

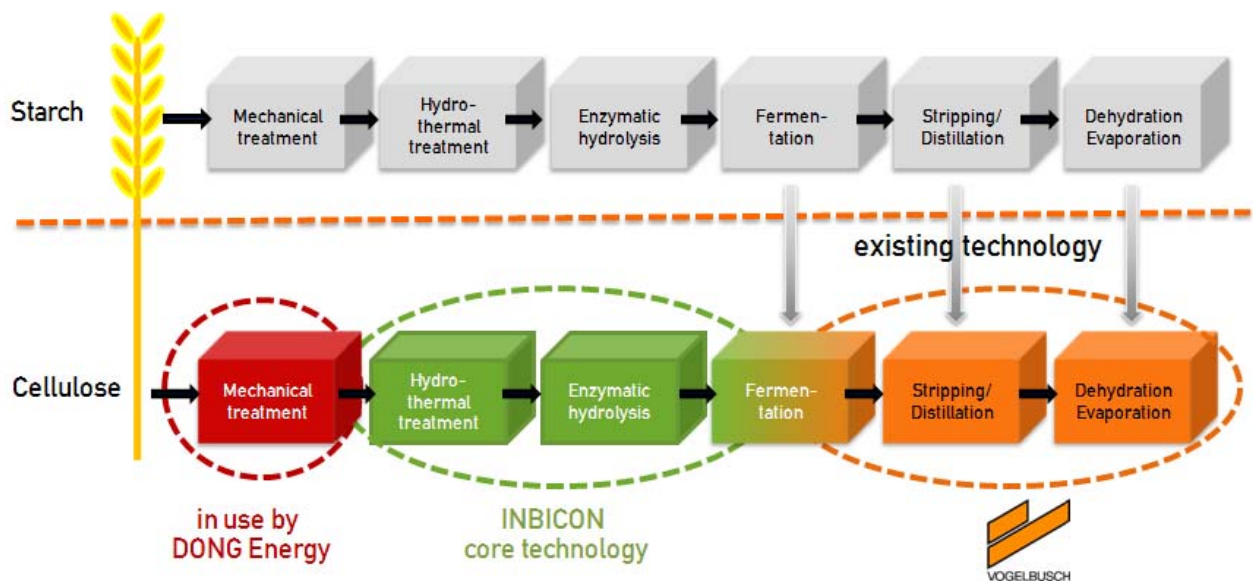
## INBICON A/S

### 2G Bioethanol Demonstration Plant

Kalundborg | DK

Demonstration facilities for second generation (2G) feedstocks, such as cellulose, are built to prove the feasibility of new raw material handling, treatment, and conversion technologies. In most cases, modified first generation (1G) technology can be used for subsequent process steps. The integration of commercially proven 1G and novel 2G processes reduces the technology risk for investors, freeing scientists and engineers to concentrate their efforts on optimizing feedstock treatment.

Inbicon (short for Integrated Biomass Conversion) is a Danish company that is at the forefront of developing technology for the utilization of 2G feedstocks. The demonstration plant, built by Inbicon A/S (a subsidiary of DONG Energy), is one of the first industrial scale facilities in the world that is capable of converting biomass, such as straw, into bioethanol and was featured as a showcase project for 2G bioethanol production at the UN climate summit in Copenhagen in December 2009.



Comparison of a 1G (starch) process and the 2G (cellulose) conversion combined with 1G process steps as implemented by Inbicon

The technology developed by Inbicon is a 3-stage process with mechanical, hydrothermal and enzymatic treatment of biomass. To complement their conversion process Inbicon has opted for technology from VOGELBUSCH for part of ethanol fermentation as well as for the distillation and dehydration process. In addition energy saving thermal integration is applied to contribute to the best possible energy balance of the plant.

## PROJECT PROFILE

### FACTS | Inbicon 2G Demonstration Plant

Raw material	wheat straw (4 tons per hour = 30,000 tons per year)
Capacity	17,000 liter per day = 4,300 tons / 5,400 m <sup>3</sup> of ethanol per year
Technology	a combination of existing and new: DONG - experienced with biomass logistics from power plants (20-30 t per hour) INBICON - pilot tested mechanical/hydrothermal/ enzymatic pretreatment and C6 fermentation VOGELBUSCH - technology and process design for final fermentation, distillation, dehydration and evaporation
By-products	11,000 tons of C5 molasses / year (animal feed, biogas, bioethanol)
Start-up	2009



The sustainability of biofuels in the European Union is regulated by binding criteria in the Renewable Energy Directive COM(2008)19. Second generation biofuels count twice within the mandatory 10% biofuel target which has effected intense research and development of 2G processes. Besides the selection of the raw material the energy efficiency of the production facility is essential for sustainable production. The reduction of greenhouse gas emissions in production is significantly affected by energy efficient state-of-the-art technology.

VOGELBUSCH is a leading supplier of technology to the ethanol industry and is currently collaborating with several firms to provide commercially-proven, state-of-the-art 1G know-how for integration into 2G pilot and demonstration plants. The Austrian company and its subsidiaries offer engineering services worldwide.

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