NATIONAL CONFERENCE IN NE REGION, SHILONG
23RD JUNE 2023
PROMOTION OF GREEN & CLEAN ENERGY IN

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(Tripura Renewable Energy Development Agency)
Department of Power, Govt. of Tripura
Tripura

- A hilly State of North-Eastern region, 3 sides surrounded by Bangladesh and border with Mizoram & Assam.

- Geographical area of 10491.69 sq. km & more than 60% area is forest covered.

- Population of 40.12 lakh, around 43% are tribes residing at remote hilly areas.

- Administrative setup - 8 Districts, 23 Sub-division & 59 Rural Development Blocks

- 5.86 lakh hect. Agricultural holding.

- People depends on Agriculture, Forestry, Fisheries, Rubber Plantation, Horticulture, Handicrafts, Handloom, Sericulture, Animal resources etc.
POWER SCENARIO

✓ Peak Demand 338 MW (April, 2023)

✓ State Own Generations: 159 MW

- Rokhia Gas Based Power Generation 98 MW
- Baramura Gas Based Power Generation 46 MW
- Gumti Hydroelectric Project 15 MW

✓ Balance from CGS Generation
Most of the rural habitations in interior and hilly terrain.
Difficult stress and 20-30 km. walking distance to reach habitation.
Grid supply is not feasible & economically viable.
The power supply to some areas is very much erratic & unreliable.
Distribution line breakdown during monsoon/ pre-monsoon.
Remain outage of power for 3-4 months.
Challenging to provide steady power supply.
Indigenous habitats still legging behind in basic amenities like education, health, standard of living etc.
Renewable Energy will play the vital role to provide electricity to tribal habitations.
TREDA, a constituent body of Dept. Of Power and State Nodal Agency of MNRE, Govt. Of India is implementing and promoting various Renewable Energy Schemes of MNRE, Govt. of India and Govt. of Tripura since 1997-98.

Tripura Electricity Regulatory Commission (TERC) has also declared TREDA as the State Nodal Agency for Monitoring of compliance of Renewable Purchase obligation Regulation of TERC in the state.
TREDA has taken remarkable initiative:

- To Augment livelihoods of those rural people.
- Enhancement of socio-economic development parameter by adopting following Renewable Energy scheme -
  - Solar Study Lamp
  - Grameen Bazar Alok Jyoti Scheme (SLS)
  - PM-KUSUM Scheme
  - Solar Micro Grid
  - Biogas Scheme
  - Solar Drinking Water
  - Solar Off-grid Power Plants
  - Grid Connected Power Plants
SOLAR LAMPS
ENHANCING EDUCATION

Students in remote areas is now able to study more hours.

Improved long-term health.

Reduced dependency on kerosene and increased in savings.
Farmers are selling their vegetable product till late evening at Barmaidan Bazar, Padmabil

**IMPACT**

- Reduced burden on conventional power supply & dependency on Kerosene.
- Increased social as well as substantial agro-based rural economic activities.
- Local employment generation.

**INITIATIVE**

- **15000 Solar Street Lights** installed by State Government Fund (NABARD-RIDF) in **1012 markets**.
Increased frequency in livelihood activities at Batapara, Ganganagar through SLS

**INITIATIVE**
- 29000 Solar Street Lights in 993 GPs under various departments (MNRE, Rurban Mission, Panchayat etc.)
- Illumination of rural and remote roads, gathering places, hospitals etc.

**IMPACT**
- Socio-economic development of rural people.
- Livelihood activities extended.
- Sense of security felt by females
PIioneer steps on PM_Kusum

- **First Phase**
  - Farmer share Rs.2500 for 1 HP & Rs.5000/- for 2 HP for marginal individual farmers and in all other states 20%
  - Boring cost by state upto Rs.1.2 lakh and in all other state is to be borne by farmers.

- **Second Phase**
  - Farmer share Rs.10000 for 1 HP & Rs.15000 for 2 HP for individual/group/community farmers and in all other states 20%.
  - Boring cost by state upto Rs.1.2 lakh and in all other states to be borne by farmers.

