FY2010 CDM/JI Feasibility Study Report Summary

Title

Energy saving project through Coal Moisture Control (CMC) technique at Yunnan Dawei Coking Co., Ltd. in Yunnan, China

Name of the Responsible Company

E&E Solutions Inc.

1. Outline of the Project

The project intends to install the Coal Moisture Control (CMC) facility into the coke producing line of Yunnan Dawei Coking Co., Ltd. ; a coke manufactory in Yunnan province, China. As the proposed project implemented, flue gas, desorption gas and carbon-rich gas are utilized for reducing the material coal moisture in CMC equipment; and the use of COG in coke ovens is saved and GHG emissions from coke ovens are reduced.

The baseline of the proposed project is described as the situation where more COG is consumed in coke ovens because of higher rate of moisture in the material coal without the installation of the CMC system. The emission reduction consists of GHG emissions from coal burning which corresponds to the utilized amount of waste energy for coal moisture reduction with CMC.

Due to the high investment cost, the installation of CMC facility for manufacturing process is quite limited in China except large-scale steel plant. Especially in Yunnan province, no precedent is found and there is possibility the project will be “first-of-its-kind.” The proposed project will lower the dependency on coal. It will not only save energy but also mitigate environmental pollution, and will contribute to achievement on the goal of emission reduction in China’s 11th five-year plan. The propagating effect is anticipated through the improved profitability of CMC installation with CER revenue.

The methodology AMS II.D ver.12 is applied for this project.

2. Method of the Study

Organization Structure for the Study

▲E&E Solutions Inc.(EES)：Japanese consultant which conduct this Study.

▲Yunnan Dawei Coking Co., Ltd. ; a coke manufactory in Yunnan province. Project

implementator

▲Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd; Counter Part Company; EPC contractor in this project

▲Tepia Corporation Japan Co., Ltd : Project participant of Japan side.

Key topics of the Study

1) Situation of the technology and project

▲Fuel species and amount for CMC

▲Type of CMC (rotating drum or fluidized bed type)

▲Fuel species for coke oven

2) Identification of Baseline scenario and project scenario

▲Definition of the project boundary

▲Use of coke oven gas before CMC installation (Baseline) and after CMC installation (Project)

▲Average moisture amount of material coal in baseline scenario

▲Average moisture amount of material coal and CMC-treated coal in project scenario

▲Energy savings or fuel savings with project implementation

▲Monitoring items and frequency

3) Confirmation of Additionality

▲Project investment amount and maintenance cost

▲Cash planning

▲Penetration status of CMC in China and Yunnan province

▲Search for proof of “first-of-its-kind” for the CMC technology in Yunnan province

4) Environmental impact analysis and stakeholders comment

▲Current status of EIA; if analyzed, confirmation of approval for EIA

▲Questioning for stakeholders

3. Contents of the Study

(1) Study Contents and Methods

(a)Pre-Survey

Data/Information on energy strategy, present status of the energy saving in China and Yunnan province was conducted from internet and existing document. Law and regulation regarding waste management and environment management were also collected.

In addition, questionnaire was prepared and sent to counter part organization in China to collect/clarify of the unclear issues.

(b)On-site Survey

Based on the result of above mentioned study (a), necessary information for following

study(i.e., (c) ~ (l)) was collected during the on-site survey. The basic structure and time schedule of the CDM project were also discussed with counter part organizations during the on-site survey.

1st site survey was conducted from Sep.26 to Sep.29 of 2010.

Kick off meeting with Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd; was hold at the 1st site survey. Work plan for this Feasibility Study and the role of each side was discussed and agreed.

Discussion with Yunnan Dawei Coking Co., Ltd. (Project implementer) was held during the 1st site-survey and it is confirmed the necessary requirement for CDM is satisfied. The penetration status of CMC in Yunnan province is confirmed during the visit to Yunnan province industry and information division. Detail of the plan for CMC technique introduction was also confirmed.

2nd site survey was conducted from Nov.28 to Dec.3 of 2010.

During the 2nd site survey, stakeholder consultation was held in the project site. Comment of the stakeholder regarding the CDM project was collected and discussed. In addition, detailed information on EIA was collected in the 2nd site survey. Action plan after the Feasibility study was also be discussed.

