Exploring drivers and barriers of Biocomposites’ circularity

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One of the major global challenges we face in the materials science is the transformation from fossil, petrochemistry based polymeric materials to the sustainable, renewable and carbon-binding materials.

Facts about fossil-based plastics:
- Produced 8.3 billion tons since 1950’s
- Yearly production 400 million tons and doubled by 2040
- Corresponds 4% of climate change now and 15% in 2050
- Recycled globally only 9%

Facts about bioplastics:
- Yearly production 2.4 million tons (<1% of fossil based)
- Not really recycled yet!
- Now mainly used as energy!

Plastics with fossil-based raw materials have impact on:
- Chemical pollution - Novel entities
- Climate change
- Freshwater change
Bioplastics and biocomposites help to reduce those changes, but can increase issues related to land use

-> CIRCULAR ECONOMY IS NEEDED FOR ALL MATERIALS

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### Biocomposites

**Plastic or Bioplastic** + **Wood fiber or Natural fiber**

**Enable bio-based plastic use in demanding high-performance applications such as:**
- Transportation
- Construction
- Furniture
- Sport equipment etc.

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**Drives and barriers**

**Drivers**

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### SystemIQ (2022) ReShaping Plastics – Pathways to Circular, Climate Neutral Plastic System in Europe

**Scenario**
- **Base Case (current system, no change)**
  - Virgin fossil plastic use, Mt: 44
  - Actions related to circular economy of plastic materials:
    - The existing regulations (2021) are in force and executed
  - Current Actions Scenario
    - Virgin fossil plastic use, Mt: 37
    - Actions related to circular economy of plastic materials:
      - Reduction & Substitution Scenario
        - Virgin fossil plastic use, Mt: 29
        - Recycling Scenario
          - Virgin fossil plastic use, Mt: 24
          - Recycling Scenario
            - Virgin fossil plastic use, Mt: 20
            - Net-Zero System Change Scenario
              - Virgin fossil plastic use, Mt: 11
              - Net-Zero System Change Scenario
                - Virgin fossil plastic use, Mt: 0

**BARRIERS**

- How to secure volumes sufficient for cost-effective recycling?
- Should there be own EU level recycling labels for biocomposites/bioplastics?
- Is reuse of biocomposite products possible?
- New product innovations for recycled materials?
- Best recycling method for biocomposite/bioplastic – mechanical, chemical, enzymatic?
- How to deal with wide material base in biocomposites in recycling?
- Who will recycle biocomposites and bioplastics – existing or novel companies?
- Best way for biocomposite’s identification from other recycled material streams?

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