BUSINESS MODEL, BUSINESSES & STRATEGY

July 2019
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Borregaard is a global leader in biochemicals

High value added through full raw materials utilisation
Borregaard’s biochemicals are sustainable and environmentally friendly substitutes for petrochemicals

**Business model & strategy**

**SPECIALITY CELLULOSE & CELLULOSE FIBRILS**
- 45% fibres

**BIOETHANOL**
- 25% sugar

**LIGNIN & VANILLIN**
- 30% binding material
Operates the world’s most advanced biorefinery

Integrated production system serving diverse markets

Integration models:
- Own integrated
- Partner integrated
- Independent

End markets 2018:
- Chemical/Others: 37%
- Food & Pharma: 28%
- Agriculture: 19%
- Construction: 16%

**SPECIALITY CELLULOSE**
- Construction materials
- Filters
- Inks and coatings
- Casings
- Food/Pharma/Personal care
- Textiles

**LIGNIN**
- Concrete additives
- Animal feed
- Agrochemicals
- Batteries
- Briquetting
- Soil conditioner

**VANILLIN**
- Food
- Perfumes
- Pharmaceuticals

**BIOETHANOL**
- Biofuel
- Car care products
- Household chemicals
- Solvents
- Food
- Personal care
- Pharma

**CELLULOSE FIBRILS**
- Adhesives
- Coatings
- Agricultural chemicals
- Personal care
- Home care
- Construction
Business model & strategy

Global niche player with a market driven organisation

Performance Chemicals (46%¹)
Largest supplier and technology leader in lignin-based products with global market access

Speciality Cellulose (36%¹)
Leading global speciality cellulose supplier, significant producer of 2nd generation bioethanol

Other Businesses (18%¹)
Only producer of wood-based vanillin; largest producer of intermediates for contrast agents, pioneer in cellulose fibrils

Sales distribution (2018)

Europe 50%  
Asia 21%  
Americas 28%  
RoW 1%

Market driven organisation

• ~110 FTEs strong sales/technical service organisation
• Dedicated sales force for each business unit
• ~90% of sales handled through own organisation
The specialisation strategy

- **Specialisation in global niches**
  - Markets with high barriers to entry
  - Leading market positions through application knowledge and proximity to markets
  - Diversified market strategy and global market positions secure maximum flexibility

- **Strong innovation efforts and continuous improvement**
  - Business driven innovation model that involves the entire organisation
  - Continuous productivity improvement through more efficient organisation, competence development and smart use of technology

- **Competence is the main competitive advantage**
  - Competence differentiates Borregaard from the competitors
  - Combination of competences in sales & marketing, R&D and production
Borregaard portfolio - strategic priorities

- **Specialisation, diversification and growth** within Performance Chemicals
  - Increase sales of high-value lignin products
  - Drive product portfolio diversification
  - Leverage expanded lignin capacity

- **Develop** the unique biorefinery assets in Sarpsborg
  - Leverage high-value raw material base in Performance Chemicals
  - Expand capacity for wood based vanillin
  - Continue specialisation of Speciality Cellulose, Bioethanol and Ingredients
  - Strong focus on innovation and productivity efforts

- **Establish** Cellulose Fibrils as a new business area
  - Based on core competence within wood chemistry and fine chemistry
  - Increased specialisation through high value added
Completed and ongoing strategic projects

- Specialisation, diversification and growth within Performance Chemicals
  - Florida plant (1st phase) started up mid 2018
  - Upgrade and increased specialisation in Sarpsborg (2019)
  - Extension of joint venture agreement in South Africa to 2032

- Develop the unique biorefinery asset in Sarpsborg
  - High-end bioethanol expansion started up in Q1-18
  - Ice Bear capacity expansion completed end 2018
  - Lignin upgrade/specialisation in operation from July 2019
  - Wood based vanillin capacity expansion, completion 1H-21

- Establish Cellulose Fibrils as a new business area
  - Commercial-scale production facility completed in Q4-16
  - Exilva market introduction ongoing
Performance Chemicals

Product performance depends on the pulping process and the raw material.

- **Sulphite pulping process**
  - Versatile lignin used in a variety of products/applications
  - Quality depends on the chemicals base
  - Water soluble
  - Limited number of sulphite mills

- **Softwood (pine/spruce) vs hardwood and straw**
  - Softwood lignin has superior modification potential

- **Kraft (sulfate) pulping process**
  - Lignin is normally incinerated to recover energy and chemicals
  - Not in water soluble form from the pulp mill
  - Pulp producers are exploring potential for industrial use of kraft lignin
Performance Chemicals

Market position
- Largest supplier with a global presence
- Unique technical and application expertise

Production
- Norway, USA, South Africa, Germany, Spain, Czech Republic, UK

Applications
- Concrete admixtures
- Gypsum board
- Ceramics
- Animal feed
- Agro chemicals
- Soil conditioner
- Oil field chemicals
- Batteries

