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WBA webinar – pretreatment of biomass

February 2022

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AST Biomass concept

Grass, straw and agro residues as biogas substrate

Degassed bio-fiber for substrate and fertilizer products with added value

Circular Bio-economy & Partnerships

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AST Mixer, cutter & Grinder for effective pre-treament of biomass to biogas

(Patent granded)

Technology for pretreatment of straw and other hard to handle types of biomass to be used as biogas substrate

Biomass or mix of biomass to be pretreated

- Wet or compromised straw - loose or in balles
- Straw collected after use as winter protection in carrot production
- Horse manure
- Chicken manure
- Grass - loose or wrapped
- Deep bedding - cattle and pig production
- Dry and dusty residuals from treatment of cereals

AST mixer, cutter & grinder – stationary plant

Equipments and flow

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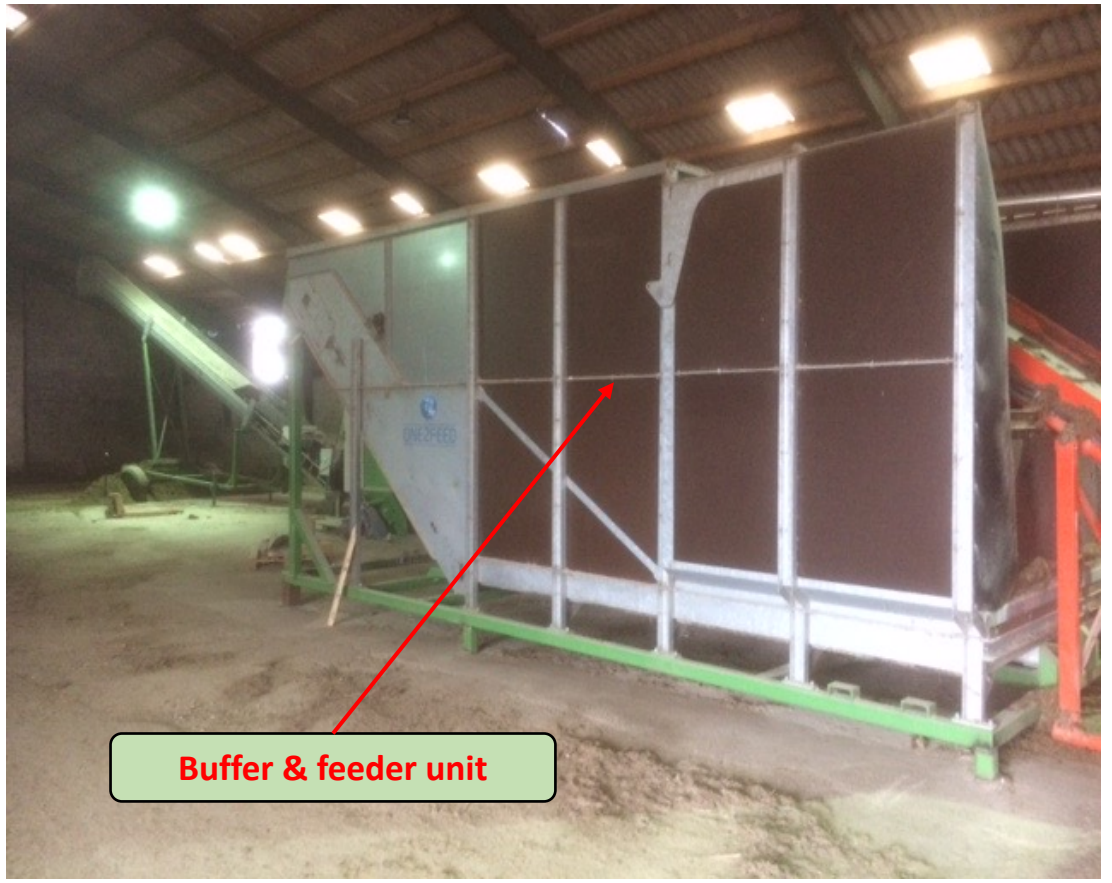
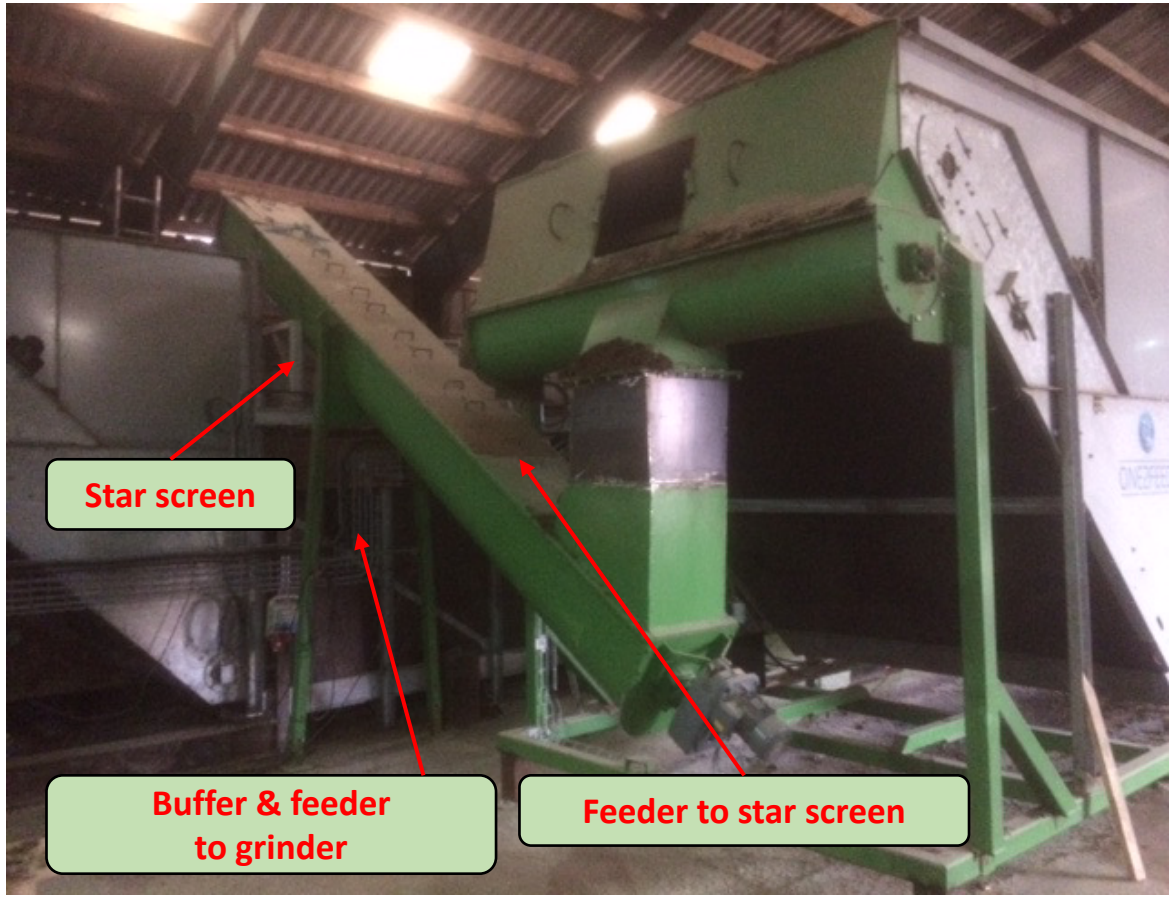
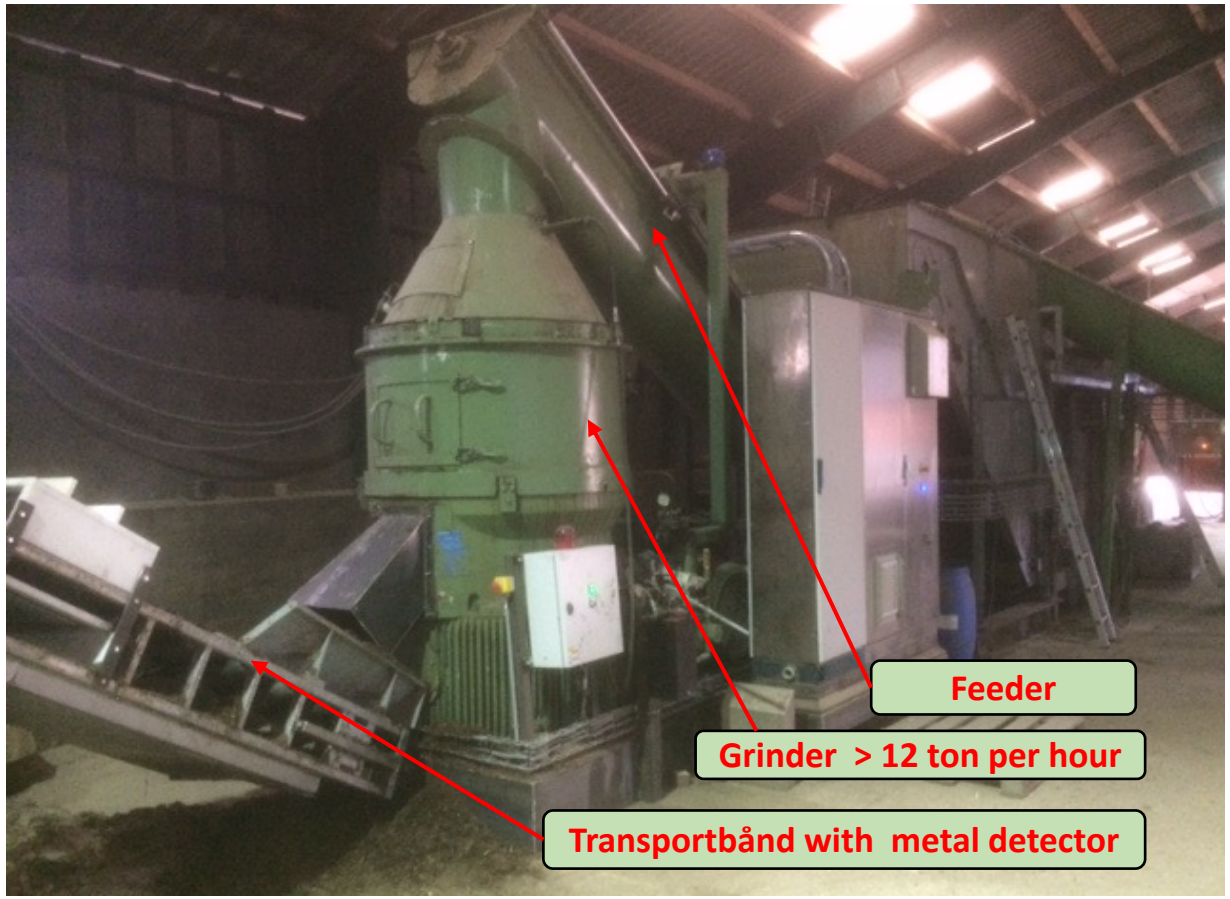


