



## **Perspective on Clean Energy Financing**

# **ICICI Bank's Energy Initiatives**

**June 27, 2007**

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# ICICI Bank's Energy Initiatives

## Support to innovative demonstration projects

- **Biomass Gasification**
- **Biomass Cogeneration**
- **Demand Side Management (DSM) for utilities**
- **Waste Heat Recovery**
- **Energy Service Companies (ESCO) for municipalities**



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# **Biomass Gasification Project**

## **Agni Energy Services Pvt. Ltd. (AESL)**

- **Undertake an energy efficiency project on a shared savings basis for Andhra Pradesh Foods (APF)**
- **Performed an energy audit & identified energy cost reduction measures implemented**
- **Energy Service Agreement (ESA) with APF**
- **Measures implemented involve:**
  - **improving the efficiency of the existing re-heating furnace by adding a heat recovery system**
  - **installing rice husk gasifiers to replace 80% of existing furnace oil to the re-heating furnace**



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# Project Highlights (Cont.)

## Profile of Andhra Pradesh Foods (APF)

- **Energy consumption of APF**
  - **Furnace oil : 3,240 ltr / day**
  - **hours of operation : 24 hours / day**
  - **Specific consumption : 24.6 ltr / ton of wheat**



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## Project Highlights (Cont.)

- **Energy audit findings of APF**
  - **Poor insulation of furnace leading to losses**
  - **The temperature of flue gases coming from stack is very high at 400° C**
- **AESL recommendations**
  - **insulate the insides of the re-heating furnace with “cerawool” to prevent heat loss**
  - **install a heat recovery system**
  - **replace furnace oil in the re-heating furnace with rice husk fired gasifiers**



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# Energy Service Agreement

- **Shared savings basis**
- **Period of agreement – 5 years**
- **Sharing ratio 70:30 of savings AESL & APF**
- **Independent M&V agency**
- **Ownership – with AESL till period of agreement**



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## Salient Features of Gasifier (cont.)

- Schematic of the gasifier developed by AESL
- Environment impact
  - Biomass fuels have negligible sulphur
  - With better mixing of air & gas in gas burners, the CO is expected to be within acceptable limits.
  - CO<sub>2</sub> emissions to the atmosphere are reduced due to reduced use of fossil fuels
  - Mitigation of over 3,000 tons of CO<sub>2</sub> per year



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# Biomass Cogeneration Project

**Parakh Foods Limited (now part of Cargill Foods)**

- **Sponsors : Prakash Parakh**
- **Edible oil refinery at Kurkumbh, near Pune**
- **Steam required for processes**
- **Co-generation (top end) using biomass (bagasse)**
- **Generation of power 550 KW**
- **Loan amount: Rs 20 million**
- **Annual savings: Rs 16 million**
- **Reduction of CO<sub>2</sub> emission: 4,350 tpa**



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# Utility DSM Project

## Noida Power Company Limited

- **Private distribution company for Greater Noida**
- **Commercial, industrial, residential and agricultural consumers**
- **Replacement of bare cables with insulated cables and LT lines with HT lines. Increase in HT/LT ratio from 0.85 to 2.46**
- **Distribution network improvements after load research – annual savings of 1.7 mn units against estimated 0.6 mn units**
- **Metering of unmetered consumers**
- **DSM – replacement of old pumps by energy efficient pumps (55% energy savings) besides 22% reduction in water consumption**



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# Project Impact

## Noida Power Company Limited

- Reduction in transmission and distribution losses.
- Reduction in GHG emissions
- Metering of unmetered households, agricultural DSM expected to boost revenue.
- Growth in industrial and residential demand expected to continue with industrial growth
- No competition for the company as it is the sole distributor of power in the area
- The project will be the first project of this kind in the country to undertake distribution reforms, metering and agricultural DSM in the same module.



