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CURRENT PRESS RELEASE

Discover Fibers^{365} - A Carbon Negative, Truly Circular Fiber World

The Fibers^{365} concept is based on a unique, state of the art process to provide functional, carbon negative, competitive non wood biomass products such as virgin fibers for paper and packaging purposes as well as high value energy, biopolymer and fertilizer side streams. The products are extracted from the stems of annual food plants such as straw by a chemical-free, regional, farm level steam explosion pulping technology, allowing to easily separate fibers from sugars, lignin, organic acid and minerals.

The use of annual plants for paper & packaging fibers, biopolymers and relevant process energy instead of wood-based biomass accelerates the recapture of biogenic CO_2 emissions significantly. All pulped natural fibers – and this is true for virgin fiber as well as recycled fiber - will release CO_2 in proportion to their original carbon content during their initial processing and final consumption. Processing typically includes partial incineration for electrical power and heat generation. Final consumption includes incineration or composting, independently of the frequency of reuse in recycling loops (on average 5 to 7 times).

In the case of annual plants, such CO_2 emissions are recaptured within 12 months from their production date, offering "instant", yearly compensation of corresponding emissions. Compared to this, packaging material from fossil resources are never compensated. And even a choice of wood pulp comes at a significant ecological short-term cost: recapturing biogenic emissions from wood biomass will take from 7 years (in the tropics) up to at least 60 years (in continental climates), not even considering other aspects like bio-diversity loss, significant extrinsic process energy needs, soil depletion, long distance transports using fossil fuel sources and other negative aspects of monoculture plantations often associated with virgin wood fiber.

Straw - as a prominent example for a regional and economical feedstock for annual fibers - is a by-product of food production and widely available (e.g., in Germany approximately 15 million tons). However, it is typically commercialized only in small percentages (e.g., in Germany only about 17 % of total volume). The main reason for this is of course the importance of such residual wastes for soil fertility. Other negative aspects are supply chain issues like storage, light weight environmental and economical transport cost, seasonality and fragmentation of supply. In order to make biomass from annual plants truly competitive (from an economical as well as an environmental reference point), it is necessary to address these points. We achieve this

- by decentralizing production on farm (biogas plant) level
- through state-of-the-art modular technology,
- chemical free, non-polluting, steam explosion processing,

- allowing a managed return of purely biological residuals after fiber, bioenergy and side fraction extraction to the original fields with minimal logistical effort, thereby closing the nutrient soil fertility loop
- permitting regional value creation in partnership with agricultural producers in an alignment of interests
- avoiding the supply chain, CAPEX and OPEX issues of competing, large scale industrial annual biomass plants
- minimal environmental impact of processing.

A direct comparison illustrates the carbon negative balance of the Fibers[365] concept regarding Co2 within a one-year regrowth period. A ton of processed, steam exploded virgin fibers[365] requires approximately 925 kWh* heat and electrical energy per ton final product. The remaining liquid phase of the biomass feedstock allows the production of 1160 kWh bioenergy*, producing more energy than required in the process. (*proofed and demonstrable through existing Fibers[365] Steam Fiber Units)

In comparison, wood pulp requires on average at least 3750 kWh* per ton of virgin wood pulp, only approximately 3120 kWh of which come from intrinsic, long term biogenic energy sources (through incineration of biomass and not considering consumed process chemicals), requiring still on average 17 % of extrinsic, carbon positive energy. Recycled pulp requires on average 444 kWh* per ton, mostly from extrinsic, carbon positive energy sources and not considering a "fair share" of the initial processing cost of virgin fiber.
("CO2-Verminderung im Papiergewerbe" by ffe gmbh, 2018)

The modular Fibers[365] process technology has been commercialized and proofed in a number of locations. A typical Fibers[365] Steam Fiber Unit may process between ten to thirty thousands ton of biomass per year, depending on regional biomass availability and existing supply chains.

Good paper qualities from fibers[365] are being produced in an industrial scale in a combination with up to 70 % fibers[365] with 30 % wood pulp in paper grammages from 80 to 600 gsm. The papers allow multiple paper packaging applications and satisfy functional requirements for packaging papers re rigidity, tear strength, cutting, barrier coating demands, machine time etc.

Finally, Fibers[365] is not only advantageous from an environmental and technical perspective. Due to the cascade utilization of annual biomass for various end uses (food, fiber, bioenergy, biopolymers, fertilizers) and relevant contribution margins, full production economical costs (Capex, Opex) of processed fibers[365] are already competitive to virgin fiber wood pulp, permitting to hope for wide spread adaption of the Fibers365 concept even in a market defined by low prices for recycled fibers.

The process also works with other fiber crops such as hemp, flax, bagasse, miscanthus, empty fruit bunch, cotton, banana stems, kenaf and others, without the logistical complexity of large scale industrial biomass plants. This allows regional, decentralized biomass refining and value creation at farm level anywhere in the world.

The Fibers365 concept

- **produces functional fibers and higher bioenergy output from annual biomass and allows for high value, unpolluted biopolymer (lignin and other) side fractions**
- **is carbon negative in production and consumption, considering a one year life cycle from production to final consumption and regrowth of the pulped biomass**
- **requires less processing energy than the bioenergy intrinsic to the pulped biomass**
- **supports soil fertility in a truly circular approach on site**
- **does not compete with food production**
- **allows value creation on farm (biogas plant) level**
- **is free of chemical treatment and chemical side streams requiring incineration**
- **solves common supply chain issues for biomass from annual plants through its easy integration in an existing infrastructure at reduced Capex.**

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