

## ANNEX 1 - Detailed information on biomass policies/programmes/projects in India

### 1.1 Annexure 1

#### Tables

**Table 1: Policies introduced by State Government for purchase of electricity from biomass power projects**

State	Participation	Wheeling	Banking	Buy back	Third party sale	Other incentives
A.P.**	Pvt.	28.4% + Rs. 0.5/kWh	Allowed at 2% for 8-12 months.	@Rs.2.25 per unit, escalated at 5%(94-95)	Not allowed	-
Chattisgarh~	Pvt.	-	-	@Rs.2.25 per unit	Allowed	As to other industry; Electricity duty exempted for 1 <sup>st</sup> five year.
Gujarat##	Pvt.	~~4% of energy	~~Allowed 12 months.	@Rs.2.25 per unit, escalated at 5% (94-95)	~~Allowed	-
Haryana	Pvt.	2% of energy	Allowed 12 months	@Rs.2.25 per unit, escalated at 5% (94-95)	Allowed	-
Karnataka**	Pvt.	6 to 12% of energy	2% per month for 12 months	@Rs.280 per unit, # escalated at 2%(on base tariff)	-	Subsidy @ Rs. 25 lakhs/MW for Co-gen only.
Kerala	Pvt.	5% of energy	Allowed 4 months.	@Rs.2.80 per unit, escalated at 5% for five years (2000-01)	Not allowed	50% cost of power line to be borne by KSEB.
Maharashtra**	Pvt./Coop.	7% of energy	Allowed	@Rs.3.05 per unit, escalated at 2% from year of commissioning	Allowed	50% cost of power line to be borne by MSEB.
M.P.	Pvt.	2% of energy	Not allowed	@Rs.2.25 per unit	Allowed	-
Punjab	Pvt.	2% of energy	Allowed 12 months	@Rs.3.01 per unit, escalated at 3% for five years (2001-02)	Allowed	As to other industry.
Rajasthan	Pvt.	2% of energy	Allowed 12 months	@Rs.2.25 per unit, escalated at 5% (94-95)	Allowed	-
Tamil Nadu	Pvt.	2% within 25 km, 10% beyond 25 others.	Allowed at 2% charge	@Rs.2.73 per unit, *** escalated at 5% for 9 years (2000-01)	Not allowed	-
U.P.**	Pvt.	12.5%	Allowed 24 months	@Rs.2.25 per unit, escalated at 5% (99-00)	Allowed*	-

**Note:**

\* Not allowed for Co-generation

\*\* SERC policy announced

~~ Not allowed for Co-generation. For biomass only.

\*\*\* Rs. 2.48 per unit at 5% escalation for 9 years (2000-01) for off-season power generation using coal/lignite.

# fixed at Rs. 3.16 not Rs. 3.32 presently

## Government Resolution No. REP-102000-502-B dated 27<sup>th</sup> September, 2001

~ Notification dated 8/4/2002.

Source: Renewable Energy in India - Business Opportunities, published by MNES on February 2004

**Table 2: Policies introduced/incentives declared by the State Governments for Private Sector Wind Energy Projects:**

Items	Andhra Pradesh	Karnataka	West	Madhya Pradesh	Maharashtra	Rajasthan	Tamil Nadu	Gujarat	Kerala
Wheeling	2% of energy	20% of energy	2% of energy	-	2% of energy	10% of energy	5% of energy	4% of energy	5% of energy
Banking	12 months	2% per month for 12 months	6 months	-	12 months	12 months	5% (12) months	6 months	9 months (June-Feb)
Buy-back	Rs. 3.37/ KWh fixed for 5 years	Rs. 3.40/ KWh fixed for 10 years	To be decided on case to case basis	Rs.3.97 to Rs.2.43 to h with reduction & esc.for 10 years each	Rs.3.50/kWh esc. Re.0.15/kWh per year	Rs.2.91/kWh with 5 paise annual esc. For 10 years	Rs. 2.70/ kWh (no esc.)	Rs. 2.60/ kWh with 5 paise annual esc. for 10 years	Rs. 2.80/ kWh with 5% annual esc. (2000-01 for 5 years)

Source: Background Paper at Brainstorming Session – “Mainstreaming of Renewable Energy in the country and attaining Global Leadership” conducted by MNES at New Delhi on 16.06.2005

**Table 3: Financial incentives for special and other category of states**

	Special Category States (NE Region, Sikkim, J&K, HP & Uttarakhand)	Other States
Small Hydro Power projects	Rs 2.25 crores × (C MW) <sup>AO.646</sup>	Rs 1.50 crores × (C MW) <sup>AO.646</sup>
<b>Biomass Based projects</b>		
Biomass Power projects	Rs 25 lacks × (C MW) <sup>AO.646</sup>	Rs 20 lacks × (C MW) <sup>AO.646</sup>
Bagasse Co-generation*	Rs 18 lacks × (C MW) <sup>AO.646</sup>	Rs 15 lacks × (C MW) <sup>AO.646</sup>
Biomass Power using Advanced Technologies	Rs.1.2 crores × (C MW) <sup>AO.646</sup>	Rs.1.0 crores × (C MW) <sup>AO.646</sup>
Wind Power demonstration projects	Rs.2.50 crores × (C MW) <sup>AO.646</sup>	Rs.2.00 crores × (C MW) <sup>AO.646</sup>

