VERSOS '10: II Congreso Internacional sobre Mejores Tecnologías Disponibles en vertederos

Landfill biogas quick scans and future utilization

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Future energy

www.gastreatmentservices.com

Gastreatment Services bv

Overview

- Introduction
- Quick scan methodology
- Quick scans in Spain
- Results
- Conclusions
- How to utilize LFG after a quick scan?
- Questions

Introduction

Gastreatment Services BV

- **Enigineering and consultancy company**
- **Field of expertise: biogas**
- **Design and manufacture biogas utilization and purification systems**

- **35 employees**
- **Turn over € 3.5 million 2009**

- **Involved in BIOGRID (Life) project in order to upgrade biogas to natural gas quality in Spain**

Introduction

Why quick scans?

- **Landfill operators are obliged according to the EU Landfill directive (LFD)to extract landfill gas to mitigate GHG's**

Landfill operator LFG treatment options:

- **Flaring**
- **Boilers**
- **Co generation or**
- **Upgrading**

- **Flaring is a necessity (LFD)**
- **Utilization of LFG decision is based on economical feasibility**

Introduction

LFG production

There are multiple options to verify LFG production at a landfill

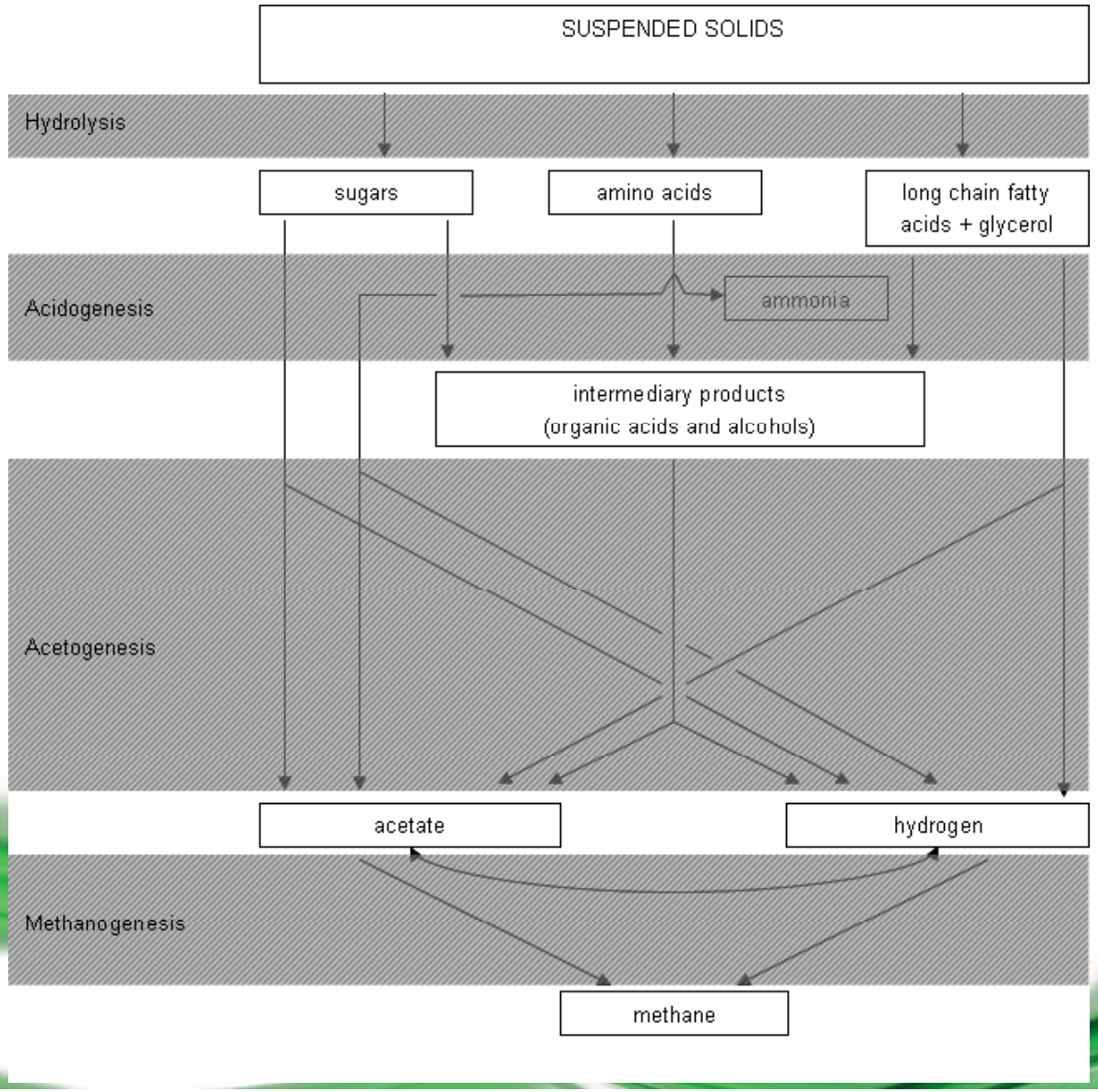
- **Pump tests**
- **Modelling**
- **Emission measurement**

