

Synthetic Esters in Metalworking Fluids: Pioneering Sustainability for Enhanced Performance and Reduced Carbon Footprint

Alisha Bloodworth

Perstorp in brief

140+ YEARS
of professional expertise

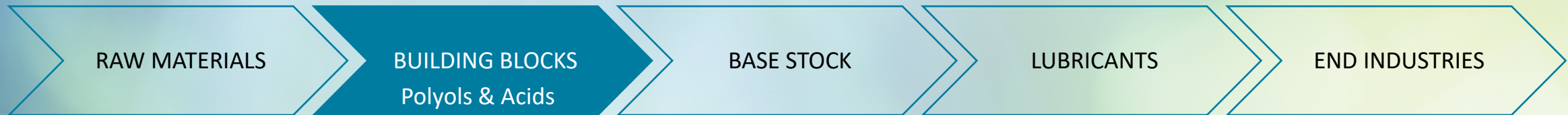
1,500 EMPLOYEES
Worldwide

26 COUNTRIES
with sales presence
and represented in many more

No. 1
POSITION
in 50% of our portfolio

90% OF
POLYOL ESTERS
can be formulated
with our portfolio of
polyols and acids

1st PORTFOLIO OF
PRO-ENVIRONMENT POLYOLS
to reduce the carbon footprint throughout
the value chain and to support
sustainable sourcing of raw materials



Our path to becoming Finite Material Neutral™

2010

Pro-Environment Portfolio
First ISCC PLUS Certified
Product Launched



2019

Internal Carbon Pricing
Implemented system for
pricing emissions



2021

Science Based Targets Set
Scope 1+2: 46%, Scope 3: 28%
Reduction by 2030



2026

Project Air
Secure prerequisites
for transformation



Shift towards synthetic metalworking fluids

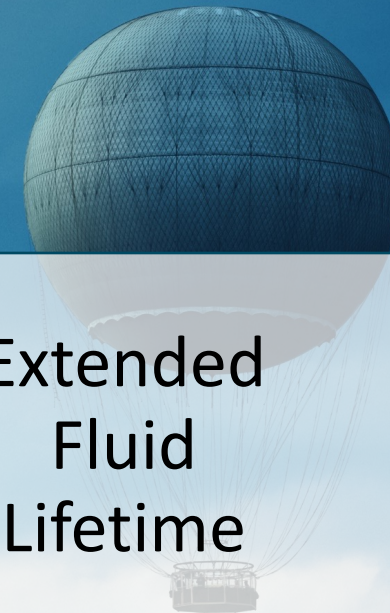
Sustainability

Extended
Tool Life

Stability

Extended
Fluid
Lifetime

Lower
misting



Synthetic Esters in Metalworking Fluids

Applications

- MQL
- Casting
- Rolling
- Grinding
- EAL fluids

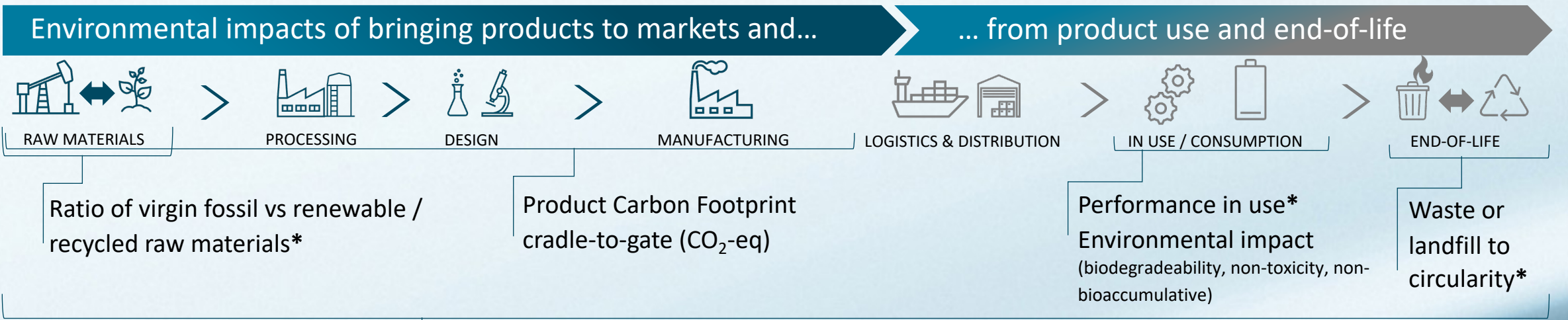
Products

- Mono esters
- Diesters
- Polyol esters
- Polymeric esters

Properties

- Excellent lubricity
- Long tool life
- Worker safety
- Biodegradability
- **Sustainability**

