

Innovative Finance and Investment for Clean Technologies

A Presentation by:

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The Beginning ...

Incorporated on March 11, 1987 as a Public Limited Government Company.

Mission

Be a pioneering, participant friendly and competitive institution for financing and promoting self-sustaining investment in energy generation from renewable sources, energy efficiency and environment technologies for sustainable development.

Sectors being financed

- ⊗ Solar Energy
- ⊗ Wind Energy
- ⊗ Hydro Energy
- ⊗ Bio Energy
- ⊗ Energy Efficiency and Conservation
- ⊗ New & Emerging Technologies

Highlights Of Cumulative Lending Operations

- **Number of Projects Approved** : **1816 Projects**
- **IREDA's Loan Commitment** : **Rs.8055 Crore**
- **Loan Disbursements** : **Rs.4429 Crore**
- **Sanctioned Capacity** : **2927 MW**
- **Conventional Fuel Replacement** : **12.91 Lakh MTCR / Year**

International Assistance

- Government of Netherlands - 18 Million Dutch Guilders
- Asian Development Bank - 100 Million US \$
- The World Bank I LOC - 145 Million US \$
- DANIDA - 15 Million US \$
- KfW, Germany - 61.35 Million Euro
- World Bank II Ind LOC - 135 Million US \$

Indian Renewable Energy Scenario

Sector	Potential	Achievement (As on 31.03.2007)
Wind	45000 MW	7094 MW
Small Hydro	15000 MW	1975 MW
Biomass Power/	16000 MW	525 MW
Bagasse Cogeneration	3500 MW	615 MW
Waste to Energy	2700 MW	44 MW
Solar PV	20 MW/sq.km	3 MW

Renewables : Total installed capacity

10256 MW

Research & Development

- **Indigenous Technology developed for :**
 - Biogas Plants, Improved Woodstoves, Biomass Gasifiers
 - Silicon Material, Wafers, Solar Cells, Modules And PV Systems
 - Solar Thermal Flat plate Collectors & Systems, Solar Cookers
 - Fuel Cells, Battery powered vehicles
- **Advanced R&d Centres and Institutes set up**
 - Alternate Hydro Energy Centre, Solar Energy Centre, Centre for Wind Energy Technology, NIRE

Resource Assessment

- Renewable Energy Technologies are resource and site specific. Therefore, Resource Assessment is essential for development of programme.
- **Resource Assessment ongoing for :**
 - Wind Energy
 - Small Hydro power
 - Biomass
 - Solar Radiation

WIND ENERGY

Wind Manufacturing Industry

- **Assembly and local production up from 55 kW to 2.00 MW machines**
- **Tie-ups for joint ventures/licensed production with leading manufacturers**
- **Annual production capacity: 750 MW (can go up to 1000 MW)**
- **Emphasis on progressive indigenization**
- **Local production of rotor blades**

Wind Energy Technology Innovations & Prospects

- **Exploitation of low wind for Off-grid application**
- **Commercialization of Solar –Wind Hybrid Systems**
- **Installation of High capacity wind turbines(>2 MW)**
- **Development of off-shore wind projects installation**
- **Identification & development additional wind sites**
- **Re-assessment of existing potential of 45000 MW**
- **Replacement & Retrofitting of existing small capacity wind turbines especially in the state of Tamil Nadu.**
- **R& D efforts for improvement of efficiency**
- **Improvement in power electronics.**
- **Higher Hub height for higher generation**
- **Development of Concrete towers towards cost reduction**

BIOMASS ENERGY

Biomass Power – Technology Interventions

- **Need to develop engines running on 100% producer gas.**
- **Simple & cost effective gas cleaning equipments.**
- **Need to develop circulating fluidized bed boilers**
- **producer gas based micro turbines**
- **Efficient fuel handling systems**
- **Optimum methods of fuel preparation and storage**
- **Alternate applications for the rural agro industry such as biomass gas based vapour absorption chillers**
- **Design and development of MW-scale fluidized bed biomass gasifier-Integrated Gasification Combined Cycle (IGCC)**

Biomass Power – Technology Interventions

- **Concept of a Bio-refinery-** Development of poly-generation facilities for the production of liquid fuels, chemicals and hydrogen in addition to power generation through IGCC route.

Bio- Fuels:

- Production of bio-diesel from all possible feed-stocks
- Production of ethanol from ligno-cellulosic materials such as rice straw and agricultural residues
- Production of ethanol from sweet sorghum / sugar beet etc

SMALL HYDRO ENERGY

SHP Technology Interventions

- ❖ **Development of low speed generator (direct drive low speed generators)**
- ❖ **Adoption of high pole permanent magnet excitation generators**
- ❖ **Development of submersible turbo-generators**
- ❖ **Development of high efficiency turbines in KW range**

SOLAR ENERGY

Solar Resource Availability in India

- Daily radiation 4 - 7 kWh per m²
- 250 - 300 sunny days in a year
- Solar energy incident on 1% of our land area at 2% net conversion efficiency can produce 6,00,000 MW of power
- Typically a 20 - 30 MW capacity solar power plant can be set up on one sq. km. of land area

Indian PV Industry

SOLAR CELL MANUFACTURE

- 40 MWp/ Year capacity (9 companies)

PV MODULE MANUFACTURE

- 76 MWp/ Year capacity (15 companies)
- Aggregate capacity of PV Modules installed : 82 MWp
- Aggregate capacity of PV Modules exported : 135MWp

Year 2004-05

- | | |
|---------------|-------|
| - SOLAR CELLS | 32 MW |
| MODULES | 45 MW |

SPV – Technology Interventions

- ❖ Development low electricity consumption process for manufacture of poly silicon material (<125 kwh/kg of silicon)**
- ❖ Efficiency improvements in Crystalline silicon solar cell to average 17 -18% and more**
- ❖ Thin Film Solar Cell Modules-Development of large area integrated poly crystalline thin film modules using different materials (>12% efficiency and long life)**
- ❖ New thin film device structures using organic and nano materials**
- ❖ Development of Concentrating Solar Cells & Modules**
- ❖ Improving the effective PV module life to 25 years and more**

Solar Thermal – Technology Interventions

- Solar thermal power generation
- MW scale Parabolic Trough for power generation.
- Maximize the utilisation of Solar Heat (upto 250° C) for Industrial Processes
- **Low Temperature Applications**
 - (a) Solar cooking Systems
 - (b) Solar Distillation/ Water Purification Systems
 - (c) Solar Air Heating,
 - (d) Solar cooling
 - (e) Solar Architecture
 - (f) Solar Detoxification of Wastes

Lots more needs to be done

Thank You