



## INDUSTRIAL CONSUMPTION OF ENERGY SURVEY

### Statistical Report of Energy Use in the Canadian Manufacturing Sector, 1995–2015

Every year, Statistics Canada conducts the Industrial Consumption of Energy (ICE) survey (co-sponsored by the Office of Energy Efficiency (OEE) of Natural Resources Canada (NRCan) and Environment and Climate Change Canada), which collects energy use data from establishments in Canada's Manufacturing sector. The survey is an essential tool for monitoring the evolution of energy consumption by manufacturing industries and helps to fulfill part of the OEE's mandate to strengthen and expand Canada's commitment to energy efficiency.

This statistical report examines energy use patterns for the Canadian Manufacturing sector using the results of the 2015 ICE survey. The estimates are based on the North American Industry Classification System (NAICS) and include all 21 subsectors of the Manufacturing sector (NAICS 31 to 33).

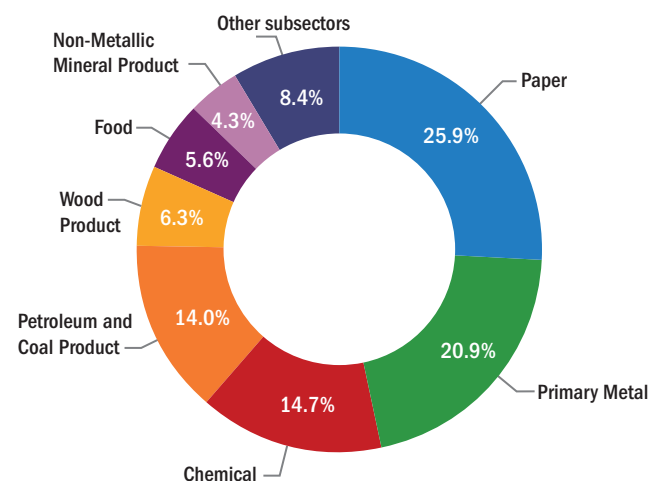
#### Manufacturing continued to reduce energy intensity in 2015

After a brief pause during the 2008/09 recession, Manufacturing energy intensity has **continued to fall** and in 2015 was about **12 percent below the pre-recession peak of 2004**. Longer term, intensity has declined 30 percent since 1995. This represented an absolute drop in the sector's energy use of about **400 petajoules (PJ)**, which is equivalent to the amount of energy consumed by cars in Ontario, Quebec and the Atlantic provinces in 2014.<sup>1</sup>

Paper Manufacturing, the subsector with the highest rate of energy use per unit of gross domestic product (GDP), experienced a decline in output (GDP) of 19.3 percent over the 1995–2015 period. The change re-weighted activity in Manufacturing toward less energy-intensive industries. This re-weighting, combined with improvement in other energy-intensive subsectors, resulted in an **overall reduction in Manufacturing energy intensity** from **17.2 megajoules per dollar of GDP (MJ/\$GDP)** in 1995 to **12.1 MJ/\$GDP** in 2015.

Although there are 21 subsectors within the Manufacturing sector, **seven subsectors** accounted for almost **92 percent** of all energy consumption in the sector in 2015.

**Figure 1. Share of energy consumption in the Manufacturing sector, 1995–2015**



<sup>1</sup> Natural Resources Canada, Comprehensive Energy Use Database, Transportation Sector, Canada, Table 31

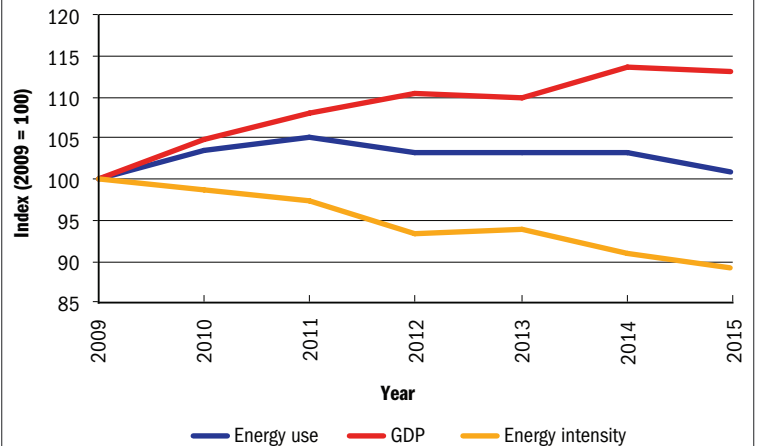
In 2015, the Manufacturing sector generated **\$172.6 billion in GDP**, in constant 2007 dollars, and according to ICE estimates, consumed **2,090.0 PJ** of energy. To put this into perspective, this amount is roughly equal to the energy consumed for space heating and cooling, water heating, and commercial lighting by all residential and commercial/institutional buildings in Canada in 2014.

