



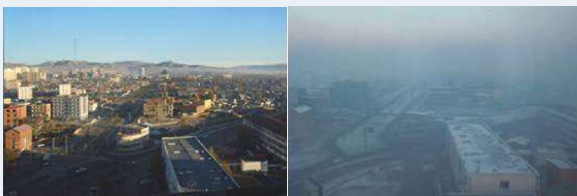
Achieving mercury-free emissions through fuel conversion from coal to LPG

Background

In many countries, coal combustion for heating during the winter is a common practice. Burning coal in houses and apartment buildings emits large amounts of carbon dioxide (CO₂), which contributes to global warming. In addition, coal contains trace amounts of mercury, which are released during combustion. Furthermore, coal combustion emits various air pollutants, including sulfur oxides, nitrogen oxides, and particulate matter, which can lead to the serious deterioration of air quality.

Although this particular source of mercury emission is not listed in Annex D of the Minamata Convention and therefore is out of the scope of Article 8, it is nevertheless an important issue that has been identified as a priority by some countries and requires action to alleviate air pollution and hence protect human health and the environment from mercury's negative impacts. This flyer introduces a technology, as exemplified with a project in Mongolia conducted by the Ministry of the Environment Japan, that can be utilized for the reduction of atmospheric emissions of air pollutants including mercury.

Air pollution in Ulaanbaatar, Mongolia



Summer

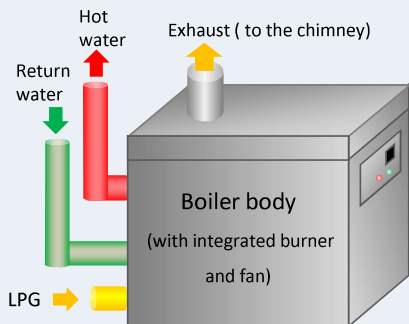
Winter

Overview of the Technology

In Mongolia, a large amount of coal is used for heating during winter. In addition, apartment complexes, public facilities such as schools, and commercial buildings use heat water supplied by coal-fired Heat Only Boilers (HOBs) in central heating systems. Combustion of coal in HOBs produces large amounts of various types of air pollutants causing serious urban air pollution. Previous efforts to improve HOBs led to the effective reduction of coal consumption and air pollutant emissions.

To further improve the technology and reduce air pollution, the fuel will be converted from coal to liquefied petroleum gas (LPG) to provide centralized heating through boilers and gas water heaters.

LPG-fired hot water supply boiler



Gas water heaters



Fuel conversion from coal to LPG increases the calorie per fuel weight. It also improves the combustion efficiency of the boiler, thereby reducing CO₂ emissions. Furthermore, since LPG contains no sulfur and ash, it achieves a co-benefit for nearly zero emission of air pollutant, such as SO_x (sulfur oxides) and dust.

Co-benefits of simultaneous reduction of CO₂ and air pollutants

A major advantage of this technology is that by converting the fuel from coal to LPG, co-benefits can be achieved whereby CO₂ emissions are reduced in addition to significant reductions in air pollutant emissions. Since LPG contains no heavy metals (mercury, selenium, etc.), their emissions also become zero along with dust.

- CO₂ emission : over 60% reduced
- NO_x emission : over 75% reduced
- SO_x emission : zero
- PM (dust) emission : zero

Co-benefits of improving operation procedures

LPG is supplied automatically from an outdoor storage tank, not necessary for manual fueling operations. The system ignites rapidly by pressing a switch and automatically controls the temperature of the heat water supply, meaning there is almost no manual labor required during operation.

Gas leaks are monitored 24 hours a day with detectors, and fire alarms are installed as safety measures.

Existing coal-fired HOB



LPG-fired boiler



Applicability

It is estimated over 1,000 HOBs are still in operation in Mongolia. Reducing coal consumption through the introduction of Japanese LPG-fired boilers and hot water heaters leads to emission reductions of heavy metals contained in coal such as mercury and selenium. Such technical cooperation can also be implemented in countries other than Mongolia, and efforts are being made to promote the introduction of gas-fired boilers in Central Asian countries where coal consumption is high.

Further Reading

MOEJ Press Release "Results of the 14th Japan-Mongolia Environmental Policy Dialogue"
(<https://www.env.go.jp/en/headline/2577.html>)

Institute for Global Environmental Strategies (IGES) "Workshop on the Joint Crediting Mechanism (JCM)"
(https://www.iges.or.jp/en/climate-energy/mm/20151110_1.html)

Carbon market express, Project Details
(https://www.carbon-markets.go.jp/en/en_column/en_energy_efficiency/1780/)

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Office of Mercury Management
Environmental Health Department
Ministry of the Environment, Japan
1-2-2 Kasumigaseki, Chiyoda-ku Tokyo, 100-8975, Japan
Tel: +81-(0)-3-5521-8260, E-Mail: suigin@env.go.jp
<https://www.env.go.jp/en/chemi/mcm.html>