

WBA webinar 23rd May 2023

“Theme: Feedstock Conversion to Pellets and Briquettes”



Agenda

Short company presentation

How to convert waste wood to something valuable

- customer case: Carl Hansen, Denmark
- customer case: Lilleheden, Denmark

Using briquetted straw to speed up biogas production

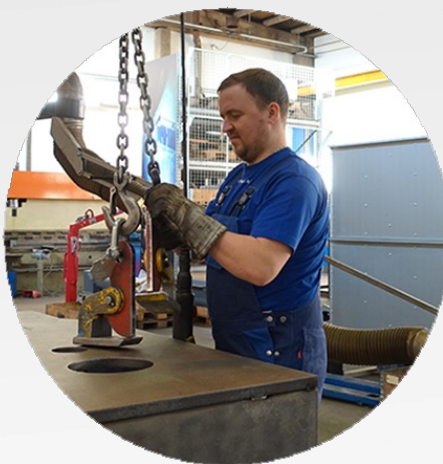
- principle
- set up a straw briquette production site.

C.F. Nielsen Timeline

- 1889: Founded by Carl Frederik Nielsen
- 1940s: The first briquetting press is designed
- 1974: New factory in Bælum
- 1998: After 100 years of being a family owned company, the company is sold to Henning M. Larsen.
- 2007: Mogens Slot Knudsen becomes shareholder and Managing Director
- 2008: Bogma AB is acquired
- 2014: Celebrates its 125th anniversary
- 2016: CFN Engineering is established
- 2016: Introduces the Star Press – the worldst largest briquetting press
- 2017: BPE Shimada Extrusion Press is acquired
- 2018: RUF Briquetting Systems, Germany acquires C.F. Nielsen A/S
- 2019: As of December 1st 2019, Jesper Stecher Madsen replaces Mogens Slot Knudsen as the new Managing Director of C.F. Nielsen A/S



The Company – The People



We produce the essential/vital parts ourselves to maintain a high quality level and flexibility as well as quick delivery.

The Company – The People



All R&D and Engineering is done by ourselves including our state of the art Control Systems. Many briquetting plants are customized based on agreements with our customers.

Briquettes



What raw material do we process?

Wood



Softwood



Hardwood

Agriculture



Straw



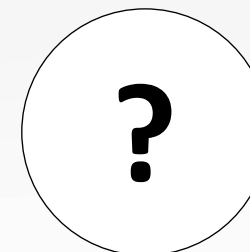
Rice Husk



Coffee Husk



Bagasse

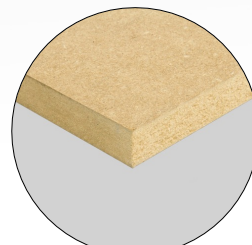


And more ...

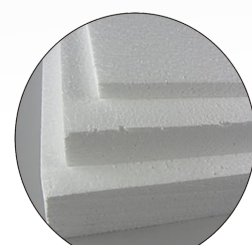
Other



Paper



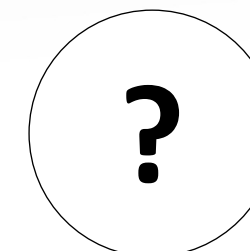
MDF



Foam



RDF



And more ...

Briquetting Technologies

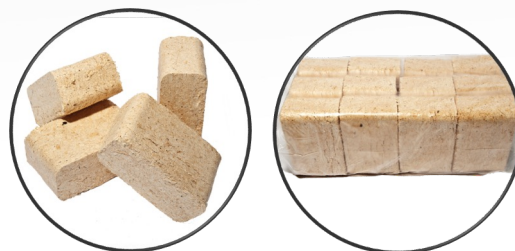
BP Mechanical Press

Capacities: From 200 to 3.500 kg/h
Size: Round/Square Ø40 to Ø120 mm
Moisture content: Industry: 6 – 16%
Consumer: 8 – 12%
Density: 1,0 - 1,2
Low production costs
Good sales price on briquettes



Hydraulic Press

Capacity: 30 - 1500 kg/h
Size: Rectangular 150x60 mm
Moisture content: 6 – 16%
Density: < 1,0
Low production costs, easy to install
Lower sales price on briquettes



BPE Shimada - Extrusion

Capacity: 500 kg/h
Size: Square 55x55, 65x65 mm
Moisture content: 6 – 8%
Smaller particles
Density: up to 1,4
High sales price on briquettes



Briquetting in general

Mechanical Presses (CFN main products)

The construction of the mechanical briquetting press is equal to the construction of an eccentric press.

