

The background of the slide is a photograph of a forest. On the left, a tree trunk is covered in vibrant green moss. On the right, a person's hand is shown holding a pile of wood chips and small branches. The background is a soft-focus forest with tall trees and green foliage.

**Electricity from wood
for 2 cents/kWh.**

**IEA Bioenergy Task 33 Workshop:
Thermal Gasification of Waste**

The company



Wood gas power plant



Process engineering



Automation

- Supplier of turn-key wood power plants
- Consultants for process engineering
- Company for automation and mechatronics
- Head quarter in Austria / Tyrol (Schwaz and Aschau)
- Foundation 2009

The product

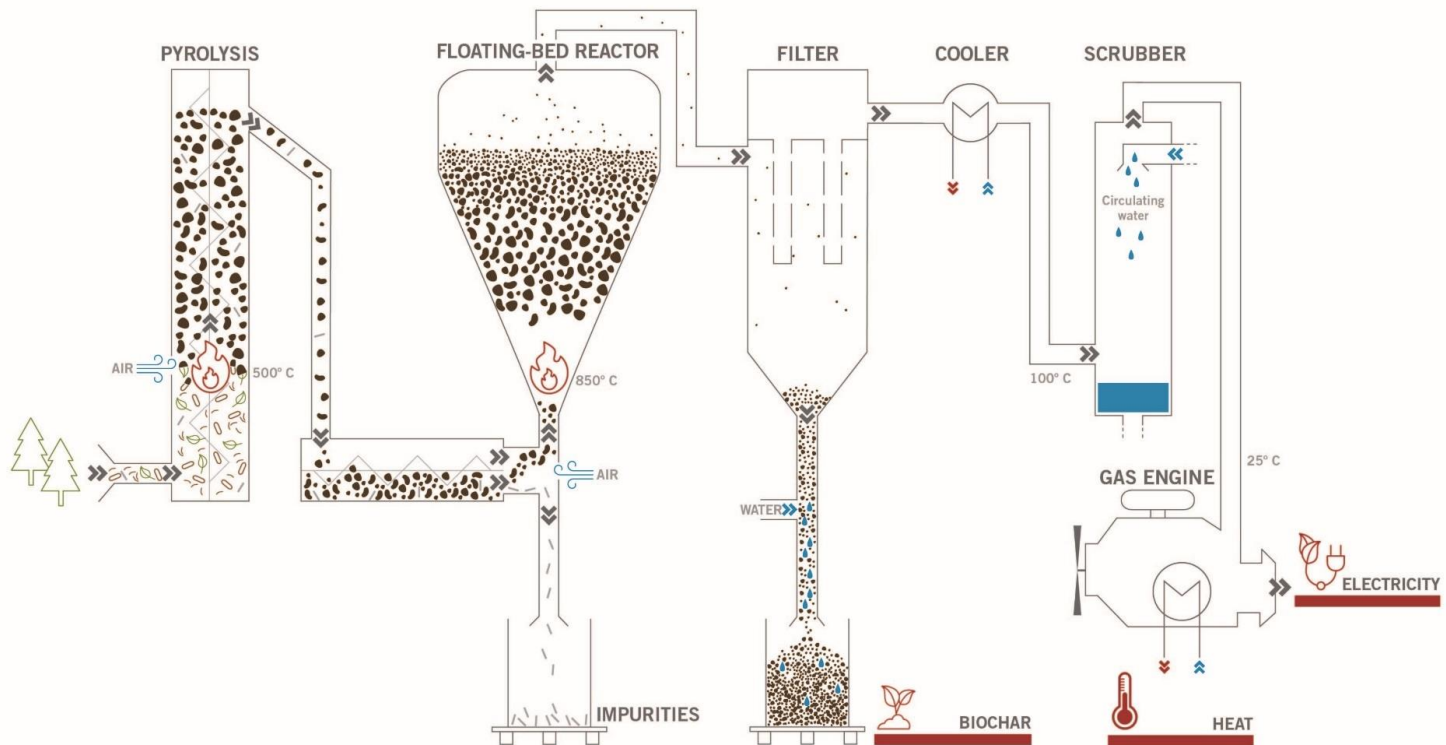
Wood power plants in the power range up to 500kW*