(c) Technical Review on the CMC technique

All technological information on CMC technique, including the installation cost, basic specification, actual distribution status of the technique etc., was supplied from Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd;. Technological and economical additionality were discussed based on the information. Detail of the discussion is shown later.

(d) Study on the CDM methodology

Small scale CDM methodology, AMSII.D ” Energy efficiency and fuel switching measures for industrial facilities” was selected as a methodology which can be employ to this project.

(e) Study on the Project boundary and Baseline scenario

In accordance with the guideline namely “Guidance on the registration of project activities under a programme of activities as a single CDM project activity”, baseline scenario of the CDM project was studied. Project boundary was also established based on the guideline.

(f) Study on Additionality

According to Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

▲ Investment barrier:

▲ Technological barrier:

▲ Barrier due to prevailing practice

▲ Other barriers

For investment barrier, FIRR bench mark of 12% was employed , as a criteria of the investment barrier,

(g)Study on Project period and Crediting Period

Study team discussed the project period and crediting period of the CDM project with Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd.

The crediting period will be 10 years. Project life time will be 15 years.

(h)Evaluation of the Emission Reduction of the Project

Emission reduction was evaluated based on the small scale methodology of AMSII.D.

(i)Study on Environmental Impact of the Project

Laws and regulations which can be applied to the project were listed and studied. It is found that the environmental assessment law is applied to the project. Both negative and positive environmental impact of the project was studied and listed.

(j)Other Indirect Impact

Indirect impacts other than environmental issue, including social and economical issues were discussed and studied.

(k)Stakeholder's comment

Stakeholder meeting was held in this study and comment on the project was collected. In addition, questionnaire survey was also conducted.

(l)Study on Cash planning

Financial issue and Cash planning of the project was discussed with Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd which will become EPC contractor of the project.

(m)Preparation of PDD

Based on the study above mentioned (i.e.,(a) ~ (l)), PDD was prepared.

Approved small scale methodology AMSII.D was employed for the PDD.

(n)Study on Co-benefit effect

Co-benefit effect of the project is evaluated in the study. Emission reductions of SO2 and COD were selected as indices of the co-benefit effect.

3. Study Results

(1) Baseline scenario and Project boundary.

The baseline of the proposed project is described as the situation where more COG is consumed in coke ovens because of higher rate of moisture in the material coal without the installation of the CMC system. In terms of the proposed project, the project boundary could be determined as CMC system, coke ovens and conveyor of material coal in the plant and the CSPG for consuming the electricity in the proposed project from the grid.

(2) Evaluation of the Emission Reduction

Emission Reduction of the project was evaluated in accordance with following equations.

(a) Baseline emission calculation

Baseline Emission

$BE_y = BE_{Heat,y} + BE_{Elec,y}$

Where

BE_y	Baseline emission in the y year (tCO2e/y)
$BE_{Heat,y}$	Baseline emission due to the consumption of COG in the y year (tCO2e/y)
$BE_{Elec,y}$	Baseline emission due to the consumption of electricity in the y year (tCO2e/y)

$BE_{Heat,\ y} = BC_y \times (1 - WC_{CMC\ IN}) \times WC_{CMC\ IN} \div 1\% \times HW_{Coal} \times VC_{COG} \div 1000$

Where

BC_y	Baseline material coal input(t/yr)
$WC_{CMC\ IN}$	Material coal moisture before CMC system (%)
HW_{Coal}	Calorific value for reducing 1% of moisture in the material coal(MJ/t)
VC_{COG}	CO2 emission after combustion of unit COG($kgCO_2$/TJCOG)

$BC_y = BK_y \times BF_{coke}$

Where

BK_y	Baseline coke production(t/y)
BF_{coke}	Baseline production efficiency

$BF_{coke} = BRC_y \div BRK_y$

Where

BRC_y	Actual coal usage amount(t/y)(t/y)
BRK_y	Actual coke production quantity(t/y)(t/y)

$BE_{Elec,\ y} = (EC_{Bl,y} \times EF_{Elec})$

Where

$EC_{Bl,y}$	Baseline consumption of electricity (MWh/y)

EF_{Elec}	Emission factor of CSPG (China Southern Power Grid, tCO2e /MWh/y)

BE_y = $(BC_y \times (1 - WC_{CMC\ IN}) \times WC_{CMC\ IN} \div 1\% \times HW_{Coal} \times VC_{COG}) + (EC_{BI,y} \times EF_{Elec})$

