Vow Green Metals – Europas største biokarbonfabrikk

30 Aug, 2023

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The formula to unlock emissions reduction at industrial scale

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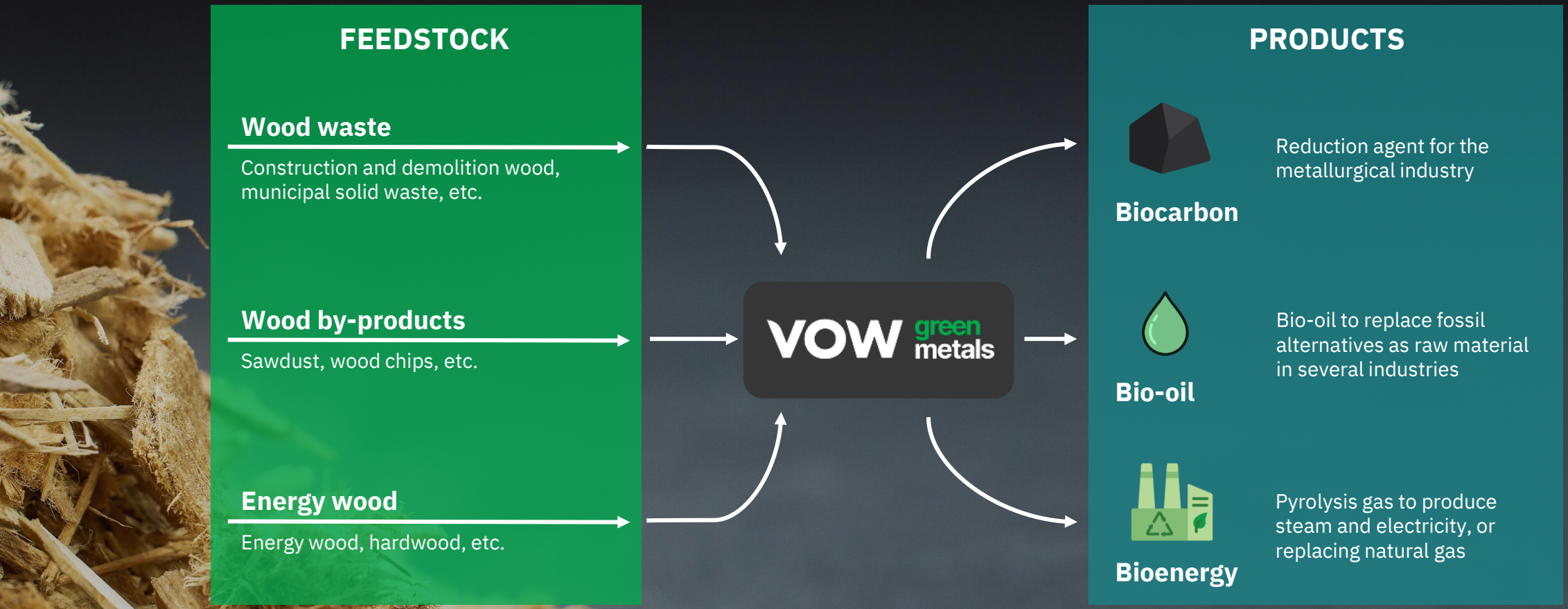
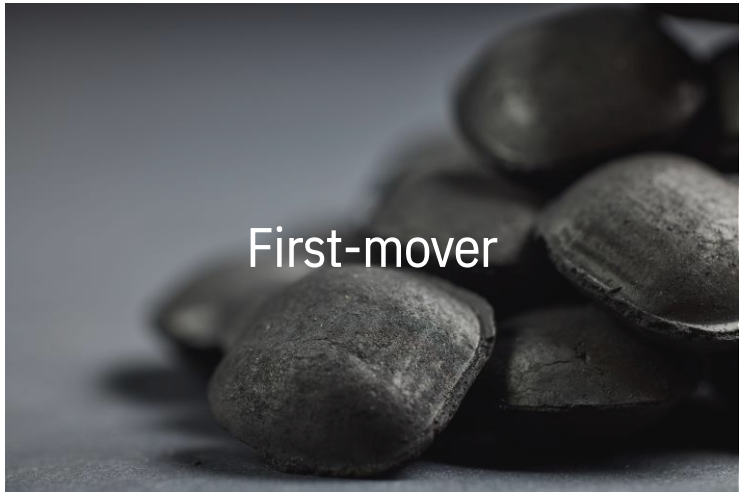
Valorizing biomass and biomass waste streams



