maxbiogas

# Lignin Extraction Process – Plant Residues for Green Chemistry and Biogas

Berlin, 04.06.2014

# Topics

- Company Profile of maxbiogas GmbH
- Hydrocarbon: Basis of our Life
- Biotechnology Market and the break-through with LX-Plants
- Profitability of LX-Plants
- LX solves the Problems
- Business Development
- Financial Development
- Status Quo
- Mission & Vision

# Company Profile

- maxbiogas GmbH is a young, dynamic and innovative Start-Up active in the field of white biotechnology.
- It is based with an office and a labour in Berlin-Brandenburg, Germany.
- It focuses on the development, marketing and licensing of technical installations for the ecological and economical processing of plant residues on the basis of closed carbon and nutrient cycles.
- The biogas and the biorefinery market is the strategic focus of maxbiogas.
- Target groups are plant manufactures, biogas plant & biorefinery operators.

# Hydrocarbon: Basis of our Life

- Fossile carbon EU import: 1 billion tons ROE p.a. (~ 600 billion € p.a.)
- In the EU 159 million hectares of agricultural land are available.
- A substitution of 1 billion tons ROE with renewable resources would need appr. **6 tons ROE per hectare**.
- **6 tons per hectare** is the average harvest today. Residues like stalks and leaves remain unused.
- But agricultural land is mainly used for food and feed production. Therefore the press states: „There is not enough agricultural land for fossil carbon substitution.“.
- maxbiogas has the technology to change this situation, an energy efficient pre-treatment process, called LX-Process.

# Biotechnology Market

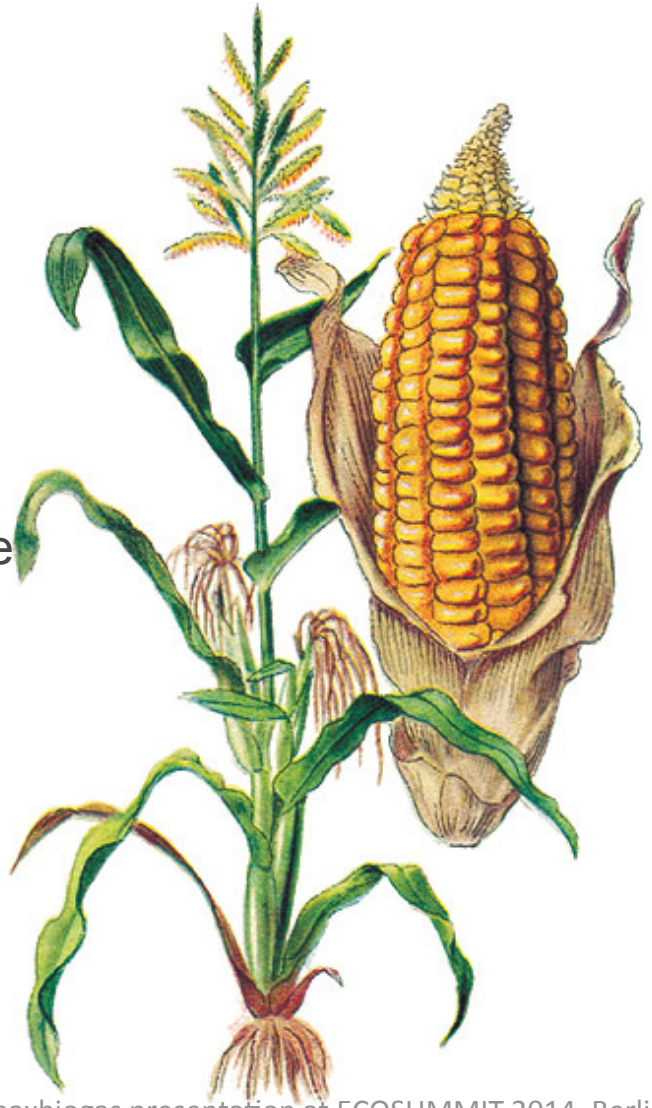
| Product | Markets | Volume p.a. | Companies | Resources |
|---|---|---|---|---|
| Ethanol | Fuels<br>Solvents<br>Polyethylene | 65.000.000 tons (biobased) | Solvay<br>Dow<br>Braskem | Starch, sugar |
| Methane | Energy<br>Fuels | 4.300.000 tons (biobased, Germany) | > 1000 companies | Starch, sugar cellulose, others |
| Lactic acid | Polylacticacid (PLA)<br>Food additiv | 400.000 tons (biobased) | Dow<br>Cargill | Starch |
| 1,3-Propandiol (PDO) | Polyurethane<br>Personal care<br>PTT | 50.000 tons (biobased) | DuPont | Starch |
| Succinic acid | 1,4 Butanediol<br>Pharmaceuticals<br>Fibers | 50.000 tons (biobased) | DSM | Starch |

