

## 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% oilbased materials
- With increased volumes in WindPower 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 Biobased raw materials



## Greentech in Composites today

- New greener resins coming up from the industry, but they are mainly 10-40 % BioBased and 60-90 % oilbased materials
  - Most Biobased products are either too expensive or lower at performance
  - Traditionally balsa and timber are used as core materials and new Biobased fibers are growing in the industry – price vs performance often a problem or enough big availability
- = Big need for new Biobased 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
- Biobased Glycerol used in ECH process

**BPA** (BioBased) + **ECH** (BioBased)

+ Biobased additives and Curing agents

= **EpoBioX** – **50-90** % natural Biobased green Epoxy resin system

## EpoBioX Epoxy Resin

- All raw materials are 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 glue, infusion and pre-preg
- Good resistance to weathering but yellows

# EpoBioX vs 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, EGS 5350
- EpoBioX Pre-Preg, semi-solid  $n > 1$

## EpoBioX references 2009

- Mechanical tests at MIKTECH Finland
- ENTROPY Research lightweight high tech Biomaterial surfboards
- Kayaks, boats, tent poles, glues (Pakcem and General De Adhesivos) and electrical cars
- Finland, France, Spain, USA and Japan
- Tests at several blade producers
- Suitable to glass - & carbon fiber