LCA Activities

Update on Activities including Renovabio GHG Emissions

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Virtual Meeting, November 23

Task 39 LCA History

- Task 39 has long been involved in biofuel LCA work.
  - 2008 Report “An Examination of the Potential for Improving Carbon/Energy Balance In Biofuels”
  - 2010 Report “Biodiesel GHG Emissions, Past, Present, and Future”
  - 2012 Advanced Biofuels – “GHG Emissions and Energy Balances”
  - 2015-2018 “Comparison of LCA Models”
    - LCA sub-group was led by Dr. Antonio Bonomi from Brazil’s Bioethanol Science Technology Lab (CTBE)
    - Compared biofuel pathways as modelled by the main LCA models in different world regions. identified differences between models’ structures, calculations, and assumptions
    - Showed its possible to obtain similar LCA results once these differences are understood and accounted for
    - Their work helped explain why different LCAs on the same biofuel pathway can have seemingly different results
    - Extremely useful especially for policy makers who use LCAs to determine the GHG savings their policies may provide.

Recent Work: renewable content (& Carbon Intensity) of co-processed drop-in fuels

- Co-processing biogenic feedstocks in existing oil refineries can enhance the production of lower-carbon-intensity (CI) fuels significantly
- Co-processing oleochemical feedstocks at existing refineries is already fully commercial
- Determining the CI of co-processed fuels is complex
- Recent work evaluates the status and recent developments in methods to track the green molecules (or atoms) in co-processed fuels

Tracking renewable content (and Carbon Intensity) of co-processed drop-in fuels

- 4 broad methods principally being used to track or estimate the bio-component from co-processing
- Mass or energy balance, incremental yields, Carbon dating (also known as ^{14}C, 2 methods AMS & LSC)
- Decisions exist over allocation of bio-component (equal, unequal, free allocation)
- Legislation/preferred method in EU varies by country
- Industry use and tend to prefer different methods
- Processing + feedstock type can affect choice of method; green hydrogen addition could be an issue

Preparing papers for policy makers and Regional LCA data

- Intend to develop “Summary Papers for Policy Makers” addressing key factors influencing biofuel LCAs.
- Displacement Effects: becoming a more important topic of late
- EU draft LCA legislation intends that novel renewable fuels, including carbon capture fuels, consider the existing use (or otherwise) of feedstocks and large inputs for these fuels
- Can also be relevant for some advanced biofuel production, such as a waste (MSW) fuel which is a mixture of bio+fossil material
- Intends to avoid taking feedstock from an existing possibly very valuable use
- Crucial legislative issue: how to prove an existing “use”?

New work: Development of Regional Life Cycle Inventory Data

- Data acquisition is always a challenge for model developers and policy makers.
- Brazilian RenovaBio program is making data for sugar cane production and processing publicly available
- This work will aim to collect data from individual mills as it becomes available, and then aggregate and summarize these data and make this information available to LCA model developers.
- Data from over 65 sugarcane-ethanol mills has been collected so far.

Renovabio Program

- Biofuel producers in Brazil must have their GHG emissions certified by approved parties to be able to generate Cbios.
- The certified GHG data are posted for public comment.
- Once the public comment period is over the production data is removed from the verifiers website.
- Started collecting data in Mid February 2020. Some were posted and removed before we started collecting the data.
- Data on 67 mills has been collected so far. Represents 153 million tonnes of sugarcane.

