600	110
			AUSTRALIAN COUNTRY SPINNERS PTY LTD	Austarlian Country Spinners P/L	Wangaratta	Textile Finishing and Other Textile Product Manufacturing	3677	Manufacture of hand knitting yarns for the textile industry.	28006290713	59
			TUFTMASTER CARPETS PTY LTD	TUFTMASTER CARPETS PTY LTD	Preston	Textile Floor Covering Manufacturing	3072	Manufacture of carpet	76004802564	130

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			FERRISTEX PTY LTD	ABMT Textiles	Melton	Textile Finishing and Other Textile Product Manufacturing	3337	The manufacturing of textile goods for the use in apparel for domestic and export markets.	20103170716	40
14	Wood Product Manufacturing		CARTER HOLT HARVEY WOODPRODUCTS AUSTRALIA PTY LIMITED	Carter Holt Harvey Myrtleford	Myrtleford	Veneer and Plywood Manufacturing	3737	Plywood manufacturing	93002993106	232
			ALPINE MDF INDUSTRIES PTY LTD	Alpine MDF Ltd	Wangaratta	Reconstituted Wood Product Manufacturing	3677	Medium density fibreboard manufacture.	37064766301	98
			CARTER HOLT HARVEY WOODPRODUCTS AUSTRALIA PTY LIMITED	CHH Morwell Sawmill	Hazelwood North	Log Sawmilling	3840	Processing of timber for the building industry.	93002993106	158
			MONSBENT PTY LTD	D & R Henderson Pty Ltd	Winton	Reconstituted Wood Product Manufacturing	3673	Particle board manufacturing	93002820117	110
			C3 AUSTRALIA PTY LTD	C3 Portland	Portland	Wood Chipping	3305	Wood chipping	49145302629	(blank)
			CARTER HOLT HARVEY WOODPRODUCTS AUSTRALIA PTY LIMITED	CHH Yarram Sawmill	Yarram	Log Sawmilling	3971	Sawmilling and CCA Treatment	93002993106	59
			REID BROS TIMBER PTY LTD	REID BROS TIMBER PTY LTD	Yarra Junction	Log Sawmilling	3797	Saw milling and kiln drying of timber	72118338211	24

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			LAMINEX GROUP PTY LIMITED	Laminex - Ballarat Plant	Wendouree	Reconstituted Wood Product Manufacturing	3355	Paper impregnation and board pressing	98004093092	123
15	Pulp, Paper and Converted Paper Product Manufacturing		VISY PAPER PTY LTD	Visy Paper No. 4 and 5	Campbellfield	Corrugated Paperboard and Paperboard Container Manufacturing	3061	Paper recycling plant. Converting waste paper to new paper and then to corrugated cartons.	63005803234	566
			PAPER AUSTRALIA PTY LTD	Paper Australia Maryvale Mill	Morwell	Pulp, Paper and Paperboard Manufacturing	3840	Wood pulp manufacturing	63061583533	836
			ASALEO CARE AUSTRALIA PTY LTD	Asaleo Care	Box Hill	Pulp, Paper and Paperboard Manufacturing	3128	Manufacture of paper tissue products	62004191324	309
			VISY PAPER PTY LTD	Visy Paper 2	Reservoir	Pulp, Paper and Paperboard Manufacturing	3073	Paper recycling plant converting waste paper into new paper for use in the corrugated box industry.	63005803234	74
			ORORA LIMITED		Scoresby	Pulp, Paper and Paperboard Manufacturing	3179	Fibre box manufacturing and printing.	55004275165	200
			ENCORE TISSUE (AUST) PTY LTD	Encore Tissue	Laverton North	Pulp, Paper and Paperboard Manufacturing	3026	Manufacturing of Paper Personal Hygiene products	99104582523	85

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			HUHTAMAKI AUSTRALIA PTY LIMITED	HUHTAMAKI MOULDED FIBRE	Preston	Pulp, Paper and Paperboard Manufacturing	3072	Manufacture of Paper Pulp Moulded Fibre Packaging Products	43003122843	89
			VISY BOARD PROPRIETARY LIMITED	Visy Board - Campbellfield	Campbellfield	Pulp, Paper and Paperboard Manufacturing	3061	Manufacturing of corrugated cartons	58005787913	180
			VISY BOARD (WODONGA) PTY LTD	Visy Board Wodonga	Wodonga	Corrugated Paperboard and Paperboard Container Manufacturing	3690	Corrugating and converting cardboard	34098839402	160
			LAMINEX GROUP PTY LIMITED	The Laminex Group	Cheltenham	Other Converted Paper Product Manufacturing	3192	High pressure laminate manufacturing	98004093092	69
			VISY BOARD PROPRIETARY LIMITED	Visy Board Dandenong	Dandenong	Corrugated Paperboard and Paperboard Container Manufacturing	3175	Corrugating and carton manufacturing	58005787913	220
			ORORA LIMITED		Brooklyn	Pulp, Paper and Paperboard Manufacturing	3012	Manufacturing of cardboard boxes and packaging material from recycled paper	55004275165	150
16	Printing (including the Reproduction of Recorded Media)		THE FRANKLIN PRINTING GROUP PTY LTD	THE FRANKLIN PRINTING GROUP PTY LTD	Sunshine	Printing	3020	Printing	98006078477	185
			PMP PRINT PTY LTD	PMP PRINT PTY LTD	Clayton	Printing	3168	Printing - Heatset web offset	76051706499	286

