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Energy Efficiency Measures in Canada's Iron and Steel Industry

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Abstract : In Canada, an increase in the production of iron and steel is anticipated for satisfying the increasing demand of iron and steel in the oil sands and automobile industries. It is predicted that GHG emissions from iron and steel sector will show a continuous increase till 2030 and, with emissions of 20 million tonnes of carbon dioxide equivalent, the sector will account for more than 2% of total national GHG emissions, or 12% of industrial emissions (i.e. 25% increase from 2010 levels). Therefore, there is an urgent need to improve the energy intensity and to implement energy efficiency measures in the industry to reduce the GHG footprint. This paper analyzes the current energy consumption in the Canadian iron and steel industries and identifies energy efficiency opportunities to improve the energy intensity and mitigate greenhouse gas emissions from this industry. In order to do this, a demand tree is developed representing different iron and steel production routs and the technologies within each rout. The main energy consumer within the industry is found to be flared heaters accounting for 81% of overall energy consumption followed by motor system and steam generation each accounting for 7% of total energy consumption. Eighteen different energy efficiency measures are identified which will help the efficiency improvement in various subsector of the industry. In the sintering process, heat recovery from coolers provides a high potential for energy saving and can be integrated in both new and existing plants. Coke dry quenching (CDQ) has the same advantages. Within the blast furnace iron-making process, injection of large amounts of coal in the furnace appears to be more effective than any other option in this category. In addition, because coal-powered electricity is being phased out in Ontario (where the majority of iron and steel plants are located) there will be surplus coal that could be used in iron and steel plants. In the steel-making processes, the recovery of Basic Oxygen Furnace (BOF) gas and scrap preheating provides considerable potential for energy savings in BOF and Electric Arc Furnace (EAF) steel-making processes, respectively. However, despite the energy savings potential, the BOF gas recovery is not applicable in existing plants using steam recovery processes. Given that the share of EAF in steel production is expected to increase the application potential of the technology will be limited. On the other hand, the long lifetime of the technology and the expected capacity increase of EAF makes scrap preheating a justified energy saving option. This paper would present the results of the assessment of the above mentioned options in terms of the costs and GHG mitigation potential.

Keywords : Iron and Steel Sectors, Energy Efficiency Improvement, Blast Furnace Iron-making Process, GHG Mitigation
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