



Energy & Environment Initiatives

Technology Finance Group

- Supports demonstration projects & activities creating awareness
- The demonstration projects are:
 - innovative
 - bridge technology gaps
 - first of its kind in India
 - replicable
 - in line with the strategic objectives of the funding agency



Energy & Environment initiatives with industry



Energy Initiatives

Objectives

- Technology development in the energy sector
- Establish consortium approach for R&D projects
- Assist energy efficiency projects, promote energy service companies (ESCO's) and utility based Demand Side Management (DSM) programmes
- Reduce green house gas (GHG) emissions
- Alternate fuels for vehicles
- Capacity building of institutions, NGOs



Energy Initiatives

Approach

- Forming consortium of users, manufacturers and R&D institutions
- Assistance to private companies, NGOs, power distribution utilities
- Different financial mechanisms like concessional rupee loans, conditional grants, escrow mechanism, pooled finance

Focus Areas

- Energy conservation/energy efficiency
- Renewable energy
- Energy service companies
- DSM and distribution improvements
- Non-sugar cogeneration



Energy Initiatives

Parakh Foods Limited (now 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 CO₂ emission: 4,350 tpa



Energy Initiatives

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



Energy Initiatives

Noida Power Company Limited – Project Impact

- 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
- The project was the first project of its kind in the country to undertake distribution reforms, metering and agricultural DSM in the same module



Energy Initiatives

Sterlite Industries Limited – waste heat recovery

- 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 CO₂ emission: 47,500 tpa



Energy Initiatives

Sterlite Industries 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



Energy Initiatives

- Sterlite waste heat recovery project
- 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



Energy Initiatives

- Sterlite SAP project
- 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



Energy Initiatives

Sterlite Industries 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 m³
- Cost of water : Rs 17 / m³
- Annual saving in water cost : Rs 8.5 Mn

- Total savings in water recycling : Rs 22.7 Mn



Energy Initiatives

Sterlite Industries Ltd

- Total Annual Savings
 - Waste Heat Recovery : Rs 265 million
 - Captive power Generation : Rs 423 million
 - Water conservation project : Rs 22.7 million
 - LP Steam (savings) : Rs 94.4 million
- Total annual savings : Rs 805.1 million
- Payback : < 6 months



Energy Initiatives

Sahastratronic Contols Pvt. Ltd. (SCPL)

- An energy service company (ESCO) which worked with Nasik Municipal Corporation (NMC) on a shared savings based street lighting ESCO project
- Energy saving potential was assessed jointly with NMC
- Energy Services Agreement for implementation of the project entered into between SCPL and NMC
- Savings were shared for five years
- Earlier energy bill prior to project implementation - Rs 50.0 million per annum for area allotted to SCPL
- Avg achieved annual savings - Rs 17.0 million on a capital investment of Rs 16.6 million
- Project completed in Nov 2005
- Payback period ~1.5 years



Project Objective

- Installation of 486 street light controllers covering about 19000 street lights at various lighting stations to improve street lighting efficiency
- Improvement in the existing electrical distribution network for
 - Reduction in cable losses
 - Power factor optimization



Street Light Controller (SLC)

