UPM today

UPM BIOREFINING
Pulp
Biofuels
Timber

UPM ENERGY
Electricity
generation and
trading

UPM RAFLATAC
Label
materials for
product and
information
labelling

UPM SPECIALTY PAPERS
Label papers,
release liners,
office papers
and flexible
packaging

UPM PAPER ENA
Magazine
papers,
newsprint and
fine papers

UPM PLYWOOD
Plywood and
veneer
products

UPM BIOCOMPOSITES

UPM BIOCHEMICALS

WOOD SOURCING
AND FORESTRY
Global businesses – local presence

UPM’s sales by market 2016
EUR 9,812 million

13% North America
63% Europe
18% Asia
6% Rest of the world

54 production plants in 12 countries
19,300 employees in 45 countries

12,000 customers in 120 countries
85,000 shareholders in 40 countries
55,000 suppliers in 70 countries
## UPM in transformation

**Operating model**
Promotes value creation

### Business portfolio
Increasing share of businesses with strong long-term fundamentals for profitability and growth

### Business performance
Continuous improvement in financial, social and environmental performance

### Disciplined capital allocation
Driving value creation

### 2008: Vertically integrated paper company

<table>
<thead>
<tr>
<th>Sales</th>
<th>Paper</th>
<th>Plywood</th>
<th>Raflatac</th>
<th>Sawmilling</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2016: Six separate businesses

<table>
<thead>
<tr>
<th>Sales</th>
<th>Paper ENA</th>
<th>Plywood</th>
<th>Energy</th>
<th>Specialty Papers</th>
<th>Raflatac</th>
<th>Biorefining</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Financials

**2008**

- **Sales**: EUR 9.5bn
- **EBIT**: EUR 513m (3.5%)

**2016**

- **Sales**: EUR 9.8bn
- **EBIT**: EUR 1,143m (10.9%)

**Net debt**

- EUR 4.3bn

**Market cap**

- EUR 4.7bn

---

*) excluding special items for 2008, comparable figures for 2016
Competitive businesses with strong market positions
Operating on healthily growing markets

**Growth drivers:**
- Private consumption
- Sustainability
- Population growth
- Urbanisation
- E-commerce
- Construction
- Transportation

**UPM PLYWOOD**
Plywood, veneer ~3%

**UPM PAPER ENA**
Graphic papers ~−4%

**UPM Specialty Papers**
- Label papers ~4%
- High-end office papers ~4%

**UPM RAFLATAC**
Self-adhesive labels ~4%

**UPM ENERGY**
Electricity ~1%

**UPM BIREFINING**
- Pulp ~3%
- Biofuels strong
- Timber ~2%

By comparable EBIT 2016
Demand trend growth, % pa
Increasing share of businesses with strong long-term fundamentals for profitability and growth

Sales 2016

- Sustainable growth
- UPM Biorefining
- UPM Raflatac
- UPM Specialty Papers
- UPM Plywood
- UPM Energy

- Maintaining strong cash flow
- UPM Paper ENA

Focused investments:
- Pulp +70,000 t
- Pulp +100,000 t
- Pulp +170,000 t
- Label stock expansions
- Renewable diesel +120m litres
- Specialty papers +360,000 t
- Plywood +40,000 m³
- Specialty labels expansion

Capacity closures and divestments:
- 13: 420,000 t magazine
- 14: 160,000 t fine
- 15: 460,000 t magazine
- 16: 345,000 t news
- 17: 280,000 t news
- 18: 305,000 t magazine
- 19: 195,000 t magazine
Value creation through sustainable growth and cash generation

Sustainable growth
- Commercial success
- Cost efficiency
- Focused growth investments
- Product mix development

Maintain strong cash flow
- Commercial success
- Cost efficiency
- Efficient use of assets, including restructuring
Serving the increasing customer demand with the focused growth projects