- Vegetable crop production has been increased and developed agro based rural economies.
- Farmers are developing in terms of income generation.
- Ensured better livelihood.
- Local employment generation.
DOUBLE CROPPING WITH SOLAR PUMP

- 2274 Solar Pumps installed and 3847 ongoing.
- 4348 Acre land covered.
- 750 nos. existing pumps solarization work going on.

INITIATIVE
LAST MILE POWER- SOLAR MICRO-GRID

INITIATIVE

- 20 Remote hamlet/habitation/villages (435 households) are covered by installation of 65 KW Micro Grid through Solar.
- Facilitate the habitations with grid quality power for street lights, indoor illuminations, drinking water etc.
- To run and facilitate electric appliances
  - i.e. TV, Mobile, Internet etc.

IMPACT

- Remote hamlets now gradually progressing educationally and economically.
- Increased social harmony.
- Lives of habitants are getting healthier, easier, and enjoyable.
- The traditional bamboo products and weaving at night is now possible.
- Business activities still running at nights.
LIVELINESS OF SHARKIPARA
<table>
<thead>
<tr>
<th><strong>NAME OF THE PROJECT</strong></th>
<th>Establishment of micro-grid through Solar Photovoltaic Power Plant or supply of reliable power to habitants of remote habitations / hamlets under Prime Minister’s Development Initiative for North East Region (PM-Dev INE) Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COVERAGE &amp; CAPACITY</strong></td>
<td>274 micro-grids – 9253 families and 3335 KWp SPV Power Plants (Aggraded capacity)</td>
</tr>
<tr>
<td><strong>COST</strong></td>
<td>Rs. 81.02 Crore</td>
</tr>
<tr>
<td><strong>LOCATION</strong></td>
<td>274 Remote habitations / hamlets (20 to 30 kms. From)</td>
</tr>
</tbody>
</table>
| **STATUS**             | ✓ In principle, Ministry of DoNER have approved  
✓ DPR vetted by IIT, Guwahati  
✓ State DISCOM (TSECL) has certified the habitation / hamlets as un-electrified.                                                                 |
SOLAR COMMUNITY WATER PURIFIER PLANT FOR DISEASE FREE LIFE

INITIATIVE

❖ To provide Solar community based drinking water plant in remote hamlet 7 nos. iron removal and water purification system have been installed.
❖ To facilitate for storing and collecting water.

IMPACT

❖ Disease free healthy life.
❖ Time and labour is saved as water collection is at doorstep.
❖ Sustainable solution for drinking water in rural remote hamlets and off-grid areas.
OFF-GRID RELIABLE SOLAR POWER IN RURAL ESSENTIAL GOVT. ESTABLISHMENT

**Thalchar TSR Camp, Chawmanu**

**Raishyabari VC office**

**ILR life saving medicine in Hospital**

**INITIATIVE**

- Generation of electricity through installation of 2.10 MW solar Power Plant.
- Installation of Solar power plant covering all hospitals, security camps, panchayet offices and other Govt. offices.

**IMPACT**

- People getting better service in rural hospitals including critical delivery/surgeries. ILR for life saving medicines.
- Offices are performing services more efficiently.
- Solar power plants are gradually leading to improvements in rural lives.
GRID-TIED SOLAR POWER PLANTS

INITIATIVE

❖ Installation of 2.864 MW Grid connected solar power plants in Govt. buildings.
❖ Planning to install floating solar power plant.

IMPACT

❖ Reduced dependency on conventional power.
❖ Energy savings for future generation.
❖ Mitigate climate change issues.
❖ Fulfillment of RPO Obligation.
❖ Mitigation of Renewable Purchase Obligation.
❖ Environment protection.
**VIBRANT VILLAGE**: Project Proposal for installation of 69 nos. of 80 KWp/50 KWp/12 KWp/12KWp/8KWp grid connected Solar Photovoltaic Power Plants (Aggregated capacity – 2558 KWp) at 8 (eight) Vibrant Villages in Tripura have been submitted to MNRE under Grid Connected Rooftop Solar Programme – Phase II through Virtual Net Metering (VNM)

+ **Project Cost**: Rs. 16.19 crore

+ **MNRE Share**: Rs. 4.31 crore

+ **State Share**: Rs. 11.88 crore
  + State Government has already sanctioned Rs. 11.88 crore under Swarna Jayanti Tripura Nirman Yojna.

