

2nd International Conference & Expo on **Green Energy, Recycling & Environmental Microbiology**

November 28-30, 2016 Atlanta, USA

St1 Cellunolix™ bioethanol demonstration plant process is based on softwood as a raw material

Tom Granström

St1 Biofuels Oy, Finland

St1 has built the first-of-a-kind-commercial softwood demonstration plant with the annual output of 10 ML of bioethanol in Finland. The main unit operations of St1 Cellunolix™ process are steam explosion, enzyme hydrolysis, yeast fermentation, lignin separation, turpentine and furfural recovery and waste water treatment. Lignin and evaporation residues are fed into the boiler plant. The process utilizes softwood saw dust transported from the local mills. The saw dust is a natural choice for a raw material since 75% of the Finnish landscape is covered by wood. Softwood has an advantage of composing mainly C6 sugars enabling the use of conventional yeast fermentation. Enzyme hydrolysis and fermentation has been exclusively optimized to the pretreated softwood taking into consideration the recalcitrance of raw material and fermentation inhibitors generated. Furthermore, by upgrading the side streams the cost effectiveness of the St1 Cellunolix™ process can be increased significantly. The experiences running the demonstration plant are utilized in the 50 ML plant that will be planned next. The future process includes upgrading the lignin stream into more valuable products such as plasticizers, biofuel components or energy products. The economy of using simultaneous saccharification and fermentation and high gravity fermentation will be studied further. Recirculation of process waters and working with higher total solids concentration throughout the process will be assessed further. Finally, the raw material base will be extended to other lignocellulose material available in Nordic countries and outside Europe. St1 is a privately owned Finnish based energy company running its own retail station chain and an oil refinery in Sweden. The revenues generated from the fossil fuel business are invested into different forms of renewable energy including wind, geothermal, biogas and bioethanol. St1 is investing on research to reduce CO₂ emissions by using only wood industry waste and residues as raw materials in all renewable energy processes. Currently, the three main processes are using food based reject waste (Etanolix™), separately collected biowaste (Bionolix™) and lignocellulose waste (Cellunolix™). St1 operates 1500 retail stations in the three countries and distributes all the produced bioethanol through its own channels.

Biography

Tom Granström received his PhD in the field of Bioprocess Engineering from Aalto University in Finland in 2002. After that, he was appointed as an Assistant Professor to Kagawa University in Japan 2003-2007 to study rare sugar production. After returning to Finland, he acted as a Project Leader in industrial projects for producing lactic and propionic acids, ABE-fermentation and bioethanol production from lignocellulose feed stock. He has been involved in the industrial development projects of pretreatment technology, enzyme hydrolysis, fermentation and waste water treatment. He is the author of 50 peer reviewed scientific articles, 70 posters and public speeches, 4 book chapters and inventor of 4 patent applications. Currently, he is acting as Research Team Leader in St1 Biofuels developing processes for producing renewable energy from waste raw materials.

tom.granstrom@st1.fi