ENERGY EFFICIENCY TRENDS IN CANADA 1990 to 2015

SUMMARY

Natural Resources Canada analyzes the factors behind the observed changes in total energy use in Canada in the publication *Energy Efficiency Trends in Canada – 1990 to 2015*. This extract summarizes the key elements and findings in that analysis.

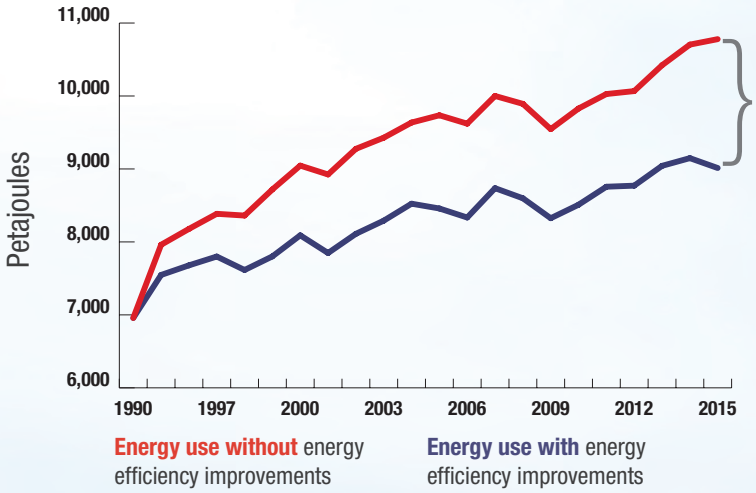
Overview

Energy efficiency has improved by **26.5 percent since 1990**. These improvements reduced energy use by about **1,766 petajoules (PJ)**, avoiding 94.8 megatonnes (Mt) of greenhouse gas (GHG) emissions and saved Canadians **$38.2 billion in 2015**.

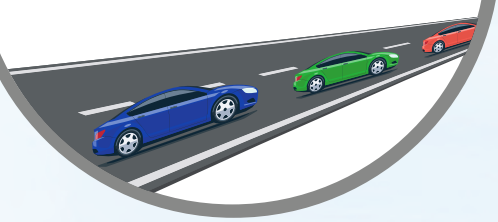
Energy use **grew by 30 percent** and would have **increased by 55 percent** without energy efficiency improvements.

While energy intensity, measured as GJ/GDP, improved for the economy, the change in energy use per capita was marginal, reflecting the combined effect of an increased number of energy-consuming items and improvements in energy efficiency.

Final energy use, with and without energy efficiency improvements, 1990–2015



Savings from energy efficiency in 2015,
1,766.1 PJ or **$38.2 billion**, equivalent to the energy used by over **42 million cars in one year.**



Canada

Residential

Between 1990 and 2015, residential energy use increased by **8 percent** while **GHG emissions decreased** by **10 percent**. In terms of performance, in 2015 the net result was a **46 percent improvement** or 656 PJ and a **savings of $13.3 billion** in energy costs.

Energy use per household **decreased by 24 percent** and energy use per square metre **decreased by 35 percent,** primarily because of changes to building envelope requirements and improvement in efficiency of energy-consuming items.

Residential energy indicators

	1990	2015
People per household	2.8	2.5
Living space	122 m²	143 m²
Households	9.9 million	14.1 million
Appliances per household	15	23
Occupied floor space cooled	22%	57%

Commercial/institutional

Overall, sector energy efficiency improved **23 percent** or **169 PJ** in 2015, saving **7.6 Mt of GHG emissions** and **$3.8 billion** in energy costs.

Since 1990, the commercial/institutional sector's **GDP has increased 97 percent**, while **energy use has increased 35 percent** and **GHG emissions have increased 10 percent**.

Energy consumed per unit of floor space had **decreased by 8 percent**, while energy consumed per unit of **economic activity decreased by 31 percent**. These results reflect the improvements in the building envelope and the efficiency of energy-consuming items.

The largest energy end-use increase was in equipment related to the proliferation of new technologies.

Commercial/institutional energy indicators

	1990	2015
Floor space	509.9 million m²	751.5 million m²
Auxiliary and electronic equipment	54 PJ	145 PJ
Employees	9 million	13 million
GDP	$553 billion ($2007)	$1,093 billion ($2007)

Industrial

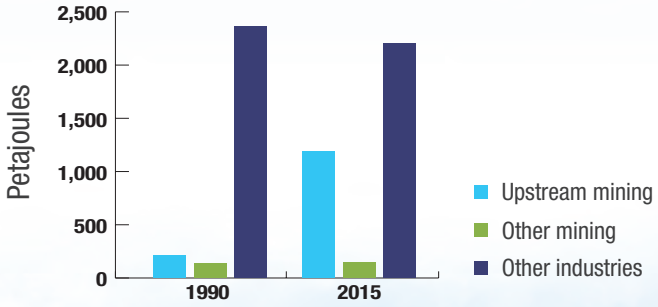
From 1990 to 2015, industrial **energy use increased by 31 percent** and associated **GHG emissions increased by 26 percent** as there has been a shift toward using slightly less carbon-intensive fuels.

