

University of Mauritius

The Multidisciplinary Centre of Excellence(MCE) Energy, Environment & Water, in collaboration with UNDP (Mauritius)

has much pleasure in inviting you to the following talks

Gasification of Biomass for biofuels and power generation

by

Lars Waldheim of TPS Termiska Processer AB

&

ARER (Agence Régionale de l'Energie Réunion) & Energy efficiency practices in La Réunion

by

Franck AL SHAKARCHI, Project Manager, ARER

on Wednesday the 10th September 2008 at 09 30 hrs

Venue: Lecture Theatre, LT2, New Academic Complex, University of Mauritius

Agenda:

- | | |
|----------------------|---|
| 9.30 – 10.30 | Gasification of Biomass for biofuels and power generation
by Lars Waldeim, TPS Termiska Processer AB |
| 10.30 - 10.45 | TEA BREAK |
| 10.45 - 11.45 | ARER & Energy efficiency practices in La Reunion
By Franck Al Shakarchi, Project Manager, ARER |

Gasification of Biomass for Second Generation Biofuels for Transport; Principles and Development Status

Lars Waldheim

TPS Termiska Processer AB

ABSTRACT

The conversion of the carbon and hydrogen content of the biomass to a synthesis gas opens possibilities for the conversion of the biomass fuels to chemical such as ammonia, hydrogen gas, methanol, di-methyl ether and ethanol or petroleum-like products such as synthetic natural gas or Fischer-Tropsch crude. Some of these potential products can find use as transport fuels. This processing chain, together with ethanol produced by hydrolysis of cellulosic materials to sugars, is often termed second generation biofuels to distinguish it from ethanol based on sugar or crop starch raw materials or fatty acid methyl or ethyl esters. The benefit and strong promotion of these so called first generation biofuels in Europe and USA have recently been under heavy debate, as they use potential foodstuff for fuel, may have negative land use impacts and with the exclusion of sugar cane ethanol, the greenhouse gas reduction benefit as estimated by life cycle analysis methodology is at best limited. While the commitments in reduction of the greenhouse gas footprint in the transport sector provides a growing and large market for biofuels in general, policies to encourage and promote the transition from first to second generation technologies are being implemented. However, the technology is at a development stage and the rate of scaling-up, and replication, as well as also a future potential competition for biomass fuel sources with traditional uses or other renewable energy technologies will affect rate of penetration.

This presentation will:

- highlight the policies in force or being introduced, mainly in the European Union, but also in USA, in terms of quantitative targets and other criteria, e.g. sustainability
- briefly describe the principles of the gasification technology used for synthesis gas generation and the fuel product options
- provide an overview of the state of the art of the synthesis gas based technologies
- give an idea of the future outlook for this new technology

**Gasification of Biomass for Power Generation;
Principles, Status and Application potential in the Sugar cane Industry
Lars Waldheim**

TPS Termiska Processer AB

ABSTRACT

The conversion of the energy in biomass to an energy-rich gas opens possibilities for use of this fuel in processes and conversion devices where solid fuels cannot be used directly.

In the past there have been a number of attempts to realise this potential, and gasification systems have been developed specifically for biomass fuels to meet requirements for various downstream applications. Biomass gasifiers of up to 80 MW thermal are in industrial operation today for some applications not requiring extensive gas cleaning.

Integrated gasification of biomass for power generation using gas turbine combined cycle technology (B-IGCC, BIG-GT etc.) has for some decades attracted interest, as it has the potential of delivering a considerably higher efficiency to electrical power or, in the case of co-gen applications, a higher fraction of the recovered energy as electric power rather than process heat, compared to conventional technology as represented by combustion boiler steam turbine systems. For this application, the gas must be cleaned and also pressurised prior to use in a gas turbine. The gas cleaning and overall process configuration for atmospheric and pressurised gasification, respectively, was developed during the 1990's and several demonstration projects were launched, and a few of these were constructed and operated for some time. However, the market interest shifted towards biofuels for transport but recently, a new interest for the technology seems to emerge.

With regard to the sugar cane industry, the project "BRA/96/G31 - Biomass Power Generation: Sugar Cane Bagasse and Trash" supported by UNDP and the EU had the specific aim to develop and evaluate the technology required in the complete fuel-to electricity chain; starting from sugar cane by-product fuels to electric power generation with gasification systems integrated with a sugar mill. As part of this project, TPS has conducted fuel testing on bagasse and sugar cane trash in its 2 MW gasification pilot plant in Nyköping, Sweden and assisted Copersucar of Brazil, with the integration study.

This presentation will:

- describe the principles of the gasification technology used for power generation
- provide a review of the state of the art and the progress of the BIG-GT technology
- present the general results of the pilot plant test work at TPS on sugar cane fuels and the conclusions of the sugar mill integration study for project

Franck AL SHAKARCHI

Projects Manager (ARER)

Project Manager, Island States Program

ABOUT ARER

Réunion Island Regional Energy Agency (Agence Régionale de l'Energie Réunion – ARER) is a non-profit-making association as defined by the French Associations Act 1901. It was created in 2001 under patronage of Réunion Island Regional Council.

ARER's aim is to promote and develop energy savings as well as the use of renewable energy, and to protect local energy resources.

ARER gathers the main Energy Actors in Reunion Island:

- Réunion Island Regional Council
- Electricité De France Réunion (EDF - local electricity provider)
- Agence De l'Environnement et de la Maîtrise de l'Energie (ADEME – french agency for environment and energy management)
- Urban communities and city councils : CIVIS (south sub-region), TCO (west sub-region), CIREST (east sub-region), Bras-Panon, Le Port, St Leu, St Paul, Ste Suzanne
- Centre Hospitalier Félix Guyon

Its main missions are:

- As far as citizens and children are concerned :
 - Information, education and sensitization
- As far as public and private energy consumers are concerned:
 - Development of sustainable energy strategies
- As far as regional and local public authorities are concerned
 - Development of regional and local sustainable energy policies
 - Integration of energy specifications to construction and land-planning
- From a technological point of view:
 - Inventory of potentials of sustainable energy technologies
 - Development of local applications and pilot projects
 - Development of local industries