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INDUSTRIAL CONSUMPTION OF ENERGY SURVEY

Statistical Report of Energy Use in the Canadian Manufacturing Sector, 1995–2014

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 2014 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).[1]

Although there are 21 subsectors within the Manufacturing sector, seven subsectors accounted for almost 91 percent of all energy consumption in the sector in 2014. These subsectors (in order of their share of energy consumption) are:

- Paper (24.0 percent)
- Primary Metal (21.7 percent)
- Chemical (14.5 percent)
- Petroleum and Coal Product (13.9 percent)
- Wood Product (7.0 percent)
- Food (5.2 percent)
- Non-Metallic Mineral Product (4.5 percent)

Manufacturing continued to reduce energy intensity in 2014

After a brief pause during the 2008/09 recession, Manufacturing energy intensity has continued to fall and in 2014 was about 7 percent below the pre-recession peak. Longer term, intensity has declined 27 percent since 1995. This represented an absolute drop in the sector's energy use of 315 petajoules (PJ), which is just over the amount of energy consumed for space heating by all residential dwellings in Quebec and the Atlantic provinces in 2013.[2]

Paper Manufacturing, the subsector with the highest rate of energy use per unit of GDP, experienced a decline in output (GDP) of 21.5 percent over the 1995–2014 period, re-weighting 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 gross domestic product (MJ/$GDP) in 1995 to 12.6 MJ/$GDP in 2014.

This trend in improved energy intensity is evident over both the long and short run. Figure 1 indicates that output of the Manufacturing sector has outpaced energy use, resulting in continued improvement in energy intensity.

[1] For a list of the 21 subsectors, see the North American Industry Classification System (NAICS) Canada 2012 (31-33 – Manufacturing).

[2] Natural Resources Canada, Comprehensive Energy Use Database, 1990–2013, Residential Sector.

Canada

In 2014, the Manufacturing sector generated $173.2 billion in GDP, in constant 2007 dollars, and according to ICE estimates, consumed 2,176.5 PJ of energy. To put this into perspective, this amount is roughly equal to the energy consumed for space heating and cooling, water heating, residential appliances and lighting by all residential and commercial and institutional buildings in Canada in 2013.

As shown in Figure 2, all seven subsectors experienced a decrease in energy intensity from 1995 to 2014, but significant decreases were shown for Non-Metallic Mineral Product (44.5 percent), Primary Metal (29.8 percent) and Paper (26.0 percent).

Figure 1. Indexed growth of energy use, GDP and energy intensity for the Manufacturing sector, 2009–2014

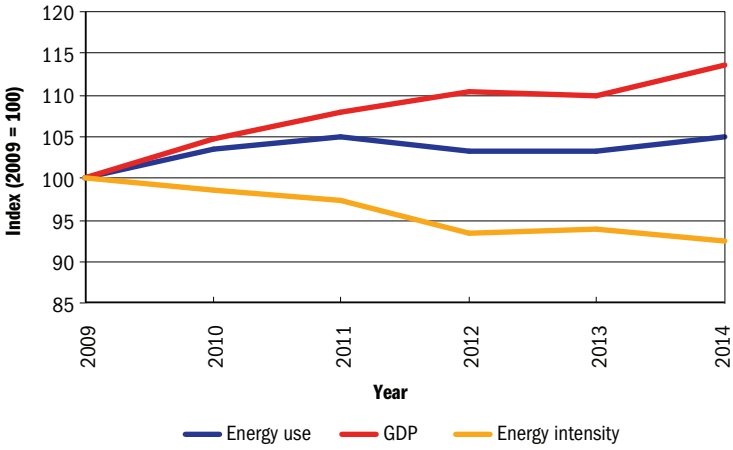
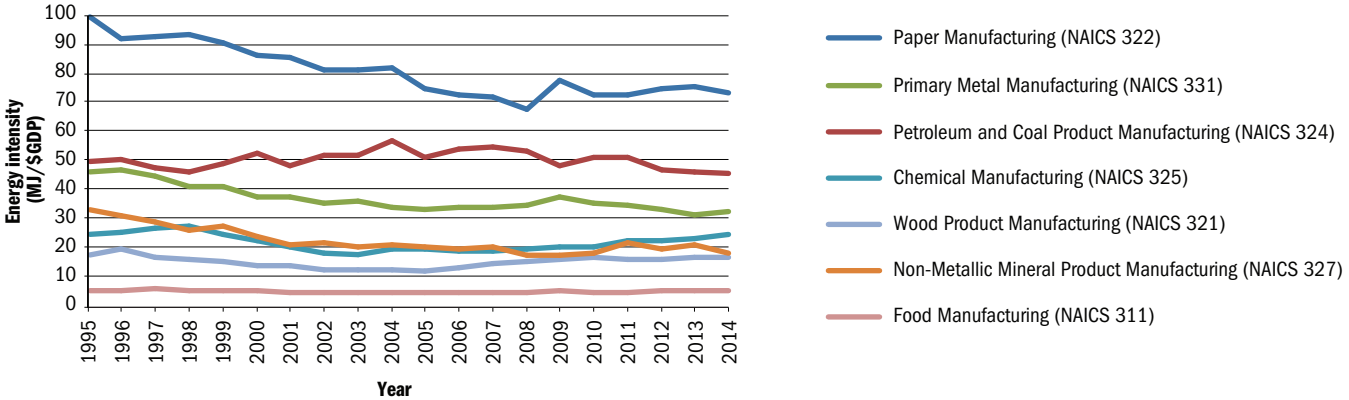


Table 1 provides these comparisons for each of the seven most energy-consuming subsectors.