Key attractions
- A sustainable and broad product portfolio
- Large and diverse customer base
- High barriers to entry

Operating revenues 2,237 mNOK (2018)
Lignin – the supply side

Total market (2017) ~ 1.1 million mtds²

Performance Chemicals

Borregaard manufacturing facilities

Source: Borregaard estimates

² Metric tonne dry solid
Performance Chemicals

650 products to around 3,000 customers (2018)

Lignosulfonate properties

<table>
<thead>
<tr>
<th>Properties</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binding agent</td>
<td>• Feed binder</td>
</tr>
<tr>
<td></td>
<td>• Granulation aid</td>
</tr>
<tr>
<td></td>
<td>• Ceramic tiles</td>
</tr>
<tr>
<td></td>
<td>• Dust binder</td>
</tr>
<tr>
<td>Dispersing agent/Rheology control</td>
<td>• Concrete admixture</td>
</tr>
<tr>
<td></td>
<td>• Agrochemicals</td>
</tr>
<tr>
<td></td>
<td>• Dyestuffs</td>
</tr>
<tr>
<td></td>
<td>• Metals and minerals</td>
</tr>
<tr>
<td></td>
<td>• Carbon black and pigments</td>
</tr>
<tr>
<td></td>
<td>• Micronutrients</td>
</tr>
<tr>
<td>Crystal growth control</td>
<td>• Battery expander</td>
</tr>
<tr>
<td></td>
<td>• Retardation of cement hydration</td>
</tr>
<tr>
<td></td>
<td>• Oil-well cementing</td>
</tr>
<tr>
<td>Functional additive</td>
<td>• Phenol replacement</td>
</tr>
<tr>
<td></td>
<td>• UV-protection</td>
</tr>
<tr>
<td></td>
<td>• Antioxidant</td>
</tr>
<tr>
<td></td>
<td>• SoftAcid</td>
</tr>
<tr>
<td></td>
<td>• Soil conditioner</td>
</tr>
<tr>
<td></td>
<td>• Complexing agent</td>
</tr>
</tbody>
</table>

Revenues by end market and region

1) Includes Lignotech South Africa sales

Top 10 and top 3 customers in % of revenues

Revenue by end-market (2018)

Sales distribution (2018)
End markets growth forecast

### Performance Chemicals

<table>
<thead>
<tr>
<th></th>
<th>Construction</th>
<th>Feed</th>
<th>Industry</th>
<th>Agro /Agchem</th>
<th>Automotive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMEA</strong></td>
<td>2 to 3%</td>
<td>0 to 2%</td>
<td>0,5 to 2%</td>
<td>3 to 4%</td>
<td>1 to 2%</td>
</tr>
<tr>
<td><strong>Americas</strong></td>
<td>1 to 3%</td>
<td>2 to 4%</td>
<td>2 to 4%</td>
<td>3 to 4%</td>
<td>0 to 1%</td>
</tr>
<tr>
<td><strong>Asia/Pacific</strong></td>
<td>2 to 4%</td>
<td>-2 to -5%¹</td>
<td>3 to 5%</td>
<td>4 to 5%</td>
<td>3 to 6%</td>
</tr>
</tbody>
</table>

**Indicative annual rates to 2022**
*based on 2.5% annual GDP growth rate*

¹ Outbreak of African Swine Fever in China causes reduction of swine numbers by 30 - 40%. Feed market development is uncertain since recovery pattern is difficult to predict.

Concrete admixture formulation preferences

- Admixture market diverse, lignin competes with captive synthetic products
- Regional and local formulation preferences
- Climate influences formulation

Industrial and Specialities

**Industrial (previously Miscellaneous)**
- Significant global volume growth since 2015 across a wide range of applications
- Demonstrates capabilities in innovation, market development and sales
- Robust and growing customer and application base

**Specialities**
- Volume growth based on capabilities in innovation, application development and sales
- Lead acid batteries for automotive and industrial applications on a steady growth path
- Increasing use of green alternatives in agrochemical applications

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1) **Metric tonne dry solid (thousand)**
Performance Chemicals

Driving specialisation and diversification

Industrial and Specialities targeted to represent 70% of total sales volume by end 2021

Volume split 2009-2018

Target

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1) Metric tonne dry solid (thousand)
## Performance Chemicals

### Applications, functionality and substitutes

<table>
<thead>
<tr>
<th>Application</th>
<th>Functionality</th>
<th>Competing technologies</th>
<th>Value proposition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries</td>
<td>Crystal growth control</td>
<td>Few</td>
<td>✓✓</td>
</tr>
<tr>
<td>Crop protection</td>
<td>Dispersant</td>
<td>Synthetic surfactants</td>
<td>✓✓</td>
</tr>
<tr>
<td>Metals and minerals</td>
<td>Dispersants and binder</td>
<td>Synthetic and organic surfactants</td>
<td>✓✓</td>
</tr>
<tr>
<td>Crop nutrition</td>
<td>Soil conditioner / complexing agent</td>
<td>Humic acid, ethylenediaminetetraacetic acid (EDTA)</td>
<td>✓✓</td>
</tr>
<tr>
<td>Concrete admixtures</td>
<td>Plasticiser</td>
<td>Superplasticizers: naphthalene, melamine sulfonates and polycarboxylic acids</td>
<td>(✓✓)</td>
</tr>
<tr>
<td>Animal feed pellets</td>
<td>Binder</td>
<td>Starch residues, bentonite and mechanical compacting</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Value proposition:**
- Green alternative
- Cost / performance vs. synthetics
**Performance Chemicals**