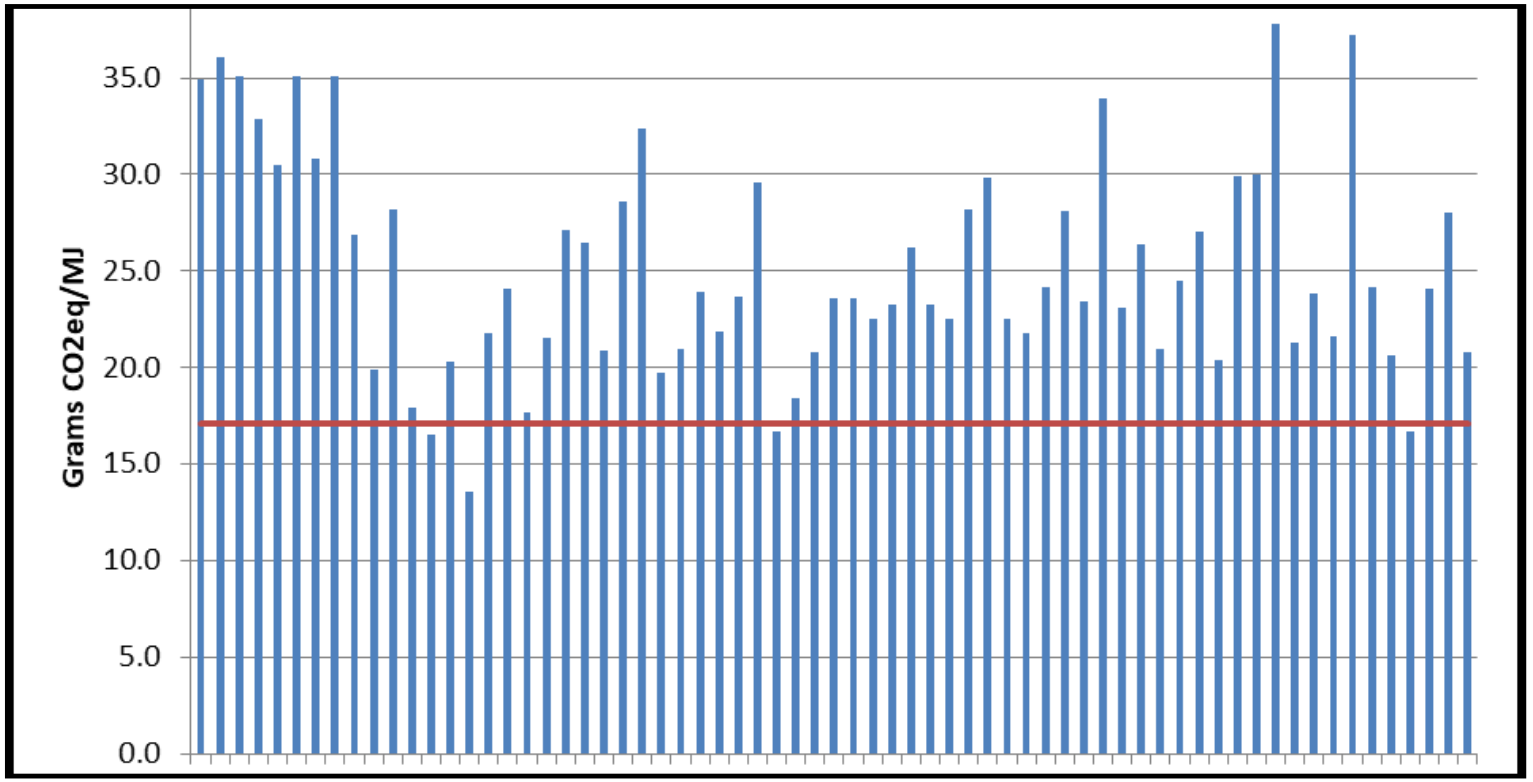
Data Collected

- A lot of raw data is available, limestone, fertilizer, fuel, organic nitrogen sources, bagasse burned, sold, bought, power consumed and sold.
- Some default values could be used and a few mills used them for fertilizer but they are conservative.
- Results shown in the next slide exclude the mills (8) that used default values.