Biomass is added to mixer & cutter in batches
7 ton/batch, 2 batch per hour

From mixer & cutter the biomass is transferred to buffer % feeder unit





Biomass from buffer is add to star screen – elimination of stones, metal piesces and similar – to buffer & feeder to grinder

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Biomass is added to grinder with feeder and from grinder with band conveyor to temporary store/ direct loading in walking floor trailer

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What´s in it

Biogas substrate:

- Utilization of hard to handle biomass and residues
- Utilization of low value biomass
- More value per truck load and less transport
- Easy to handle
- More biogas +25% per ton VS
- Biogas comes faster
- shorter retention time
- Increased capacity on existing plants

Experiences, effect, investment & operation

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Movable plant in operation August 2018
Biomass pretreated on location in Gram

by September 2019	13850 ton
Average % TS (dry matter)	57,8 %
Average % VS (volatile solids) of TS	81,5 %
Gas potential in CH_4 per ton VS	265-285 m^3

December 2019 moved to DBG in Nibe
Pretreated biomass

by end July 2020	10057ton
Average % TS	57,5 %
Average % VS of TS	85,6 %
Gas potential in CH_4 per ton VS	260-290 m^3

Rebuild as stationary plant in Autumn 2020
Pretreatment capacity per shift

Expected per year	20000 ton
Average % TS	55 %
Average % VS of TS	85 %
Gas potential in CH_4 per ton VS	275 m^3

Effect of pretreatment - increase in gas production

per ton VS	25%
Value per m^3 CH_4	5,0 Dkk

Pretreated biomass – added value per ton 129 Dkk
In total 1,8 mio Dkk

Pretreated biomass - added value per ton 135 Dkk
In total 1,3 mio Dkk

Pretreated biomass – added value per ton 130 Dkk
In total 2,6 mio Dkk

Investment, operation, reparation and maintenance

Investment in mixer, cutter & grinder as stationary plant with 12 ton capacity per hour at 55% TS :
is of excl. VAT: 7,2 mio Dkk

Lifetime in full load hours	20000
Depreciation per hour	360 Dkk
Depreciation per ton	30 Dkk

Operation is done by 1 man and 1 loader per shift incl handling of biomass and loading of grinded biomass on truck.
Cost incl. depreciation on loader is per ton 30 Dkk

Electricity ~ 11 Kwh/ton	7 Dkk
Rep + maintenance per ton	25 kr

AST N-steamer

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N-steamer for treatment of grinded wet straw and similar low value agro residuals.

N-steam from drying of degassed biofiber or from N-stripning on reject liquid from separation on degas-sed biomass is sucked thru the biomass in a continius flow (patent granded).

Experiences

Test-plant: Foulum Biogas – 2017-18
Demo-plant: Foulum Biogas – 2019-20

Commerciel plant - 2 units in parallel -
installed at DBG Autumn 2021
Investment excl. VAT: 1,5 mio Dkk
Capacity per hour 3,0 ton

Effect on CH_4 output

Depending on ppm ammonia in the N-steam and retention time in N-steamer can be expected 15 to 25% increase in biogas output ~ 35 – 60 m^3 CH_4 per ton VS in the grinded and N-steamet biomass

Key management

Name: Peter Damgaard Nielsen
Position: CEO and partner
Background: Master of Science in Business Administration (M.Sc.)
Key role: Making the most of the AST technologies - bring it into practical use

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Name: Svend Hoff
Position: Director and partner
Background: Agricultural Engineer (B.Sc)
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Key role: Innovation and development, implementation of new technologies, cross border cooperation, project development and execution
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