

A wide-angle photograph of an industrial biomass gasification plant. In the foreground, there is a large pile of wood chips on the left and a paved area with white markings. In the middle ground, there are several large white industrial units, a green container, and a stack of wooden pallets. In the background, there are trees and a clear blue sky with light clouds.

September 2023

Rolf Ljunggren,
CEO (acting) & founder






How to deploy WoodRoll® multistage biomass gasification?

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2	The Höganäs project
3	Value adding applications
4	Projects



Company history

- 
2006–2010
 - The WoodRoll® technology invented and Cortus Energy is founded. The technology is confirmed on a small scale (150 kW)
- 
2011–2013
 - ½ MW gasifier followed by verifying all sub-processes in the WoodRoll®.
- 
2014–2015
 - The plant in Köping is upgraded to a complete reference and test plant. WoodRoll® fully integrated. Design of first commercial 6 MW modular WoodRoll® plant is initiated
- 
2016–2017
 - Basic engineering is performed for two 6 MW WoodRoll® plants (the projects in Höganäs and Japan), strategic cooperation agreement is signed with Forest Energy (Japan), the Höganäs project is granted SEK 47.6m in subsidy and the project in California USD 5m.
- 
2018–2022
 - The construction of the 6 MW WoodRoll® together with Höganäs. Commissioning & Start-up is ongoing.
 - Cortus has financed this plant and will deliver energy gas on a 20 years contract.

2023 Project pipeline

Green H₂/CO₂
DE, FR, JP

½ & 6 MW Hydrogen from biomass

Green Natural Gas - SE / FIN / EU

6 and 20 MW gasifiers for cat-process to SNG/RNG

Green Methanol
SE / NO / EU / JP

Multiple 20 MW gasifiers for cat-process for Methanol

Green Power
USA, FR, SE

Multiple projects, 3 -16 MW_{el},
20 years PPA

Green char & carbon, SE, EU

Tests ongoing!

Green Diesel
NO

Multiple 20 MW gasifiers
FTR cat-process for diesel

HÖGANÄS

Industrial reference plant,
6 MW modular WoodRoll,
Showcase for clients!

KISTA

HQ &
Engineering office

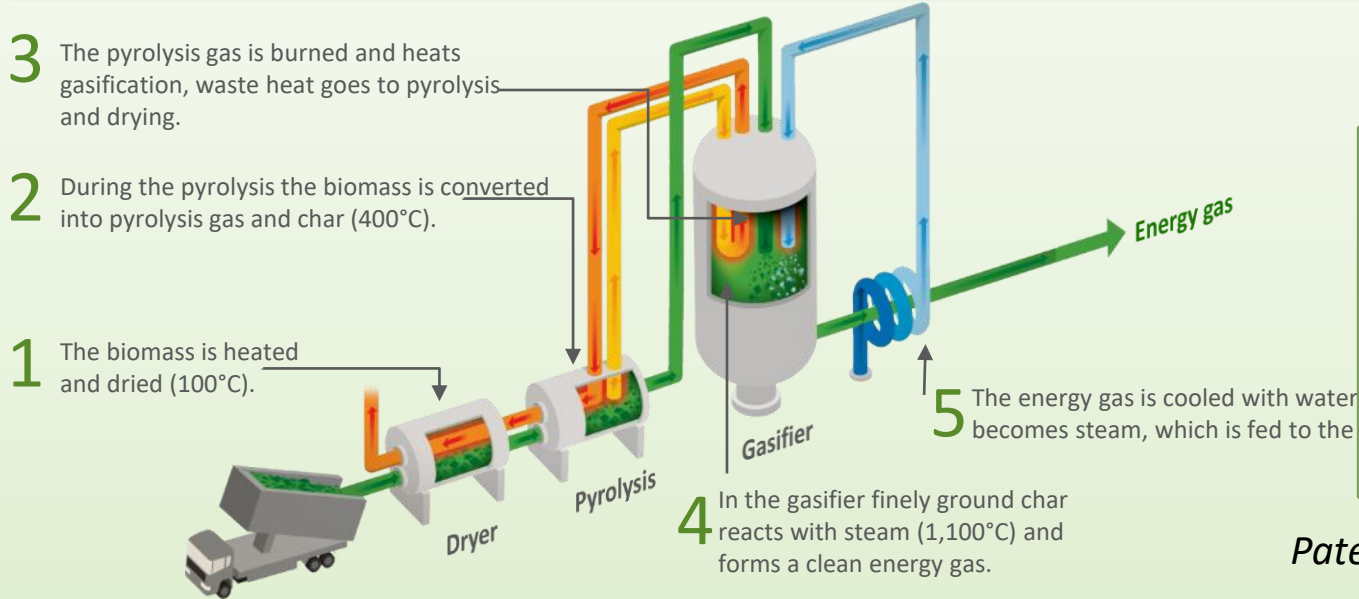
KÖPING

500 kW pilot
facility
"Moth balled"

35 Employees

WoodRoll® – A breakthrough & patented gasification system

A proprietary & fully integrated gasification process



Strong patent protection

6 PATENT FAMILIES

162 confirmed patents

1. Gasification process
2. Hydrogen from gasification
3. Indirectly heated gasifier
4. Steam/char injector in WR
5. Biocoke process in WR
6. Pure hydrocarbons from WR

