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Process technology development and pyrolysis of building waste

New European Bauhaus event

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Construction and demolition waste

- EU goal by 2020 was to recycle 70 % of construction and demolition waste
- Wood waste in Finland (2018)
  - 3 269 000 tonnes – total
  - 401 000 tonnes – from construction
- Wood waste is barely reused or recycled
  - Over 95% ends up for energy production
  - There is strong demand for efficient solutions to reuse or recycle wood waste

Picture: Annakaisa Elo

Types of wood waste

- Waste and demolition wood is categorized into A-, B-, C- and D –quality
  - A – Contains clean wood such as wood industry side streams and non-chemically treated demolition wood
  - B - Lightly treated wood e.g. lacquered or painted wood
  - C – Lightly contaminated wood containing e.g. increased levels of heavy metals
  - D – Pressure-treated wood – categorized as hazardous waste
- A, B, and part of C –category woods are seen as the most promising for pyrolysis

Pictures: Annakaisa Elo

Pyrolysis in treating wood and demolition waste

- Reusing/recycling waste wood is major challenge across the globe
- Pyrolysis is highly promising technology in treating wood waste efficiently
- Only small proportion of the waste wood can be reused directly
- In pyrolysis, waste wood is treated in high temperatures (350-1000°C) which removes various contaminants
- Majority of waste wood is only lightly contaminated
- Different stakeholders have already shown high preliminary interest towards this concept

Business opportunities

Establishing new business ecosystem around waste wood

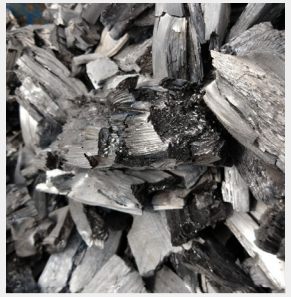
Waste wood

Pyrolysis in static or mobile units

The raw material is heated in the absence of oxygen, producing gas, char and pyrolysis liquid. Pyrolysis is self-sustaining process.

Biochar

Various applications, e.g. soil amendment, water and air filtration.



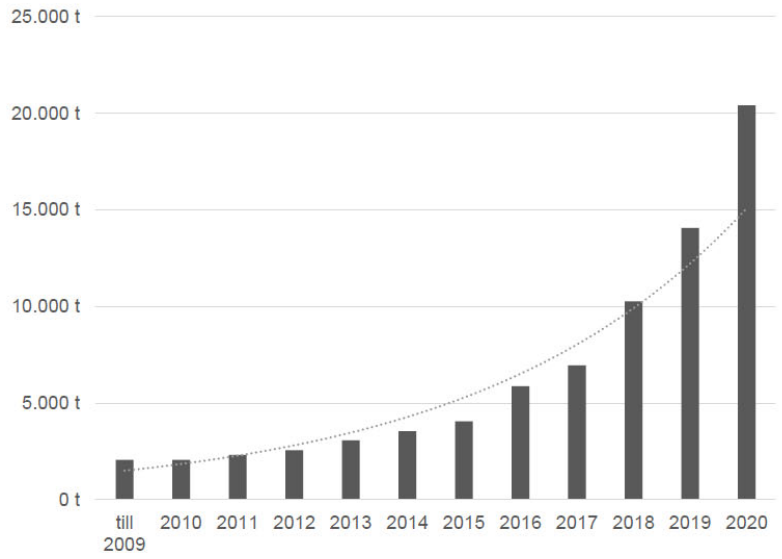
Closing the loop

Positive C cycle can be created as up to 50% of the carbon in waste wood can be retained in biochar instead of released back to the atmosphere.