= (2,607,613t × (1-12.09%) × 12.09% ÷ 1%×58MJ/t ÷ 1,000,000TJ/MJ × 44,400kgCO_2/TJ ÷ 1,000kg/t)+(1,759MWh/y × 0.78795 tCO2e /MWh/y)

=72,757 tCO_2/year

Data of Baseline Emission

	Value	Data unit
Baseline emission due to the consumption of heat in the y year	71,370	tCO_2/ year
Baseline emission due to the consumption of electric in the y year	1,386	tCO_2/ year
Total Baseline emission	72,757	tCO_2/year

Project emission

$PE_y = PE_{Heat,y} + PE_{Elec,y}$

Where

PE_y	Project emission in the y year (tCO2e)
$PE_{Heat,y}$	Project emission from COG in the y year (tCO2e)
$PE_{Elec,y}$	Project emission due to the consumption of electric in the y year (tCO2e)

$PE_{Heat,\ y} = PC_y \times (1 - WC_{PJ}) \times WC_{PJ} \div 1\% \times HW_{coal} \times VC_{COG} \div 1000$

Where

PC_y	Project material coal input after CMC system(t/yr)
WC_{PJ}	Material coal moisture after CMC system (%)
HW_{coal}	Calorific value for reducing 1% of moisture in the material coal(MJ/t)
VC_{COG}	CO2 emission after combustion of unit COG(kgCO_2/TJCOG)

$PC_y = BK_y \times PF_{coke}$

Where

BK_y	Baseline coke production(t/y)
PF_{coke}	Project production efficiency

$PF_{coke} = PRC_y \div PRK_y$

Where

PRC_y	Actual coal usage amount(t/y)
PRK_y	Actual coke production quantity(t/y)

$PE_{Elec,\ y} = (EC_{PJ,y} \times EF_{Elec})$

Where

$FC_{PJ,y}$	Project consumption of electric (MWh)
EF_{Elec}	Emission factor of CSPG (China Southern Power Grid, tCO2e /MWh)

$PC_y = BK_y \times PF_{coke} = BK_y * (PRC_y / PRK_y)$

$= BK_y * (BRC_y / (BRK_y + 67,000))$

$= 2,000,000 * (2,496,197 / (1,914,545 + 67,000))$

$= 2,519,445t$

$PE_y = (PC_y \times (1 - WC_{PJ}) \times WC_{PJ} \div 1\% \times HW_{coal} \times VC_{COG}) + (EC_{PJ,y} \times EF_{Elec})$

$= (2,519,445t \times (1\text{-}10\%) \times 10\% \div 1\% \times 58MJ/t \div 1,000,000TJ/MJ \times 44,400kgCO_2/TJ \div 1,000kg/t) + (7,675MWh/y \times 0.78795\ tCO2e\ /MWh/y)$

$=64,440tCO_2/year$

Data of Project Emission

	Value	Data unit
Project emission due to the consumption of heat in the y year	58,393	tCO_2/ year
Project emission due to the consumption of electric in the y year	6,048	tCO_2/ year
Total Project emission	64,440	tCO_2/year

Leakage is:

The proposed project will not transfer equipment from other places and will also not transfer equipment to other places, so there is no leakage.

$LE_y = 0$

LE_y Leakage of the proposed project in the y year (t-CO2e)

Emission reduction:

Emission reduction of the project is calculated using following equation.

$ER_y = BE_y - PE_y - LE_y = BE_y - PE_y$

The emission reduction is evaluated as 8,316t-CO2e/year

(3) Monitoring plan

The monitoring method of the proposed project is based on AMSII.D (ver.12).

In the methodology, there is no specific instruction on the monitoring parameters but shall consist of:

(a) Documenting the specifications of the equipment replaced;

(b) Metering the energy use of the industrial or mining and mineral production facility, process or the equipment affected by the project activity;

(c) Calculating the energy saving using the metered energy obtained from sub-paragraph(b).

According to above, the monitoring data of the proposed project determined as follows.

