

Inbicon Biomass Refinery™

Ethanol From Straw

– Now a Reality in Denmark

1st Brazilian BioEnergy Science and Technology Conference
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Cellulosic Ethanol available to drivers in Denmark from October 2010



Inbicon Biomass Refinery

1

The path to cellulosic ethanol

2

Plant tour

3

Demo Plant Operation



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1

The Path to Cellulosic Ethanol

Commercial Scale



Demonstration



1,200 MT/d*

Pilot Plant II



100 MT/d*

Pilot Plant I



24 MT/d*

Laboratory



<10 kg

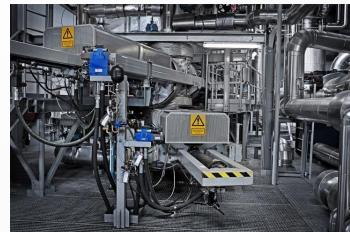
Proven Technology

Conventional technology and tested new technology

Straw Handling



Hydro-thermal Pretreatment



Liquefaction



Fermentation



Distillation



DONG Energy
20 years
experience

Inbicon
Core
Technology

Traditional
First-Generation
Technology Providers

Inbicon



Inbicon Biomass Refinery™ Multiple Feedstocks Tested



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Integrated with Asnaes Power Station



2

Kalundborg Demonstration Plant

Plant Tour



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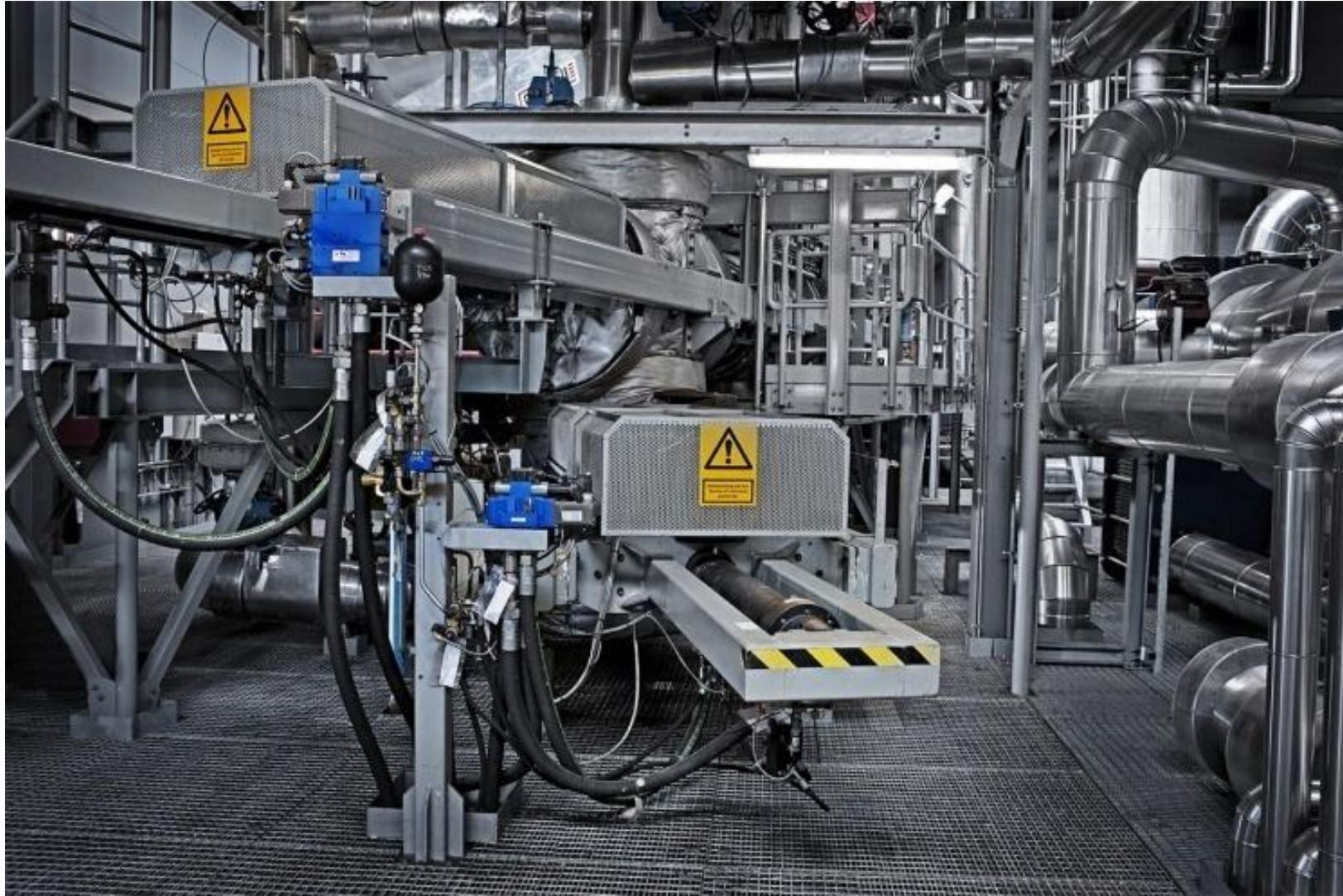
Biomass Handling



