



**Benefits of using biobased raw materials for coatings**

*Making sustainability tangible*

November 11, 2011

Armin Michel  
Program Manager Sustainability  
DSM Coating Resins

HEALTH • NUTRITION • MATERIALS

---

---

---

---

---

---

---

---


**Agenda**

Introduction

- DSM and sustainability

Foot Printing

- Carbon Foot Print
- Life Cycle Analyses



HEALTH • NUTRITION • MATERIALS

---

---

---

---

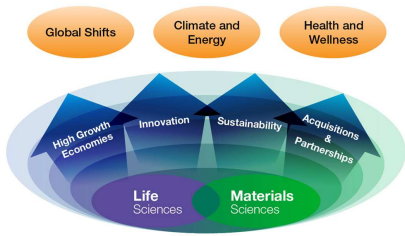
---

---


---

---

**Introducing DSM**    Annual net sales of € 8 billion with ~ 22.700 employees



People - Planet - Profit: creating value along three dimensions



Page 2

---

---

---

---

---

---

---

---

## DSM and sustainability

- DSM is a top league player in the chemicals market sector of the Dow Jones Sustainability Index

*Since 2004 ranked 6 times as being the # 1 !*

- DSM is included in the FTSE4Good Europe index  
FTSE4Good Global index



---

---

---

---

---

---

---

---

---

---

## Global warming is not a joke



---

---

---

---

---

---

---

---

---

---

## Where did it start...

Need for new and sustainable energy resources



Coal



Oil



Biomass

Non-renewable

Renewable



---

---

---

---

---

---

---

---

---

---

... and what are we heading for?



First generation



Second generation




---

---

---

---

---

---

---

---

---

---

### Is there enough biomass ?

#### Some figures

- World production of plant materials = 100 trillion kg of new plant dry matter per year
- = approx 10 times the total worldwide use of all forms of energy (B. Dale, 2003)
- Major crop residues = 1.000 billion kg / year
- Total US consumption of organic chemicals = 100 billion kg / year

Is there enough biomass ? **YES**




---

---

---

---

---

---

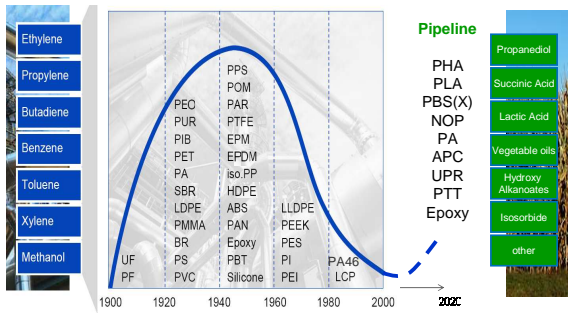
---

---

---

---

### The Innovation Promise of Bio-Based Materials Offering a step change for growth




---

---

---

---

---

---

---

---

---

---

# Agenda

- Introduction
  - DSM and sustainability
- Foot Printing
  - Carbon Foot Print
  - Life Cycle Analyses

HEALTH • NUTRITION • MATERIALS

---

---

---

---

---

---

---

---

## Methods for sustainability analyses

- LCA; life cycle assessment
- Carbon footprint
- Eco-Indicator 99 (ReCiPe)

Page 10

---

---

---

---

---

---

---

---

## Contributors to the Life Cycle Analyses of Coatings

LCA calculating the GWP to coat 1m<sup>2</sup>  
Carbon footprint expressed as Kg CO<sub>2</sub> eq. is part of the total LCA. Other factors are eg the impacts on fossil fuels, the production of respiratory inorganics and climate change.

