RESPONSE to the REQUEST for REVIEW

Fuqing MSW Incineration Project [ref: 6340]

19 SEPTEMBER 2012

KOREA ENVIRONMENT CORPORATION

Dear Sir or Madam,

Please find the response below to the request for review of the CDM project 'Fuqing MSW Incineration Project' with the reference number 6340. In case you have any further inquiries, please let us know as we kindly assist you.

Yours sincerely,

19 September 2012

Lee Seon-woo

Keco GHG Certification Center Manager

1. *The DOE shall provide information on the steps taken to validate the project starting date. In particular, the DOE shall provide information to justify why the signature of the BOT agreement (22/05/2009) was not considered as either the implementation or construction or real action of the proposed CDM project. Please refer to VVM version 1.2 paragraph 104 (a), EB 66 Annex 63.*

As per the latest version of Glossary of CDM terms(ver 06.0), the start date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a CDM project activity begins. In this regard, 'Engineering, procurement and construction contract' signed by the project owner and New Sky Engineering Co, Ltd on 03/07/2010 is regarded as a real action of a project activity. This is also cross-checked against a copy of the real contract 〈13〉.

'Investment Intension Agreement' 〈74〉 was signed on 20/06/2008 between Fuqing City Management Bureau and the project owner, which was the draft agreement before a formal BOT contract, where the total amount of MSW disposal treatment and the waste disposal cost were specified. Based on Investment Intension Agreement, the EIA and FSR of the project was completed respectively. Regarding 'BOT agreement' 〈14〉, it is validated by clarification from the PPs and consult with relevant government authorities that a BOT contract is indispensable document as requested by the National Development and Reform Commission(NDRC) of China that is responsible for approval of the FSR. It can also be confirmed that the project procedure is fully in compliance with the current regulation, 'Regulation on the BOT investment in the utilities sector' 〈62〉 released by Ministry of Construction of China. The pre-signed BOT agreement is just one step in the project preparation procedure as it cannot be enforced without approval of the NDRC. Hence, the PDD was not considered as committed to the project implementation at the moment of signature of the BOT agreement. Further, the FSR of the project was completed in November 2008. It is validated that the incentive from the CDM was considered as a definitive factor in the decision to proceed with the project. The FSR was approved by Fujian Provincial Development and Reform Commission on 25/07/2009 based on the BOT agreement signed on 22/05/2009 and other relevant documents. In the above mentioned context, the BOT agreement can only be referred as one step in the project preparation phase and cannot be considered as the project start date as per the Glossary of CDM terms. After the BOT agreement is signed, the PPs are considered being granted the legal right to go through other administrative approvals and project financing etc. as per the relevant Chinese regulation.

In conclusion, the date of 03/07/2010 when the project contracted engineering, procurement and construction contract is considered as a real action of the CDM project activity which is the start date of the project activity as per Glossary of CDM terms.

2. *The assumption regarding the project's thermal efficiency was published in an October 2010 document (VR, p. 38), whereas the FSR and the investment decision are dated, respectively, 11/2008 and 20/08/2009 (VR, p. 29). The DOE shall clarify the validity of all input values at the time of the investment decision. Please refer to EB 62 Annex 5 paragraph 6.*

20.4% is used as thermal efficiency of project. All of the input values used in the IRR calculation including data of thermal efficiency of waste heat utilization, are sourced from the FSR compiled by a professional third party, China City Construction Research Institute. According to a