- **First two options are cost effective solutions when combined**
- **Emission measurements are costly and need to be performed on a regular basis**

Combination of both pump test and model run give more insight in future development of the landfill with respect to LFG production and future utilization

Introduction

LFG production



Introduction

LFG production

Variabilities in LFG production are mainly caused by:

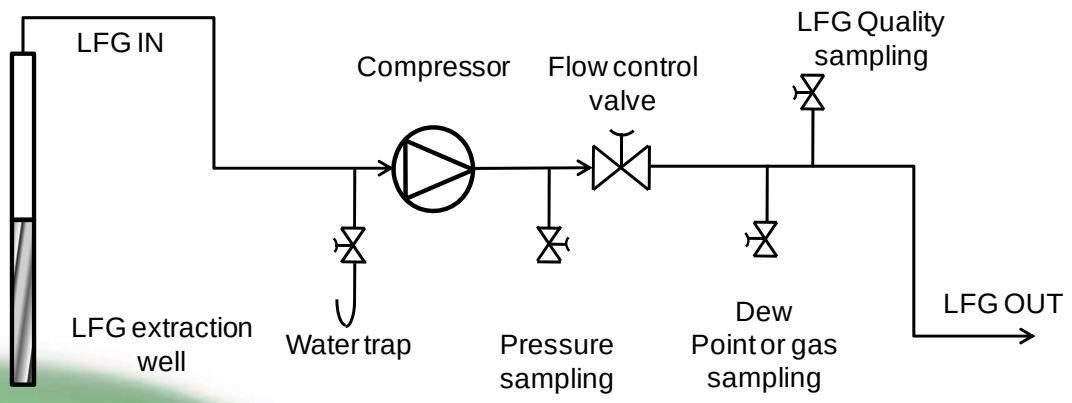
- **Waste composition**
- **Age of waste**
- **Presence of oxygen**
- **Moisture content**
- **Temperature**

Quick scan

Methodology

- **Pump trails at different gas wells**
- **Time trial 2 hours per well**
- **Start pump and adjust extraction flow until LFG quality stabilizes**
- **Monitor and record gas quality and flow**
- **Take samples of biogas for laboratory verification**

- **Pump set up**



Quick scan

Methodology

Every 15 minutes the following information is recorded:

- **Time**
- **Atmospheric pressure**
- **CH_4/CO_2/O_2/H_2S/CO concentrations**
- **Discharge pressure**
- **Flow**

After sampling, biogas will be sent to KIWA laboratory for analysis on:

- **CH_4/CO_2/O_2/H_2S/CO concentrations**
- **Calorific value**
- **Density of landfill gas**