+ **Status of the project**: Sanction from MNRE, Govt. of India is yet to be received.
FIRST SOLAR HAMLET, KHARANSING KAMI, KILLA

INITIATIVE

- 6 Nos. of 2 HP Solar Pump installed for irrigation
- Solar Micro Grid 2 Nos. 5 KWp have been established.
- Local market, village roads have been illuminated by 71 nos. of Solar Stret Lighting Systems.
- 45,000 Lt./ Day capacity Solar based Community Water Purification Plant installed.
- 8 nos. Biogas Plant installed for household cooking.
- Supply of 24 nos. fuel efficient improved cook stoves for smokeless clean cooking.
- Distribution of 67 Solar Study Lamps for school going children.

IMPACT

- Exploring energy access through Renewable Energy Sources.
- Implementation of various Renewable Energy Schemes.
- Purified drinking water for villagers.
- Steady electricity.
- Develop better livelihoods.
SOLUTION FOR ENERGY ACCESS IN REMOTE AREAS

Solar Hamlet, Kharangsinghkami, Killa
### Overall power generation and CO2 Emission reduction data

<table>
<thead>
<tr>
<th>Details of Solar Energy Generation</th>
<th>No. of Product</th>
<th>KW</th>
<th>Total Power Generation in KW</th>
<th>CO2 Emission Reduction in Ton/ Day (0.8 Kg./KW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Study Lamps in 3335 Schools</td>
<td>300000</td>
<td>0.0025</td>
<td>750</td>
<td>0.68</td>
</tr>
<tr>
<td>Solar Street Lights in 1012 markets</td>
<td>15000</td>
<td>0.075</td>
<td>1125</td>
<td>0.90</td>
</tr>
<tr>
<td>Solar Street Lights in 993 GPs</td>
<td>29000</td>
<td>0.075</td>
<td>2175</td>
<td>1.96</td>
</tr>
<tr>
<td>Solar pumps covering 4348 Acre of land</td>
<td>3024</td>
<td>5593.2</td>
<td>5593.2</td>
<td>5.03</td>
</tr>
<tr>
<td>Solar Water Pumps</td>
<td>3847</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Micro Grid 20 remote 435 households</td>
<td>1</td>
<td>65</td>
<td>65</td>
<td>0.06</td>
</tr>
<tr>
<td>Solar Purifier</td>
<td>7</td>
<td>3</td>
<td>21</td>
<td>0.02</td>
</tr>
<tr>
<td>Off Grid Solar Power Plant</td>
<td>1</td>
<td>2100</td>
<td>2100</td>
<td>1.89</td>
</tr>
<tr>
<td>Grid Tied Solar Power Plant</td>
<td>1</td>
<td>2864</td>
<td>2864</td>
<td>2.58</td>
</tr>
<tr>
<td><strong>Total Value</strong></td>
<td></td>
<td></td>
<td><strong>14693.2</strong></td>
<td><strong>13.12</strong></td>
</tr>
</tbody>
</table>
BIOGAS PROGRAMME
TRADITIONAL CHULHA
LPG LIFE LIMITED YEARS......
About 52% village people depends on fire wood.

Rising cost of LPG cylinders.

Piles of Cow dung in villages & wastage give breeding heaven for housefly and mosquitoes also odour issues.

Women in villages leaves in drudgery as smoke generation from conventional cooking impart diseases related to eyes and respiration.

Deforestation & ecological imbalance.