Spearheading the development of a rapidly growing biocarbon industry

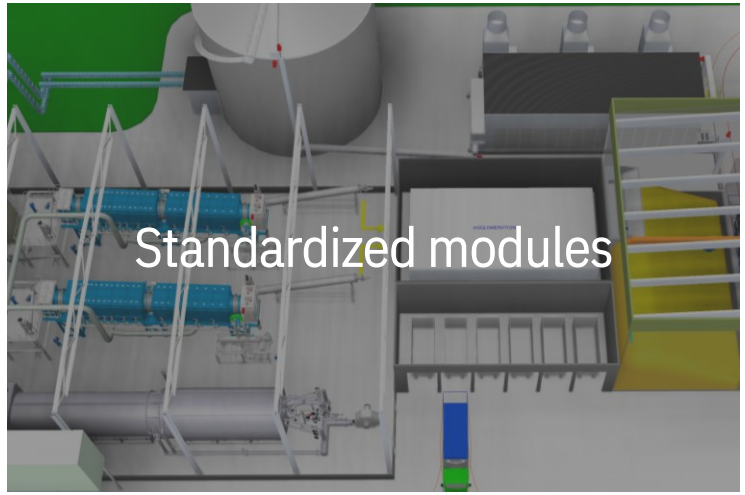
Building a profitable business while meaningfully reducing emissions

Will be a leading producer of advanced biocarbon and other green products enabling low-cost renewable production at scale for metallurgical industry



Market leader in a rapidly growing market

First-mover advantage with growing global pipeline totalling more than 600,000 tons of biocarbon production capacity



Proven technology and standardized factory modules in place

Unique access to proprietary technology with secured IP rights to standardized plant architecture and biocarbon factory modules and

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Breaking ground at Follum – building Europe's largest biocarbon production facility

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Large feedstock potential from Norwegian forest industry; Similar trends in other countries

Potential

15 M fm³

It is possible to harvest approx. 15 M fm³ from Norwegian forests in a sustainable way[1]

Additional potential

~6 M fm³

Branches and treetops are currently left in the forest

Industrial forest harvest

Harvest for energy (firewood)

Currently not harvested

Not utilized biomass

Net export
3.6 M fm³

Harvested forest to industry
11 M fm³

Firewood
1.7 M fm³

Potential harvest
>2 M fm³

Potential feedstock
6 M fm³

Pulp wood
3 M fm³

Wood logs
4.5 M fm³

Energy wood
N/A

P&P industry

Timber (55%)

Residuals (45%)

Energy

Other industries

Potential feedstock
1 M fm³

Divide fm3 by 2.4 to get bone dry tons

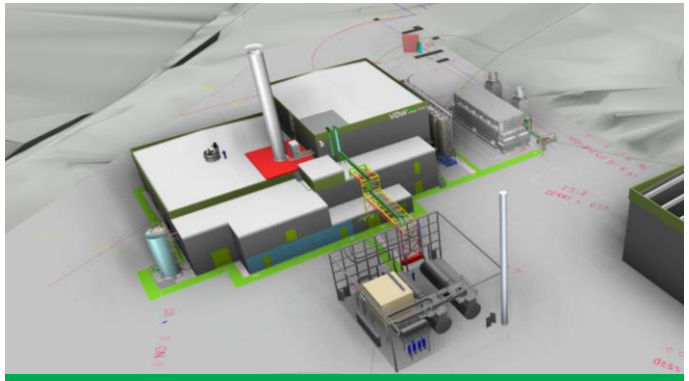
District heating use **1 M fm³** annually, including other wood waste streams)

Current forest industry
End-use
Potential feedstock

Source: 1) Norsk institutt for skog og landskap 2014; 2) SSB 2019 tbl. 03895; 3) Norsk institutt for bioøkonomi 2018

First industrial biocarbon production volumes expected in third quarter this year

Early production line



Follum (phase 1 and 2)

Viken Park

Project data

Capacity: 2,500 tons p.a.
Planned operation: Q3 2023
Location: Hønefoss, Norway
Partners: Vow ASA, Treklyngen industripark