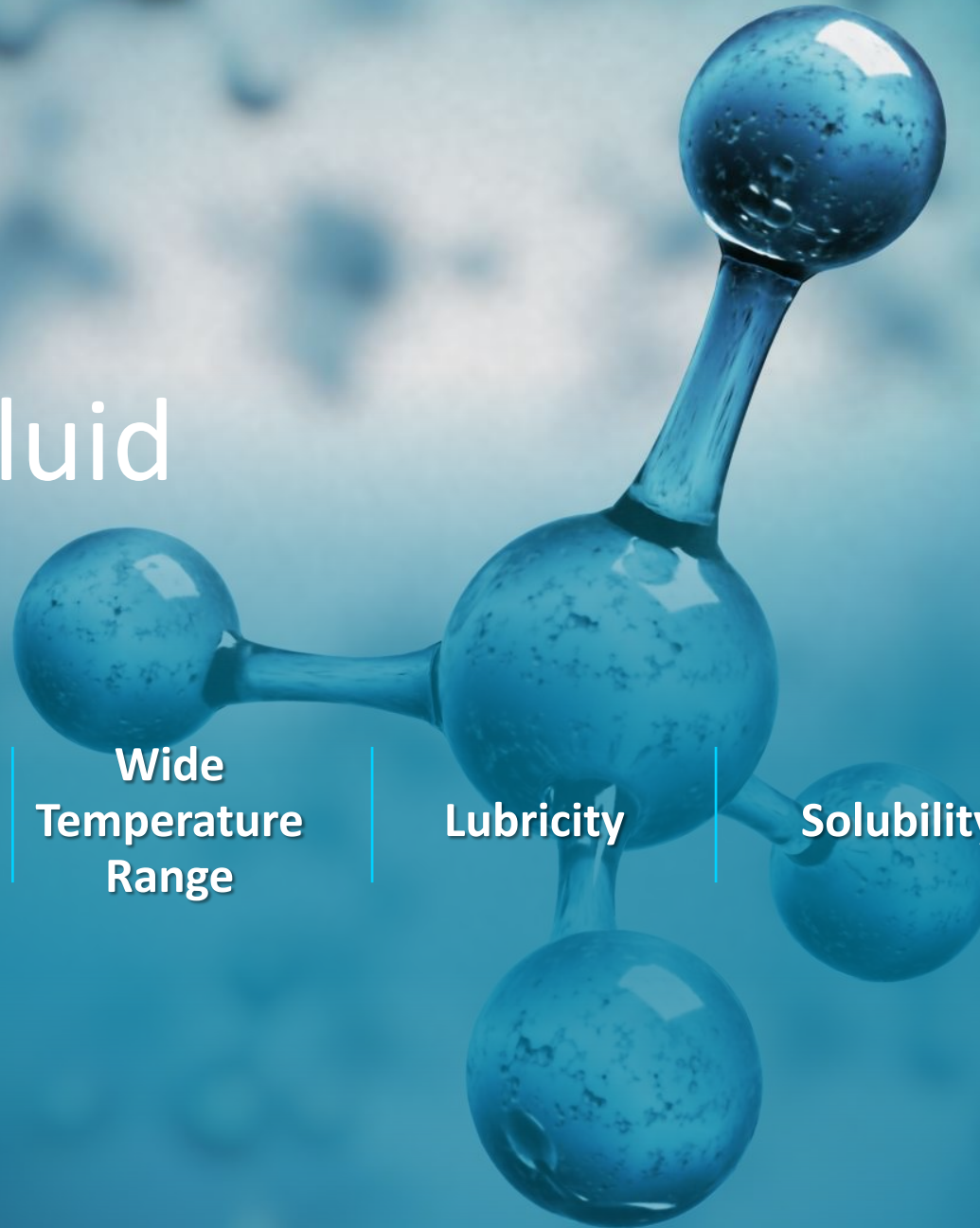
What is sustainability in MWF?