Patent application – C & Chemical looping

FEEDSTOCK OPTIONS

Wood



- ✓ Wood chips, bark
- ✓ Saw dust, recycled wood
- ✓ Branches, roots and tops

Crops



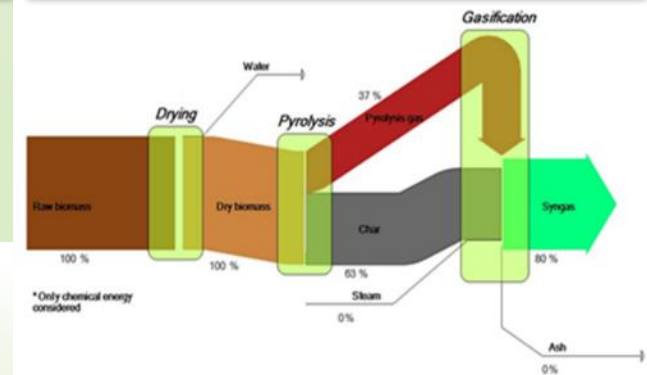
- ✓ Vine tree
- ✓ Vine cutting
- ✓ Stem with leaves
- ✓ Roots

Industrial waste



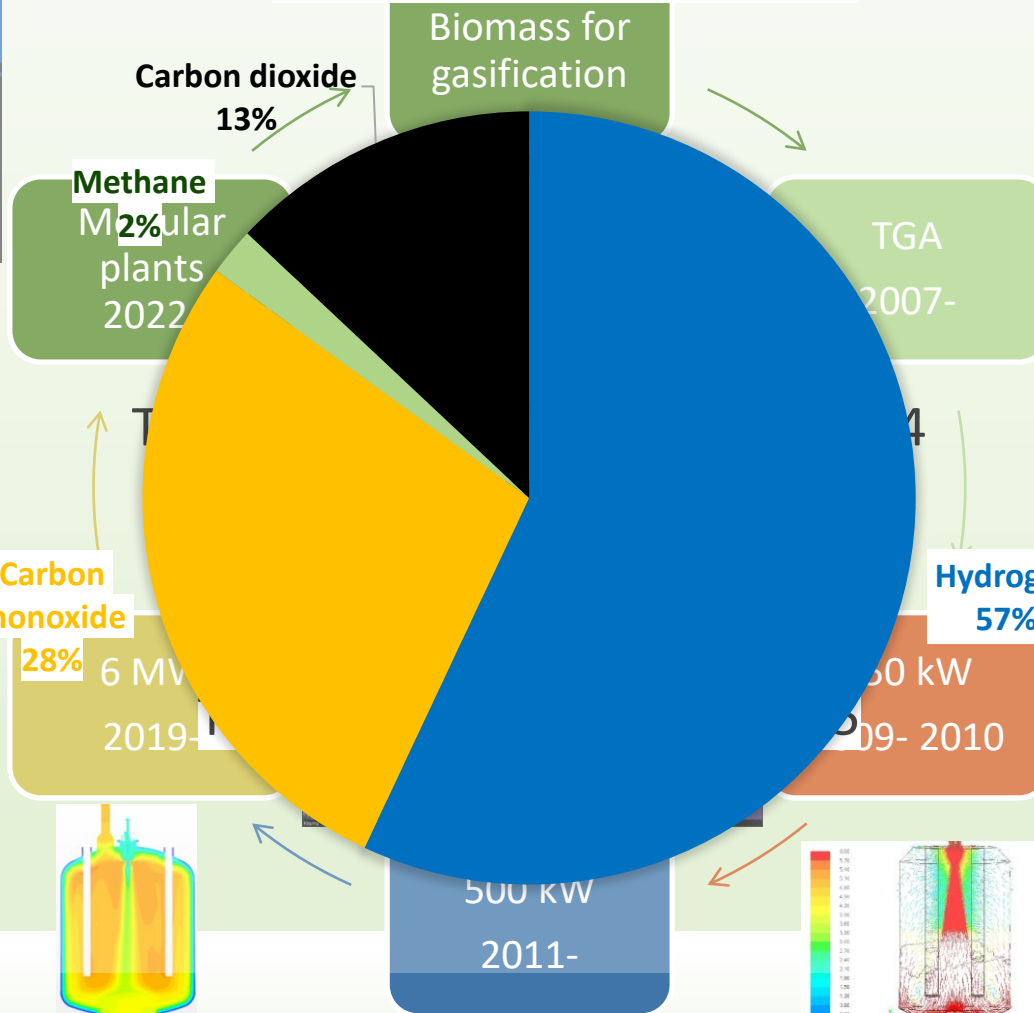
- ✓ Fiber sludge
- ✓ Chemical sludge
- ✓ Furniture manufacturing

ENERGY BALANCE – 80% YIELD



WoodRoll® – gasification development until today

ULTRA CLEAN SYNGAS



Biomass for gasification

Carbon dioxide 13%

Methane 2%
Molecular plants 2022

TGA 2007-

Carbon monoxide 28%

Hydrogen 57%

500 kW 2011-

50 kW 2009-2010

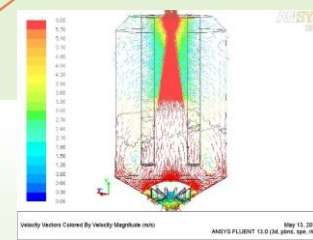
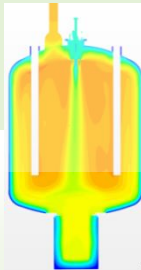
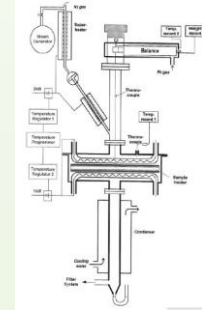


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6 MW plant in Höganäs with Cortus as Main contractor

Startup ongoing

PLANT SUMMARY

- 
6 MW plant for syngas delivery
 - Use within industrial processes with high hydrogen requirements
- 
20 year off take agreement
 - Agreement with Höganäs AB, price index adjustment every 3rd year
- 
10,000 tones CO₂ reduction
 - Existing supply of energy origins from fossil fuels; coal, oil and natural gas
- 
20 MW expansion possibility
 - The industrial plant in Höganäs has demand for additional syngas, in addition to 6 MW plant now to be started



Blue chip customer and partners

CUSTOMER

Höganäs 

A producer of specialized metal powders, used in a range of applications, from welding and surface coating to water treatment and iron fortification in foodstuff.