**Agriculture**

<table>
<thead>
<tr>
<th>Crop nutrition (Agro)</th>
<th>Crop protection (Agchem)</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Micro-nutrients](Zn, Fe, Cu, Mn)</td>
<td>![Soil conditioners](+ source of C&amp;Ca)</td>
</tr>
<tr>
<td>Formulation/complexing agent</td>
<td>Enhancers/bio-stimulants</td>
</tr>
<tr>
<td><img src="%E2%9C%93" alt="✓" /></td>
<td><img src="%E2%9C%93" alt="✓" /></td>
</tr>
<tr>
<td><img src="%E2%9C%93" alt="✓" /></td>
<td><img src="%E2%9C%97" alt="✗" /></td>
</tr>
<tr>
<td>Granulation aid/binders for pesticides, fungicides, fertilisers, limestone, feed &amp; gypsum</td>
<td><img src="granules" alt="Granulation aid/binders" /></td>
</tr>
</tbody>
</table>
## Batteries

### Automotive:

<table>
<thead>
<tr>
<th></th>
<th>Start battery</th>
<th>Start/stop battery</th>
<th>Hybrid</th>
<th>Electric vehicle¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start battery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead acid</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start/stop battery</strong></td>
<td></td>
<td></td>
<td>AGM as start battery</td>
<td></td>
</tr>
<tr>
<td>Absorbant Glass Mat (AGM)</td>
<td></td>
<td></td>
<td></td>
<td>Other technologies</td>
</tr>
<tr>
<td>Fuel for motion</td>
<td></td>
<td>Fuel for motion</td>
<td>Fuel/NiMH/lithium ion for motion</td>
<td>Lithium ion for motion</td>
</tr>
</tbody>
</table>

¹) Lead acid battery for 12V auxiliary system
LignoTech Florida

• The venture
  • Located at Rayonier Advanced Materials’ (RYAM) Fernandina Beach softwood sulphite pulp mill
  • Borregaard (55%) and RYAM (45%) ownership
  • Borregaard’s know-how and technology

• Expansion project in two phases
  • Phase one (2018) represents 100,000 mtds capacity, investment USD 110 mill.
  • Phase two will give additional 50,000 mtds, investment USD 25 mill.

• New plant officially opened 26 June 2018
  • Investment completed on time and cost
  • Production commenced in June

• Commercialisation
  • Diversified product and application portfolio established
  • Sales volume developing according to plan
Update on Sarpsborg lignin investment programme

- 500 mNOK capex, 70% expansion/30% replacement
  - Additional dryer with packaging capacity
  - Tanks for storage of liquid materials
  - Improved solutions for logistics, infrastructure and energy
  - In operation from July 2019
  - Capex ≈10% below budget

- Several benefits
  - Further specialisation on a unique raw material base
  - Reduced exposure to cyclical market segments
  - Optimisation of production campaigns, internal and outbound logistics
  - Substantial environmental and safety benefits

- Annual cost savings >40 mNOK expected
  - Gradual realisation through 2020
  - Full impact from 2021
New lignin warehouse at the Port of Borg

- New, modern warehouse for dried lignin
  - 19,000 square metres/43,000 pallet positions
  - Will replace several rented warehouses
  - Located inside the port area at Øra, Fredrikstad
  - Built, owned and operated by the Port of Borg
  - Will be treated in accordance with IFRS 16

- Several benefits
  - Optimise product flow and improve logistics
  - Reduce CO₂ emissions from road transport
  - Reduce local heavy transport

- In operation from June 2019
Speciality Cellulose

Market position
- Strong positions in Europe and Asia within high-end niches

Production
- Sarpsborg, Norway with capacity of 160,000 mt

Operating revenues 2018
- NOK 1,669 million

Focused applications
- Ethers
- Acetate
- Nitrocellulose
- Other cellulose specialities

Long term market growth\(^1\)
- Ethers: 3-4%
- Acetate: -2-0%
- Nitrocellulose: 0%

High quality speciality cellulose with strong niche positions

1) Source: Celco market reports and Borregaard estimates
**Speciality Cellulose**

The speciality cellulose market

- **Speciality Cellulose**
- **Viscose** (textile)
- **Dissolving pulp**
- **Commodity pulp incl. captive use** (for paper/cardboard/fluff)

**Recent trends**
- Total speciality cellulose market relatively unchanged
- Viscose (textile) market growth 8.4% annually last 5 years
- Supply side restructuring