- Fully contributing
  - Pietarsaari pulp mill expansion
  - Fray Bentos pulp mill expansion
  - Kymi pulp mill expansion
  - Raflatac expansion in APAC, Poland
  - Kaukas pulp mill efficiency

- Contributing well in H1 2017
  - Lappeenranta biorefinery
  - Changshu speciality paper machine
  - Otepää plywood mill expansion

- Under construction
  - Kymi pulp mill expansion 2
  - Raflatac expansions in Poland and Finland
  - Kaukas pulp mill expansion 2
Focused investments are delivering growth

Average delivery growth 2011 –2016

<table>
<thead>
<tr>
<th>Business Unit</th>
<th>Products</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPM Biorefining</td>
<td>Pulp, Biofuels</td>
<td>+3%</td>
</tr>
<tr>
<td>UPM Raflatac</td>
<td>Standard products, Films and specials</td>
<td>+4%</td>
</tr>
<tr>
<td>UPM Specialty Papers</td>
<td>Label materials, Cut-size</td>
<td>+4%</td>
</tr>
<tr>
<td>UPM Plywood</td>
<td>Plywood</td>
<td>+3%</td>
</tr>
</tbody>
</table>

Sales 2016

- 100%
- 75%
- 50%
- 25%
- 0%
Business area long-term targets compared with realised returns

* Shareholdings in UPM Energy valued at fair value.
Group financial performance

Comparable EBIT

Target: EBIT growth

Comparable ROE

Target: 10%

Net debt and leverage

Net debt/EBITDA (x)

Comparable figures for 2014 – 2017, excluding special items for earlier years
## Capital allocation – maintaining capability for future opportunities

1. Maintain strong balance sheet, investment grade metrics
   - *Net debt/EBITDA 2x or less*

2. **Attractive dividend**
   - 30-40% of operating cash flow per share

3. Capex in attractive larger growth opportunities
   - *IRR exceeds ROCE targets*

4. M&A, if the opportunity and timing are right
   - *IRR exceeds ROCE targets*

5. Additional shareholder distribution selectively
   - *balance long term free cash flow cycles*
Strong cash flow and balance sheet

Operating cash flow

- Q2/17 operating cash flow: EUR 269m
- Working capital increased by EUR 59m

Net debt

- Net debt / EBITDA (trailing 12 months): 0.68x
Dividend policy

- UPM aims to pay an attractive dividend, 30–40% of operating cash flow per share

Dividend for 2016

- EUR 0.95 (0.75) per share, totalling EUR 507m
  - 30% of 2016 operating cash flow
Low investment needs in existing assets allow growth projects with modest total capex

Focused growth investments
- Good returns and fast payback
- Low implementation risk
- Financed from operating cash flow

Low replacement investments
- Asset quality in all businesses, e.g. large competitive pulp mills
- UPM Paper ENA

Modest total capex and attractive returns
Direction: grow businesses with strong long-term fundamentals and sustainable competitive advantage

Operating model
→ Better than sum of parts
• Separate businesses
• Top performance
• Corporate benefits

Performance
→ Continuous improvement
• Profit focus
• High performing people
• Value-based leadership
• Responsibility
• Innovation

Capability
→ Foundation for opportunities
• Strong cash flow
• Strong balance sheet
• Corporate structure

Capital allocation
→ Attractive returns
• Attractive dividend
• Focused growth investments
• Selected larger investments
• Synergistic M&A

Growth
→ Earnings growth and valuation
• Current growing businesses
• New bio-based businesses
Q2 2017 – Good performance and favourable market demand continued

- Comparable EBIT increased by 2% to EUR 270m (264m)
- Temporarily higher fixed costs and lower operational efficiency due to high maintenance activity:
  - EUR -20m compared with Q2 2016
  - EUR -45m compared with Q1 2017
- Q2 2017 operating cash flow was EUR 269m (434m)
- Net debt decreased to EUR 1,046m (1,876m), net debt/EBITDA to 0.68x (1.25x)
Q2 2017 – Good market demand, high maintenance activity