A constantly rotating eccentric is connected to a press piston, that is compressing the raw material into a conical compression die.



- Larger initial investment
- High density (-> 1,2t/m³)
- High capacity

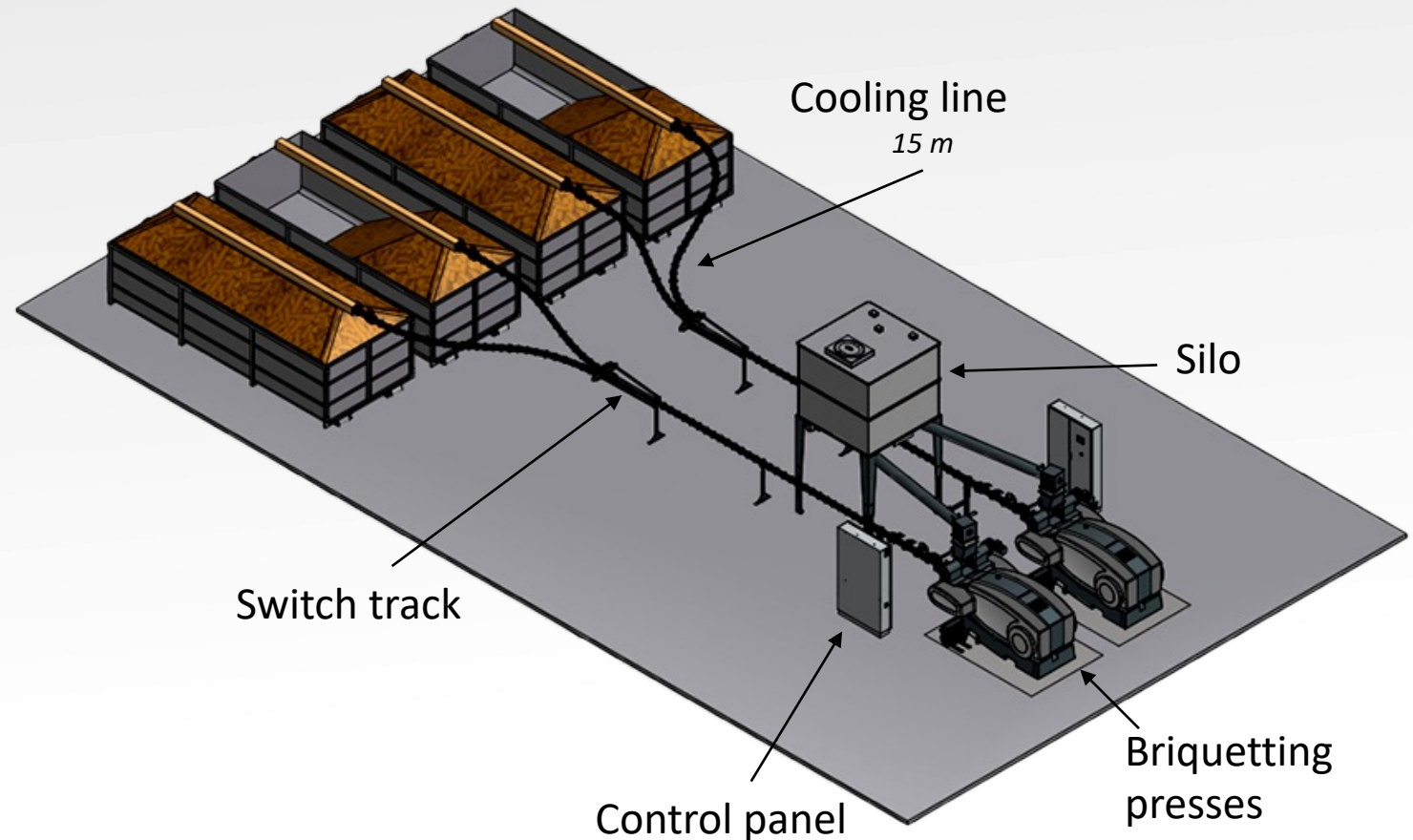
Model	Main motor	Briquette size	Capacity industry*	Capacity consumer*
BP2010	18,5kW	50	150-250	-
BP2510	22kW	50	250-350	-
BP3200	22kW	60	400-600	-
BP4000	30kW	60	500-700	500-650
BP5000	37kW	75	800-1200	700-1000
BP5510/5510HD	45/55kW	75/65x65mm	900-1600	850-1200
BP6510/BP6510HD	55/75kW	Ø90-100/75x75mm	1200-2300	900-1500
BP7010/7010HD	75/90kW	Ø90-100/75x75/85x85mm	1500-2500	1300-1700
BP7510/7510HD	110/132kW	90-120/85x85/90x90mm	2000-3500	1400-2600

* Capacities are depending on raw material and requirements for the briquettes

Mechanical Briquetting Technology – Industrial

BP Mechanical Press

- High technology Industrial solutions
- Complete line
- Round briquettes $\varnothing 40$ to $\varnothing 120$ mm
- Density 0,9-1,2



How to shorten briquettes?

