SABIC CERTIFIED RENEWABLE POLYOLEFIN

January 30th, 2015
SABIC’S SUSTAINABILITY VISION
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- Our sustainability focus areas are creating **economic value**, protecting **natural capital**, investing in **people** and improving the **communities** in which we operate and live.

- Ensuring Sustainability requires us to innovate, to conserve, to collaborate and to inspire our workforce.

“Ensuring a successful sustainability strategy is an inherent part of our business model. Our biggest challenge is to embrace the fact that sustainability means doing everything better than we do today”

MOHAMED AL-MADY
VICE CHAIRMAN &
CHIEF EXECUTIVE OFFICER
INNOVATING ON SUSTAINABILITY ACROSS THE LIFE CYCLE

**FEEDSTOCK**
- Renewables
- Local sourcing

**MANUFACTURING PROCESSES**
- New processes
- Down gauging
- Green chemistry

**APPLICATION USE**
- Light weighting
- Enhanced life
- Energy efficiency

**END OF LIFE**
- (Chemical) recycling
- Energy recovery

SOME STAGES OF LIFE CYCLE WILL BE MORE IMPACTFUL THAN OTHERS
SABIC’S CERTIFIED RENEWABLE POLYOLEFINS
CHALLENGES IN THE INDUSTRY

- The need for renewable products and packaging that
  - do not compromise on standards set on food and product safety by existing polyefins
  - meet regulatory requirements
  - meet the need for increasing consumer demand for environmentally friendly solutions

- The need to offer differentiated renewable products and packaging from 2\textsuperscript{nd} generation biofeedstock that
  - help meet corporate sustainability targets
  - enhance brand value

- The need to produce renewable products and packaging on your existing equipment modifications

- Demand for renewable solutions that can be recycled
OUR SOLUTION: SABIC CERTIFIED RENEWABLE PP AND PE

CHAIN OF CUSTODY

CRUDE OIL/ NAPHTHA
REPLACE PART WITH
BIO FEEDSTOCK

BY USING OUR EXISTING PROCESSES TO PRODUCE IDENTICAL PRODUCTS AS IN OUR EXISTING PORTFOLIO

PRODUCTION

POLYMERS

CONVERTOR

END PRODUCT

BY REPLACING PART OF THE FOSSIL BASED FEEDSTOCK USED IN OUR PROCESSES BY RENEWABLE FEEDSTOCK

BY USING INDEPENDENT MASS BALANCE CERTIFICATION TO GUARANTEE THE PROCESSING OF RENEWABLE FEEDSTOCKS AND ALLOCATION TO SPECIFIC PRODUCTS

ISCC
www.iscc-system.org
contributing to responsible sourcing of bio-based materials
LIFE CYCLE ASSESSMENT

THIS LCA STUDY HAS UNDERGONE EXTERNAL CRITICAL PEER REVIEW BY MANCHESTER UNIVERSITY
KEY CLAIMS: EXECUTIVE SUMMARY

Based on ISO 14040/14044 & PAS 2050 Compliant Externally Critical Reviewed LCA Study:

“From Cradle To Gate”, each kilogram of Polyethylene resin produced from Renewable Diesel that are based on waste Fats, can sequester up to 2.3 kilograms of Carbon dioxide emissions from the atmosphere.

“From Cradle To Gate”, each kilogram of Polyethylene resin produced from Renewable Diesel that are based on waste Fats, can lead to reduction in Fossil depletion by up to 83% when compared to conventional route based on Petroleum Naphtha.
LCA RESULTS AND INTERPRETATION – CRADLE TO GATE

Carbon footprint comparison (Cradle to Gate):
Unit: kg CO₂ eq / kg polyethylene resin at production Method: IPCC GWP 100a

<table>
<thead>
<tr>
<th>Production Method</th>
<th>Carbon Footprint (kg CO₂ eq / kg polyethylene)</th>
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</thead>
<tbody>
<tr>
<td>Conventional Petroleum Naphtha based Polyethylene production</td>
<td>1.861</td>
</tr>
<tr>
<td>Palm oil fatty acid based Polyethylene production (100% methane capture)</td>
<td>-1.233</td>
</tr>
<tr>
<td>Palm oil fatty acid based Polyethylene production (5% methane capture)</td>
<td>1.031</td>
</tr>
<tr>
<td>Waste fats based Polyethylene production (SABIC route for Renewable Polyethylene production)</td>
<td>-2.312</td>
</tr>
</tbody>
</table>

Each kilogram of Renewable Polyethylene resin produced at Gate via Renewable diesel route (sourced from waste fats) can lead to removals of up to 2.3 kilograms of carbon dioxide emissions from the atmosphere.

What are the key differences between “Cradle to Grave” & Cradle to Gate” from Carbon footprint accounting perspective?

**Cradle to Grave:**
In accordance with PAS2050 standard, sequestration credit is claimed only for the fraction of waste plastic that is landfilled at end of life. No credit is claimed for fraction of waste plastic that is either recycled or incinerated at end of life to comply with PAS 2050 standard.

**Cradle to Gate:**
In accordance with PAS2050 standard, full sequestration credit is applied for 1 kg of plastic since End of Life assumptions are not applicable at “Cradle to Gate” stage.
LCA RESULTS AND INTERPRETATION – CRADLE TO GATE

Fossil depletion potential
Unit: kJ oil eq. / kg
Polyethylene resin at production
Method: Fossil Depletion Potential, Midpoint (H) V1.07 / World ReCiPe H

Conventional Petroleum Naphtha based Polyethylene production

Palm oil fatty acid based Polyethylene production (100% methane capture in Palm oil mills)

Palm oil fatty acid based Polyethylene production (5% methane capture in Palm oil mills)

Waste fats based Polyethylene production (SABIC route for Renewable Polyethylene production)

Each kilogram of Renewable Polyethylene produced at Gate via Renewable diesel route (sourced from waste fats) can lead to reduction in fossil depletion potential by up to 83.9%
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