Source: Background Paper at Brainstorming Session on 'Mainstreaming of Renewable Energy in the country and attaining Global Leadership' organised by MNES at New Delhi on 16.06.05

**Table 4: Cumulative Potential and Installed capacity of Grid Interactive Renewable Power**

Source/System	Estimated potential	Cumulative installed capacity/number (as on 31.12.04)
Wind power	45,000 MW	2,980 MW
Biomass power	16,000 MW	290.50 MW
Bagasse cogeneration	3,500 MW	437.03 MW
Small hydro (up to 25 MW)	15,000 MW	1,705 MW
Waste to energy		
Municipal solid waste	1,700 MW	17 MW
Industrial waste	1,000 MW	29.50 MW
Family-size biogas plants	12 million	3.71 million
Improved chulhas	120 million	35.20 million
Solar street lighting system	-	52,102
Home lighting systems	-	307,763
Solar lanterns	-	538,718
Solar water heating systems	140 million m <sup>2</sup> of collector area	1 million m <sup>2</sup> of collector area
Box-type solar cookers	-	559,030
Solar photovoltaic pumps	-	6,452
Wind pumps	-	1,087
Biomass gasifiers	-	62 MW

Source: Case Study on Biomass, Ministry of Non-Conventional Energy Sources, Government of India, 2005

**Table 5: Targets for production of renewable energy for 10th plan**

Source	Target during 10 <sup>th</sup> Plan (in MW)	Achievements during first three years (in MW)
Wind Power	1500	1968
Biomass Power & Bagasse Co-generation	700	368
Small Hydro (up to 25 MW)	600	266
<b>Total</b>	<b>2800</b>	<b>2602</b>

Source : Background Paper at Brainstorming Session – "Mainstreaming of Renewable Energy in the country and attaining Global Leadership" conducted by MNES at New Delhi on 16.06.2005

## 1.2 Annexure – 2

**No.3/3/2995/UICA (SE)**  
**Government of India**  
**Ministry of Non-conventional Sources**  
**(Urban, Industrial and Commercial Group)**

Block No.14, CGO Complex  
 Lodi Road, New Delhi 110003

Dated: 26<sup>th</sup> July, 2005

To  
 Secretaries of State Departments  
 Heads of State Nodal Agencies  
 Municipal Corporations &  
 State Police Departments

Sub: Implementation of the scheme on “Demonstration and Promotion of Solar Photovoltaic Devices/Systems in Urban Areas” during 2005-2006

Sir,

I am directed to convey the sanction of the President for implementation of the scheme on “Demonstration and Promotion of Solar Photovoltaic Devices / Systems in Urban Areas” during 2005-2006. The scheme provides financial support for installation and demonstration of various solar photovoltaics / devices / systems for community application and for organizing seminars / workshops / symposia / training programmes to create awareness about the systems in urban areas.

### 1.0 Objectives

The major objectives of promoting / demonstrating solar photovoltaic devices / systems in urban areas are as follows:

- i) To demonstrate effective alternate solutions for community / institutional low power solar based systems in urban areas.
- ii) To create awareness about the benefits of photovoltaic devices / systems in urban areas.
- iii) To reduce the burden on conventional electricity in cities / towns and divert the energy saved to small towns and villages that face acute shortage of power.

### 2.0 Targets of systems to be demonstrated/promoted

➤ Streetlight solar control systems	:	1000 Nos.
➤ Solar street / public garden lights	:	2500 Nos.
➤ Illuminating hoardings	:	500 Nos.
➤ Solar road studs	:	5000 Nos.
➤ Solar blinkers	:	2500 Nos.
➤ Solar traffic signals	:	125 Nos.

- BIPV Systems : 10 Nos.
- Solar power packs : 150 Nos.

The systems will be installed in fully autonomous mode and will not have any interface with conventional power. Brief information about these systems is given in the Annexure.

### 3.0 Implementation Arrangements

The scheme will be implemented by the Municipal Corporations/Traffic Police Departments and State Nodal Agencies. In addition, other organisations such as Manufacturers Associations, IREDA / Reputed NGOs / Institutions of proven track record of implementation will be involved in organising publicity awareness campaign, seminars / workshops / symposia / training, etc. Detailed guidelines for implementation of the scheme and financial provisions for various activities are given in the Annexure.

### 4.0 Monitoring mechanisms

The Implementing Agencies will set up arrangements to closely monitor the implementation of the projects undertaken by them under the scheme. The agencies will furnish progress reports and other information to MNES on a quarterly basis. In addition, Regional Offices of MNES will be involved in monitoring the implementation and performance of the system.