Drop by weight

Briquettes will be of various length



Mechanical breaker

Briquettes in short length



Puck maker

Briquettes in length of 10 – 50 mm



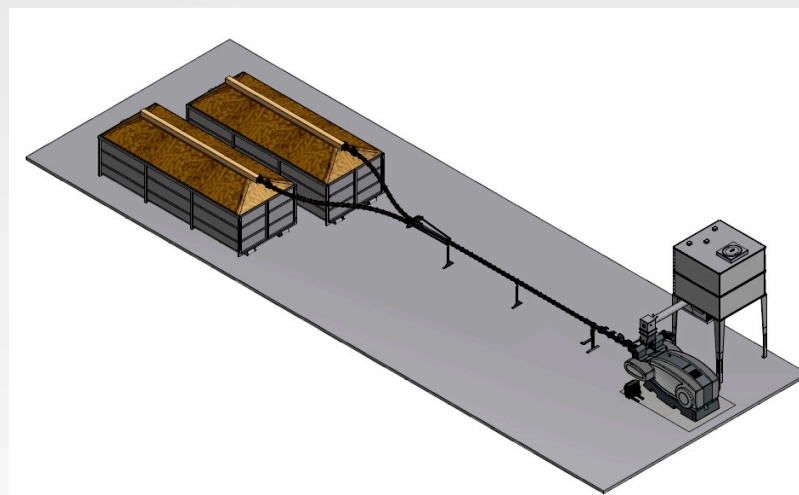
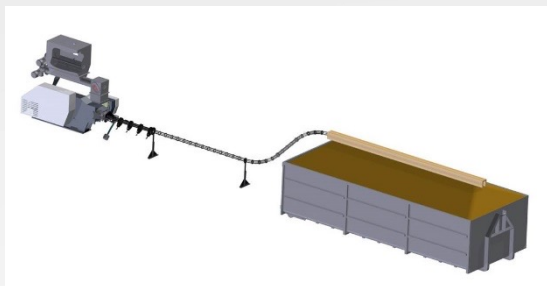
Briquette divider

Briquettes in length of 25 – 75 mm

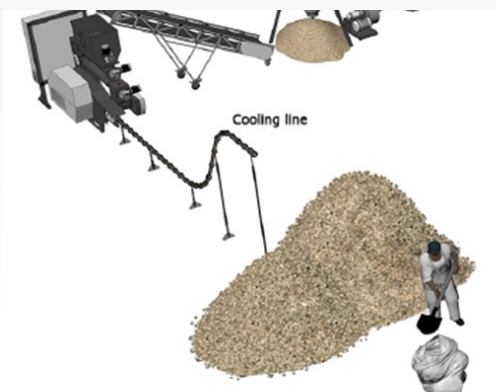


How to handle briquettes?