1797
Established

>3 000
Customers

75
Countries

12 256 MSEK
Revenues 2022

2 400
Employees

17
Production facilities

515,000 tons

World's largest metal powder producer

PROJECT PARTNERS


SSAB

ABB

outokumpu 

SVEASKOG

 Energimyndigheten

Swedbank 

ALMI
FÖRETAGSPARTNER

 **SÖDRA**

KLIMAT KLIVET
Lokalt klimatstrategiskt, nationellt resultat

 **calderys**

Höganäs Plant – Solid foundation for growth

Höganäs

Kista

HIGHLIGHTS

1. Syngas to Höganäs AB reheating furnace - in September
2. Biochar delivery is ongoing
3. Syngas test delivery to Höganäs AB started in May (-23)
4. 24/7 integrated operation completed (Oct-22)
5. Full syngas quality produced from start and verified by 3rd party
6. Char dusting in Pyrolysis gas under control (pre-separation & cyclone)
7. Test of new generation of radiation tube burners on-going

Customer

Biomass supplier

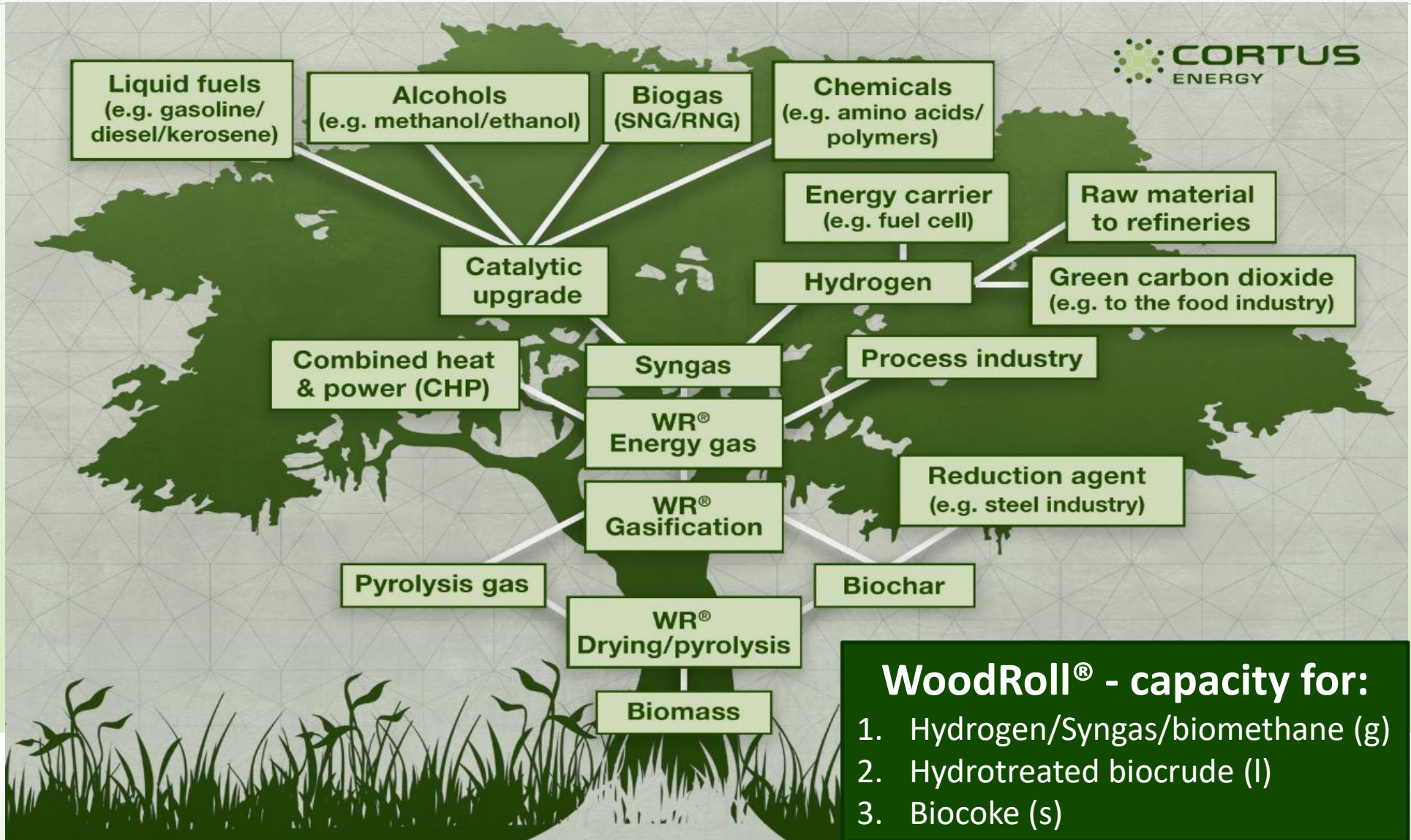
3rd parties

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WoodRoll® application tree – true biorefinery technology!