### 5.0 Expenditure

An amount of Rs.10.00 crores has been earmarked for demonstration and promotion of solar photovoltaic devices / systems in urban areas. The expenditure will be met from the overall allocated budget of Solar Photovoltaic Programme for 2005-2006, as per the following budget heads:

#### Major Head: 2810 Non-conventional Sources of Energy

#### Allocated budget (Rs. in crore)

02 Solar (Sub Major Head)

02.102 Photovoltaic (minor head)

02 Demonstration and Technology

02.00.31 Grants in aid 22.80

02.00.33 Subsidies 0.70

07 Other Items

07.00.50 Other charges 0.10

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Total 23.60

**6.0** The provisions of the scheme are likely to be continued during 2006-2007.

**7.0** This sanction issues in exercise of delegated powers to this Ministry and with concurrence of IFD vide their sanction No.IFD/SAN/106/171/2005-2006 dated 26.7.2005.

Yours faithfully,

Sd/-

(Dilip Nigam)

Principal Scientific Officer

Phone: 24360707; Extn.2233

Copy for information and necessary action to:

1. The Managing Director, IREDA
2. Director of Audit, Scientific Audit-II, DACR Building, I.P. Estate, New Delhi 110002
3. PS to MOS
4. Sr. PPS to Secretary, MNES
5. AS & FA / Dir (F) /US (F) / AO (F) / SO (F)
6. All Group Heads / Solar Energy Centre
7. Adviser (UICA) / Dir (AKS) / PSO (DN)
8. Regional Offices of MNES
9. Regional Test Centres
10. Cash Section
11. Pay & Accounts Officer, MNES
12. Sanction folder

### 1.3 Annexure 3

F.No.2/2/2005-UICA  
Government of India  
Ministry of Non-Conventional Energy Sources  
(Urban, Industrial & Commercial Applications Group)

Block No.14, CGO Complex  
Lodi Road, New Delhi 110003  
Date: 25<sup>th</sup> July, 2005

To  
Chief Secretaries of State Governments  
Administrators of Union Territories  
Heads of State Nodal Agencies  
Heads of IREDA / banks / Fis

**Subject: Programme on Biomass Energy and Co-generation (non-bagasse)  
in Industry for implementation in 2005-06**

Sir,

I am directed to convey the sanction of the Government of India for the implementation of the Programme on “Biomass Energy and Co-generation (non-bagasse) in Industry” during 2005-06. The scheme provides for Central Financial Assistance for setting up of biomass co-generation (non-bagasse) and biomass gasifier projects for generation of thermal and electrical energy in industries and incentives to State Nodal Agencies and Financial Institutions. The scheme also provides for Grants-in-Aid to State Nodal Agencies, NGOs and other concerned institutions for promotional activities i.e. for organizing seminars, workshops, training / orientation programmes, technology validation, strategic studies, industry-wise sectoral studies and performance monitoring & evaluation, etc., and promotional incentives for co-generation projects based on conventional fuels and rejects.

#### 2.0 Objectives

The main objectives of the programme on Biomass Energy and Co-generation (non-bagasse) in Industry are given below:-

- (i) To encourage the deployment of biomass energy systems in industry for meeting thermal and electrical energy requirements.
- (ii) To promote decentralized / distributed power generation through supply of surplus power to the grid.
- (iii) To conserve the use of fossil fuels for captive requirements in industry.
- (iv) To bring about reduction in greenhouse gas emissions in industry.
- (v) To create awareness about the potential and benefits of alternative modes of energy generation in industry.

#### 3.0 Scope

The programme will cover the following types of projects and other activities:-

**(i) Biomass gasifiers for thermal and electrical applications in industry**

The deployment of small scale gasifiers has already been demonstrated for electrical and thermal energy applications. Greater thrust is proposed to be provided for the deployment of gasifiers of higher capacity, to operate on diversity of biomass feed material, and for specific segments of industrial applications for captive power generation and production of thermal energy or co-generation of heat and power. Deployment of 100% producer gas engines will be encouraged for achieving higher efficiency and eliminating use of fossil fuels.

**(ii) Biomass Co-generation Projects**

To meet the requirement of captive power and thermal energy, the installation of biomass co-generation projects (excluding bagasse co-generation) is to be promoted in industry, with at least 50% of power for captive use, and a provision for the surplus power to be exported to the grid. This will increase the use of non-conventional energy sources and conserve the use of fossil fuels such as coal, oil and natural gas. Use of maximum of 25% conventional fuels would be allowed in such projects.

**(iii) Industrial Co-generation Projects based on Conventional Fuels and their Rejects**

The installation of co-generation projects based on conventional fuels such as coal, oil, lignite, gas and un/semi-utilized wastes / rejects like dolodhar, coal rejects and refinery mud, etc., is to be encouraged in industry for meeting power and energy requirements.

