COMPETITIVE ADVANTAGE AND GROWTH THROUGH INNOVATION

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What do we mean by innovations at UPM?

- Target: to find & develop new business opportunities and enhance existing businesses

- Innovation is an idea that translates into business value for UPM
  - Business model
  - Service concept
  - Product / product enhancement
  - Business
  - Technology & process
  - New way of operating
Innovation needs differ, but it is a must in all UPM businesses

- **Mature**
  - Cost savings
  - New services
  - New business models

- **Growth**
  - New products
  - Go-to-market concept
  - Cost savings

- **New**
  - New products
  - New technologies
  - Application development
  - Commercialisation
Product innovations in new and existing businesses
Digital innovations offer a new opportunity to transform existing businesses

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  - Commercialisation
Digitalization and IoT

Why to be interested?

• New competitive advantage that is hard to copy
• Better customer / user satisfaction with lower costs to serve
• Disrupt industry practices and our own ways of working
• Next steps in cost competitiveness
• Frontrunners will define the rules of the game
Our planet has to provide increasingly more wellbeing to more people

- Population growth
- Urbanization
- Climate change
- Resource scarcity
- Aging population
- Higher living standards

MORE WITH BIOFORE

SUSTAINABLE BIOALTERNATIVES & NEW BIOINNOVATIONS
Consumer brand owners continue to drive renewables and green initiatives
Wood is a unique and excellent raw material for mitigation of global challenges.

- Renewable
- Recyclable
- Versatile
- Sustainable
- Non-GMO
- Non-food
- Competitive
- Low market volatility
New business opportunities for UPM

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

- **Biochemicals**
  - Auxiliary for pharma R&D
  - Industrial Applications

- **Biofibrils**
  - Performance chemical
  - New applications

- **Lignin**
  - New material
  - End-user product

- **Biocomposites**
  - 2 prod. sites
New separation technologies ensure best overall value capture
Partial overlap with fossil-based value chains in chemicals

**Feedstocks**
- Oil
- Gas
- Coal

**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
Diversified chemicals markets offer many opportunities

TYPICAL APPLICATIONS FOR BIOCHEMICALS

- PLASTICS
- FOOD
- COSMETICS
- PAINTS
- COATINGS

- ADHESIVES
- FIBERS
- AGRICULTURE
- INDUSTRIES
- MANY OTHERS
Why UPM and biochemicals?

Access to and management of 2G-biomass

Biomass conversion processes

- Chemical processes
  - Kraft pulping
  - Biodiesel production

- Bioenergy & Infrastructure
  - Biomass boilers
  - CHP
  - Water treatment

Run sustainably large industrial processes
REALITY: phenol in resins replaced by renewable UPM biochemicals
REALITY: UPM biomedicals enabling development of new medical treatments

GrowDex®
cellulose based hydrogel for life science applications

3D Cell Culturing Matrix for e.g. Cancer Research

Membranes for e.g. Wound Care Applications
Summary

• Innovations accelerate transformation, drive competitive advantage, top-line growth and new business opportunities

• UPM is in unique position to provide mitigating solutions for global challenges

• Biochemicals provide large market potential. UPM is in good position to capture value through focused growth investments

• Major studies for novel technologies have been going on for 5 years
Redefining the industry

BIO + FORE