Challenges in financing of new sustainable biofuels technology projects

Michael Persson, General Manager of Regulatory Affairs
DONG Energy, Power New Bio Solutions

European Biofuels Technology Platform
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Agenda

- DONG Energy / Inbicon straw-based bioethanol
- From laboratory to demonstration
- Funding history
- Challenges for commercialisation
- Proposals for incentivising commercialisation
- Conclusion and recommendation

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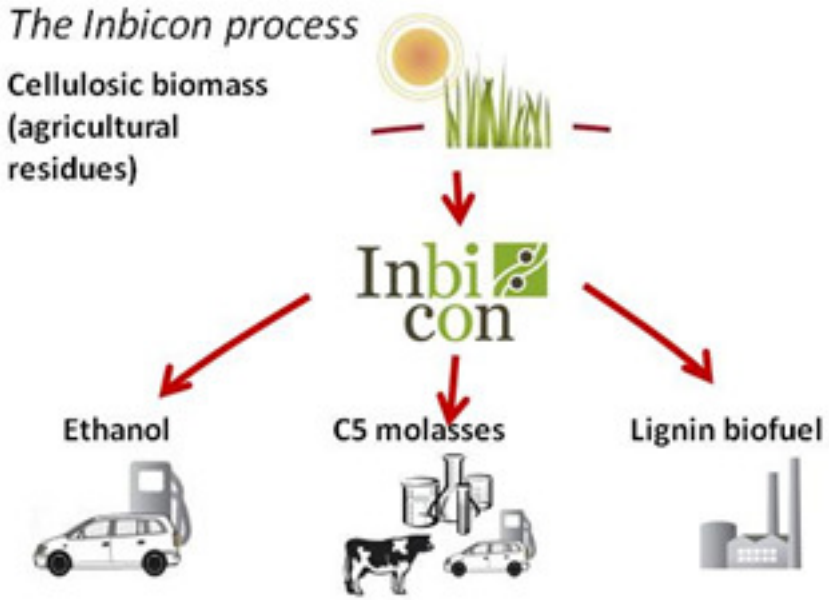
The Inbicon process



2G ethanol on the market

October 2010 Statoil introduced 2G E5 on 98 petrol stations in Denmark

Demonstration plant in Kalundborg

Input:
30.000 t wheat straw

Output:
5,4 mio. l ethanol
13.100 t lignin pellets
11.250 t C5-molasses

Investment:
€ 64 mill., incl. € 10 mill. support from DK government

Demonstration:
€ 9.1 mill. support from EU 7th FP

In operation since November 2009

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Straw Ethanol – Inbicon Demo-Plant Results

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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 purpose is to show continuous operation, fully automated and with limited staff (3)

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**

Overall Concept

Ethanol according to EN standard	***Proven***
Lignin pellets in high quality	***Proven***
Molasses for biogas	***Proven***
Molasses for feed	**2011**

Capacity and Availability

The capacity is tested and proven in key areas

Availability is calculated and tested by sections

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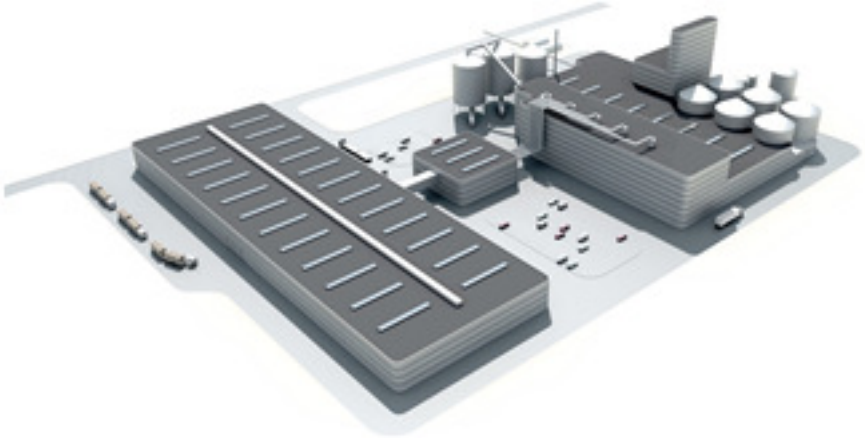
Technology ready for commercial deployment