Non-energy biochar markets

Biochar Market growth until 2020

Cumulative biochar production capacity in Europe



- By **end of 2020** dedicated **production capacity for biochar** was just above **20.000 t**
- **Biochar production in 2020** was approximately **17.000 t**
- The **market is growing** substantially, and even its **growth is growing**
  - Production capacity doubled in only two years from 2018 to 2020
  - Growth rates for cumulative production capacity are increasing:
    5y CAGR was **38%**,
    3y CAGR was even **43%**

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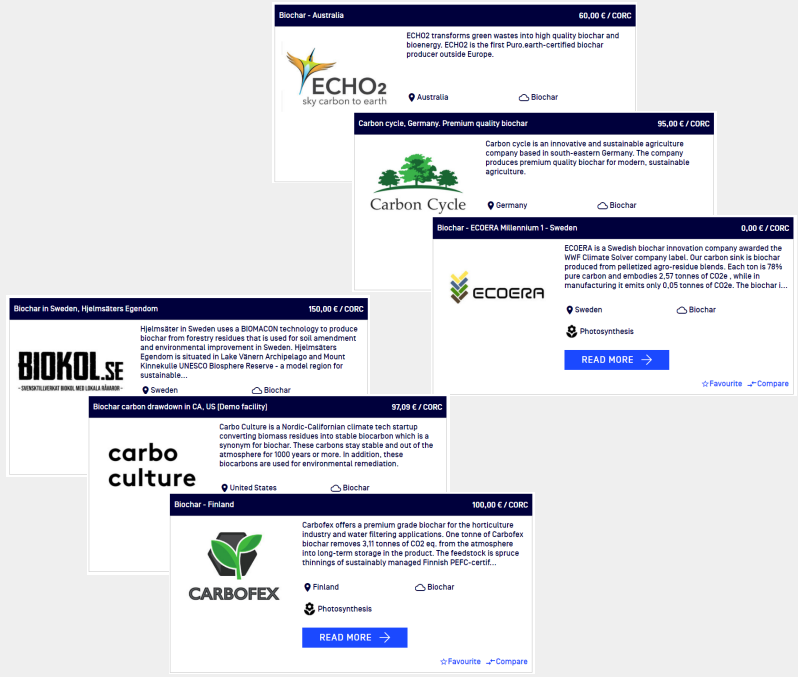
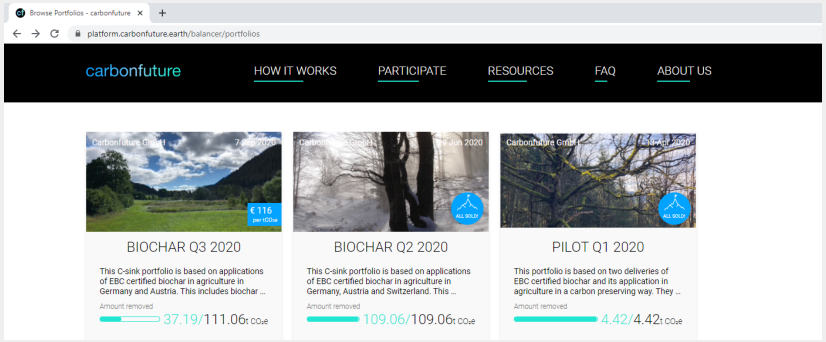
EBI European Biochar Industry

Source: European Biochar Market Report 2020 - https://www.biochar-industry.com/market-overview/

Voluntary Carbon Market (VCM)

- Producing biochar from waste wood can be certified into carbon removal certificates or credits and sold
- Examples of market places:
  - Puro.earth
  - CarbonFuture
- Biochar based carbon removal is highly requested
- Corporations such as Microsoft has purchased and support biochar-based carbon removal
- VCM is highly growing market and essential tool to meet climate goals of Paris agreement
  - Current market size 300M $
  - Estimated to grow 15x by 2030 and 100X by 2050

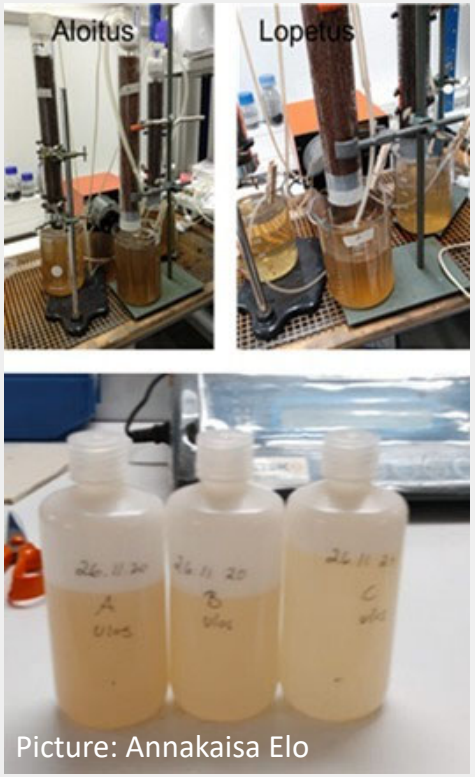




Microsoft carbon removal (pdf): https://query.prod.cms.rt.microsoft.com/cms/api/am/binary/RE4MDlc

