Haltermann Carless

Mass-balanced Pentane: An opportunity to reduce Carbon Intensity (CI) during foam polymer manufacturing

Keith Mead, Sustainability Manager

Agenda

- Haltermann Carless – who we are
- Pentanes – main blowing agent alternative for CFC and HCFC
- EU Green Deal & Fit for 55 – consequences for the industry
- Mass balance approach – process, market acceptance and benefits
- Conclusion

A leading global provider of specialty hydrocarbons

Haltermann Carless

ISCC International Sustainability & Carbon Certification

GOLD 2023 ecovadis Sustainability Rating

1859 - 2024

Business Units

Life Science 

Industrial 

Mobility 

Energy 

Markets

- Agro Chemicals
- Pharma
- Energy Industry
- Automotive
- Electronics
- Industrial

Products

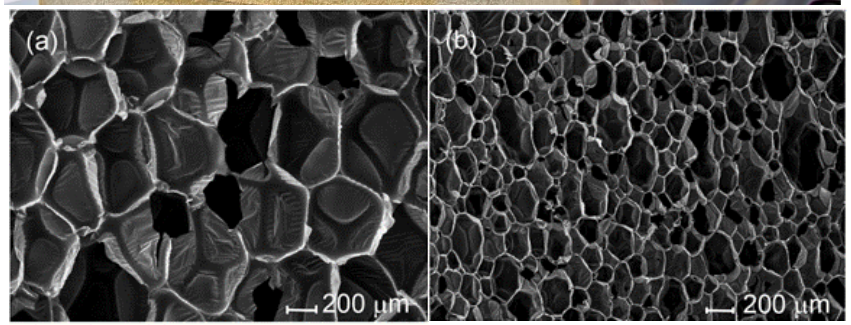
- High purity aromatic and paraffinic solvents
- Energy products & services (including transformer oil recycling)
- Performance fuels (engine testing, outdoor equipment, racing)
- Middle distillates
- Oxo products
- Pentanes

Pentanes positioning

- Global leader in Cyclopentane manufacturing
- Exclusive European producer of all three Pentane isomers (*n-, iso-* and Cyclopentane)
- Pentane blends in any mixing ratio available
- 2022 inauguration of hydrogenation unit allowing +70 % Cyclopentane production capacity

Pentane physical blowing agents

- Main alternative to the banned CFC and to HCFC blowing agents (banned from 2030)
- Cost-effective
- Very good insulation properties, especially Cyclopentanes
- Ideally suited for board manufacturing
- Prevents thermal transfer through PU foam cell structure as it remains in cell structure
- Can be part of “pre-mix” or added as an individual component at mixing stage
- BP 30-45°C; converted from liquid to gas due to heat of reaction
- Flammability - requires specialist handling equipment