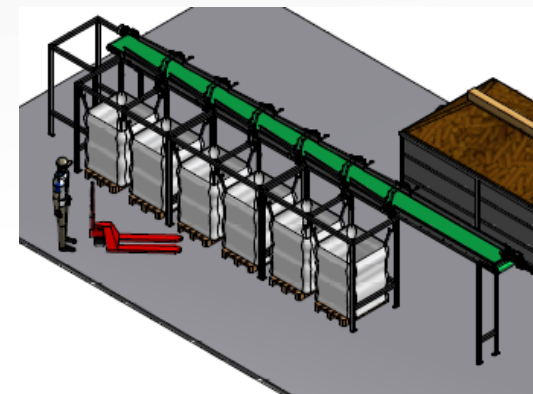
In container



On the floor

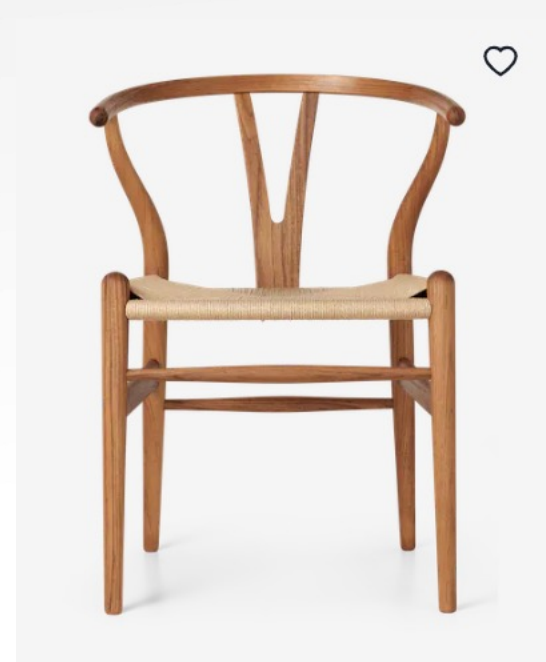


In big bags



Customer cases for converting waste wood to energy and at the same time reduce the CO2 footprint.

- Carl Hansen & Søn, Denmark



Carl Hansen & Søn (Denmark)



Customer cases for converting waste wood to energy and at the same time reduce CO2 footprint

- Lilleheden, Denmark

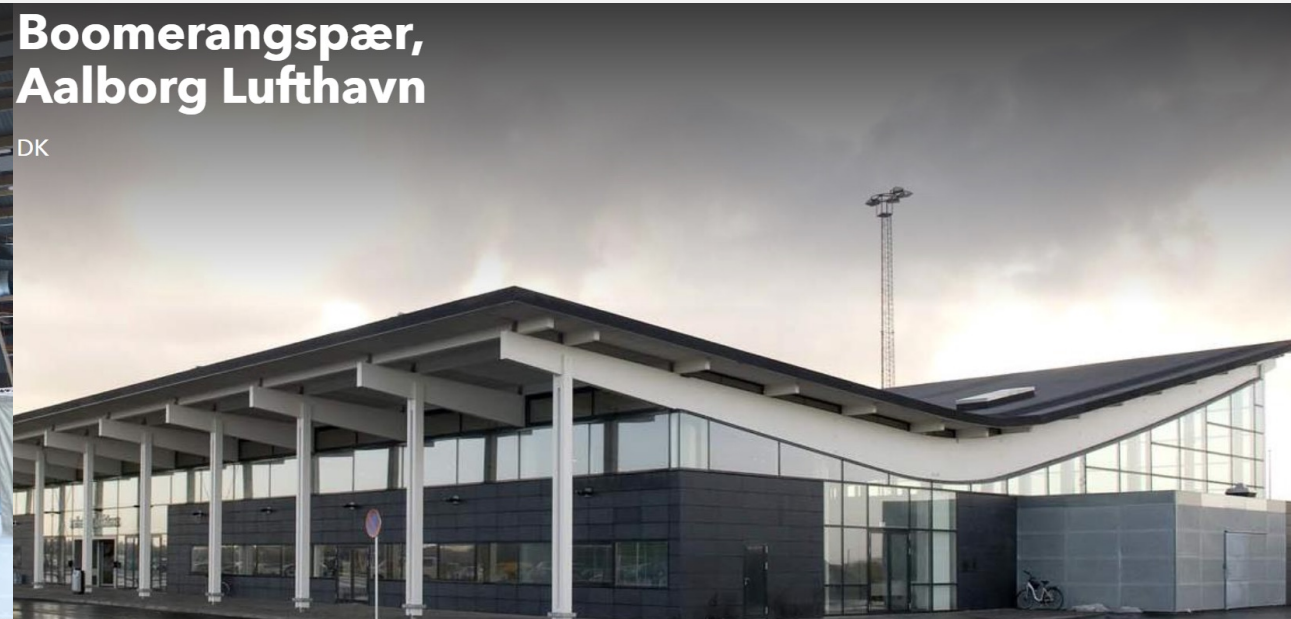
**Gavlkonstruktion,
Gigantium Aalborg**

DK



**Boomerangspær,
Aalborg Lufthavn**

DK



Lilleheden (Denmark)



The Danish company Lilleheden
is a glulam beams production facility in Hirtshals

Focus application areas

Agri Waste

Advantages:

- In many countries agri waste is burned in the field
- Burning is polluting and has been prohibited in many countries
- Forests are being depleted and agri waste can be turned into fuel
- Government incentives are available

CFN offers:

- Capacities from 500 kg/h and upwards
- Total engineered solutions
- Site Management for start-up period



Torrefied Wood

Advantages:

- Torrefied wood has properties similar to coal and can be used instead of coal in a power plant
- It is hydrophobic and has 25% higher calorific value
- Logical costs are lower due to higher carbon content