Table 1. Comparison of energy consumption, GDP and energy intensity of the Manufacturing sector and selected subsectors, 1995–2014

	Change in energy consumption (%)	Change in GDP (%)	Change in energy intensity (%)
Total Manufacturing	**-12.7**	**19.8**	**-27.1**
Paper	-41.9	-21.5	-26.0
Primary Metal	-6.3	33.5	-29.8
Chemical	14.0	17.1	-2.7
Petroleum and Coal Product	3.6	13.0	-8.3
Wood Product	41.3	48.1	-4.6
Food	32.6	37.7	-3.7
Non-Metallic Mineral Product	-16.1	51.1	-44.5
Other Manufacturing subsectors	-4.1	16.3	-17.6

Figure 2. Energy intensity of the seven selected subsectors, 1995–2014



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 41.9 percent from 1995 to 2014 (GDP fell 21.5 percent).
- Wood Product Manufacturing consumed 41.3 percent more energy in 2014 compared to 1995 (GDP increased 48.1 percent).

Fuel mix has evolved

Fuel mix has also evolved over the short term with natural gas representing 33 percent of energy use, up from 27 percent in 2009, and replacing electricity, which had a 28 percent share in 2014, as the dominant fuel used in Manufacturing. The price of natural gas fell from 33.4¢/m³ in 2008 to 16.5¢/m³ in 2013, while industrial electricity prices, on a national basis, were rising.

Significant reductions were evident in the consumption of many energy sources from 1995 to 2014, in particular spent pulping liquor, 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 2014. Within the refined petroleum products category, there were significant changes to the fuel mix (i.e. heavy fuel oil and propane were down 82.4 percent and 36.9 percent, respectively, while middle distillates were up 32.9 percent).

Figure 3. Energy consumption of the seven selected Manufacturing subsectors, 1995 and 2014

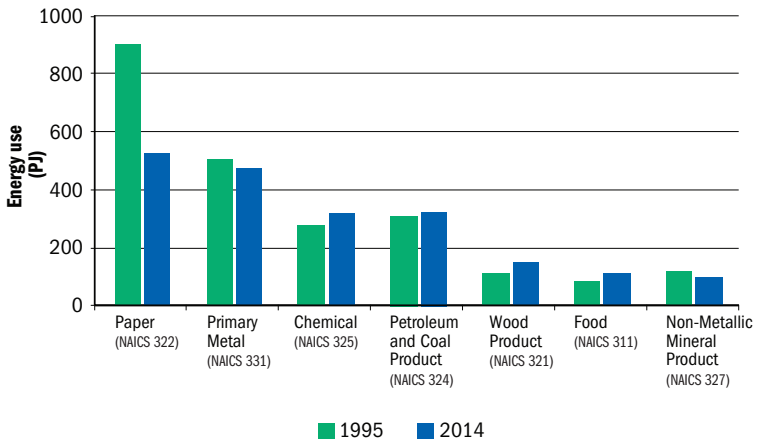


Table 2. Manufacturing sector's energy use by energy source, 1995 and 2014

Energy source	1995 energy (PJ)	2014 energy (PJ)	Growth, 1995–2014 (%)
Natural gas	**777.8**	**722.2**	**-7.1**
Electricity	**624.7**	**616.1**	**-1.4**
Coal	41.3	45.7	10.6
Coke	102.9	77.6	-24.6
Coke oven gas	27.4	22.6	-17.5
Petroleum coke and coke from catalytic cracking catalyst	64.6	63.5	-1.8
Total, coal and coke	**236.2**	**209.3**	**-11.4**
Heavy fuel oil	139.8	24.6	-82.4
Middle distillates	17.2	22.9	32.9
Propane	12.3	7.8	-36.9
Refinery fuel gas	127.6	X	N/A
Total, RPP* (including natural gas liquids)	**296.9**	**X**	**N/A**
Spent pulping liquor	**343.6**	**200.2**	**-41.7**
Steam	**33.5**	**47.1**	**40.7**
Wood	**178.9**	**180.6**	**1.0**
Total	**2,491.7**	**2,176.5**	**-12.7**

Note: Due to rounding, the numbers in the table may not add up.
X denotes undisclosed value for confidentiality reasons.
*RPP = refined petroleum products

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.

*Source: *Improving Energy Performance in Canada, Report to Parliament Under the* Energy Efficiency Act, *2013–2015*

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 web site at oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/ice/2014/tables.cfm.

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Cat. No. M141-24E-PDF (Online)
ISSN 2371-5839

Aussi disponible en français sous le titre: Enquête sur la consommation industrielle de l'énergie – Rapport statistique sur l'utilisation de l'énergie dans le secteur manufacturier canadien, 1995–2014