Most energy-use growth was in mining. This was due in part to higher oil prices and process technology advances, leading to significant increases in upstream oil and gas activity (notably oil sands development).

In 2015, the industrial sector's **energy efficiency improved 11 percent** or 298 PJ, **saving $3.2 billion** in energy costs.

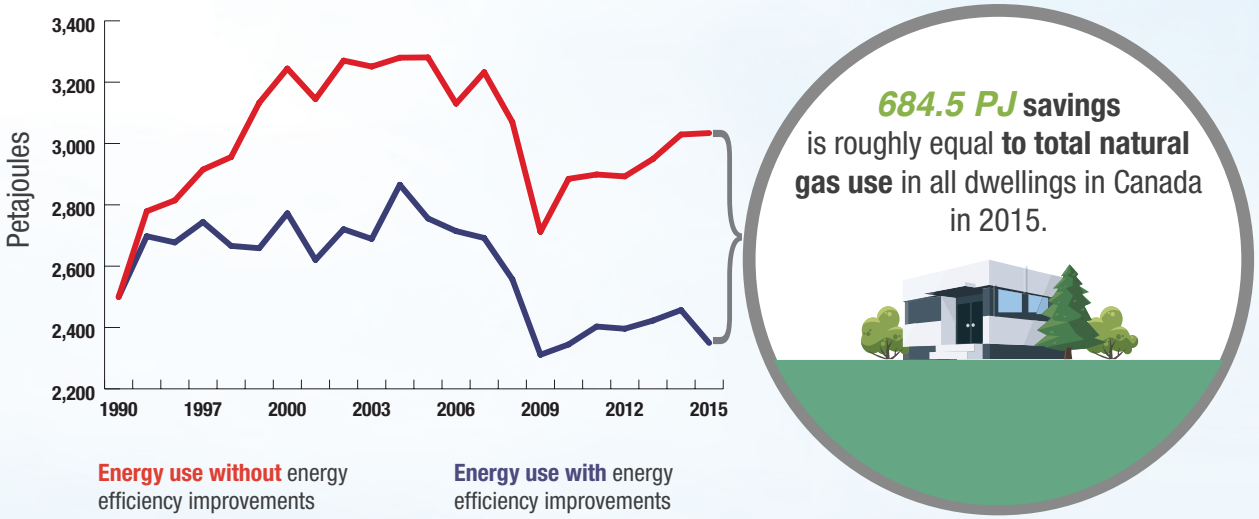
Even with technological advances, increased difficulty in resource extraction has resulted in the upstream mining industry being more energy-intensive.

Industrial energy use by selected industry, 1990 and 2015



As illustrated in the following figure, without the upstream mining industry, this sector's **energy efficiency savings** would have been **685 PJ** and 29.6 Mt of GHG emissions avoided.

Industrial energy use, with and without energy efficiency improvements (without upstream mining), 1990–2015



Transportation

Between 1990 and 2015, the transportation sector's **energy use increased by 40 percent** and **GHG emissions increased by 38 percent**. Around two thirds of this increase was in freight transportation.

Energy efficiency improved by 36 percent or 643 PJ, mainly within passenger light-duty vehicles and freight trucks, reflecting improvements in both end use and the dominance of these two modes within the sector. In 2015, the total sector's improvement translates into $17.9 billion in energy costs in 2015.

Passenger transportation

Overall, passenger transportation **energy efficiency improved 30 percent** or 333 PJ, avoiding 22.6 Mt of GHG emissions.

Freight transportation

Energy use increased by 72 percent and **GHG emissions increased 71 percent**, equal to 34 Mt of emissions.

While rail remains the dominant mode, heavy trucks has surpassed marine to become the second dominant mode with a **151 percent increase in tonne-kilometres travelled** over the 1990–2015 period.

Overall, freight transportation **energy efficiency improved 46 percent** for all modes (i.e. marine, rail, air and road), accounting for 310 PJ, avoiding 21.9 Mt of GHG emissions between 1990 and 2015.

Passenger transportation energy indicators

	1990	2015
Total vehicles	14.2 million	22.3 million
Light trucks	19.4%	39.2%
Average per vehicle	17,824 Km/year	14,448 Km/year
Pkm covered	388.1 billion	526.0 billion
Vehicles per person aged 18 years and over	0.68	0.77

Freight transportation energy indicators,

	1990	2015
Total freight trucks	1.9 million	5.0 million
Heavy trucks	297,000	464,000
Average for heavy trucks	51,886 Km/year	86,664 Km/year
Tkm travelled	134.6 billion	355.0 billion
Litres of fuel used per truck	6,600 L	5,150 L

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