Quick scan

Methodology

Quick scan

Vascontainer Irun April 2010

Quick scan Vascontainer landfill

Case study

Vascontainer landfill characteristics

- **In operation since 2002**
- **18 ha in area**
- **947,000 tonnes of waste in place (2009)**
- **Waste composition dominated by contaminated soil and construction and demolition waste (low carbon content)**
- **6 vertical gas extraction wells installed**

Quick scan

Urteta landfill February 2010

Quick scan Urteta landfill

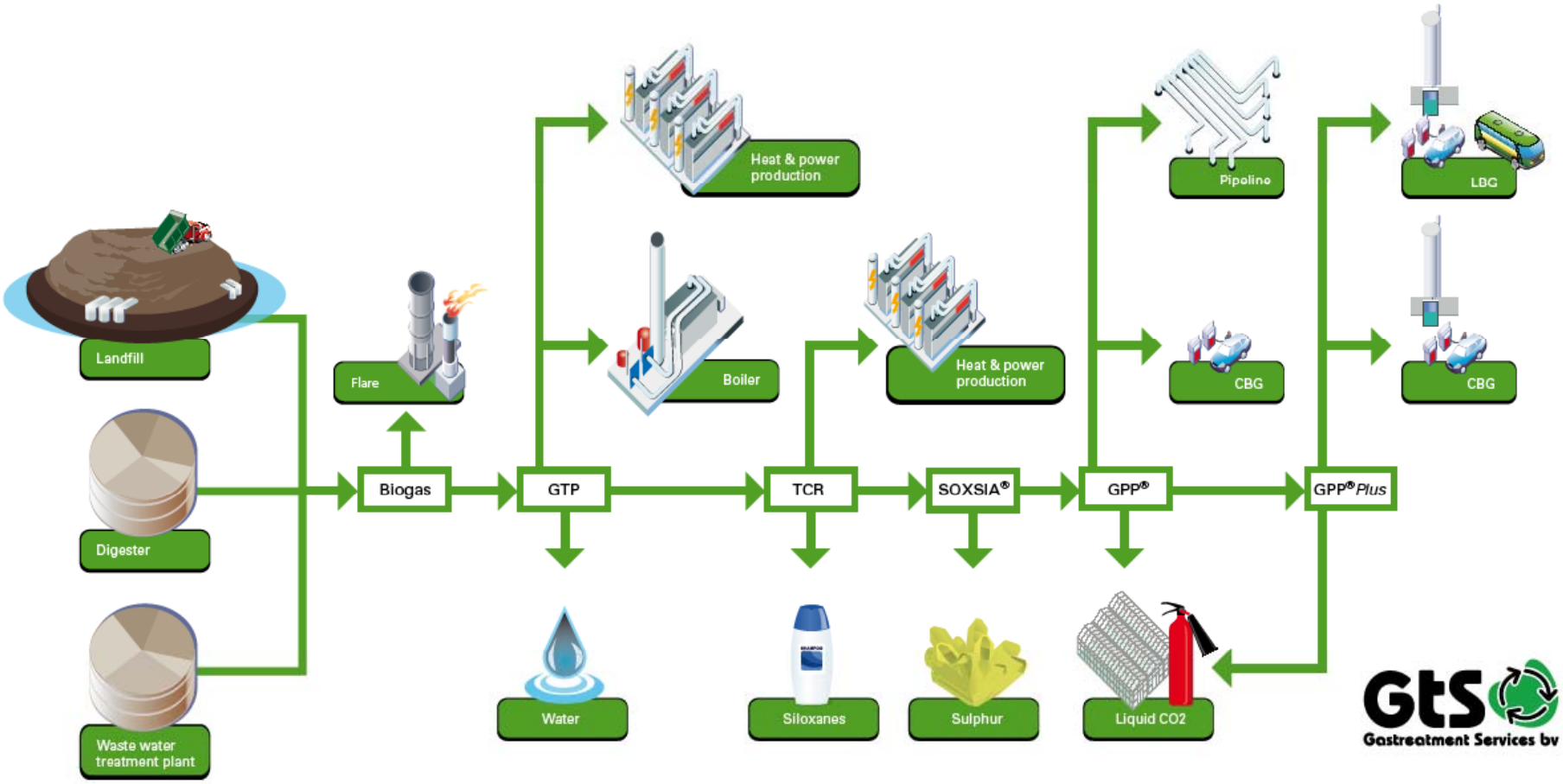
Case study

Urteta landfill characteristics