Monitor Data

PRC_y (t/yr) Material coal input, measured before input to coke ovens

PRK_y (t/yr) Project coke production

$WC_{CMC\ IN}$ (%) Material coal moisture before CMC system, measured by sampling

WC_{PJ} (%) Material coal moisture after CMC system, measured by sampling

$EC_{PJ\ y}$ (MWh/y) Electricity consumption of CMC system, measured by the meter

All data collected as part of the monitoring plan should be archived electronically and be kept at least for 3 years after the end of the last crediting period.

(4) Calculated emission Reduction

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2011/7/1~2011/12/31	32,220	36,378	0	4,158
2012	64,440	72,757	0	8,316
2013	64,440	72,757	0	8,316
2014	64,440	72,757	0	8,316
2015	64,440	72,757	0	8,316
2016	64,440	72,757	0	8,316
2017	64,440	72,757	0	8,316

2018	64,440	72,757	0	8,316
2019	64,440	72,757	0	8,316
2020	64,440	72,757	0	8,316
2021/1/1~2021/6/30	32,220	36,378	0	4,158
Total (tonnes of CO_2 e)	644,400	727,570	0	83,160

(5) Project Period

Fixed crediting period was set as 10 years.

Expected operational lifetime of the project activity was set as 15years considering the expected lifetime of the facilities.

The start date of the project will be entered by 1 July 2011.

(6) Environmental Impact

The Environmental Impact Assessment has been done for the proposed project and approved by Qujing Environmental Protection Bureau on 23/5/2010. The environmental impacts arising from the Project are analyzed and get the conclusions in the following:

1) Air impact analysis

✓ Smut caused through delivery system

Band conveyors are usually used in delivery system of coal. When delivering small coal, because of the small size, smut will be caused easily. Therefore, delivery system-band conveyors will be set up with protective covering, each reloading point of band conveyors will be obdurate in order to preventing smut leak. Meanwhile the delivery coal of the project contain moisture, this is why smut caused through delivery system will not destroy environment.

2) Flue gases caused during drying project

To remove smut caused during drying project, mechanical dust abatement will be implemented twice. Flue gases caused during drying project will be absorbed by dust abatement-machine by 50% once a time through inertia and speed droop. In addition to hop-pocket dust abatement (99.9% efficiency), flue gases will be discharged to atmosphere through exhaust funnel after twice filter. Waste gas will be discharged to atmosphere after dust abatement; therefore it is little damage to the environment.

3) Analysis of water environment influence

Water will not be used in the course of the project production, and no factory effluent will be discharged. Therefore there is no environmental influence.

4) Analysis of solid waste influence

Solid wastes caused from the project are mainly waste filter pockets and waste coal. Waste filter pockets will be 0.5 ton yearly, which will be collected and delivered to Zhanyi county incineration power plant. Coal dust collected during drying project will be delivered to coal blending system by band conveyors to reuse. Therefore it is little damage to the environment.

5) Analysis of acoustical environment influence

The noise of the project is caused mainly from drying rollers, high-heat draft fans and air-blowers etc., which is mostly mechanical noise and aerodynamic noise. The intensity of noise origin is between 85-95dB(A). To common factory, when well closure of doors and windows, defining effect will be 15-20dB(A). Therefore the intensity of noise is between 70-75dB(A) outside of the factory, and will weaken to 15 dB(A) from 20m outside of the factory because of range attenuation and green area.

(7) Stakeholder Comment

The questionnaire survey activity was carried out by the Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd and Yunnan Dawei Coking Co., Ltd. during October 1, 2010 and October 30, 2010, covering the area of 30 km around the project site, including municipal government, public institute, farmers, state-owned and private enterprises. Total numbers of delivered questionnaire are 50 and among them 50 were collected.

Questionnaire was made easy to answer, such as the comments on the economy and environment impact, project information, CDM project knowledge, etc.

No any modifications is necessary for the project planning due to the comments received since most of responses support the construction and implementation of the project without any amendment of the mentioning in full or partial.

(8) Project Organization

▲Yunnan Dawei Coking Co., Ltd. ; a coke manufactory in Yunnan province. Project implementator

▲Yunnan Sun Valley Energy Conservation Industry Development Co., Ltd; Counter Part Company; EPC contractor in this project

▲Tepia Corporation Japan Co., Ltd : Project participant of Japan side.

(9) Project cost and financial plan

Total Initial cost for the Project will be 79.35 million Yuan.

In the financial plan, all cost will be bared by Yunnan Dawei Coking Co., Ltd.

