

Market Potential and Competitiveness of Cellulosic Ethanol

Inauguration of Chempolis
3rd Generation Bioethanol Production Line, Oulu, May 4th, 2010

Tom Knutzen
CEO
Danisco A/S



Danisco and Genencor have strong roots in Finland

- Key parts of our global business segments:
 - Animal Nutrition
 - Danisco Sweetener business
 - Danisco's key R&D group for our Health & Nutrition platform

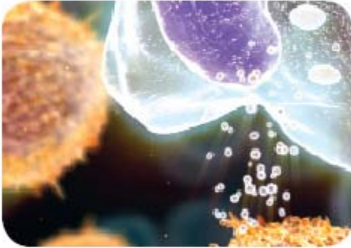
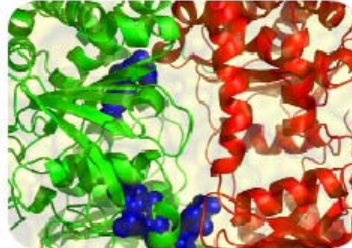
- 1999: Danisco's acquisition of Cultor - giving Danisco 50% ownership of Genencor, later expanded to full ownership in 2005

- Today: Strategic sites & plants:
 - Kantvik: health & nutrition, animal nutrition
 - Kotka: fructose and xylitol
 - Naantali: betaine
 - Hanko, Jämsänkoski and Joikonen: enzyme
 - Vaasa: feed premix facility

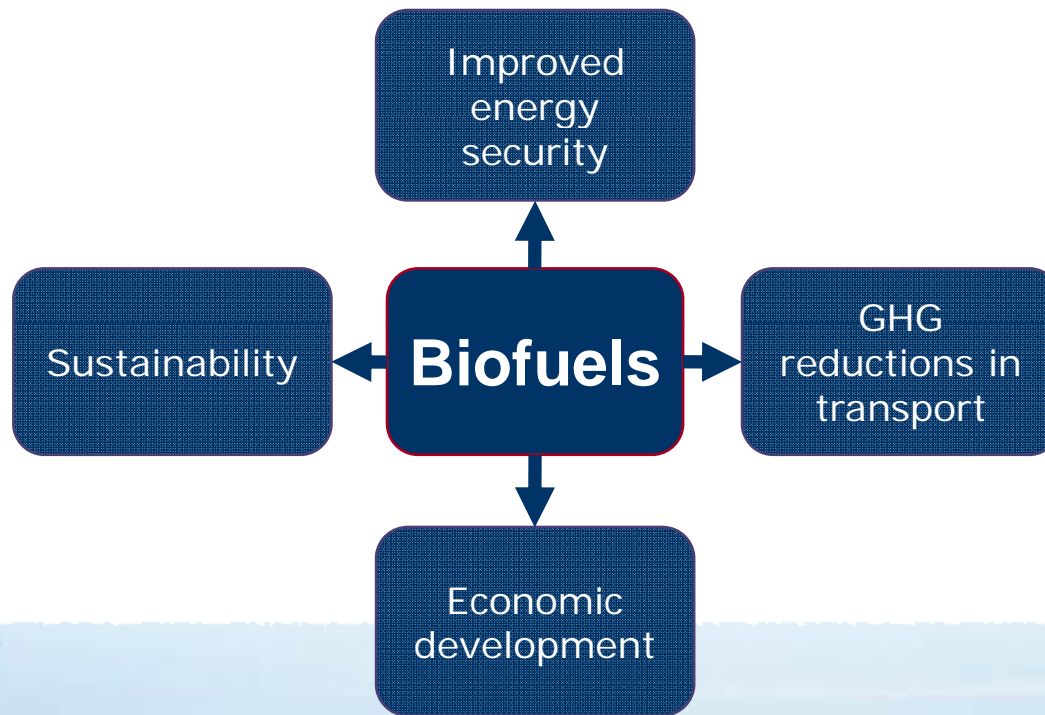
Our mission since 1982



Through innovation and responsible practices, we deliver bio-solutions that improve industry performance and sustainability.



Biofuels address a number of issues high on the global political agenda



Biofuels are key to reducing CO₂ emissions, growing the economy, and increasing energy security

The transport sector is responsible for about 25% of global CO₂ emissions and is expected to be the main driver of emission growth going forward.

Biofuel produced from corn reduces CO₂ emissions by 20–50%. Cellulosic biofuel will reduce CO₂ emissions by approx. 90%.