Capacity: 20,000 tons p.a. (10,000 first phase)
Planned operation (phase 1): H2 2024
Planned FID (phase 2): H2 2023
Location: Hønefoss, Norway
Partners: Vow ASA, Vardar Varme, Lindum, Treklyngen industripark

Capacity: 30,000 tons p.a.
Planned FID: 2024
Location: Fredrikstad, Norway
Partners: Vow ASA, Viken Park and unnamed companies at Viken Park

Status update

- Planned commissioning and first biocarbon production starting in Q3 2023
- Providing significant synergies to the Follum project, improving ramp-up, operations and more
- Installation work largely completed
- Three first operators recruited

- Phase 1 progressing as planned with commissioning and first biocarbon mid-2024
- Most process equipment for phase 1 already delivered at site
- Negotiations for civil works and process equipment installation ongoing
- Joint infrastructure project progressing well
- Main study for phase 2 initiated

- Feasibility study completed
- Pre-study for a plant with 30,000 tons of biocarbon production capacity initiated
- Evaluating synergies with other companies to locate at Viken Park

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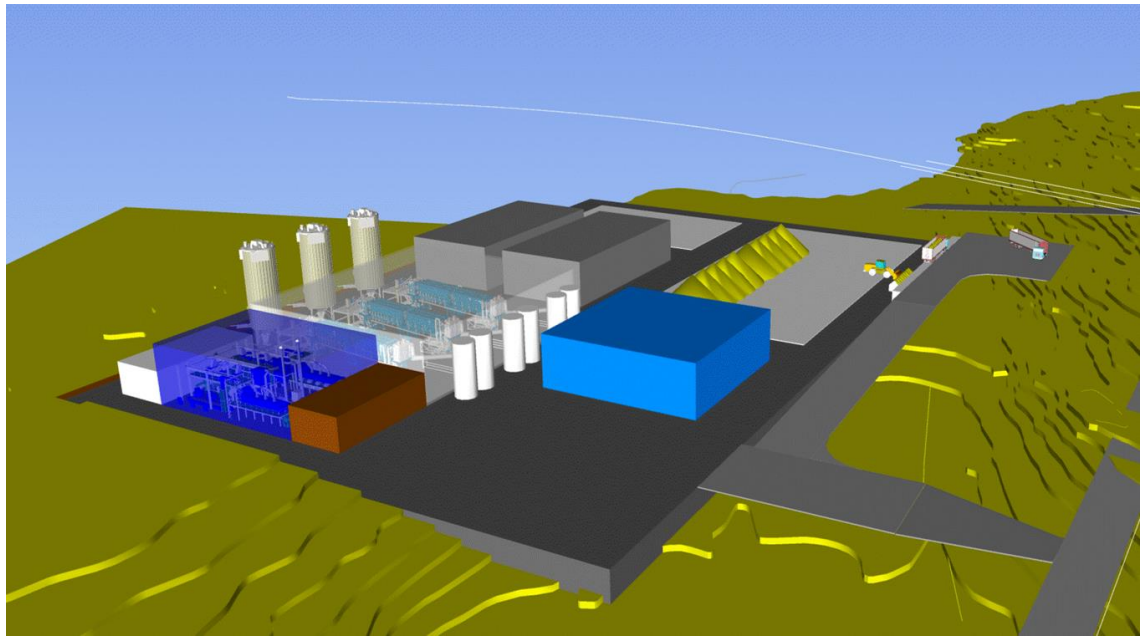
Promising Viken Park project entering pre-study phase

Viken Park industrial area

- Set to become one of the largest and most innovative industrial areas in Europe
- Key focus to optimize industrial symbiosis and energy utilization
- Great logistics with proximity to E6, Borg Harbour and Rolvsøy freight terminal

