Decentralised Solid Waste Management Project

NIRMALA bhavanam
Nirmala NAGARAM

ALAPPUZHA MUNICIPALITY
Decentralised Solid Waste Management Project

ALAPPUZHA MUNICIPALITY

- Coastal Municipality
- Sandwiched between vembanadu lake and arabian sea
- Wards 52
  - 20 wards Rural
  - Area 46.77 Sq. KM
- Population (2011 census) - 197029
- Most Densely Populated Municipality - 4212/Sq. KM
Decentralised Solid Waste Management Project

MSW Crisis in Alappuzha

- 50 tones waste per day (per capita daily waste Generation 210-350 gms-NEERI 1996) in Alleppey it is taken as 250 gms/person/day

Centralised Dumping Yard at Sarvodayapuram

Public Opposition due to Environmental Problems

Local Residents blocked transportation of MSW

Agreed to reopen the yard – condition – bring down the MSW to 5 tons per day

hOW?

Waste piles up in streets
Nirmala Bhavanam Nirmala Nagaram

“Make the houses clean and thereby the streets”

tries to process biodegradable domestic waste at source

domestic bio degradable waste 35 %

Methods

1. Composting – pipe composting and aerobic composting bins

2. Family type biogas plants

Technology Participants

1. IRTC
2. ANERT
3. KERALA Veterinary and Animal Science University
4. Kerala Agriculture University
Decentralised Solid Waste Management Project
Decentralised Solid Waste Management Project
Nirmala Bhavanam Nirmala Nagaram

1. Biodegradable Domestic Waste – composting and bio methanation

2. Hotels, Shops, slaughter houses etc – contract with a private party (pig and fish farms)

3. Plastic etc – periodic collection by the municipality (resource recovery centre)

4. Hazardous Waste – periodic collection by the municipality (resource recovery centre)

5. Hospital Waste – IMA

Pilot project in 12 Wards
Extended to the whole of Municipality
achievements
(upto March 2015)

1. I m³ portable biogas plants IRTC – 1850 (Digester – 600 ltrs, Gas holder – 400 ltrs)

2. KVIC Model fixed biogas plants ANERT 290 (Digester – 1620 ltrs, Gas holder – 550 ltrs)

3. Pipe compost units – 1234 (2 PVC pipes of 8” diameter and 1 m length –1 unit)

4. Aerobic composting bins (Thumboormuzhy model) 166 (4 x 4 x 4 ft Ferro cement bin)
Waste Management

Solid waste

- IRTC Biogas plants 1850*3kgs/ day - 2025.75 Tons/ year
- ANERT Biogas plants 290* 6 Kgs/ day - 635.1 Tons/ year
- Pipe compost units 1234*1kg/ day - 450.41 Tons / year
- ACBs 166* 6 Tons/ year - 996 Tons / year

Total Solid waste management 4107.26 tons / year
Quantity of Liquid waste Managed

- IRTC Biogas plants 1850*5 kgs/day - 3372.61 Tons/year
- ANERT Biogas plants 290* 10 Kgs/day - 1058.5 Tons/year

Total Liquid Waste managed - 4431.10 Tons/year
Energy Conservation

Biogas production

IRTC Biogas plants  -  83538.07 kg LPG equivalent/year
ANERT Biogas Plants  -  31428.38 kg LPG equivalent/year

TOTAL  -  114966.45 kg LPG equivalent/year

(non subsidized cost  11496645  rupees per year)

❑ 1 M³ Biogas is Equivalent to
  - 0.433 Kg of LPG
  - 3.474 Kg of Firewood
  - 0620 Litres of Kerosine
Decentralised Solid Waste Management Project

- Diesel Savings (Due to abandoning of transportation of waste)
  20525.35 Ltrs/year (Rs 1026267.5 per year)

- Organic manure production
  433.92 tons per year (from 1446.41 tones of waste ie, 30 percent manure)

- LED street lighting scheme (upcoming project) 2062170 kwh
  (Rs 24746040 savings expected per year)
## Quantity of Equivalent LPG Saved in Alappuzha Municipality

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Model</th>
<th>No of Biogas Plants Installed</th>
<th>No of Hours Biogas Used in 8cft Burner per day</th>
<th>Equivalent LPG saved per Year in Kg</th>
<th>No of LPG Domestic Cylinder Saved per Year</th>
<th>Total amount Saved Year Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IRTC</td>
<td>1850</td>
<td>1.25</td>
<td>83538.07</td>
<td>5883</td>
<td>8353800</td>
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<td>2</td>
<td>ANERT</td>
<td>290</td>
<td>3</td>
<td>31428.38</td>
<td>2213.27</td>
<td>3142838</td>
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<tr>
<td>Total</td>
<td></td>
<td>2140</td>
<td></td>
<td>114966.45</td>
<td>8096</td>
<td>11496638</td>
</tr>
</tbody>
</table>

- Burner used is 8 Cft
- 1M³ Biogas is Equivalent to 0.433Kg of LPG
- Cost of 1 Kg of LPG Rs 100
- Weight of Domestic LPG Cylinder is 14.2 KG
- Efficiency reckoned 75 %
## Diesel savings Due to abandoning of waste transportation

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Model</th>
<th>Number</th>
<th>Total Solid waste processed Tons/year</th>
<th>Qty of Diesel saved Litres per year</th>
<th>Total amount Saved per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IRTC Biogas Plant</td>
<td>1850</td>
<td>2025.75</td>
<td>10128.75</td>
<td>506437.5</td>
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<td>2</td>
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<td>450.41</td>
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<td>ANERT Biogas plant</td>
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<td>635.10</td>
<td>3175.50</td>
<td>158775</td>
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<tr>
<td>4</td>
<td>KVASU Aerobic Composting Bin</td>
<td>166</td>
<td>996.00</td>
<td>4980.00</td>
<td>249000</td>
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<td>Total</td>
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<td>4107.26</td>
<td>20536.3</td>
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</table>