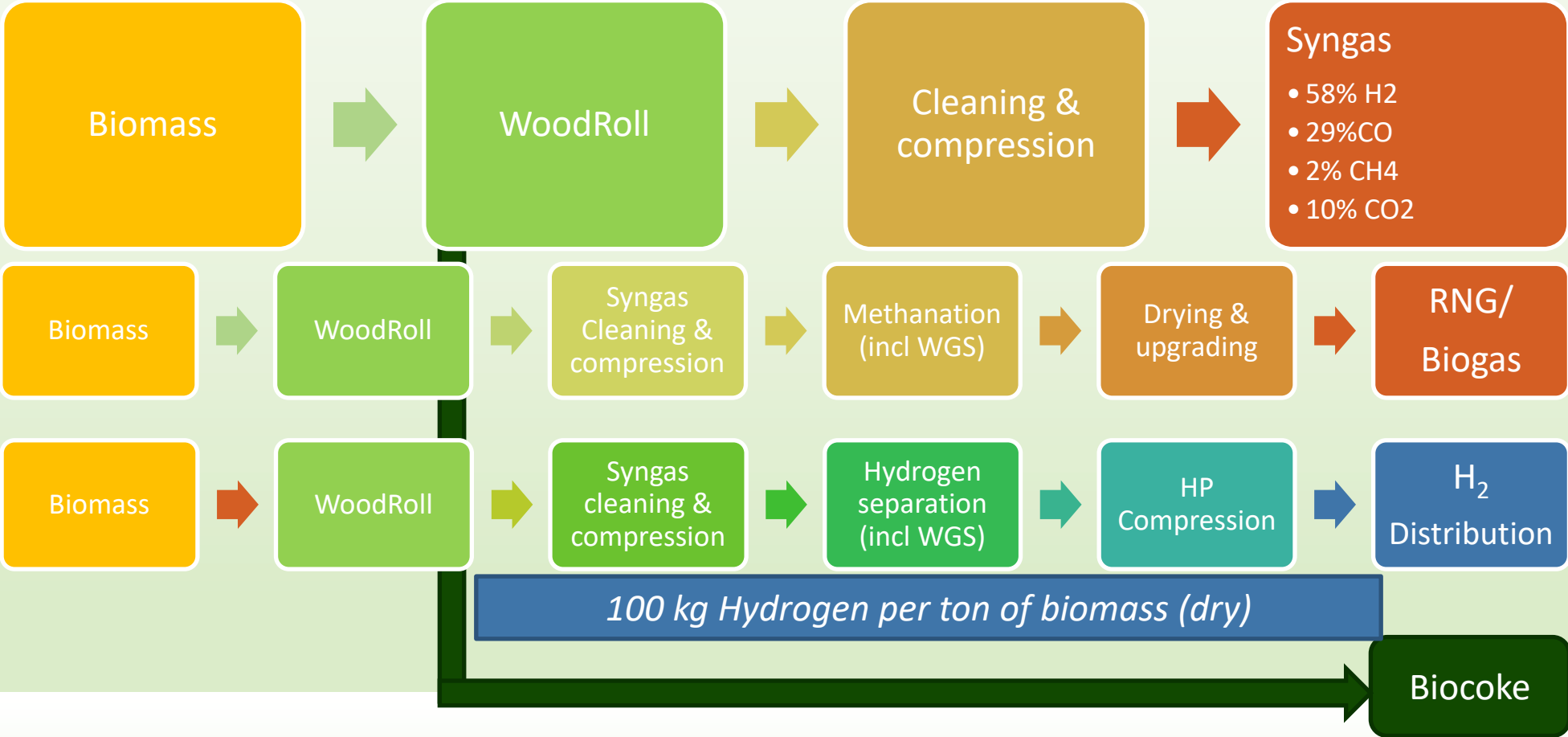


WoodRoll® - capacity for:

1. Hydrogen/Syngas/biomethane (g)
2. Hydrotreated biocrude (l)
3. Biocoke (s)

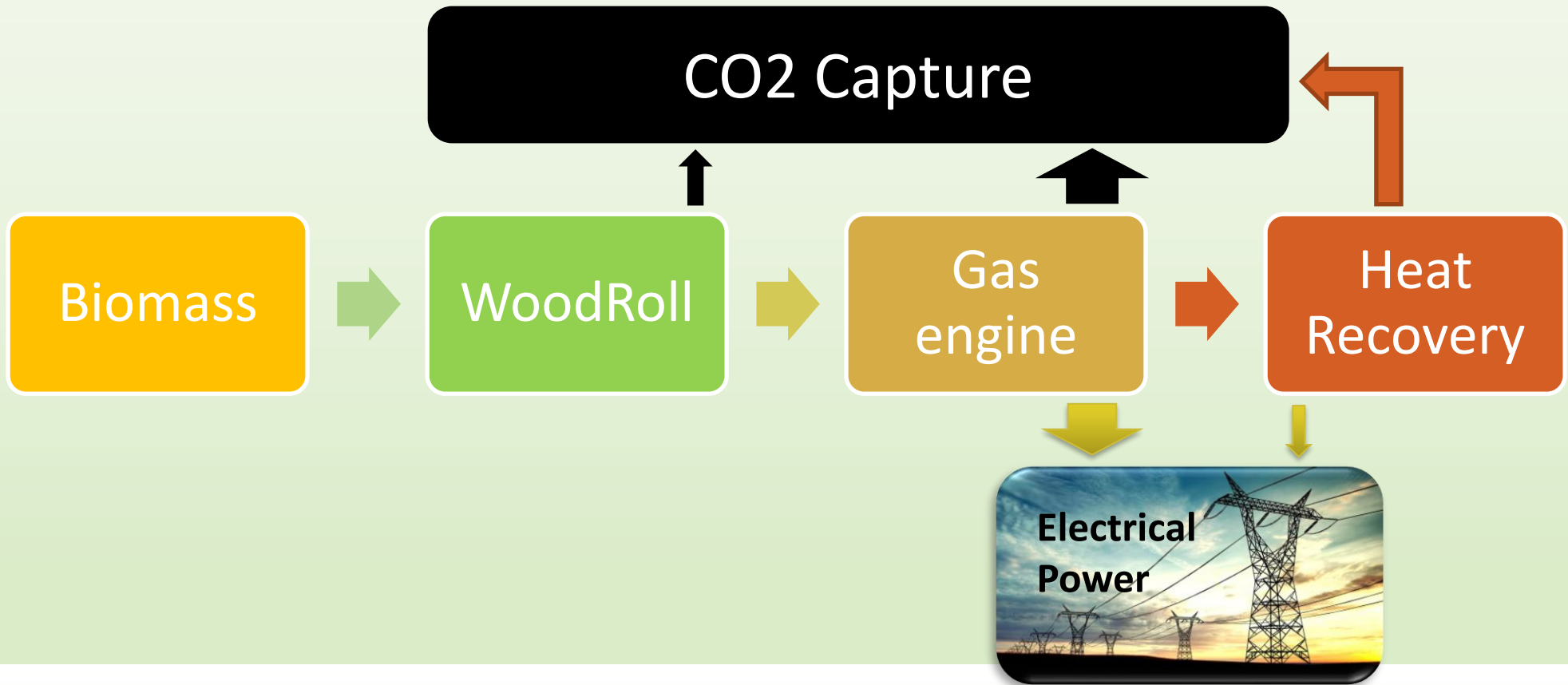
WoodRoll® project applications in Pipeline 2023