specification from designer of FSR, the thermal efficiency of waste heat utilization is defined as the heat efficiency of the whole waste heat utilization system and is the product of thermal efficiency of the incineration boiler, channel, turbine and generator. Thus, the project thermal efficiency of waste heat utilization is calculated as 20.4%(=85%×99%×25%×97%).
Regarding the thermal efficiency of the project, Keco has reviewed literature 'Study on method of estimating power generation during operation for a BOT project of refuse-incineration power generation' 〈63〉 issued in April 2008 where a reasonable range of LHV(4,600-6,700KJ/kg) and thermal efficiency(17.8%-21.5%) of incineration power generation under BOT sceme is specified. The thermal efficiency of the project, 20.4% is well within the range of 17.8%-21.5%. Based on the literature, the FSR applied the thermal efficiency of the project and Keco confirms that the literature was considered at the time of preparation of the FSR(11/2008) and also investment decision(08/2009). In addition, Keco has cross-checked those values with 'Environmental Sanitation Engineering, Vol.18, No.5' 〈59〉 issued in October 2010 where average design power generation efficiency of MSW power plants at steam condition with 4.0MPa and 400℃ is stipulated as 21%, which is almost the same condition as that of the project activity, 20.4%.
Further, even 21.5% is applied to the project, the IRR becomes 5.57%(from 4.91%), still far below the benchmark 8%.

3. The DOE shall clarify how it validated the lenght of the construction period, including the assumption that the generation on the first year of operation will be limited to 50%. Please refer to VVM version 1.2 paragraph 114 (a).

In accordance with VVM version 1.2, para 114(a), Keco has reviewed the FSR 〈7〉 designed by China City Construction Research Institute and approved by Fujian Provincial Development and Reform Commission where the construction period of two years is determined. For validation of the construction period, Keco has referred 'Construction Standard for Municipal Solid Waste Treatment Project' 〈73〉 issued by Ministry of Construction and State Development Planning Commission and found that a reasonable construction period of incineration facility with a daily MSW treatment capacity of 600-1,200t/d is mentioned 24-32 months. Keco has also cross-checked 'Engineering, procurement and construction contract' 〈13〉 signed between the project owner and New Sky Engineering Co., Ltd, and identified that a two-year of construction period is specified at chapter 6. Therefore, Keco confirms that the construction period of the project is reasonable.
Regarding the operation limit of 50% for the first operation year, 50% is applied as a plant load factor of the first operation year. After construction, two incinerators are to be operated for the first year with a commission period of three months and the rest one will be equipped in the second operation year, thus, the plant load factor of the first two units is 75%(=9months/ 12months). Since the FSR is designed based on operation of the whole three incinerators, the plant load factor of the first operation year can be calculated as 50%(=75%×2/3). Further, even if 100% of the plant load factor for the first operation year is applied, the IRR becomes 5.35%, still far below the benchmark 8%. Therefore, Keco confirms that the plant load factor of the first operation year of 50% is reasonable.

4. The DOE shall clarify how it validated the applicable geographical area for the common practice analysis to be the Fujian Province. Please refer to EB 65 Annex 21 paragraph 5.

Due to following reason, the PDD considers Fujian Province as an geographical area for the

common practice analysis.

China is the fifth world largest country where the local conditions, such as access to technology, regulatory framework, investment climate, and so on vary significantly among different Provinces. These local conditions have great impact on selection of incineration technology. Therefore, for similar incineration projects to the proposed project, the same Province(Fujian Province) is selected as the applicable geographic area, as access to technology, economic development level, regulatory framework, electricity tariff, MSW disposal cost, and etc. are more comparable under provincial level than the whole country level, China.

1)Access to technology

Chinese incineration plants largely prefer fluidized bed type and grate type. Due to low calorific value of waste(MSW) in China, the use of the generally unavoidable auxiliary fossil fuel must be taken into consideration. Coal can be added into a fluidized bed incinerator, since fluctuations in calorific value can be levelled out due to the high thermal capacity of the sandy bed. The technology 'reverse reciprocating grate' applied to the project activity aims to meet the local MSW characteristics and ensure complete combustion without support of fuel. The reverse reciprocating grate is divided into different combustion zones: drying, degassing and exhaust. The grate in each combustion zone is driven by a separate control system that can adjust the speed of the transport of the wastes to be incinerated through the furnace. This can improve largely the combustion performance of the furnace. The primary and secondary air is also distributed according to the requirement of the different zones. A separate air blower and integrated air pre-heater can meet the proper needs of the incineration air amount and temperature during the different combustion phases. The incineration air can be adjusted by an automatic control system. The operation of exhaust combustion zone is automatically controlled by an infrared device for ensuring complete combustion. A minimum gas phase combustion temperature of 850℃ and a minimum residence time of the flue-gases, above this temperature, of two seconds can be strictly respected, which make dioxin smoke effectively removed. The reverse reciprocating grate can be better adapted to the specific nature of the Chinese MSW than the imported furnace of the same type. In China, these two types of incineration technology account for 78% in total according to 'Current situation and estimation of incineration technology in China' 〈64〉 released by Environmental Sanitation Engineering Technology Research Center of National Ministry of Construction.