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Hydrothermal Pre-treatment



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Enzymatic Processing



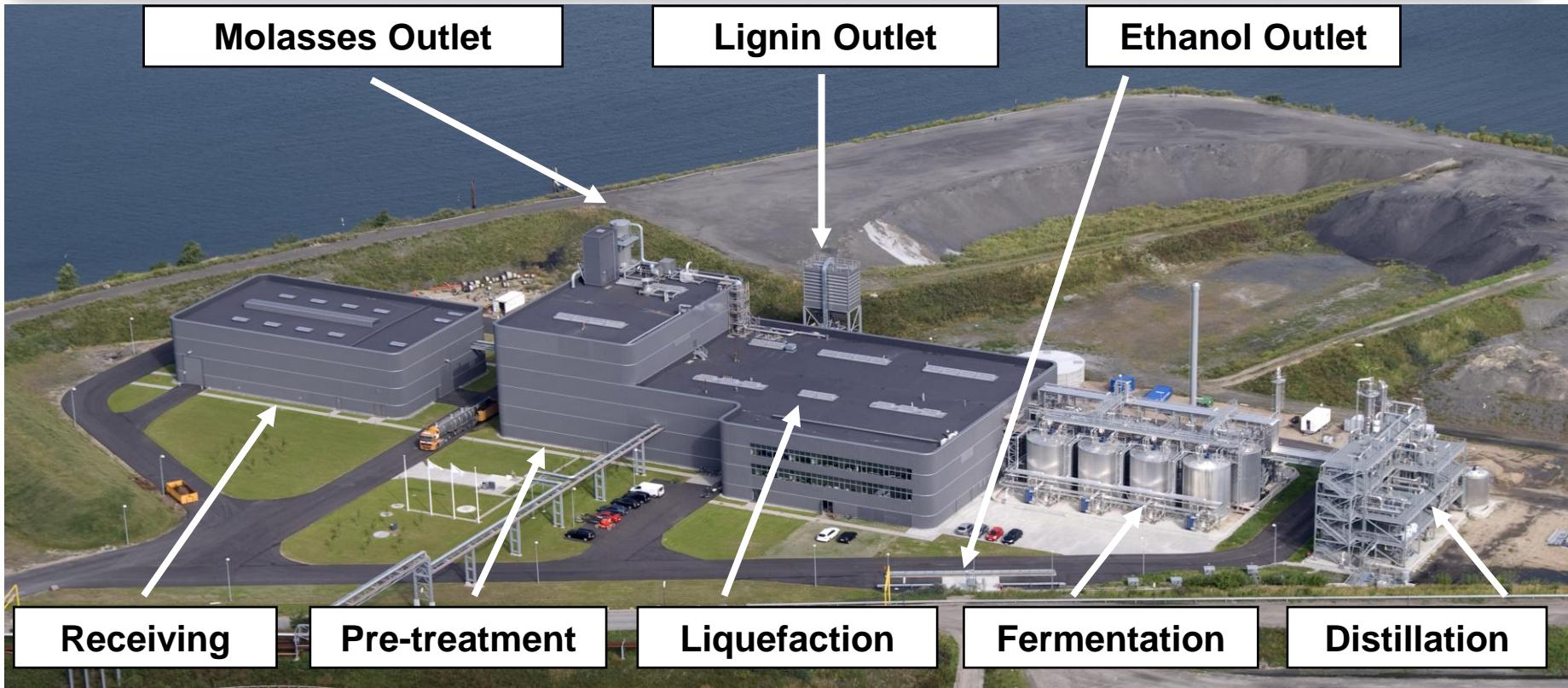
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Fermentation, Distillation and Dehydration