VALUE ADDING APPLICATIONS



Biopower production with BECCS

Bioenergy Carbon capture and storage with WoodRoll®



Carbon negative power is a big breakthrough in decarbonization!

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Pipeline for WoodRoll® - Scaling up and scaling down

Diesel



Methanol



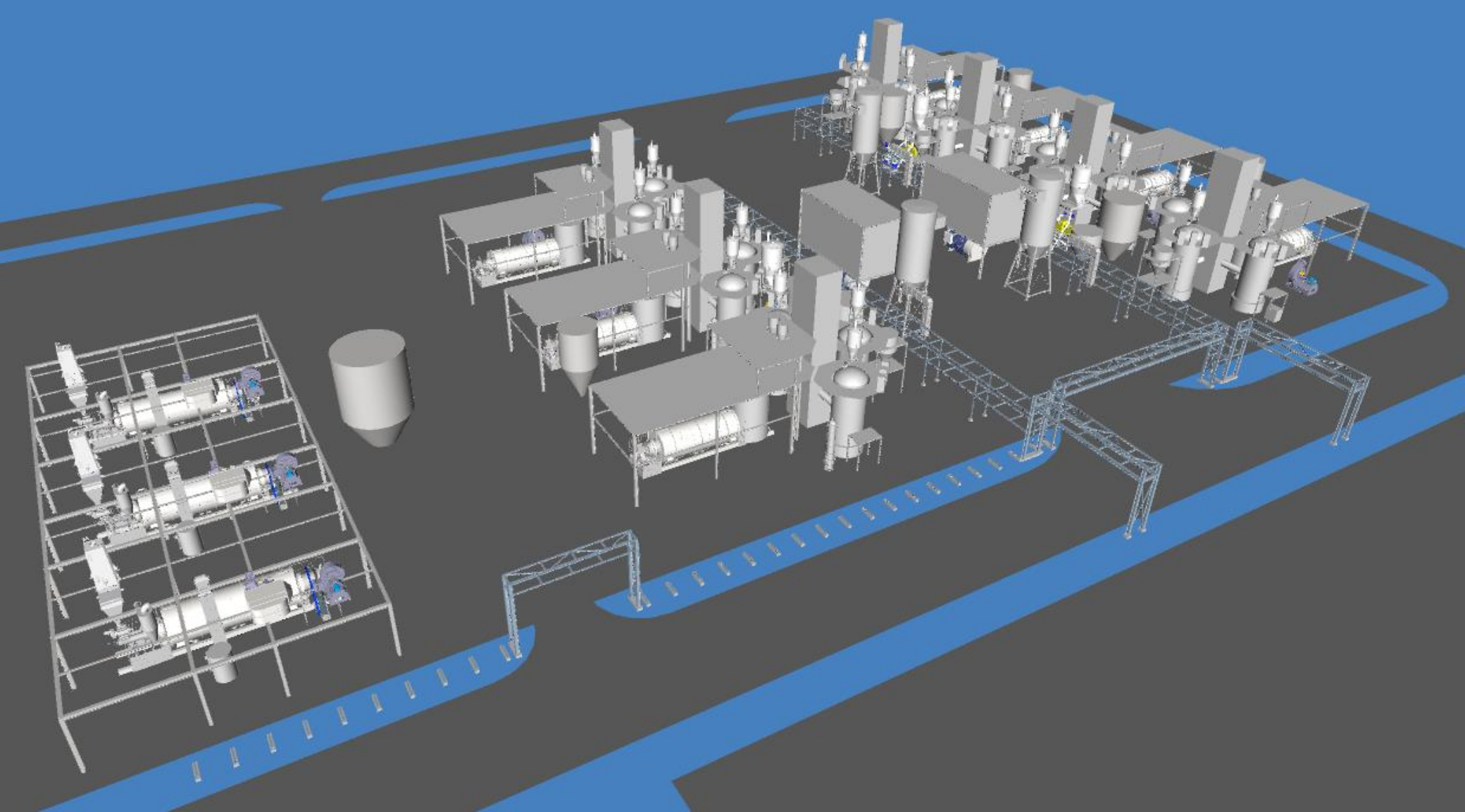
Methane



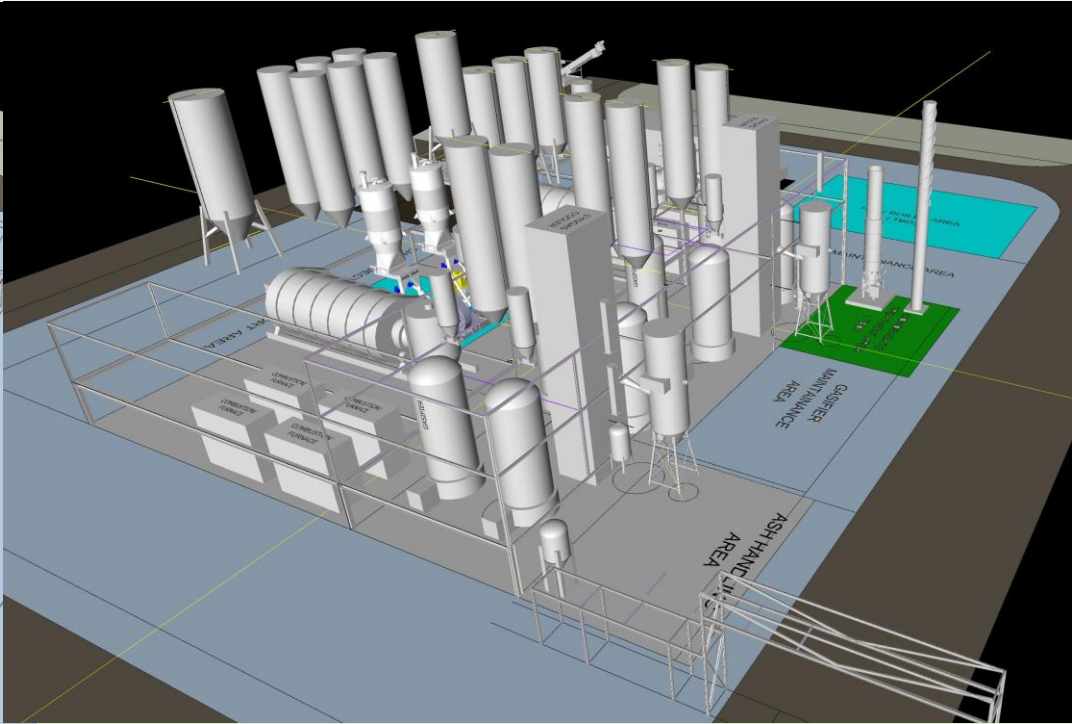
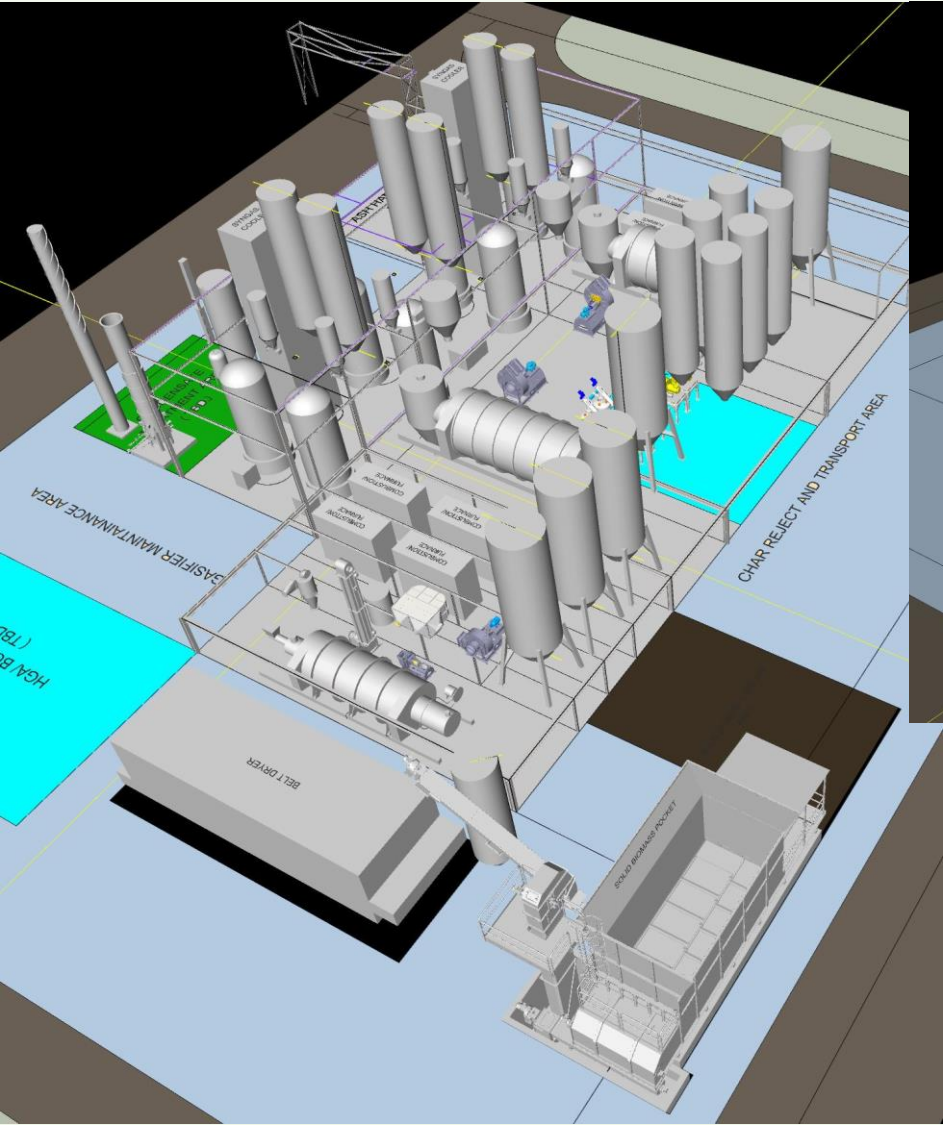
Hydrogen



