

BIOCARBON – A KEY DECARBONIZATION TOOL

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Envigas

Providing the missing piece of the fossil-free equation

First large-scale producer of high-quality biocarbon

- Swedish biocarbon solutions provider driving the industrial shift from fossil coal to biocarbon.
- Deliveries for 5+ years for tests and trials to the European steel industry.

Part of the green industrial transition in northern Sweden

- First planned large scale blueprint facility in Bureå, outside Skellefteå, Sweden, fully operational by 2026.

Driving change through smart technology and strategic collaboration

- Extensive research combined with in-depth expertise to maximize the value creation of biocarbon and its by-products.
- In 2023, Envigas entered into a strategic partnership with Outokumpu.

Solutions-thinking at the core

- Optimizing biocarbon and its by-products for high-value use to deliver customized high-quality solutions.

350 000

By 2030, the Nordic market for fossil-free steel will require a minimum of 350 000 tons of biocarbon annually

150 000

By 2030, Envigas aims to produce 150 000 tons of biocarbon annually

50%

Outokumpu has secured 50% of our 1:st scale up production volumes in a long-term supply agreement.



Biocarbon – nothing is new



Routes to decarbonization for steel industry



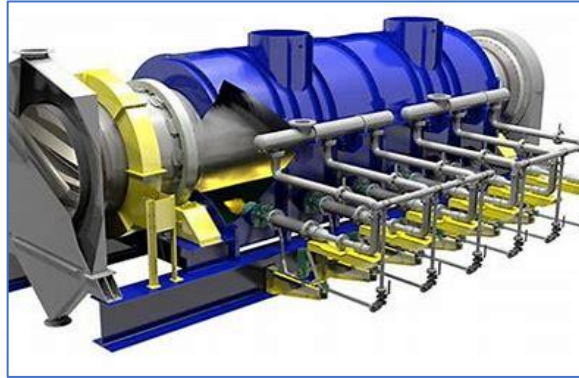
Quality aspects- biocarbon

- Tested in most applications in small scale – check!
- Large scale trials in some applications – takes time
- No standard definitions in place
- High Q requirements – higher cost
- Can be implemented step by step

Key prerequisites for large scale to happen



Secure raw material



Technology - concept



Offtake agreements



Time-timing-urgency



Permits



Guidelines for safe handling, transportation and storage



Funding

Secure raw material

- European forests - the solution to everything in combating climate change
- Dependence on supporting legislation
- Biomass residuals will be a scarce resource
- Biomass will never be cheap – at scale
- Use the biomass smart – cascading principle
- Value chain integration
- Biomass owners wants to be part of the green transition

Permits

- Time consuming
- New application for authorities



Technology – concept

- High temperature pyrolysis concept- no references at scale
- Equipment suppliers, no full turn key alternatives
- First large scale concepts has to be designed with redundancy – means higher CAPEX. Technology risks not accepted.
- Redundancy is key!
- Value chain integration enabling efficiency and cost ramp down.



Offtake agreements

- 75-100% of volume covered by bankable offtake agreements to enable project financing (steel industry independent projects)
- Valid for both biocarbon as well as side streams (Oil, heat etc.)
- Complex processes
- Tenure of agreement to correlate with payback time of project
- Risk sharing in price model.



Guidelines for safe handling, transportation and storage

- Risk mitigation during handling, transport and storage of biocarbon
- Customer confidence in the use of biocarbon as a replacement or supplement for fossil coal
- Optimize logistics with the most cost-effective methods for transport and storage
- Determine the most suitable transport terms and conditions between supplier and customer
- Develop appropriate specifications and formats for biocarbon based on current regulations or industry specific guidelines for transport by truck, train or sea vessel
- Establish guidelines for managing any health risks or inconveniences regarding the work environment when handling biocarbon



Funding

- Derisk – derisk – derisk !
- Equity – grants – loans
- To get all pieces in place – Catch 22 situations



Time – timing

- Industry targets set towards 2030
- 2024, long time to 2030, or?
- Building of a new industry takes time
- Decision processes
- No time to lose – We have to start now!



Value chain risks for scaling to materialize

- Resistance to change
- Governance models not supporting necessary change
- Fear of risk
- Lack of redundancy
- Shortage of raw material
- Unclear political landscape concerning the Green transition



Concluding message to the steel industry

- Use all available tools in the toolbox
- Accept that the transition has a price tag.
Alternative is even worse
- Plan large scale tests asap
- Secure your place in the queue
– sign LOI:s or offtakes
- Do not wait – start now! 2030 is very soon!



Thank you!