Social impact (human and labor rights)
 Environmental impact (deforestation, bio-diversity, water use and waste)

***Reduce dependency on virgin fossils**

Polyol Esters a functional fluid



Polarity

Well-defined
structure

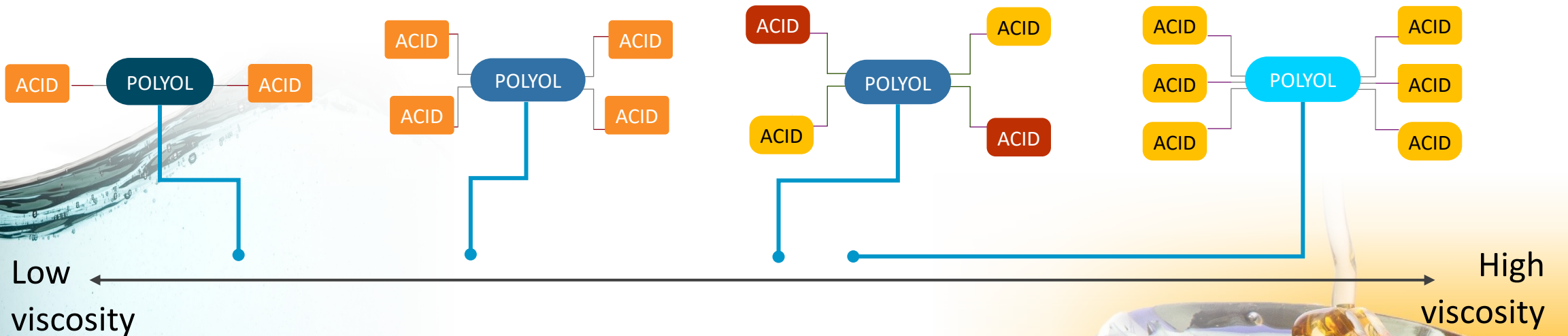
Wide
Temperature
Range

Lubricity

Solubility

Cleanliness

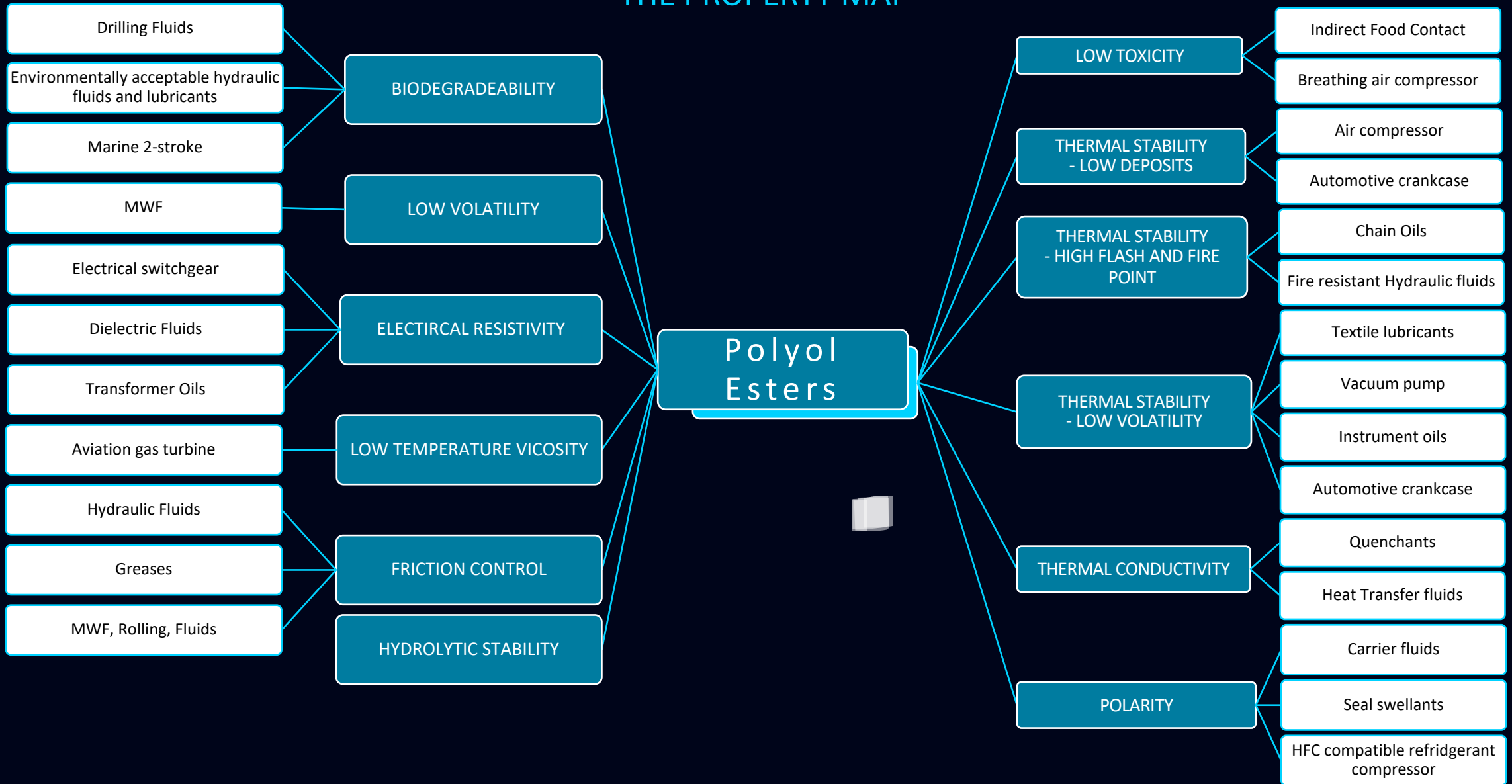
Polyol ester structure and viscosity grade



