

# Industry

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## NAVIGATOR

SUSTAINABLE DEVELOPMENT  
STRATEGIES FOR T&D

CONFERENCE 2025

# Usage and Life Cycle Analysis of Shell MIDEL synthetic ester

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## Sustainability – the big picture



# Case Study – Omkareshwar, India



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## Case Study – Omkareshwar, India

- 300MW Installation
- India's (and one of the world's) largest floating solar projects
- Multiple stakeholders across industry
- K-class fluid allowed substation to be miniaturised
- Mineral oil selection *would have* determined:
  - Substations to all be located on land
  - Increased distances around the transformers
  - More cabling to solar arrays - with greater losses
  - A more complex build (e.g. oil containment)
- Reservoir supplies water for agriculture and drinking water
  - Biodegradable, non-hazardous fluid a key factor



## Mass Balancing

- Although technically possible to build 100% sustainable molecules, supply chains aren't ready at scale
- Mass balancing is an accepted approach in industry to support the transition towards more sustainable products
- Transparent process with independent, 3<sup>rd</sup> party verification
- Referenced in recent DNV Joint Industry Project Report
- Mass balancing is an approach used in Shell
- Our MIDEL mass balancing project ongoing as we work through integration into Shell systems

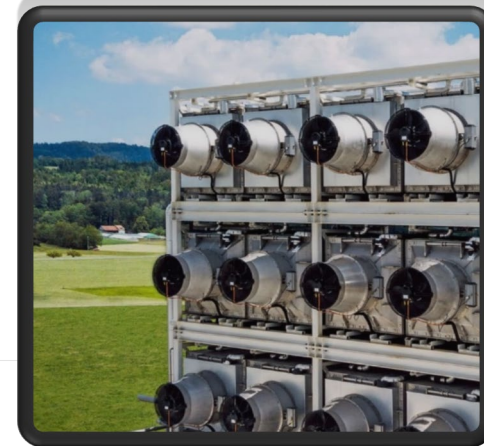
FOSSIL



WASTE



SEED OILS

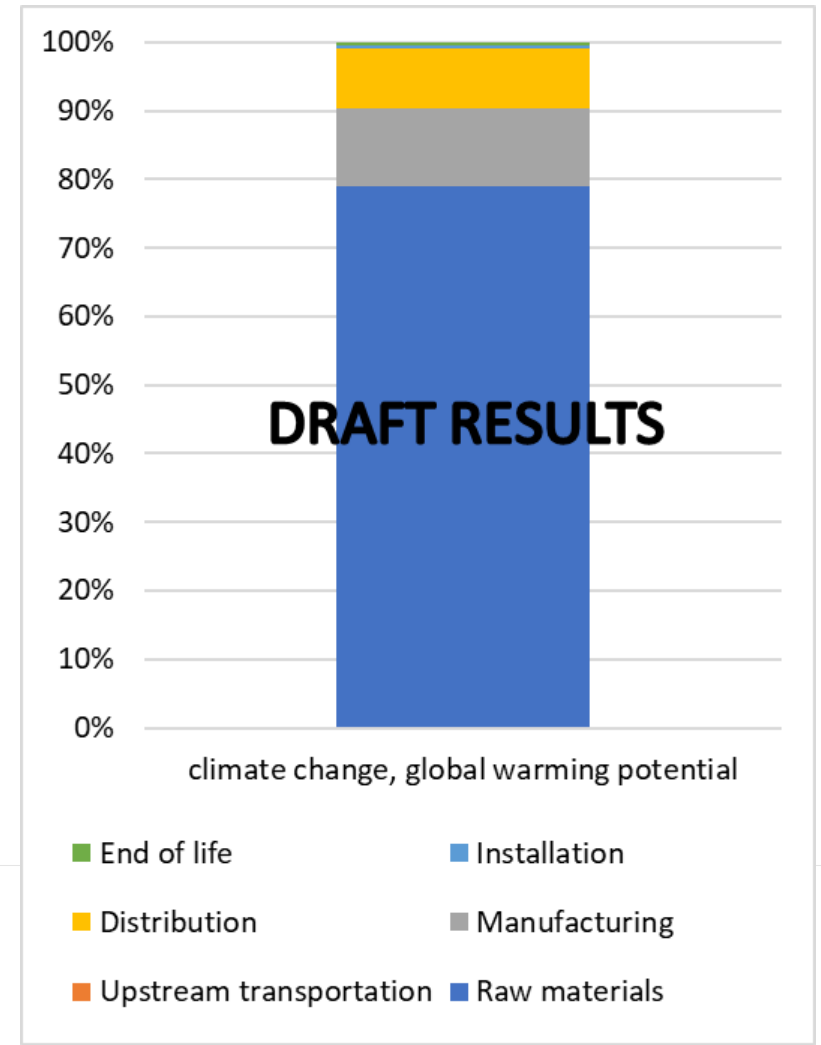


INDUSTRIAL  
CARBON CAPTURE



## LCA Project – MIDEL 7131

- Launched in 2024
- Goal: non-comparative LCA study of MIDEL 7131 to produce Environmental Product Declaration (EPD)
- Most elements are complete but big challenge with data availability in supply chain