The trend in improved energy intensity is evident over both the long and short term. The sector continued its recovery from the global economic downturn in 2009 as GDP increased steadily in the following years. Figure 2 indicates that **output of the Manufacturing sector has outpaced energy use**, resulting in continued **improvement in energy intensity**.

Table 1 provides these comparisons for each of the seven most energy-consuming subsectors. As indicated, **four of the seven subsectors reported a decline in energy use** in 2015 compared to 1995, with the most significant declines in **Paper Manufacturing** (-39.9 percent) and **Non-Metallic Mineral Product Manufacturing** (-24.0 percent). There are a number of **factors** that can influence the amount of energy used by a particular industry, such as its level of **economic activity**, its **structure** and **how efficiently it uses energy**. The adoption of more efficient energy-related processes or technologies in the industry would reduce its demand for energy, such as **waste energy recovery** and **re-use and cogeneration** in the Paper Manufacturing subsector.

With support from BC Hydro's Power Smart program for thermo-mechanical pulp (TMP) producers, Catalyst Paper is developing a project to use **excess steam for power generation** – a scheme that will generate 67 gigawatt-hours (GWh) of electricity and reduce the company's energy costs by roughly \$5 million a year. That is enough to power 6,400 households. Power Smart will subsidize 75 percent of the cost of the project, helping Catalyst Paper become energy self-sufficient and reducing the energy load on BC Hydro.

**Figure 2. Indexed growth of energy use, GDP and energy intensity for the Manufacturing sector, 2009–2015**



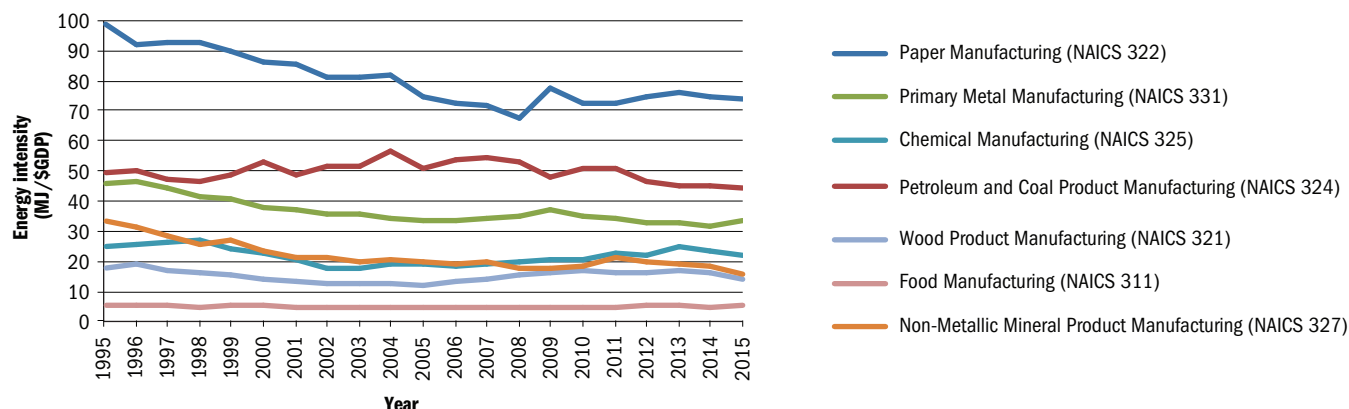
**Tableau 1. Comparison of energy consumption, GDP and energy intensity of the Manufacturing sector and selected subsectors, 1995–2015**

	Change in energy consumption (%)	Change in GDP (%)	Change in energy intensity (%)
<b>Total Manufacturing</b>	<b>-16.1</b>	<b>19.3</b>	<b>-29.7</b>
Paper	-39.9	-19.3	-25.5
Primary Metal	-13.4	18.0	-26.6
Chemical	10.6	25.4	-11.8
Petroleum and Coal Product	-0.1	12.2	-11.0
Wood Product	20.7	53.8	-21.5
Food	37.8	38.4	-0.4
Non-Metallic Mineral Product	-24.0	60.8	-52.8



As shown in Figure 3, **all seven subsectors experienced a decrease in energy intensity** from 1995 to 2015, but **significant decreases** were shown for **Non-Metallic Mineral Product Manufacturing** (-52.8 percent), **Primary Metal Manufacturing** (-26.6 percent) and **Paper Manufacturing** (-25.5 percent).

