Exchange of View Part II

Seminar on Financial Schemes for Renewable Energy Projects
- November 27th, 2012-

Thailand ESCO Pilot since 1999

ESCO Excellence Award 2009-2011

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Excellent Energy International Co., Ltd. (EEI):-

✓ A well-known ESCO (Energy Service Company) in Thailand established since 1999 with the registered capital of 26 MB

✓ An ESCO who offers guaranteed-payback on EE/RE/AE* projects for clients in various Industries and Commercial buildings

*Energy Efficiency/ Renewable Energy/ Alternative Energy

The first one, and only ESCO in Thailand who successfully implemented “Thailand ESCO Pilot Project” with excellent base of support from the Thai Government & the World Bank.

✓ The only ESCO in Thailand whom was invited to contribute a regional perspective as a Co-writer in two books of World- God Mother of ESCO, Dr. Shirley Hansen!!! Namely “ESCOs Around The World: Lessons Learned in 49 Countries”(published in 2009) and “World ESCO Outlook” (just released and available now!!!)

✓ An ESCO with Over 6,000 MB of on-going projects distributed over Cogeneration system, Renewable Energy, Energy Management Information System (EMIS), Heat Recovery projects, etc

Awarded 3 consecutive years of “ESCO Excellence Award 2009 - 2011”, by The Federation of Thai Industries, supported by the Ministry of Energy, to the leading ESCO of Thailand.

Some of EEI Clients

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EEI’s Service-Solution

EEI Services

Investment
Potential Study, Feasibility Study

Engineering Design, Conceptual Design

Bidding and Procurement Management

ESCO Performance Guaranteed Service

Investment & Financial Arrangement

Project Management Consultant (PMC)

EEI Solutions
Energy Conservation Measures: ECMs

ECMs for Industrial Facility

Cogeneration System

- Coal
- Biomass
- Natural Gas

Power Generation – Renewable Energy

- Solar Power Plant
- Biomass Power
- Plant Simple Cycle
- Waste to Energy
- Gasification

EEI Solutions
Energy Conservation Measures: ECMs

ECMs for Commercial Building

- Steam Turbine
- Gas Turbine
- Gas Engine
- Absorption Chiller
- Waste Heat Recovery / ORC
- EMIS (Energy Management Information System)
- Heat Pump
- Lighting
- Ozone for Laundry
- Refrigeration & HVAC

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Business Case Example: *Large scale investment*

Plan Ecoenergy Co., Ltd. (PEC)

- **Cogeneration Power Plant**
  - 4.5 MW, 3.4 TPH, Gasification (GF)
  - (Fuel: Biomass)

Project Investment Cost = 330 MB
Energy Cost Savings = 71 MB/Year
Payback Period = 4.6 Years
IRR 15 Years = 18.85%
NPV (15 Year DR@4%) = 184 MB
Start Savings = Dec 2012

Plan toys’ project will be the first successful large scale commercial project. This needs the real expert who can develop, implement, and guarantee the technical thus financial feasibility of gasification project. EEI-with our 12 year experience as leading ESCO in Thailand with expertise in Biomass Cogeneration Power Plant using gasification technology -then has been engaged under ESCO-Performance Guaranteed Service, covering the Development phase, Implementation phase through Operation and Maintenance phase which served PEC in those concerns.
### Business Case Example: *Large scale investment*

**Boon Chareon Green Energy (BGC)**

- **Utilities System in Rice Mill (Dryer & Boiler)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Investment Cost</td>
<td>380 MB</td>
</tr>
<tr>
<td>Energy Cost Savings</td>
<td>65 MB/Year</td>
</tr>
<tr>
<td>Payback Period</td>
<td>6 Years</td>
</tr>
<tr>
<td>IRR 15 Years</td>
<td>12.9%</td>
</tr>
<tr>
<td>NPV (15 Year DR@7%)</td>
<td>128 MB</td>
</tr>
<tr>
<td>Start Savings</td>
<td>May 2013</td>
</tr>
</tbody>
</table>

**Cogeneration Power Plant**

- 5.3 MW, 3.4 TPH Gasification (GF)
- (Fuel: Biomass)

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**Boon Chareon Panit Limited Partnership** is a big rice mill entrepreneur in Suphanburi province. He realizes the advantage of biomaterial, which is left from milling and agriculture in the neighborhood. Therefore, Cogeneration Power Plant, Gasification(GF) which can produce electricity 5.3 MW., is an interesting and worthwhile investment.