CFN offers:

- Capacities from 200-1.000 kg/h or higher per press
- Several references
- Engineered equipment



Focus application areas

Consumer Charcoal

Advantages:

- High amount of low cost waste in developing countries – Asia, Africa, South America
- Very high price on end product
- Low logistical costs
- CFN has contact to customers

CFN offers:

- Only industrial supplier of Extrusion press
- Total engineered solutions
- Partners for carbonization kilns



Industrial Bio Coal

Advantages:

- Increasing demand for bio coal to replace coal and coke
- Access to high amounts of waste
- High prices on end product
- Low logistical costs
- CFN has contact to customers/endusers

CFN offers:

- Technology and grant to develop new products
- Mechanical and extrusion presses
- Total engineered solutions
- Partners for carbonization kilns



Using briquetted straw to speed up biogas production

Principle and the company behind

The company Kinetic Biofuel offers a complete concept for handling of straw from bales to briquettes for industrial scale biogas production based on straw and slurry –

www.kineticbiofuel.com

Kinetic Biofuel is a partnership of two companies combining briquetting technology with biofuel technology. (C.F. Nielsen and Biofuel Technology) and hold the patent.

The briquetting process creates small steam explosions changing the structure of the straw enabling it to absorb more than 7 times more than normal straw

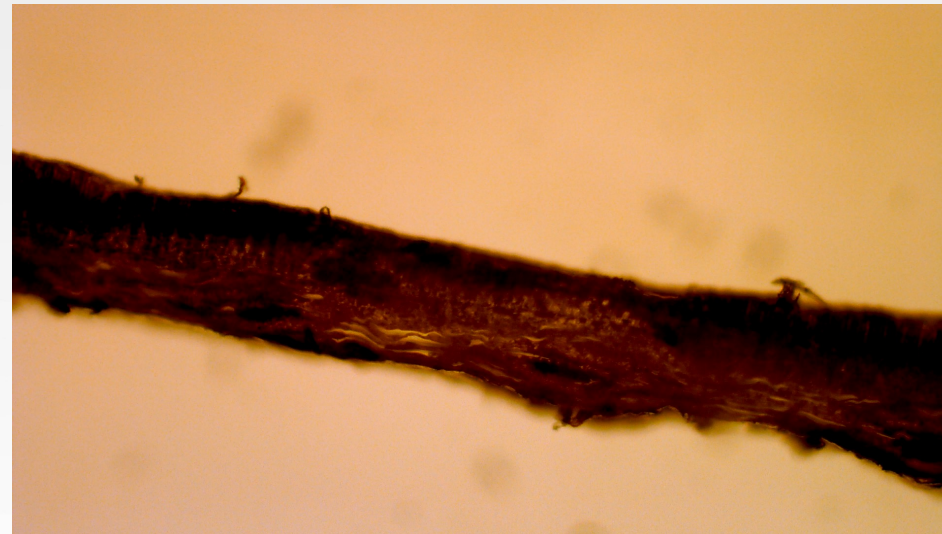
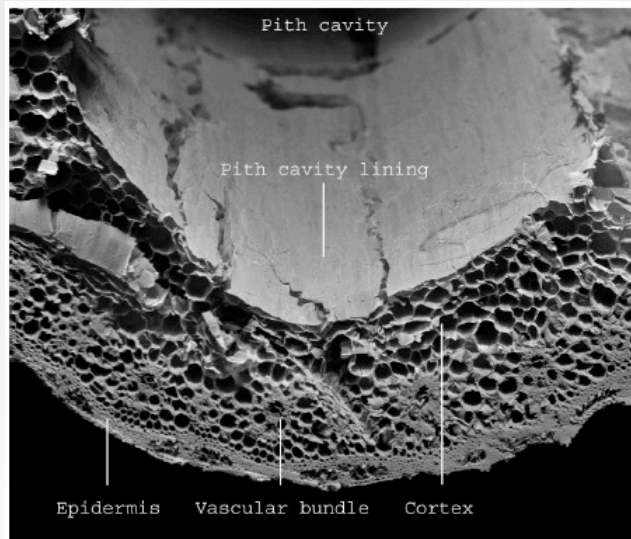
The briquetted straw offers a high gas yield of approx. 250 Nm³ methane per ton straw



