

## Greentech needs in resins



- Composites need to compete against other materials by increasing **ECO** value and lowering carbon footprint.
- Lower weight composites – lower fuel consumption and carbon footprint, but raw materials are still > 90 % oil-based materials.
- With increased volumes in wind-power and transportation the composites material volumes have increased significantly and so has the carbon footprint and oil need for the raw materials.
  - = Big demand for green bio-based raw materials

## Greentech in composites today

- New greener resins coming up from the industry, but they are mainly 10 – 40 % bio-based and 60 – 90 % oil-based materials.
  - Most bio-based products are either too expensive or lower at performance.
  - Traditionally balsa and timber used as core materials and new bio-based fibres are growing in the industry – price versus performance often a problem or big enough availability.
- = Big need for new bio-based cost effective performance resins with big availability.

## **EPOBIOX™** Manufacturing technology

- Natural phenols distilled from forest industry waste stream
- Natural phenols reacted to create natural based BPA
- Bio-based glycerol used in ECH process

**BPA** (bio-based) + **ECH** (bio-based) + bio-based additives and curing agents

= **EPOBIOX™**, **50 – 90 %** natural bio-based green epoxy resin system

## **EPOBIOX™** Epoxy Resin

- All raw materials from industrial waste processes and not from food sources
- Very big availability
- Competitive price of raw materials and resin
- Suitable to most composites applications as a glue, infusion and pre-preg
- Good resistance to weathering but yellows

## **EPOBIOX™** versus standard resin

### **EPOBIOX™**

- Viscosity tailor-made
- Tg max 150 °C
- OH content max 3000 mmol/kg = excellent adhesion
- Colour clear yellow/brown
- Price lower 10 – 20 %
- Modulus 2 – 3,2 Gpa
- Elongation 3 – 20 %

### **Standard Epoxy**

- Same
- Tg max 200 °C
- OH content max 1000 mmol/kg
- Colour clear/yellow
- Modulus 2,5 – 4 Gpa
- Elongation 2 – 12 %

## **EPOBIOX™** main characteristics

- **EPOBIOX™** HV, high viscosity glue
- Viscosity 10 – 15 PaS, EGC 4000 mmol/kg, OH 2500 mmol/kg
- **EPOBIOX™** MV, medium viscosity 7 PaS, EGC 4500 mmol/kg, OH 1000 mmol/kg
- **EPOBIOX™** LV, low viscosity infusion resin
- **EPOBIOX™** WR, high quality, filtered, EGC 5350 mmol/kg
- **EPOBIOX™** pre-preg, semi-solid  $n > 1$

## **EPOBIOX™** References 2010

- Mechanical tests at MIKTECH Finland
- ENTROPY Research lightweight high tech Biomaterial surfboards
- Kayaks, boats, tent poles, glues and skis
- Finland, France, Spain, USA and Japan
- Tests at several blade producers
- Tests ongoing for natural fibre pre-pregs
- Tests ongoing with Burton and Völkl
- Suitable to glass & carbon fibre