Proposal for an EU definition of mass balance

Malmö, Sweden, September 28, 2023

As part of the implementation of the EU Single Use Plastic Directive, the European Commission is now discussing the definition of the chain of custody method mass balance. The choice of definition will have large consequences for brand owners and producing industry and this paper aims at clarifying and sharing our recommendations for the EU definition of mass balance.

Content:

The transformation needs a mass balance standard with chemical and physical traceability which:

- is transparent and has credibility and acceptance from all parties in the value chain including brand owners and end consumers.
- will drive real change; supporting the development of the recycled/renewable (including bio) raw materials and the efficient production processes needed for the transition of the industry.
- has traceability in the value chain and enables a theoretical possibility of finding a recycled/renewable molecule in the output product.
- shall never be the end goal, but rather the bridge from fossil to sustainable industries; preferably there should be a possibility of increasing from 0% up to 100% over time as demand grows, raw material inputs become available and the transition takes place.

Suggestion on common ground

- There is a proven chemical route to produce the product from the recycled/renewable (including bio) raw material(s) used, and a production process, "the steel", exists within the production site for producing the product from the recycled/renewable raw material(s).
- The recycled/renewable raw material can only replace its own part/share of the product.
  - If 1 kg of a product is produced from 0,4 kg raw material A and 0,6 kg of raw material B, each raw material can only substitute their own share of the product, e.g. raw material A 40% of the product and raw material B 60%.
- Free attribution can be applied; meaning the recycled/renewable raw material can be attributed to one or several of the outgoing products, but based on yields taking losses into account for consumptions of raw material inputs.
- No attribution of recycled/renewable content from process fuel to products

- The actual process specific production yields are the basis for calculating the product output e.g. pyrolysis oil, an amine or propylene.
- No credit transfer within or between companies or sites. A real physical flow of the renewable/recycled raw material connects the producer of the raw material and the production site where the product is produced.
  - If we drive credit transfer within EU27, we probably have to accept it also within other free trade areas like e.g. NAFTA and ASEAN and further more between different free trade areas. We have then opened for uncontrolled credit transfer and risk of damaged credibility.

Most important and the question to ask for checking if chemical and physical traceability is applied:

Is there a theoretical possibility of finding the recycled/renewable molecule in the product?

When applying chemical and physical traceability, there is a theoretical possibility of finding that recycled/renewable molecule in the product. This means that the real transition is taking place and with time there will be a gradual shift to full transition.

This will also meet requirements of traceability in Green Claims and is needed for realizing the Green Deal, Paris agreement etc.

Chemical traceability - definition

There are two criteria's to be fulfilled in the definition of chemical traceability:

1. Only the raw materials used to produce a product, are the raw materials that can enable the shift of that product.

A. Making a pancake.
Egg + Milk + Flour → Pancake
Only organic egg, milk and flour can enable an organic pancake. No credit transfer from organic tomatoes or oranges possible.

B. In a cracker, longer hydrocarbons like naphtha are cracked to shorter hydrocarbons.
Naphtha → Ethylene + Propylene + Residue streams
Biomethane/Biogas can be injected into the cracker but since it is the shortest hydrocarbon with only one carbon it is impossible to crack it to longer hydrocarbons like ethylene and propylene. The biomethane, if injected into a cracker, will always end up in the Residue streams. No chemical traceability is applied if biomethane is accepted in the cracker process for producing bioethylene or biopropylene.
Bio-naphtha consists of longer hydrocarbon and can, when used as input in a cracker become both ethylene and propylene. Hence bio-naphtha can be used to produce bioethylene and biopropylene.

C. When producing a polyol, like e.g Penta, three raw materials are used and two products are received;
Methanol + Acetaldehyde + Caustic soda → Penta + Formate
with the two sub reactions below (that we as a chemical company knows and follows rigorously to improve yields etc.);
Methanol + Acetaldehyde → Penta
Methanol + Caustic Soda → Formate

When chemical traceability is applied only renewable/recycled methanol and acetaldehyde can be used for enabling sustainable Penta, and only renewable/recycled methanol and caustic soda can be used to produce sustainable Formate.

2. One raw material can only replace its own share of the product.

A Pancake – organic eggs can only replace its own share, %, of the pancake. Only eggs can never be used to claim a 100% organic pancake.

B Cracker producing ethylene and propylene. – Bio-naphtha is the only raw material needed to make 100% ethylene and propylene and hence 100% renewable/recycled ethylene/propylene can be produced from bio-naphtha.

C Producing the polyol Penta. – to produce 100% renewable/recycled Penta both methanol and acetaldehyde is needed. Methanol makes 60% of the Penta molecule and acetaldehyde 40%. When only using biomethanol, maximum a 60% renewable/recycled Penta can be achieved.

In the polyol reaction free allocation can be applied which means that even though the methanol going in to the process is in reality ending up in both the Formate and the Penta, you can choose to attribute all of the methanol to one of the products, like the Penta. But again, the methanol can then only enable a 60% renewable/recycled Penta.

Proposal:

E. Free allocation given that all three below requirements are fulfilled.
Our interpretation of free allocation: Given that the three below requirements are fulfilled the recycled/renewable raw materials can be attributed freely to any product including material and fuel products.

- System losses (conversion factor) needs to be taken into account when calculating feedstock amount available for attribution to products.
- No attribution of recycled/renewable content from process fuel to products.
- Chemical traceability: Only the raw materials used to produce a product, are the raw materials that can enable the shift of that product from fossil to recycled/renewable. One raw material can only replace its own share of the product, following the chemical reaction. The company applying the mass balance for a product must be able to show evidence for this.

We propose to also have physical traceability where the two below requirements must be fulfilled.

- A production process, the steel, exists for producing the product from the raw materials used for its shift from fossil to recycled/renewable.
- There must be a physical connection between the raw materials used and the production process. No credit transfer within or between companies or sites.

Relation to ISCC PLUS certification (Perstorp Group example).

Perstorp started to use ISCC EU certification for its RME/biodiesel production around 2010. Chemical and Physical traceability was applied by ISCC EU since it was and is regulated by the RED directive.

Perstorp started to use ISCC PLUS certification for its chemical products in 2017. At that time Perstorp applied chemical and physical traceability and this was also the requirements of ISCC PLUS. With time ISCC PLUS has allowed exceptions to be made, from both the physical (under certain conditions) and the chemical traceability. Perstorp has continuously had a close dialog with ISCC and always raised the importance of chemical and physical traceability. Perstorp has always applied chemical and physical traceability with free allocation between products (see above) and is still using the ISCC PLUS certification for its more sustainable products (called Pro-Environment products), its mass balance and also its product carbon footprint calculations.

Even though ISCC PLUS does not require full chemical traceability, a company can still apply and certify a stricter mass balance. Furthermore ISCC PLUS has several mass balance methods that can be certified i.e C-14 measurable, chemical traceability, no chemical traceability.

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Sincerely,

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