**(iv) Other Promotional Activities**

Other promotional activities would cover potential / resource assessment, preparation of DPRs, organization of seminars / workshops / conferences, interactive / business meets, awareness creation activities, and other professional technical services.

**4.0 Central Financial Assistance (CFA)**

Central Financial Assistance in the form of capital subsidy would be provided to biomass gasifier projects and biomass co-generation (non-bagasse) projects in industries. However, in respect of co-generation projects based on conventional fuels and their rejects, Central Financial Assistance would be provided only for promotional and awareness creation activities. The details of Central Financial Assistance and other provisions are given below:-

**4.1 Capital subsidy for Biomass Gasifiers for thermal and electrical applications**

- (i) Rs.2.0 lakhs / 300 kWth for thermal applications
- (ii) Rs.2.5 lakhs / 100 kWe for electrical applications through dual fuel engines
- (iii) Rs.8.0 lakhs / 100 kWe for 100% producer gas engines with gasifier system
- (iv) Rs.6.0 lakhs / 100 kWe for 100% producer gas engine alone

**4.2 Capital subsidy for Biomass Co-generation (non-bagasse) projects**

Capital subsidy @ Rs.20.00 lakhs/MWe would be provided to promoters for installation of Biomass Co-generation (non-bagasse) projects, including captive projects based on direct combustion.

**4.3 The capital subsidy will be considered subject to the following:-**

- (i) The amount of capital subsidy would be calculated on the basis of installed capacity;
- (ii) CFA would be limited to a maximum capacity of 5 MW, irrespective of the installed capacity of the project;
- (iii) In case of Special Category States (NE Region, Sikkim, J&K, Himachal Pradesh and Uttaranchal), 20% higher capital subsidy than that for General Category States would be provided.

4.4 Incentives for the installation of co-generation projects based on conventional fuels and reject promotional incentives @ Rs.1.00 lakh / MW, subject to maximum of Rs.5.00 lakhs / project for professional technical services would be provided to consultancy firms helping to bring a project to financial closure including preparation of DPR.

4.5 Incentives / service charges to SNAs

Incentives / service charges @ Rs.1.00 lakh / MWe (or equivalent) would be provided to SNAs on pro-rata basis, subject to a ceiling of Rs 5.00 lakhs / project, including for Industrial Co-generation projects, for their active involvement in promoting Biomass Power / Co-generation projects.

4.6 CFA for organising business meets, seminars, workshops, orientation and training programmes, etc.

CFA up to Rs.3.00 lakhs / event would be considered for organization of business meets, seminars, workshops, orientation programmes and training programmes, etc.

4.7 CFA for technology validation, strategic studies, industry-wise sectoral studies and performance monitoring & evaluation, etc.

CFA up to Rs.5.00 lakhs, on case-by-case basis, would be considered for technology validation, strategic studies, industry-wise sectoral studies and performance monitoring & evaluation etc. to institutions / industries. This will be governed by the procedures / guidelines being issued by the R&D Division of MNES separately.

## **5.0 Implementation Arrangements**

5.1 The projects will be implemented by private and public sector, industry, including through Energy Service Companies (ESCOs), in which case the ESCO would be eligible for the CFA.

5.2 IREDA, other financial institutions or commercial banks shall forward the Detailed Project Reports received from the promoters / ESCOs to the Ministry along with their Appraisal Note indicating the techno-economic viability of the projects, taking into account the eligible capital subsidy. The promoters would be required to also submit an advance copy of their proposal to the Ministry directly. The prescribed format for submission of the proposal is given in the Annexure.

5.3 For projects to be implemented by the promoter without debt financing / loans from domestic FIs / banks, the proposals should be directly submitted the Ministry for financial support.

5.4 After receipt of DPR from promoters, Appraisal Note and copy of loan sanction order from IREDA / lead bank / FI, and other requisite information / documents from the promoters, the proposal will be examined in the Ministry and sanction will be issued for providing capital subsidy in accordance with the provisions of scheme.

## **6.0 Release of Central Financial Assistance (CFA)**

6.1 The entire capital subsidy amount would be released directly to the lead bank / lending financial institution for the purpose of offsetting the loan amount after successful commissioning of the project as per DPR norms and receipt of copies of statutory clearances and requisite project relating information / documents. The condition of successful commissioning of the project would inter-alia imply operation of the project for three months, including at least 72 hours continuous operation at minimum 80% of rated capacity.

6.2 In case the project is set up by the promoters through their own resources, the CFA would be released directly to promoters after successful commissioning of the project (as per item 6.1 above).

6.3 The incentives to State Nodal Agencies would be released after successful commissioning of the project.

### **7.0 Monitoring Mechanism**

7.1 The concerned State Nodal Agencies will closely monitor the execution of the projects and ensure their timely completion. They would be required to submit periodic progress reports to MNES.

7.2 MNES will also monitor the project of implementation of the projects as well as their performance through a Monitoring Committee consisting of representatives from MNES, financial institution(s) / banks and State Nodal Agencies.