Commercialisation Phase

1st of kind commercial

- 98 million liter bioethanol
- + lignin solid biofuel
- + C5 molasses
- Possible sites identified in Denmark
- Feedstock collection in place
- €320M investment
- Debt, equity + possibly grant funding
- Solid market incentives required
- Potential for many plants across the EU by 2020



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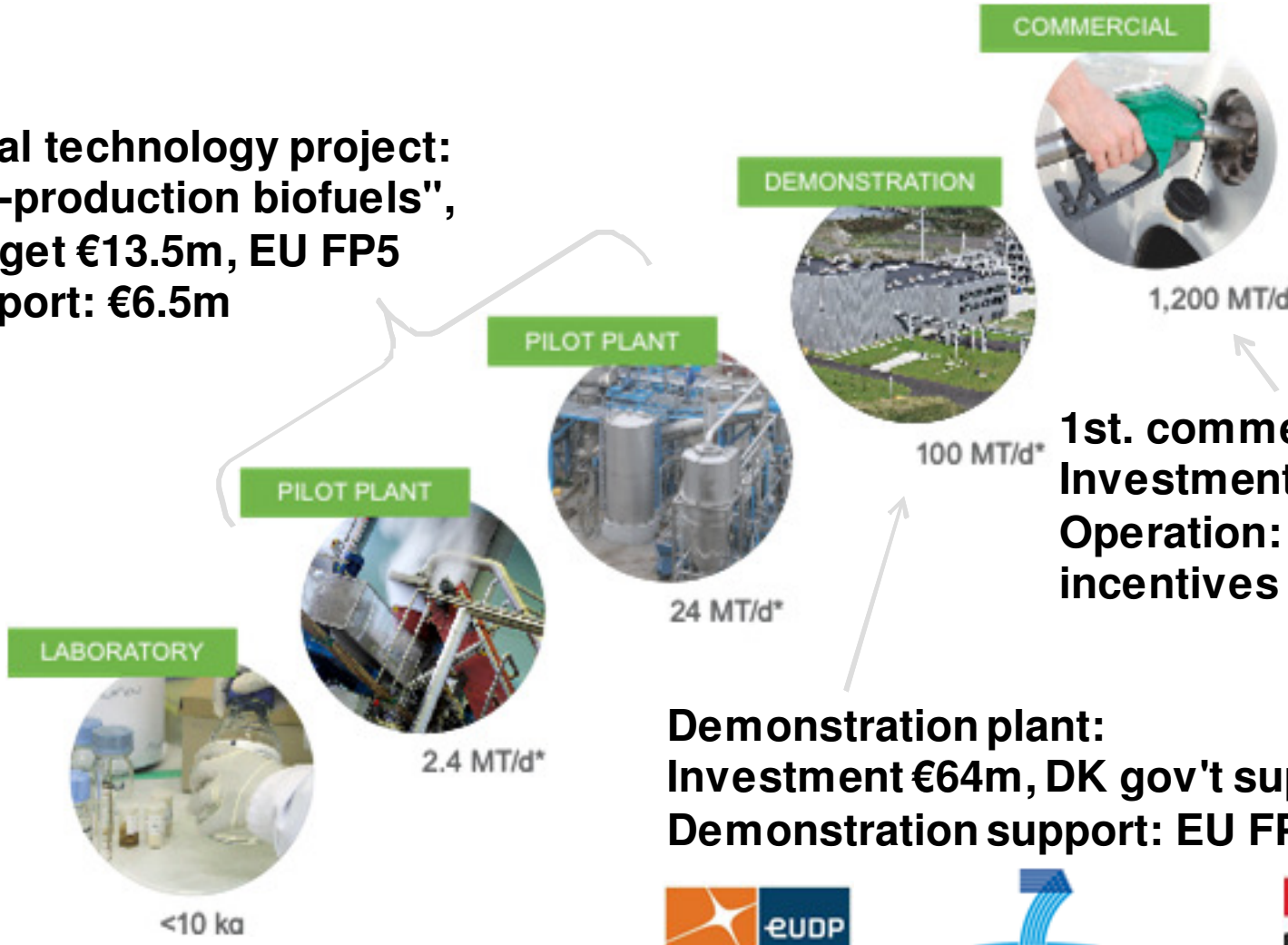
Investment and operating cost increase dramatically with scale