- In operation since 1989
- 10 ha in area
- 780,000 tonnes of waste in place
- Waste composition dominated by municipal solid waste
- 4 vertical gas extraction wells installed

- Plan to develop 30 gas extraction wells in the future

Utilization after quick scan



Upgrading technology

Cryogenic upgrading benefits

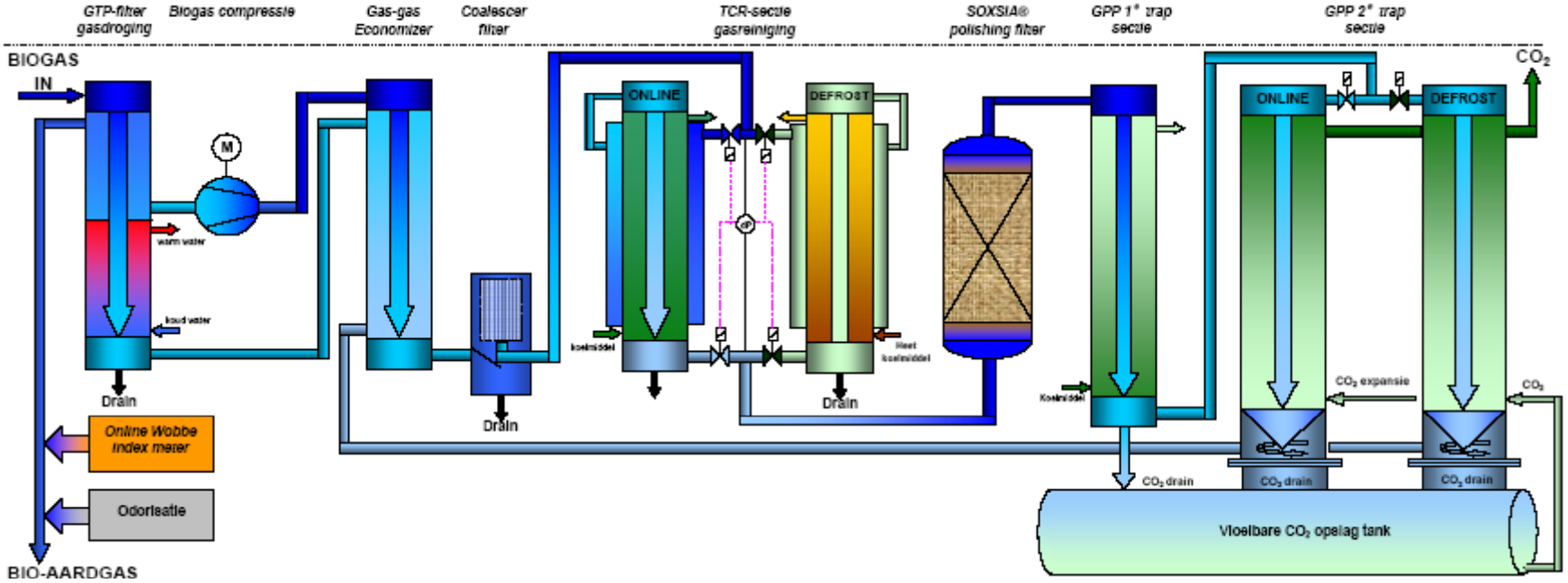
Energy efficiency is high

- **Methane loss is low (0,5%)**
- **Both BMG and LBG production possible**
- **Liquid CO_2 production, enabling utilization at:**
  - **Greenhouses**
  - **Conditioned transport**