Methane from cow dung piles goes into environment which is 22 times hazardous than Carbon Dioxide which pollutes air in houses & villages.
Biogas Plants are the only Renewable Energy tool which not only gives energy but also gives back to mother earth the essential elements like N, P and K.

North East having huge potential for Renewable Energy and particularly Biogas Plants to make farmers truly “Atma Nirbhar” in Cooking Energy and Organic Manure which is organic fertilizer.
Types of Feed Material

- Cattle Dung (Cow + Buffaloes)
- Cattle in Panjra Pole/ Non-Milch Cattle
- Poultry Waste
- Food Waste
- Vegetable Market Waste
- Agriculture Produce Market Waste
- Fisheries Waste
- Fruit & Food processing waste
- Dairy/ Dairy Industries’ waste
CAPACITY & APPLICATION WISE TYPES OF BIOGAS PLANTS.

➢ Small Size – 1 to 25 Cu. Mtr./Day
➢ Medium Size – 25 to 1000 Cu. Mtr./Day
➢ Higher Size – 1,000 Cu. Mtr. To 10,000 Cu. Mtr./Day
➢ CBG Plants – More than 10,000 Cu. Mtr./Day
Organic Waste Generation source

- **Cow/ Cattle Population**
  - (5.5 Lakh)
- **Poultry Nos.**
  - (42 Lakhs)
- **Waste from Rural House, Vegetable waste at veg. market**
  - (Population 30 Lakh)
- **Urban Organic Waste**
  - (Population 10 Lakh)

**Images:**
- Cattle Dung
- Rural Household waste
- Urban Household waste
### Potential for Biogas Generation & Earnings

<table>
<thead>
<tr>
<th>Substrate Category</th>
<th>Qty. of Substrate/ Cu. Mtr. of gas</th>
<th>Realizable in Ton/ Day</th>
<th>Potential for Biogas generation</th>
<th>Equivalent LPG value</th>
<th>Possible LPG Replacement / Earnings per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle Dung</td>
<td>25 Kg./ Day</td>
<td>5506</td>
<td>2.2 Lakh Cu. Mtr.</td>
<td>0.99 Lakh Kg.</td>
<td>Rs. 68.31 Lakh</td>
</tr>
<tr>
<td>Poultry waste</td>
<td>16 Kg./ Day</td>
<td>769</td>
<td>0.48 Lakh Cu. Mtr.</td>
<td>0.216 Lakh Kg.</td>
<td>Rs. 14.9 Lakh</td>
</tr>
<tr>
<td>Rural House, Market Waste</td>
<td>10 Kg./ Day</td>
<td>192.5</td>
<td>0.19 Lakh Cu. Mtr.</td>
<td>0.086 Lakh Kg.</td>
<td>Rs. 5.9 Lakh</td>
</tr>
<tr>
<td>Urban House, Market Waste</td>
<td>10 Kg./ Day</td>
<td>241.63</td>
<td>0.24 Lakh Cu. Mtr.</td>
<td>0.108 Lakh Kg.</td>
<td>Rs. 7.45 Lakh</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>6709.13</td>
<td>3.27 Lakh Cu. Mtr.</td>
<td>1.472 Lakh Kg.</td>
<td>Rs. 96.56 Lakh</td>
</tr>
</tbody>
</table>

Total Annual Earnings from Biogas Generation Rs. 347.62 Crores
TREDA Recent Initiative and Success Story

➢ TREDA had initiated the concept of Bio-Village & Cluster approach.
➢ Bio Village has 75 Biogas plants and 800 nos. in cluster of 16 villages.
➢ Under NNBOMP Scheme/STATE/CSR of MNRE 745 nos. recently.
➢ TREDA conduction the user training program time to time to ensure the proper functioning of the plants.
## Implementation Details and Funding