**UPM BIOREFINING**
- Good demand, pulp deliveries +2%, strong growth in biofuels
- Pulp prices higher
- Pietarsaari pulp mill maintenance
- Kaukas investment decision

**UPM PAPER ENA**
- Graphic paper deliveries –2%
- Seasonally high fixed costs, including maintenance
- Fibre costs higher

**UPM ENERGY**
- Electricity deliveries –17%
- Hydropower generation below average and prolonged maintenance at Olkiluoto nuclear power plant

**UPM SPECIALTY PAPERS**
- Significant progress in product mix, higher release liner deliveries
- Good demand
- Pulp costs higher, sales prices higher

**UPM RAFLATAC**
- Good demand, deliveries +6%
- Variable costs higher
- Specialty label investment decision, Tampere

**UPM PLYWOOD**
- Good demand, deliveries +4%
- Variable costs higher, sales prices higher
Comparable EBIT by business area

- **UPM Biorefining**: EURm 150, % of sales 25
- **UPM Energy**: EURm 120, % of sales 60
- **UPM Paper ENA**: EURm 120, % of sales 12
- **UPM Specialty Papers**: EURm 50, % of sales 12.5
- **UPM Raflatac**: EURm 50, % of sales 12.5
- **UPM Plywood**: EURm 25, % of sales 16

The Biofore Company

UPM

19 | © UPM
Comparable EBIT in Q2 2017 vs. Q2 2016

High maintenance activity in Q2/17 resulted in temporarily higher fixed costs and lower operational efficiency. Prices increased.

Outlook for 2017

• UPM’s profitability improved significantly in 2016 and is expected to continue on a good level in 2017.

• Demand growth is expected to continue for most of UPM’s businesses, while demand decline is expected to continue for UPM Paper ENA. The focused growth projects continue to contribute gradually to UPM’s performance.

• Following a deflationary environment in recent years, 2017 is expected to show modest input cost inflation. UPM will continue measures to reduce fixed and variable costs to mitigate this.

• Q3 2017 is expected to include significantly less maintenance activity than Q2 2017 in UPM Biorefining, UPM Paper ENA and UPM Energy.
Responsibility is good business

"We believe that customers, investors and other stakeholders value responsible operations that keep risks under control and add to our business opportunities, thereby increasing the company value."

UPM Annual Report 2015

MORE WITH BIOFORE

Creating value through products and innovation

Creating competitive advantage and long-term value by efficiency

Risk mitigation by responsible value chain and production
Creating competitive advantage and long-term value by engagement

**Safety**

- Lost-time accident frequency
- 5-year change: **−76%**

**Employee engagement**

- Manager effectiveness
- Employee engagement
- 5-year change: **+9**

**Productivity**

- Sales per employee
- 5-year CAGR: **+4% pa**
Creating competitive advantage and long-term value by efficiency
Case: UPM Changshu mill in China

Water
-60%
Per tonne of paper

Energy
-30%
Per tonne of paper

Waste to landfill
-60%
Per tonne of paper

Certified fibre
85%
In 2015

2015 compared to 2005

COD in effluent
-75%
Per tonne of paper

SO₂ emission
-90%
Per tonne of paper

Source: UPM
Consistent long-term work receives external recognition

UPM in sustainability indices

Sustainable and Responsible (SRI) investors form a significant part of UPM's shareholders

Source: Nasdaq, September 2016
Market pulp consumed in growing end-uses – supply of alternative white fibres declines

Global paper and board production

Stressed supply of white recycled fibre

Market pulp consumption in growing end-uses

Mixed collection crowding out white recycled fibre
Case: Market pulp consumption in growing end-uses

Fibre consumption in tissue, cartonboard and specialty end-uses

<table>
<thead>
<tr>
<th>Fibre Type</th>
<th>Consumption (Million tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White integrated pulp</td>
<td>10</td>
</tr>
<tr>
<td>White market pulp</td>
<td>30</td>
</tr>
<tr>
<td>Other fibres (RCP, mechanical pulps…)</td>
<td>85</td>
</tr>
</tbody>
</table>