Choice of polyol (functionality, polarity) and fatty acid (length, branching, saturation) determines the viscosity

Tailor-made Polyol Esters

THE PROPERTY MAP





Technical capabilities and
Environmental features
of polyol esters

**Focus on raw material origin
and emission reductions**

- Renewable and recycled content based on traceable mass balance
- Product Carbon Footprint calculation and reductions

Shifting the feed stocks for essential POE building blocks to more sustainable options

RENEWABLE / BIOBASED

Vegetable oils

WASTE AND RESIDUE STREAMS

Forestry and Agriculture residue

Bio-waste including algae

RECYCLED

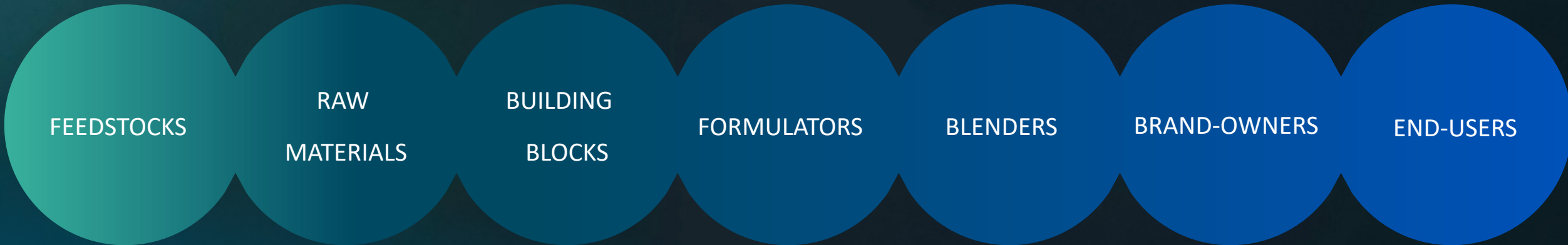
Cooking oils

CO₂

Direct emissions from production

No company is greener than its suppliers

Upstream industries are needed to enable sustainable transformation downstream



- Opting for sustainable building blocks makes an immense impact throughout an entire value chain
- Collaborating with suppliers is vital for sustainable progress and meeting sustainability goals
- Typical chemical value chains have at least 5-10 touchpoints from cradle to end-consumer product



Traceable mass balance:

An agnostic view on raw materials with high traceability of source and credible data

Complete product interchangeability

Same quality, performance and regulatory compliance for drop-in to existing formulations