KINETIC BIOFUEL

BOOSTING SUSTAINABILITY

The structure of straw and the effects of briquetting



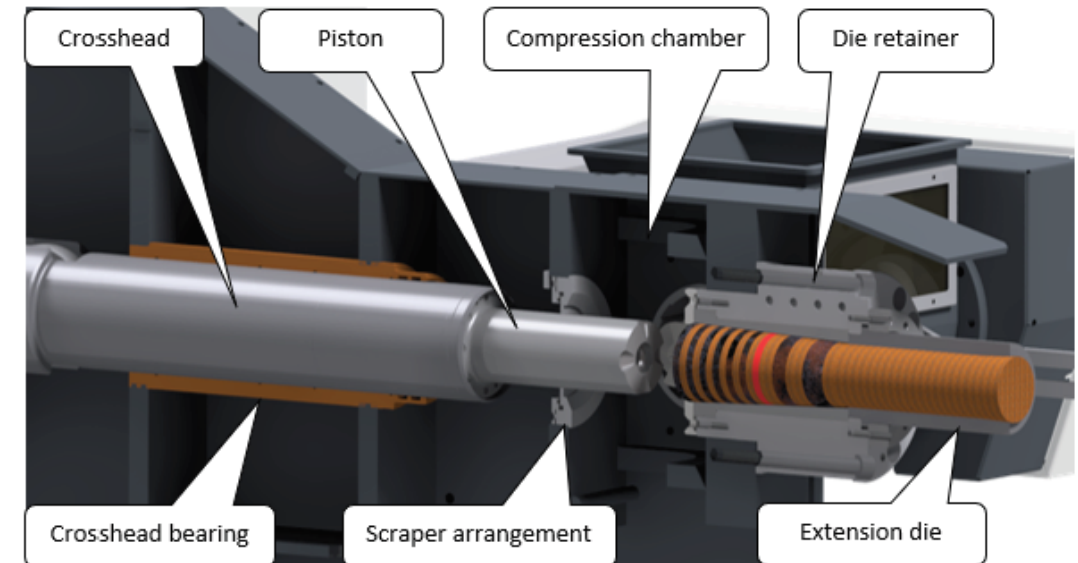
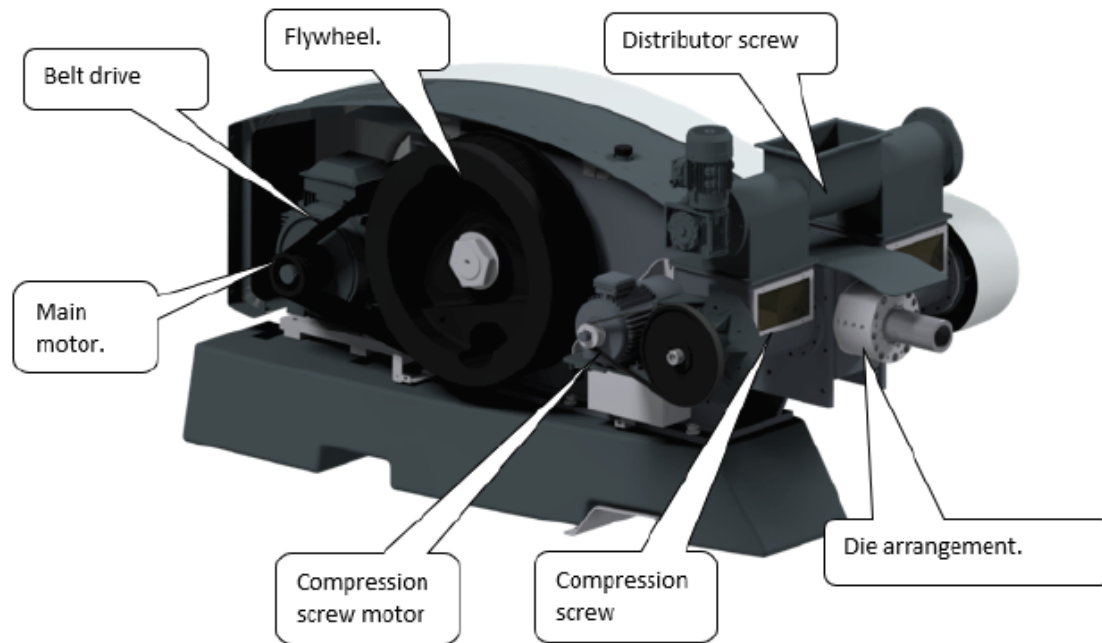
Briquetting changes the structure of the straw

BP7510 Mechanical Briquetting Press for straw briquettes



- The world's largest single line mechanical briquetting press
- Capacity up to 3 tons/hour
- Large briquette dimension – up to Ø120 mm
- Up to 132 kW main motor

Mechanical Briquetting changes the structure of straw (steam explosion)



Why should you use straw briquettes in your biogas plant

- Straw briquettes absorb 7-10 times more water than shredded straw and are easily introduced in a biogas reactor



100 gram each
briquette and
straw



Start 0 minutes



100 gram each
briquette and
straw



15 minutes later

Why should you use straw briquettes in your biogas plant?