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# **Integrated Energy Efficiency Project**

## **Sterlite Industries (India) Limited**

- **Major copper manufacturing unit at Tuticorin**
- **Sub projects**
  - **Waste heat recovery**
  - **Captive power generation**
  - **Water Recycling/conservation**



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# Waste Heat Recovery Project

## Sterlite Industries (India) Limited

- Major unit manufacturing copper at Tuticorin
- Copper smelting exothermic process
- Hot flue gases with high heat content being wasted
- Waste heat recovery system to be installed
- Power generation 10.4 MW
- Payback <1 year
- Reduction of CO<sub>2</sub> emission: 47,500 tpa



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# Waste Heat Recovery Project

## Sterlite Industries (India) Limited

- **Current Power Requirement : 24 MW**
- **Source: 4 DG sets of 6.1 MW each**
  
- **Additional power requirement : 33 MW**
  
- **Source :**
  - **3 DG sets of 7.5 MW each = 22.5 MW**
  - **Waste heat recovery = 10.5 MW**



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# Waste Heat Recovery Project

## Sterlite Industries (India) Limited

- **WHR at Copper smelter: annual savings**
  - **Total generation : 82.8 million units**
  - **Cost of generation : Rs 1.10 per unit**
  - **Cost of Grid Power : Rs 4.30 per unit**
  
  - **Annual Savings : Rs 265 million**



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# Captive Power Generation Project

## Sterlite Industries (India) Limited

- **Captive Power Generation: annual savings**
  - **Total generation : 171.8 million units**
  - **Cost of generation : Rs 2.59 per unit**
  - **Cost of Grid Power : Rs 5.05 per unit**
  - **Annual Savings : Rs 423 million**



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# Water Recycling/Conservation Project

**Sterlite Industries (India) Ltd**

**Water Recycling/conservation: annual savings**

- **Current Power requirement** : **794 KW**
- **Power saving with modifications** : **420 KW**
- **Annual saving in power cost** : **Rs 14.2 Mn**
- **Current water loss** : **1419 m<sup>3</sup>**
- **Cost of water** : **Rs 17 / m<sup>3</sup>**
- **Annual saving in water cost** : **Rs 8.5 Mn**
  
- **Total savings in water recycling** : **Rs 22.7 Mn**



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# Integrated Energy Efficiency Project

## Sterlite Industries (India) Ltd

- **Total Annual Savings under the Integrated EE Project**
  - **Waste Heat Recovery** : Rs 265 million
  - **Captive Power Generation** : Rs 423 million
  - **Water Conservation** : Rs 22.7 million
  - **LP Steam (savings)** : Rs 94.4 million
  
  - **Total annual savings** : Rs 805.1 million
  
  - **Payback** : < 6 months



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# Municipal ESCO Project

## Sahastratronic Controls Pvt. Ltd. (SCPL)

- Energy saving potential assessed jointly with Nasik Municipal Corporation (NMC)
- Energy Services Agreement for implementation of the project entered into between SCPL and NMC
- Estimated annual savings of Rs 6.0 million on a capital investment of Rs 9.0 million
- Current power bills - Rs 27.5 million per annum for area allotted to SCPL
- Expected annual energy savings - Rs 6.0 million
- Savings to be shared for five years
- Project implemented in March, 2004
- Payback period ~1.5 years



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# Municipal ESCO Project

## Salient Features of Street Light Controller (SLC)

- Microprocessor based unit with a real time clock
- Three modes of operation (Start , Run & Dim)
- Voltage correction in Start mode as per lamp manufacturer specifications to enhance life of bulb
- Microprocessor changes mode to Run mode where voltage is changed to acceptable lux level
- At programmed time DIM mode takes over automatically to reduce illumination at an agreed value
- On/Off and sunrise/sunset timings for 52 weeks can be programmed

