

## EXPLOITABLE FOREGROUND

### Procedure and apparatus for hydrolysis of pelletized biomass using hydrogen halides

#### Explanation and Purpose

When hydrochloric acid was used in the past as an agent for saccharification it was almost exclusively applied to wood and this for two reasons. First, the dry matter density of wood exceeds the value of biomass such as straw or grass two to threefold when it is filled into the hydrolysis unit. Following this line an equal throughput corresponds with a two to threefold increase in terms of the installed hydrolysis capacity. Secondly, biomass with a lower level of lignification such as straw showed a tendency to clog the reactors when finally the acid was replaced by water leading to an interruption of the procedure applied. By observing the mechanism of movement of solids and liquid streams during the hydrolysis using a glass vessel, simple solutions were obtained leading to a fivefold increase in terms of load when straw was used. This was reached by using a mixture of chaff and pellets instead of straw. In comparison to wood an increase of 30-40% could be reached. Further, by simple modification of the reactors the clogging can be avoided.

These two modifications lead to a remarkable increase in terms of applicability of our hydrolysis technology. Now, a wider range of biomass can more easily be hydrolysed using lower capacities installed.

#### Exploitation Strategy

Green Sugar earns its revenues by licensing their technology. This technology is protected by patents. This innovation is added to the portfolio of patents Green Sugar holds.

#### IPR Measures

It is currently being evaluated in which countries or regions the patent will be claimed.

#### Further Research

The innovation will be verified on further biomass of different kind in order to explore their scope.

#### Impact of Exploitation

Using this simple innovation the throughput of biomass in terms of volume and time can be increased by a factor of at least two. In combination with inventions already claimed production costs of sugars using the technology of Green Sugar will be in the range of 20 ct/kg. The potential to minimise production costs is a very strong feature of this technology.

# Novel Microbes and Enzymes for 2<sup>nd</sup> Generation Bioethanol Production



#### Contact for Exploitable Result:

**Green Sugar GmbH (GS)**  
Dipl.-Ing. Biotech. Frank Kose  
kose@green-sugar.eu

#### Project Coordination:

**VTT Technical Research Centre of Finland**  
Prof. Merja Penttilä  
merja.penttila@vtt.fi

#### Project Dissemination:

**WIP – Renewable Energies, Germany**  
Dr. Rainer Janssen  
rainer.janssen@wip-munich.de

**NEMO Website:** <http://nemo.vtt.fi>



NEMO is co-funded by the European Commission in the 7<sup>th</sup> Framework Programme (Project No. FP7-222699)