GRAMEEN SURYA BIJLEE FOUNDATION (GSBF)

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From **Darkness** *to* **LIGHT**

Dignity through Empowerment

December 15th, 2006

GSBF MISSION STATEMENT

- **Use Renewable ENERGY (RE) as the HUB**
- **Around RE build lighting, potable water, e-education (healthcare & environment)**
- **Prevent rural migration to urban areas**
- **Preserve local culture but be part of global village**
- **Be the leading developer and low cost manufacturer of Off-grid & On-grid LED Lamp Systems**

Highlights

- GSBF is one of the first companies to market Solar Energy based LED Lighting Systems (SELLS) at low cost
- Large and rapidly expanding renewable energy based lighting market
- Value proposition for Indian government agencies & NGO's involved in renewable energy and rural electrification
- Align "Best in Class" companies throughout the value chain
- Experienced management team and advisory board members

GSBF History

- **IIT** (Indian Institute of Technology) graduates receive the finest public education from the government of India
- Decided to give back to society and country in a meaningful way after achieving professional goals
- Founders have a track record in successful businesses
- Environment, Education and increasing Population are key issues in Indian society
- Feedback from IIT alumni in the USA was an important catalyst to initiate current project

Indian Power Sector Scenario

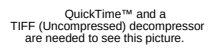
- Indian government initiative **"Vision 2012 – Power For All"**
- Nationally, the 10th and 11th five year plans targets 100,000 MW of power
- Increase generation capacity from 112,000 MW to 212,000 MW
- **10% from renewable sources** though currently RE is only 5% of total energy supply in India
- Increase private sector share from **11% to 16.5%**

Incentives

- Sale of carbon credits
- Funding for energy efficiency by IREDA (Indian Renewable Energy Development Agency)
- Rural Electrification of 45,000 remote villages through renewable sources

Year 2001 Census	DISTRIBUTION OF HOUSEHOLDS BY SOURCE OF LIGHTING						
	Total number of households	Electricity	Kerosene	Solar energy	Other oil	Any other	No lighting
Total %		55.85%	43.30%	0.27%	0.10%	0.16%	0.32%
Total	191,963,935	107,209,054	83,127,739	522,561	184,424	305,308	614,849
Rural	138,271,559	60,180,685	76,896,701	394,425	146,165	227,210	426,373
Urban	53,692,376	47,028,369	6,231,038	128,136	38,259	78,098	188,476
Rural	72%	56%	93%	75%	79%	74%	69%
Urban	28%	44%	7%	25%	21%	26%	31%

72 LED’s Lamp for 220V AC



Solar based 2 Lamp LED system

Benefits to the villager

- Substitute for monthly expenditure of Rs. 100 - Rs. 150 on kerosene
- Payback period of 2-3 years using micro-credit & saving on monthly expenses
- Superior lighting for children's studying, cooking & practicing artisans
- Improved healthcare due to non-use of kerosene which generates carbon dioxide
- Reduce greenhouse gases and protect the environment

Improve Health, Wealth & Education via Off-Grid Lighting

1) Ensuring the continued education of the rural underprivileged children:

Case Study: Home Lighting systems (given thro' the Azim Premji Foundation)
only for households whose children attend school

- **i) improve school attendance, reduce drop out rates**
- **ii) motivates parents to encourage their children attend school**
- **iii) home study in the night time**
- **iv) increase literacy rates especially for girls**

2) Benefit the community as a whole:

- **i) Improve social bonding among family members**
- **ii) Income generating activities in the evening hours**
- **iii) Reduce Alcoholism in the Male members**
- **iv) Help Women cook & perform household chores with greater ease**

3) Help the Environment:

- **i) Reduce Carbon Dioxide Emissions & create CERs (carbon emission credits)**
  - **1 litre Kerosene is equivalent to 2.52 kgs of Carbon Dioxide emission**
    - **70 million Homes = 6.4 Million Tonnes of CO_2 per year**
- **ii) Reduce deforestation, Improve Green cover**

4) Increased savings due to non-use of kerosene:

Solar Energy based LED Lamp System
(SELLS)

Our typical Renewable Energy Based LED Home Lighting System is:

- 1) 10 Watt **Solar Panel:**
  10 Watts - for two, 33 LED's Lamp System

- 2) Two 33 **LED Lamp**:
  One 33 LED Lamp - Power Consumption @ 2.5 Watts

- 3) **Sealed Low Maintenance Lead Acid Battery**:
  Capacity: 12 Volts / 7.6 Ah

- 4) **Controller Box**:
  Battery Box with a Controller Circuit for connections of the Solar Panel to the Battery, and supply to the Lamps along with Switches and a Control Circuit

Solar Home Lighting Systems Configurations:

	Solar Panel (Watt)	(# Lamps) x (LED's/Lamp)	12V Battery	Max. Usage Hrs./day	Cost*
1)	5 Wp	1 x 33	4.5 AH	4	Rs. 2,000
2)	5 Wp	2 x 21	7.0 AH	4	Rs. 2,300
3)	7 Wp	2 x 33	7.0 AH	3	Rs. 2,700
4)	10 Wp	2 x 33	7.0 AH	4	Rs. 3,000