For the sake of adoption of incineration technology, design elements of an incineration plant such as waste composition, amount of waste, calorific value of waste, moisture/carbon content of waste, waste properties and other relevant factors should be considered and daily treatment capacity, purification system, and waste water treatment facility also rely on these elements along with incineration type. The units of the proposed project such as the grate type incinerator with 300t/d capacity and power generation system etc. were determined when the FSR was made after studying those factors. However, the design elements, waste composition, amount of waste, calorific value of waste, moisture/carbon content of waste, waste properties, and others relevant ones differ from Province to Province as each Province in China has different local conditions. In addition, waste properties, heat value of waste, and amount of waste are influenced by geographic condition, economic development level, and consumption level as well as local fuel structure 〈65〉 that vary from Province to Province. For example, in some coal-fired heating area of China, such as Gansu Province, coal cinder and ash content contained in waste is higher than that of in no coal-fired heating areas, thus the heat value of waste is comparably low 〈66〉, which implies that incineration technology is not suitable in that area. Moreover, if the ash content is too high, treatment for fly ash, residual and smoke generated from incineration process will be more complicated and require

higher investment. Further, it is commonly known that enhancement of living level causes increase in the ratio of plastic waste, waste paper, etc. in waste and raises calorific value of waste as well as its amount.

2)Economic development

Due to technology complication, strict requirements for operators and supervision, and comparably high construction investment and O&M costs 〈67〉, the prerequisite for incineration technology is economic development level. In China, the economic development level varies from Province to Province. According to China Statistical Yearbook 2010, financial revenues of Zhejiang, Guangdong, and Jiangsu Provinces are ranked top-three in 2009, and these Provinces have 21, 17, and 14 incineration plants respectively in 2009 〈68〉, which are also top-three number of incineration plants. Medium-developed areas such as Fujian, Shandong Provinces, have 4-6 incineration plants, mostly other Provinces have 1 or 2 incineration plants, and some under-developed Provinces such as Inner Mongolia, Guizhou, Xizang, Xinjiang and Ningxia have no incineration plants recorded, which implies that incineration technology is not applicable to all over China because of the different economic development level and it is mainly distributed in developed Provinces.

3)Regulatory framework

Each Province has different local regulation on MSW incineration and power generation project investment. The project activity was also examined based on relevant local regulations. Projects developed within the same Province are faced by same regulatory framework and investment climate that make them comparable. In addition, the treatment approach for ash/clinker/wastewater is different and may have different cost impacts on a company. In some Provinces, the government is responsible for the treatment of ash, clinker and the wastewater. In other Provinces, the local governments require on-site treatment of ash, clinker and the wastewater. Jiangsu, Shanghai, and Anhui Province has higher requirements for treatment of ash, clinker and wastewater while Fujian Province has to reach only the third level of national standard. For another example, according to China Water Environment Capacity Shortage Degree(COD index) Research 〈69〉, water capacity of Jiangsu, Shanghai and Anhui is almost exhausted, thus, water pollutant emission must be controlled to the lowest, leachate treatment during incineration process should reach the first level of national standard which requires to install better leachate treatment facilities, causing higher investment; whereas water capacity of Zhejiang, Fujian and Guangdong is comparably sufficient, the leachate treatment just need to reach the third level of national standard, lower than first level. Therefore, it can be confirmed that the environment policy and regulations on the pollutants produced during incineration process are different from Province to Province according to different environmental capacity.