Page 11

---

---

---

---

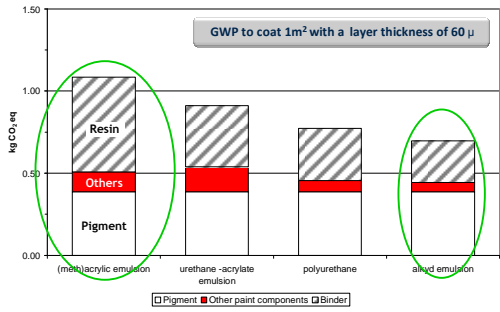
---

---

---

---

### Life Cycle Analyses of Waterborne Decorative Coatings



The higher environmental footprint of acrylic emulsions should be compensated by its durability




---

---

---

---

---

---

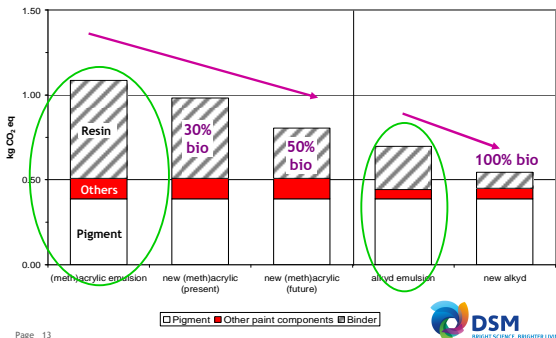
---

---

---

---

### LCA of Decorative Coatings including new biobased acrylics and biobased alkyd



Page 13




---

---

---

---

---

---

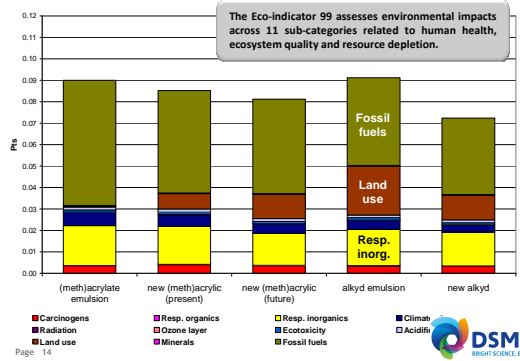
---

---

---

---

### Eco-indicator 99 assessment Decorative Coatings



Page 14




---

---

---

---

---

---

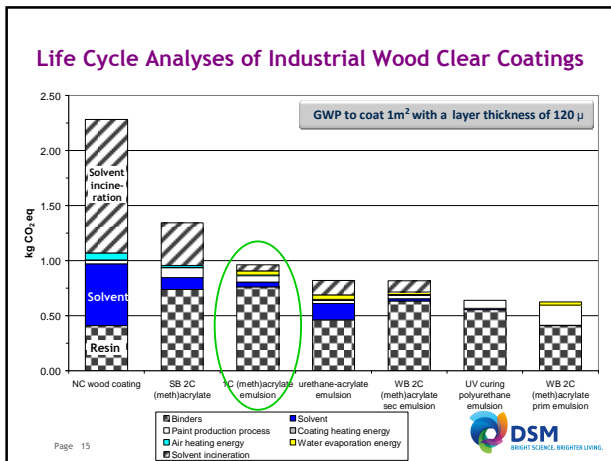
---

---

---

---

### Life Cycle Analyses of Industrial Wood Clear Coatings




---

---

---

---

---

---

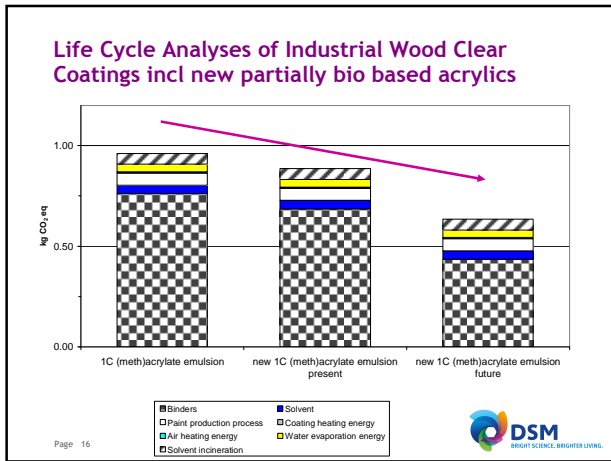
---

---

---

---