In 2009, biofuel supported 400,000 jobs in the US, added USD 53 billion to the US GDP and increased US energy security by decreasing oil imports of 364 million barrels (5%).

Source: UN-Energy, International Monetary Fund, EU JRC, US DoE, Liska et al., in 'Journal of Industrial Ecology', RFA

Jeffreys Clean Tech symposium exhibit

As a result, many countries support EtOH often with specific support for cellulosic EtOH

USA

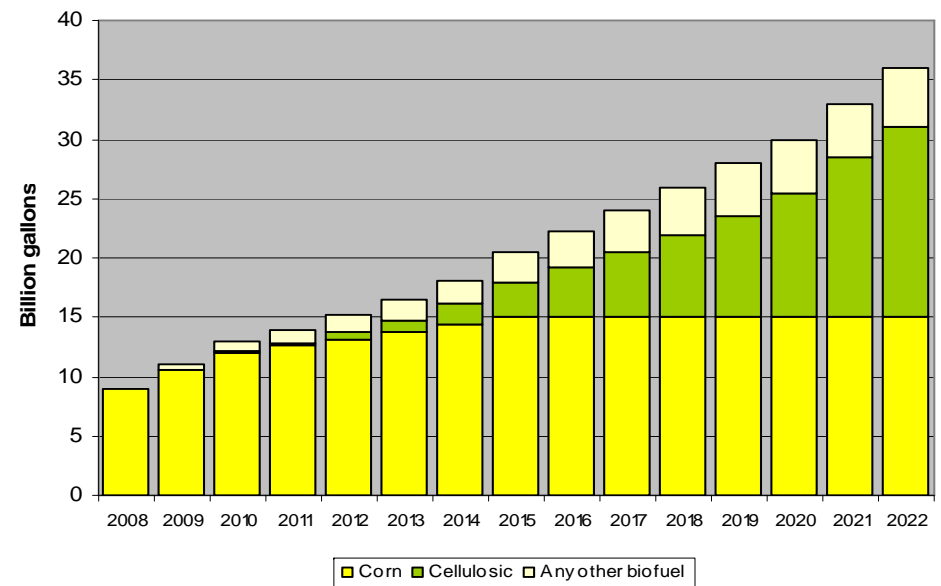
RFS2 mandates the use of 16 Bgl cellulosic Ethanol =44% of total 2022 mandate

EU

Cellulosic ethanol counts double against national renewable energy obligations (10% by 2020)

