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**UNITED NATIONS YOUTH AND STUDENT ASSOCIATION OF AUSTRIA**

GRAZ - INNSBRUCK - KLAGENFURT - LINZ - SALZBURG - VIENNA



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### **Preparation Paper**

**United Nations Industrial Development Organization**

**“Supporting Biogas Production as Supplementary Income  
for Small Farmers”**

## **Introduction**

The United Nations Industrial Development Organization (UNIDO) has been created in order to promote and accelerate the industrialization of developing countries by the resolution 2152 (XXI) as an autonomous body within the United Nations in November 1966. In January 1967, the Organization was formally established with Headquarters in Vienna, Austria. In 1979 a draft constitution preparing its conversion into a specialized agency was adopted but it was only in 1985 that UNIDO finally became the sixteenth specialized agency of the United Nations. Facing a tough crisis in the early 1990's and the withdrawal of three major countries (USA, Canada and Australia), the member states finally adopted a business plan for the future role and functions of UNIDO in 1997. The main purpose of the business plan was to enable UNIDO to better respond to the changing global economic environment while avoiding overlap and duplication with other multilateral institutions. From 2001 the United Nations Millennium Development Goals play a crucial role in the work of UNIDO; a new corporate strategy has been adopted in 2003.

## **United Nations Industrial Development Organization**

UNIDO is the specialized agency of the United Nations that promotes industrial development for poverty reduction, inclusive globalization and environmental sustainability.

The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations. Its mandate is to promote and accelerate sustainable industrial development in developing countries and economies in transition, and work towards improving living conditions in the world's poorest countries by drawing on its combined global resources and expertise.

In recent years, UNIDO has assumed an enhanced role in the global development agenda by focusing its activities on poverty reduction, inclusive globalization and environmental sustainability. Our services are based on two core functions: as a global forum, we generate and disseminate industry-related knowledge; as a technical cooperation agency, we provide technical support and implement projects.

Today, the Organization is recognized as a highly relevant, specialized and efficient provider of key services in support of the interlinked challenges of reducing poverty through productive activities, promoting the integration of developing countries in global trade through trade capacity building, fostering environmental sustainability in industry, and improving access to energy.

Our long-term vision is to aspire to a world of opportunity where progress is equitable, accessible and sustainable and where the alleviation of poverty is considered a common aim and global responsibility. UNIDO's role is that of an informed institution, in tuned with the goals of its partners and capable of making an effective contribution to industrial development and sustainable development.

## **Biogas**

### **1) Overview**

Biogas is the gaseous product of the anaerobic digestion (decomposition without oxygen) of organic matter. It is typically made up of 50-80% methane, 20-50% carbon dioxide, and traces of gases such as hydrogen, carbon monoxide, and nitrogen. In contrast, natural gas is typically made up of more than 70% methane, with most of the rest being other hydrocarbons (such as propane and butane) and only small amounts of carbon dioxide and other contaminants. Biogas is sometimes called swamp gas, landfill gas, or digester gas. When its composition is upgraded to a higher standard of purity, it can be called renewable natural gas.

Biogas is used for many different applications worldwide. In rural communities, small-scale digesters provide biogas for single-household cooking and lighting. China alone is estimated to have 8–17 million of these systems. Large-scale digesters provide biogas for electricity production, heat and steam, chemical production, and vehicle fuel.

Once upgraded to the required level of purity (and compressed or liquefied), biogas can be used as an alternative vehicle fuel in the same forms as conventionally derived natural gas.

## 2) Production

Biogas is practically produced as landfill gas (LFG) or digester gas.

A biogas plant is the name often given to an anaerobic digester that treats farm wastes or energy crops.

### Sources

- Sewage sludge
- Agricultural wastes
- Industrial wastes
- Animal by-products
- Municipal solid wastes

### Anaerobic Digestion Methods

- Dry continuous digestion of source separated waste
- Farm-scale biogas production
- Large-scale centralized co-digestion

Biogas can be produced utilizing anaerobic digesters. These plants can be fed with energy crops such as maize silage or biodegradable wastes including sewage sludge and food waste. During the process, an air-tight tank transforms biomass waste into methane producing renewable energy that can be used for heating, electricity, and many other operations that use any variation of an internal combustion engine, such as GE Jenbacher gas engines. There are two key processes: Mesophilic and Thermophilic digestion.