**Source:** Borregaard estimates, [www.celco.ch](http://www.celco.ch), 2018, RISI 2016

All figures in cellulose tonnes – wood pulp and cotton linter pulp/refined cotton. Dissolving pulp figures do not include fluff, and (modified) paper pulp.
Speciality cellulose suppliers

- 12 players supplying 1.6 million mt speciality cellulose
- Top 4 players (Rayonier Advanced Materials, G-P Cellulose, Bracell and Borregaard) have 90%¹ market share
- Top 4 players use textile and fluff markets as capacity filler
- Limited volumes from viscose pulp producers into speciality segments due to barriers to entry

¹ Celco market report
Speciality Cellulose

Speciality cellulose industry

Speciality cellulose sales volume by producer

Dissolving pulp segments by wood species and pulping process

Top 4 speciality cellulose producers by wood species and pulping process

<table>
<thead>
<tr>
<th></th>
<th>Hardwood/kraft</th>
<th>Softwood/kraft</th>
<th>Hardwood/sulphite</th>
<th>Softwood/sulphite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rayonier AM</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Georgia-Pacific</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bracell</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borregaard</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

Source: Borregaard estimates, [www.celco.ch](http://www.celco.ch)
### Speciality Cellulose

#### Speciality cellulose market

**Speciality cellulose demand 2018 (1.6 million mt\(^1\))**

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Highly specialised</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetate</td>
<td>Cigarette filters, plastics, LCD, yarn</td>
<td>550</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Ethers</td>
<td>Construction, coatings, food, pharma, personal care</td>
<td>475</td>
<td>3.4%</td>
</tr>
<tr>
<td>Speciality paper</td>
<td>Automotive filtration, bank notes</td>
<td>60</td>
<td>1.2%</td>
</tr>
<tr>
<td>Tire cord</td>
<td>High-performance tire cords</td>
<td>60</td>
<td>3.4%</td>
</tr>
<tr>
<td><strong>Other specialities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrocellulose (NC)</td>
<td>Coatings, printing inks, nail varnish, energetic grades</td>
<td>125</td>
<td>0%</td>
</tr>
<tr>
<td>Microcrystalline cellulose (MCC)</td>
<td>Food, pharma</td>
<td>180</td>
<td>3.4%</td>
</tr>
<tr>
<td>Cellophane</td>
<td>Food packaging</td>
<td>55</td>
<td>0.1%</td>
</tr>
<tr>
<td>Casings</td>
<td>Sausage casings</td>
<td>55</td>
<td>3.4%</td>
</tr>
<tr>
<td>Sponges</td>
<td>Sponge cloths</td>
<td>20</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

Source: Celco market reports, RISI and Borregaard estimates

\(^1\) Metric tonne
Acetate industry status and outlook

- Top 5 acetate tow producers represent >90% of global capacity
- Cigarette filter sales ~85% of total sales
- In 2012-18, demand for acetate pulp declined -2.2% annually, expected at -2-0% going forward
  - Slower cigarette consumption growth in China
  - Low capacity utilisation in acetate tow (~80%), rationalisation expected
  - Cost focus among acetate tow producers, looking for lower cost pulp options
- ‘Heat-not-burn’ cigarettes (e.g. PMI IQOS) becoming popular, still small share
- Ice Bear strategically important
  - Ability to offer higher purity products important to defend existing and compete for new/additional filter tow business
  - Potential for growth in other acetate segments

Source: Borregaard estimates, www.celco.ch, Celanese presentation June 2017
Top 5 ether producers represent ~43% of global capacity

1/3 of global capacity is in China

Construction & coatings account for ~60% of total sales, sales to food, pharma and personal care ~20% of total sales

In 2012-17, demand for ether pulp grew 4.3% annually

- Solid growth in construction and new cellulose ether capacity under construction
- Strong growth in food & pharma
- Annual growth estimated at 3-4% towards 2021

Potential for further growth and specialisation
Speciality Cellulose

Ice Bear status

- Strategic initiative enabling further specialisation and flexibility
  - Higher purity products important to defend existing and compete for new/additional filter tow business
  - Increasing interest from other speciality segments – “niches within the niches”
- Capacity expansion completed on time and cost
  - 115 mNOK investment completed Q4-18
  - 60,000 mt total capacity
- Ramp-up based on market demand

Dissolving pulp segments by wood species and pulp process

Source: Borregaard estimates, www.celco.ch
Borregaard is positioned in high-end segments in Europe and Asia, with strong and long lasting customer relationships.