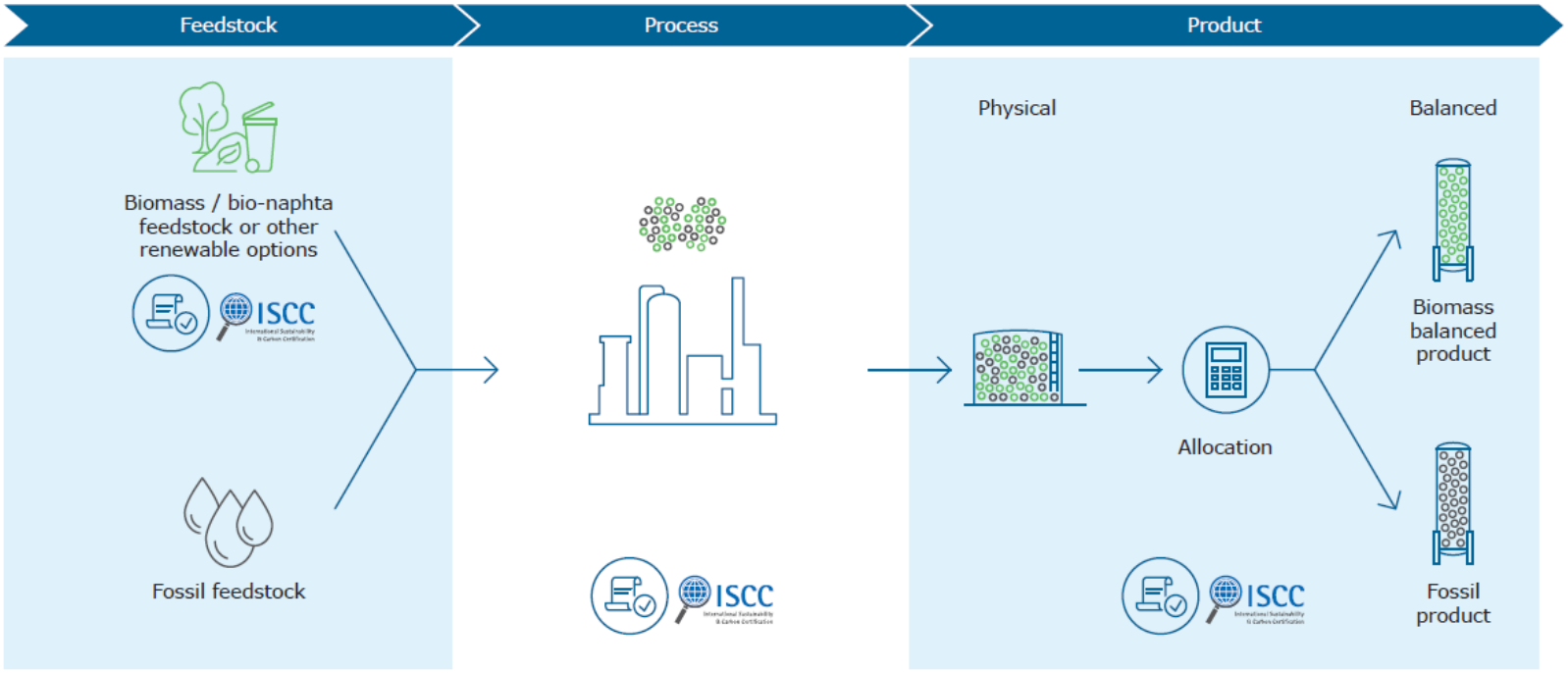
Increase energy efficiency of buildings

EU Green Deal & Fit for 55 – 12.03.2024

- Building sector accounts for 36% of GHG emissions in Europe
- New measures to achieve Fit for 55 targets by 2030:
  - Zero Emission Buildings (ZEB):
    - 2028 occupied or owned by public authorities
    - 2030 all others
  - Reduction of average primary energy in residential buildings:
    - 2030 at least 16%
    - 2035 at least 20 to 22%
  - Renovation of worst-performing non-residential buildings through minimum energy performance requirements:
    - 2030 16%
    - 2035 25%
  - Progressive deployment of solar installations, if technically and economically suitable