8.0 The aforesaid programme is subject to change(s) and modification(s) as may be decided by the MNES, Govt. of India from time to time, and subject to availability of funds. The Ministry shall in no way be liable for expenditure incurred by promoters for pre-project preparation or their activities, merely on the basis of these circular and / or related announcements by the Ministry. In case of any dispute on interpretation of any provision under the scheme, the decision of the Ministry shall be final and binding.

9.0 The funds required for the implementation of the programme would be met out of allocated budget of Rs.4.00 crores from the Budget Head 2810, Bio-energy, Sub-Head 03.00.33 – Subsidies, 02.00.31 – Grants-in-Aid, 05.01.33 – Subsidies and 05.01.31 – Grants-in-Aid for the year 2005-06 (Plan).

10.0 This issues in exercise of powers delegated to this Ministry and with the concurrence of IFD, MNES vide their sanction No.IFD/SAN/106/168/2005-06 dated 25<sup>th</sup> July, 2005.

Yours faithfully,

Sd/-  
(R.C. Tiwari)  
Director

## 1.4 Annexure 4

### Energy from Wastes

#### MNES Financial Incentives for Energy from Urban, Municipal and Industrial Wastes

Programme/Scheme	Amount of subsidy
Interest Subsidy	For reducing rate of interest to 6.0% (4% in case of projects taken up by Municipal Corporation/Urban Local Bodies) subject to a maximum of Rs.2.0 crore MW for waste-to-power project, Rs.1.0 crore/MW for fuel-to-power project and Rs.0.50 crore/MW for waste-to-fuel project.
Financial support for the preparation of DPR/Techno-economic Feasibility Report (TEFR)	50% of the cost, subject to a maximum of Rs.2.0 lakh
Incentive to Municipal Corporation/Urban Local Bodies for site clearance / facilitation / coordinated actions	Rs.15 lakh per MW Rs.7.5 lakh per MW if the project is for waste-to-fuel or fuel-to-power
Incentive to SNAs for their coordinated actions / monitoring, etc.	Rs.5 lakh per MW Rs.2.5 lakh per MW if the project is for waste-to-fuel or fuel-to-power
Financial support for Demonstration Projects	Under review

Source: Renewable Energy in India – Business Opportunities by MNES, Feb.2004

#### IREDA Financial Assistance for Waste to Energy

Category	Interest Rate (% pa)	Repayment (Yrs)	Moratorium (max)(yrs)	Promoter's Contribution (%)	Lending Norms
<b>Project Financing</b>					
Recovery of Energy from Industrial Waste	12.25	10	3	30	Upto 70% of project cost
Recovery of Energy from Urban and Municipal Waste					
(i) Upto 3 MW	11.00	10	3	30	Upto 70% of project cost
(ii) Above 3 MW & up to 6 MW	11.50	10	3	30	Upto 70% of project cost

Source: Renewable Energy in India – Business Opportunities by MNES, Feb.2004

#### IREDA Financial Assistance for Grid Inter-connection Facility for eligible utilities for Renewable Energy Power Evacuation

Category	Interest Rate (% pa)	Repayment (Yrs)	Moratorium (max)(yrs)	Promoter's Contribution (%)	Lending Norms
Grid Inter-connection Facility for eligible utilities for Renewable Energy Power Evacuation	12.50	10	1	30	100% of eligible equipment cost limited to a maximum of 70% of total project cost

Source: Renewable Energy in India – Business Opportunities by MNES, Feb.2004

## Solar Photovoltaic Power

### MNES Financial Incentives for Solar PV Grid-connected Power Projects

Programme/Scheme	Amount of Subsidy
Solar Photovoltaic Grid-connected Power Projects: Solar Photovoltaic Grid-connected Power Projects for niche applications, namely, voltage support systems at the tail-end of the grid in rural areas, rooftop peak-shaving systems in Urban Centres and diesel saving in island/remote locations. Projects to be implemented by SEBs, SNAs and Private Electric Utilities only	<ul style="list-style-type: none"> <li>• 2/3rd of the project cost subject to a maximum of Rs.1.2 crore per 100 kw</li> <li>• Upto Rs.1 lakh for preparation of DPR</li> <li>• 2.5% of MNES share subject to maximum of Rs.5 lakh for O&amp;M, data compilation, etc.</li> </ul>

Source: Renewable Energy in India – Business Opportunities by MNES, Feb.2004

### MNES Financial Incentives for Solar Photovoltaic Systems (2 years AMC)

Financial assistance (central subsidy) is available for purchase of various solar PV systems to certain eligible categories of users. Under the PV water pumping programme, a combination of soft loan and central subsidy can be availed

