Natural Gas and the Industrial Sector

Last year, the Canadian Gas Association, a long time supporter of CIEEDAC's activities, requested a special report highlighting the use of natural gas in industry. The report, released in March, 2015, focuses on how major industrial users actually use the natural gas. It also looks at natural gas use in the production of electricity and the movement of natural gas through pipelines.

The industrial sector uses roughly 37% of the total energy used in Canada (see Fig. 1, next page). Natural gas (NG) is the fuel of choice in this sector and assumes about 44% of the total energy used by industry (see Fig. 2, next page). NG is also a feedstock to numerous industrial processes; about 3.5% of the total supply of NG served this end in 2012. In recent years, a well-supplied North American market has continued to put downward pressure on NG prices making it an increasingly valuable energy source for industry, as well as the other sectors, in Canada.

NG versatility
The versatility of NG makes it an important fuel for all Canadian sectors - it is, by far, the primary supplier of heat in residential and commercial sectors and is also used in transportation - but about half of the available supply is used in the industrial sector. The report, available online from both CGA and CIEEDAC (see below), provides data on of the relative use and importance of NG in industry. Industries described in more detail include Food and manufacturing industries. They are also the largest consumer of NG as a feedstock. The primary metals industry is the second largest user of NG as an energy carrier primarily to produce iron and steel, followed by petroleum refining and then the pulp and paper industries. In the mining group of industries (outside of oil and gas extraction), potash extraction uses the most natural gas. While these are the biggest users, all industry groups use natural gas where it is available, from construction to logging, from metal mining to all the other various manufacturing industries.

Energy Byte: Natural Gas and Electricity Production
Utility use of natural gas to generate electricity increased by a factor of 7.2 between 1990 and 2012. In 1990, nearly 50.5 PJ of natural gas was used to generate 4.13 TWh of electricity where in 2012, 415 PJ generated over 40 TWh. While this shows an efficiency improvement over the period, the average efficiency of conversion of all utilities in Canada has remained quite stable at about 35% since 1995.

Where it's used
Industries such as potash mining, food processing and manufacturing in the chemistry industry depend on NG for more than 60% of their energy needs. The chemical products industry is the largest user of NG of the manufacturing industries. They are also the largest consumer of NG as a feedstock. The primary metals industry is the second largest user of NG as an energy carrier primarily to produce iron and steel, followed by petroleum refining and then the pulp and paper industries. In the mining group of industries (outside of oil and gas extraction), potash extraction uses the most natural gas. While these are the biggest users, all industry groups use natural gas where it is available, from construction to logging, from metal mining to all the other various manufacturing industries.
Two non-industry users of natural gas are also reviewed. Natural gas plays an increasingly important role in the production of electricity, both by utilities (see Energy Byte, previous page) and by industry. The existing range of NG technologies allows it to be used to provide base load electricity as well as to meet peak load demand and it is the typical fuel used in industry for combined heat and power systems (also known as cogeneration).

The second non-industry user of considerable quantities of natural gas is the pipeline component of the transportation sector. About 99% of all NG used in transport is consumed to prepare the NG for shipment and then run the compressors that actually move it down the pipeline. While the pipeline shipment of NG has doubled since 1990, the average distance travelled has declined by 40%. This, along with a 15% improvement in intensity (energy per unit moved), means that the energy used to run pipelines in 2012 was less than what it was in 1990.

The report is available from CGA at www.cga.ca/wp-content/uploads/2015/04/Natural-Gas-and-the-Canadian-Industrial-Sector-Final.pdf or from CIEEDAC at ciedac.sfu.ca/media/publications/Natural_Gas_and_the_Canadian_Industrial_Sector-Final.pdf

Nyboer moves over
Dr John Nyboer, who has been the executive director of CIEEDAC since 1993, will reduce his participation in its activities beginning in April, 2016. As he moves into the next phase of his life, he will continue to play a strong role at the level of strategic direction and management of the Centre he has run for 23 years. His long time liaison with government and industry agencies will be retained as he trains his successor in the intricacies of the relationships he has established over the last two decades.

What's Going On?
Pet Ref data in
Each year for 21 years, CIEEDAC has received energy use data from petroleum refineries in Canada; this year all the data are once again in and CIEEDAC staff wish to thank all those who provided the data.

Survey year for all databases
CIEEDAC has received funding to update its database on cogeneration, renewable energy and district energy with new data to be gathered by survey, online sources and direct contact with facility owners and operators. The goal is not only to add to the data those who are not yet represented there but also to improve data quality to aid in analyses of this component of Canada's energy system.

Dr. Nyboer, and CIEEDAC's director, Dr. Mark Jaccard, have sought a replacement for his position. It looks like Brad Griffin, a graduate of the School of Resource and Environmental Management, will play a growing role as Nyboer and Jaccard explore with him a path in which he takes over more and more of Nyboer's functions over the coming months and years.

Griffin has worked throughout his career on resource management issues from the project scale to global public policy problems. He received a Bachelor's degree in geological engineering (BASc) from the University of British Columbia in 2004, which included work in the mining, construction, small hydro, and materials sectors. After graduating, he worked as a field engineer with Keystone Environmental investigating and remediating contaminated sites around B.C.

For greater policy focus, Brad completed a Master's degree in Resource and Environmental Management (MRM) at Simon Fraser University in 2010, with an emphasis on energy economics, risk analysis, and physical resources. Following this, Griffin moved to Grenoble, France where he worked with a consulting company, Enerdata, using the POLES global energy-economy model to forecast long-term scenarios. His work included model development (upstream oil & gas, carbon pricing, transport), analyses for the European Commission, national governments and large utilities, and reports and presentations aimed at various audiences, both technical and public.

Both Nyboer and Griffin are looking forward to working together in this coming year to maintain the high quality data analysis and reports that CIEEDAC has become known for.