<table>
<thead>
<tr>
<th>Name of the Scheme</th>
<th>Number of village covered</th>
<th>Capacity</th>
<th>No. of biogas plant installed</th>
<th>Beneficiary share</th>
<th>Central/State Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio-Village</td>
<td>12 nos.</td>
<td>1 CUM</td>
<td>75 nos.</td>
<td>Rs.500/-</td>
<td>Central : Rs.17000/- State/CSR funding : Rs.24,500/-</td>
</tr>
<tr>
<td>GOBARDHAN SCHEME</td>
<td>18 nos.(Cluster village)</td>
<td>1 CUM</td>
<td>800 nos.</td>
<td>--</td>
<td>Funded by DWS under Swachh Bharat Mission</td>
</tr>
<tr>
<td>MNRE Scheme</td>
<td>50 blocks (Individual beneficiary)</td>
<td>1 CUM /2 CUM</td>
<td>745 nos.</td>
<td>1 CUM = Rs.500/- 2 CUM = Rs.1000/-</td>
<td>a) For 1 CUM Central : Rs.17000/- State/CSR funding : Rs.24,500/- b) For 2 CUM Central : Rs.22000/- State/CSR funding : Rs.39,000/-</td>
</tr>
</tbody>
</table>
TYPES OF BIOGAS PLANT

FIXED TYPE

PORTABLE TYPE
Installation of 1620 Biogas plants recently installed.
Production of fertilizer as a byproduct from cattle dung.
Prevention of deforestation.
To meet ‘lifeline energy’ needs for cooking.
PHOTOGRAPHS OF INSTALLED PLANTS
WASTE TO WEALTH
100 CUM BIOGAS PLANT, KANCHANMALA, AGARTALA

➢ OPEPL FRESH PVT. LTD POULTRY FARM
  ❖ Birds – 20,000
  ❖ Poultry Litter – 800-1000 kg./ Day
  ❖ Biogas Plant capacity – 100 Cu. Mtr./ Day
  ❖ Utility –
    1. Cooking of 45 workers
    2. Production of Organic Fertilizer with local herbal plants use for Crop production, fish production, rubber production etc. and excess sold in market.
  ❖ Total Yearly Income – Rs. 20 Lakh/ Annum
  ❖ Additional 200 CUM capacity biogas plant under process.
## Socio-Economic & Environment Impact

- **Impact of 1620 recently visited installations**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total waste handling per day</td>
<td>40.5 Ton/ Day</td>
</tr>
<tr>
<td>Daily gas generation</td>
<td>1,620 Cu.Mtr./Day</td>
</tr>
<tr>
<td>Daily firewood savings @ 3.45 kg/ plant</td>
<td>5.589 Ton/Day</td>
</tr>
<tr>
<td>Equivalent LPG value</td>
<td>729 Kg./ Day</td>
</tr>
<tr>
<td>Monthly LPG Replacement value</td>
<td>21.87 Ton/ Month</td>
</tr>
<tr>
<td>Annual LPG Replacement value</td>
<td>262.44 Ton/ Annum</td>
</tr>
<tr>
<td>Daily fertilizer generation</td>
<td>16.2 Ton/ Day</td>
</tr>
<tr>
<td>Monthly fertilizer generation</td>
<td>486 Ton/ Month</td>
</tr>
<tr>
<td>Annual Fertilizer generation</td>
<td>5832 Ton/ Annum</td>
</tr>
</tbody>
</table>
Socio-Economic & Environment Impact

Impact of 1620 recently visited installations

Savings with LPG Replacement @ Rs.69/ Kg.: Rs. 50,300/ Day
Monthly LPG Replacement value: Rs. 15.09 Lakh/ Month
Annual LPG Replacement value: Rs. 1.81 Crore/ Annum
Revenue from fertilizer @ Rs.3/Kg.: Rs. 48,600 / Day
Monthly revenue with fertilizer generation: Rs. 14.58 Lakh/ Month
Annual revenue with Fertilizer generation: Rs. 1.75 Cr./ Annum
Daily CH4 emission reduction: 691.82 Kg/ Day
Daily CO2 emission reduction: 15,220 Kg/ Day
Monthly CO2 emission reduction: 456.6 Ton/ Month
Yearly CO2 emission reduction: 5479.2 Ton/ Annum
Next Initiatives

Project - 1
➢ Family size biogas plants around 10,000 with MNRE/ State/ GOBARDHAN Scheme etc.

