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A biorefinery model



The Sustainable Biorefinery

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Borregaard is the global leader in biobased chemicals High value added through full raw material utilisation



Borregaard's biochemicals are sustainable and environmentally friendly substitutes to petrochemicals







Borregaard is the world's most advanced biorefinery Integrated production system serving diverse markets



Specialty cellulose	Lignin	Vanillin	Bioetanol
Construction materials	Concrete additive	Food	Car care
Cosmetics	Animal feed	Perfumes	Paint/varnish
Food	Dyestuff	Pharmaceuticals	Pharmaceutical industry
Tablets	Batteries		Bio fuel
Textiles	Briquetting		
Filters	Mining		
Paint/varnish	Soil conditioning		

Borregaard Sarpsborg today Worlds most advanced biorefinery in operation



Global presence An international business with global customers



Borregaard ww concepts today



Not all biorefineries are sustainable or have a low CO2 footprint.



Significant environmental investments at Borregaard: NOK 2 billion during the last 20 years



- Reduced emissions to air and water
 - New technology
 - New operations
 - Cleaning measures
- More renewable energy
 - Oil is being phased out, replaced by biofuel and waste



Reduced energy costs and greener products



From paper mill to biorefinery





Optimal use of biomass - differentiation



BALI[™] process in a nutshell



Borregaard BALI[™] Demo Plant

- Location: Borregaard: Sarpsborg, Norway
- Feed: 1-1.5 metric ton DM/day
- Construction started May 2011
- Ready end 2012
- 800 m² total area
- Budget cost: NOK 130 mill (EUR 16.5 mill)
- 45% cash support from Innovation Norway
- Currently exploring partnership opportunities for full scale production plant





Borregaard biorefinery extended with BALI[™] technology





Increased value creation







Conclusions



- Norway have lots of unused biomass (wood, fish) and potentials for more (straw, macro algae, energy crops)
- Biomass is expensive in Norway
- There are opportunities to build biorefineries that are particularly adapted to local conditions
- Biorefineries need to be flexible and have the option to develop further to cope with changes in market demand
- Focus on high value creation is needed, high volume commodity products whenever there is no better option.

