- The LIFE Programme -
Over 20 years improving waste-to-energy management in the EU

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LIFE Programme – Communications Team

4th International Conference on Sustainable Solid Waste Management
23-25 June, Limassol
Contents

• What is LIFE?

• Structure & budget: LIFE 2014-2020

• LIFE projects on sludge management

• LIFE website

• More info: Call for proposals 2016
What is LIFE?

**LIFE = L’Instrument Financier pour l’Environnement**

**Fully dedicated:**

Pilot, innovative, demonstrative actions to contribute to implementing and developing EU environmental policy and legislation for the environment and climate action

**Since 1992:** 4306 projects

€ 3.46 billion for 2014-2020

Two sub-programmes:

- LIFE Environment
- LIFE Climate Action
Structure: LIFE 2014-2020 (traditional projects)

Sub-Program. Environment
2,6 billion € (75%)

Environment & Resource efficiency
Water | Res. eff. | Waste | Health | Air

Sub-Program. Climate Action
864 mio € (25%)

Climate change Mitigation
Climate change Adaptation

Nature & Biodiversity
Habitat & species | Biodiv.: strategy 2020

Governance & Information
Governance & Information
LIFE09 ENV/IT/000186 - Ennobling of sludge for energy use and industrial

Sludge's Wealth

Project beneficiary: COOMI SOC.COOP. (SME)
Contact person: Danilo MARANGONI / d.marangoni@coomi.it

Main aim

To demonstrate an innovative & cost effective sludge waste treatment plant for offshore oil rigs & similar units that converts biological sludge with 75% humidity into pellets

Methodology

• To construct a mobile unit (portability and small size)
• To obtain agglomerates with high calorific value (max water content of 18%), leading to an increased use of biological sludge in combustion plants
Technology

Design of the pilot plant

→ Hybrid microwave hot air heating technology with associated elements
  - Loading station
  - Drying tunnel
  - The position & number of microwave generators
  - The electromagnetic field distribution
Results

• Highly efficient drying of the sludge (14-18% humidity)

• Annual conversion of 650 tonnes of organic sludge with 75% humidity

• Generation of 280 tonnes of pellets with high heating power & easily transportable

• Elimination of unpleasant odours produced by the material

• Longer life of the unit's components due to the lack of abrasion in the process
LIFE08 ENV/CY/000457 - Demonstration of an integrated waste-to-energy system for energy generation from biodegradable organic waste and wastewater

INTER-WASTE
Project beneficiary: Cyprus University of Technology
Contact person: Costas COSTA / costas.costa@cut.ac.cy

Main aim

An integrated pilot system consisting of a Membrane Bioreactor (MBR) unit for wastewater treatment & an Anaerobic Digestion (AD) unit for Biodegradable Organic Waste (BOW) treatment

Methodology

• To assess the legislative framework & the relevant AD&MBR systems at EU level
• To construct an integrated MBR-AD prototype unit based on a “zero” waste symbiotic approach

INTER-WASTE project summary
Technology
Methodology

Development, optimization & demonstration of the MBR-AD system

→ Physicochemical analysis of the waste streams used (manure, organic MSW)
→ Start up and operation of the unit
→ Characterisation of sludge & treated wastewater (MBR)
→ Characterisation of biogas & stabilized solid residue (AD)
→ Optimisation of the unit (environmental impacts, viable & profitable level)
→ Examination of the capability of the unit to generate electricity
Technology

**Development of guidelines & specifications**

**Optimum operation of the unit**
- built near the production of wastes
- adequate infra to receive municipal wastewater
- built near fields requiring irrigation

**Utilisation of the produced biogas, water & stabilised solid product**
- electricity generation
- watering cultivations / municipal parks
- soil improvement in agricultural applications / fuel material
Results

• Integrated **stand alone & energy autonomous MBR-AD pilot system**

• The AD unit produces 12.1 m³/d of good quality biogas - contains 59% methane

• The dried solid digestate (AD unit), after bag filtering and drying, acquires good quality characteristics for **land application as organic fertilizer**

• The MBR unit treating wastewater and liquid digestate produces **high irrigation water** that conforms to the stringiest Cypriot water reuse limits

**Novel approach for local communities**

→ renewable energy production; hence reduction in fossil fuel dependency
→ reuse of treated water
→ soil fertility
Results