Source: Public data summarized by Direvo (GoingPublic 3/2013)

# The Break-through with the LX-Process

maize plants:

**16** tons DM per hectare



Starch:

**4,4** tons DM per hectare

# Biotechnology Market

| Product | Markets | Volume p.a. | Companies | Resources |
|---|---|---|---|---|
| Ethanol | Fuels<br>Solvents<br>Polyethylene | 65.000.000 tons (biobased) | Solvay<br>Dow<br>Braskem | Starch, sugar |
| Methane<br>Market entry | Energy<br>Fuels | 4.300.000 tons (biobased, Germany) | > 1000 companies | Starch, sugar cellulose, others |
| Lactic acid | Polylacticacid (PLA)<br>Food additiv | 400.000 tons (biobased) | Dow<br>Cargill | Starch |
| 1,3-Propandiol (PDO) | Polyurethane<br>Personal care<br>PTT | 50.000 tons (biobased) | DuPont | Starch |
| Succinic acid | 1,4 Butanediol<br>Pharmaceuticals<br>Fibers | 50.000 tons (biobased) | DSM | Starch |

Source: Public data summarized by Direvo (GoingPublic 3/2013)

# LX-Plant in front of a Biogas Plant

# Profitability of LX-Plants

| EEG | Input LX-Plant, t DM p.a. | Input biogas plant | Input biogas plant combined with LX-Plant | IRR, % |
|---|---|---|---|---|
| 2009 | 1.000 | Maize | Maize : Manure 1 : 2 | > 30 |
| 2009 | 5.000 | Maize | Maize : Manure 1 : 2 | > 30 |
| 2012 | 1.000 | Maize : Gras : Whole plant silage 3 : 1 : 1 | Maize : Manure 1 : 2 | > 30 |
| 2012 | 5.000 | Maize : Gras : Whole plant silage 3 : 1 : 1 | Maize : Manure 1 : 2 | > 30 |