Project – 2
➢ For 8 Clusters there will be one PROM Mfg. Unit of 5 Ton/ Day Capacity
➢ PROM Mfg. Unit will convert 4 Ton de-watered Cake in to 5 Ton/ Day PROM

Project – 3
➢ Installation of 240 Cu. Mtr./ Day capacity plant at Basant Bihar Gaushala, South Tripura District

Project – 4
➢ Market (Vegetable / Fruits/ Grain) waste based biogas plant
Project - 2 PROM Manufacturing Unit

- Two PROM (Phosphate Rich Organic Manure) manufacturing unit will be installed for the cluster of 8 villages.
- Total for the cluster of 16 villages two PROM manufacturing unit will be installed.
- Digested slurry will be dewatered in the specially designed Slurry Filter.
- Digested-Dewatered cake will be blended with rock phosphate along with other nutrient material to produce very high quality PROM which can replace Single Super Phosphate.
- Each plant will produce 200 Ton PROM/year
Fund Arrangements

- MNRE – NNMBOMP Scheme
- SBM – G – Swachh Bharat Mission
- 15TH Finance Commission
- MNREGA Scheme
- NABARD/ RIDF
- CSR/ State Fund Scheme
Local Co-operative / Village Committee will be formed for taking ownership of the Project.

Panchayet Development Fund(PDF) / BEUF etc. will be arranged for maintenance / replacement / replacement of the components after 5 years AMC Period.

A corpus fund with fixed / rational contribution from the users will also be formed.

Local User training programme are being conducted.

Initiative taken for setting up of call center for post maintenance.
## Vision Plan 2030

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Name of RE Projects/Scheme</th>
<th>Capacity/Number</th>
<th>Total Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Solar Street light</td>
<td>300000 nos.</td>
<td>22.5 MW</td>
</tr>
<tr>
<td>2.</td>
<td>Solar Power Plant in rural areas (Off-grid)</td>
<td>5 MW</td>
<td>5 MW</td>
</tr>
<tr>
<td>3.</td>
<td>Solar Micro-grid</td>
<td>5 MW</td>
<td>5 MW</td>
</tr>
<tr>
<td>4.</td>
<td>Solar Grid connected Power Plant/Floating Solar</td>
<td>130 MW</td>
<td>130 MW</td>
</tr>
<tr>
<td>5.</td>
<td>Solar RO water</td>
<td>1000 nos.</td>
<td>3 MW</td>
</tr>
<tr>
<td>6.</td>
<td>Solar Pump (Component B &amp; C)</td>
<td>10600 nos.</td>
<td>21.2 MW</td>
</tr>
<tr>
<td>7.</td>
<td>Higher Capacity Solar Pump</td>
<td>100 nos.</td>
<td>1 MW</td>
</tr>
<tr>
<td>8.</td>
<td>Solar Rooftop (Domestic &amp; Govt.)</td>
<td>60 MW</td>
<td>60 MW</td>
</tr>
<tr>
<td>10.</td>
<td>Solar High Mast</td>
<td>1000 nos.</td>
<td>0.8 MW</td>
</tr>
<tr>
<td>11.</td>
<td>Biogas</td>
<td>100000 nos.</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total 261 MW</td>
</tr>
</tbody>
</table>
➢ Increase adoption of DRE based livelihood solutions.
➢ Adoption of public awareness campaign to scale up of DRE livelihood applications.
➢ Strong monitoring and evaluation framework.
➢ Promoting skill development.
➢ Capacity building and Man Power support.
➢ Adoption of business model to generate income for villagers.
➢ Provision of consultancy support.
➢ Enhancement of CFA upto 90% of Benchmark Cost as well as revision of Benchmark Cost due to high transportation cost for Tripura.
➢ Separate Policy for North East.
SUCCESS STORY OF TREDAR

- TRADA.mpg
LETS MANAGE SOLID WASTE

THANK YOU