Landfill gas is produced by wet organic waste decomposing under anaerobic conditions in a landfill. The waste is covered and mechanically compressed by the weight of the material that is deposited from above. This material prevents oxygen exposure thus allowing anaerobic microbes to thrive. This gas builds up and is slowly released into the atmosphere if the landfill site has not been engineered to capture the gas. Landfill gas is hazardous for three key reasons. Landfill gas becomes explosive when it escapes from the landfill and mixes with oxygen. The lower explosive limit is 5% methane and the upper explosive limit is 15% methane. The methane contained within biogas is 20 times more potent as a greenhouse gas than carbon dioxide. Therefore uncontained landfill gas which escapes into the atmosphere may significantly contribute to the effects of global warming. In addition landfill gas' impact in global warming, volatile organic compounds (VOCs) contained within landfill gas contribute to the formation of photochemical smog.

## 3) Biogas benefits

The benefits of biogas are similar to the benefits of natural gas: increasing energy security, paving the way for fuel cell vehicles, and improving public health and the environment through reduced vehicle emissions. The following are additional potential benefits of biogas:

- It is a domestic, renewable resource; using it offsets the use of non-renewable resources such as coal, oil, and fossil fuel-derived natural gas, with corresponding emission reduction and energy security benefits.
- It directly reduces greenhouse gas emissions by preventing methane release into the atmosphere (methane is 21-times stronger as a greenhouse gas than carbon dioxide).
- Its production creates jobs and benefits the local economy.
- Anaerobic digestion systems (non-landfill) treat waste naturally, require less land area than aerobic composting, reduce the amount of material that must be landfilled, reduce waste odors, and produce sanitized compost and nutrient-rich liquid fertilizer.

Domestic biogas plants convert livestock manure and night soil into biogas and slurry, the fermented manure. This technology is feasible for small holders with livestock producing 50 Kg manure per day, an equivalent of about 6 pigs or 3 cows. This manure has to be collectable to mix it with water and feed it into the plant. Toilets can be connected. Another precondition is the temperature that affects the fermentation process. With an optimum at 36 C° the technology especially applies for those living in a (sub) tropical climate. This makes the technology for small holders in developing countries often suitable.

Depending on size and location, a typical brick made fixed dome biogas plant can be installed at the yard of a rural household with the investment between 300 to 500 US \$ in Asian countries and up to 1400 US \$ in the African context. A high quality biogas plant needs minimum maintenance costs and can produce gas for at least 15–20 years without major problems and re-investments. For the user, biogas provides clean cooking energy, reduces indoor air pollution and reduces the time needed for traditional biomass collection, especially for women and children. The slurry is a clean organic fertilizer that potentially increases agricultural productivity.

### **Topics**

The United Nations Industrial Development Organization debates impacts and spillover effects of supporting bio gas production as supplementary income for small farmers. We will focus on the following topics:

- reliable energy supply, 'green growth' and sustainability
- visions for small farmers, prospects of development
- impact on the food product market
- possible mechanisms of support, support regime, prerequisites
- interoperability with the Millennium Development Goals

In the end of the discussion we want to compile a resolution containing reasonable suggestions for the international community.

### **Links**

<http://www.un.org>  
<http://www.unido.org>  
<http://www.iea.org>  
<http://www.energy.gov>  
<http://www.unido.org/index.php?id=o710110>  
[http://www.unido.org/.../68441\\_FINAL\\_DRAFT\\_UNIDO\\_BIOFUEL\\_STRATEGY.pdf](http://www.unido.org/.../68441_FINAL_DRAFT_UNIDO_BIOFUEL_STRATEGY.pdf)  
<http://www.unido.org/index.php?id=6464>  
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