Waste Processed in IRTC plant/day is taken as 3 Kg

Waste Processed in ANERT plant/day is taken as 6Kg

Waste Processed in Pipe Compost/day is taken as 1 Kg

Waste Processed in Aerobic Compost Bin /Year is taken as 6 ton

Diesel Required for Collection and transportation of 1 Ton waste taken as 5 Litres
### Energy Conservation in a Decentralised Solid Waste Management Project

#### Quantity of Equivalent LPG /Kerosine/Firewood Saved

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Model</th>
<th>No of Biogas Plants Installed</th>
<th>No of Hours Biogas Used in 8cft Burner per day</th>
<th>Equivalent LPG saved Per Year in Kg per Year</th>
<th>Equivalent Firewood saved Per Year in Kg per Year</th>
<th>Equivalent Kerosine saved Per Year in Litres per Year</th>
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<tbody>
<tr>
<td>1</td>
<td>IRTC</td>
<td>1850</td>
<td>1.25</td>
<td>83538.07</td>
<td>670233.86</td>
<td>119615.71</td>
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<tr>
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<td>ANERT</td>
<td>290</td>
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<td>31428.38</td>
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<td>45001.38</td>
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<td></td>
<td></td>
<td>2140</td>
<td>114966.45</td>
<td>922386.70</td>
</tr>
</tbody>
</table>

1\text{M}^3\text{ Biogas is Equivalent to 0.433 Kg of LPG}

1\text{M}^3\text{ Biogas is Equivalent to 3.474 Kg of Firewood}

1\text{M}^3\text{ Biogas is Equivalent to 0.620 Litres of Kerosene}
### Energy Conservation in a Decentralised Solid Waste Management Project

**Quantity of organic Manure Produced from Aerobic Bins and Pipe Compost**

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Model</th>
<th>Qty</th>
<th>Total waste processed in Tons/year</th>
<th>Organic Manure Produced in Tons/year</th>
<th>Value Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aerobic Composting Bin</td>
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<td>996</td>
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<td>2</td>
<td>Pipe Compost</td>
<td>1234</td>
<td>450.41</td>
<td>135.12</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1446.41</strong></td>
<td><strong>433.92</strong></td>
<td><strong>6508800</strong></td>
</tr>
</tbody>
</table>

*Manufacturing 1 ton chemical fertilizer requires 1 ton natural gas*
## Energy Conservation in a Decentralised Solid Waste Management Project

On completion of the project.... Diesel savings

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Model</th>
<th>Model to be Installed</th>
<th>Qty</th>
<th>Waste processing expected (tones per year)</th>
<th>Qty of Diesel expected to be saved Litres per year</th>
<th>Total amount expected to be Saved per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IRTC</td>
<td>Biogas plant</td>
<td>2500</td>
<td>2737.50</td>
<td>13687.50</td>
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<tr>
<td>2</td>
<td>IRTC</td>
<td>Pipe Compost</td>
<td>5000</td>
<td>1825.00</td>
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<td>3</td>
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<td>Biogas plant</td>
<td>500</td>
<td>1095.00</td>
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<td>7</td>
<td>KVASU</td>
<td>Aerobic Composting Bin</td>
<td>200</td>
<td>1200.00</td>
<td>6000.00</td>
<td>360000.00</td>
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<tr>
<td><strong>Total</strong></td>
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<td></td>
<td></td>
<td><strong>6857.50</strong></td>
<td><strong>34287.50</strong></td>
<td><strong>2057250.00</strong></td>
</tr>
</tbody>
</table>

Waste Processed in IRTC plant/day is taken as 3 Kg
Waste Processed in ANERT plant/day is taken as 6 Kg
Waste Processed in Pipe Compost/day is taken as 1 Kg
Waste Processed in Aerobic Compost Bin/Year is taken as 6 ton

Diesel Required for Collection and transportation of 1 Ton waste taken as 5 Litres
Energy Conservation in a Decentralised Solid Waste Management Project

On completion of the project.... Biogas production (LPG Equivalent)

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Model</th>
<th>No of Biogas Sanctioned</th>
<th>No of Hours Biogas expected to be Used in 8cft Burner per day</th>
<th>Equivalent LPG expected to be saved Per Year in Kg</th>
<th>No of LPG Domestic Cylinder expected to be Saved per Year</th>
<th>Total amount expected to be Saved Year Rs</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>IRTC</td>
<td>2500</td>
<td>1.25</td>
<td>112889.29</td>
<td>7949.95</td>
<td>11288929</td>
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<td>Total</td>
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<td>167076.14</td>
<td>11765.93</td>
<td>16707614</td>
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</tbody>
</table>

Burner used is 8 Cft

1M³ Biogas is Equivalent to 0.433Kg of LPG
Cost of 1 Kg of LPG Rs 100

Weight of Domestic LPG Cylinder is 14-2 KG
Waste to wealth

- Bio degradable waste converted to fuel and manure
- Waste menace managed.
- Prevented epidemic out break
- Litter free streets – a boost to tourism economy
- Centralised dumping yard closed down
- Systematic collection of non degradable waste

What a waste .......

decentralized management is the answer..
Cleaning of canal
Cleaning of canal
kµÀi-\-§Ä
सान पैर्क
Thank you