**Volume split %**

- **Highly specialised**
- **Other**

**Geographical split (sales revenues)**

- **Europe**: 61%
- **Asia**: 35%
- **RoW**: 4%

**Customer base and concentration (sales revenues)**

- **Top 3**: 84%
- **Top 10**: 43%

*Source: Borregaard*

1) Acetate, ether and tire cord grades
2\textsuperscript{nd} generation bioethanol

- Bioethanol contributes to the overall value creation in the biorefinery
- 20 million litres capacity, delivered as 96% or 100% bioethanol (full flexibility between grades)
- Life cycle analysis shows favourable environmental footprint compared with petrochemical substitutes
- Political incentives drive specialisation and value
- Major part goes to biofuel, where growth has been significant
Other Businesses

Ingredients

Market position
• Leading supplier of vanillin products
• The only supplier of wood based vanillin

Production
• Sarpsborg, Norway

Sales revenues 2018
• NOK 471 million

Products
• Vanillin
• Ethyl vanillin
• Vanillin blends

Applications
• Chocolate
• Bakery products
• Confectionary
• Dairy products
• Perfume

Market growth\(^1\)
• ≈10% for plant based

Fine Chemicals

Market position
• Largest producer of intermediates for contrast agents

Production
• Sarpsborg, Norway

Sales revenues 2018
• NOK 247 million

Products
• C3 aminodiols
• Intermediates for pharmaceutical products

Applications
• Contrast agents for medical imaging
• Medicines

Market growth\(^1\)
• 5-7%

1) Borregaard estimates
Positive trend for Borregaard’s wood based vanillin

<table>
<thead>
<tr>
<th>Raw material</th>
<th>Vanilla beans</th>
<th>Plant based vanillin</th>
<th>Oil based vanillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>Ferulic acid from bran/straw</td>
<td>Eugenol from clove</td>
<td>Guaiacol from creosote/tar</td>
</tr>
<tr>
<td>Guaiacol</td>
<td>Guethol</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key selling points</th>
<th>Vanilla beans</th>
<th>Plant based vanillin</th>
<th>Oil based vanillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural/flavor profile</td>
<td>Plant based/natural raw material/sustainability /flavor profile</td>
<td>Price</td>
<td></td>
</tr>
<tr>
<td>Sales volume (MT)¹</td>
<td>~2400²</td>
<td>~2000</td>
<td>~15 000</td>
</tr>
<tr>
<td>Indicative price level USD/kg¹</td>
<td>~500</td>
<td>~400</td>
<td>25 - 100</td>
</tr>
<tr>
<td># of manufacturers¹</td>
<td>1000+</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Growth¹</td>
<td></td>
<td>~10%</td>
<td></td>
</tr>
</tbody>
</table>

1) Company estimates
2) Cured vanilla pods contain around 1-2% vanillin, corresponding to around 25 – 50 MT on pure vanillin basis
Capacity increase for plant based vanillin

- Capacity increase at least 250 MT
  - Part of the increase will be realised before the end of 2019
- Construction to start 2H 2019, completion 1H 2021
- Debottlenecking of existing facility
- Capex NOK 130 million
Cellulose Fibrils

- Two product categories
  - Exilva – additive for industrial applications
    - Commercial size plant in Norway
  - SenseFi – additive for food applications
    - Demonstration plant in the US
Microfibrillar cellulose (MFC) is cellulose fibers defibrillated into millions of tiny fibrils (100,000 times thinner than hair)

Exilva is Borregaard’s brand name for microfibrillar cellulose used in industrial applications

Exilva is a sustainable biobased material with multifunctional properties

- Improves flow, stability, flexibility and strength in industrial formulations and materials
- Enables customers to develop new and improved products
Nanocellulose landscape

• Three main product categories
  • NCC/CNC - nano cellulose crystals
  • NFC/MFC - nano/microfibrillated cellulose
  • CNF - ionic cellulose nano fibrils
  • Significant variations within each product group
  • Few standards exist

• Typically more complementary than competing in use, some overlaps

• Crystals and ionic fibrils classified as nano by EU and USA (EPA), while NFC/MFC are not as they form micro clusters

• One commercial size plant exists in each category
  • NCC/CNC - Celluforce, Canada
  • NFC/MFC - Exilva, Norway
    • Several full-scale captive plants in pulp and paper
  • CNF - Nippon Paper, Japan
  • Many pilot plants with 5-30 mt capacity
Nanocellulose market still embryonic

- Market analysts estimate that the nanocellulose market could grow to 700-1,000 mUSD by 2024\(^1\)
  - NFC/MFC estimated to be 50%
  - Awareness a possible limitation
- NFC/MFC market today
  - Largest volumes in paper and packaging (captive)
- The rheology modifiers market is large (5 bnUSD), but complex and fragmented
  - Highest interest from Exilva prospects

\(^1\) Markets Insider, Global Market Insight, Transparency Market Research
Horizon 2020 support for commercialisation of Exilva

- Covers 60% of total costs, including depreciation
- Support period is four years (1 May 2016 - 30 April 2020)
- Granted amount is 25 mEUR
- Not covering costs outside EEA

1) Exilva has received funding from the Bio-Based Industries Joint Undertaking (BBI) under the European Union’s Horizon 2020 research and innovation programme under grant agreement No 709746.
**SenseFi**

