Promotion of biogas in (agro)-industries – UNIDO’s ongoing projects

Brief overview of current project activities

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A. About Energy Branch Activities

B. Selected flagship projects

C. Biogas Projects
   - Why promoting industrial scale biogas
   - Some ongoing biogas projects
   - Emerging experiences
The global energy agenda is being shaped by **two** predominant forces:

- **ENERGY SECURITY**
  - The need to address the energy poverty through reliable, affordable and sustainable forms of energy

- **CLIMATE SECURITY**
  - The need to shift energy production and consumption towards cleaner, efficient and greener patterns

These forces create opportunities and challenges for all countries to meet twin objectives of ENERGY AND CLIMATE SECURITY for ensuring long term sustainable energy development.
UNIDO Energy and Climate Change Programme

Four Strategic Pillars

Industrial Energy Efficiency
- Energy Management System-ISO 50001
- Energy System Optimization
- Sub-sector, process and product specific

Renewable Energy
- Smart Mini-Grids
- Renewable Energy for Industrial Applications
- Business Models

Low-Carbon Low Emission Technologies
- Integrated Low Emission Technologies
- Innovative Clean Technologies; Hydrogen, Carbon Capture Storage
- Sustainable Transport/ Cities

Policy, Partnership and Global Forums
- EE & RE Regional and National Policies
- Transformational, Strategic and Knowledge Partnerships
- Vienna Energy Forum, COP, Climate Summit
Energy Projects Footprint

Over 50 Countries

<table>
<thead>
<tr>
<th>Number of Projects</th>
<th>Total $US Mio</th>
</tr>
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<tbody>
<tr>
<td>117</td>
<td>254.4</td>
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</table>
B. Selected flagship projects
UNIDO GEF Global CleanTech Innovation Programme for SMEs (GCIP)

Pillars

- Supporting Innovation Ecosystem
- Development of strong entrepreneurship
- Enhancing access to venture capitalists, angel investors and grant funding
- Mentoring and Training of clean energy technology start-ups
- Bankable start-ups for scaling up operations

Currently On-going in 7 countries and expected to expand to 25 countries in GEF 6
Regional Sustainable Energy Centers

- ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)
- East African Centre for Renewable Energy and Energy Efficiency (EACREEE)
- Renewable Centre for Renewable Energy and Energy Efficiency (RCREEE) for the Arab region
- Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE)
- Southern African Centre for Renewable Energy and Energy Efficiency (SACREEE)
- Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE)
- Regional Observatory for Renewable Energy in Latin America and the Caribbean
Global Energy Training Programme

SLOVENIA
Sustainable Energy Solutions Programme for Energy Experts

INDIA
UNIDO-TERI Energy Leadership Programme for Policy Makers

CAPE VERDE
UNIDO and ECREEE and Columbia University Training Programme for Engineers, Utility Professionals
UNIDO and Sustainable Energy for All – SE4ALL

Strategic Approach

Global Hub for Industrial Energy Efficiency

Country Level Action Plans – Focus on IEE and RE Technologies

System Approach on Nexus Issues (Energy-Water-Food-Health)

Technology Transfer, Scaling up Markets and Capacity Building
C. Industrial Biogas projects
Why promote industrial biogas system?

- Agro industries and agriculture are sources of livelihoods for many in developing countries.
- They provide employment, incomes, in remote areas.
- Energy is a major constraint to their operations affecting their productivity and ultimately competitiveness.
Electricity access and insecurity in enterprises in SSA and South Asia

<table>
<thead>
<tr>
<th></th>
<th>Sub-Saharan Africa</th>
<th>South Asia</th>
<th>High Income Countries</th>
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<tbody>
<tr>
<td>Cost to get electricity (as a percentage of income per capita)</td>
<td>4,736.9%</td>
<td>1,894.9%</td>
<td>79.1%*</td>
</tr>
<tr>
<td>Days to gain access</td>
<td>133</td>
<td>148</td>
<td>89*</td>
</tr>
<tr>
<td>People with access to electricity</td>
<td>36%</td>
<td>62%</td>
<td>99.7%*</td>
</tr>
<tr>
<td>Electricity losses as a percentage of output</td>
<td>10.8%</td>
<td>20.3%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Electricity consumption (Kwh per capita)</td>
<td>534.9</td>
<td>605.2</td>
<td>8,905.4</td>
</tr>
<tr>
<td>Hours for an average outage</td>
<td>5.3</td>
<td>2.4</td>
<td>0.99</td>
</tr>
<tr>
<td>Percentage of firms identifying electricity as a major constraint</td>
<td>49.3%</td>
<td>53.2%</td>
<td>26.0%</td>
</tr>
</tbody>
</table>