5% demand increase in tissue, cartonboard and specialty end-uses

Increase in market pulp consumption +1.5

Source: Pöyry, Hawkins Wright, UPM
UPM Biorefining

Case: Stressed supply of white recycled paper

5% fall in global graphic paper production

-7 125

-2

Fall in market pulp demand

Market pulp to replace fall in white recycled paper supply

+3

+1

Net increase in market pulp demand

Source: Pöyry, UPM
Case: Mixed collection crowding out white recycled fibre

- **White RCP grades**: 75 million tonnes
- **Mixed RCP**: 49 million tonnes (increasing to 62 million tonnes)
- **Old corrugated boxes**: 135 million tonnes

5%-point increase in mixed collection share

Market pulp to replace fall in white recycled paper

Source: Pöyry, UPM
Summary of pulp demand outlook

Increase in end use …

<table>
<thead>
<tr>
<th>Year</th>
<th>Newsprint</th>
<th>WC</th>
<th>WF</th>
<th>Spec. &amp; other</th>
<th>Container-boards</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

… will drive fibre demand in coming decades

<table>
<thead>
<tr>
<th>Year</th>
<th>Market pulp</th>
<th>Integrated pulp</th>
<th>RCP White</th>
<th>Mechanical pulp</th>
<th>Non-wood</th>
<th>RCP Brown</th>
<th>Unbleached pulp</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Growth in Market pulp vs. decline in Integrated pulp
- Declining White RCP
- Demand of Brown fibre may overwhelm the supply

Source: UPM, Pöyry, RISI

Increase in end use: 
- Healthy growth in other White Papers & Boards
- Decline in Graphic papers
- Strong growth in Containerboards (brown fibre)

Estimated growth of White RCP + Integrated Pulp + Market Pulp is still conservative (~1 Mt/a)
UPM Biorefining

White fibres in different stages of life-cycle; 64 Mt capacity closed within 2000–2015

- **Hardwood pulp** capacity has experienced strong net growth after 2000 and is expected to continue growing.
- **Softwood** has faced closures as much as hardwood. New demand in China is turning decline into a slow growth.
- **White RCP** was the fastest-growing fibre in Europe and NA in early 1990’s. After recession capacity has been in decline due to very high collection rates and diminishing supply of graphic paper.
- **Mechanical** pulp continues to decline along with graphic papers.
- **Non-wood** pulps consumed mostly in China are under pressure due to environmental reasons.
- **Sulphite** has been in decline for decades.

Note: Including both market and integrated pulp

Source: Pöyry
UPM Biorefining
Chemical pulp market

Pulp market prices, EUR

Pulp market prices, USD

Source: FOEX Indexes Ltd, ECB
Potential pulp mill in Uruguay could be a competitive alternative – time schedule is several years.

Phase I: Conversation with Government of Uruguay on local prerequisites

Phase II: Development of infrastructure and permitting
est. 1.5 – 2 years

Phase III: Investment project development of Infrastructure
est. 2.5 years

Potential UPM investment decision
UPM Biorefining

UPM Biofuels in existing and future end-use

- Fuel retail
- Dedicated green fleets
- Marine/Aviation
UPM Biorefining

UPM Biofuels business evolving

- **UPM enters Biofuels**
- **Investment decision 2012**
- **Build Lappeenranta Biorefinery and Biofuels organization**
- **Establish Bioverno as a benchmark product and brand in biofuels**
- **Technology and Business case proven**
- **Commercial start 2015**
- **Start evaluation of future growth opportunities**

Timeline:
- **2010**
- **2020**

The Biofore Company

© UPM
Significant emission cuts needed in transportation sector

EU’s greenhouse gas reduction targets cannot be met without significant emission cuts in transport – actions needed in all sectors.

