Textile recycling. From cotton (glucose) to FDCA (PEF)

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Motivation

Avantium is working on various alternative feedstock options for glucose (to produce FDCA). Currently, the Delfzijl Flagship will use starch (1st generation glucose). In our biorefinery technology DAWN, we aim to produce glucose from the cellulose fraction of wood residues (2nd generation glucose). We also found that cotton from textile waste can be used for glucose production in our DAWN process. As an extra benefit we now also liberate polyester (PET) from mixed waste.

Globally we annually produce 110 million tons of textile waste, of which 24 million tons is cotton.

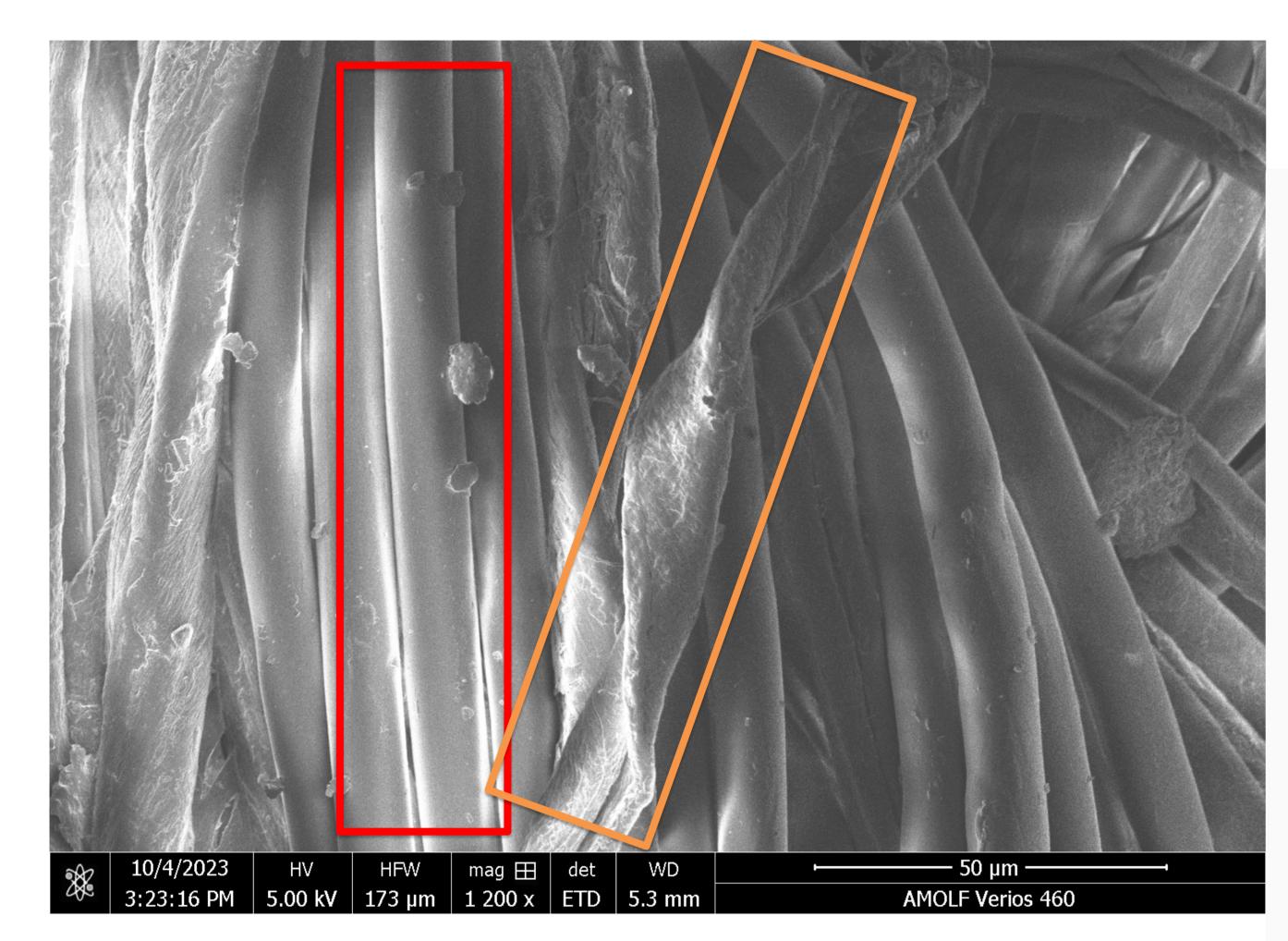


Fig 1: Textile made from polyester (red) and cotton (orange) before hydrolysis.

