kfq Korean Foundation for Quality

# RESPONSE REGARDS REQUEST FOR REVIEW OF 'DAEGU & SINANJEUNGDO PV (PHOTOVOLTAIC) POWER PLANT PROJECT (1883)'

| | Comments |
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| Review requirement | **1. Further clarification is required how the DOE has validated the input values to the investment analysis.** |
| Review process and Response by PP/DOE | 1. Review Procedure :<br>1) Validation team has re-validated the input values to the investment analysis on objective point of view and described how the DOE has validated it in Appendix A-B.3.1 of the revised validation report (Ver 4) in detail.<br>2) Validation Report is revised and approved final validation report by KFQ's internal reviewer for submission to the UNFCCC.<br><br>2. Response by DOE<br>According to above review process, validation team has re-validated input values to the investment analysis and revised validation report (appendix A. protocol B.3.1).<br><br>1) Contents related to the investment analysis in the protocol B.3.1. of validation report version 3:<br>"According to the attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project additionality is assessed by investment analysis and sensitivity analysis that the evidences are provided in section B.5 in the PDD.<br><br>The project NPV (Net Present Value) of the project activity is selected as the financial indicator. The NPV for proposed CDM project is negative (Daegu project: -818 million KRW, SinanJeungdo project: -6,517 million KRW). This shows that the project is not financially attractive in the absence of CDM benefits.<br>In order to arrive at the conclusions regarding the robustness of the financial attractiveness to reasonable variations in the critical assumptions, sensitivity analysis is opted.<br><br>Below parameters are considered in sensitivity analysis.<br>: Utilization rate with -10% ~ 30% variation ranges |

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| | - According to research report of MOCIE, even through under good condition, utilization rate of PV plant may not be exceeded 30%. Also it may not -10% below than selected utilization rate.<br>: Price of purchasing electricity (SMP) with ±10% variation range<br>: Discount rate changing with 3% and 10%<br>- 3-year yield of treasury bonds (Government bond rate) for 2006 was 4.83% and corporate bond was not exceed 10%.<br>According to sensitivity analysis, NPVs for proposed project activity are still negative.<br>Based on the investment analysis above, the project is not financially attractive and the project activity is not a likely baseline scenario. Thus emission reduction from the project activity is additional.<br>Validation team has been verified all financial data and information for investment analysis and also validated relevant assumptions such as the utilization rate and variation range for sensitivity analysis in a reasonable and conservative manner.<br><br>2) Contents related to the investment analysis in the protocol B.3.1. of validation report version 4:<br>"According to the attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project additionality were assessed by investment analysis and sensitivity analysis that the evidences are provided in section B.5 in the PDD.<br><br>The project NPV (Net Present Value) of the project activity is selected as the financial indicator. The NPV for proposed CDM project is negative (Daegu project: -818 million KRW, SinanJeungdo project: -6,517 million KRW). This shows that the project is not financially attractive in the absence of CDM benefits.<br>To reach a conclusion as above, validation team validated the data and figures in Appendix 2(NPV Analysis) of the PDD provided by PP.<br><br>Main input figures in Appendix 2 are as follow:<br>① Construction cost :<br>For Daegu-100kw : 835 million won(excluding V.A.T) is crosschecked with the cost in '2nd clause of the Daegu PV Power Plant Construction |

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| | Completion Report(Refer appendix 3)' and related bills<br>For SinanJeungdo-800kw: 6,637 Million won (excluding V.A.T) is crosschecked against contract between PP and construction company, Unison Co.,Ltd. Also 'The result of the permit on the completion of SinanJeungdo PV power plant' in appendix 3 is reviewed whether these figures are correct and reasonable.<br>② Maintenance cost :<br>Validation team found and accepted that the maintenance cost is approximately 1% of total investment cost for decision making in a general way. And 1% of total investment cost is reflected as maintenance cost in other project too.<br>③ Electricity generation :<br>Electricity generation is directly related to the utilization rates. PP adopted 13.8% for fixed type of Daegu, 15% for SinanJeungdo, 17.6% for tracking one axis and 19.5% for tracking two axis as utilization rate.<br>- 13.8% for fixed type of Daegu: This utilization rated is selected from 'Daegu project's actual operation and prediction' dated July 2007 which is based on real operational data. In the course of validation, validation team identified utilization rate against real operational data and accepted the selected figure.<br>- 15% for SinanJeungdo, 17.6% for tracking one axis and 19.5% for tracking two axis: This figures are selected from 'The final report of business feasibility analysis by Josun University'. Validation team accepted these utilization rates according to professional advice and module specification in Appendix 2.<br>④ price of purchasing electricity(SMP)<br>SMP for this project activity is 82.116 won/kWh which announced publicly on KPX website. Validation team crosschecked this price with the data from website and calculated average SMP for making decision whether the SMP is reasonable. And validation team decided this SMP is reasonable.<br>But, calculated electricity sales and gross sales in 'The report "Daegu project's actual operation and prediction' of the Appendix 3 are different as SMP because of electricity sales and gross sales is including compensation according to subsidy for renewable energy facility. And this is reported to PP internally.<br>In 2002, subsidy for renewable energy facility was established first with |