	CW 700-200	CW 1000-300	CW 1200-400	CW 1800-500
Electrical power	200 kW	300 kW	400 kW	500 kW
Thermal power (basic variant)	326 kW	488 kW	615 kW	770 kW
Thermal power up to	481 kW	719 kW	920 kW	1153 kW
Fuel heat capacity	721 kW	1,067 kW	1,368 kW	1,754 kW
Fuel demand	140 kg/h	208 kg/h	267 kg/h	342 kg/h
Specific fuel demand	0.70 kg/kWh _{el}	0.69 kg/kWh _{el}	0.67 kg/kWh _{el}	0.68 kg/kWh _{el}
Charcoal by-product	1.95 m ³ /d	2.9 m ³ /d	3.7 m ³ /d	4.7 m ³ /d

* In combination of multiple plants in parallel higher power levels are achievable

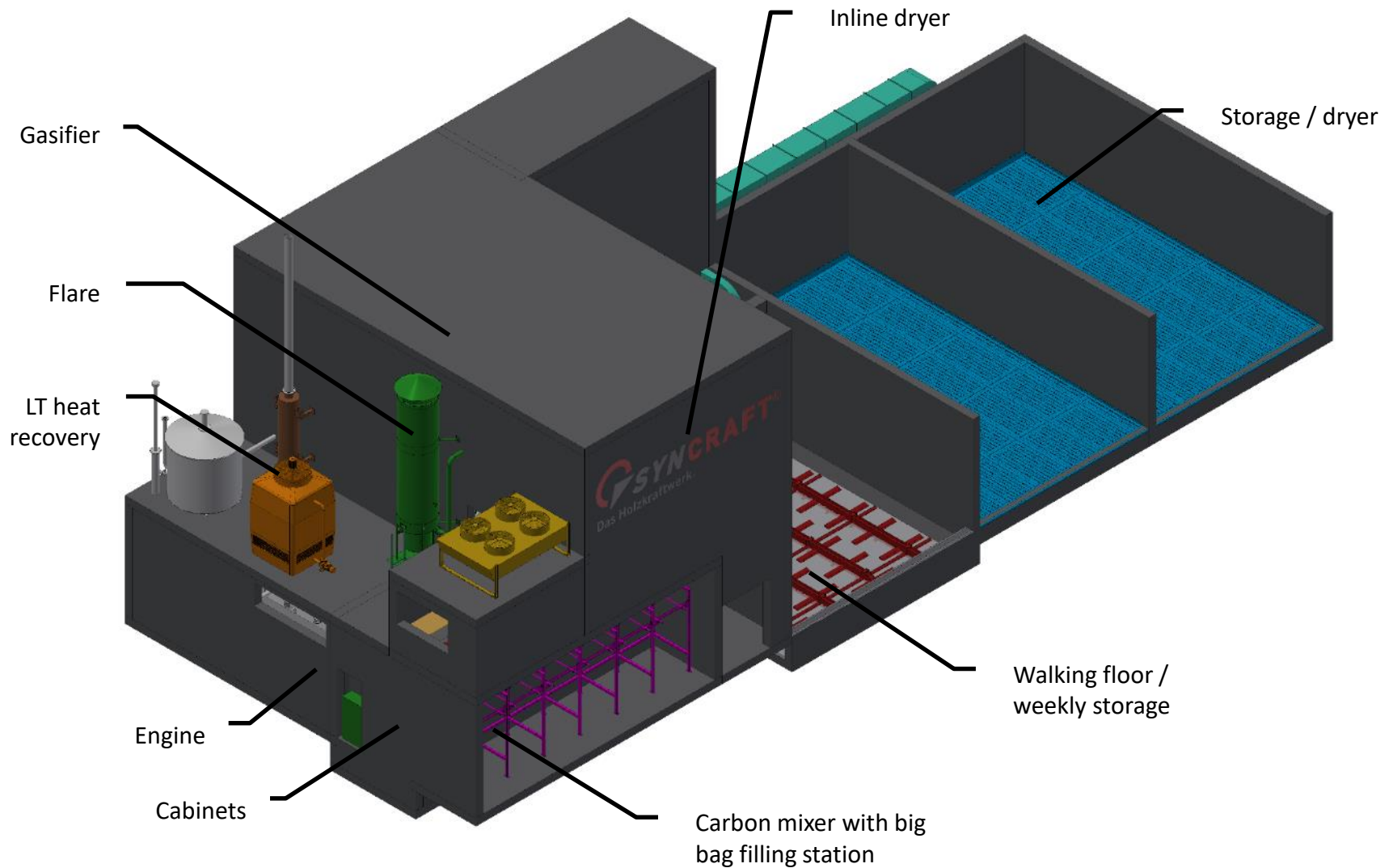
The technology

The staged floating*-fixed-bed gasification



* not to be mistaken with fluidised bed gasification

The wood power plant



The wood power plant

SYNCRAFT[®]
Das Holzkraftwerk.



IKB Eins für alle.

The wood power plant



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8950 Dornbirn
Telhas & Benninger Tlg
www.Biowasertlg.at

The references (selected)



SYNCRAFT®Werk CW 1000-300 / Innsbruck / AT
Commissioned early **2017**; produces **261kW** power and **601kW** heat. Delivered including low-temperature heat utilisation and dryer.



SYNCRAFT®Werk CW 1200-400 / Stadl / AT
Commissioned end **2016**; produces **324kW** power and **784kW** heat. Delivered including low-temperature heat utilisation and dryer.



SYNCRAFT®Werk CW 700-200 / Dornbirn / AT
Commissioned end **2014**; produces **220kW** power and **500kW** heat. Delivered with 185kW power. Low-temperature heat utilisation retrofitted 2016.



SYNCRAFT®Werk CW 1000-300 / Vierschach / IT
Commissioned mid **2014**; produces **300kW** power and **488kW** heat. Gas engine, dryer and feeding system supplied by customer.

A close-up photograph of a person's hand holding a piece of wood chip. The hand is positioned in the lower-left quadrant, with fingers gently gripping a rectangular wood chip. The background is a dense, textured pile of various wood chips, including small shavings and larger, irregular pieces, in shades of light brown and tan. The lighting is bright, casting soft shadows on the wood chips. The overall scene is a top-down view of the wood chip material.