SPV System	Central Subsidy
<i>For General Areas (excluding all special category states and islands)</i>	
Solar Home system	
Model 1 (18 W module, 1 light)	Rs.4,300/-
Model 2 (37 W module, 2 lights)	Rs.4,550/-
Model 3 (37 W module, 1 light, 1 fan)	Rs.4,550/-
Model 4 (74 W module, 2 lights, 1 fan)	Rs.8,440/-
Model 5 (74 W module, 4 lights)	Rs.8,440/-
Street Lighting System	Rs.9,100/-
Power Plants & Other Community Systems	Rs.1,19,000/- kWp of PV array capacity
PV water pumping systems	Rs.100/W of the PV array subject to a maximum of Rs.2 lakh/system; when no soft loan is availed. Rs.75/W of the PV array subject to a maximum of Rs.2 lakh/system
<i>For Special Category states and islands</i>	
Solar Home system	
Model 1 (18 W module, 1 light)	Rs.4,300/-
Model 2 (37 W module, 2 lights)	Rs.8,200/-
Model 3 (37 W module, 1 light, 1 fan)	Rs.8,200/-
Model 4 (74 W module, 2 lights, 1 fan)	Rs.15,190/-
Model 5 (74 W module, 4 lights)	Rs.15,190/-
Street Lighting System	Rs.16,390/-
Power Plants & Other Community Systems	Rs.2,14,200/- kWp of PV array capacity
PV water pumping systems	Rs.135/W of the PV array of the system (subject to a maximum of 90% of approved ex-works cost)

Source: Renewable Energy in India – Business Opportunities by MNES, Feb.2004

## Solar Thermal Systems

### MNES Financial Incentives for Solar Thermal Systems

Subsidy Programme/Scheme	Amount of subsidy
Demonstration Programme on Solar Water Heating systems – for NE States, islands, J&K and Sikkim (Special Demonstration Programme)	Rs.4,000 per sq.m of installed collector area (Rs.6,000 per sq.m for States of NE and Sikkim)
Aditya Solar Shops	Financial assistance: Rs.3-5 lakh non-recurring Rs.0.50 lakh recurring for two years Rs.1 lakh for publicity

Source: Renewable Energy in India – Business Opportunities by MNES, Feb.2004

### Interest Subsidy

Subsidy on	Technology	Implementing organisation	Category of end-user	Rate of interest
Solar Water heating system	Banks/UHUDCO, etc.	Individual, institution, association, small business establishment	5%* (to end-user)	
Solar Water heating system	IREDA (through financial intermediaries). IREDA provides loans to financial intermediaries @ 2.5% rate of interest)	Individual, institution, association, small business establishment	5%* (to end-user)	
Solar Water heating system (any capacity), solar air heating system, solar desalination system, solar swimming pool	IREDA (direct or through financial intermediaries)**			5%*
Solar Water heating system (any capacity), solar air heating system, solar desalination system, solar swimming pool	IREDA (direct or through financial intermediaries)**	Industry, hotels and other commercial organisations (profit making)		7%

\* End-users (other than individuals) will have to give an undertaking that no depreciation allowance will be claimed under Income Tax rules.

\*\* The financial intermediaries may charge a spread up to 4% over the rate charged from them by IREDA.

Source: Renewable Energy in India – Business Opportunities by MNES, Feb.2004

**Biogas**

## Financial Incentives during 2002-2003 under NPDB (Family type)

Category	Amount of Central Subsidy per plant
North Eastern region states and Sikkim (except plain areas of Assam)	Rs.11,700/-
Plain areas of Assam	Rs.9,000/-
Jammu & Kashmir, Himachal Pradesh, Uttaranchal (excluding terai region), Nilgiris of Tamil Nadu, Sadar Kurseong and Kalimpong sub-Divisions of the Darjeeling distt (WB), Sunderbans, Andaman and Nicobar Islands	Rs.3,500/-
Scheduled caste, Scheduled Tribe, desert district, small and marginal farmers, landless labourers, terai region of Uttaranchal, Western Ghats and other notified hilly areas	Rs.2,300/-
All others	Rs.1,800/-

Source: *Renewable Energy in India – Business Opportunities* by MNES, Feb.2004

**Other forms of incentives for biogas plants under NPDB**

*Turn-key job fee linked with three years free maintenance warranty:*

*A sum of Rs.800/- per plant is given in north-eastern region states (excluding plain areas of Assam), Sikkim, Jammu & Kashmir, Himachal Pradesh and hilly districts of Uttar Pradesh, Andaman & Nicobar Islands and Lakshadweep, whereas Rs.700/- per plant is given in all states.*

*Financial support for repair of old non-functional plants:*

*Financial support limited to 50% of the rate of Central Subsidy, as applicable for different categories of beneficiaries and areas, is admissible for repair and revival of family type biogas plants, which are at least five years old and which are in disuse at present for want of structural repairs.*

Source: *Renewable Energy in India – Business Opportunities* by MNES, Feb.2004

## 1.5 Annexure 5

### **Research, Design and Development on Bioenergy:**

Biomass is a versatile source of energy. Modern biomass conversion technologies provide us an opportunity to use biomass feed stocks for production of all three kinds of fuel, i.e. gaseous, liquid and solid. Biomass combustion, cogeneration and anaerobic digestion are already established technologies. Recent developments in pyrolysis and gasification have further added advantages for using biomass more effectively not only for heat and electricity generation but also- for transport and chemicals production.