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| | Alternative Energy Development Promotion Act(No. 6672) and in 2004 the law was revised with Alternative Energy Development Promotion Act(No. 7284)<br>⑤ Discount rate is 7%.<br>Discount rate is 7% and PP selected this rate based on the '2nd Basic Plan of Long Term Electric Supply & Demand (2004, Ministry of Commerce, Industry and Energy). Validation team checked discount rate, 7%, with the evidence submitted by PP and confirmed the rate is appropriate.<br><br>Without subsidy for renewable energy facility, IRR for photovoltaic power project in Korea is very low even through expanding sensitivity of main parameters such as construction cost, maintenance cost, electricity generation, SMP and discount rate.<br>In spite of that, In order to arrive at the conclusions regarding the robustness of the financial attractiveness to reasonable variations in the critical assumptions, sensitivity analysis is opted.<br><br>Below parameters are considered in sensitivity analysis.<br>: Utilization rate with -10% ~ 30% variation ranges<br>- According to research report of MOCIE, even through under good condition, utilization rate of PV plant may not be exceeded 30%. Also it may not -10% below than selected utilization rate.<br>: Price of purchasing electricity (SMP) with ±10% variation range<br>: Discount rate changing with 3% and 10%<br>- 3-year yield of treasury bonds (Government bond rate) for 2006 was 4.83% and corporate bond was not exceed 10%.<br>According to sensitivity analysis, NPVs for proposed project activity are still negative.<br>Based on the investment analysis above, the project is not financially attractive and the project activity is not a likely baseline scenario. Thus emission reduction from the project activity is additional.<br>Validation team has been verified all financial data and information for investment analysis and also validated relevant assumptions such as the utilization rate and variation range for sensitivity analysis in a reasonable and conservative manner. |

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| | Checked input values related to the sensitivity analysis by DOE is as follows:<br>① Yields of treasury bonds(3-year) in market interest rates was 4.83% (2006, The Bank of Korea) and Yields of Korean company's bond have been not over 10% during current 3 years.<br>Evidence of 4.83% is information provided in 2006 by 'The bank of Korea' and interest rate of corporate bond, 10% is confirmed by the latest Balance Sheets of KDHC that was published on 2008.<br>And validation team accepted that selected discount rate, 3%, is reasonable in conservative manner as yields of treasury bounds in market interest rate was 4.83%<br>② Utilization rate with -10% ~ 30% variation ranges<br>According to research report of MOCIE, utilization rate of photovoltaic power project in Korea is 13.7% at the minimum and 22.7% at the maximum. Thus PP selected variation range as -10%(13.5% at the minimum) and +30%(25.4% at the maximum) of standard value and DOE accepted this range for sensitivity analysis.<br>③ Price of purchasing electricity (SMP) with ±10% variation range.<br>Variation range for SMP sensitivity analysis is ±10%. Published SMP for photovoltaic power by KPX has not exceeded 90 won/kWh until the time for validation<br>Based on this SMP, 90.328 won/kWh(+10% of 82.116 won/kWh) is decided as maximum SMP and 73.9 won/kWh(-10% of 82.116 won/kWh) as minimum SMP by PP. Validation team identified these figures via KPX website and accepted it.<br>④ Discount rate changing with 3% and 10%<br>PP decided variation range for discount rate as 3% and 10% because of 3-year yield of treasury bonds (Government bond rate) for 2006 was 4.83% and corporate bond was not exceed 10%"<br>Validation team identified these figures with 2006 government bond rate provided by The Bank of Korea and The Balance Sheet of KDHC(2008), and concluded selected figures are appropriate.<br>Also validation team decided that selected minimum range for sensitivity analysis of discount rate, 3%, is reasonable in conservative manner |
| Attachment | PDD(Ver 5)<br>Validation Report(Ver 4)<br>Attach.1-1: |