### Life Cycle Analyses of Industrial Wood Clear Coatings incl new partially bio based acrylics




---

---

---

---

---

---

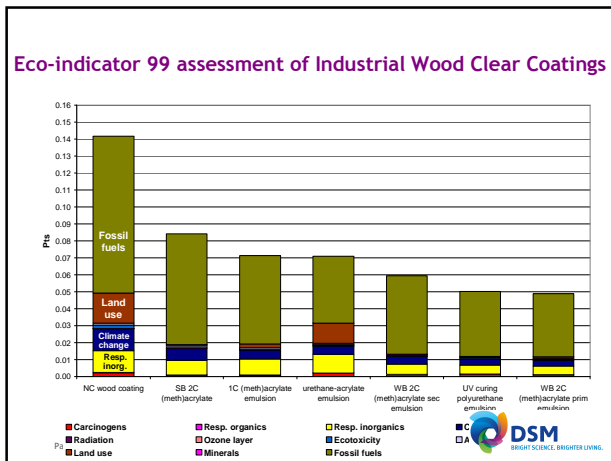
---

---

---

---

### Eco-indicator 99 assessment of Industrial Wood Clear Coatings




---

---

---

---

---

---

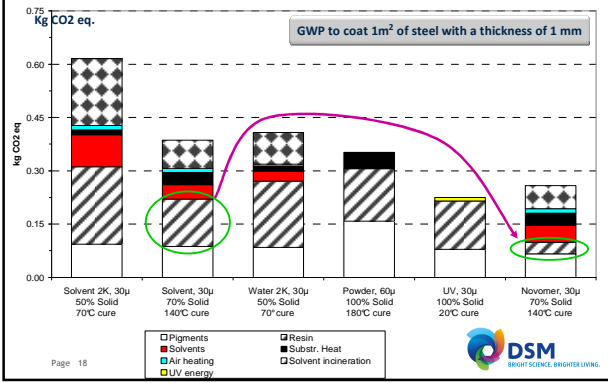
---

---

---

---

### Life Cycle Analyses of Industrial Metal Coatings




---

---

---

---

---

---

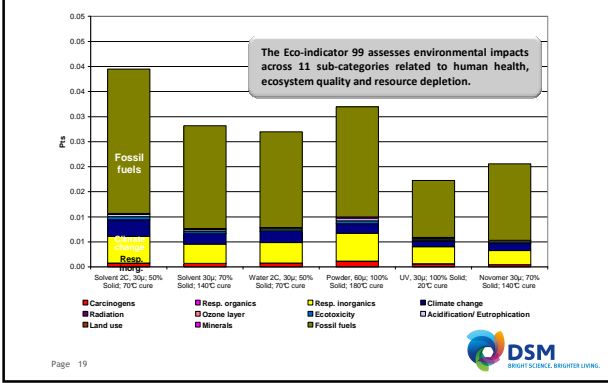
---

---

---

---

### Eco-indicator 99 assessment Industrial Metal Coatings




---

---

---

---

---

---

---

---

---

---

### Introduction Novomer technology




---

---

---

---

---

---

---

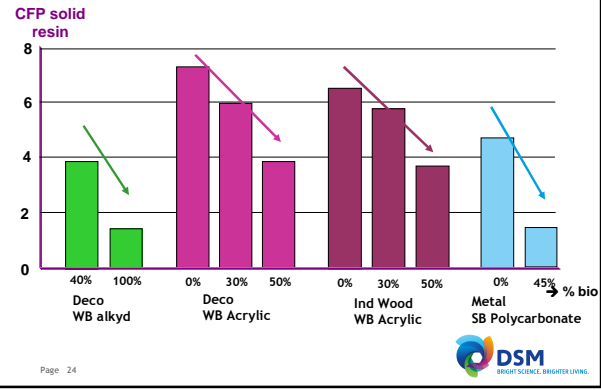
---

---

---



**Summarizing; Carbon Foot Print reduction of biobased resin prototypes recalculated to 100% solid resin**




---

---

---

---

---

---

---

---




---

---

---

---

---

---

---

---