Financing Mechanism for Supporting Large Scale Energy Efficiency

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Asian Development Bank

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Goals:

**Scale Up** Investments in Energy Efficient Infrastructure, Technologies and Solutions

Improve the **Confidence**, **Cost** and **Convenience** with which users can seek financing and investors invest in Energy Efficiency
Aggregation of Projects

‘Aggregation’ may be used to achieve Scale Advantages of Quality, Cost and Reliability

- **Pre-registration**
  - Initial discussions with Hosts and EEFF, PMU.
  - Willing hosts, register with EEFF
    - Defined technologies
    - EE, E Goals
  - Initial financial/technical check on acceptability of Hosts for the program

- **Assessment**
  - Feasibility Assessment of the proposed technologies carried out
  - Baseline and M&V methodology established.
  - Environmental, Social & Governance assessments

- **Pre-Implementation MOU**
  - Registered hosts establish an implementation MOU with EEFF, outlining commitment to
    - Participate in the aggregated bids
    - Implementing resulting projects
    - Loan program etc.
    - RFQ, RFP, Contract form, baseline MRV protocols form agreed

- **Bidding**
  - Bids Invited
    - For aggregated capacity
    - Feasibility assessment reports made available
  - Bid evaluation
  - Each participant signs specific agreements with the winning bidder with agreed timeline
  - Loan agreements established
  - Bidding and Development costs shared.
  - Common lender’s technical consultant appointed to ensure contracted results are achieved

- **Implementation**

- **M&V**
  - Monitoring and Verification of results
  - Approval of payouts to implementers.

(not all areas may be suitable for aggregation)
Aggregation Approach for EE Investments in SME

- **Technology Aggregation**: Suitable for Individual Companies, Groups, SME Clusters, Buildings, Municipality
- **Group Level Aggregation**: Suitable for Bigger Groups from all sectors
- **Cluster Level Aggregation**: Suitable for SME Clusters, Regional Industrial Sectors
Benefits of Aggregation

Users
- Get trusted, verified technologies and implementers
- Technical Assistance to get feasibility assessments
- Well structured, risk mitigated projects.
- Get benefit of lower cost, due to aggregation/scale
- Pre-approved financing

Financial Institutions
- Lower Transaction Costs
- Faster scale up of loan book
- Risk mitigation (technology, implementation) because of increased participation of well qualified implementation agencies.

ESCOs, Technology OEMs
- Lower customer acquisition cost and time
- Faster scale up
- Well established baseline and well structured performance contracts.
- Improved payment security, due to bank involvement

Regulators
- Faster scale up
- Larger customer adoption
- Higher certainty of program reaching performance results
- Less leakages
- Higher chances of market based models getting adopted
Aggregation

ESCO's, Technology Providers

Performance Contract

EEFF, PMU

Bid

Loan service

Escrow

Make up cash if guaranteed performance not achieved.

Performance based / savings linked payment made by Customers

Loan

Register

TA- Feasibility Assessment, Baselines setting

Host Industries

Partial Risk Guarantee - credit or technical performance default.

Structure-1: Loan to Host Industry
Aggregation –2

ESCO’s, Technology Providers

Bid

Loan

EEFF, PMU

Loan service

Register

Escrow

Balance cash after payout of Loan service to ESCO

Performance based / savings linked payment made by Customers based on performance contract

Host Industries

Partial Risk Guarantee - credit or technical performance default.

Structure-2: Loan to ESCO
Proposed Structure for EEFF

Guides and directs PMU for EEFF deployment

EEFF Management Board
PFC, BEE, Others

PMU

Performance Based Contracting, Securitise Cash flows

ESCOs

APEX Lending Agency

EEFF

USD 100/500 m debt financing by ADB

Co-finance/re-finance the project

Contributes 20-30 percent of investments as equity financing

EEFF

Host Enterprise

PFI

PFI

Debt routed through PFIs to sub-borrowers

PMU roles

Sector, Technology Identification and Aggregation of Projects

Project Feasibility and ESG assessments.