# LX solves the Problems

maxbiogas

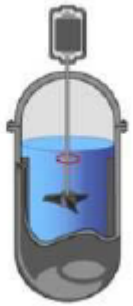
## Ecological Advantages

- Usage of plant residues
- Low energy consumption
- No toxic substances

## Economic Advantages

- Lower substrate costs
- Higher remuneration
- High substrate flexibility

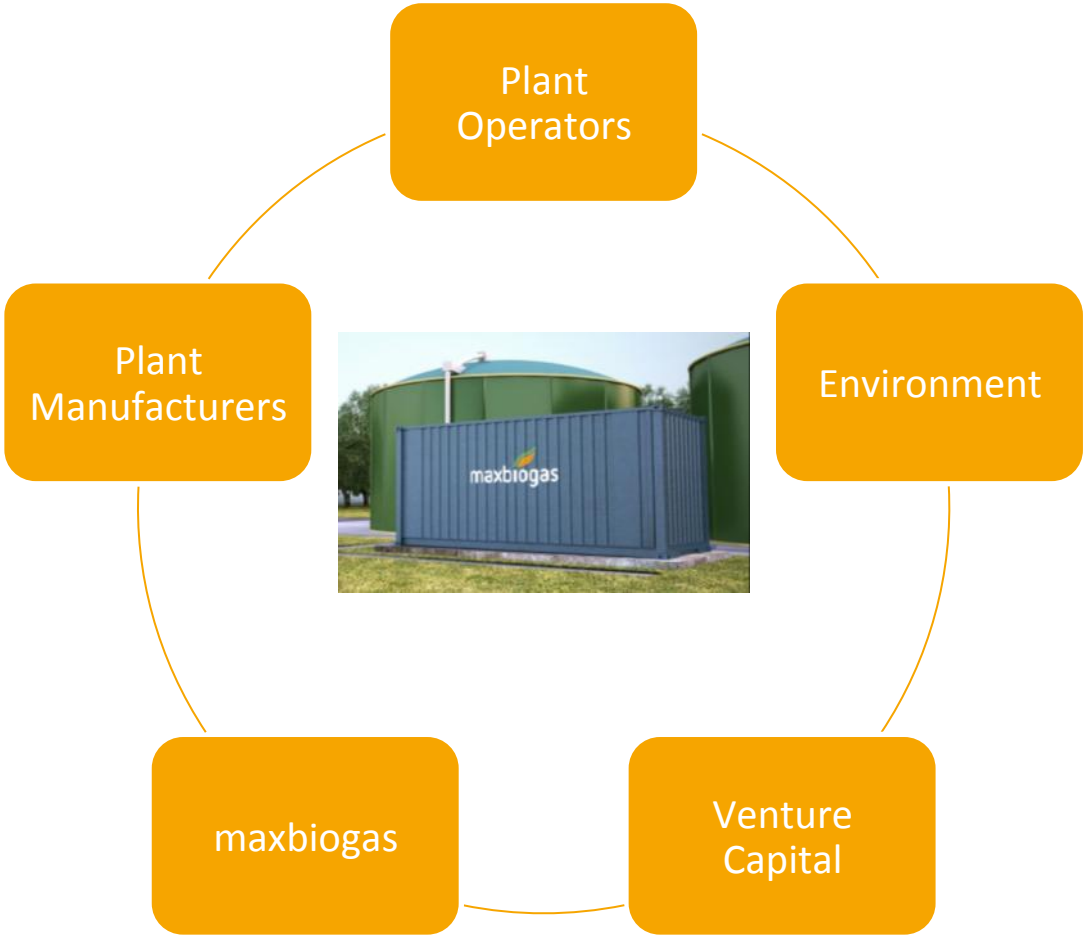
# Business Development




| 2012 | 2013 | 2015 | 2017 |
|---|---|---|---|
| Laboratory Experiment | LX-Miniplant | 1. LX-Plant | 1. LX-Plant for White Biotech. |
| < 1kg p.d. | 1 – 10 kg p.d. | 1.000 t p.a. | > 5.000 t p.a. |
| Proof of Principle, External Validation, 1. Patent Appl. | Proof of Concept, Continuous Process, Further Patent Appl. | Output of a 500 kW, Biogas Plant, Continuous Process. | Different Biorefinery Plants producing biofuels, biopolymers, dietary supplements |

# Financial Development

# Enough Yield to Share



# Status Quo

- ✓ 1st and 2nd fundraising in the total amount of € 1.240.000 completed. The investors are MIG Verwaltungs AG, München and the KfW Bank, Bonn.
- ✓ In addition subsidies in the amount of € 570.000 have been granted.
- ✓ 1 patent and 7 patent applications in 4 patent families.
- ✓ LX-Miniplant has been put successfully into operation in 2013.
- ✓ Proof of Concept completed in the beginning of 2014.
- ✓ Basic Engineering is completed.
- ✓ Detailed Engineering & Scale-Up will be finished in 2014.
- ✓ Operation of the first LX-Plant in 2015.

**The next fundraising!!!**

# Contact

**maxbiogas GmbH**

Katrin Streffer, CEO
Alte Dorfstraße 14a
16348 Marienwerder

Tel.: +49(0)3337 / 37 74 140
Mobil: +49(0)178 / 86 31 939
Fax: +49(0)3337 / 37 74 189
Mail: katrin.streffer@maxbiogas.com
URL: www.maxbiogas.com

maxbiogas thanks the EU

Investition in **Ihre** Zukunft!
EUROPÄISCHE UNION
Europäischer Fonds für Regionale Entwicklung
www.efre.brandenburg.de