### **R&D projects in progress**

At present, MNES sponsored R&D is in progress in the areas mentioned below:-

- Preparation of Biomass Resource Atlas; based on crop distribution pattern
- derived from GIS-based maps;
- Strategic development of bio energy, involving biomass gasification systems and producer gas engines;
- A coordinated project on Biomass Gasification with focus on improving gas quality and developing control systems for gas turbines;
- Development of fluidized bed gasification system; safety control and instrumentation package for gasifier linked IC engine; and membrane filters for cleaning of producer gas.

Different notifications issued by Government of India to promote renewable energy are given in Annexure 1 and 2 attached herewith.

## 1.6 Annexure 6

### Renewable Energy for Rural Areas

#### National status:

Energy has come to occupy the centre space in the process of development. This is all the more so for rural areas in developing countries like India where over 70% of India's population lives in 5.87 lakh villages. The living patterns of these people have been characterized by extremely low energy intensity lifestyles. The main characteristics of their energy consumption patterns are given in Table-1. As can be seen, over 80% of the population in rural areas is dependent upon biomass for meeting its cooking energy needs. Only 44% of rural households have access to electricity. Use of kerosene is the primary means of lighting and more than 77 million households are dependent on it, spending on an average of Re.1 per capita per day for buying kerosene. Use of bio-fuels for lighting applications though known for centuries, surprisingly, is not widely prevalent. Requirement of fuel for cooking constitutes the primary energy need in rural areas and as can be expected biomass is the predominant fuel. Consumption of biomass materials for cooking varies from region to region and is generally estimated to be in the range of 1.5 to 2.0 kg per capita per day. The biomass fuel comprise primarily of firewood and to a lesser extent of dried animal dung and agricultural residues. A conspicuous feature of biomass use in rural areas is its low degree of monetization. This according to some experts has also been responsible for low device efficiencies, lack of incentives for changing over to better fuels, etc. Penetration of LPG use for cooking has now started showing an increasing trend and as per the last National Sample Survey, was placed at 17.5% of the households. However, it can be shown that if all the biomass used for cooking was to be replaced with LPG, more than 30 million tons of additional LPG will have to be made available which is clearly a tall order for a country like India. A more sustainable and feasible option would be ensuring availability of biomass through organized efforts.

It is in this perspective that the planning and programmes for meeting energy needs of rural areas have to be undertaken. It is apparent that conventional energy sources cannot be depended upon to a large extent for this purpose. The renewable energy sources on the other hand offer a number of advantages such as Local availability, Self sufficiency and autonomy, Long term economy, Freedom from pollution and Suited for remote, isolated areas.

A number of renewable energy technologies have now been developed for meeting various energy needs of rural areas. Some of the already established as well as emerging options are

- Cooking Applications
  - Family/community biogas plants
  - Producer gas from biomass gasification systems
  - Solar cookers

- Lighting Applications
  - Domestic SPV lights
  - SPV street lights
  - SPV lanterns
  
- Pumping Applications
  - Biomass gasifier based systems
  - Bio fuel based systems
  - Wind alone or hybrid with bio-fuel based IC engines
  - SPV water pumping systems
  
- Community Applications
  - SPV operated TV, radio, refrigerator, etc.
  
- Centralized Electricity Generation Systems
  - Biomass gasifier based systems
  - SHP based systems
  - Bio fuel based systems
  - SPV based systems

With the availability of a number of renewable energy technologies for meeting the diverse energy needs of rural areas, a complete energy plan could be drawn for a community to eliminate or reduce dependence on conventional energy sources. In the subsequent pages, the paper discusses each of the possible technologies, their likely costs, the incentives available from the Ministry, etc. It is attempted to bring out the whole range of options open to rural energy planners without prioritizing any particular resource or technology. This implies that ideally a package of all the technological options as well as renewable energy resources should be employed to meet all the energy needs of a community.

### **Village Electrification with Renewable Energy Technologies**

The Ministry of Non-conventional Energy Sources has been implementing the Village Electrification Programme since 2001-02. During 10<sup>th</sup> Plan, the focus of the programme shifted to remote villages and hence, the programme was renamed as the Remote Village Electrification Programme. The Programme aims at a paradigm shift in the manner in which provision of energy and electricity is expected to be made available for households in villages which are either unfeasible for electrification by conventional means or such electrification may not be cost effective. Some of the reasons for unfeasibility may include requirement of forest clearance, low intensity of load, distance from the grid lines, etc. For the 10th Plan, a target of electrification of 5,000 villages through non-conventional energy sources with a budgetary outlay of Rs.735 crores has been set. During the first three years of the plan period, a total of 1979 villages and hamlets where grid extension is neither cost effective nor feasible have been electrified and in 1120 remote villages and 723 hamlets, electrification projects are under implementation. Since inception of the Programme, 1944 villages and 594 hamlets have been electrified. In

these villages, SPV, biomass gasification and small hydro systems have been used. The number of villages taken up on each of the technologies is given in Table 6 below.

