SNV Supported Domestic Biogas Programmes in Nepal and Beyond

Presentation in Start up Meeting
of the Climate and Clean Air Coalition (CCAC)
to Reduce Short-Lived Climate Pollutants (SLCPs)
Agriculture Initiative’s
New Livestock and Manure Management Work Stream

January 23-24, 2014
Rome, Italy
What is Domestic Biogas System?

- Design: fixed dome (2-20 m³)
- Local materials & resources
- Feeding: livestock manure & human excreta (> 15 kg daily)
- Daily stove burning: 1.5 - 15 hours

- Price: US$ 300-1,500
- Life: > 20 years
- Gas use: cooking & basic lighting
- Bio-slurry: organic fertiliser, composting other organic materials
Multiple Benefits of Domestic Biogas System

Health & sanitation

Environment

Energy

Agriculture

Carbon revenues

Economy

Biogas for Better Life!

SNV
Nepal’s Domestic Biogas Programme

- Total domestic bio-digesters till 2013 = 292,979 (2013 = 24,535)

Nepal’s Map with District Wise Domestic Biogas Installation Coverage in Nepal

Annual Trend of Domestic Biogas Plant Installation in Nepal

Fiscal Year Wise Biogas Plant Installation

Percentage of Household with Biogas

- District Line
- 0.00
- 0.01 - 1.00
- 1.01 - 5.00
- 5.01 - 10.00
- 10.01 - 20.00
- 20.01 - 25.00
SNV Supported Programs: Coverage in Asia

By End of 2013
- 8 countries
- 528,000 bio-digesters
- In 2013: 47,925
- Operation Rate: 90%
SNV Supported Programs: Coverage in Africa

By End of 2013
- 9 countries
- 42,000 biodigesters
- 16,865 in 2013

By End of 2013:
Asia + Africa = 570,000
SNV’s Sector Development Approach

• Since 1989, the cornerstone of SNV’s domestic biogas programme has been initiating and supporting *market-based* (national) sector development programmes focused on rural households and SMEs.

• Dual & interlinked objectives:
  - To provide access to energy for households or SMEs;
  - To develop capacities of local organisations in the sector.

• Not less than **5-10 years are required** to develop a sustainable, commercial sub-sector.
Achievements in Domestic Biogas Programs

- Development of proven but generic sector development model, that needs some tailor-making in each country

- Proven institutional set and business modality with government in the driver’s seat and sharing responsibilities with others
  - Clear approach in private sector development
  - Importance and modalities of linkage with micro credit

- Fixed dome biogas design, as a standard design with some variations from countries to countries

- Importance and modalities of quality assurance and monitoring
Achievements in Domestic Biogas .. Contd.

• **Emission Reduction and Carbon Finance**
  - Biogas has a high rate of Emission Reduction per household, hence carbon credit
  - Emission Reduction results, mainly from
    - Avoided/reduced use of firewood, and
    - Avoided methane production due to changed practice in manure/waste management
  - Most of the programs are going for carbon finance (both CDM & Gold Standard VER)
  - Nepal’s Biogas Support Program (BSP) is a successful carbon finance element and moving towards financial self-reliance
    - Credit rate ranges from 2.3 to 4 tons/plant/year
    - Trading rate varies from US $7 to 17 per ton.
Some Issues in Slurry Management

- Biogas technology **improves manure value** of dung

<table>
<thead>
<tr>
<th>Type</th>
<th>Total solid%</th>
<th>Total Nitrogen, %</th>
<th>P$_2$O$_5$ %</th>
<th>K$_2$O %</th>
<th>Organic Carbon, %</th>
<th>C/N Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Yard Manure</td>
<td>21.66</td>
<td>1.06</td>
<td>1.46</td>
<td>0.72</td>
<td>47.0</td>
<td>46.2</td>
</tr>
<tr>
<td>Bio-slurry</td>
<td>7.63</td>
<td>1.26</td>
<td>0.56</td>
<td>0.80</td>
<td>33.0</td>
<td>29.2</td>
</tr>
<tr>
<td>Slurry compost</td>
<td>35.23</td>
<td>1.65</td>
<td>1.23</td>
<td>0.90</td>
<td>37.90</td>
<td>23.50</td>
</tr>
</tbody>
</table>


- Nepal’s **Biogas Support Program (BSP)** has been making a lot of effort in improved use of bio-slurry, including demos, training and
  - Incentives for biogas companies for improved use of slurry by users

- **Result of slurry use is mixed**, depending on area, user and company
  - A report in Nepal reveals around 89% users use slurry (63% for composting, 29.48% after drying and 4.99% as liquid in the field).
Some Issues in Slurry Management.. Contd.