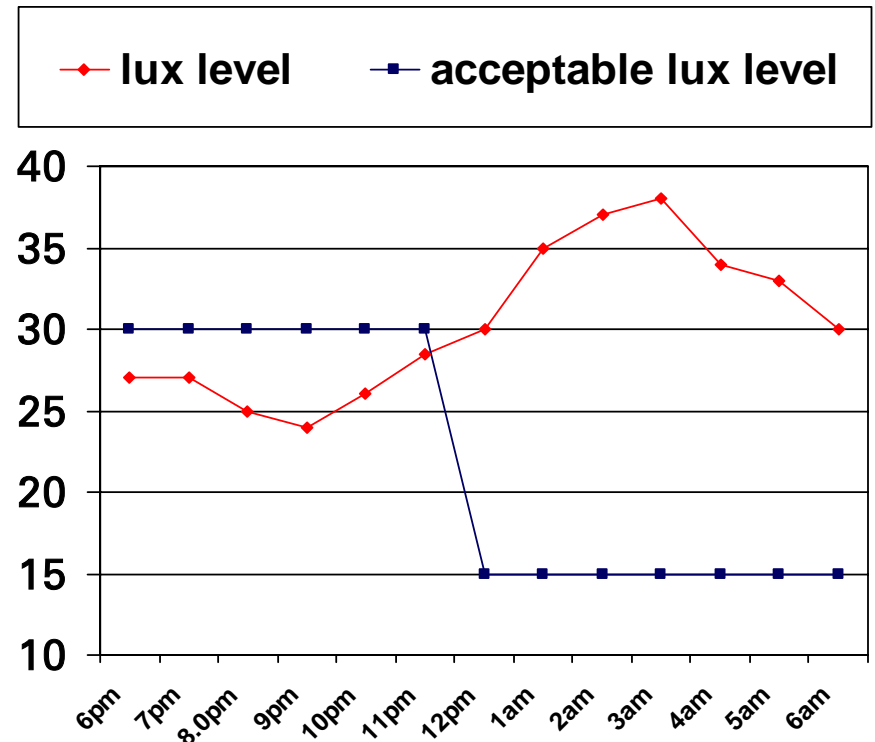
Salient Features of SLC

- 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

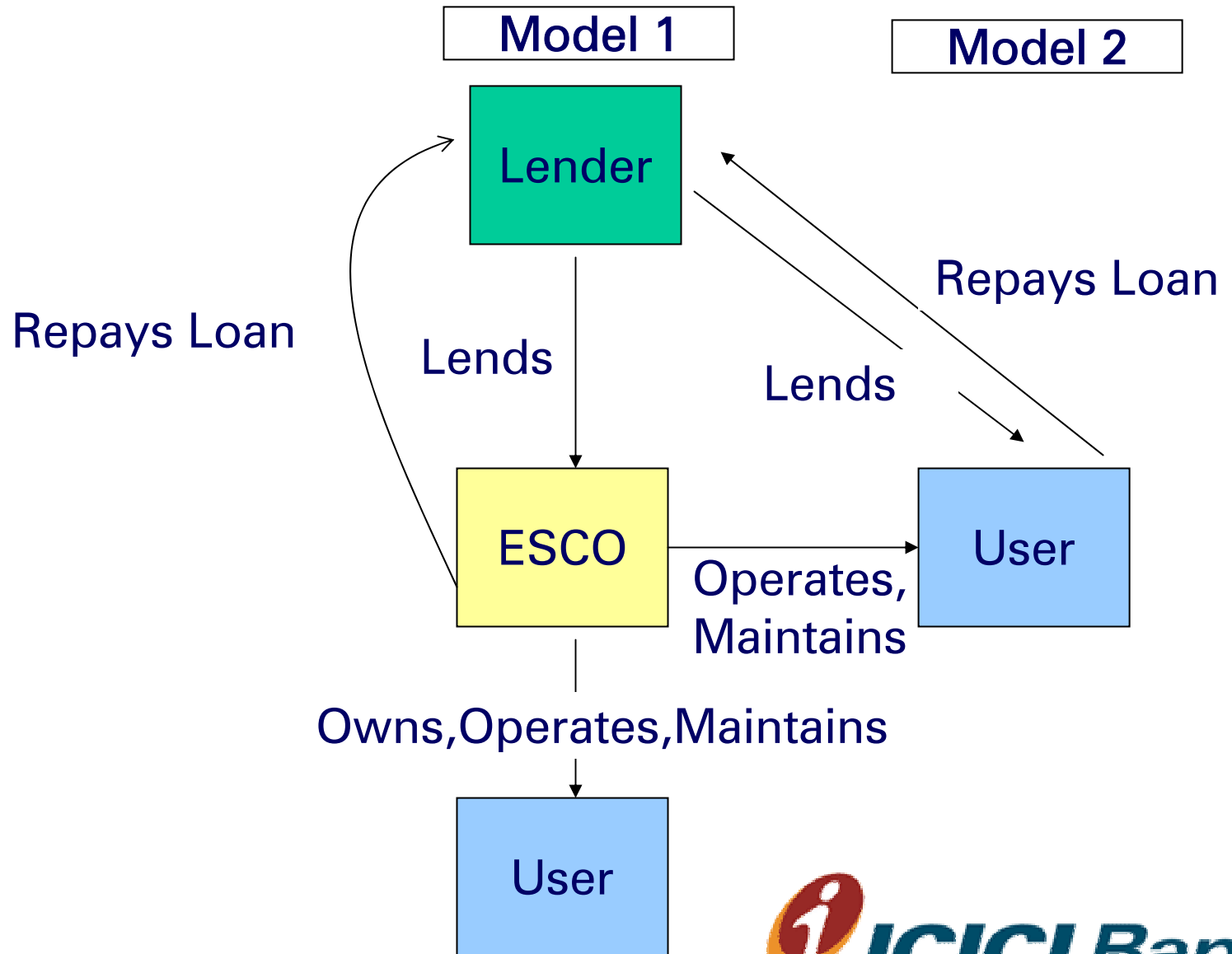


Street Light Controller

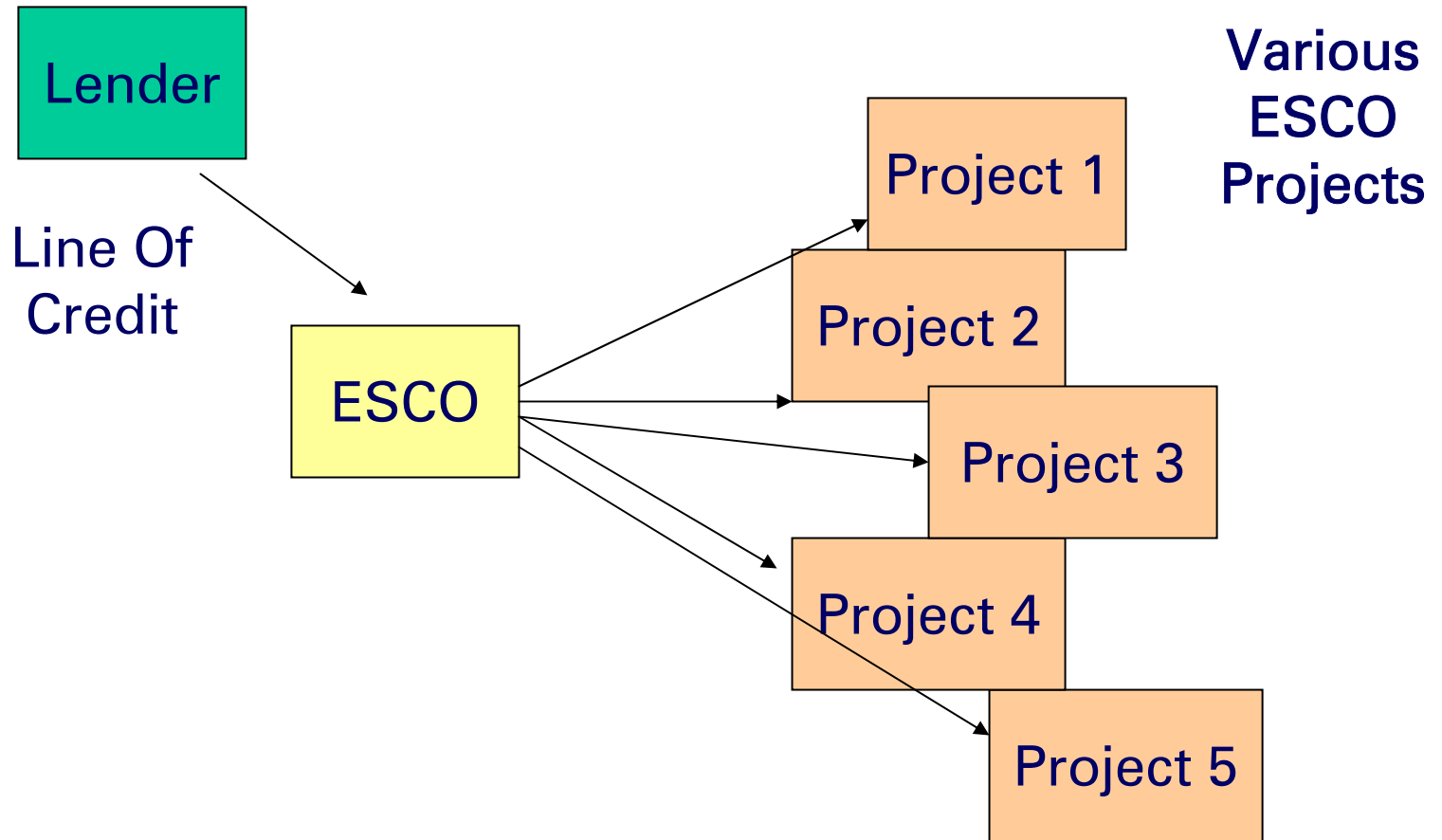
- The actual lux level varies due to variation in the voltage levels
- The red graph shows the approx lux level, whereas green graph shows the acceptable lux level
- Light level available during peak traffic hours is less than during low traffic hours.
- Large potential to save energy between 12 pm to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