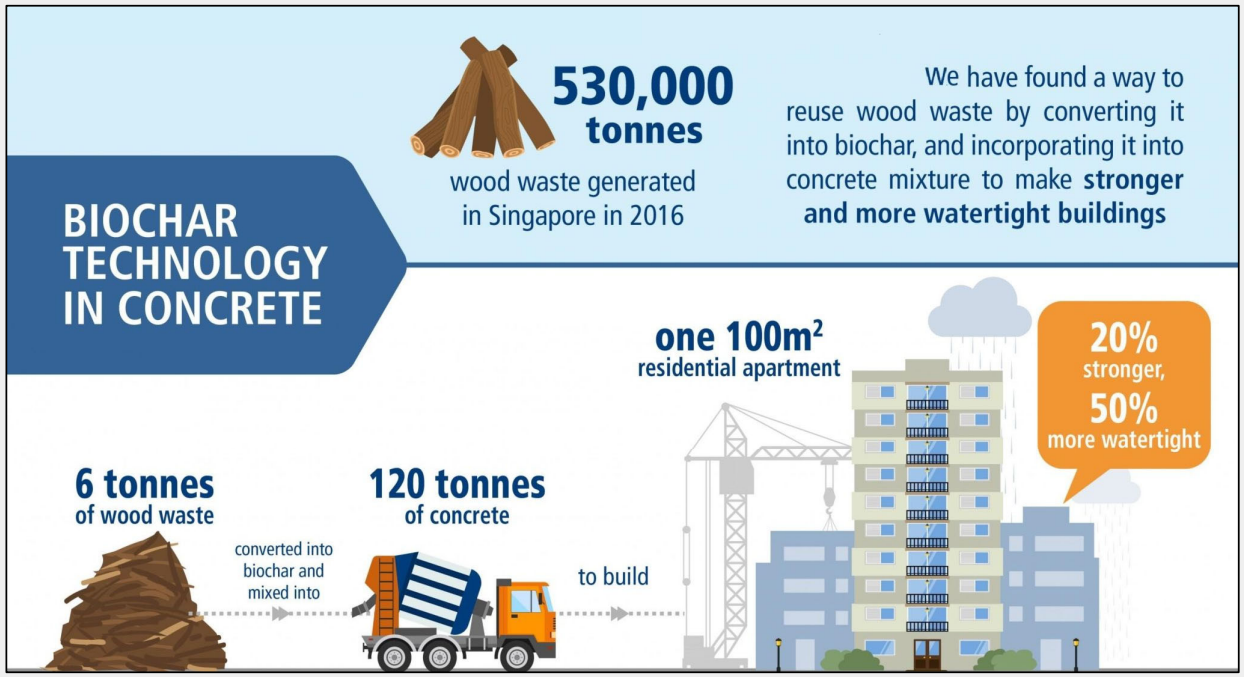
Potential applications for wastewood biochar

- Various potential applications depending on the characteristics, quality and purity of biochar
  - Soil amendment
  - Composting
  - Water filtration



Potential applications for wastewood biochar

- Material uses: concrete, composites, asphalt
  - Safe to use with higher impurity levels



Benefits and impacts

- Waste prevention and EU targets
  - Recycling waste wood and solving the problem
- Going up in waste hierarchy
- Creating new and scalable business opportunities
  - R&D of new technological solutions
  - Production and sales of biochar or activated carbon
- Biochar can be used to solve various environmental problems related to air, water and soil
- Carbon removal - biochar in soil can store carbon for hundreds or thousands of years

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