Press release

The SkyClean Scale-up project receives DKK 124 million grant

Odense, 28 June 2022.

Stiesdal SkyClean A/S, together with a number of partners, has received a grant of DKK 124 million for the SkyClean Scale-up project. The project aims to develop pyrolysis into an efficient and economical climate technology for Danish agriculture.

The funds are distributed by the Danish Energy Agency from a special climate initiative, adopted in the Finance Act for 2021. The purpose is to promote technologies with great potential to reduce greenhouse gas emissions in agriculture.

“The grant means that we and our partners can demonstrate the pyrolysis technology on a commercial scale. We will now test and document many aspects of the technology and the overall value chain in practice. It is a big step forward. In a time of enormous challenges, we owe the government and a broad coalition of MPs in the Danish parliament a big thanks for setting funds aside to accelerate the development of pyrolysis technology," says Henrik Stiesdal, CEO of Stiesdal A/S.

The first large-scale SkyClean plant to be built in Vrå
The core of the SkyClean Scale-up project is the pyrolysis technology itself and the upscaling of a pyrolysis plant to industrial and commercial size.

The majority of the project funds have been set aside for the construction of a 20 MW SkyClean pyrolysis plant at the BB Bioenergy biogas plant in Vrå in North Denmark. The largest SkyClean plant to date has an output of 2 MW, so the new plant will have a capacity that is ten times larger.

The SkyClean plant in Vrå will be able to process 40,000 tons of residual fibers from the biogas plant annually. It will be able to produce 14,000 tons of biochar and a large amount of green gas. The production of biochar alone corresponds to approx. 26,000 tons of CO_2 removed from the atmosphere.

“The grant means that we can continue the very high development pace that we have had with the development of our two current test plants of 200 kW and 2 MW, respectively. Now we can scale up times ten and together with our project partners make pyrolysis a well-described and well-documented climate technology", says Peder Riis Nickelsen, CEO of Stiesdal SkyClean A/S, a subsidiary of Stiesdal A/S.

In addition to Stiesdal SkyClean, 14 other partners are participating in the project.

Project perspectives
The SkyClean Scale-up project focus is on the production of biochar, which removes CO_2 from the air, as well as on the production of advanced biofuels.

The project will provide the basis for an expansion of pyrolysis in Denmark. With approx. 100 similar size plants, an annual reduction in greenhouse gas emissions from the Danish agricultural sector of at least 2 million tons of CO_2 can be achieved by 2030. In addition, the

green fuels from pyrolysis production will displace fossil fuels corresponding to an annual reduction in Danish greenhouse gas emissions in 2030 of at least 1.6 million tons of CO_2.

Appendix: Factsheet on SkyClean Scale-up.

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Fact Sheet on the SkyClean Scale-up project

Project facts: SkyClean Scale-up will run for three and a half years and has been awarded DKK 124 million in state funds.

The purpose of the project: To build the first 20 MW SkyClean pyrolysis plant and to initiate the relevant changes that are necessary to make pyrolysis-based carbon sequestration an efficient and essential climate technology for Danish agriculture.

Applicants: The project has a total of 15 participating partners: Stiesdal SkyClean, BB Bioenergy, KK Wind Solutions, Aktive Energianlæg, Topsoe, Vestjyllands Andel, SEGES, DTU Kemiteknik, DTU Construct, Roskilde University Center, University of Copenhagen / Plan and Environment, Aarhus University / Environmental Science, Aarhus University / Agro, Energy Cluster Denmark, Food & Bio Cluster.

Project content: SkyClean Scale-up focuses on establishing and demonstrating the entire biochar value chain. The project will validate the value of biochar as CO_2 sink and soil improver and also focus on the conversion of pyrolysis gas to advanced fuels. The project contains a total of 12 work packages:

- Project management
- Detailed design and construction of the first full-scale SkyClean prototype plant
- Construction, commissioning and test operation of full-scale SkyClean prototype systems
- Process optimization and simplification
- Optimized design and construction of 0-series production-ready SkyClean systems
- Biochar production, raw material testing and traceability
- Demonstration of pure syngas for biofuels
- Handling, logistics and pelleting
- Quality assessment and assurance of biochar
- Assessment of climate impact and environmental effects of the produced biochar
- National field trials and agricultural end-user engagement
- Stakeholder engagement

Location of 20 MW SkyClean plant: The new plant will be established in connection with the existing biogas plant BB Bioenergi in Vrå. The biogas plant will be expanded with a new building, which will house the SkyClean plant and facilities for drying and pelletizing residual fibers from the biogas plant.

How SkyClean works: In the SkyClean pyrolysis process, organic waste from agriculture is converted into biochar and gas. This is done by heating to a high temperature in a special oven.

Dry plant material typically contains approx. 50% carbon that the plants have extracted from the atmosphere in the form of CO_2. In the pyrolysis process, half of the carbon in the plant waste is converted to biochar, while the other half is turned into gas. Upon cooling, part of the gas becomes bio-oil, while the rest remains in gaseous form.

Biochar is a stable material that only decomposes very slowly, and the half of the carbon that becomes biochar is thus effectively removed from the atmosphere.

The gas can be used as fuel in heat supply and in industry, and the oil can be refined into fuel for the transport sector. Both the gas and the oil can also be further processed into PtX solutions, e.g. for aviation fuel.