- 80% by 2050
- 60% by 2040
- 40% by 2030

25% of total emissions in Europe from transport

- Road transport, light-duty 55%
- Road transport, heavy-duty 18%
- Aviation 13%
- Marine 14%

Drop-in biofuels are a solution for GHG reduction in all transport sectors

Electric vehicles can be applied in light-duty road transport

Transport emissions by sector
All energy and technology options needed

Decarbonizing European transport requires effective use of all energy and technology options – renewable drop-in fuels a fast-lane solution

- 40% reduction in road transport emissions vs. reference year 2005

**GHG reduction by high electric vehicle adoption**

**GHG reduction gained by projected fuel economy improvement**

Additional need of sustainable drop-in biofuels by 2040

2020 mandated biofuel volume

Fossil share in fuel pool

GHG emissions %, reference year 2005

- Calculated based on "Global EV sales outlook to 2040" by Bloomberg New Energy Finance
- Assuming EV’s represent 38% of new car sales in Europe by 2040 + EV’s are fully emission free
- Assuming annual energy efficiency improvement of 2% in light-duty, 0.5% in heavy-duty
UPM Energy

Cost competitive and flexible asset base

Power generation breakdown

Condensing power

Flexible hydro production with optimisation opportunities

Nuclear as reliable base load with world-class availability performance
### UPM Energy’s power generation

<table>
<thead>
<tr>
<th>Power Generation</th>
<th>MW</th>
<th>EURm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydropower holdings</td>
<td>565</td>
<td>723</td>
</tr>
<tr>
<td>Nuclear power OL1 and OL2</td>
<td>580</td>
<td>1,031</td>
</tr>
<tr>
<td>Nuclear power OL3 under construction</td>
<td>(500)</td>
<td>178</td>
</tr>
<tr>
<td>Condensing power</td>
<td>190</td>
<td>8</td>
</tr>
<tr>
<td>UPM Energy’s shareholdings in total, valued at fair value</td>
<td>1,335</td>
<td>1,940</td>
</tr>
<tr>
<td>UPM own hydropower assets</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>UPM Energy’s in total (excl. OL3)</td>
<td>1,495</td>
<td></td>
</tr>
<tr>
<td>UPM Energy capital employed</td>
<td>2,267</td>
<td></td>
</tr>
</tbody>
</table>

In addition to its own power generation, UPM Energy sources electricity from part owned energy companies at full cost (cost-price principle)
UPM Energy

Cost efficient power generation enables robust profitability also in challenging market environment

<table>
<thead>
<tr>
<th>Year</th>
<th>Comparable EBIT, EURm</th>
<th>% of sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>217</td>
<td>45.0</td>
</tr>
<tr>
<td>2013</td>
<td>186</td>
<td>39.9</td>
</tr>
<tr>
<td>2014</td>
<td>202</td>
<td>43.5</td>
</tr>
<tr>
<td>2015</td>
<td>181</td>
<td>43.6</td>
</tr>
<tr>
<td>2016</td>
<td>116</td>
<td>32.7</td>
</tr>
<tr>
<td>H117</td>
<td>34</td>
<td>23.4</td>
</tr>
</tbody>
</table>
UPM Raflatac

Self-adhesive labels in end-use
Leading position in a growing market

The self adhesive labelstock market

- > EUR 8bn global market
- ~ 4% p.a. growth
- Private consumption driven

UPM Raflatac

- #2 globally
- Business in 120 countries
- > 8,000 customers
- 3,000 people in six continents
Continuing growth

1. Capturing the market growth in the current markets and product areas
2. Increased distribution coverage and customer reach
3. Wider product portfolio
4. M&A when opportunities emerge

Enabled by scalable operating platform & efficient investments
Focus on global Labelling materials, Packaging in Europe and Office paper in APAC
UPM Specialty Papers
Our end use markets are growing