Initial technology project: "Co-production biofuels", budget €13.5m, EU FP5 support: €6.5m



1st. commercial plant: Investment €320m, Operation: Regulatory incentives required

Demonstration plant: Investment €64m, DK gov't support €10m Demonstration support: EU FP7 € 9m

EUDP

SEVENTH FRAMEWORK PROGRAMME

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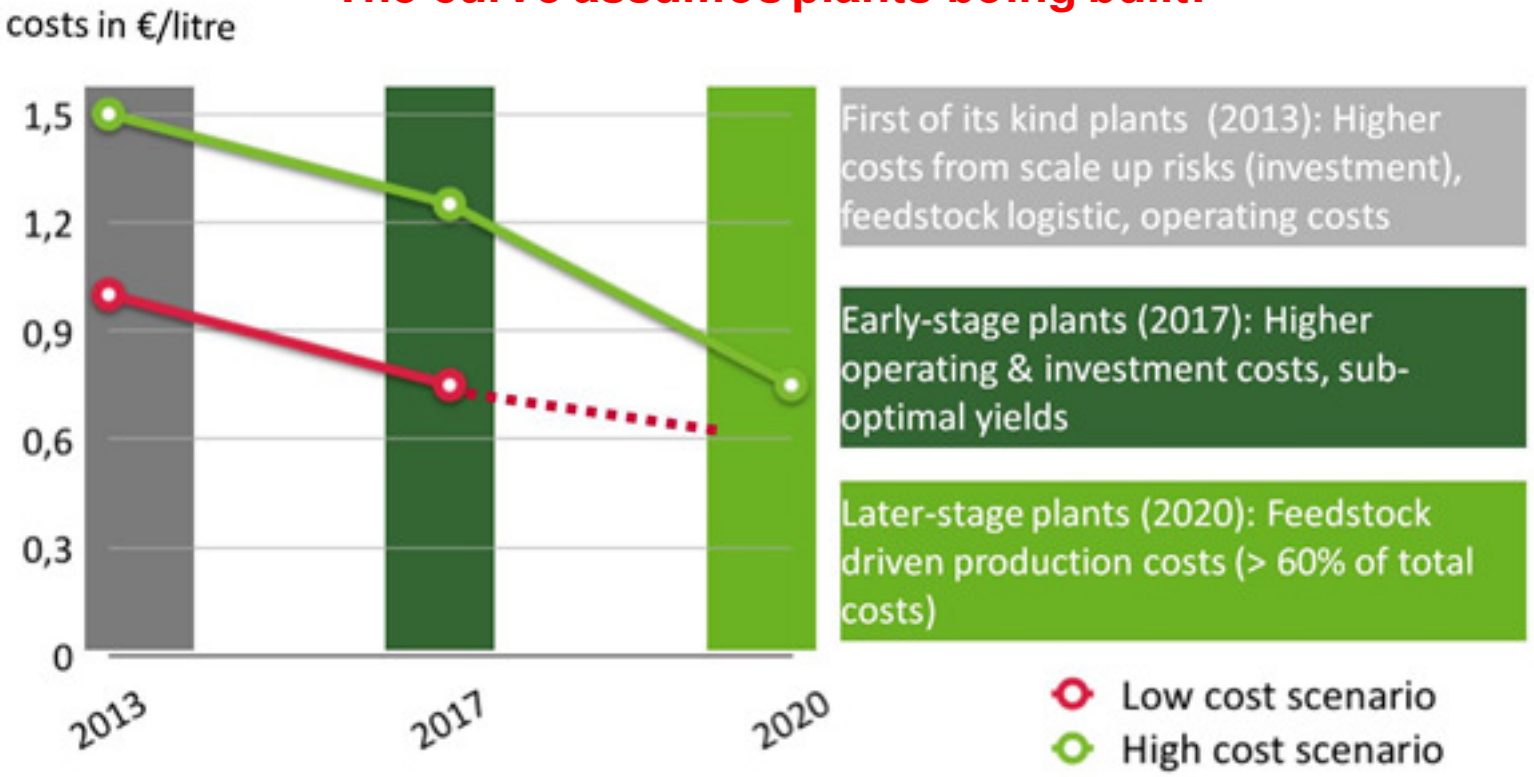
Commercial scale plants are needed to get down the experience curve