Kalundborg Demonstration Plant Layout



Input:

30,000 t wheat straw

Enzyme suppliers:

Genencor, Novozymes

Output:

5.4 mill. liters ethanol

13,100 t lignin pellets

11,250 t C5-molasses

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Inbicon Biomass Refinery Demo Plant Operation



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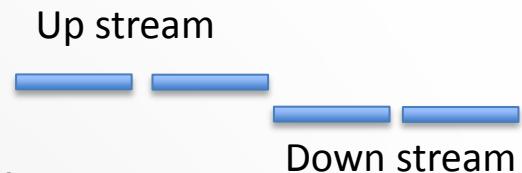
Production Schedule 2010

19. Nov 2009 - Formal opening of the plant

1st half '10 - Commissioning & Trial Run

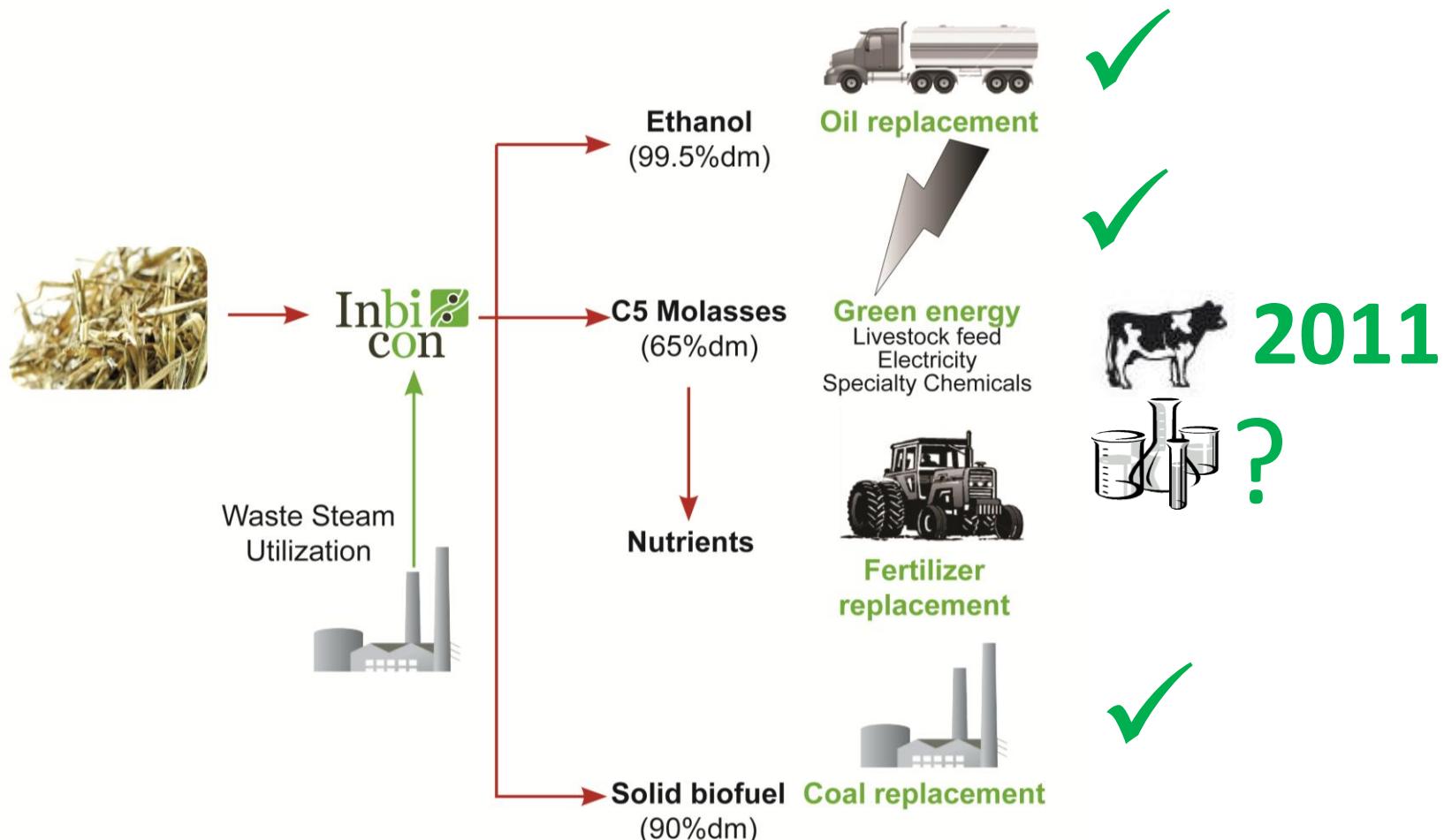
2nd half '10 - 4 week campaigns

- upgrade & improvements
- mechanical issues & fine tuning
- DCS → 3 operators can now run the plant!



Proof of Concept

3 Consistent Value Streams



COII

Inbicon Core Technology Features

- ✓ High ethanol yield (180-200 l/t biomass DM)
- ✓ Continuous operating process
- ✓ High dry solids – 10% v/v beer
- ✓ Enzymatic liquefaction with low dosage
- ✓ Integrated contamination control (no antibiotics)