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			INNOVIA SECURITY PTY LTD	CCL SECURE PTY LTD	Craigieburn	Printing	3064	Security printing - gravure on polymer	13072353452	150
			HANNANPRINT VICTORIA PTY LIMITED	Hannanprint Victoria	Noble Park	Printing	3174	Heatset printing of magazines and catalogues	29100817712	138
			AMCOR FLEXIBLES (AUSTRALIA) PTY LTD	Amcor Flexibles Asia Pacific - Preston	Preston	Printing	3072	Manufacture of flexible packaging to the food, pharmaceutical and general industry.	46113833748	180
			AMCOR FLEXIBLES (AUSTRALIA) PTY LTD	Amcor Flexibles Asia Pacific - Nunawading	Mitcham	Printing	3132	Manufacturer of flexible packaging to food, pharmaceutical and general industry	46113833748	40
			AMCOR FLEXIBLES (AUSTRALIA) PTY LTD	Amcor Flexibles Asia Pacific - Moorabbin	Moorabbin	Printing	3189	Manufacture of flexible packaging to food, pharmaceutical and general industry	46113833748	180
			AMCOR FLEXIBLES (AUSTRALIA) PTY LTD	Amcor Flexibles Asia Pacific - Oakleigh	Oakleigh	Printing	3166	Manufacturer of flexible packaging to food, pharmaceutical and general industry	46113833748	70
			NOTE PRINTING AUSTRALIA LIMITED	Note Printing Australia Limited	Craigieburn	Printing	3064	Manufacturing banknotes and passports	86082630671	244
			FAIRFAX MEDIA LIMITED	FAIRFAX MEDIA LIMITED	Wendouree	Printing	3355	Printing	15008663161	(blank)
			AMCOR FLEXIBLES (AUSTRALIA) PTY LTD	Amcor Flexibles Asia Pacific - Port Melbourne	Port Melbourne	Printing	3207	Manufacture of flexible packaging to food, pharmaceutical and general industry	46113833748	90

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
18	Basic Chemical and Chemical Product Manufacturing		NUFARM AUSTRALIA LIMITED	Laverton North	Laverton North	Pesticide Manufacturing	3026	Manufacture and formulation of phenoxy- based herbicides and other agricultural chemicals.	80004377780	320
			PPG INDUSTRIES AUSTRALIA PTY LIMITED	PPG Clayton	Clayton	Paint and Coatings Manufacturing	3168	Manufacture of automotive, industrial, architectural and refinish coatings	82055500939	324
			CSL LIMITED	CSL Behring (Broadmeadows)	Broadmeadows	Human Pharmaceutical and Medicinal Product Manufacturing	3047	Manufacture of pharmaceutical products of biological origin	99051588348	1000
			CSL LIMITED	Seqirus (Parkville)	Parkville	Human Pharmaceutical and Medicinal Product Manufacturing	3052	Manufacture, development and marketing of pharmaceutical products of biological origin.	99051588348	1000
			HOSPIRA AUSTRALIA PTY LTD	Mulgrave Site	Mulgrave	Human Pharmaceutical and Medicinal Product Manufacturing	3170	Sterile pharmaceutical product manufacture and distribution	58097064330	459
			GLAXOSMITHKLINE AUSTRALIA PTY LTD	Boronia	Boronia	Human Pharmaceutical and Medicinal Product Manufacturing	3155	Manufacturing pharmaceuticals	47100162481	291
			SUN PHARMACEUTICAL INDUSTRIES (AUSTRALIA) PTY LTD	Sun Pharma Controlled Substances Division	Port Fairy	Human Pharmaceutical and Medicinal Product Manufacturing	3284	Extraction of bulk narcotic pharmaceuticals from poppies. Synthesis of narcotic derivatives.	64130119603	120

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			CATALENT AUSTRALIA PTY LTD	Catalent Pharma Solutions	Braeside	Human Pharmaceutical and Medicinal Product Manufacturing	3195	Manufacture of pharmaceutical products	61007219990	264
			PENTAL LIMITED	Pental Limited	Shepparton	Cleaning Compound Manufacturing	3630	The principal activities of the Group during the course of the financial year were the manufacturing and distribution of personal care and home products.	29091035353	133
			ASPEN PHARMA PTY LTD	Aspen Australia Dandenong	Dandenong	Human Pharmaceutical and Medicinal Product Manufacturing	3175	Manufacture of pharmaceutical products	88004118594	320
			AKZO NOBEL PTY LIMITED	Akzo Nobel Pty Limited	Sunshine	Paint and Coatings Manufacturing	3020	Manufacture of surface coatings and resins.	59000119424	200
			ENSIGN LABORATORIES PROPRIETARY LIMITED	ENSIGN LABORATORIES PROPRIETARY LIMITED	Mulgrave	Human Pharmaceutical and Medicinal Product Manufacturing	3170	Manufacture of medicinal products, aerosols (insecticides, personal insect repellants, air fresheners, personal deodorants), sunscreens, toothpaste, body washes, skin cleansers, hair care and detergents.	11004395242	350
19	Polymer Product and Rubber Product Manufacturing		SEALED AIR AUSTRALIA PTY LIMITED	Fawkner	Fawkner	Polymer Film and Sheet Packaging Material Manufacturing	3060	Manufacturing and printing of flexible plastic packaging material.	65004207532	460