**LABELING MATERIAL**
CASE: Siliconized release liner market, 44 Bn m²
- 2014: 44 Bn
- 2020E: 60 Bn
- CAGR: 5%

**PACKAGING**
Paper flexpack, k tonnes
- 2015: 2,370 k tonnes
- 2020E: 2,702 k tonnes
- CAGR: 2%

**OFFICE PAPER ASIA**
Asian cut size market, million tonnes
- 2015: 5.2 million tonnes
- 2020E: 6.2 million tonnes
- CAGR: 2.5%

- **China (CHN)**: 46,5.2%
- **Japan (JPN)**: 4,6%
- **Korea (KOR)**: 3%
- **Southeast Asia (SEA)**: 5%
- **Australia (AUS)**: 4%
- **Other (OTH)**: 2%

~$12 Bn
~$58 Bn
~$4 Bn
Mkt value
UPM Specialty Papers

Global release liner market: Applications

48.6 Bn m²

Product functions:
Release liner carries the adhesive and face material
- Prevents the adhesive from sticking permanently
- Important and often critical feature of a layered construction

- Label 49%
- Medical 3%
- Graphic film 5%
- Food & bakery 5%
- Hygiene 9%
- Industrial 11%
- Tapes 13%
- Envelope 2%
- Others 3%

Source: AWA
Historically Home & Office end-use has been the most resilient to structural changes.

Despite the digital alternatives personal preferences (way of working and learning), regulation (archiving) and lack of common standards have mitigated the change.

A moderate decline has taken place in Direct marketing end-use.

Paper based marketing is still recognized to be the most effective medium for retailers and cataloguers.

Steady decline in Magazine Publishing circulation and pagination, however number of titles increasing.

Publishers still rely heavily on the revenues from print.

Newspaper publishing being historically the most vulnerable to structural changes but remarkable differences between countries.

Monetizing digital circulation for Magazines and Newspapers continue to be challenging.

Source: Euro-Graph
Demand-supply balance in European graphic paper is visible in margins

Sources: PPI, RISI, Pöyry
Graphic paper prices

Sources: PPI, RISI
UPM Plywood

UPM Plywood in end-use

Construction

Vehicle flooring

LNG shipbuilding
Relevant high-end market offers meaningful growth potential

Relevant market ~5 million m³

- High-end demanding applications & customers
- Medium range standard products
- EMEA region
- Global LNG business

- Europe is net importer of plywood
- Imports focus mainly on standard products in mid-low ranges

Source: FEIC; FAOSTAT; UPM
Selected focus end-uses provide further growth potential

- The recovery of the European construction sector is driving demand (annual growth 2–3% p.a.)
- The financial crisis created a backlog for trailers driving the current replacement need (average growth 4% p.a.)
- The LNG market is expected to remain solid as countries secure energy availability, thereby supporting the demand for LNG vessels (existing order book for plywood based LNGC ~90 vessels)

Sources: Euroconstruct, West European trailer registrations for Big 7 Countries (1985–2016), LNG World Shipping
New business opportunities for UPM

- **Biofuels**
  - Biofuels
  - Biorefinery Chemicals
  - High volume products
  - Economies of scale
  - Drop-in applications
  - 100 kt renewable diesel

- **Biochemicals**
  - Biofibrils
  - Lignin
  - Life science prod. e.g. cell culturing and medical care
  - Performance chemicals e.g. resin for plywood manufacturing

- **Biocomposites**
  - Terrace materials
  - New applications, e.g. acoustics pr.
  - Scale up

- Biofuels
- Biochemicals
- Biocomposites

---

**Market entry**

---

**Scale up**
New separation technologies ensure best overall value capture
Partial overlap with fossil-based value chains in chemicals

Feedstocks
- Oil
- Gas
- Coal
- Biomass

Key Intermediates
- C1: Syngas
- C2: Ethylene
- C3: Propylene
- C4: Butadiene
- C5: Xylose
- C6: Benzene
- C7: Toluene
- C8: Xylene

Chemical Building Blocks
- 600 Mtons

Final products
- 10 Mtons