A Study on the Korean Railroad's GHG Reduction Strategies for Counteracting Climate Change

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1. Project Outline

In 2008, the Korean government established a new national vision, entitled Low Carbon and Green Growth, in an effort to counteract global issues related to climate change. Also, the national GHG reduction target was set at 30% of BAU (4% compared to 2005 level) to be achieved by 2020. This is the highest reduction target ever set in a developed country. Among the various action plans, the plan to shift a large portion of road traffic to the rail sector will play a key role in accomplishing the mid-term reduction target. Our project was conducted during 8 months from May 2009 to January 2010, which was commissioned by the Ministry of Land, Transport and Maritime Affairs (MLTM). Korea Railroad Research Institute (KRRI) was totally responsible for project management. The main purpose of the project was to predict the BAU of Korean railroad in 2020 based on the national policies and to come up with the action plans of the railroad division of MLTM to reduce CO_2 emissions including R&D.

2. Project Results

Figure 1 depicts the total CO_2 emissions produced by the Korean railroad from 2005 to 2008. The majority of the emissions came from railcars and infrastructure, including stations and depots. The operation of diesel and electric railcars accounted for 80% of the total CO_2 emissions. In 2008, total CO_2 emissions were about 2,383 thousand tons, which decreased about 1% in comparison of the level of 2005. After the KTX (Korea Express Train) was introduced, total CO_2 emissions steadily decreased.
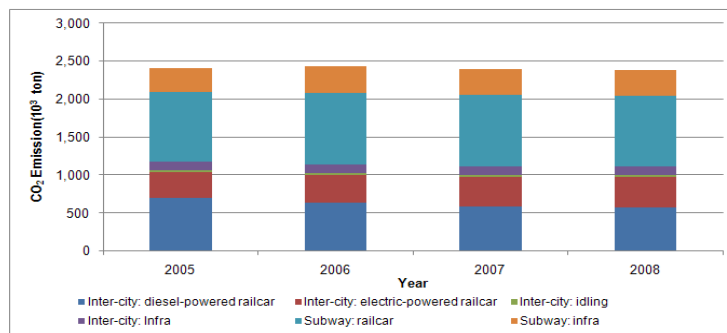

Fig.1 Total CO_2 emissions produced by the Korean railroad (2005-2008)

Recently, our government established a plan to double the traffic volume of railroad by 2020, in an effort to reduce CO_2 emissions produced from transportation. Figure 2 shows the predicted BAU by 2020 considering the increase of traffic volume if the reduction actions of the Korean railroad are not promoted additionally. The BAU in 2020 was about 3,161 thousand tons, which was more 30% than the level of 2005. These results are a clear indication that various CO_2 reduction strategies are essential in maintaining the railroad's position as a low carbon mode of transportation.
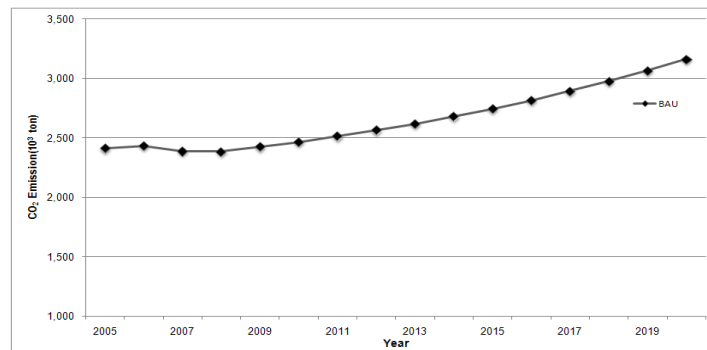

Fig.2 Predicted BAU in Korean railroad by 2020

This year, the government will determine and allocate the reduction targets of each mode of transportation separately. Figure 3 describes the action plan that was established in an effort to efficiently decrease CO_2 emission in Korean railroad. It is necessary to develop new technologies to increase energy efficiency as well as change into new energy sources in railroad. Therefore, our government will invest a large portion of their budget in R&D, so as facilitate future researches such as multi-power hybrid systems, light-weighting vehicles, and so on.
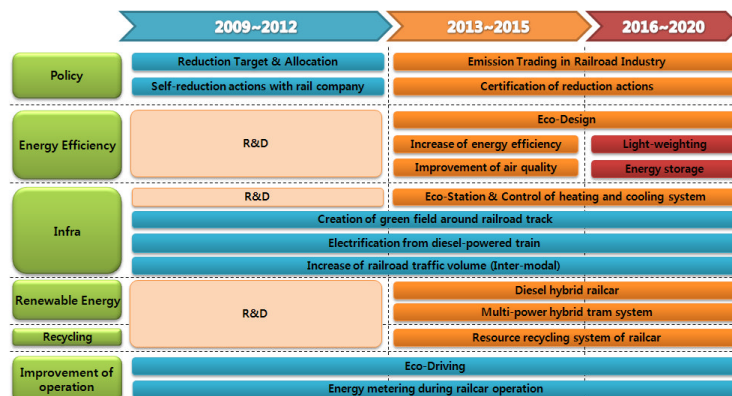

Fig. 3 Action plans for CO_2 reduction in Korean railroad

3. Conclusions

The aim of this project was to establish GHG reduction strategies in Korean railroad to support government policies based on the new national vision. If preventative measures are not taken to reduce the CO_2 emissions in Korean railroad, it will increase significantly by 2020. This increase will be caused by the result of a shift in traffic volume from other modes of transportation to railroad. Our action plan to reduce GHG in railroad focused mainly on promoting new R&D projects. The government will finance the R&D projects. These efforts to reduce carbon emissions will make railroad a more the competitive mode of transportation, even though new traffic modes such as electric car and fuel cell bus are emerged in the future market.

4. Acknowledgements

5. References

(1) The Presidential Committee on Green Growth, National Strategies and Five-Action Plan for Green Growth, 2009.
(2) Korea Railroad Research Institute, Final Report on GHG reduction strategies in Korean Railroad for Climate Change, 2010.