- **Advanced texture system for food**
  - Enables formulation of food products with reduced fat content without compromising mouthfeel, texture or taste

- **Status**
  - Pipeline >200 active prospects
  - Still in demonstration phase
  - Costs adjusted to activity level
  - Decision on commercial scale-up pending
Research & development

- Innovation Management Teams
- ~100 employees in R&D – of which 67 at the research centre in Sarpsborg – 34 has a PhD
- R&D and innovation spending ~3.9% of revenues
- IP strategies for each BU and major innovation projects

~15%\(^1\) of Borregaard’s revenues come from new products\(^2\)

Cellulose Fibrils: Exilva
Microfibrillar cellulose and SenseFi ® Advanced Texture Systems

«BALI»: Utilisation of various biomasses for lignin products

Continuous specialisation and improved products

1) Average last 5 years. 13% in 2017
2) Launched the last 5 years
3) Includes R&D centres, operation of BALI/Exilva pilots and market/application innovations
Business driven innovation model

Ideas from sales, technical application, R&D, production, external partners

Idea database

Innovation Management Teams (IMT)

Inter disciplinary development work

Scale-up and commercialisation

**IMT**
- Chaired by head of business unit
- Cross functional team of line managers
- Gatekeepers at important milestones

Co-work with (when required):
- Universities
- Research institutes
- Consultants

Co-work with (when possible):
- Customers
Borregaard shall provide sustainable solutions based on renewable raw materials and unique competence.
One of three core values

• **Sustainability**
  - Green chemicals that substitute petrochemicals
  - Sustainability demonstrated through life-cycle analysis
  - Focus on EHS across the organisation
  - Profitability is key to sustainability

• **Long-term perspective**
  - Consistent strategy over time
  - Long-term perspective on innovation, market development and investments
  - Competence development through training programmes, organisational development and use of technology

• **Integrity**
  - High credibility through transparency, honesty and predictability
  - Act responsibly in relation to stakeholders and exercise corporate responsibility
  - Demonstrate respect for individuals and different cultures while maintaining integrity and adhering to the company's code of conduct
**Sustainability**

**Integral part of market offering**

**RAW MATERIALS**
- Natural, renewable, sustainable raw materials

**PROCESSES**
- Efficient and sustainable production and value chain

**PRODUCTS**
- Sustainable biochemicals

---

**Sustainable and certified wood**
- Documentation
- PEFC\(^1\) and FSC\(^1\) standards
- Lignin raw materials from certified forests

**Reduced emissions improve LCA\(^2\)**
- Target based CO\(_2\)-reductions
  - Energy conservations
  - New/Green energy sources
  - Reduced emissions to water and air
  - “Greener” logistical solutions

**Products add sustainable value to customers**
- **Climate**: LCA\(^2\) shows favourable GHG footprint
- **Biobased**: Natural raw materials preferred
- **EHS\(^3\)**: Non-toxic, harmless products

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1) PEFC: Programme for the Endorsement of Forest Certification, FSC: Forest Stewardship Council
2) Life Cycle Analysis
3) Environment, Health and Safety
Sustainability

Favourable climate footprint

Fuel – production and use

Borregaard 2G bioethanol vs Gasoline

- 2nd generation bioethanol vs petroleum-based fuel
  - Increased demand in different countries due to incentives
- Most of Borregaard’s products have favourable GHG footprint compared with alternatives

Positive EHS impact in crop protection

- Lignin products in crop protection have a favourable environmental impact
- Water-based solutions as an alternative to solvent-based formulations
- Good safety and health performance as binders (less dust) in crop protection granules

1) GHG emissions “cradle to grave”, third party analysis based on ISO 14044/48
Alignment with UN’s Sustainable Development Goals

**Sustainability**

**THE SIX PRIORITISED SUSTAINABLE DEVELOPMENT GOALS FOR BORREGAARD**

- **2 Zero Hunger**
- **8 Decent Work and Economic Growth**
- **9 Industry, Innovation and Infrastructure**
- **12 Responsible Consumption and Production**
- **13 Climate Action**
- **15 Life on Land**

**GLOBAL CHALLENGES**

- **Growing Population**
- **Climate Change**

**OUR CONTRIBUTION**

- **Sustainable Food Production**
- **Sustainable Business**
- **Sustainable Industry**
- **Sustainable Production**
- **Sustainable Biorefinery**
- **Sustainable Raw Material**

**Alignment with long-term global goals**

**Contribution to market growth**

**Variety of green solutions**
Financial objectives

Financial objectives and dividend policy

Financial objectives

• ROCE >15% pre-tax over a business cycle
• IRR >15% pre-tax for expansion capex
• Average net working capital at 20% of operating revenues
• Replacement capex at depreciation level
• Maintain key financial ratios corresponding to an investment grade rated company
  • Leverage ratio\(^\text{1)}\) targeted between 1.0 and 2.0 over time

Borregaard’s dividend policy

• To pay regular and progressive dividends reflecting Borregaard’s expected long term earnings, free cash flows and expansion capex
• Annual dividend is targeted between 30% and 50% of net profit for the preceding fiscal year

