Bioplastics today – an overview

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Bioplastic Conference 2019
Agenda

Why am I here?
Bioplastics – what is it?
Bioplastic applications and market
Challenges and barriers
## Danish Technological Institute

**President Søren Stjernqvist**

### Corporate staff:
- **Building Services, Finance & Accounts, IT & Communications, Personnel & Development, Secretary of executive board**

### AgroTech
- **Vice president** Mikael Poulsen
- **Bioresources & Biorefinery**
- **Plant Technology**
- **Field Trials, Technology & Analysis**
- **Food Technology**
- **Vice president** Mette Giavind
- **Concrete**
- **Buildings & Environment**
- **Masonry**
- **Wood & Biomaterials**
- **Policy & Business Development**
- **Ideas & Innovation**
- **Training**

### Building & Construction
- **Vice president** Jane Wickmann

### Business & Society
- **Vice president** Lars Hinrichsen
- **Business Development**
- **Food Safety**
- **Meat Technology**
- **Measuring Systems & Data Integration**
- **Slaughterhouse Technologies**
- **Automation**

### DMRI
- **Vice president** David Tveit
- **Automobile Technology**
- **Energy Efficiency & Ventilation**
- **Installation & Calibration**
- **Refrigeration & Heat Pump Technology**
- **Pipe Centre**
- **Transport and Electric Systems**

### Energy & Climate
- **Vice president** Sune D. Nygaard
- **DTI Oil & Gas**
- **Laboratory for Chemistry & Microbiology**
- **Industrial Materials Technology**
- **Tribology**
- **Big Science**

### Life Science
- **Vice president** Mikkel Agerbæk
- **DTI Oil & Gas**
- **Laboratory for Chemistry & Microbiology**
- **Industrial Materials Technology**
- **Tribology**
- **Big Science**

### Materials
- **Vice president** Anne-Lise H. Lejre
- **Metrology & Quality Assurance**
- **Nano Production & Micro Analysis**
- **Robot Technology**

### Production
- **Vice president** Sune D. Nygaard
- **DTI Oil & Gas**
- **Laboratory for Chemistry & Microbiology**
- **Industrial Materials Technology**
- **Tribology**
- **Big Science**

### Subsidaries
- **Danfysik A/S**
- **Teknologisk Institut AB Sverige**
- **Dancert A/S**
Our brand promise

**Expertise**
We combine advanced knowledge with practical experience.
Our services are based on specialised expertise and state-of-the-art equipment.

**Integrity**
We are open and engaged in our collaborations.
Our credibility is based on integrity, transparency and impartiality.

**Creating results**
We provide solutions that create value for our customers.
Our commitment and insight drive us to achieve high-quality results.

**Ground-breaking**
We apply tomorrow’s technology.
We set the direction for applying technology within the business community.
Bioplastics: Biobased or biodegradable? Or both?
Biosimilar

- e.g. biobased PE, PET, PA, PTT

Bioplastics

- e.g. PLA, PHA, PBS, Starch blends

New materials

Conventional plastics

- e.g. PE, PP, PET

Biodegradable

Bioplastics

- e.g. PBAT, PCL

Fossil-based

Non biodegradable

Source: https://www.european-bioplastics.org/bioplastics/materials/
71 % biobased
29 % biobased
Biobased content
Bioplastics

- Biobased
  - e.g. biobased PE, PET, PA, PTT
- Biodegradable
  - e.g. PLA, PHA, PBS, Starch blends

Important biodegradation parameters
- Timeframe
- Level of biodegradation
- Required surrounding conditions

Source: https://www.european-bioplastics.org/bioplastics/materials/
Source: https://www.european-bioplastics.org/bioplastics/feedstock/
Bioplastics are here!
Application and market
Examples

DuPont™ Sorona® EP renewably sourced™ thermoplastic polymer

Meet the world’s 1st recyclable shampoo bottle made with beach plastic
Global production

Source: https://www.european-bioplastics.org/bioplastics/materials/
Global production

- **Bio-based/non-biodegradable** 56.8%
  - Other (bio-based/non-biodegradable) 0.9%
- **Biodegradable** 43.2%
  - PBAT 7.2%
  - PBS 4.6%
  - PLA 10.3%
  - PHA 1.4%
  - Starch blends 18.2%
  - Other (biodegradable) 1.5%

Total: 2.11 million tonnes

Source: https://www.european-bioplastics.org/bioplastics/materials/
Published patents

29% of patents
1970-2009

31% of patents
2016-2018

Source: Gitte Tang Kristensen et al., 2018: “Analyse af danske styrkepositioner inden for biopolymerværdikæden”, carried out for the Danish National Bioeconomy Panel
Great potential – what are the challenges?

- Transparancy of terms, confusion of concepts:
  - Biobased, biodegradability
  - Standards, certificates and labels
- Availability vs. demand
- The investment risk
- Which direction is the right?
  - Sources – 1st or 2nd generation, land use or waste fractions
  - Bio-similar or new bioplastic biodegradable materials?
- Handling of new material types, including after-life
- Technical potential
Thank you – questions?

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With thanks to European Bioplastics for allowing the use of their illustrations