ESCO Business Models



ESCO: Line of Credit



Energy Initiatives

Sumaya HMX Systems Ltd

- Development of “Ambiator”, an eco-friendly alternative to an AC
- Works on the indirect evaporative cooling technology by incorporating a wet plate and a cross flow heat exchanger
- Provides 100% filtered cool fresh air and consumes about 35% power compared to an AC making it about 65% more energy efficient compared to an AC
- Does not use chloro fluoro carbons (CFC), as it does not run on compressor-based technology
- The product has also been endorsed by TERI (DCS 001) and the Energy Management Centre (EMC) under Gol
- The company is currently improving on
 - increasing heat exchanger efficiency from 63% to about 80%
 - bringing min offer temperature below 23°C &
 - reducing product size



Environment Initiatives

Indus Smelters Limited

- Sponsor: Lalit Kumar Singhania
- Pilot for 30 tpd steel smelting shop at Raipur
- Innovative process of steel making by utilization of wastes
 - mill fines
 - coal fines
- Cost of production substantially lower



Environment Initiatives

CII-GBC

- LEEDS – platinum rated Green Business Centre at Hyderabad
- Centre for excellence in energy/ environment
- First building outside USA and third in the world to achieve platinum rating
- Support for GBC set up and 2 years operations



Environment Initiatives

Agra Iron Founders' Association

- Three world heritage monuments located at Agra
- Agra dominated by small and medium foundry units
- Foundry units used obsolete technology that damaged the marble of the monument due to emissions (primarily sulphur)
- Agra had highest levels of Suspended Particulate Matter (SPM), Sulphur Dioxide and other pollutants



Environment Initiatives

Agra Iron Founders' Association

- In 1996 Supreme Court directed creation of Taj Trapezium Zone, closure/shifting of all foundry units or to switch over to natural gas based
- Foundry units did not have access to gas based technology
- Technology developed with technical assistance from Cokeless Cupola Ltd., UK



Environment Initiatives

Agra Iron Founders' Association

- An experimental cokeless cupola designed and set up at one unit
- Savings of Rs. 1000/tonne of metal likely in shifting to cokeless operations
- Payback period ~ 1 year
- support for technological and commercial validation for use at 10 member units



Project Name	<u>Reva Electric Car Company</u>
Project Cost	Rs.442 mn
Amount Sanctioned	Rs.90 mn
Sponsors	Mr. Chetan Maini, Amerigon(AEVT)
Project Description	Design and Manufacturing of Electric Vehicle (EV)
Status : <ul style="list-style-type: none"> ● Company exporting EVs to several countries ● Company expanding its installed capacity ● Development of fuel cell vehicles with DRDO 	



Project Name	<u>New Generation Motors Corp.</u>
Project Cost	\$ 3.3mn
Amount Sanctioned	\$ 1.24mn
Sponsors	Dr.Nabih Bedewi
Project Description	Reengineering of electric drive systems & development of NGM drive systems
Status :	
<ul style="list-style-type: none"> ● The project has been delayed ● Bajaj Auto has signed a contract with NGM in December 2005 for commercialization of electric two wheelers ● Reliefs and concessions given recently 	



Major Initiatives/Impact



New Concepts Introduced

Environment

- Clean coal technologies
- Environmental helpline
- ISO 14000
- Environmental information networking
- Green supply chain management

Energy

- ESCO
- DSM



Zero Emission Initiative

- Reva Electric Car Company Limited
 - Manufacture of Electric Vehicle
- New Generation Motors
 - Electric drive system for two and three wheelers
- Twenty First Century Batteries
 - Lithium ion flexible polymer electrolyte rechargeable battery



National Level Initiatives

Energy

- Establishing Bureau of Energy Efficiency (BEE)
- Setting up of Green Business Centre (GBC) with CII
- Energy rating for electrical appliances - CERC
- Innovative structuring of ESCO projects
- Demand side management in utilities
- Greenhouse gas mitigation
- Training programme for bank officials in financing solar energy products



National Level Initiatives

Energy

- **Capacity building of technology institutions**
 - **Central Power Research Institute (CPRI) – Setting up of a laboratory for testing various transformer & power station characteristics at Bangalore**
 - **Electrical Research & Development Association (ERDA) - Setting up of a short circuit laboratory & facilities for testing electrical appliances at Vadodara**
 - **The Energy Research Institute (TERI) - Setting up of an instrument bank with calibration facility & creation of an energy efficiency advisory & training centre**



Environment Initiatives with other stakeholders



Indian Army's Green Governance Programme

- Implementing agency - Indian Army Environment Ecology Cell (IAEEC)
- Comprises of
 - 17 sub-projects at select Indian Army locations in the following areas
 - rainwater harvesting
 - ground water rejuvenation
 - construction of check dams
 - treatment of water bodies
 - energy conservation through earth air tunnel
 - wind energy harvesting at remote military outposts
 - awareness initiative for school children on ecology at select sainik schools, military schools