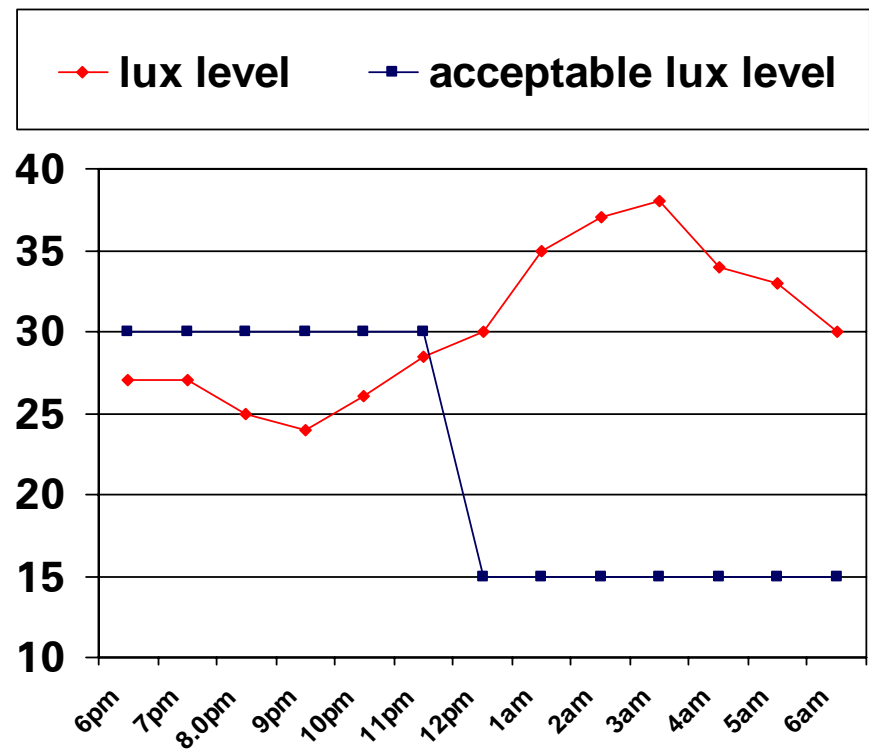


# Municipal ESCO Project

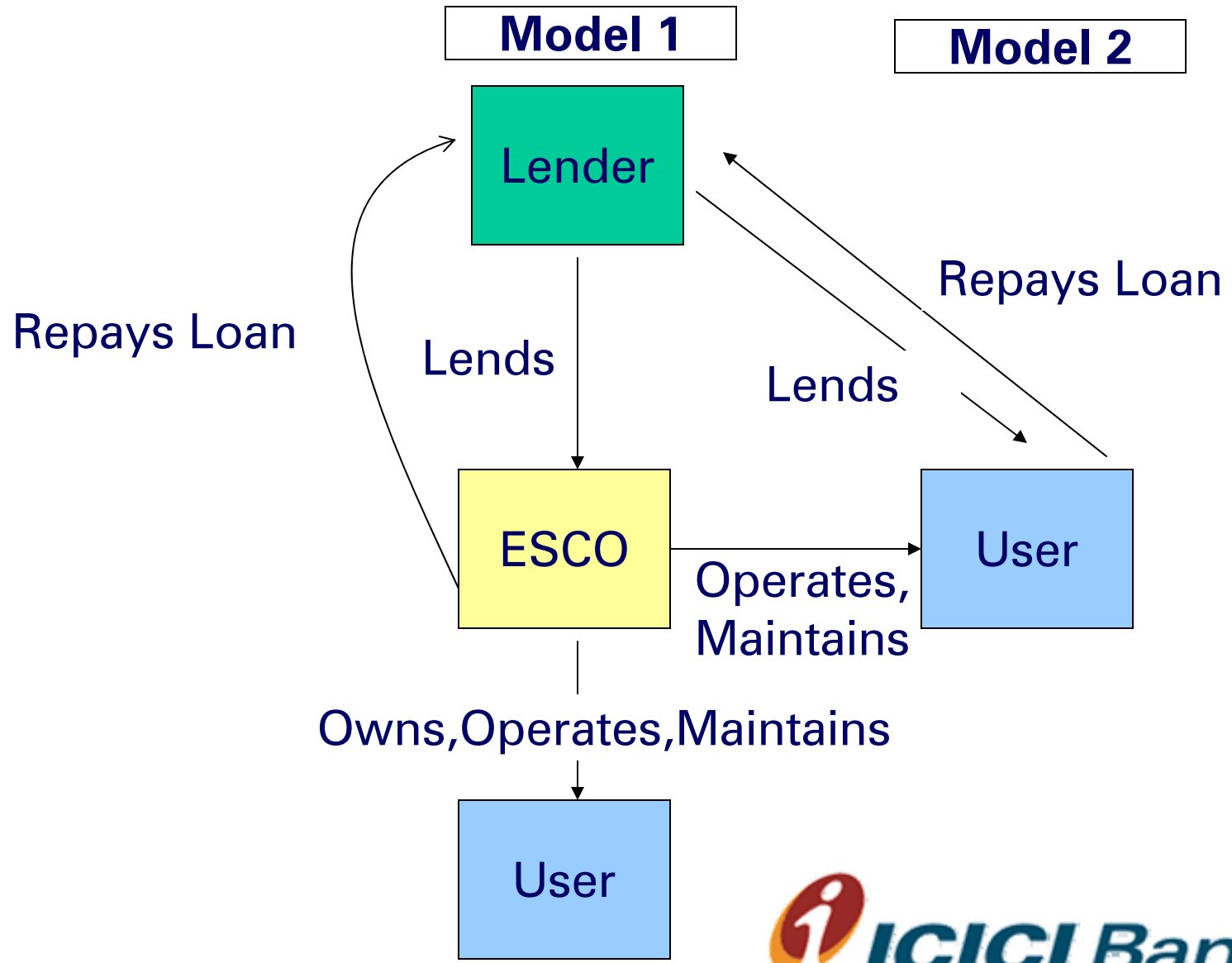
Significant EE potential  
using

SLC:

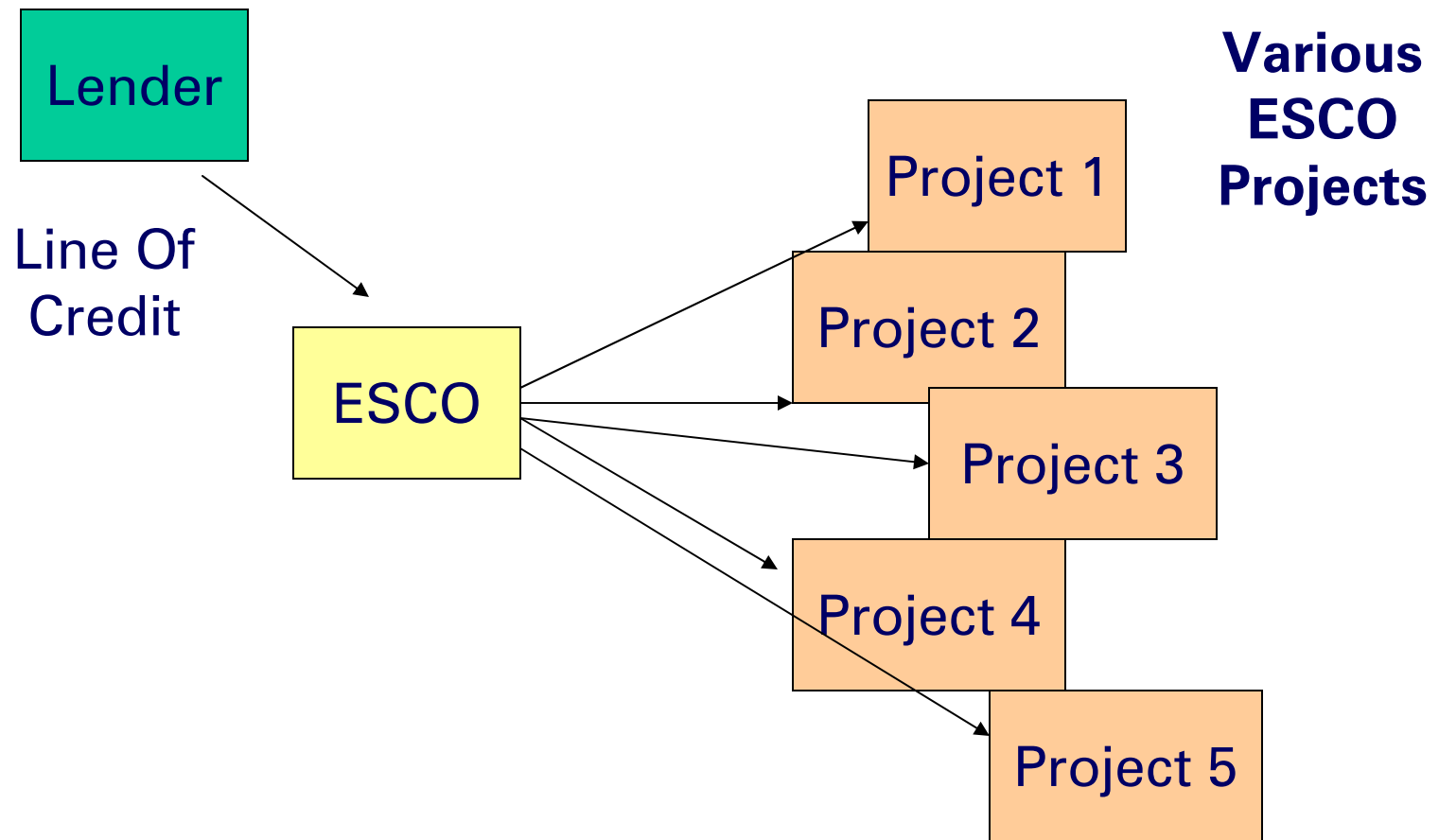
- The actual lux level varies due to variation in the voltage levels
- The red graph shows the approx lux level, whereas green graph shows the acceptable lux level
- Light level available during peak traffic hours is less than during low traffic hours.
- Large potential to save energy between 12 pm to 6 am