Optimization & Sustainable sourcing

Transition to non-fossil raw materials in existing production

Scope 3 emissions reductions

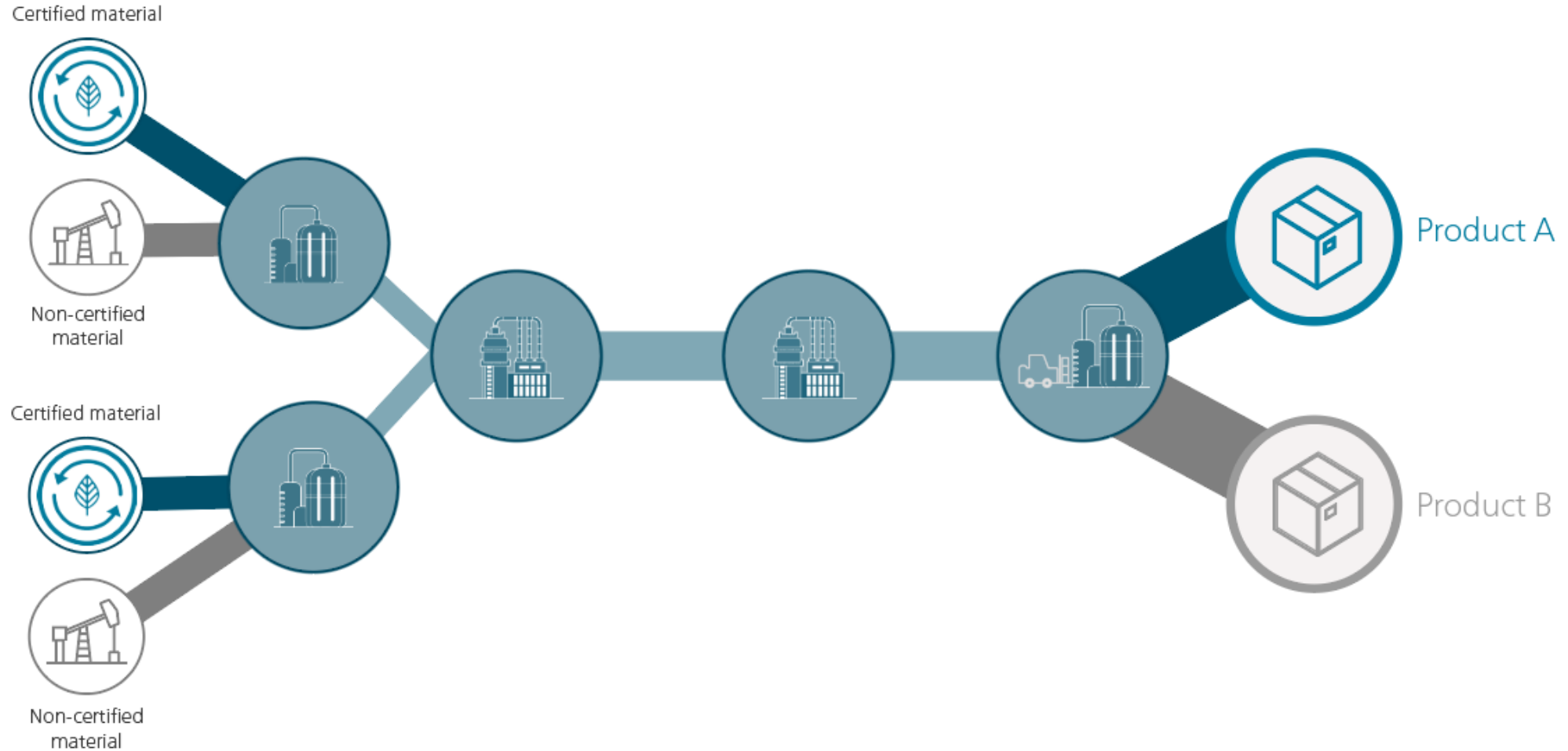
Product Carbon Footprint methodology aligned with Together for Sustainability