(10) Additionality

Investment barrier

Option of analysis methods

To prove the additionality of the project, it is demonstrated that the project is not economically attractive without the revenues from the sale of CERs. There are, in principle, three analysis methods that can be used to demonstrate this:

- Option I: Simple cost analysis.
- Option II: Investment comparison analysis.
- Option III: Benchmark analysis.

The simple cost analysis is not applicable for the proposed project because it will produce economic benefit other than CERs income. Then the benchmark analysis is chosen.

Without the consideration of CDM benefit, the internal rate of return is 11.07% which is lower than benchmark rate of return 12%, so the proposed project has no financial attraction. This project is unfeasible. With the consideration of CDM benefit, the internal rate of return is 12.02%, which is higher than benchmark rate of return 12%. This project is feasible. We can get the conclusion that CDM benefit can improve the financial attraction of proposed project.

4. Study on the Co-benefit effect

(1) Environmental effect in the Host country

(a) Target Items

▲SO_x Emission

▲COD

(b) Baseline scenario and Project Scenario

Baseline scenario：

Un-moisture-controlled-coal is consumed in coke ovens due to lack of the installation of the CMC system. De-sulfur facility is installed and at most efforts are done for controlling emission of sulfur oxidants

Project scenario：

The moisture of material coal is controlled with CMC. Coal is saved and the discharge of wastewater from coke oven is reduced. As same as baseline scenario, de-sulfur facility is installed.

(c) Baseline emission

□SOx emission

Baseline emission of SOx is calculated based on the following equation. :

$BE_{SOx,y} = CC_{BL,y} * CR_{S,fuel}/100*64/32*(1-BDR/100)$

Where

$BE_{SOx,y}$: Baseline Sox generation in year y (t/y)

$CC_{BL,y}$: Coal consumption in the Baseline scenario in year y (t/y)

$CR_{S,fuel}$: Sulfa concentration in the coal (%) (In Yunnan : 3.09%)

BDR : Desulfuration rate (Planned as 90%)

Coal consumption in the baseline is calculated as follows :

$CC_{BL,y}=EG_y/W_{coal}$

Where

EG_y : Energy saving in year y

W_{coal} : Net Calorific value of the coal (=20,908MJ/t)

□COD emission

Baseline emission of the COD is calculated as follows :

$BE_{COD,y} = COD_{const,treatment}(1-R_{COD,BL})*Q_{BL,y}$

Where

$COD_{const,treatment}$: the COD concentration of wastewater flow into wastewater treatment system (mg /m3)

$R_{COD,BL}$: COD removal rate

$Q_{BL,y}$: baseline wastewater discharge (m3/year)

(d) Project Emission

□SOx emission

SOx emission in the project is calculated by following equation :

$PE_{SOx,y} = CC_{PR,y} * CR_{S,fuel}/100*64/32*(1-BDR/100)$

Where

$PE_{SOx,y}$: Project emission of Sox in year y (t/y)

$CC_{BL,y}$: Coal consumption in the Project scenario in year y (t/y)

$CR_{S,fuel}$: Sulfa concentration in the coal (%) (In Yunnan : 3.09%)

BDR : Desulfuration rate (Planned as 90%)

□COD emission

COD emission in the project is calculated by following equation :

$PE_{COD,y} = COD_{const,treatment}(1-R_{COD,PJ})*Q_{BL,y}$

Where

$COD_{const,treatment}$: the COD concentration of wastewater flow into wastewater treatment system (mg /m3)

$R_{COD,PJ}$: COD removal rate

$Q_{PJ,y}$: project wastewater discharge (m3/year)

(e)Ex-anteCaclulation of the Emission Reduction

□SOx emission

SOx emission Reduction (t/y) =$BE_{SOx,y}$ - $PE_{SOx,y}$ = 2,145t

□COD emission

COD emission Reduction = $BE_{COD,y}$ — $PE_{COD,y}$ = 6,940t

(f) Monitoring Method

Following Parameters are monitored

□SOx emission

▲Coal Moisture：Monitoring Record

▲Sulfa concentration in the coal：Spec of the Coal

▲Coal Consumption：Plant record

□COD emission

▲Coal Moisture：Monitoring Record

▲Coal Consumption：Plant record

5. Study on the Sustainable Development

N/A