- Unverified preliminary value  $\sim 3.2\text{kg CO}_2\text{e} / \text{kg}$  MIDEL 7131 but with better primary data believe true value may be  $\sim 2.4\text{kg CO}_2\text{e} / \text{kg}$  MIDEL 7131
- Majority contribution to this value is in the supply chain



## How do PCF, LCA and EPD compare

PCF	LCA	EPD
<ul style="list-style-type: none"> <li>• Based on ISO14067, PAS 2050 or similar</li> <li>• Only evaluates GHG emissions</li> <li>• Most suitable for GHG reporting and targeted emissions reduction</li> </ul>	<ul style="list-style-type: none"> <li>• Follows international standards (ISO 14040/14044) but allows flexibility in methodology</li> <li>• May contain sensitive information</li> <li>• Requires multiple impact indicators but the selection depends on study scope</li> </ul>	<ul style="list-style-type: none"> <li>• Follows ISO14025</li> <li>• Developed through LCA following specific PCRs (eg EN15804)</li> <li>• Is meant to be shared as format is comparable to other EPDs</li> <li>• Requires broader set of standard indicators but may lead to data gaps</li> </ul>



## Circularity

### Resources:

- Use of renewable energy
- Use of more sustainable raw materials

### Synthetic ester can be:

- Recycled to reduce raw material consumption
- Reclaimed/regenerated

### Ester After Transformer Life Options:

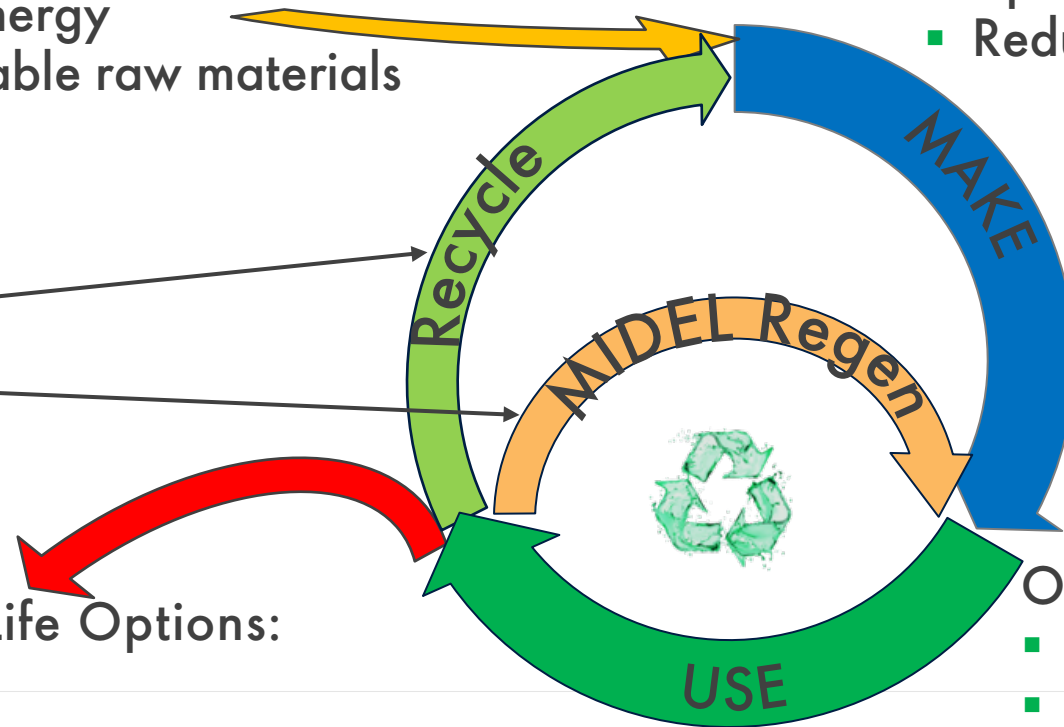
- Composting
- Bitumen/asphalt flux
- Lubricants feedstock
- Conversion to bio-fuel

### Responsible manufacturing:

- Reducing energy consumption

### Operational Advantage:

- Esters extend asset life
- Esters reduce fire risk
- Esters reduce environmental risk
- Esters enable substation innovation



Shell MIDEL Regen  
Case Study – Lake District, UK



## Shell MIDEL Regen – First Case Study



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