- **BMG production feed into local natural gas grid**
- **LBG is a high density fuel, and makes transport possible**
  - **Remote landfills, flaring not longer only option**

Process flow GPP®-systeem

LFG upgrading to BMG



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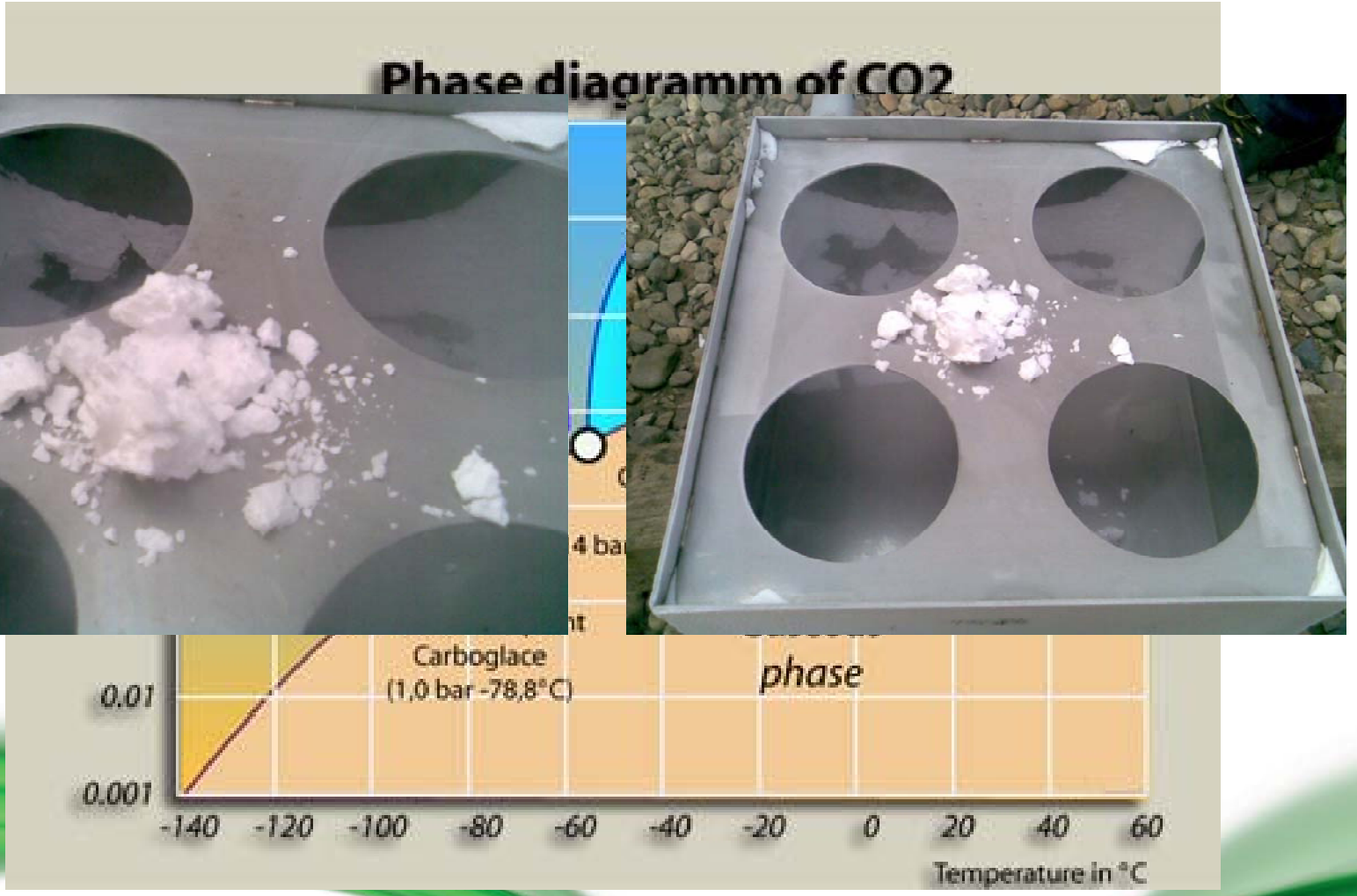
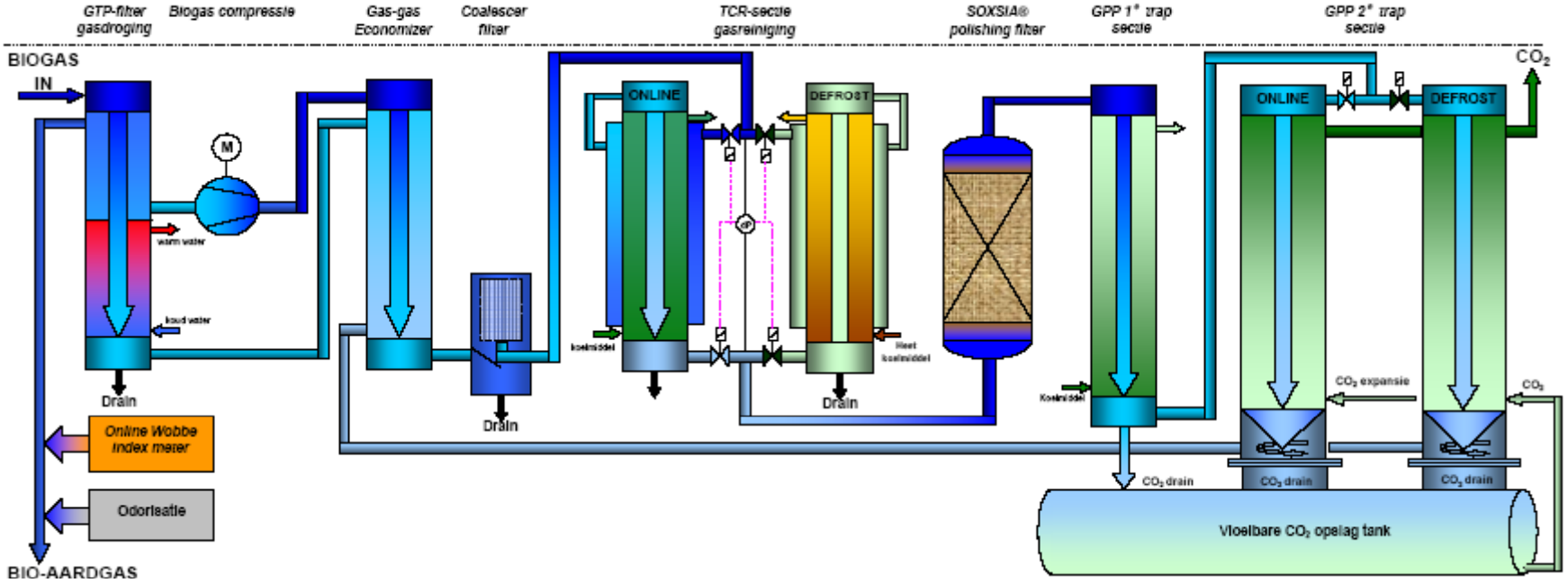
CO_2 removal