Before signing Energy Performance Contract (EPC) in Guaranteed Saving Option, EEI had written the Investment Grade Audit Report to ensure the project’s possibilities about technique, finance and government rules and regulations.
Business Case Example: *Large scale investment*

Thanyarungroengchai Rice Mill (Thailand) Co., Ltd. (TRCCE)

- **Cogeneration Power Plant**
  - 7.8 MW, 45 TPH, High Pressure Boiler & Steam Turbine Generator (HP-STG) (Fuel: Biomass)

- Project Investment Cost = 573 MB
- Energy Cost Savings = 126 MB/Year
- Payback Period = 4.5 Years
- IRR 15 Years = 23%
- NPV (0% Discount Rate) = 1,586 MB
- Start Savings = June 2011

TRCCE has developed the Biomass Cogeneration Power Plant with Rice Husk which is the TRCCE by-product. EEI has been engaged into the ESCO Performance Guaranteed Contract since 2009. The project has started to save in June 2011. EEI provide the complete solution of project management, bidding & procurement, construction and installation supervision, commissioning supervision until the measurement and verification. The plant contributes the gross electrical power generation of 7.8 MW together with the steam 45 ton per hour.
### Business Case Example:

**Large scale investment – Big Saving**

โครงการผลิตไฟฟ้าและไอ้น้ำ โดยใช้ถังซิลิคอนชาร์ตของกลุ่ม CPF จำนวน 5 โครงการที่ดำเนินการแล้ว

**Bangkok Produce Merchandising Public Co., Ltd. (BKP)**

<table>
<thead>
<tr>
<th>Energy Conservation Measure (ECM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cogeneration</strong></td>
</tr>
<tr>
<td>Gas Turbine Generation (GTG)</td>
</tr>
<tr>
<td>4.5 MW, 12 TPH</td>
</tr>
<tr>
<td>(Fuel: Natural Gas)</td>
</tr>
<tr>
<td><strong>Motor Optimization</strong></td>
</tr>
<tr>
<td><strong>Lighting Control</strong></td>
</tr>
</tbody>
</table>

| Project Investment Cost = 188.4 MB |
| Energy Cost Savings = 47.0 MB/Year |
| Payback Period = 4.5 Years         |
| IRR = 20.5%                        |
| NPV (DR @ 0%) = 418.6 MB          |

Start Savings: November 2002

**4 New Cogeneration Power Plants after Success of BKP Pilot Project**

<table>
<thead>
<tr>
<th>Project Name &amp; Location</th>
<th>Cogeneration Technology (Gas Engine Generator)</th>
<th>Total Investment Cost (MB)</th>
<th>Estimated Cost Savings (MB)</th>
<th>Project IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CPF-Min2 (BKK)</td>
<td>2x2 MWe</td>
<td>132</td>
<td>32</td>
<td>24%</td>
</tr>
<tr>
<td>2. CPF-NJ (BKK)</td>
<td>2x1.5 MWe</td>
<td>125</td>
<td>28</td>
<td>22%</td>
</tr>
<tr>
<td>3. CPF-BKP2 (Saraburi)</td>
<td>2x2 MWe</td>
<td>130</td>
<td>37</td>
<td>28%</td>
</tr>
<tr>
<td>4. CPF-MEIJI (Saraburi)</td>
<td>1x2 MWe</td>
<td>88</td>
<td>20</td>
<td>23%</td>
</tr>
</tbody>
</table>

หมายเหตุ: จะเริ่มมีก้าวใจจากโครงการผลิตไฟฟ้าและไอ้น้ำประมาณไตรมาสที่ 2 ปี 2554

ผลประหยัดตลอดระยะเวลาดำเนินโครงการจนถึงปัจจุบัน มูลค่ามากกว่า 280 ล้านบาท
Business Case Example: *Large scale investment – Big Saving*

**Thai Oil Public Company Limited (SET: TOP)**

- **Heat Recovery**
  - Steam Generator (HRSG) From Gas Turbine Flue gas producing 40 Ton steam/hour

- **Project Investment Cost** = 175 MB
- **Energy Cost Savings** = 103 MB/Year
- **Payback Period** = 1.92 Years
- **IRR 10 Years** = 53.48%
- **NPV (10 Year DR @ 2.7%)** = 690 MB
- **Start Savings** = December 2008
- **End of Guaranteed Period** = January 2011

EEI not only develops the Energy Efficiency Project, but also looks after the available support from Government or any related source to the Client. The challenge we overcome for customer is how to install the Heat Recovery Steam Generation (HRSG) system by not affecting the existing utility system stability within the limited time frame of DSM bidding proposal submission to EPPO for the awarded DSM Grant.