Trust & Transparency

3rd party accreditation by ISCC PLUS

Traceable mass balance

Applying chemical and physical traceability throughout the value chain



Traceable mass balance

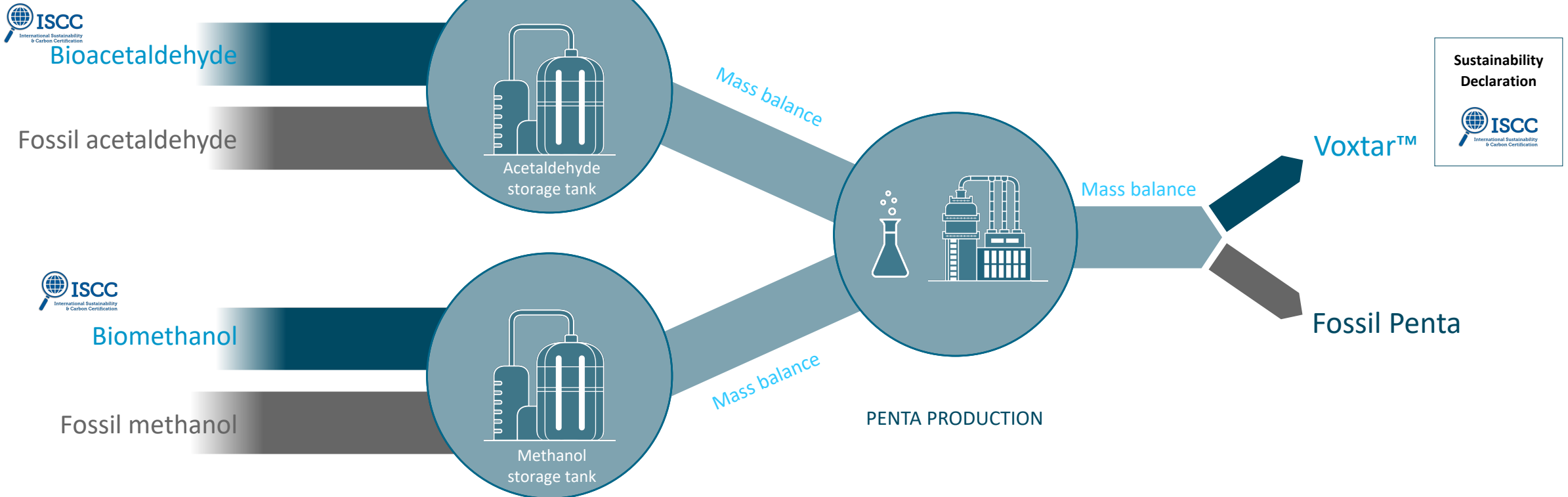
Applying chemical and physical traceability. Example of Pentaerythritol and Voxtar™

Raw materials transported to the site where they are used. No transfer of credits within the company.

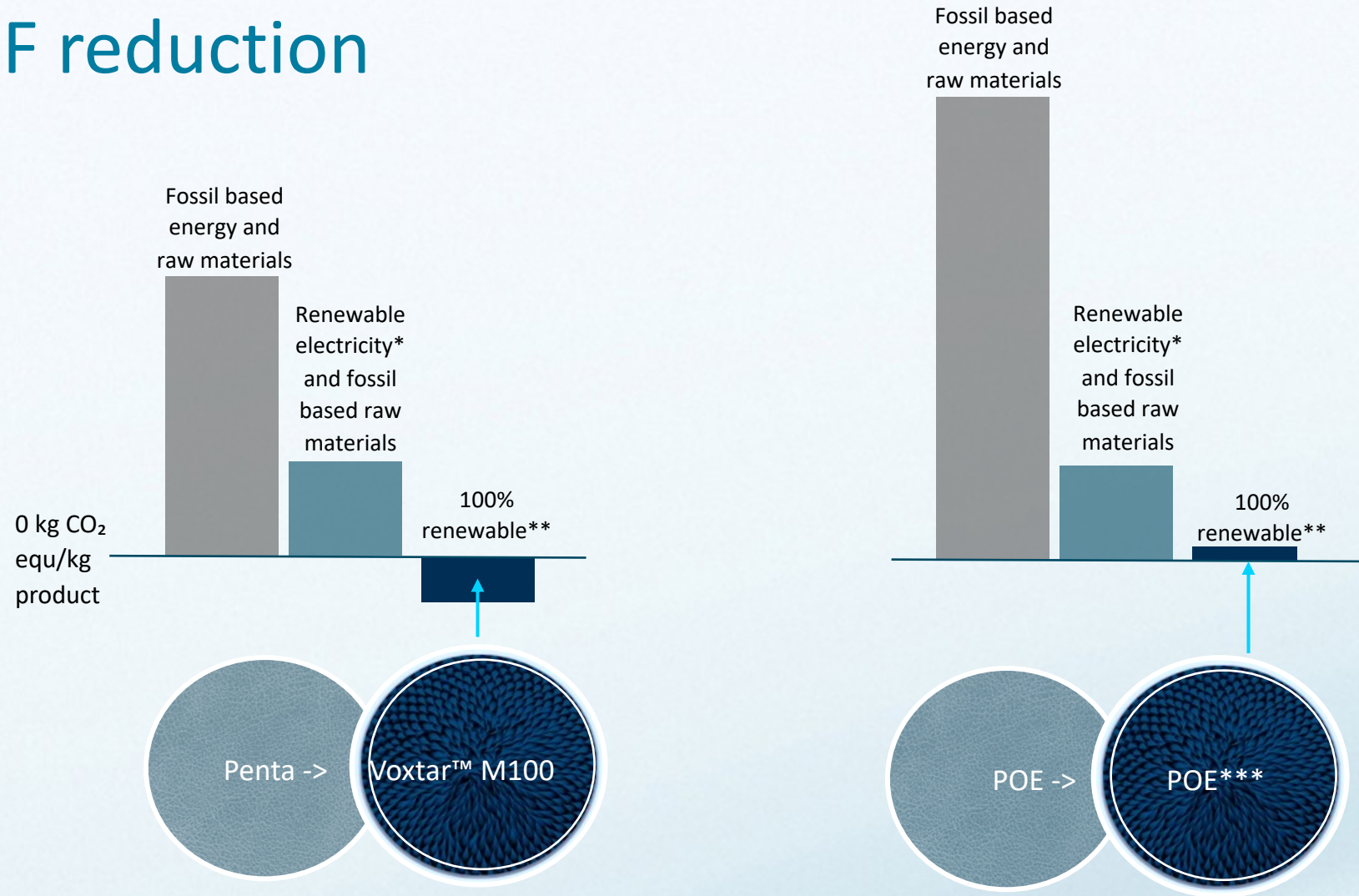
The raw materials can only replace their own share of the product.