1) Net interest-bearing debt divided by last twelve months’ EBITDA adj.
Value creation since IPO

Financials

<table>
<thead>
<tr>
<th>Year</th>
<th>Market capitalisation</th>
<th>Net debt ex IFRS16</th>
<th>Accumulated dividend</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td></td>
<td></td>
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<td>2015</td>
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<td>2017</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTM 2019</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CAGR

- Share price, including reinvestment of dividend: 30.0%
- Enterprise value = market cap + net debt: 22.0%
Financials

Key figures 2015 – 2019 (LTM)¹

Operating revenues

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>LTM 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>mNOK</td>
<td>4164</td>
<td>4492</td>
<td>4618</td>
<td>4785</td>
<td>4959</td>
</tr>
</tbody>
</table>

CAGR 5.1%

EBITA adj. & EBITA adj. %

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>LTM 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>11.9</td>
<td>16.6</td>
<td>16.2</td>
<td>12.1</td>
<td>11.6</td>
</tr>
</tbody>
</table>

ROCE and EPS

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>LTM 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROCE %</td>
<td>15.6</td>
<td>21.7</td>
<td>19.1</td>
<td>12.7</td>
<td>11.5</td>
</tr>
<tr>
<td>EPS</td>
<td>3.86</td>
<td>5.55</td>
<td>5.66</td>
<td>4.76</td>
<td>4.55</td>
</tr>
</tbody>
</table>

¹ Last twelve months as per June 2019
Key cost items 2014-2018

• 75%-85% sourced from Norway, the rest mainly from Sweden
• Annual price and volume contracts, mid-year adjustments occur
• Includes inbound logistics, ~30% of wood cost

• Energy consumption: Heat energy 2/3, electricity 1/3
• Heat energy: Base load mainly covered by renewable energy sources, peak-load mainly covered by LNG and spot electricity
• Electricity: Long term contract to 2029 for substantial part of needed volume

• Chemicals\(^1\) and other raw materials like lignin raw material
• Internal production of caustic soda
• Contract manufacturing of petrochemical-based vanillin
• Change in inventories

• Most products sold delivered customer
• Logistical optimisation important, especially for Performance Chemicals

• Continuous productivity improvement, including de-manning and cost reduction activities

• Repair and maintenance, external services, rental/leasing and other operating expenses

- Total costs in 2018 close to 3.9 billion NOK
- 4.9% CAGR from 2014 to 2018
- Main cost components’ share of total costs relatively stable over time

1) Main chemicals are caustic soda, salt, sulphur, epichlorohydrine and guethol
Financials

Sensitivity on EBITA adj. ¹)

- Global presence, diversified product portfolio and GDP-driven demand reduce market risk
- Oil price affects demand and competition in certain markets, but main effect historically has been on NOK FX rate
- Significant FX exposure, softened by FX hedging ²) in the medium term
- No major single component in other cost of materials
- Distribution costs: Most products sold “delivered customer”
- Other expenses are repair and maintenance, external services, rental/leasing etc.

¹) Non-GAAP measure – see appendix
²) Hedging based on expected net cash flow (EBITDA)
   - Base hedge - 75%/50% on a rolling basis for 6/9 months for major currencies
   - Extended hedge - 75%/50% of the next 24/36 months if USD and EUR are above predefined levels
**FX impact and policy**

**Currency hedging strategy**

Purpose is to delay effects of currency fluctuations and secure competitiveness

- Hedging based on expected net cash flow (EBITDA) 1)
  - **Base hedge** - 75%/50% on a rolling basis for 6/9 months for major currencies
  - **Extended hedge** - 75%/50% of the next 24/36 months if USD and EUR are above defined levels
    * EUR; effective rate above 8.50
    * USD; gradually at effective rates between 7.50 and 8.50
  - **Contracts** 2) - 100% hedged

- Balance sheet exposure hedged 100%
- Net investments in subsidiaries hedged up to 90% of book value in major currencies

**FX exposure**

- Borregaard’s revenues are primarily in USD or EUR, while costs are primarily in NOK
- Net FX exposure in 2018
  - **USD**: 65% (approximately 190 mUSD)
  - **EUR**: 34% (approximately 84 mEUR)
  - **Other**: 1% (GBP, BRL, JPY, SEK, ZAR)

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1) Net cash flow hedging mainly in the Norwegian company
2) Strict definitions for contracts applied for 100% hedging
   (mutually binding agreement in which price, currency, volume and time are defined)
3) Currency basket based on Borregaard’s net exposure in 2018 (100)
4) Last twelve months as per June 2019
Financials

Key figures 2015 – 2019 (LTM)\(^1\)

Performance Chemicals
EBITA adj.\(^1\) & EBITA % adj.\(^1\)

Speciality Cellulose
EBITA adj.\(^1\) & EBITA % adj.\(^1\)