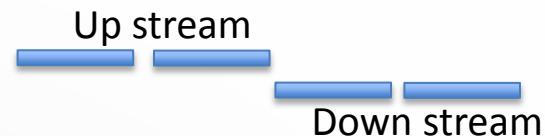
2011 Water and energy consumption



Production Plan 2011

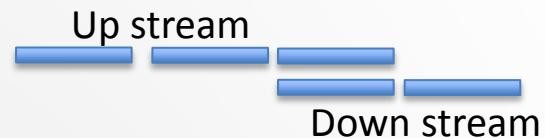
Q1

- 4 week campaigns
- Focus on stable production
- Fine tuning of process parameters



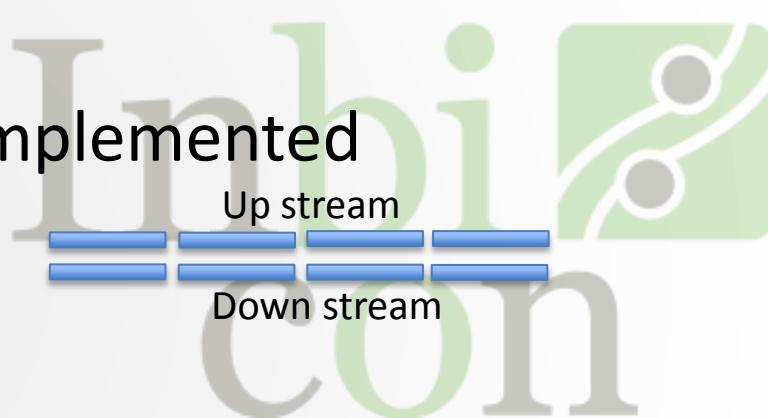
Q2

- 4 week campaigns



2nd half

- Tested improvements implemented
- Continuous production



Summary

Scope of demo plant

The demo plant is a complete **Inbicon Biomass Refinery**, showing all steps in sequence

The demo plant produces 3 end-products

The demo plant is to show continuous operation, fully automated and with limited staff (3)

Overall concept

Ethanol according to EN standard **Proven**

Lignin pellets in high quality **Proven**

Molasses for biogas **Proven**

Molasses for feed **2011**

Technology

High ethanol yield	Proven
Continuous operating process	Proven
High dry solids	Proven
Enzymatic liquid fraction	Proven
Integrated contamination control	Proven
Water & energy consumption	2011

