

FOR PARTICIPANTS ONLY

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## **ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC**

Second On-site Assessment Workshop on Efficiency Improvement  
of Particulate Abatement Systems in Existing Power Plants  
25-27 September 2003  
Ulaanbaatar, Mongolia

### **OBSERVATIONS AND RECOMMENDATIONS**

The Second On-site Assessment Workshop on Efficiency Improvement of Particulate Abatement Systems in Existing Power Plants was held in Ulaanbaatar, Mongolia from 25 to 27 September 2003. The following main observations and recommendations were made.

#### **Section I: Efficiency Improvement of Particulate Abatement System in Co-generation Power Plant No. 3, Ulaanbaatar, Mongolia**

1. The Workshop noted that the power plant has 6 boilers of 75 tonnes/hr and 4 generators (in the medium pressure side) with installed capacity of 48 MW. It also has 7 boilers of 220 tonnes/hr and 4 generators (in the high-pressure side) with installed capacity of 100 MW. The plant supplies 25-28% of the power to Mongolia's central grid and also 35% of the district heating demand of Ulaanbaatar.
2. The Workshop observed that the plant is old and almost at the end of its useful life and therefore operational conditions were very hard. In spite of this the management and workers tried their best to maintain and operate the plant under these difficult conditions. The power plant is actually composed of two power plants, a medium-pressure side and a high-pressure side. Four of the seven high-pressure boilers were rehabilitated in November 2000. As a result of this rehabilitation the thermal efficiency was dramatically increased resulting in a 20% reduction of air pollutant emissions and a savings of 21,000 tonnes of coal per annum.
3. The Workshop noted that the plant is trying to use low temperature fluidized bed combustion technology to reduce NO<sub>x</sub> emissions on the medium pressure side.
4. The Workshop also noticed that the plant lacks automatic emission monitoring equipment to optimize the operation of pollutant emission abatement system. For removal of the particulate matter from flue gas the power plant uses wet scrubbers. In order to monitor the performance of the scrubbers appropriate measuring instruments need to be installed at the outlets.

5. The workshop was informed that the plant was initially designed to use high calorific value coal from the Sharin Gol deposit, however due to the exhausting of the supply the plant was forced to switch to the Baganuur coal deposit which is of lower calorific value. As a result rehabilitation was required and direct firing with flue gas drying of pulverized coal was carried out in four out of the seven boilers on the high-pressure side.

6. The Workshop observed that the unburned carbon in the Fly ash varies from boiler to boiler and the power plant agreed to give KEPRI some samples to analyze at their laboratories in Korea. The power plant also agreed to analyze duplicate samples for comparison purposes.

7. The Workshop suggested coal blending as an option to reduce pollutant emission levels and increase the thermal efficiency but was informed that this was not a viable option due to abundant reserves of Baganuur coal and the financial and space constraints in obtaining another source of coal for blending.

8. The Workshop was presented with a list of the power plant's needs to make measurements for controlling particulate matter and other pollutants emitted by the power plant.

## **Section II: Efficiency Improvement of Particulate Abatement System in Co-generation Power Plant No. 4, Ulaanbaatar, Mongolia**

1. The Workshop noted that the power plant has 8 boilers of 420 tonnes/hr and 6 generators with installed capacity of 540 MW. The plant supplies 70% of the power to Mongolia's central grid and also 65% of the district heating demand of Ulaanbaatar.

2. The Workshop observed power plant No. 4 is more modern than No. 3 (being less than 20 years old) and it is in relatively good condition and has on-line pollutant monitoring systems to monitor SO<sub>2</sub> and NO<sub>x</sub> in the flue gas.

3. The Workshop was made aware that the plant has 8 electrostatic precipitators (ESP), which were of compact design but some were functioning with an efficiency of 93% which was lower than their designed value of 99% due to failures in some sections. The Workshop was of the opinion that these should be replaced as soon as possible. The Workshop advised power plant No. 4 to send engineers responsible for O&M of ESP for the next training programme to be organized by KEPRI.

## **Section III. General Comments Regarding Power Plants in Ulaanbaatar, Mongolia**

1. The Workshop was informed that Mongolia did not have emission standards for power plants but did have national air quality standards as well as standards for vehicular emissions. The workshop felt that standards for power plants should be established.