- Straw briquettes are 2nd generation technology – we are using waste not raw material from primary food production



Corn silage 1'st generation raw material



Straw briquettes 2nd generation raw material

Why should you use straw briquettes in your biogas plant?

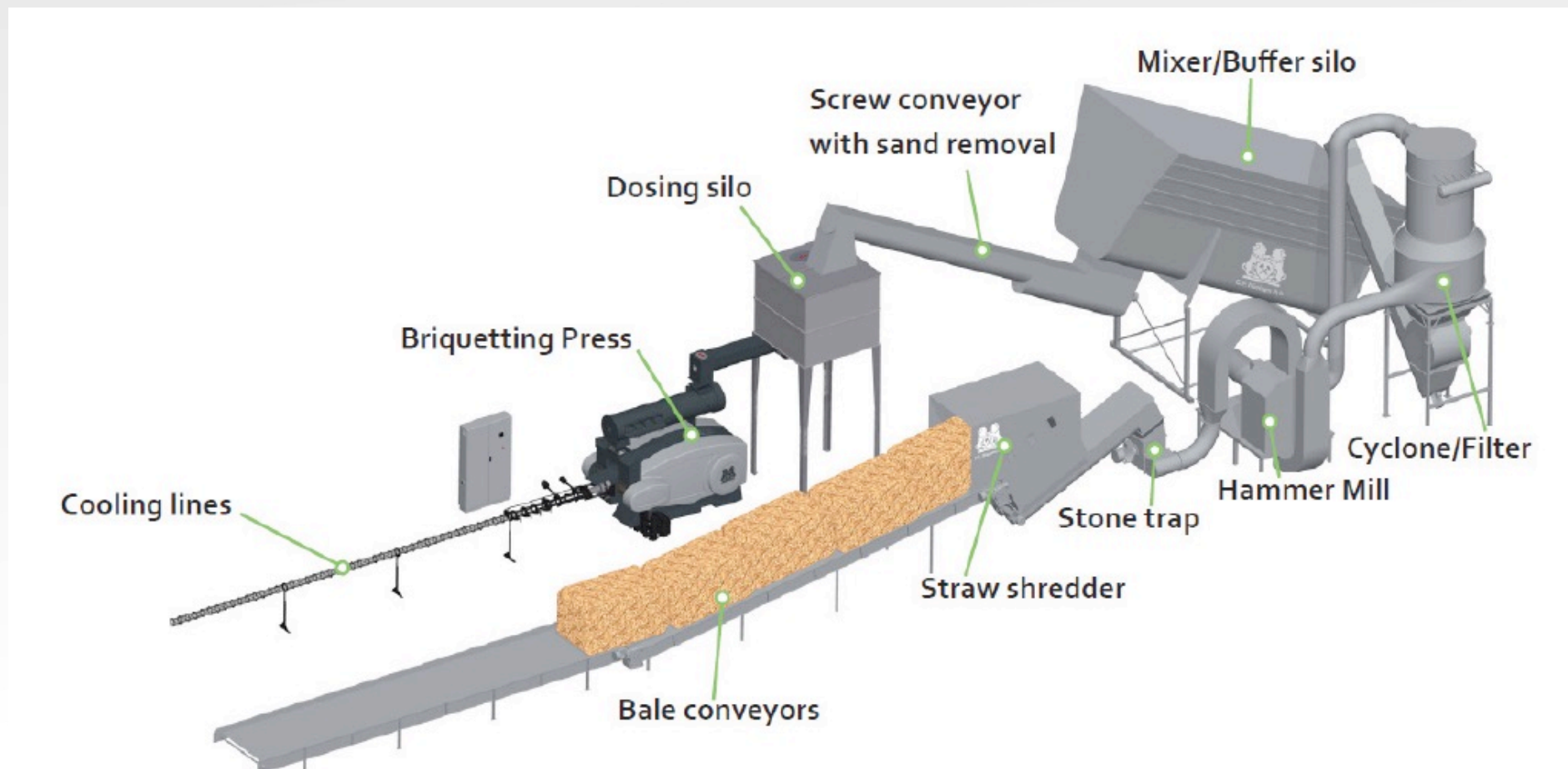
- Straw briquettes can more than double your biogas production with a yield of 300 l of methane per ton VS corresponding to approx. 250 l of methane per ton straw.
- Straw briquettes give logistical advantages compared to bales . Bulk density app. 600 kg/m³
- Straw briquettes are dense and handling at the biogas plant is simple
- The concept is patented and proven through tests at the University of Aarhus, Denmark
- There is plenty of straw available in most countries

