DESCRIPTION

The power sector consumes majority of the coal produced in the People’s Republic of China (PRC). Every year, waste coal, which has low energy value, is generated during coal mining, accounting for about 25% of total coal produced. Its large stockpiles damage mining areas’ ecology and occupy valuable land. In addition, spontaneous combustion within waste coal heaps causes air pollution and safety hazards, and leaching of trace elements with rainwater causes groundwater contamination.

Annual waste coal generation in the PRC is almost equivalent to the coal production in the Russian Federation, the sixth-largest coal producer in the world. Shanxi Province, the largest coal-producing province, has accumulated about 25% of the total waste coal in the PRC. The utilization level of waste coal in Shanxi Province is only 50%. Thus, environmental issues related to waste coal are more acute in Shanxi than in other provinces. If used in an environment friendly manner, waste coal can bring social and environmental benefits to local residents and coal mine workers by (i) creating new jobs during power plant construction, operation, and associated economic activities; (ii) eliminating harmful environmental contamination; and (iii) improving public health, including quality of water and air in and around the mining area.

One of the important agenda under the 11th Five-Year Plan for Energy Development in the PRC was to promote a recycling economy that included increasing waste coal use for power generation through large-scale power plant that uses more efficient and less polluting technologies such as circulating fluidized bed combustion boilers. With this background the government requested ADB’s assistance to undertake feasibility assessment of such technology.

EXPECTED IMPACT, OUTCOME AND OUTPUTS

The expected impact of the technical assistance (TA) was reduced negative environmental impacts from waste coal heaps in Shanxi Province. The outcome was a set of recommended policy measures to increase waste coal use in Shanxi Province. The outputs were: (i) provide a comprehensive utilization plan and policy recommendations for waste coal, (ii) introduce advanced energy-efficient technologies for waste coal power generation and a technical due diligence report for a 600 megawatt waste coal power plant utilizing circulating fluidized bed combustion technology with supercritical steam parameters, and (iii) disseminate knowledge on advanced energy-efficient technology for waste coal power generation.

DELIVERY OF INPUTS AND CONDUCT OF ACTIVITIES

The Ministry of Finance selected this TA as one of the first pilot delegated TAs to be implemented by the executing agency. The executing agency was the Shanxi Provincial Finance Bureau, and the implementing agency was Pingshuo Waste Coal Power Generation Company.

The Shanxi Provincial Finance Bureau managed the overall TA implementation including the recruitment of consulting services and disbursement. It provided guidance to the Pingshuo Waste Coal Power Generation Company and consultants when necessary, fielded regular monitoring missions, and participated in workshops and training. The TA was implemented over 42 months, which was 31 months longer than the original schedule. The extended implementation period was due to prolonged (i) recruitment of consulting services by the Shanxi Provincial Finance Bureau due to its weak understanding of ADB guidelines and procedures in recruiting consultants, which led to repeated exchange of letters and information between ADB Headquarters and Shanxi Provincial Finance Bureau in each approval process, and (ii) disbursement process towards the end of the TA implementation. The Shanxi
Provincial Finance Bureau’s performance was partially satisfactory. The Shanxi Provincial Finance Bureau expressed their appreciation for ADB’s assistance and diligent work throughout the project. ADB’s performance was satisfactory.

A consulting firm was engaged to provide 48 person-months of national experts. The consultants supported the Shanxi Provincial Finance Bureau and the Pingshuo Waste Coal Power Generation Company in conducting project activities. Both the Shanxi Provincial Finance Bureau and the Pingshuo Waste Coal Power Generation Company appreciated the consultants’ expertise, which successfully designed the world’s largest waste coal power plant and helped to obtain all necessary documents to proceed with the construction of the power plant in Pingshou coal mining area. Consultants conducted the study efficiently. It took only 9 months to complete the study, which was 2 months ahead of the schedule. The performance of the consultants was highly satisfactory.

**Evaluation of Outputs and Achievement of Outcome**

The TA achieved all expected outputs and outcome. The world’s largest energy efficient coal fired power plant using waste coal was successfully designed by the consultants. The design of the plant was accepted by both the Shanxi Provincial Finance Bureau and the Pingshuo Waste Coal Power Generation Company. The TA findings were disseminated during the workshops held twice in Taiyuan, Shanxi Province and Chengdu, Sichuan Province and attended by the government officials from Shanxi Province, experts from universities and research institutes, and the Pingshuo Waste Coal Power Generation Company. The TA concluded that promoting utilization of large amount of waste coal through large scale power plant is technically viable. Based on this conclusion, the TA proposed a policy to the Shanxi provincial government to promote large scale cleaner and efficient waste coal power plant that uses circulating fluidized bed combustion boilers with supercritical steam parameters in other major coal mines in the province for replication.

**Overall Assessment and Rating**

Although delays in TA implementation occurred during its initial and closing stage, the TA is rated *successful* and *highly relevant*. All outputs were achieved, and the TA resources were used efficiently. The TA helped to achieve the development priority of the government to increase usage of waste coal using energy efficient power generation. The Shanxi provincial government assured its support to the waste coal power generation project if such project application goes to the provincial authority for consideration.

**Major Lessons**

The TA delegation to the Shanxi Provincial Finance Bureau consumed longer time than expected to recruit the consultants and complete the payments. The transaction cost for both the Shanxi Provincial Finance Bureau and ADB was unnecessarily high. The key lesson is that initiating a new action such as delegated TA should be complemented by appropriate capacity development.

**Recommendations and Follow-Up Actions**

It is recommended that delegated TA should be better coordinated by a unit in PRCM which is physically close, has no language barrier with the client and has the capacity to address any emerging issue. It is also recommended that Shanxi provincial government adopt the policy to promote the large scale cleaner and efficient waste coal power plant that uses circulating fluidized bed combustion boilers with supercritical steam parameters to increase waste coal use in other major coal mines in the province. Other provinces can learn from Shanxi province once the advance technology project designed under the TA is successfully implemented. EAEN will continue to follow-up with Shanxi provincial government on the recommended policy and its timely adoption for action.