Technology Fact Sheet

Biodiesel[i] /http://climatetechwiki.org/technology/biodiesel/

General description

Biodiesel is used as a diesel substitute, and is generally blended with fossil diesel to various degrees. In Europe, the fuel standard permits only up to 5% biodiesel blend, mainly due to limitations imposed by fuel and vehicle specifications. Using blends over 20% may require some modest vehicle adaptations. Higher biodiesel fuel blends are sometimes used in fleet vehicles (e.g. trucks and buses) (IEA Bioenergy, 2009).

Depending on the feedstock and conversion route, we can distinguish 1st and 2nd generation biodiesel 1st generation biodiesel can be produced from various vegetable oils, such as rapeseed, palm, soybean and palm oil and animal fats (Source: climatetechwiki.org).

There are various routes to produce 1st generation diesel-type fuels from biomass. Transesterification, the most common route, is a catalytic process where fat or oil is combined with an alcohol (usually methanol). Two important by-products of this conversion route are glycerin and animal feed in the form of press cakes. The alternative route, hydrogenation, a process resembling oil refining, has so far seen limited deployment, although it produces a renewable diesel of superior quality (with higher blending potential) to that obtained via transesterification (IEA Bioenergy, 2009).

Implementation

Transesterification and hydrogenation are technically mature and commercially available 1st generation technologies that produce biodiesel from vegetable oil and animal fats. (IEA Bioenergy, 2009). The bulk of global biodiesel production is in Europe, which accounts for the largest part of the global biodiesel supply (with Germany and France the largest European producers), as a result of past support for domestic bio-fuel production.

Implementation of biodiesel production technologies is part of the commitment of the Republic of Moldova to mitigate emissions in transport sector, one of the measures being to accomplish a 20% share of bio-fuel in conventional fuels mix.

Implementation barriers

- Production of biodiesel depends mainly on sufficient provision of economical vegetable oils and animal fats used as feedstock. The production of biomass, is limited by the availability of land and crop yields. Yield improvements require significant investment into fertilizers, mechanization and training of farmers to improve agricultural practices.
- The specific properties of biomass: low energy density, often requiring drying and densification; seasonal availability and problematic storage;
- Factors limiting the supply: availability and appropriateness of mechanized equipment; and inadequate infrastructure to access conversion facilities and markets.

GHG emissions reduction (megatons CO_2 equivalent) – 110 thousand tons CO_2 in 2030.

Impact on development priorities:

a) *social*

- Job creation in the agriculture and forestry sectors, which is particularly relevant for developing countries with significant unused land resources and a large pool of unskilled workers;
- Job creation in the industrial sector (e.g. a 125 million liter ethanol plant would employ cca 270 people (Gnansounou et al., 2005);
- Increasing farm incomes: provided the additional income is distributed equitably, increasing the income in the primary sector, which employs the majority of the workforce, can support rural development and significantly improve living standards;
- Increasing inclusion in the economic system: well-organized farmers unions can gain access to energy markets.

b) *Economic*

- Increasing energy security by producing and using bio-fuels locally, thus reducing the dependence on imported fossil oil;
- Saving foreign currency by displacing fossil oil imports;
- Earning foreign currency by producing bio-fuels for export.
- Diversifying the industrial sector.

c) *Environmental*

- GHG emission reduction: most bio-fuels offer net GHG savings compared to fossil fuels, unless forest land areas are cleared to make way for bio-fuel feedstock plantations.

d) *other*

Investments

Depending on the feedstock used and scale of the plant, production costs can differ significantly. Because of lower average costs, larger plants (of capacity greater than 200 million liters per year) have dominated among new installation. Production costs range from roughly $0.50/l to $1.60/l, (IEA Bioenergy, 2009). For a plant with a production capacity of 220 million liters / year investment costs are $ 26.1 million.

Operation and maintenance costs - are estimated at $ 0.02 / liter, given the plant capacity of 220 million liters / year, $ 4.4 million / year.

GHG reduction cost– 278 $/ton CO_2.

Technology lifetime – 50 years.

Other

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[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change mitigation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**