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| Review requirement | **2. A detailed time line of the project activity must be provided in particular the dates of investment decision and commissioning of the power plant.** |
| Review process and Response by PP/DOE | 1. Review Procedure :<br>1) Date of investment decision of this project activity was not expressed clearly in the PDD as well as work performed since starting date of project activity. Thus, PP was requested to submit related evidence to this requirement and revise the PDD.<br>2) DOE has validated the revised PDD with objective evidence provided by PP<br>3) Validation Report is revised and approved final validation report by KFQ's internal reviewer for submission to the UNFCCC.<br><br>2. Response<br>1) Response by PP : Modification of B.5 in PDD as follows,<br>"Daegu & SinanJeungdo PV(photovoltaic) Power Plant Project was discussed at the KDHC's 6th management session of 2005 for the first time. Although the large amount for investment including purchasing real estates for installment of PV Power Plant and the maintenance cost had been expected, the executive of KDHC decided to proceed this project for diversifying fuel sources for producing the electricity, serving as a responsible public enterprise and abating the GHG at 6th management meeting on 5 October 2005 and got permission about the electric enterprise from the governor of JeollaNamdo province(13 December 2005) and a mayor of Daegu(22 February 2006). But most of all the possibility of investment's recoupment through selling CERs was considered seriously for development of this project. It can be confirmed through documents of management session and business plans of KDHC.<br><br>After the government's admission, KDHC started construction of Daegu(4 May 2006) & SinanJeungdo (28 February 2007) PV Power Plant and completed construction of Daegu(30 September 2006) & SinanJeungdo(30 November 2007) PV Power Plant. Daegu Plant has been operated since its operation was officially started on 22 September 2006 and SinanJeungdo Plant has been operated since its operation was officially started on 8 November 2007.<br><br>Please refer attached documents as evidence: |

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| | Attach 2-1. The Daegu PV power Plant Construction Completion Report[This is a document that the electrical team manager of Daegu branch summarize to CEO about whole process related with construction after completion of Daegu PV Power Plant. We can know when the construction is started and completed as well as when the operation is started officially<br><br>Attach 2-2. The result of the permit on the completion of SinanJeungdo PV Power Plant [This is a document that the construction inspector of Daegu branch report to director of construction headquarters about the permit on the completion of SinanJeungdo PV Power Plant. We can know when the construction is started and completed]<br><br>Attach 2-3. Notification recognition of the commissioning of the Daegu PV Power Plant [This is a document that the mayor of Daegu notify recognition of the commissioning of the Daegu PV Plant and we can know when the operation is started officially.]<br><br>Attach 2-4. Notification recognition of the commissioning of the PV Platn [This is a document that the governor of JeollaNamdo notify recognition of the commissioning of SinanJeungdo Plant and we can know when the operation is started.]<br><br>2) Response by DOE: Following description of prior consideration of CDM is added to section 3.4 of the validation report.<br><br>Based on the objective evidence submitted by PP, DOE confirmed that investment to this project activity was decided at at the 6th management meeting on 5 October 2005 as requesting approval of this project activity to local government was performed which was preceded based on the minutes of the 6th management meeting. Also staring of construction, completion of construction and starting date of commercial operation were reviewed based on the evidence provided by PP.<br>And PP was requested to explain above facts clearly in the PDD and submitted those evidences to DOE. |