4)Electricity tariff and MSW disposal cost

Electricity tariff, MSW disposal cost are different from location to location in China due to the fact that economic development level, industrial structure, fundamental infrastructure, and development strategy and policy framework of each Province differ one another. According to National Bureau of Statistics of China, each Province shows different economic indicators such as salary level and price indices etc. In addition, 'Regulation on renewable power pricing and cost sharing' 〈30〉 also shows different electricity tariff from Province to Province. It can be confirmed that different economic climate from location to location may cause different investment cost and O&M cost of a project activity. For example, the electricity tariff in Zhejiang Province is 0.4045RMB/kWh, 0.375RMB/kW for Jiangsu Province, 0.364RMB/kWh for Fujian Province, and Shanghai has 0.400RMB/kWh 〈70〉. Regarding MSW disposal cost, it also varies from Province to Province due to the different policy, and the economic development level, commonly, the more developed of

economy, the higher of MSW disposal charge, for example, MSW disposal cost in Fuqing city in Fujian province is 61.5RMB/t, Ningbo city in Zhejiang province is 193RMB/t, Shanghai is 240RMB/t, 〈71〉 and Guangzhou city in Guangdong Province is 200RMB/t 〈72〉 each. As a cross-check of the disposal cost of Fuqing city, Keco has reviewed disposal charge invoices in July and August 2012 〈75〉 issued by Fuqing City Management Bureau where the charge, 61.5RMB/t is mentioned. Further, tariff rates of products, cost of materials and other utilities such as water, cost of labour and services, and types of loan that can be obtained vary considerably from Province to Province, which also have great impact on investment level of incineration plants.

Keco has reviewed the approach presented in the PDD and confirmed that local conditions such as access to technology, economic development level, regulatory framework, electricity tariff, MSW disposal cost, and etc. are taken into account in order to define the geographical area to be used for the common practice analysis. From the analysis above, it can be confirmed that as:

i)China is a large country where economic development level, geographic condition, industrial structure, fundamental infrastructure, regulatory framework such as policy and regulations are different from Province to Province,

ii)due to complicated incineration technology, not all Provinces can access to the technology, thus the incineration technology is not applicable to the whole China, and

iii)suitable conditions for MSW incineration technology such as characters of waste, investment climate, and so on are also different from Province to Province,

incineration technology varies from Province to Province in China depending on those local conditions listed above. As per the 'Tool for Demonstration and Assessment of Additionality'(ver 06.0.0), the most applicable geographical area for the common practice analysis of the proposed project is not the whole country, but the Province where the proposed project is located.

*REFERENCES

〈62〉: Regulation on the BOT investment in the utilities sector released by Ministry of Construction dated 05/2004

〈63〉: Study on method of estimating power generation during operation for a BOT project of refuse-incineration power generation dated April, 2008

〈64〉: Current situation and estimation of incineration technology in China by Environmental Sanitation Engineering Technology Research Center of National Ministry of Construction dated 20/12/2007

〈65〉: Current situation and strategy of MSW treatment in China

〈66〉: Analysis of Components and Treatment Methods of Domestic Waste in China, published on Chinese professional journal - Environment Sanitation Engineering

〈67〉: Technical Guidance for Municipal Solid Waste Treatment, Jiancheng [2010] No.61 issued by National ministry of housing and urban-rural development, National Development Reform Committee, National Environmental Protection Bureau dated 22/04/2010

〈68〉: China Statistical Yearbook 2010

〈69〉: Research on China Water Environment Capacity, published in Chinese professional journal China Environmental Science

〈70〉: Notice on the electricity tariff of ECPG

〈71〉: Waste disposal cost in Shanghai and Ningbo, http://www.sznews.com/zhuanti/content/2006-04/20/content_99772.htm

〈72〉: Waste disposal cost in Guangzhou,

http://www.21cbh.com/HTML/2010-4-21/yNMDAwMDE3MzcyNQ.html

〈73〉: Construction Standard for Municipal Solid Waste Treatment Project(Jianbiao No.[2001]203) issued by Ministry of Construction and State Development Planning Commission on 23/10/2001

〈74〉: Investment Intension Agreement signed between Fuqing City Management Bureau and the project developer dated 20/06/2008

〈75〉: Disposal charge of Fuqing city in July, August 2012 issued by Fuqing City Management Bureau