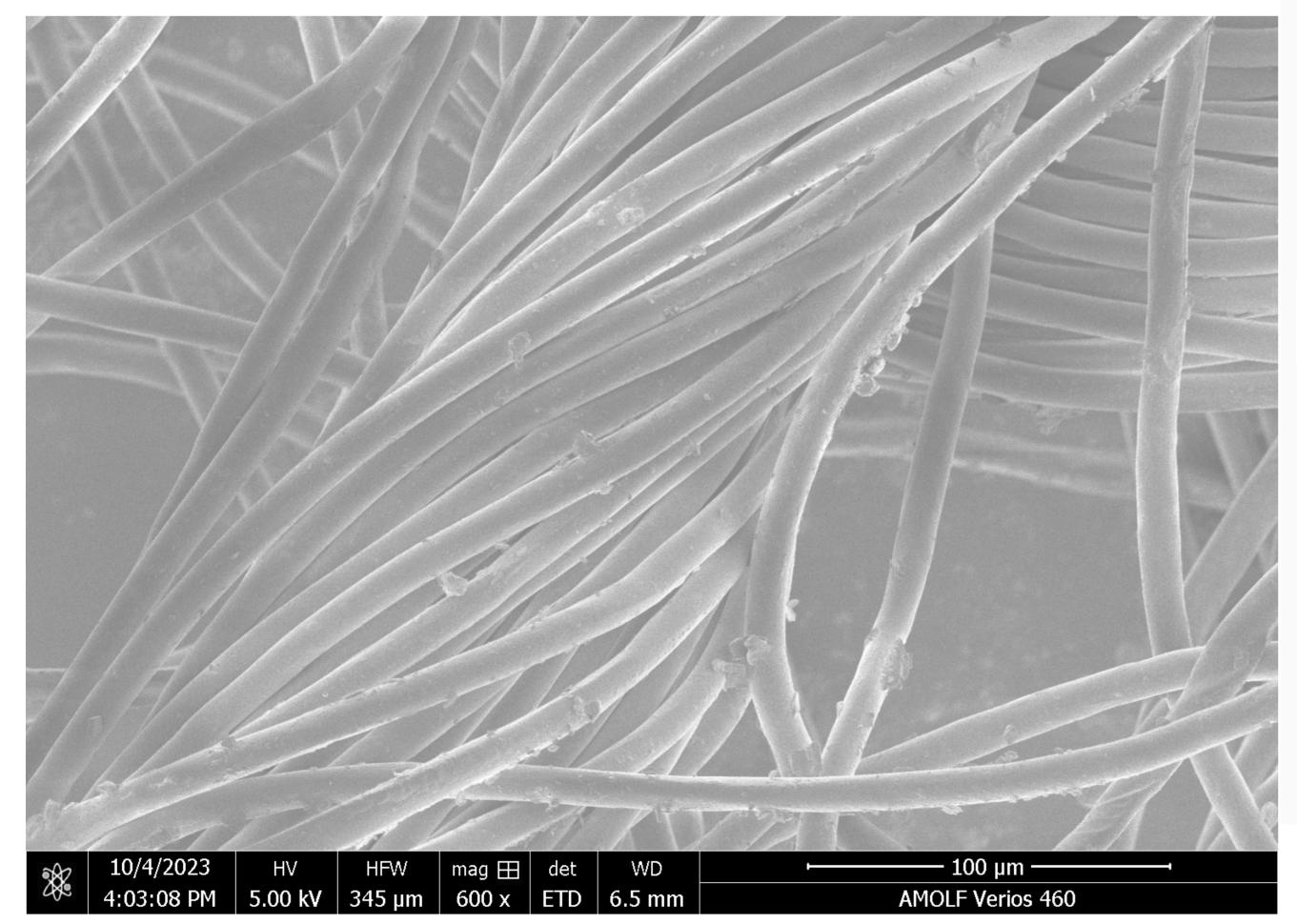


Fig 2: Textile after hydrolysis, only polyester remaining.

Preliminary Findings

- Static cotton hydrolysis:
 - Full cotton removal, up to 850 grams glucose per 1 kg cotton obtained
 - Proof of principle for subsequent PET fibres recycling obtained

Aims

Produce FDCA from the cotton fraction of mixed textile waste. Subsequently, produce rPET from the polyester residue after cotton removal.