Advantages of waste to energy biogas systems in enterprises

- GHG emissions reduction
- Reduction/replacing fossil energy carriers and closing the nutrient cycles.
- Avoidance of ~ 90% methane emissions from open disposal
- Reduction of waste volume by 50-80%
- Production of organic fertilizers that could create jobs for local communities
- Biogas is dispatch able/ flexible – balance fluctuations from other renewables.
- Power and heat generation in decentralized systems
Architecture of a typical UNIDO industrial biogas project.

**Overall Objective** - to stimulate market-based adoption of biogas technology in industries by attending barriers related to:

A – Policy and regulatory issues

B – Capacity of market players and enablers.

C – Awareness and knowledge.

D – Technical feasibility and commercial viability of biogas systems and applications

E – Access financing

Gender & S-S/N-S-S cooperation
Promotion of waste-to-energy (WTE) applications in agro-industries of Tanzania

- **OBJECTIVE:**
  - To promote investments in WTE technologies for electricity generation in agro-industries

- **KEY PARTNERS:**
  - Ministry of Energy and Minerals (MEM) and Rural Energy Agency (REA)

- **OUTPUTS:**
  - Improving human and institutional capacity for continuous development of WTE projects
  - Demonstrating WTE projects on a private-public partnership (PPP) basis for a cumulative 6.8 MW capacity leading to upscaling of the WTE technology and an overall emissions reduction of around 328,877 tCO2e
  - Establishing a favorable investment environment leading to replication of at least 15MW

- **BUDGET:** US$ 32.1 Million
  - GEF grant US$ 5.3 Million
  - Co-financing US$ 26.8 Million
Sustainable conversion of waste to clean energy for greenhouse gas (GHG) emissions reduction in Kenya

**OBJECTIVE:**
- To promote investments in waste-to-energy (WTE) technologies to increase electrification and to reduce GHG emissions

**KEY PARTNERS:**
- Ministry of Energy (MoE), Ministry of Industrialization and Enterprise Development (MoIED), and Ministry of Agriculture, Livestock and Fisheries (MoALF)

**OUTCOMES:**
- Improved awareness knowledge sharing on best practices and capacity building on WTE in the country
- Increased involvement of private investors in WTE projects
- Increased use of biogas for energy generation.

**BUDGET: US$ 10.8 Million**
- GEF grant US$ 2.0 Million
- Co-financing US$ 8.8 Million
Reduction of GHG emission through promotion of commercial biogas plants in Cambodia

**OBJECTIVE:**
- To promote investments in biogas based rural electricity enterprises (REE) for increasing rural electrification

**KEY PARTNERS:**
- Ministry of Environment (MoE), Ministry of Agriculture, Forestry and Fisheries (MAFF) and Foreign Trade Bank (FTB)

**OUTPUTS:**
- Improving human and institutional capacity for continuous development, sustainable operation and maintenance of commercial biogas projects
- Demonstrating biogas projects on a private-public partnership (PPP) basis for a cumulative at least 1.5 MW installed capacity leading to scaling up of biogas technologies
- An enabling investment environment through the creation of incentive schemes leading to replication of at least 4 MW installed at animal farms;
- Reducing GHG emissions of 1,348,707 tCO2e directly and 7,915 tCO2e from post-direct investment

**BUDGET: US$ 14.0 Million**
- GEF grant US$ 1.5 Million
- Co-financing US$ 12.5 Million
Organic waste streams for industrial renewable energy applications in India

OBJECTIVE:
Increase the use of organic waste streams through AD in key SME sectors
To increase the competitiveness of SMEs, trigger technology innovation and reduce dependency on fossil fuels