**State of technology:
Forest residues**

The state of the technology economics

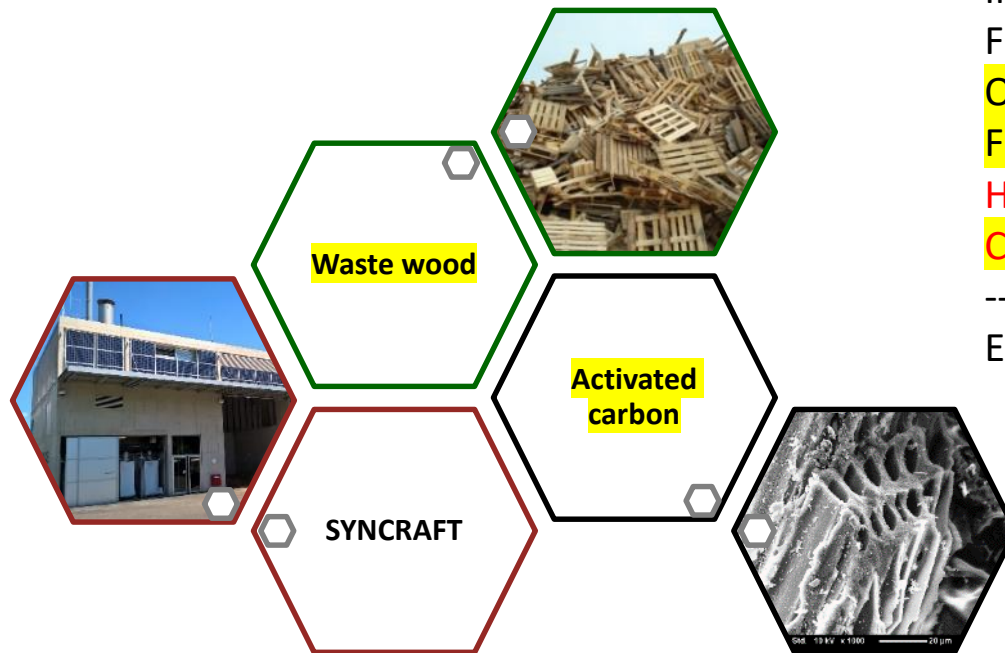
Electricity costs basic



Investment	+ 5 cent/kWh
Financing	+ 1 cent/kWh
O&M	+ 3 cent/kWh
Fuel	+ 7 cent/kWh
Heat benefit	- 6 cent/kWh
Charcoal benefit	- 1 cent/kWh
<hr/>	
Electricity costs	+ 9 cent/kWh

The 2 cents approach

Electricity costs with waste wood and AC



Investment	+ 5 cent/kWh
Financing	+ 1 cent/kWh
O&M	+ 4 cent/kWh
Fuel	+ 2 cent/kWh
Heat benefit	- 6 cent/kWh
Charcoal benefit	- 4 cent/kWh

Electricity costs	+ 2 cent/kWh

Key 1: Waste wood





Key 2: Activated carbon

This scanning electron micrograph (SEM) displays a cross-section of activated carbon. The material exhibits a highly porous, layered structure. A prominent dark horizontal band runs through the center, likely representing a different layer or a region of higher density. The surrounding layers are characterized by a complex, interconnected network of fibers and voids, creating a porous appearance. The overall texture is rough and irregular, typical of activated carbon's morphology.

Vac-High PC-Std. 10 kV x 800

— 20 μ m

000048

MCI

The lessons learned on Key 1

- Waste wood
- Tar
- Impurities
- Pre-treatment
- Contaminants
- Emissions

The lessons learned on Key 1

- **Waste wood**
so far test runs on class A1 waste wood. Untreated waste wood. Pallets dominating.



The lessons learned on Key 1

- **Tar**
also no issue with waste wood, as it
contains even less lignin than forest
wood chips



The lessons learned on Key 1

- **Impurities**
high content of stones and especially nails from pallets
- Limited capability of standard impurity removal device



Impurities within 30m³ of waste wood chips

The lessons learned on Key 1

- **Pre-treatment**
huge difference in pre-treatment step.
Homogeneous structure is the key to ensure proper operation.



The lessons learned on Key 1

- **Contaminants**

Depending on class; beside heavy metals
Cl, S, N to considered; Engine relevance
Not yet enough data collected; tba 2019

- Cl → WC 100 → A1 300 → A3+ >10.000
- S → WC 200 → A1 300 → A3+ > 5.000?
- N → WC 3.000 → A1+ << 3.000?

The lessons learned on Key 1

- **Emissions**
Concerning dust, NO_x and S; no difference measured with A1 class waste wood. Cl and N to precipitated in water scrubber / condenser.
- S (H₂S) in case of A3+ needs additional desulfurization before engine. To be investigated in 2019

The status and next steps

- **Continuous operation**
on waste wood class A1 confirmed
- **Ongoing Tests**
 - Pre-treated A1 – A3 class waste wood
 - A4 class scheduled for 2019
- **Demonstration plant 400kWel**
in Austria to be finished by end 2019

The contact & impressions



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