**Table 6: Technology-wise distribution of villages taken up for electrification**

	Villages taken up with SPV systems	Villages taken up with biomass gasification systems	Villages taken up with SHP	Total
Completed Projects	1911	25	8	1944
Ongoing Projects	955	17	148	1120

Source : Background Paper at Brainstorming Session – “Mainstreaming of Renewable Energy in the country and attaining Global Leadership” conducted by MNES at New Delhi on 16.06.2005

An expenditure of US\$ 330,400 has so far been incurred on the programme implementation during the 10<sup>th</sup> Plan. During 2004-05, the Ministry could take up no new major activity since the issue of approval for the programme could not be resolved. Necessary action in this regard has been taken so that the matter can be resolved at an early date.

As explained above, the primary justification for the programme initiated by the Ministry lies in the fact that there are a large number of villages that are too remote to be economically electrified by conventional means. Since renewable energy sources are locally available, they can be used to meet the local energy requirements. Therefore ideally, each village electrification project should be preceded by an exhaustive demand and resource survey. The Ministry had earlier laid down that a remote village will be deemed to be electrified if at least 10% of the households are provided with lighting facility. However, the Rajiv Gandhi Village Electrification Programme of the Ministry of Power has now targeted electrification of all the households in the country by 2009.

The Ministry provides a Central Financial Assistance of up to 90% of the benchmark costs of installation of various renewable energy devices when deployed for electrification of remote villages. Initially, a majority of villages taken up for electrification under the programme were provided SPV home lighting systems that are suitable for 2-4 lights. A few villages were also electrified with centralized SPV projects, with biomass gasification systems or with small hydro systems. With the recent announcement of the National Electricity Policy and the Rajiv Gandhi Electrification Programme by the Ministry of Power, it has been considered desirable to bring about a convergence between the two programmes. The Village Electrification programme of Ministry of Power aims to electrify all the households in the country by 2009 and also aims to supply electricity not only for lighting but also for productive applications such as water pumping for irrigation, community applications, health care, etc. The National Electricity Policy also lays down a minimum lifeline consumption of 1 kWh / household / day. The programme also emphasizes proper quality of electricity and stresses the need for bringing this at par with that available in urban areas. Accordingly, MNES also

proposes to deploy centralized electricity generation technologies including biomass gasification, small hydro, SPV power plant, etc., as the first option. Lighting with SPV domestic lights will be resorted to in only those cases where it is considered unfeasible to use other options.

Due to peculiar operating and load conditions expected in remote unelectrified village environment, at least initially, application of standard system design parameters may not be desirable. Some of the conditions peculiar to remote villages are low plant load factors, non-continuous operations, part load operations for a major period of time, low skills of the O&M staff, difficulties in frequent/regular preventive maintenance, etc. If the systems are designed without taking into account such peculiarities. Their efficiency could be reduced, affecting viability. It has been therefore proposed to take up remote village specific system development for technologies based on SPV, biomass and small hydro.

### **Village Energy Security through Biomass**

Recent technological developments in biomass have made it possible to deploy various biomass-based systems to meet total energy requirements of villages, including electricity generation, in an efficient, reliable and cost-effective manner. Keeping in view such developments, the Ministry has evolved a concept of providing energy security in villages mainly through biomass. The objective of the village energy security projects is to go beyond mere electrification per se by meeting the total energy requirements of villages including cooking, lighting and motive power, with full participation of the local communities, including women.

To begin with, test projects on village energy security are being taken up to demonstrate the techno-economic parameters, provide operational experience, and mobilize local communities and firm up the institutional arrangements. The test projects would be undertaken in remote villages and hamlets that are not likely to be electrified through conventional means, with emphasis on forest fringe and tribal villages. The energy production systems could comprise biogas plants based on dung or leafy biomass, biomass gasifiers coupled to 100% producer gas engines and biofuel run pump sets.

The test projects would be undertaken by a Village Energy Committee formed by the Gram Sabha and notified by the Panchayat, and facilitated by implementing agencies such as District Rural Development Agencies (DRDAs), forestry departments and NGOS, with technical inputs, overall coordination and monitoring by the State Nodal Agencies. Guidelines for planning, implementation and funding of the test projects have been formulated and circulated to the stakeholders. A High-level Steering Group has been constituted to provide overall guidance for the implementation of the test projects. 90% of the capital cost of the test projects would be met through a Central grant, subject to a benchmark of Rs.20, 000/- per beneficiary household for meeting the total domestic and community energy requirements. During 2004-05, 24 test projects have so far been sanctioned in three States, viz., Madhya Pradesh, Rajasthan and West Bengal.