The curve assumes plants being built!



Source: ePURE working group on cellulosic ethanol

Barriers and needs from the perspective of a cellulosic ethanol producer

Barriers - Risks:

- Uncertain policy environment: RED implementation, targets, FQD
- Unclear incentives / policy signals to invest big scale in advanced biofuels
- Results in no or unclear premium for cellulosic biofuels to value superior sustainability

Needs:

- Specific mandatory target for advanced/cellulosic ethanol
- Production support, fixed premium for first 1 billion liters per plant (wind mill model)
- Other support measures (e.g. grants, loan guarantees) for production plants
- Incentives for creation of value chain also for by-products and collection of residues

Reluctance to invest in cellulosic biofuels

No capacity build up

Source: EBTP Financing Workshop, June 2011

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Willingness to pay for sustainable renewable energy – but not within fuels

- Renewable energy usually can not stand alone without subsidies
- Financial stability is needed to ensure build-up of capacity
- Windpower enjoy support resulting in prices 2X to 3X the price of the fossil alternatives, such as coal-based power
- Biomass power and heat also enjoy incentives resulting in prices considerably above the price of the fossil alternative
- Why are cellulosic biofuels expected to be able to compete with mature, optimised first-generation bioethanol?

- **PROPOSAL:**

  Support of XX €cent per liter for the first 1 billion liter per individual plant

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Conclusion

- R&D funding programmes are very useful for R&D activities
- Deployment and commercialisation need support of another magnitude, i.e. solid regulatory incentives
- New, sustainable technologies are rarely competitive with the fossil technologies they replace, for example windpower, biopower etc.
- Financing of sustainable biofuels projects is a challenge, but not impossible. Financing can deal with technological risk and market risk
- Financing can not deal with an economically unsustainable business case
- There is a need for strong regulatory incentives, that can be put into the investment calculation

MIPER@dongenergy.dk

www.dongenergy.com

www.inbicon.com

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Thank You

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Success story in EU funding of projects

10 X multiplication effect of original EU investment:

Initial technology project: "Co-production biofuels", budget €13.5m, EU contribution (FP5): €6.5m

Demonstration plant: Budget €40m, Danish gov't support €10m

Total project expenditure till end of 2009: +/- €65m

New projects based on the initial project:

HYPE

Develop consolidated and more cost-effective bioprocessing, budget €5.4m, EU contribution €3.6m

Renescience

Pre-treatment of waste with enzymes for introduction in pressurised gasifiers, budget €7.3 million, contribution from Danish sources approx. €3.8m

2nd generation biofuel for cars of the future

Comparison of pretreatment technologies, budget €5.6m, DK gov't contribution approx. €2.8m

Biomass for biofuel and bioethanol on pilot scale

Optimisation, budget €1m, contribution from Danish sources approx. €0.8m

Kacelle

Demonstration and optimisation of the Kalundborg demonstration plant

FP7 contribution:

€ 9 m