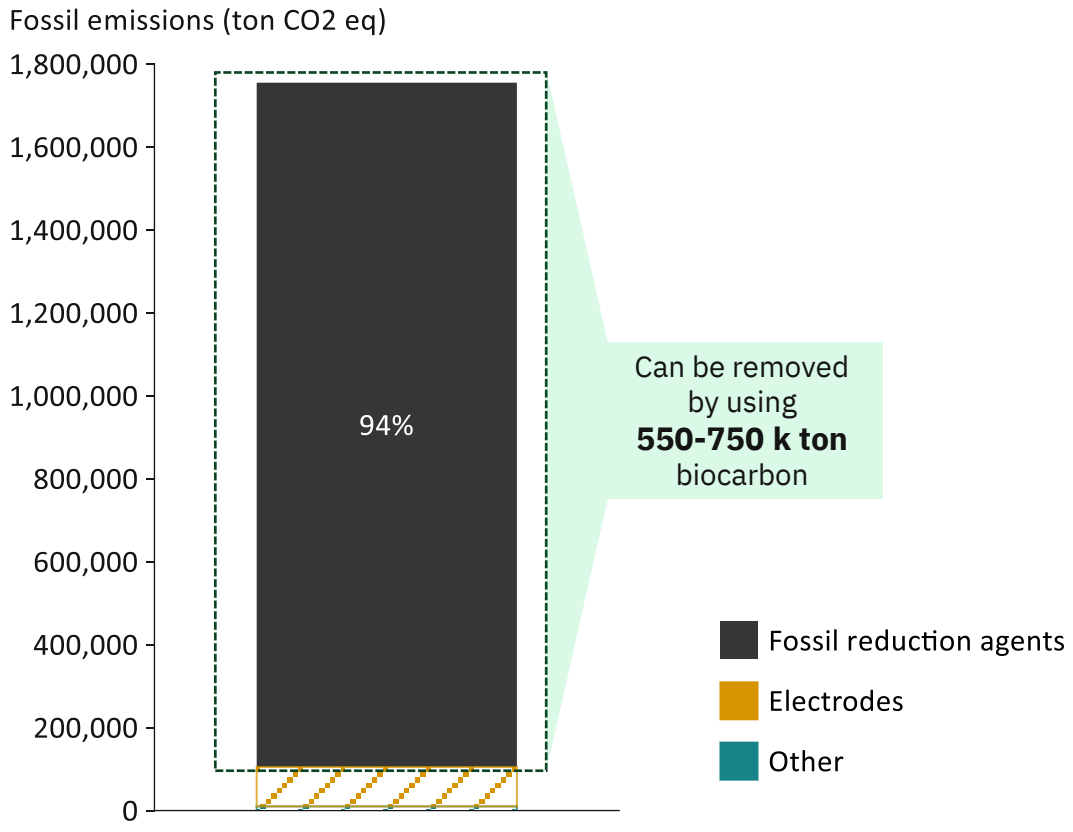
Our concept

- Introducing our first plant concept with a production capacity of 30,000 tons of biocarbon p.a.
- Using the dual energy source C.H. Evensen reactor, provided by Vow
- Excess energy used by adjacent industrial companies
- Pre-study to further map the potential for stable feedstock supply, local energy offtake and industrial synergies



Reduction agents currently account for more than 5% of the CO_2 emissions in Norway

Si and FeSi emissions, Norway



Comments

- Currently, the metallurgical industry is mainly based on fossil reduction materials
- Close to 1 million ton fossil coal and coke used by metal producers in Norway annually
- Biocarbon can directly substitute fossil-based reduction agents
- Hydrogen (H_2) can not replace carbon as a reduction material in the production of FeSi, Si, FeCr, FeMn, Mn, FeSiMn

Source: SpareBank 1 Markets, Miljødirektoratet, SINTEF

The value of reducing emissions is massive – enabling profitable biocarbon at competitive price levels

Using
1
ton biocarbon

›

Replaces
1.3
ton fossil coal

›

Reducing
~5
tons of fossil CO_2 emissions

Note: Assuming 1 ton biocarbon replaces 1.36 ton fossil coal (75% and 55% fixed carbon respectively)

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Key take away’s

Biocarbon er en helt sentral del av løsningen på klimautfordringene

Vi ser etter flere steder å bygge nye fabrikker

Vi må være gjerrigere på råstoffet

Mye norsk trevikre blir i dag fraktet langt for så å brennes – når det kan resirkuleres, skapes en ny industry og samtidig gi en hel næring et enormt konkurransefortrinn

Vi trenger alle gode krefter

Støtteordninger som hensyntar innovasjon og skalering

Fleksible partnere som tør å sates

Offentlig og privat kapital som vil sates på en helt ny grønn industri

Og ikke minst forutsigbare prosesser!

FORGING A NEW ERA FOR THE METALLURGICAL INDUSTRY

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