Data

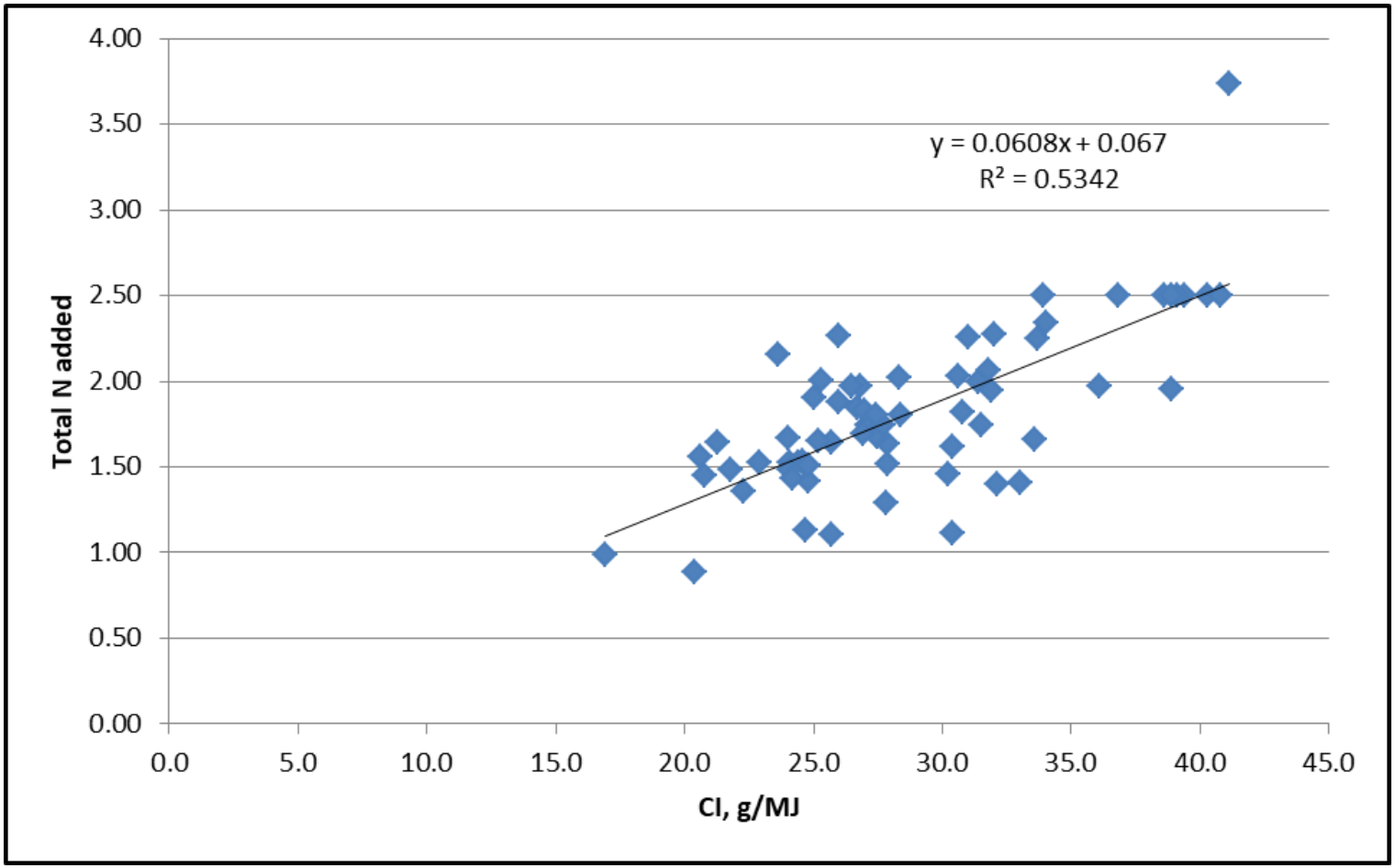
Parameter	Average Value	Std Dev
Limestone, kg/tonne cane	0.05	2.9
Dolomite Limestone, kg/tonne cane	10.53	4.0
Gypsum, kg/tonne cane	4.23	2.9
Total, kg/tonne cane	14.7	6.6
Total Syn N, kg/tonne cane	1.33	0.35
Total P, kg/tonne cane	0.61	0.37
Total K, kg/tonne cane	1.22	0.39
Total Organic N, kg/tonne cane	0.42	0.16
Total Diesel, L/t cane	4.51	1.25
Total Biodiesel, L/t cane	0.50	0.14
Gasoline, L/t cane	0.0	0.03
Hydrous ethanol, L/t cane	0.17	0.09
Ethanol equivalent Yield/ litres/t	73.9	12.7

Farming GHG Emissions
Includes mills with default values



JRC Default is in Red

Nitrogen vs CI



Future Plans

- Continue to collect the data.
- When the availability of new data slows down, prepare a report with the data summarized so it can be used by GHG model developers.
- Some of the new data is already incorporated in GHGenius.
- Continue ongoing rapport with other biofuels LCA “modellers”
- LCA values will become increasing important as needed polices are driven by the Carbon Intensity (CI) of low carbon fuels

Questions?

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