# ESCO Business Models



# ESCO: Line of Credit

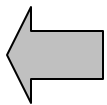
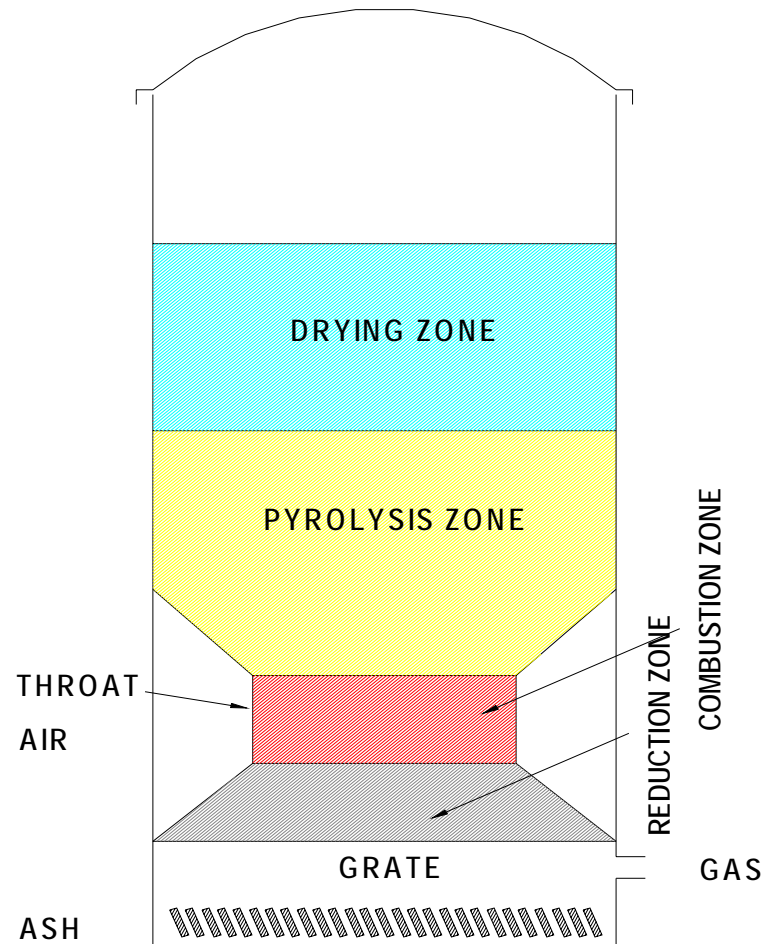




**Thank You**



# Biomass gasifier



**Agni Energy Services Pvt Ltd**