The raw materials are used in the process unit where the product is being produced.

There is a possibility of finding sustainable molecules in the end-product.



PCF reduction



*** A viable, currently non-commercial product

*Renewable electricity and a significant share of renewable steam and heat

**100% renewable products are ISCC PLUS certified and based on traceable mass-balance and Perstorp emission data.

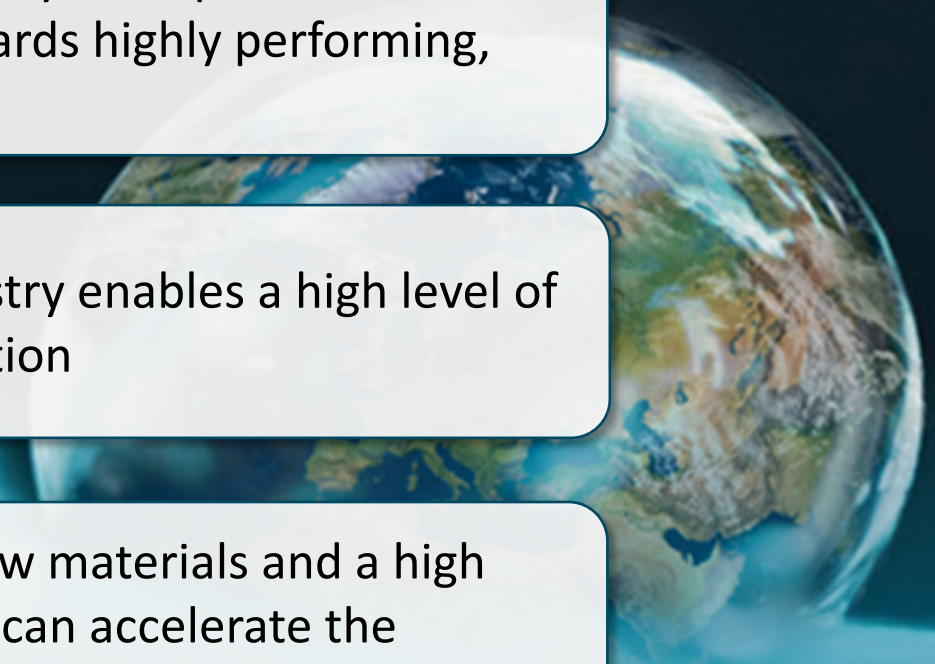
The PCF values are based on production data from latest ISCC audit and are calculated based on ISCC, Together for Sustainability and GHG protocol methodology.



Polyol esters can play an important role in the transition towards highly performing, sustainable MWF

Polyol ester chemistry enables a high level of product customization

The selection of raw materials and a high data transparency can accelerate the sustainability journey of the industry



 **Perstorp**