Capacity and Availability

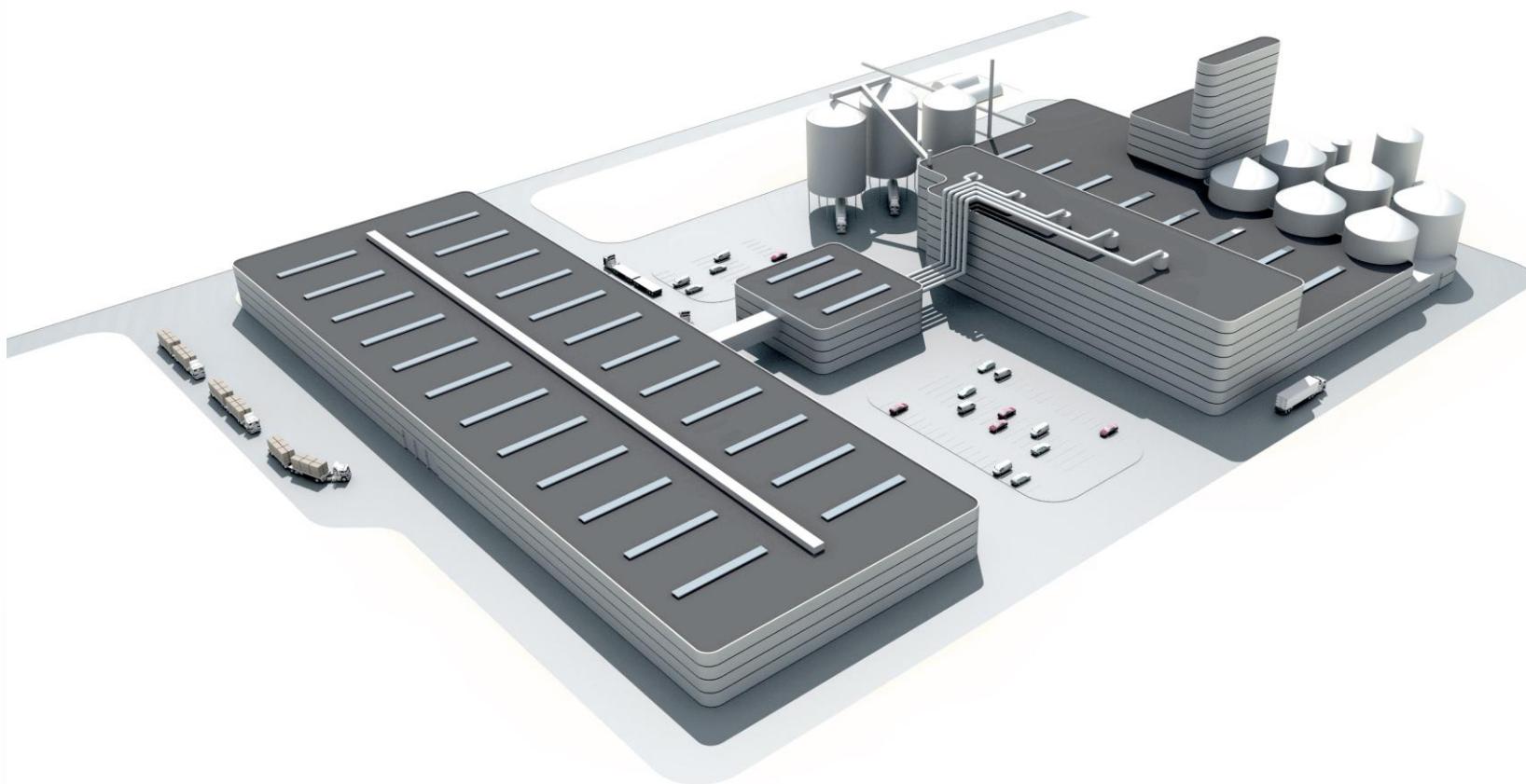
The capacity has been tested and proven in key areas
Availability is calculated and tested section by section



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Inbicon Biomass Refinery – Next Step!

- processes 1200 t biomass daily



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Unleash Biomass Potential

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