Indian Army's Green Governance Programme- Impact

- Reduced water run-off and higher water percolation into sub-soil
- Increased water storage through artificially constructed lakes, check dams & bunds
- Increase in ground water table by upto 50 ft
- Assured water supply during peak summer
- Creation of environmental parks
- Reduced dependence on water tankers or municipal water supply for gardening or horticulture
- Better utilization of waste water with suitable treatment
- Improved awareness among school children on issues related to ecology & biodiversity



BNHS Corporate Environmental Stewardship Programme

- Grant assistance to Bombay Natural History Society (BNHS)
- Sensitise various corporate/ financial institutions/ banks and Government agencies involved in project planning of
 - Biodiversity
 - wildlife habitats
 - various environmental laws and conventions
- Institutionalized a “Green Governance Award”
 - 3 conservation categories – flora, fauna & habitat
- Impact: The programme has helped promote biodiversity conservation and recognise efforts of organisations that protect biodiversity



Kaziranga National Park (KNP)

- KNP at Assam is a World Natural Heritage Site
- Well known for housing the great Indian one-horned rhinoceros
- Is frequently threatened by flash floods and wildlife poachers
- Grant assistance given to KNP to procure some rain boots & other vital kits for forest guards as part of environment protection monitoring initiative
- Impact: The project is expected to prevent poaching and promote better supervision by forest staff



Indian Vulture Conservation Project

- Assisted Institute for Financial Management and Research (IFMR) - Centre for Development Finance (CDF)
- Implementing agency - The Peregrine Fund, US (TPF)
- Objective: To establish whether Govt of India's directive on the ban of *diclofenac* (veterinary drug) would result in an increase in Gyps vulture population in areas where it declined
- Dr Munir Virani from TPF spearheading this five year project (2006-2011)
- Impact: Project to contribute to a research report that will help the government formulate a policy with regards to protecting the Gyps vulture population



IFMR - Centre for Development Finance (CDF)

- Corpus assistance to CDF-IFMR to help meet its objectives in its focus areas by undertaking initiatives in the areas of energy and environment
- Focus areas include environmentally sustainable project financing, water & sanitation, energy technology & services, rural and urban infrastructure
- Initiatives
 - Facilitating development of urban & rural infrastructure
 - Conserve water and energy resources
 - Promote energy efficiency
 - Support clean technologies
 - Promote biodiversity awareness & projects
 - Draft environmental policies for Indian financial institutions and the government



IFMR - Centre for Development Finance (CDF)

- Assistance to CDF-IFMR to help meet the cost of its Environmentally Sustainable Project Finance (ESPF) programme over 3-years
- ESPF programme focus areas
 - Poverty and environmental impact
 - India's low carbon growth
 - Environmental sustainability beyond carbon
 - Setting standards for markets
- Expected outcomes
 - Increase number of small-scale CDM projects in India
 - Report on air quality monitoring regime in India
 - Report on lenders compliance with environmental regulations



Robin Age

- A weekly children's newspaper exclusively written for children of 5-14 years of age and published by M/s Deep Prakash
- Encourages children back into the reading habit through content that is informative, interactive, engaging and fun
- Carries news & information
 - current affairs, science, technology, sports, careers, culture
 - Special focus on energy and environment
 - activities, puzzles and projects



Robin Age

- Grant assistance given to RobinAge
 - envisages carrying an environment page in every alternate issue of RobinAge
 - promote sensitivity and awareness about environmental issues amongst school children
 - organise in-school workshops to introduce children to basic concepts of energy & environment
 - publish a special issue on the occasion of 'Environment Day' (June 5) in 2009
 - organise child-to-child outreach programmes



Going Forward

- Strengthen linkages with Govt and multilateral agencies
- Support projects in the areas of
 - Clean technologies / fuels
 - Electric /Hybrid vehicles
 - Alternate sources of energy
 - Energy efficiency initiatives/ ESCO's/ DSM
 - Energy efficient products/capacity creation
 - Biodiversity protection and minimization of waste
 - Environment Sustainability initiatives



Thank you

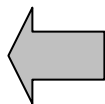




India's
First
Electric Car.



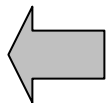
REVA
The electriCity Car



 **ICICI Bank**



New Generation Motors Corporation



New Generation Motors Corp.



Green Business Centre