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			ARMSTRONG WORLD INDUSTRIES (AUSTRALIA) PTY LTD	Armstrong Flooring Pty Ltd Australia	Braeside	Other Polymer Product Manufacturing	3195	Manufacturing commercial vinyl sheet flooring	77004747942	110
			TAGHLEEF INDUSTRIES PTY LTD	Taghleef Industries - Wodonga	Wodonga	Polymer Film and Sheet Packaging Material Manufacturing	3690	Manufacture of polypropylene film	51005893112	60
			VISCOUNT ROTATIONAL MOULDINGS PTY LTD	VISCOUNT ROTATIONAL MOULDINGS PTY LTD	Carrum Downs	Rigid and Semi-Rigid Polymer Product Manufacturing	3201	Manufacture of plastic tanks	19067462337	(blank)
			HUNTSMAN CHEMICAL COMPANY AUSTRALIA PTY LIMITED		Maribyrnong	Polymer Foam Product Manufacturing	3032	Manufacture of expandable, moulded and cut polystyrene foam products and expandable moulded polypropylene foam.	48004146338	41
			FOAMEX VICTORIA PTY LTD	FOAMEX VICTORIA PTY LTD	Bayswater North	Polymer Foam Product Manufacturing	3153	Manufacture of polystyrene foam.	72006535520	46
			LABELMAKERS GROUP PTY LTD	Labelmakers Group Pty Ltd	Somerton	Polymer Film and Sheet Packaging Material Manufacturing	3062	Packaging Material Manufacturing	41114717814	170
			POLYFOAM (AUSTRALIA) PTY LTD		Dandenong South	Rigid and Semi-Rigid Polymer Product Manufacturing	3175	Plastics converting into moulded products	25007207678	54
			AIRSTEP AUSTRALIA PTY LTD	AIRSTEP AUSTRALIA PTY LTD	Dandenong	Natural Rubber Product Manufacturing	3175	Rubber product manufacturing	24144967215	66

ANZSIC classification			Registered business name	Facility name	Suburb/ town	Industry Type	Post code	Main activities	ABN	Number of employees
			COMPLETE POD SOLUTIONS PTY LTD	COMPLETE POD SOLUTIONS PTY LTD	Somerton	Polymer Foam Product Manufacturing	3062	Manufacture and Storage of Polystyrene Foam Products	75139996544	28
			MOTHERSON ELASTOMERS PTY LTD	Factory 1	Bendigo	Other Polymer Product Manufacturing	3550	Rubber compounding, calendering and extrusion.	19124112009	33
9531	Laundry services		ENSIGN SERVICES (AUST) PTY LTD	Spotless Linen Services	Abbotsford	Laundry and Dry-Cleaning Services	3067	Industrial laundry	40006254306	130
			PRINCES LAUNDRY SERVICES PTY LTD	PRINCES LAUNDRY SERVICES PTY LTD	Altona North	Laundry and Dry-Cleaning Services	3025	Launder and iron hospital linen	11071339323	(blank)
			CABRINI HEALTH LIMITED	Cabrini Linen Service Dandenong	Dandenong South	Laundry and Dry-Cleaning Services	3175	Commercial Laundry	99108515073	100
			PRINCES LAUNDRY SERVICES PTY LTD		Braeside	Laundry and Dry-Cleaning Services	3195	Launder and iron hospital linen and table linen	11071339323	75
			PRINCES LAUNDRY SERVICES PTY LTD		Box Hill	Laundry and Dry-Cleaning Services	3128	Launder and iron hospital linen	11071339323	70
			ALSCO PTY LIMITED	Footscray	Footscray	Laundry and Dry-Cleaning Services	3011	Industrial laundry	26000435629	130
			CENTRAL GIPPSLAND HEALTH SERVICE	Sale Linen Service	Sale	Laundry and Dry-Cleaning Services	3850	Commercial Laundry	85050485681	32
			BALLARAT HEALTH SERVICES	EUREKA LINEN	Ballarat	Laundry and Dry-Cleaning Services	3350	Laundry	39089584391	2700

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			ENSIGN SERVICES (AUST) PTY LTD	Spotless Garment Services	Northcote	Laundry and Dry-Cleaning Services	3070	Industrial laundry	40006254306	130
			ALSCO PTY LIMITED	Mulgrave	Mulgrave	Laundry and Dry-Cleaning Services	3170	Industrial laundry and mat cleaning	26000435629	135

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