Located: Chonburi, Thailand

**Through our project, Thaioil received 20 MB grant (out of 27 MB grant to all 7 projects)**
Business Case Example: *Medium scale investment*

**Pataya Food Industries Co., Ltd. (PFI)**

- **Low Pressure Boiler 15 TPH** *(Fuel: Solid Fuel)*
  
  - Project Investment Cost = 70 MB
  - Energy Cost Savings = 23 MB/Year
  - Payback Period = 3 Years
  - IRR 15 Years = 34.74%
  - NPV @ 8% Discount Rate = 168 MB
  - Start Savings = Feb 2012

As future crude oil price still go up and the policy of the executive of PFI foresee the importance of cost reduction for competitive advantages, EEI has approved by PFI to study and analyze reduction cost of energy trend. The Low Pressure Boiler (LPB) project is the first Energy Conservation Measure (ECM) selected by PFI to proceed implementation. LPB use such solid fuel to replace existing Heavy Fuel Oil (HFO) boiler to reduce the expenses of energy because of cheaper and higher heating value of solid fuel comparing to HFO.
Business Case Example: *Large scale investment*

**Sura Bangyikhan Co., Ltd. (SBP)**

- Evaporation System for steam generation
  - 12.2 TPH

Project Investment Cost = 294 MB
Energy Cost Savings = 122 MB/Year
Payback Period = 2.91 Years
IRR 15 Years = 34.48%
NPV @ 6% Discount Rate = 836 MB
Start Savings = Aug 2012

EEI has gained trust from SBP to study energy efficiency improvement project. The investment grade audit report (IGA) indicated that SBP has high potential to implement the Evaporation System which use the waste of alcohol production process as fuel.
Structure of ESCO Guaranteed Savings Model

Case: Set Up New Company

- **Client**
  - Land Leasing Agreement (if any)
    - New Energy Company to rent land from Client

- **New Energy Company**
  - **Loan**
    - Power Purchase Agreement (with PEA/MEA)
  - **Equity**
    - Shareholder Agreement
    - ESCO & VSPP: Import & Income Tax Exempt
    - Energy Performance Contract (Guaranteed Savings)

- **Bank**
  - Loan Agreement

- **PEA/MEA**
  - Energy Performance Contract (Shared Savings)

- **ESCO Fund**
  - B%

- **Investor (Optional)**
  - C%

**Engineering (IGA) and Implementation Phase**
- Project Development

**Reimbursement Phase**
- Guarantee Savings to cover full investment + interest
- Compensate Deficit Savings
- Get shared saving on Performance

**Structure**
- Client A%
- ESCO Fund B%
- Investor C% (if any)
- Capital Calls
- Board, Right, Vote
- Dividend payout after debt services
Structure of ESCO Guaranteed Savings Model
Case: Plan Ecoenergy Co., Ltd. (PEC)

**Bank**
- Loan Agreement

**PEA/MEA**
- Power Purchase Agreement (VSPP Optional)
- Energy Performance Contract (Shared Savings)
- Land Leasing Agreement (if any)

**Saw Mill**
- Power Purchase Agreement & Thermal Sales Agreement
  - Electricity & Thermal Tariff
  - Term & Minimum take
- Fuel Sales Agreement
  - Fuel Tariff
  - Term & Minimum give

**Plan E-Co Energy Co., Ltd.**
- Loan 66%
- Equity 34%

**ESCO**
- ESCO Fund
  - A%
  - B%
  - C%
- MFC (if any)

**EEI**
- Energy Performance Contract (Guaranteed Saving)

**Shareholder Agreement**
- Seat percentage
- Board, Right, Vote
- Dividend payout after debt services

**Engineering (IGA) and Implementation Phase**
- Project Development

**Reimbursement Phase**
- Guarantee Savings to cover full investment + interest
- Compensate Deficit Savings
- Get shared saving on Performance
Structure of ESCO Guaranteed Savings Model
Case: Boon Chareon Green Energy Co., Ltd. (BGC)
Privileges for Energy Efficiency Program:
By Government Agencies

2. Co-Investment via ESCO Fund by DEDE
3. Power Purchase Subsidy for VSPP by ENCON Fund under DEDE
4. Natural Gas – Cogeneration Rate, which is cheaper than Industrial Rate (if any)
5. New Innovative Project by NIA
6. CDM (Clean Development Mechanism: a.k.a. Carbon Credit) by TGO/Others
## Power Purchase Subsidy for VSPP by ENCON Fund under DEDE

<table>
<thead>
<tr>
<th>Renewable Energy Type</th>
<th>VSPP Adder Tariff (Baht/kWh)</th>
<th>Total Electricity Price (Baht/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass/Biogas</td>
<td>0.30</td>
<td>3.40</td>
</tr>
<tr>
<td>Hydro</td>
<td>0.40</td>
<td>3.50</td>
</tr>
<tr>
<td>Small-Hydro</td>
<td>0.80</td>
<td>3.90</td>
</tr>
<tr>
<td>Wastes</td>
<td>2.50</td>
<td>5.60</td>
</tr>
<tr>
<td>Wind</td>
<td>2.50</td>
<td>5.60</td>
</tr>
<tr>
<td>Solar*</td>
<td>6.50</td>
<td>9.60</td>
</tr>
</tbody>
</table>

### Remarks:

- *This privilege is waiting for Energy R regulatory Commissions (ERC) Announcement*
- *Electricity Price for VSPP is about 3.1 Baht/kWh (Base Price= 2.7067 Baht/kWh, FT Tariff= 0.3993 Baht/kWh )*
- *Data as of October 2012*
Public Participation for VSPP Project
Thank You

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