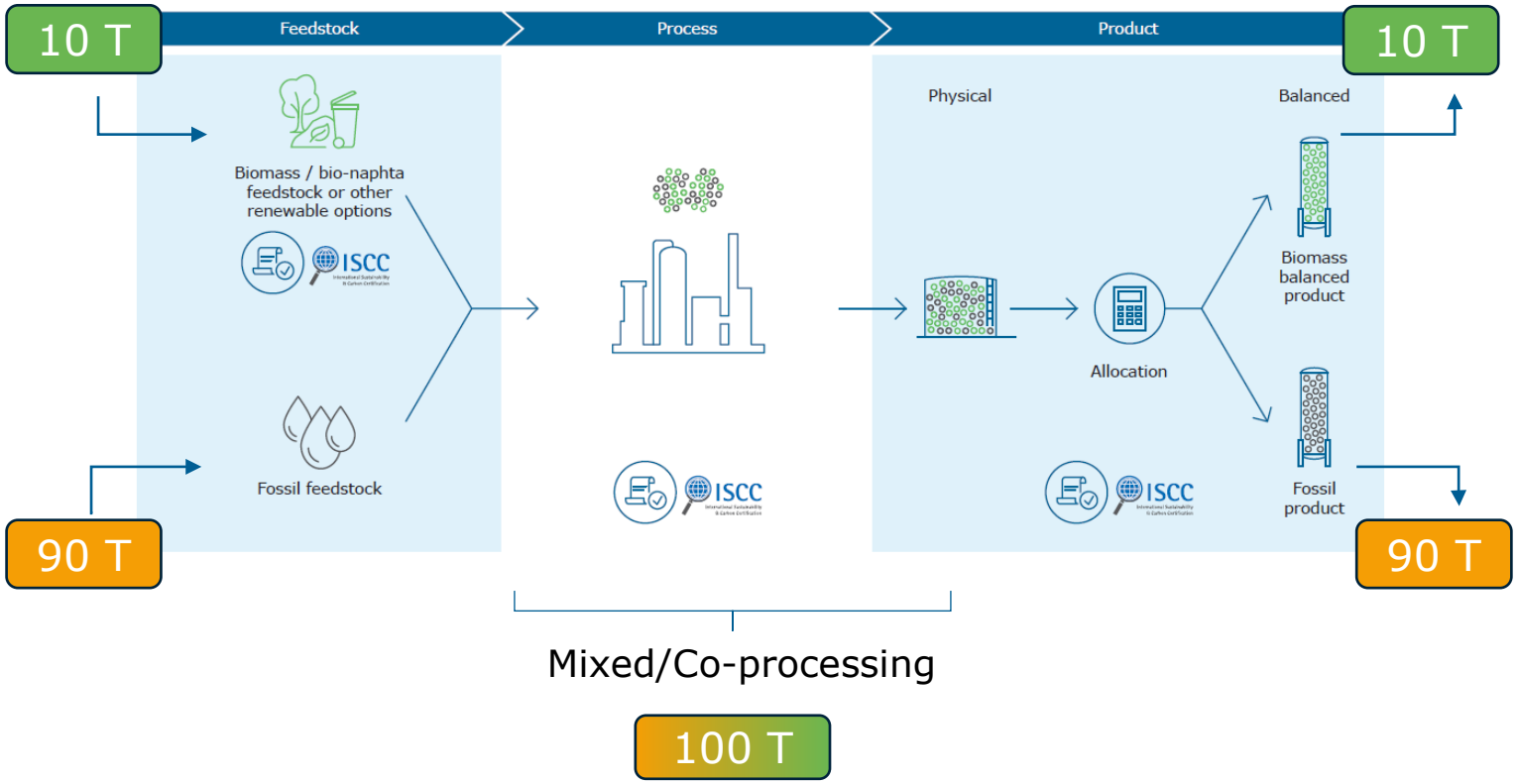
Mass Balance Approach

Supports transition to renewable and sustainable materials



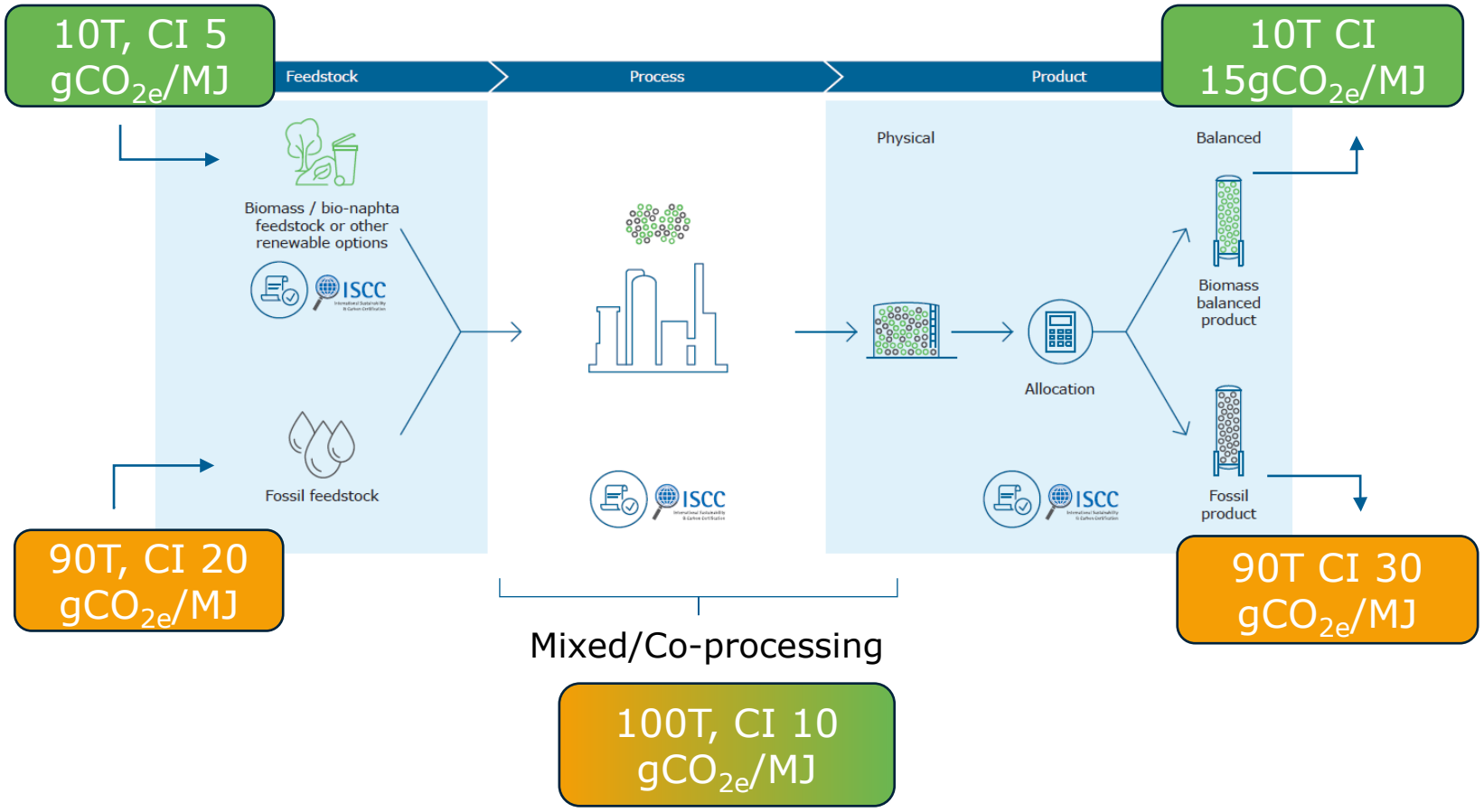
- Applies to diverse feedstock
- Chemical and physical traceability throughout the supply chain
- Allows co-processing with fossil components and allocation to final products
- Inventory management over an agreed time-period
- Auditable and consistent process e.g. ISCC Plus, ISCC EU (International Sustainability Carbon Certification)

Example: Simple Mass Balance



- Inputs are a known quantity of certified and non-certified material
- Materials are physically mixed during processing – co-processing
- Materials are "segregated" in bookkeeping
- Output can be assigned to individual products at an amount not exceeding the input (for certified material)
- Molecules are mixed during processing steps
- Carbon intensity savings are possible in the finished material