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<tr><th>NO</th><th>DATE</th><th>SUBJECT</th></tr>
<tr><td>2-1</td><td>'06.10.19</td><td>- The Daegu PV Power Plant Construction Completion Report (대구 태양광발전 설치완료 보고)</td></tr>
<tr><td>2-2</td><td>'07.12.21</td><td>- The result of the permit on the completion of SinanJeungdo PV (신안증도 태양광발전설비 구매 준공검사 결과보고)</td></tr>
<tr><td>2-3</td><td>'06.09.22</td><td>- Notification recognition of the commissioning of the Daegu PV Power Plant (대구 태양광발전소 사업개시신고 수리)</td></tr>
<tr><td>2-4</td><td>'07.11.13</td><td>- Notification recognition of the commissioning of the PV Power Plant (전기사업 개시신고 수리)</td></tr>
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[List of documents regards construction]
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<tr><td>Attachment</td><td>PDD(Ver 5)<br>Validation Report (Ver 4)<br>Attach.2-1~2-4</td></tr>
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| Review requirement | **3. The PP/DOE is requested to provide evidence that continuing and real actions were taken to secure CDM status for the project activity in parallel with its implementation (EB41, Annex 46, paragraph 5 (b)).**<br><br>““UNFCCC/CCNUCC CDM – Executive Board EB 41 Annex 46 paragraph 5 (b)<br><br>{5. Proposed project activities with a start date before 2 August 2008, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, are required to demonstrate that the CDM was seriously considered in the decision to implement the project activity. Such demonstration requires the following elements to be satisfied:<br><br>(b) The project participant must indicate, by means of reliable evidence, that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation.<br>Evidence to support this should include, *inter alia*, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat;} |
| Review process and Response by PP/DOE | 1. Review Procedure :<br>1) Annex 46 (Guidance on the demonstration and assessment of prior consideration of the CDM) made by EB 41st meeting was need to check conformity of this decision with project activity. This Annex 46 is decided after requesting registration of this project but, DOE has requested submission of objective evidence to PP and revision of the PDD according to this evidence.<br>2) DOE has validated the revised PDD with objective evidence provided by PP<br>3) Validation Report is revised and approved final validation report by KFQ’s internal reviewer for submission to the UNFCCC.<br><br>2. Response<br>1) Response by PP: Addition of B.5 in PDD as follows,<br>In case of SinanJeungdo Project the capacity and site for facility had been changed in the middle of proceeding. Thus KDHC received the second permission about site |

change from the governor of Jeollanamdo province (5 December 2006) and received the final permission about capacity change from the governor of Jeollanamdo province (17 April 2008). As the result of that the construction of PV Power Plant was started late compared with the initial plan and the start of CDM propulsion was also delayed. Expected emission reductions from Daegu PV Power Plant were less than 100t$CO_2$, it was not reasonable to register the project by itself on economic point of view. Thus KDHC decided to bundle Daegu PV Power Plant project and SinanJeungdo PV Power Plant Project.

**<figure 6> the memorandum of understanding between KDHC and Eco-Frontier(2006)**

기후변화협약 업무협력 합의서 (안)

When KDHC decided to proceed this project, there was an economic barrier to promote the project as CDM. Daegu and SinanJeung PV Power Plants each had very small capacity, so KDHC had to bundle those projects for saving the cost. Even though those projects would be registered as bundling CDM, the CERs would be still very small. Thus KDHC tried to register this project by themselves for saving the cost and raising their ability for dealing CDM. KDHC has focused on the training of employees and KDHC employees working at CDM has been educated steadily. They have attended various educations, conferences and seminars. Especially the educations conducted by DOE and consulting company have been helpful for raising their ability related with CDM and Green House Gas. At the same time, KDHC was trying to register fuel switching project as CDM under a contract with a consultant company and they anticipated obtaining the know-how for other CDM project through the project's registration as CDM. When the fuel switching CDM was registered as

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| | CDM, KDHC published the news including the fact PV Power Plant and LFG boiler projects were also proceeding as CDM through the newspapers like financial news(5 April 2007) and Gyeonginilbo(6 April 2007) and KDHC's homepage. Those news can be still confirmed by these web sites (www.kdhc.co.kr , www.kyeongin.com, www.fnnews.com). Furthermore KDHC signed MOU(memorandum of understanding) with the consultant company, Eco-Frontier on 31 October 2006. They agreed that they would cooperate each other for all of the work related with UNFCCC. KDHC employees working at CDM Team has been educated by a consultant company according to the document. Through the education they could learn sufficiently how they write PDD and calculate the emission reductions, which method had to be adopted and the procedure of CDM registration. After the plan of the SinanJeungdo cleared through the final permission from the governor of Jeollanamdo and the SinanJeungdo PV plant was completed, KDHC put their right hand to the work for CDM.<br>Finally they started writing the PDD on September 2007 and signed a contract for validation with KFQ on 29 October 2007. After that KDHC received approval form DNA on 20 June 2008 and requested registration on 25 June 2008.<br><br>2) Response by DOE: According to above review process, validation team has re-validated "revised PDD and the evidences that continuing and real actions were taken to secure CDM status for the project activity in parallel with its implementation" and is added to section 3.4 of the validation report as follows.<br><br>Based on the objective the evidences submitted by PP, validation team confirmed that continuing and real actions were taken to secure CDM status for the project activity in parallel with its implementation.<br><br>In the course of taking real actions for project activity after deciding to do this project as CDM in the 6th management meeting on 5 October 2005, there was a little delay. The reason of it was explained by PP and validation team accepted it.<br><br>The reason is as below:<br>"Expected emission reductions from Daegu PV Power Plant were less than 100tCO2, it was not reasonable to register the project by itself on economic point of view. Thus KDHC decided to bundle Daegu PV Power Plant project and SinanJeungdo PV Power Plant Project. When KDHC decided to proceed this project, there was an economic |