**Figure 3. Energy intensity of the seven selected subsectors, 1995–2015**



### Energy consumption has varied by sector

For example, some of the biggest changes in energy consumption levels occurred in subsectors with large fluctuations in outputs:

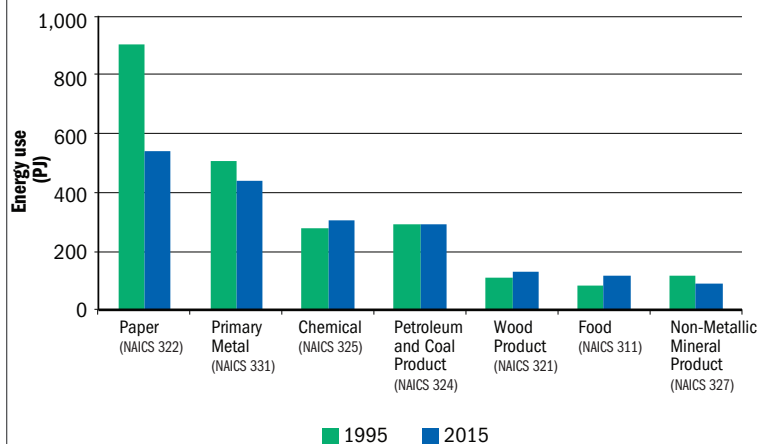
- Energy consumption in Paper Manufacturing decreased **39.9 percent** from 1995 to 2015 (GDP fell **19.8 percent**).
- Food Manufacturing consumed **37.8 percent** more energy in 2015 compared to 1995 (GDP increased **38.2 percent**).

### Fuel mix has evolved

Fuel mix has also evolved over the short term. **Natural gas** represented **33 percent** of energy use, up from 27 percent in 2009, and replaced **electricity**, which had a **29 percent** share in 2015, as the dominant fuel used in Manufacturing. The price of natural gas fell from 33.4¢ per cubic metre (¢/m³) in 2008 to 21.0¢/m³ in 2014, while industrial electricity prices, on a national basis, were rising.

The consumption of many energy sources **decreased** significantly from 1995 to 2015 – in particular **spent pulping liquor**, which is produced and used exclusively by Paper Manufacturing. This subsector has been in decline since 2005, which might explain, at least in part, the decreased use of spent pulping liquor from 2005 to 2015. Use of **coke and coke oven gas** decreased notably, whereas **steam use has increased** substantially since 1995.

**Figure 4. Energy consumption of the seven selected Manufacturing subsectors, 1995 and 2015**





**Table 2. Manufacturing sector's energy use by energy source, 1995 and 2015**

Energy source	1995 energy (PJ)	2015 energy (PJ)	Growth, 1995-2015 (%)
<b>Natural gas</b>	<b>777.8</b>	<b>680.1</b>	<b>-12.6</b>
<b>Electricity</b>	<b>624.7</b>	<b>597.9</b>	<b>-4.3</b>
Coal	41.3	39.2	-5.1
Coke	102.9	70.3	-31.7
Coke oven gas	27.4	19.1	-30.3
Petroleum coke and coke from catalytic cracking catalyst	64.6	65.3	1.1
<b>Total, coal and coke</b>	<b>236.2</b>	<b>193.9</b>	<b>-17.9</b>
Heavy fuel oil	139.8	X	N/A
Middle distillates	17.2	16.3	-5.2
Propane	12.3	X	N/A
Refinery fuel gas	127.6	X	N/A
<b>Total, RPP* (including natural gas liquids)</b>	<b>296.9</b>	<b>X</b>	<b>N/A</b>
<b>Spent pulping liquor</b>	<b>343.6</b>	<b>223.1</b>	<b>-35.1</b>
<b>Steam</b>	<b>33.5</b>	<b>44.1</b>	<b>31.6</b>
<b>Wood</b>	<b>178.9</b>	<b>166.2</b>	<b>-7.1</b>
<b>Total</b>	<b>2,491.7</b>	<b>2,090.0</b>	<b>-16.1</b>

Note: Because of rounding, the numbers in the table may not add up.

X denotes undisclosed value for confidentiality reasons.

\*RPP = refined petroleum products



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## Did you know?

Since the adoption of the **ISO 50001 Energy Management Systems** standard in Canada in 2011, significant energy and cost savings of up to \$2 million annually per facility have been achieved by Canadian industrial facilities.

The **Canadian Industry Program for Energy Conservation (CIPEC)** supports a network of over 2,400 facilities and more than 50 trade associations that work together to cut costs, improve energy efficiency and reduce industrial GHG emissions.

To encourage and support industry's energy efficiency efforts, NRCan offers Canadian industry tools and services through CIPEC, such as Dollars to \$ense energy management workshops through the Canadian Institute for Energy Training (CIET), benchmarking reports, best practice guides and cost-shared assistance.

For more information on ISO 50001 and CIPEC, consult [nrcan.gc.ca/energy/efficiency/industry/5143](http://nrcan.gc.ca/energy/efficiency/industry/5143).

Source: *Improving Energy Performance in Canada, Report to Parliament Under the Energy Efficiency Act, 2015-2016*

To learn more about the ICE survey, including details of the methodology used in conducting the survey, consult Statistics Canada's [website](#).

For a full breakdown of energy use, GDP and energy intensity for the sector and selected subsectors, consult the website at [oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/ice/2015/tables.cfm](http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/ice/2015/tables.cfm).

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