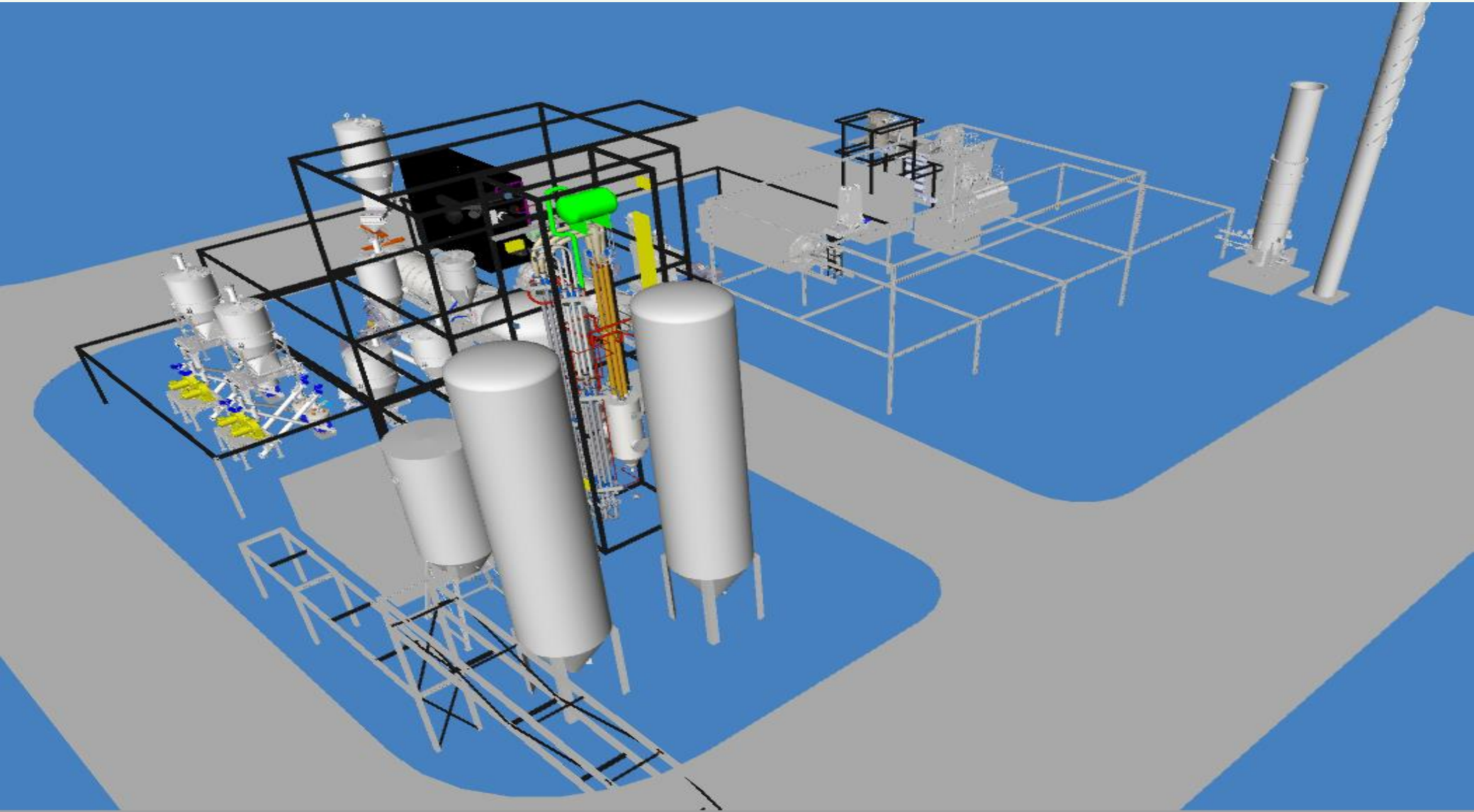
BIOJET > Diesel from biomass by 140 MW WoodRoll®



NORWAY > Methanol from biomass by 48 MW WoodRoll®

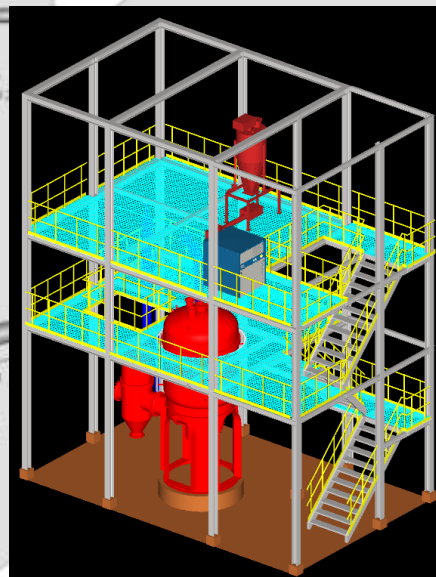
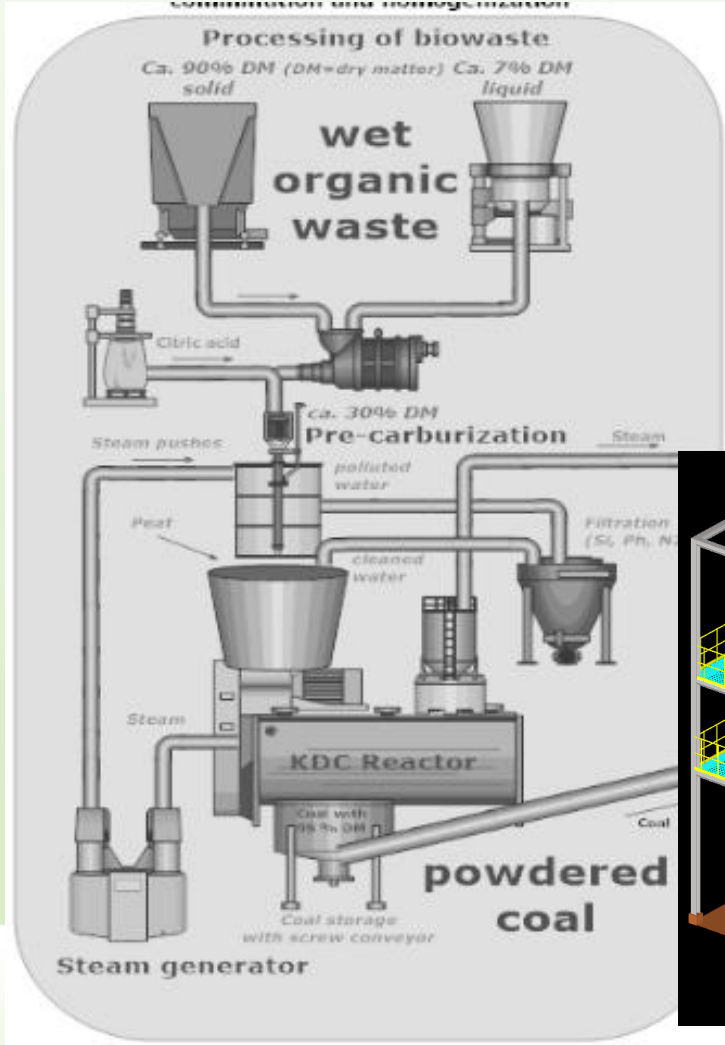