Other Businesses
EBITA adj.\(^1\) & EBITA adj.\(^1\)

1) Last twelve months as per June 2019
Cash flow, NWC and investments 2015 – 2019 (LTM)\(^1\)

1) Last twelve months as per June 2019

2) Cash flow from operating activities (IFRS) + tax paid +/- net financial items +/- dividend (share of profit) from JV
**Financials**

**Updated investment forecast 2019-2020**

- **Replacement investments**
  - Targeted at depreciation level

- **Expansion investments**
  - Capacity expansion for wood based vanillin: 130 mNOK (H2-19 to mid 2021)
  - New plant LignoTech Florida phase 1: 110 mUSD budget (100%) ≈900 mNOK
  - Lignin operation upgrade in Norway: ≈450 mNOK, ≈70% expansion
  - Other smaller expansion projects

- **New projects may lead to additional investments**

1 Uncertainty is related to final investment decisions, timing of investment payments, execution time and risk and unexpected events e.g.
Capital structure

- Target for capital structure
  - Maintain key financial ratios corresponding to an investment grade rated company
  - Leverage ratio\(^1\) targeted between 1.0 and 2.0 over time

- Solid capital structure as per 30.6.19
  - Leverage ratio 1.77
  - Equity ratio\(^1\) 51.0%

- Borregaard has financial capacity for expansion
  - Revolving credit facilities (RCF), 1,500 mNOK, maturity 2021
  - 60mUSD term loan for LignoTech Florida (LTF), tenor 8.5 years from completion of project phase 1
  - Bond issues, 400 mNOK, maturity June 2023
  - Nordic Investment Bank (NIB) loan, 40 mEUR, maturity 2024

1) Non-GAAP measures – see appendix
Highly experienced and proven management team

CEO
Per A. Sørlie
- CEO since 1999
- Member of management team since 1990
- 29 years with Borregaard

Per Bjarne Lyngstad
- CFO
- 21 years in current position
- 31 years with Borregaard

Tom Erik Foss-Jacobsen
- EVP Performance Chemicals
- In current position from May 2019
- 20 years with Borregaard

Gisle Løhre Johansen
- EVP Speciality Cellulose and Fine Chemicals
- In current position from May 2019
- 28 years with Borregaard

Ole Gunnar Jakobsen
- Plant Director - Sarpsborg Site
- 11 years in current position
- 24 years with Borregaard

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- Plant Director - Sarpsborg Site
- 11 years in current position
- 24 years with Borregaard

Tuva Barnholt
- SVP Strategic Sourcing and Logistics
- 13 years in current position
- 21 years with Borregaard

Kristin Misund
- SVP R&D and Business Development
- In current position from May 2019
- 26 years with Borregaard

Dag Arthur Aasbø
- SVP HR & Comm./Public Affairs
- 11 years in current position
- 26 years with Borregaard

Sveinung Heggen
- General Counsel
- 6 years in current position
- 6 years with Borregaard
Appendix - Non-GAAP measures

In the discussion of the reported operating results, financial position and cash flows, Borregaard refers to certain measures which are not defined by generally accepted accounting principles (GAAP) such as IFRS. Borregaard management makes regular use of these non-GAAP measures and is of the opinion that this information, along with comparable GAAP measures, is useful to investors who wish to evaluate the company’s operating performance, ability to repay debt and capability to pursue new business opportunities. Such non-GAAP measures should not be viewed in isolation or as an alternative to the equivalent GAAP measure.

• Cash flow from operations: Cash flow from operating activities (IFRS) + tax paid +/- net financial items +/- dividend (share of profit) from JV.

• EBITA adjusted (EBITA adj.): Operating profit before amortisation and other income and expenses.

• EBITA adj. margin: EBITA adj. divided by operating revenues

• EBITDA adjusted (EBITDA adj.): Operating profit before depreciation, amortisation and other income and expenses.

• Equity ratio: Equity (including non-controlling interests) divided by equity and liabilities.

• Expansion investments: Investments made in order to expand production capacity, produce new products or to improve the performance of existing products. Such investments include business acquisitions, pilot plants, capitalised R&D costs and new distribution set-ups.

• Other income and expenses: Non-recurring items or items related to other periods or to a discontinued business or activity. These items are not viewed as reliable indicators of future earnings based on the business areas’ normal operations. These items will be included in the Group's operating profit.

• Leverage ratio: Net interest-bearing debt divided by last twelve months’ (LTM) EBITDA adj., excluding the impact on EBITDA of IFRS 16 Leases.

• Net interest-bearing debt (NIBD): Interest-bearing liabilities minus interest-bearing assets

• Return on capital employed (ROCE): Last twelve months’ (LTM) EBITA adj., excluding the impact of IFRS 16 Leases, divided by average capital employed based on the ending balance of the last five quarters. Capital employed is defined by Borregaard as the total of net working capital, intangible assets, property, plant and equipment (excluding the impact of IFRS 16 Leases) and investment in joint venture minus net pension liabilities.