Phase diagram



Process flow GPP®-systeem

LFG upgrading to BMG



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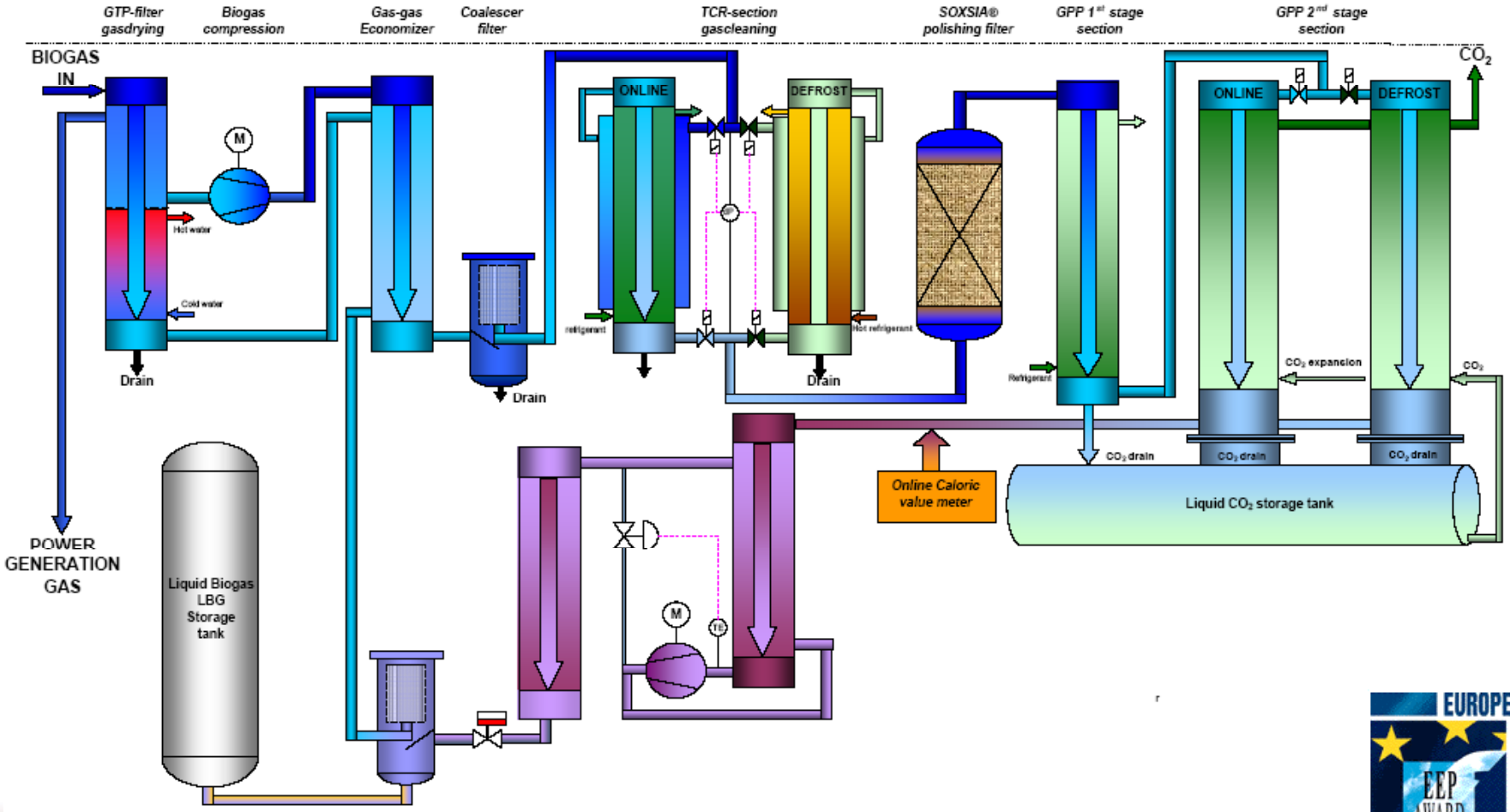
Process flow GPP®plus-system

LFG upgrading to LBG



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Conclusions

Future developments

At WWTP's

- **November commercial LBG plant in operation (120 Nm^3/h)**

  Sundsvall Sweden – Public transport buses run on LBG

- **Q4 2010 second LBG plant in operation (475 Nm^3/h)**

  Loudden, Sweden

At landfills

- **2011 – Haarlem The Netherlands - production of LBG out of LFG**
- **Aim 2010 – 2012 2 additional landfills**

Thank you for your attention

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