- The knowledge that use of bio-slurry significantly improves yield, is not always resulting in improvement in farmers’ practice.
- The science is clear, method is not and practice far from perfect!
- A study report from Nepal is presented below:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield, ton/ha</th>
<th>Difference from control, ton/ha</th>
<th>Difference from control, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1=Control (farmer practice)</td>
<td>27.5</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>T2=FYM @20ton/ha</td>
<td>30.5</td>
<td>3.0</td>
<td>10%</td>
</tr>
<tr>
<td>T3=Slurry compost @18 ton/ha</td>
<td>32.0</td>
<td>4.5</td>
<td>14%</td>
</tr>
<tr>
<td>T4=Liquid-slurry @16 ton/ha</td>
<td>28.7</td>
<td>1.2</td>
<td>4%</td>
</tr>
<tr>
<td>T5=Recommended dose of chemical fertilizer (120N:60P:50K)</td>
<td>31.9</td>
<td>4.4</td>
<td>14%</td>
</tr>
<tr>
<td>T6=Fertiliser (T5) + slurry compost (T3)</td>
<td>35.5</td>
<td>8.0</td>
<td>23%</td>
</tr>
<tr>
<td>T7=1/2 slurry compost (@9 ton/ha) + 1/2 fertilizer (60N:30P:25K)</td>
<td>26.6</td>
<td>-0.9</td>
<td>-3%</td>
</tr>
</tbody>
</table>

Source: Impact Study of Bio-slurry on Soil Quality and Cauliflower Production, Nepal (2011/12)
Engagement of the CCAC Agriculture Initiative

- **Rationale for Additional Support from the Initiative**
  - Many countries have substantial fund gaps to continue the program and to scale up with equity, commercialisation and sustainability.
  - Some aspects of the programs, including the ones in advanced stage of sector development, do need further support in specific areas.
  - For example, Nepal programme still needs innovation in bio-slurry management, access to micro credit and reaching the poor.

- **Outputs and Levels of Impact Expected from the Engagement**
  - Different programs expect varying outputs and impacts.
  - For example, Cambodia needs support to strengthen private sector for faster scaling up.
  - TA with strong focus on slurry management knowledge, tools and techniques will be very useful in all programs.
Engagement of the CCAC Agriculture Initiative

• Common ground for effective inclusion/participation of stakeholders in the implementation of the opportunities
  ➢ Groundwork for effective involvement of stakeholders is already done with SNV’s effective multi-stakeholder facilitation roles
  ➢ In all programs, the government is in the driving seat and work with others, including private sector with clear roles and space.

• Main lessons that will be learned and can benefit others in the pursuit of sustainable livestock sector development
  ➢ Effective slurry management practices can be taught to farmers, through e.g., action research and effective extension programs
  ➢ Biogas technology is as good for agriculture, as for clean and renewable energy, once all benefits are harnessed.
Engagement of the CCAC Agriculture Initiative

- Roles of government and others to create enabling environment
  - “Eco-system approach” of thinking and partnering
    - Government, both national and sub-national, must be the facilitator, coordinator, promoter and regulator, while creating an enabling environment for private sector and others
    - Private sector has to play its role keeping in mind that biogas has a substantial public good in it, hence a PPP
    - Other actors like civil society organizations come in to help build capacities and to act as capacity-gap-fillers.
    - Financial institutions lubricate market and help reach the poor.
    - Other development partners support the local eco-system of actors, with a programmatic approach.
Thank you and welcome for partnership!

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