Testing plant

Kinetic Biofuel has tested and documented the concept through trials during 5-6 years at the University of Aarhus in Foulum, Denmark



The Briquetting Process (principle)



Customer case: Sheppey Island(UK) – Farm Renewables biogas plant

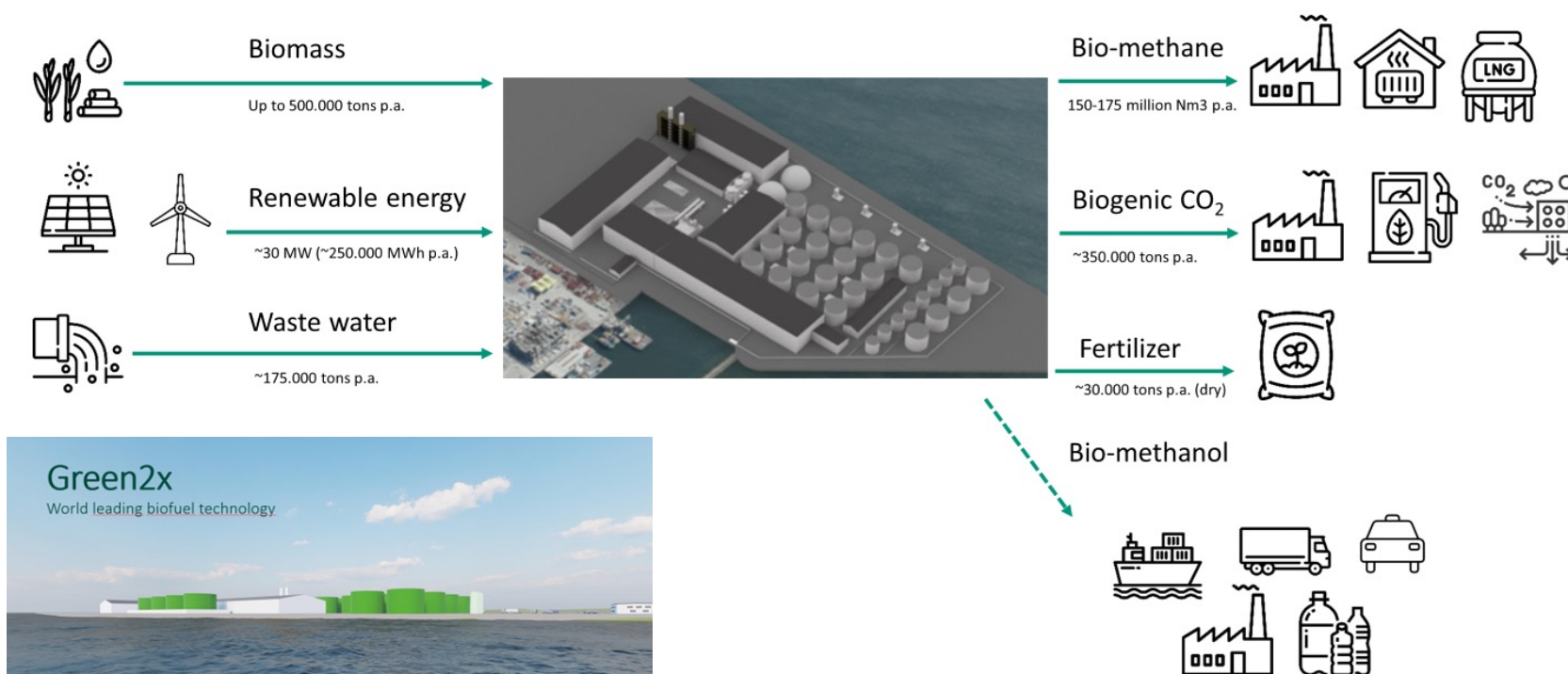


Customer case: Sheppey Island(UK) – Farm Renewables biogas plant



In process: Vordingborg (DK): 500.000 tons briquetted straw/year

Vordingborg Biofuel will be first-of-a-kind



Establishing of satellite briquette production sites (~ 60.000 ts/year)