* excluding 4% VAT + Transportation charges + Installation Charges

Solar Street Lighting Systems Configurations:

	Solar Panel (Watt)	(# Lamps) x (LED's/Lamp)	12V Battery	Max. Usage Hrs./day	Cost*
1)	20 Wp	1 x 72	18 AH	12	Rs. 12,000
2)	40 Wp	2 x 72	33 AH	12	Rs. 17,000

Features:
Auto On/Off
Auto Dimming after 4 hours to a luminosity level of about 45-50%
includes electronic charge controller for low voltage disconnect & overloads

* excluding 4% VAT + Transportation charges + Installation Charges

LED Lamps for both off-grid (DC) & on-grid (AC):

FY2006 - 4.0 Lumens/LED = Luminous Efficacy of 50 ± 5 Lumens/Watt

LED Lamp Configuration	Input Voltage	Luminosity (Lumens)	Power Consumption per LED Lamp	Incandescent bulb	Cost of LED Lamp
21 LED's	12V DC	85	1.6 W	10 W	Rs. 250
33 LED's	12V DC	135	2.5 W	15 W	Rs. 325
72 LED's	**12V DC**	**300**	**5.5 W**	**30 W**	**Rs. 525**
72 LED's	220V AC	300	6.0 W	30 W	Rs. 550
108 LED's	220V AC	440	8.5 W	45 W	Rs. 675
144 LED's	**220V AC**	**575**	**11.0 W**	**60 W**	**Rs. 800**

Expected Luminosity/LED: (Mar-2007, 4.5 Lumens/LED); (Jun-2007, 5.0 Lumens/LED); (Dec-2007, 6.0 Lumens/LED)

Power Comparison between WLED Lamps, CFL & Incandescent Lamps

No. of LED's in each Lamp *	LUMINOSITY (Lumens)	CFL (Watts)	Incandescent Lamp (Watts)	Total Wattage per Lamp based on Lumens/LED for each period - present & future			
				Dec-06	Jan-07	Jun-07	Dec-07
4.0 Lu/LED				4.0 Lu/LED	4.5 Lu/LED	5.0 Lu/LED	6.0 Lu/LED
				(Watts)	(Watts)	(Watts)	(Watts)
21	85	2	10	1.6	1.4	1.3	1.1
33	135	3	15	2.5	2.2	2.0	1.7
54	225	5	25	4.0	3.6	3.2	2.7
108	440	8	40	8.0	7.1	6.4	5.3
144	**600**	**11**	**60**	**11.0**	**9.8**	**8.8**	**7.3**
UD	810	14	75				
UD	1,200	18	100				
UD	1,500	23	120				
UD	1,710	30	150				
UD	2,050	36	180				

***** 5 mm diameter LED's

UD Under Development

As Lumens/LED increases, the no. of LEDs decreases for each Lamp for ' same Luminosity, thereby reducing ' cost of the La

Cost per LED lamp goes down, Luminosity increases for the same # LED's, with Longer life cycles for LED lamps

Marketing Program

- NGO’s, SHG’s, Financial Institutions (NABARD)
- MNES (Ministry of Non-Conventional Energy Sources)
- Rural Electrification Corporation & Ministry of Power
- State Level RE & Rural Development Departments
- Village-Level Distribution through Panchayats
- Domestic & Multi-National Corporations (CSR)
- High Net Worth Individuals, Individual Donors, NRIs

Value Proposition for Partners

- Corporate Social Responsibility (CSR)
- Gain mind-share and market-share in the second largest market in the world
- Penetrate both the private and public sector companies involved in Renewable Energy systems and LED Lighting systems
- Use GSBF as a platform to launch various other Renewable Energy and LED Lighting applications

GSBF Management

- **Jasjeet Singh Chaddah**, Founder & Chief Executive Officer
  - Electrical Engineering degree from IIT, Kharagpur, 1985
  - Owner-founder of Harman Plastics for 15 years, a successful export-oriented Cosmetics packaging company
- **Kama Krishna,** President
  - B.Tech (Hons.) from IIT, Kharagpur, 1985 & MBA from USA
  - Senior Technology Analyst on Wall Street for 15 years
  - Founded two investment firms in financial research & portfolio management, Equitis Inc., Himalayan Investments
- **Ashok Seth,** Chief Operating Officer
  - Bombay University
  - Director-Manufacturing Operations for multi-national healthcare firms - Smith and Nephew, and Production & Contract Manufacturer: Johnson & Johnson

Summary

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STRENGTHS

- Triple A - availability, affordability, accessibility
- Technology & economic barriers solved
- Focus on product development, leverage supply-chain partners
- Proven business models
- Duplicate the IT success story with RET (Renewable Energy Technologies)

CONCERNS

- Lack of awareness (CFL)
- Bureaucracy
- Vested interests
- Subsidy - corruption
- Holistic solution not point solutions
- Lack of Govt support
- Solar panel (thin film) technology
- Battery technology