Approach

- Two stage production:
 - Static hydrolysis of cotton with highly concentrated acid to glucose
 - Conversion of glucose to FDCA

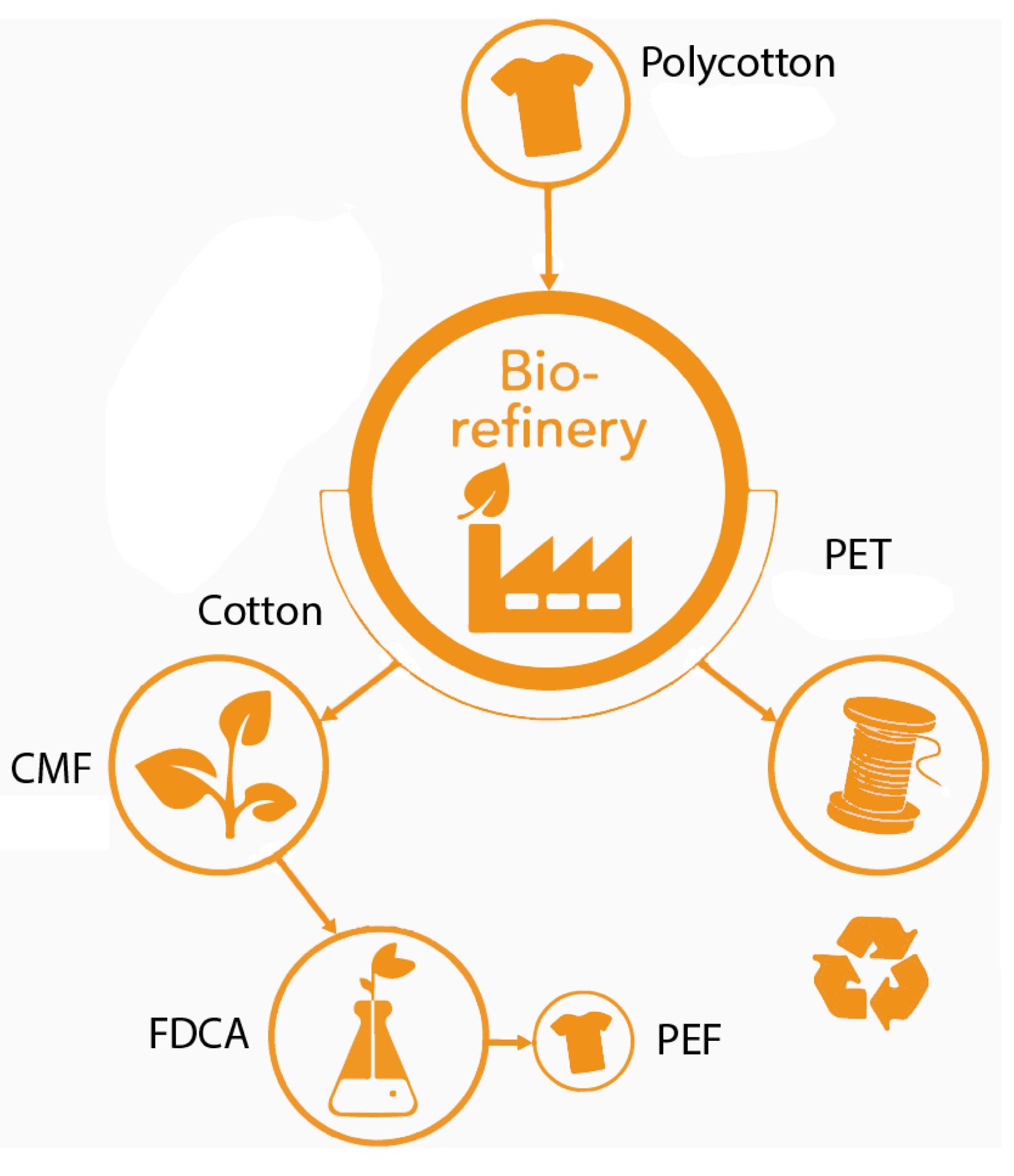


Fig 3: How we produce PEF from cotton.

Future Avenues

- Further optimization of current processes
- Scale up in DAWN pilot plant
- Investigate effect of different textile fibres on glucose recovery rate