Proposal for approval from Investment committee/Management Board of EEFF

Pipeline build up for lending

Technical support to EEFF Management Board

Contracting support, Monitoring and Evaluation
## Partial Risk Guarantee – broad outline*

<table>
<thead>
<tr>
<th>SN</th>
<th>Parameter</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Projects Covered</td>
<td>All projects approved by EEFF</td>
</tr>
<tr>
<td>2</td>
<td>Risk Cover Provided to</td>
<td>EEFF Manager – Financial Intermediary</td>
</tr>
<tr>
<td>3</td>
<td>Risks covered</td>
<td>Technology Performance Risk&lt;br&gt;Payment Risk of Host Enterprises (of the borrower)&lt;br&gt;Non-Acceleratable</td>
</tr>
<tr>
<td>4</td>
<td>% Loss Covered</td>
<td>First 10% - Lender (EEFC)&lt;br&gt;Balance - Shared equally between the lender and risk cover provider, beyond the collateral value obtained by the Lender</td>
</tr>
<tr>
<td>5</td>
<td>Risk cover be sourced from</td>
<td>GCF / GEF / GOI</td>
</tr>
</tbody>
</table>

* To be designed in detail later
Projected outcome – PAT Cycle – 1

Energy Savings
8.67 MTOE
5635 MW

Monetary Savings
$ 1.5 billion er year

Investments
$ 4 billion

Source: beenet.gov.in
Significant Investments already made by the Industry

- Projected outcome – PAT Cycle – 2

- Energy Savings
  - 17.5 MTOE
  - 11,407 MW

- Monetary Savings
  - $ 3 billion per year

- Investments
  - $ 4.5 billion

Source: beenet.gov.in
Cement sector

- 210 major plants in India
- Major Technologies Vs Estimated Investment

<table>
<thead>
<tr>
<th>Major Technologies</th>
<th>Estimated Investment opportunity ($ million)</th>
<th>Replication Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Efficiency Clinker Cooler</td>
<td>400</td>
<td>125 Plants</td>
</tr>
<tr>
<td>Waste Heat Recovery Plants</td>
<td>800</td>
<td>500 MW</td>
</tr>
<tr>
<td>Latest Generation Gaassifiers</td>
<td>40</td>
<td>110 Plants</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,240</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Example – Installation of High Efficiency Coolers**

- Replacement of existing coolers with recuperative efficiency of 50-60 % with new high efficiency coolers of 72-76 % efficiency
- Ex – Reference Plant
  - **Savings Achieved** – Rs 3.75 Crores*
  - **Total Investment** – Rs 30 Crores
  - **Payback Period** – 8 Years

* Productivity Improvements not considered
### Major Technologies Vs Estimated Investment

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<tr>
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<th>Replication Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT VFD for CEP, ID and BFP</td>
<td>200</td>
<td>150 units</td>
</tr>
<tr>
<td>Dynamic Gaassifiers</td>
<td>500</td>
<td>250 units</td>
</tr>
<tr>
<td>Micro Oil Ignition System</td>
<td>50</td>
<td>90 units</td>
</tr>
<tr>
<td>Flue Gas Desulfurization (Environmental compliance for SOx reduction)</td>
<td>6,000</td>
<td>300 Units</td>
</tr>
<tr>
<td>SNCR, SCR (Environmental compliance for NOx reduction)</td>
<td>3,000</td>
<td>300 Units</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9.750</strong></td>
<td><strong>1090 units</strong></td>
</tr>
</tbody>
</table>

#### Example – Installation of HT VFDs for CEP
- **Ex – Reference Plant (300 MW)**
  - Savings Achieved – Rs 60 Lakhs
  - Total Investment – Rs 2.3 Crores
  - Payback Period – 4 Years

#### Example – Installation of FGD Plant for meeting new Emission norms (SOx)
- **Example NTPC Vindhyachal (500 MW)**
  - Capital Cost Approved by CERC – Rs 161 Crores
## Iron and Steel Sector

