Feasibility Studies with the Aim of Developing a Bilateral Offset Credit Mechanism FY2011

Studies for Project Exploration and Planning

Development of Small Hydro power project with Japanese Technology and Financial scheme

New Energy and Industrial Technology Development Organization (NEDO)
Industrial Decisions Inc.
Project outline

【Small hydro-power project in Indonesia and its development potential】
• Indonesia’s hydro power potential is 76,000 MW and 10% of 76,000MW can be developed as small hydro-power project(below 10MW)

【The difficulty to develop small hydro-power projects】
• Government of Indonesia has announced Feed-in-Tariff for small hydro-power project to help owners to develop the project and many of owners have shown their interest in developing small hydro-power project.

• However, because owners of small hydro power projects in Indonesia are usually not well known companies and rarely have the experience in hydro-power project development. Furthermore, owners usually prefer the cheap machinery for saving initial cost.

• Those gives them a lots of difficulties to get debt loan from financial providers(banking or governmental financial agencies etc.) to obtain the development cost.

• If we can solve those issues described above, the project owners will be encouraged to develop more small hydro-power and this can help the country to achieve its GHG emission reduction goal.
Project outline

【Project scheme】
• Our project scheme focuses on those issues below and is able to help project owners to develop their small hydro-power projects constantly.

Issues at current stage

<table>
<thead>
<tr>
<th>Lack of Experience</th>
<th>Project Risk</th>
<th>Cash Shortage</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Local financial providers will not give any financial support if the owner has no experience in developing the project)</td>
<td>(if the technology used in project are not reliable, the financial providers will not give any support either)</td>
<td>(As, in general, the owners are not well known company and have cash problem, the owners have to borrow cash, but difficult.)</td>
</tr>
</tbody>
</table>

Our Scheme

- Well experienced Machinery producer/ OM consulting company from Japan
- Financial providers from Japan
- Revenue from Carbon Credits transaction under the Bilateral Offset Mechanism

Provide reliable technology and know how
Provide financial support
Baseline and calculation of GHG reductions

【Baseline】
• The carbon credits, in other words, the reduction volume will be calculated based on the emission factor.

• As the small hydro-power project is connected to grid and Indonesian government has announced the emission factor for seven grids, we would like to follow the CDM methodology and use those emission factors to calculate the reduction volume.

【Reduction Volume】
• Projects in Feasibility Study
We have been studying small hydro-power project through two projects in Sumatra, Indonesia. The data still is under studying but the annual reduction volume from those two projects can be calculated roughly as following.

- Capacity : 2 MW and 6 MW
- Utilization rate : 65%
- Emission factor : 0.743 tCO2/MWh

\[
33,845 \text{ tCO2/year} = 8\text{MW} \times 8760 \text{ Hours} \times 65\% \times 0.743
\]

According to the assessment with local financial providers, usually the loan period is from 7 to 9 years and the crediting period in the CDM scheme can be set to 7 years. Hence, we would like to set the crediting period for our scheme to 7 years as well. Therefore the accumulated reduction volume will be 236,915 tCO2=33,845 tCO2/year * 7 years.
Our Scheme

【Credit transaction in our scheme】
• In our scheme, the carbon credits will be traded more like Green Investment Scheme (GIS), which the credits can be traded even before the start date for operation.

Refunding scheme of the Loan from Local bank
At the early year of redemption period, the owners have to suffer from big burden of refunding as the amount of interest is much higher than the amount in later year.

Credits transaction in CDM scheme
As the credits are issued after 2 or 3 years from the registration, the owner can not refund for loan with credit transaction revenue till 2 or 3 years later.

Credits transaction in our scheme
In our scheme, the owner can sell their credits at the beginning of registration or form the beginning of the operation. Revenue from credits transaction will help the owners to refund their loan at the early year of the loan period.
Project valuation

- Local banks evaluate the project according to IRR, ROE and other financial indicators. But the cash balance is most considered factor for local bank. Even if the result assessed in pre F/S shows that the cash balance turns into minus, the financial providers will hardly give project owners debt loan.

- We have been analyzing the impact of credits revenue to the project development through different kinds of cash flows and trying to get the idea what the best timing is to provide credits revenue to the projects under our scheme.

Please see next page for a short summary of evaluation regarding cash flow models.
## Project valuation

- The assumption for those cash flows are as following:
  - **Carbon credits price**: 10 euro/tonne (= 118,500 Rp.)
  - **Reduction volume**: 30,000 tonne/year
  - **Revenue from Electricity sales**: 32,869 million Rp/year.

<table>
<thead>
<tr>
<th>Million Rp.</th>
<th>Year</th>
<th>Construction Stage</th>
<th>Operation Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Base case</strong> (without any credits revenue)</td>
<td>Net Income (Income from credits sales)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Less Senior principal payments</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Cash Balance</td>
<td>28,922</td>
<td>0</td>
</tr>
<tr>
<td><strong>CDM Scheme</strong> (credits revenue paid at the second year of operation)</td>
<td>Net Income (Income from credits sales)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Less Senior principal payments</td>
<td>0</td>
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<td>0</td>
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<tr>
<td><strong>Our Scheme</strong> (credits revenue paid right after operation starts)</td>
<td>Net Income (Income from credits sales)</td>
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</tr>
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20% of accumulated credit sales revenue for 7 years paid in 2nd and 3rd year each

12% of accumulated credit sales revenue for 7 years paid from 4th to 7th year
Baseline and calculation of GHG reductions

【MRV】
• The reduction data must be measured, reported and verified by third party to prove and ensure its fairness and accuracy.

• We would like to follow the MRV been designed by Indonesian government. But those idea below can be considered for project MRV, especially for small hydro-power project.
  ➢ Monitoring : the electricity output(kwh) will be monitored
  ➢ Reporting : the monitoring report will be submitted to both Indonesian and Japanese government and also will be disclosed on the web.
  ➢ Verification : the data will be verified by the agencies appointed by both Indonesian and Japanese government. Further, the whitelist also can be considered.

• In our scheme, the credits will be purchased and the cash will be paid before actual reduction in order to help project owners to obtain cash for their cash shortage.

• Therefore, we have to avoid the volume gap between actual reduction volume and the pre transferred credits volume made before actual reduction. Those gaps usually are caused by machinery malfunctions or natural phenomena such as river depletion.

• Hence we require the project to install reliable technology and submit/analysis the water flow data for past several years to secure the stable and constant operation of the project.

• We also will set the maximum amount to the prepayment and the payments will be made after test-run of the project to avoid the risk in the case if the actual reduction is not enough for the prepayment.
## Summary

- Small hydro-power potential in Indonesia is around 7,600MW and this can be great helpful for Indonesia to meet its electricity demand. Especially, small hydro-power is environmentally friendly power source due to its size and costs.

- To stimulate the development of small hydro-power projects, the Bilateral Offset Credits Scheme can be the key which solves those issues happened to project owners.

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- We think those ways showed above (installing Japanese machinery/ OM consulting, Financial supporting from Japan and carbon credits) can encourage and help project owners to develop small hydro-power projects.

- Also, carbon credits under BOCM can help the project owners to obtain cash for the cash shortage often happened at the beginning of operation period. This will give project owners an advantage to get loan from bank.

- Neighboring countries such as Vietnam and India have huge potential in small hydropower development so if the scheme can be applied to those countries, about 40 million tonne of CO2 reduction (India 22 million + Vietnam 18 million) can be achieved ever year.