IRELAND > Methane from biomass by 6 MW WoodRoll®

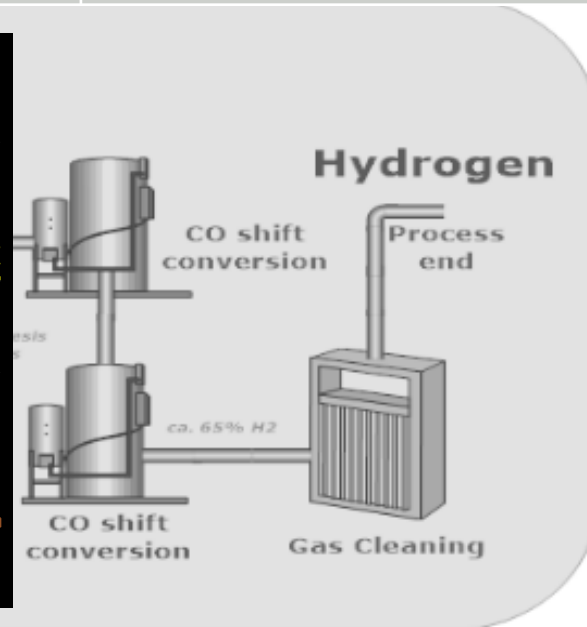


blueFLUX > Hydrogen from biomass by ½ & 6 MW WoodRoll®

VERKOHLUNG DURCH HYDROLYSE



WoodRoll®		
Stable manure	12 TPD	70% humidity
Syngas	0,6 MW	Mini WoodRoll®
Scope	System delivery	
Opportunity	New feedstock, bio-H2	
Next step	Under construction	



Pipeline for WoodRoll® - Opportunities

Diesel

In the EU there are ambitious goals for 2030 in the Fit for 55 package followed by the European Green Deal to become carbon neutral by 2050.

Gen1 – Bio-diesel (vegetable oil)

Gen2 - HVO (Hydrotreated vegetable oil)

Next Gen – Fischer Tropsch (diesel from gasification of biomass)

Typical project

Plant size 150- 300 MW syngas by 2027, and then growing

Potential number of installations until 2050 up to 500

Methane/Biogas/SNG/RNG

The goal for REPowerEU is 35 billion Nm³ of biogas in 2030.

Digestion is the solution today but limited in size.

Distribution

- Compressed gas
- Pipeline
- Bio LNG (liquid methane)

Typical project

Demonstration 6 MW (Ireland 2024/25)

Expected plant size 20-100 MW syngas

Potential number of installations by 2050 >1000 units

Methanol

Methanol for the maritime sector, where IMO:s goal is net zero emission by 2050.

Until now there has been limited technical solutions.

1. E-Methanol depends upon cheap and accessible green electricity and green CO₂
2. Catalytic processing of syngas from gasified biomass has been technically immature.

Typical project

Plant size 50- 300 MW syngas, first plant in 2025

Potential number of installations until 2050 up to 500

Hydrogen

Green hydrogen production capacity must increase 75-fold by 2030 to meet expected demand. Electrolysis is the solution today but requires cheap green electricity and technology scale-up references.

Distribution (constrained)

- Compressed gas
- Pipeline
- Liquid H₂

Typical project

Demonstration ½ MW (Germany 23/24)

Expected plant size ½ -100 MW syngas

Potential number of installations by 2050 >1000 units

Cortus Highlights – September 2023



Höganäs

- Syngas to reheating furnace, biochar external



Engineering

- Assignments (NO, DE, IRE)



Plants

- Two gasifiers under delivery 2023/24



General

- Market drive for industrial green solutions



Turn around starting

- Syngas and biochar sales in Höganäs & Pre-project assignments and new projects

Баярлалаа
пасибо
nami
nandri
kiitos
dankie
dhanyavad
bayanlala
gracie
hvala
mauruuru
koszonom
faafetai lava
vinaka
спасиби
blagodaram
merci
kia oia
barka
welalin
tack
spas
ngiyabonga
tesekkür ederim
dank je
misaotra
matondo
paldies
grazzi
mahalo
tapadh leat
gracias
XB
asan
obriga
dijere dieuf
tau
mochchakkeram
mamnun
dякую
sulpáy
go raibh maith agat
chnorakaloutioun
gratias ago
gracies
sukriya
kop khun krap
taiku
arigatō
takk
dakujem
trugare
sagolun
najis tuke
merci
didi madloba
kam sah hamnida
rahmat
terima kasih
ありがとう
tanemirt
rahmet
dhanyavadagal
shukriya
mercé
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merci
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