2. The Workshop noted that appropriate technical and management training workshops needed to be given to decision makers, managers and operators. Where necessary, on-the-job training in similar plants outside Mongolia to be provided to engineers and technicians responsible for power plant operation.

3. The Workshop was informed of the radiation present in fly ash, which prevented its current utilization in civil construction. To determine whether the ash could in fact be used for civil construction its radiation level needs to be measured and appropriate national standards for ash utilization formulated in keeping with international standards.

4. The Workshop suggested the growing of trees or installation of a net fence around the coal storage yard as a measure to prevent coal dust from being blown by the wind.

5. The Workshop noted the low cost of raw water supplied to power plants coupled with water wastage and felt that if higher prices were charged for water then there would be a stronger incentive to conserve water.

6. The Workshop felt that NEASPEC countries like Mongolia should actively explore potentials for CDM opportunities as a method of jointly reducing air pollution.

7. The workshop made a request that the topic of this workshop be extended in subsequent workshops to include other emission sources, which contributed to air pollution. The situation in Mongolia was highlighted where permanent sources of pollution included not only power plants but also other sources such as domestic heating and heat-only boilers.

#### **Section IV: General Comment on Findings of the Workshop**

1. The workshop strongly felt that at the next workshop a presentation be made on the measures taken to realize the observations and recommendations made at this workshop.

#### **Section V: Further Development of the Subregional Action Plan for Efficiency Improvement of Particulate Abatement Systems in Electric Power Plants in North-East Asia**

1. In further developing this NEASPEC action plan for efficiency improvement of particulate abatement systems in electric power plants, developed at the First Onsite workshop held in Guiyang, China in 2002, the workshop agreed in general with the guidelines developed and made the following modifications.

2. Priority should be accorded to capacity building activities for building the necessary capacity for making decisions on improvement options in individual plants in the participating countries:

- (a) The Workshop evaluated that the present Workshop was useful in information exchange and capacity building in pollution reduction

in electric power plants in North-East Asia, and recommended that the series of the Workshop should be continued. As the past workshops had been organized in China and the present one in Mongolia, it was suggested that the future workshops might be organized in the Democratic People's Republic of Korea; the Russian Federation, Japan or the Republic of Korea.

- (b) The Workshop recommended that the future NEASPEC Training Course on Pollution Reduction in Coal-fired Power Plant in North East Asia, hosted by the NEASPEC/KEPRI Training Centre in Daejeon, Republic of Korea, should be strengthened based on the information and experience gained from the present Workshop. The training curriculum using the coal combustion test facility might be considered.
- (c) The Workshop also recommended that the information on existing training opportunities in the relevant field, which might be conducted under the different programmes and initiatives, should be collected and disseminated to the participating countries.

3. As the technological elements of the Action Plan, the following activities should be developed:

- (a) Raising awareness on structure and operation of particulate abatement systems, proper performance and measures needed to achieve maximum efficiency, use of emission monitoring data to the operation of boilers and particulate abatement systems, etc.;
- (b) Information collection and dissemination, via workshops and databases, on available technologies for combustion systems, particulate and other pollution control systems, and emission monitoring systems;
- (c) Networking of technological information exchange using Internet media.

4. The Action Plan should include the recommendations on policy measures and proposal on financial mechanism for efficiency improvement of particulate abatement systems in electric power plant. Specific activities may include the following:

- (a) Awareness should be raised among national authorities, decision-makers and financial institutions, to draw proper attention to formulation of appropriate policy framework, as well as to mobilize financial resources at the national level;
- (b) Recommendations on the appropriate policy framework should be elaborated;
- (c) Studies should be conducted regarding the market-based approach to attracting foreign investments.

5. The Action Plan should not only cover the efficiency improvement of particulate abatement systems alone, but also cover the control of other pollutants, as well as the management of overall energy efficiency and CO<sub>2</sub> emission, in view of integrated approach to environmental management of electric power plants. In this regard, a comprehensive clean coal programme may need to be developed in cooperation with a broader range of national and international organizations with relevant expertise, including, in particular, industry ministries of participating countries.

The Workshop expressed its sincere appreciation to the Ministry of Nature and Environment of Mongolia for hosting the Workshop, as well as for their warm hospitality, the North East Asian Training Centre on Pollution Reduction for Coal Fired Power Plants in KEPRI for their support and UNESCAP for organizing the Workshop.