### Major Technologies Vs Estimated Investment

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<tr>
<td>Waste Heat Recovery from Sinter Cooler</td>
<td>300</td>
<td>80%</td>
</tr>
<tr>
<td>Coke Dry Quenching</td>
<td>350</td>
<td>90%</td>
</tr>
<tr>
<td>Waste heat recovery from exhaust gases of Blast Furnace Hot Stoves</td>
<td>230</td>
<td>70%</td>
</tr>
<tr>
<td>Top Recovery turbine</td>
<td>230</td>
<td>40%</td>
</tr>
<tr>
<td>Waste Heat Recovery from Sinter Cooler</td>
<td>300</td>
<td>80%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,400</strong></td>
<td></td>
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### Example – Waste Heat Recovery from Sinter Bed

- **Waste heat from Sinter bed air Cooler cab** be used for:
  - Power Generation
  - Preheating of combustion air

- **Ex – Reference Plant (Power generation):**
  - Savings Achieved – Rs 3.3 Crores
  - Total Investment – Rs 13.4 Crores
  - Payback Period – 4 Years
Paper Sector

Major Technologies Vs Estimated Investment

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</thead>
<tbody>
<tr>
<td>Installation of Extended delignification system for cooking of wood</td>
<td>185</td>
<td>50 %</td>
</tr>
<tr>
<td>Boiler Upgradation</td>
<td>50</td>
<td>50 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>235</strong></td>
<td></td>
</tr>
</tbody>
</table>

- **Example – Boiler Upgradation**
  - Conversion of AFBC Boiler to Spouted Bed Combustion Boiler
  - Increased Steam Generation
  - Improved Efficiency, availability
  - Ex – Reference Plant
    - Savings Achieved – Rs 3.5 Crores
    - Total Investment – Rs 10 Crores
    - Payback Period – 3 Years
Fertilizer sector

Major Technologies Vs Estimated Investment

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</thead>
<tbody>
<tr>
<td>Vapour Absorption systems</td>
<td>700</td>
<td>50 %</td>
</tr>
<tr>
<td>Two stage regeneration in CO2 removal system</td>
<td>770</td>
<td>50 %</td>
</tr>
<tr>
<td>Retrofitting steam turbines for higher efficiency</td>
<td>925</td>
<td>50 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,400</strong></td>
<td></td>
</tr>
</tbody>
</table>

- **Example—Installation of VAM in CO2 removal system**

  - **Ex – Reference Plant**
    - **Savings Achieved** – Rs 2.5 Crores
    - **Total Investment** – Rs 6 Crores
    - **Payback Period** – 3 Years
Municipalities in India

- Second Largest Municipal System in the world
- No of Urban Local bodies in Indian – 3255 ULBs
- Indian Municipalities Consume 4% of total electricity
- Investment Opportunity – US $ 1.2 billion Crores (considering 100 smart cities with US $ 12 million investment opportunity each)

Example – Chandigarh Municipality

- Area – 114 KM², Population – 1.055 million
- No of Pumping Sets (water and Sewage)
  - Typical Capacities – 5 HP to 550 HP
  - Estimated Annual Savings – US $ 2.5 million
  - Estimated Investment – US $ 2 million Crores
  - Payback – 1 Year
- Public Street Lighting
  - Total Power Consumption – 24.71 MKWH
  - Chandigarh MC to replace 48000 street lights
  - Project Cost – US 9 million
  - 7 year Project Period
  - Annual Savings – US $ 1 million / annum
**Sector snapshot**
- No of MSMEs – 512.99 Lakhs*
- Energy Consumption by MSME sector – 50 million tons of oil equivalent (2012)
- More than 200 high energy intensive clusters in India
- Energy Saving potential of 15%
- Estimated Investment opportunity – US $ 2 billion

* Annual Report of ministry of MSME – (2016-17)

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**Example – Pune Forging Cluster**
- **No of Units** – 70 units
- **Study Done for** – 52 units
- **Typical Projects** – EE compressors, Lighting, Power factor improvement, furnace replacement
  - Energy Savings Achieved – 1849 TOE
  - Savings Achieved – $ 1.5 million
  - Investments Made – $ 1.5 million