KEY PARTNERS:
Ministry of New and Renewable Energy (MNRE) + other relevant Ministries/agencies

OUTPUTS:
Demonstrated technical and financial viability of organic waste to energy applications for most relevant sectors
Enhancement of capacity of key players in target sectors
Sustainable replication model across target industries

BUDGET: US$ 21.5 Million
GEF grant US$ 3.3 Million; Co-financing US$ 18.2 Million
**GEF-5 RE project in South Africa:**

**Promoting Market Based adoption of integrated biogas technologies IN SMEs in South Africa – Accelerating biogas market development**

**OBJECTIVE:**
To promote market based adoption of integrated biogas technologies in SMEs

**BUDGET:**
Total: US$ 30 million
US$ 4.2 million from GEF grant
US$ 25.8 million in co-financing

**DURATION:**
October 2015 – September 2019 (48 months)
**GEF-5 RE project in Uruguay:**

**Towards a green economy in Uruguay: Stimulating sustainable production practices and low-emission technologies in prioritized sectors**

**OBJECTIVE:**
To transform the different kinds of waste generated in the agriculture and the agro-industry production chains in Uruguay into various types of energy and/or other byproducts with the aim of reducing GHG emissions, while contributing to the development of a low carbon sustainable production model supported by an adequate technology development and transfer.

**BUDGET:**
Total: US$ 35,802,727
US$ 3,392,727 from GEF grant and US$ 32,410,000 in co-financing

**DURATION:**
December 2013 - November 2017 (48 months)
GEF-5 RE project in Chile:

Promoting the development of biogas energy amongst select small- and medium-sized agro-industries

OBJECTIVE:
To reduce GHG emissions by promoting investment and market development of biogas energy technologies in select agro-industries in Chile.

BUDGET:
Total: US$ 18,159,151
US$ 1,715,151 from GEF grant and US$ 16,444,500 in co-financing

DURATION:
November 2014 - October 2017 (36 months)
**GEF-6 RE project in Argentina:**

Reducing Argentina’s greenhouse gas emissions from the energy sector through the utilization of organic waste for energy generation in agriculture and agroindustries.

**OBJECTIVE:**
To reduce GHG emissions from Argentina’s energy sector by incorporating organic residues and waste into generation of heat and electricity in the agro-industrial sector.

**EXPECTED BUDGET:**
Estimated total: US$ 33,060,000
US$ 6,000,000 from GEF grant and US$ 27,060,000 in co-financing

**EXPECTED DURATION:**
Q4 2016 – Q3 2020 (48 months)
**Potential GEF-6 RE project in Brazil:**

**Biogas applications for the Brazilian agro-industry**

**OBJECTIVE:**
To reduce GHG emissions and dependence on fossil fuels through the promotion of biogas-based solutions for productive uses and mobility along agro-industrial supply chains, thus contributing to the innovativeness, competiveness and sustainability of the Brazilian agro-industries.

**EXPECTED BUDGET:**
Estimated total: US$ 49,248,000
US$ 7,000,000 from GEF grant and US$ 42,248,000 in co-financing

**EXPECTED DURATION:**
Q2 2017 – Q1 2022 (60 months)
Supporting green industrial development in Ghana: Biogas technology and business for sustainable growth

OBJECTIVES:
- Increase access to sustainable energy for productive uses in Ghana contributing to inclusive and sustainable industrial development
- Transfer of biogas technology between Korea and Ghana
- Capacity building

COUNTERPARTS:
Ministry of Trade and Industry, Ministry of Energy, Energy Commission

BUDGET:
EUR 1,280,000 from the Government of Korea

DURATION:
September 2013 – August 2016
Summary of experiences from our projects

• Our projects are demand driven and UNIDO plays a catalytic role.

• Streamlining regulations is central to success.

• Most countries need technical expertise in specialized areas of biogas.

• Biogas in developing countries presents opportunities for investors, technology suppliers. What is critical, is to get “right” partners on the ground.

• Capacity Building is central to support the growth of the industry.

• Financiers are keen to finance viable projects.
Thank You!

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