

Avoiding Greenhouse Gas Emissions The Essential Role of Chemicals



Bio-Mono Ethylene Glycol (MEG) from renewable source

An India Glycols Limited case study



INDIA GLYCOLS LIMITED

The Bio-based MEG ensures lesser GHG emission at the raw material phase during lifecycle of MEG production. The lower GHG emissions ensured by the bio-route is predominantly due to use of renewable material (sugarcane molasses) as raw material compared to MEG production via the petro route which causes significant GHG emission during crude oil excavation and processing stages.

A case study comparing GHG emissions of Bio MEG production at India Glycols Limited (IGL) with the conventional petro route has been carried out. The results are presented using the IPCC 2013 GWP100a methodology. The Eco Invent data of Petro-MEG for this study are mainly focused on plants in Europe. The total CO₂ generated is 1,221 kg CO₂ equivalents per MT of Bio-MEG production, compared to 1,628 kg CO₂ equivalents for the Petro-MEG production.

The avoided emissions are presented as the difference of GHG emissions over an MEG life cycle (Cradle-to-Gate). Avoided emission of Bio-MEG production compared to Petro-MEG production is significant. The avoided emission amount to 407 kg CO₂eq/MT MEG produced.

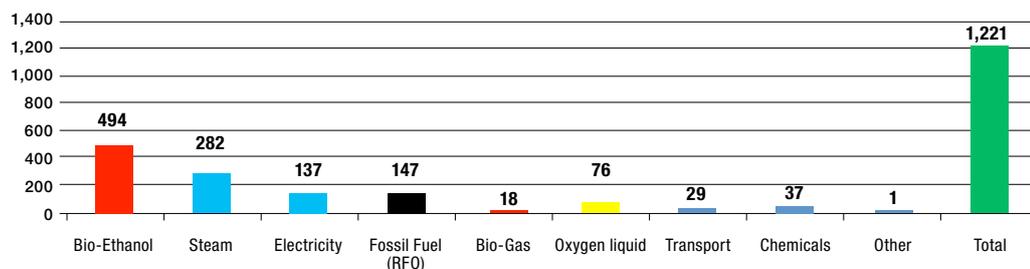
MEG is used worldwide. Global demand for MEG was estimated to be 22 million tonnes in 2012 with a capacity of 28 million tonnes. The demand for MEG continues to increase steadily. IGL alone produces around 150,000 tonnes per annum of Bio-MEG.

By using the per annum production data of Bio-MEG by India Glycols Limited, total avoided CO₂e emissions stemming from Bio-MEG production amounts to ~ 61,030 MT-CO₂e compared to petro route MEG production.

Full study available at: www.icca-chem.org/energy-climate

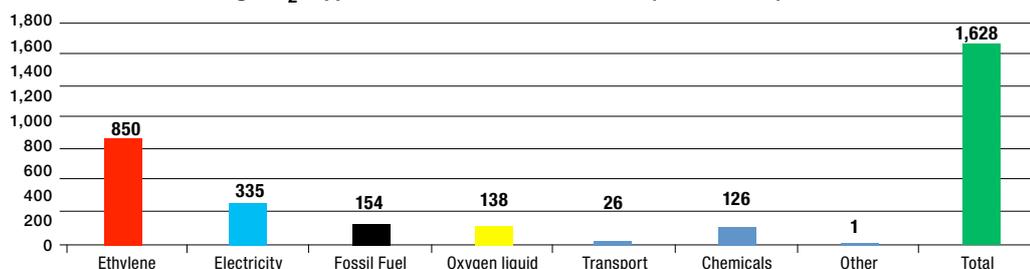
CO₂eq emissions stemming from the manufacturing of Bio-MEG (Cradle-to-Gate)

Emission in kg CO₂ eq per MT of Bio-MEG Production



CO₂eq emissions stemming from the manufacturing of MEG via the Conventional Petro route (Cradle to gate)

Emission in kg CO₂ eq per MT of Conventional-MEG (Petro route) Production



Summary

Raw material plays key role in MEG production. In Petro route MEG production, the raw material is crude oil compared to sugarcane molasses for bio route. Sugarcane molasses is a renewable material as raw material is cultivated again and again. During cultivation stage, it absorbs CO₂ from atmosphere and reduces GHG load of atmosphere.



This case study illustrates how the reduction of greenhouse gas (GHG) emissions can be enabled by chemical products, as part of a series of case studies brought to you by ICCA. Chemical industry members offered Life Cycle Assessment [LCA] case studies for the purpose of showing illustrative examples on how to calculate avoided greenhouse gas emissions. The avoided emission calculations were based on the guidelines developed by ICCA and WBSCD (World Business Council for Sustainable Development) - Chemical Sector, with the support of Arthur D. Little and Ecofys. Other life cycle environmental impacts such as water and land use change were outside the scope and usually not considered.