barrier to promote the project as CDM. Daegu and SinanJeung PV Power Plants each had very small capacity, so KDHC had to bundle those projects for saving the cost. Even though those projects would be registered as bundling CDM, the CERs would be still very small. Thus KDHC tried to register this project by themselves for saving the cost and raising their ability for dealing CDM. KDHC has focused on the training of employees and KDHC employees working at CDM has been educated steadily. They have attended various educations, conferences and seminars. Especially the educations conducted by DOE and consulting company have been helpful for raising their ability related with CDM and Green House Gas."

Above facts were crosschecked and reviewed with the documents on the list below, and validation conclude that real actions were taken in parallel with its implementation after decision-making for proceeding this project activity.

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| 3-1 | '06.10.17 | - The new CDM Project planning report (신규 CDM사업 추진계획 보고) |
| 3-2 | '06.10.31 | - The memorandum of understanding (기후변화협약 업무협력 합의서) |
| 3-3 | '06.11.21 | - Notification of the education to cultivate Exerts for UNFCCC in 2006 (2006년도 기후변화대책 전문가과정 교육 시행) |
| 3-4 | '07.03.22 | - Report the present propulsion condition of CDM Project (CDM사업 추진현황 보고) |
| 3-5 | '07.04.05 | - Articles of newspapers (보도자료) |
| 3-6 | '07.05.16 | - The result of business trip for research about tendency of world carbon market and CDM cases (세계 탄소시장의 동향 및 CDM 해외사례 조사를 위한 해외출장 결과보고) |
| 3-7 | '07.07.23 | - CDM project plan report of Daegu & SinanJeungdo PV Power Plant (대구&신안 태양광발전 CDM사업 추진방안 보고) |
| 3-8 | '07.08.20 | - Request of assistance in photovoltaic power generation CDM (태양광발전 CDM사업 추진관련 협조 요청) |
| 3-9 | '07.08.31 | - The certificate of training for verification GHG reductions (교육 수료증) |
| 3-10 | '07.08.31 | - Notification of Renewable energy CDM experts cultivation education and workshop ( 신재생에너지 CDM사업 전문가양성 교육 및 담당자 워크샵 시행) |
| 3-11 | '07.09.21 | - The instruction to cultivate experts and the results of workshop (신재생에너지 CDM사업 전문가 양성 교육 및 담당자 워크샵 결과보고) |
| 3-12 | '07.10.29 | - The contract for validation (계약서) |
| 3-13 | '08.01.31 | - The certificate of training for GHG CDM expert education (교육 수료증) |
| 3-14 | '08.06.25 | - Notification at homepage (홈페이지 공지사항 게시) |

[List of documents regards real action taken]

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| Attachment | PDD(Ver 5)<br>Validation Report(Ver 4)<br>Attach.3-1~3-14 |

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| Review requirement | **4. As per the methodology, the electricity supplied to the grid must be crosschecked against the sales.** |
| Review process and Response by PP/DOE | 1. Review Procedure :<br>1) Metering of imported electricity is described in B.7.2 of the PDD which means that crosschecking the imported electricity by PP and KEPCO. And bills of imported electricity are issued based on crosschecked importing electricity. Therefore, it is same way as cross-checking of invoice of imported electricity. However it was not described in detail. Thus PP was requested to explain it in full.<br>2) DOE has validated the revised PDD provided by PP and revised the validation report.<br><br>2. Response<br>1) PP Answer : Addition of B.7.2 in PDD as follows,<br><br>In the section of B.7.2, it is described clearly that KEPCO is the buyer of the electricity and electricity generation is crosschecked by the value form the meter and the invoice confirmed by KEPCO<br><br>Thus in the section of B.7.1 it is described clearly the invoice of KEPCO will be monitored for the purpose of crosschecking the amount of electricity generation<br><br>2) Response by DOE: A additional question, Does PP must crosscheck the electricity supplied to the grid against the sale?, is added to B.10.9 in KFQ SSC Validation Protocol to the Validation Report Appendix A for avoiding further misunderstanding. Comments from the validation team of are described in the revised validation report. |
| Attachment | PDD(Ver 5)<br>Validation Report(Ver 4) |