• The **MBR-AD system** is **energy autonomous** while the excess energy can be utilized for other purposes e.g. supply the electricity grid, provide heat to facilities or places at the vicinity of the unit.
Results

Small community of 1000 people

→ to treat the produced food waste & wastewater,
→ to cover the electricity needs of around 20 households,
→ to produce 150 m³/d of irrigation water & 12 kg/d of organic fertilizer
Results

*5 star hotel of 1200 beds*

- to treat the produced food waste and wastewater,
- to cover 3.5% of its energy requirements (electric and thermal energy)
- to produce 250 m$^3$/d of irrigation water and 26 kg/d of organic fertilizer
LIFE07 ENV/E/000847 - Energy self-sustaining and environmental footprint reduction on wastewater treatment plants via fuel cells

BIOCELL

Project beneficiary: Centro Tecnológico del Agua (Research Institution)
Contact person: Rosa Maria PIERAS / rmpieras@cetaqua.com

Main aim

The project aimed to demonstrate the viability of two methodologies – energy efficient fuel cells – for generating electricity from the biogas produced at waste water treatment plants (WWTPs)

Methodology

• To construct two prototype plants & test the Solid Oxide Fuel Cell & the Proton Exchange Membrane Fuel Cell
• To publish a guide which includes an economic & environmental assessment for WWTP managers
Technology

Prototype plant in the WWTP of Murcia

→ Proton Exchange Membrane Fuel Cells (PEMFC)

- Low temperature (60 °C)
- Biogas cleaning - caustic scrubber - and drying process
- Biogas reforming process: conversion of methane into hydrogen
- Designed to produce 3 kW of electric power
Technology

Prototype plant in the WWTP of Mataró, Catalonia

→ Solid Oxide Fuel Cell (SOFC)

- High temperature (800 ºC)
- Biogas H2S cleaning process - biotrickling filter -
- Biogas purification process - iron oxides, activated carbon -
- Designed to produce 2.8 kW of electric power & 1 kW of heat
Economic benefits

• Both plants are technically & financially viable

• The cost for sludge treatment is reduced by the use of biogas energy

The WWTP is self-sufficient from an energetic point of view

→ The produced energy can be used to heat the digesters, dramatically lowering the natural gas consumption

→ The produced electricity can be used to cover up to 60-70% of the electrical needs of the installation

The size of the prototype units is not sufficiently large to confirm whether up-scaling is feasible or economically viable
Environmental benefits

Construction phase

→ Energy conversion systems (the fuel cells) are the main contributors to the environmental impact, both in PEMFC and SOFC pilot plants.

Operation phase

→ Compared to deployed technologies such as Internal Combustion Engines (ICE), fuel cells have a positive environmental impact because of electricity production & thermal energy generation.
LIFE Communication tools & services

- **LIFE website**
- **Project database**
- **Thematic publications**
  - **LIFE thematic brochure**
    - on LIFE & resource efficiency
    - on LIFE & Climate change mitigation

Photos: LIFE Programme
More information

New Regulation 2014-2020:

Regulation (EC) No 1293/2013

National Contact Points:

Information on eligibility and project preparation
http://ec.europa.eu/life/contact/nationalcontact

Photos: LIFE Programme
More information

Funding:

General information
http://ec.europa.eu/environment/life/funding/life.htm

2016 call for proposals for LIFE Grants

<table>
<thead>
<tr>
<th>Grant Type</th>
<th>Opening Date</th>
<th>Closing Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate Change Action (Mitigation, Adaptation and</td>
<td>19 May 2016</td>
<td>07 September 2016 at 16:00 Brussels time</td>
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<tr>
<td>Climate Governance &amp; Information)</td>
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<td>Environment &amp; Resource Efficiency</td>
<td>19 May 2016</td>
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<td>15 September 2016 at 16:00 Brussels time</td>
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<td>19 May 2016</td>
<td>15 September 2016 at 16:00 Brussels time</td>
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Thank you for your attention!

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*Disclaimer: Unless stated otherwise, all pictures and tables on this presentation belong to the EU or the LIFE project featured on the slide.

LIFE, the EU funding tool for the environment and climate action
ec.europa.eu/life