Biobased ECO+ Solutions from DSM

Applications in Green Plastics:

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DSM Organization chart

- DSM Managing Board
  - DSM Innovation Center
  - Corporate Staff
    - Shared Competences
      - Business Support
  - DSM Nutritional Products
    - Human Nutrition and Health
    - Animal Nutrition and Health
    - DSM Food Specialties
  - DSM Pharmaceutical Products
  - DSM Anti-infectives
  - DSM Fibre Intermediates
  - DSM Engineering Plastics
  - DSM Dyneema
  - DSM Resins
  - DSM Fibre Intermediates

DSM Proprietary Informations
Unique business positions

- Global leader in nutritional ingredients for feed, food and personal care
- Market leader in anti-infectives and key pharma custom manufacturing player
- Market leader in sustainable high performance materials
- Merchant market leader in nylon precursor caprolactam
- Innovator active in advanced biofuels, bio-based chemicals and biomedical materials
United over 200 locations across all continents

Europe:
64 locations
13,000 employees

Asia:
31 locations
3,000 employees

North America:
33 locations
4,000 employees

Latin America:
15 locations
1,000 employees
… meeting our sustainability strategy…

- The quest for sustainable development will be the main trend in the coming decades.
- Differentiators today will become qualifiers in all major EP markets;
  - Low or neutral carbon footprint of materials and applications
  - Elimination of hazardous substances
  - Recycling with the ultimate goal to reach cradle to cradle solutions
  - Bio-based polymers able to perform in critical technical components

Our aim is to create sustainable growth via our ECO+ solutions; products and services that create more value with less environmental impact
...embarking on bio-based opportunities ....

- Solutions for global Climate & Energy needs
- Highly attractive markets
- Leadership position in conversion technologies for 2G biofuels with #1 position in yeast
- Understanding the end market needs
- We have the necessary competences including: biotech, chemistry & polymerization
... adding to our leadership in core product lines...
...Successes serving key segments

- Lead free products for E & E
- Elimination of hazardous brominated flame retardants
- Proactive scouting of opportunities (replace hazardous substances used by competition)
- Active involvement in various Green Screen and C2C programs with e.g. NGOs
EcoPaXX™ PA410 introduction

Graph CO2 footprint of various materials

CO2 reduction potential = 1,5 * 0.7 * 5 kg CO2
Bio-based Arnitel Eco (TPC) - First Applications

Bio Based 20-50%,
Green House Gas Emissions reduced with 40%

Eco Footprint Improved

DSM Proprietary Informations
Biobased Palapreg ECO (UP)

- UP Resin for SMC / BMC process
- 55% green on total
- No sacrifice in processing & performance

Use of Fossil Oil Down, Weight Down, Emissions Down

Source: Renault S.A.
... current and future.

- **BioSuccinium™** is the frontrunner - commercialized via a JV Reverdia™ (DSM + Roquette)
  - Yeast based process eliminates salt and reduces GHG emissions by >60%
- Renewable Adipic Acid - achieved feasibility on multiple routes...entering development stage
  - Introduce key renewables for polyamide 66, resins, polyurethanes and plasticizers
- Other biobased chemicals and building blocks in pipeline
Advanced Biofuels, from Corn crop residue to bio-ethanol

- POET - DSM joint venture two companies leading the transition from a petroleum-based economy to a bio-based economy.
- Current operation designed to produce more than 20 million gallons
- Replicate technology throughout POET’s existing network of 27 corn ethanol plants
..lead to breakthrough innovations

BRIGHTER LIVING

• Outstanding performance in
  - Automotive
  - Electrical and electronics
  - Lighting
  - Flexible food packaging
  - General industries
• Recycle based concepts
• Bio-based concepts
• Low emission concepts
• Halogen free concepts
• Eco efficiency
• Cradle to cradle certified solutions

DSM will continue to:

Develop renewable Raw Materials.
Introduce Safer Chemicals and Polymers
Develop new bio-based Polymers