Industry Energy / Emissions Continue to Increase!

The facts are in, the data reviewed and the outcome evident - after showing a general decline since the peak of 2004, energy use in the manufacturing sector is moving upward; 3.5% in 2010 and another 2% in 2011. Even so, energy use is still 9% lower than that of 1990 and 16% below 2004 levels. It’s true that two years is not a “trend” but, as we continue to emerge from the economic set back of 2008 / 09, the pattern is likely to continue. And, when energy use increases, fuel-based GHG emissions also trend upward, rising 3% in 2011 and now nearly 8% higher than the low of 2009. Like energy, emissions are still 17% below 1990 levels. With a GDP growth of 3%, both energy and emissions intensities show a decline.

While intensities are not at their lowest point (2006, see Fig. 1, next page), it took nearly 28% less energy to generate a dollar’s worth of goods in 2011 than it did in 1990. We saw declines in Intensity in both of the last two years.

As a data analysis centre, we point out that a lower intensity does not necessarily mean an increase in energy efficiency. It may indicate that the mix of industries has changed. Declines in the output of pulp and paper or steel smelting industries and increases in the food preparation or transportation equipment industries can radically affect overall energy intensity levels; it takes much less energy to produce a dollar’s worth of transport equipment than a dollar’s worth of wood pulp. We note that, since 1990, the GDP of the pulp and paper has dropped 12% while GDP in the transportation industry has gone up 35% suggesting that at least some of the decline is due to shifts in industry structure.

Fuel mix changes

Figure 2 depicts fuel market shares over the years. These fuel shifts affect both GHG emissions and the relative ratio of primary to secondary energy (i.e., electricity as an energy carrier is a “secondary” form of energy if made from “primary” fuel like coal, oil or natural gas).

The graph shows that electricity’s market share grew from the mid ‘90s to 2005 and then leveled off. But shares have declined over the last two years and, for the first time since 2003, fell below that of natural gas (see Energy Byte).

What about shifts in the other fuels? When we see change in production levels of certain industries, we may note shifts in the fuel mix. For example, pulp and paper production went down by 3% in 2011 from 2010 and we see that the market share of biomass also shows a decline. The significant increase in steel production since 2009 is reflected in the uptick of coal use in the fuel mix ratios.

Energy prices also play a role, especially in industries where fuel switching can happen very quickly. Low natural gas prices tend to generate an increase demand that may be seen as a shift from other fuels. For example, “other fuel” (steam, still gas, other refined petroleum products) increased steadily

**Energy Byte: Natural Gas takes the lead!**

Since 2003, electricity provided more energy to industrial users than any other fuel. It assumed nearly 30% of the market and reached a peak of 773 TJ (215,000 MWh) in 2005! But it has since dropped about 100 TJ and natural gas has taken over top spot again. It delivered about 690 TJ to industrial users and is now at 30% of the energy share while electricity has dropped to 29%.
since 2000 and then begin to drop in 2010 and 2011 after successive years of low natural gas prices. That said, without further analysis, we cannot determine if this relationship is coincidental or causal.

The contribution of biomass to energy supply increased in 2009 and again in 2010, but, as noted, showed a decline in 2011 that is consistent with what we see in the wood based industries.

Impact on GHG emissions

With the increase in the consumption of fossil fuels (including increased shares of coal-based fuels and natural gas in 2011, see Fig. 2), GHG emissions from combustion in Canadian Manufacturing Industry as defined in the ICE data increased nearly 3% from last year to a level 17% below 1990. Note that Environment Canada report for 2011 is not yet available and these data should be considered preliminary.

If one were to include all process related emissions (which fell about 2% from 2010) and emissions from the metal and non-metal mining sectors, total emissions are still 24% below the level of emissions generated in 1990. These data do NOT include coal mining and upstream oil and gas (including bitumen) or indirect emissions from electricity. Specific data by sector are currently available on line from CIEEDAC.

ISO 50001, Good for Canada

In his role as an advisor on the National Advisory Committee on Energy Efficiency, Dr. Nyboer participated in the development of the ISO 50001 standard on energy management, a protocol similar to other management protocols developed by the International Standards Organization (e.g., ISO 9001, 14001). The work was undertaken by a number of stakeholders under the umbrella of the Canadian Standards Association.

What's Going On?

Pet Ref Survey out

CIEEDAC distributed its 19th annual survey to all petroleum refiners in Canada. CIEEDAC's database on energy consumed in the refining industry is used by the industry in its publications and for CIPEC reports.

All ICE data available on line

Statistics Canada has released online its revised ICE data. CIEEDAC's own database has been accordingly updated and is also posted online. The database, available at www.cieedac.sfu.ca, contains energy, production and GHG emissions data for over 130 industry NAICS sectors up to 2011.

CIEEDAC to house District Energy database

The Housing, Buildings and Communities branch of the Innovation and Energy Technology Sector of NRCAN has asked CIEEDAC to house the District Energy database and to establish an annual DE survey of systems across Canada. The Survey should be in house by the end of March and the first survey executed later in 2013.

In continuation of that role, Nyboer is also participating in the advancement and implementation of that standard in Canadian industry. Under the old maxim of “You can’t manage what you don’t measure”, the ISO 50001 team broadened its mandate to move the standard forward and is contributing to work designed to develop guidance documents for use in Canadian industry. The documents focus on the implementation of energy management systems (EnMS), baseline development, performance indicators, auditing and monitoring.

In this regard, Nyboer will participate in a review process designed to develop these protocols as part of the Energy Management Technical Committee & Implementation Task Force. Of the eight or so issues to be addressed, Nyboer will focus on 1) energy performance, 2) renewable energy sources, 3) energy efficiency and 4) inputs from existing reference documents.

The Task Force is scheduled to meet once a month over 2012 to assess progress and update task force participants. For more information on ISO 50001 and its implementation, contact Mike Burke at Natural Resources Canada <mburke@NRCan.gc.ca>.