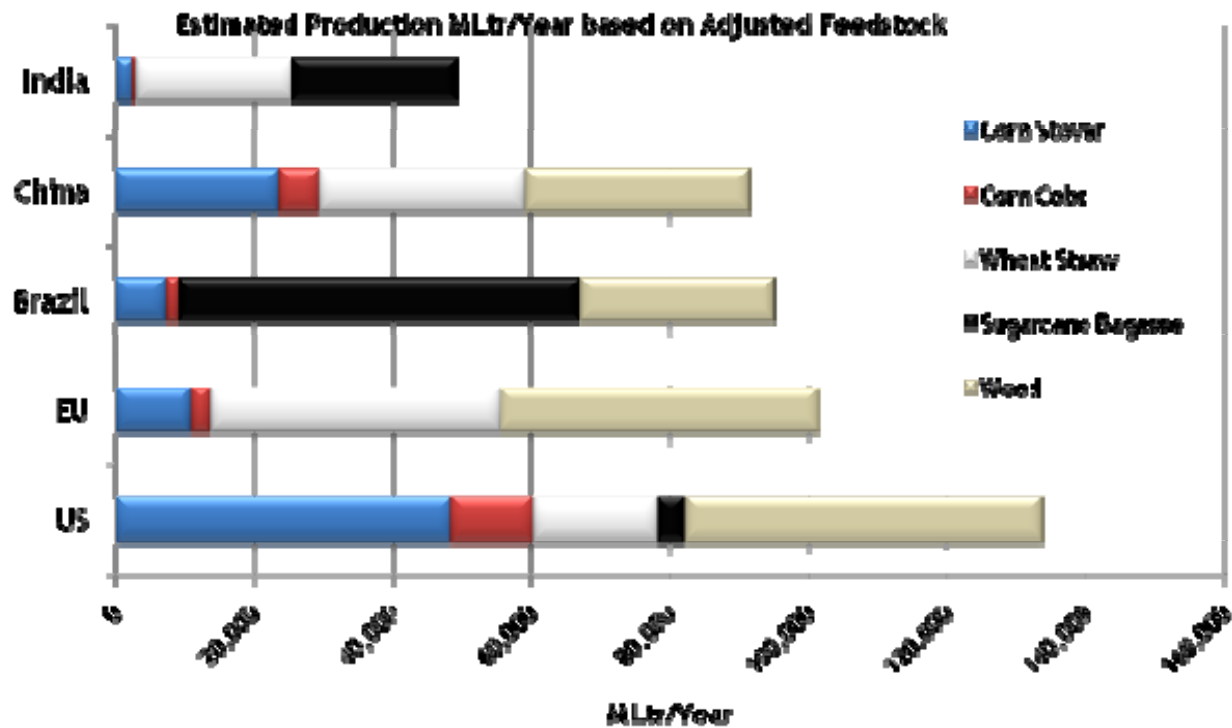
Source: Unica, US RFS, EU directive

The US mandate 2008-2022



Sandia : Available cellulosic biomass could produce bioethanol enough to displace at least 25% of current global gasoline consumption

ILLUSTRATIVE



... without increase in acreage

Market Potential of Cellulosic Ethanol in 2020

Based on mandates and projections on gasoline consumption, a potential scenario for 2020 **could** be:

USA	45 billion litres
Brazil	20 billion litres
China	30 billion litres
EU	10 billion litres

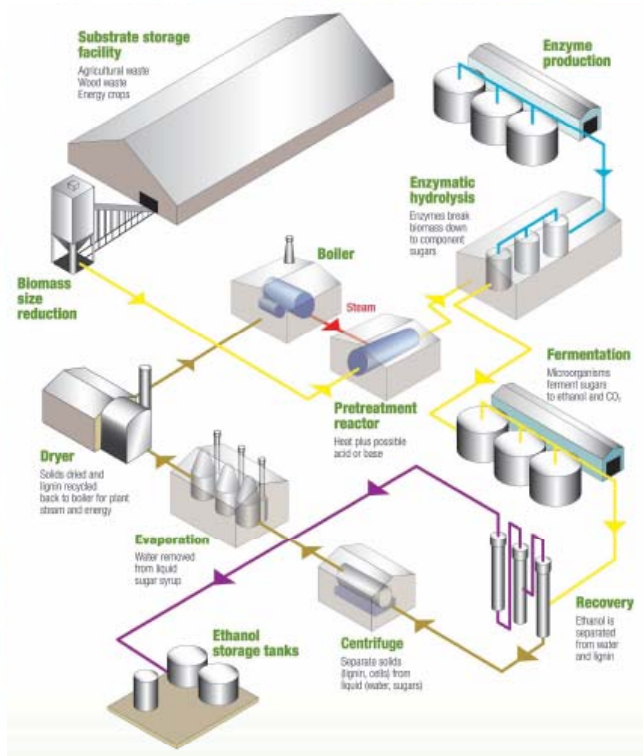
Timing is the big uncertainty

Competitiveness of Cellulosic Ethanol

Factors which influence competitiveness of cellulosic ethanol:

- The political framework
- Oil price
- Biomass availability and price
- Ethanol production costs, including enzyme costs
 - By 2012, expected production costs: 2,00 USD/gallon, at enzyme costs of 0,50 USD/gallon
 - With the US tax credits of 1,01 USD/gallon, the US fuel ethanol is expected to be priced at 1,60-1,90 USD/gallon in 2010

What is Needed to Make Biofuels Industrially Successful?



1. Continued government support until technology gets a self-sustaining start.
2. Financing in risk-adverse environment.
3. Integration and optimization of technology at large scale.
4. Feedstock logistics for handling and storage.
5. Enzyme cost-in-use allowing profitable ethanol production.



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Launched February 2010 - a new state-of-the-art enzyme solution

Dedicated low-cost product complex with enhanced performance

Up scaled successfully to full scale , supplying in bulk (over 20 metric ton/tank) from our global production sites

Strengthens Genencor®'s Leadership in biomass hydrolysis

- Additional activities increase enzymatic synergy
- Faster C5 and C6 sugar conversion.
- Results in increased ethanol yields.

Crosses economic threshold of \$0.50/ gal in several applications

Feedstock flexible: works well on hardwood pulp



Conclusion

- Finland and Chempolis are strongly positioned in the biobased economy
- Danisco is committed to driving solutions to address the megatrends
 - Biofuels is a real solution for the transport sector – by 2011/2012
- Strategic collaborations among industry leaders is key to the success of biofuels
 - Chempolis and Danisco is a great fit