Example: Simple Mass Balance



$5 + 10 = 15.0\ gCO_{2e}/MJ$

$20 + 10 = 30.0\ gCO_{2e}/MJ$

- Inputs are a known quantity of certified and non-certified material
- Materials are physically mixed during processing – co-processing
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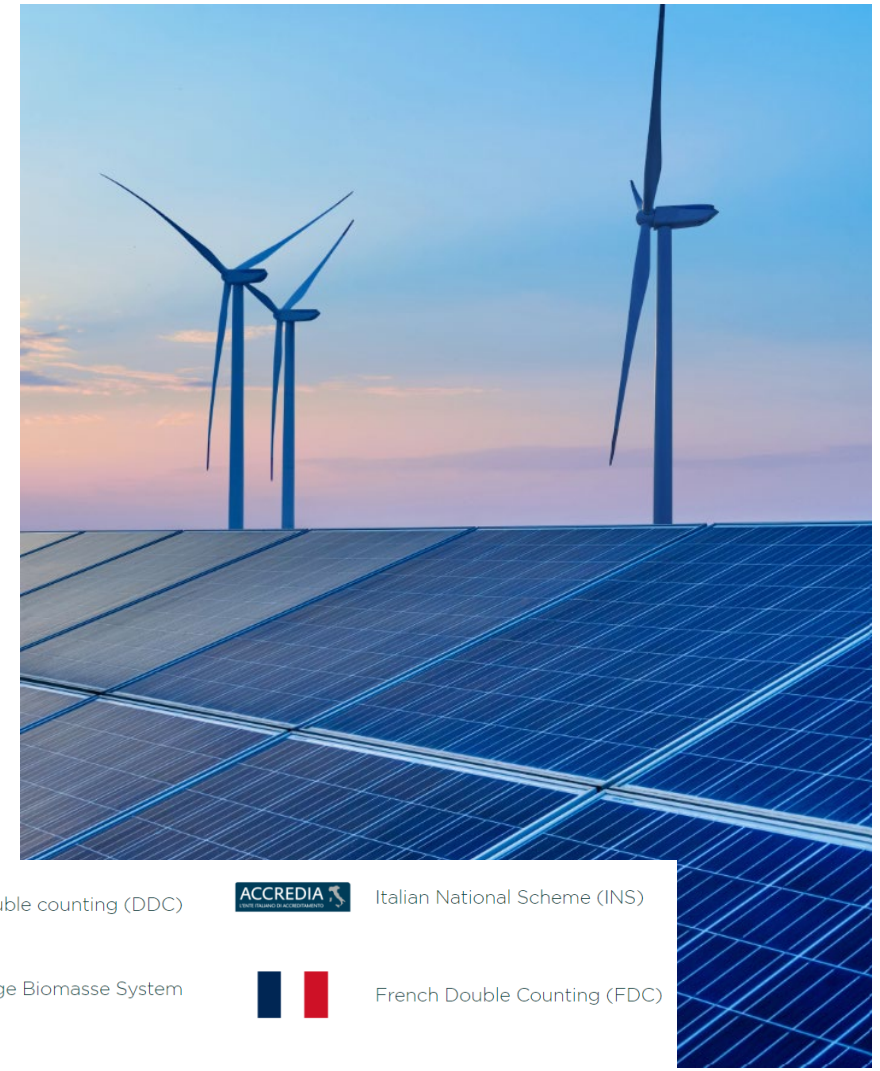
Mass Balance aspects to be considered

- Output material is a mixture and will contain a relatively small proportion of bio content (C_{14} analysis)
- GHG emissions savings are typically in the upstream supply chain (origin of material might be biomass derived or waste/residues), 0 gCO_{2e}/MJ v RED II (fuels)
- Typically, output materials do not qualify as bioliquids (or biofuels) and therefore the credit systems (double counting) are not applicable e.g. Nabisy (DE)
- Transition option to reduce CO_2 emissions whilst the development continues for low carbon alternatives e.g. REC/REGO in the electricity industry



Dutch double counting (DDC)

Italian National Scheme (INS)

Nachhaltige Biomasse System (Nabisy)

French Double Counting (FDC)

Mass Balance – an honest view

- Approach has been the subject of criticism i.e. seen as an "industry" solution to the problem
- Mass balanced materials do not comply with the requirements of tax credit systems that deal with combustion and fuel applications
- Limited feedstocks and supply challenges equate to slightly higher costs for the finished material

- ✓ Carbon intensity (CI) reductions in upstream supply chain can be offered to customers
- ✓ Customers can utilise CI reductions and incorporate them in their own LCA
- ✓ Overall CO_2 emissions are reduced in supply chain
- ✓ Chain of custody and traceability can independently audited (if voluntary system such as ISCC is implemented)
- ✓ Properties of the material remain very similar – very limited (if any) reformulation required

Conclusion

- Pressure from the regulators, customers and consumers challenges industry to find solutions to reduce GHG emissions
- Legislation such as Fit for 55 promotes wider use of insulation in residential and public buildings
- Mass balance is one option helping companies to reduce GHG emissions in their formulations now
- Transition solution to “bridge” the gap between fossil to bio-mass balance (BMB) to bioliquids and bio-circular (recycling) solutions
- Haltermann Carless supports customers to achieve their own sustainability targets

Haltermann Carless

I am happy to answer your questions.

Haltermann Carless

Your contact:

Haltermann Carless UK Ltd.
Phone: +44 1372 360000
eMail: uk@h-c-s-group.com
www.haltermann-carless.com

Resources used:

- https://www.europarl.europa.eu/news/en/press-room/20240308IPR19003/energy-efficiency-of-buildings-meps-adopt-plans-to-decarbonise-the-sector#:~:text=For%20residential%20buildings%2C%20member%20states,20%20to%2022%25%20by%202035.
- https://www.iscc-system.org/certification/chain-of-custody/mass-balance/
- https://www.iscc-system.org/certification/iscc-documents/iscc-system-documents/