Industrial structural change impact on energy demand and carbon dioxides emission: A case study of Dalian city

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Summary

Global warming and climate change has become one of the hottest political, environmental and economic issues nowadays. As Chinese president Hu Jintao announced the national carbon mitigation target, local governments such like Dalian should formulate and carry out their own plans to reduce GHG emissions from their activities based on the long-term viewpoint. In a sense, the feasiblity of local government plan can also be used to check the possibiliy of national target.

Many previous studies have shown that, because of China's expediting industrialization process, structural change actually increased the use of energy, as well as the energy intensity. Although energy-intensive sectors have made substantial progress in energy efficiency, the advantages have largely been offset by the rapid growth in these sectors. In the past decades, technical factor seems to be the only driving force that contributed to energy saving.

In case of Dalian, as one of the most advanced cities in China, it is now at the crossing road of industrial structural change. The government highly emphasizes on the development of tertiary industries. Given the current trend of its economic development, we could expect that industrial structural change will play a more important role in the future. Thus, the impact of industiral structural change on energy use and CO_2 emission becomes a valuable issue and the focus of this study.

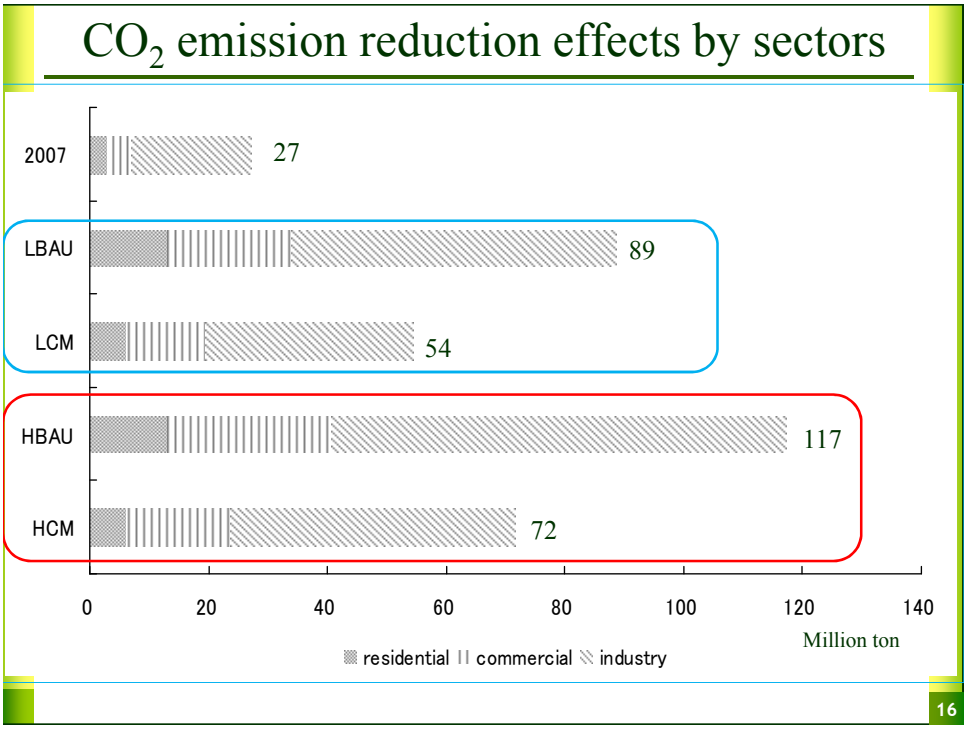
A image of future society energy use and CO_2 emission is estimated, by building up the base year information database and target year scenarios, which consists of socioeconomic assumptions of the target year including environmental load emissions, and measures for reduction. According to the scenario assumptions and analysis, we can easily identify the role of structural change and technology improvement, respectively.

The major finding of this study is that, the assumed industrial structural change (3 percent shift from primary industry towards tertiary industry and 6 percent shift from secondary industry towards tertiary

industry) may cause the CO_2-GDP ratio to decrease by around 12 percent, and fuel structure change (using more nuclear power and renewable power) may contribute 4.3 percent to the target. For the rest part of the 40-45% carbon deduction goal, Dalian's government needs to count on enegy efficiency improvements through technology innovation.

This result suggests that, the local government of Dalian should keep engaging in the development of its advantage industries, such like software, real estate and financial, which may boost economic growth as well as carbon mitigation in the mean time. Cutting down obsolete production by old energy-intensive facilities in some sectors such like plate glass, cement and thermal power will be a good option, because it can greatly improve the average energy efficiency.

Technology improvement, especially endogeneous innovation is also very important. An in-depth technology needs assessment covering institutions and skills would be an important first step. Gaining a better picture of where the major weaknesses are and addressing them will be key to adopting many low carbon technologies.



Key words: energy consuption, CO_2 emission, industrial structural change, Input-Output table, scenario analysis.