



Windsor
Energy

CLEAN ENERGY TECHNOLOGY

VYNCKE

**CO₂ CAPTURE & HIGH EFFICIENCY
BIOMASS ENERGY TECHNOLOGIES
FOR GREENHOUSES**

 **BIOENERGY**

INTRODUCTION & OVERVIEW

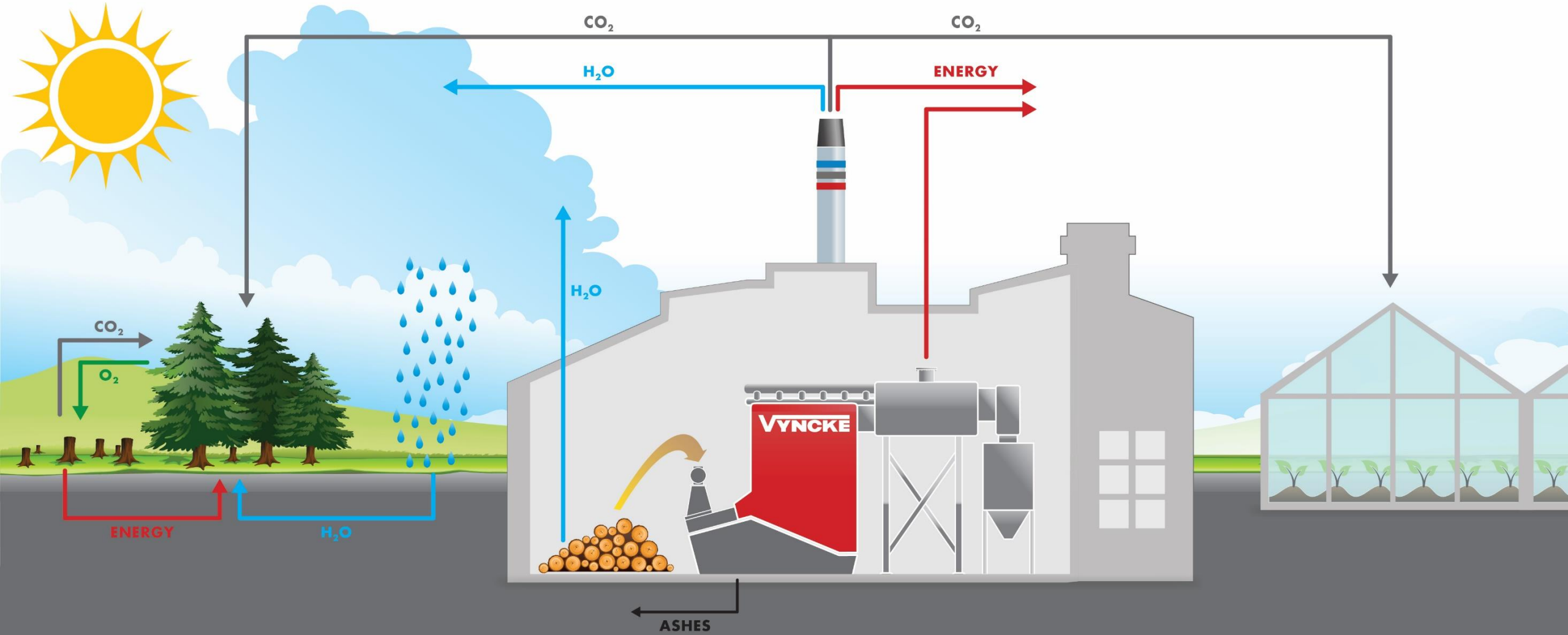
VYNCKE & WINDSOR IN A NUTSHELL

THE SOLUTIONS : WHAT'S IN IT FOR YOU ?

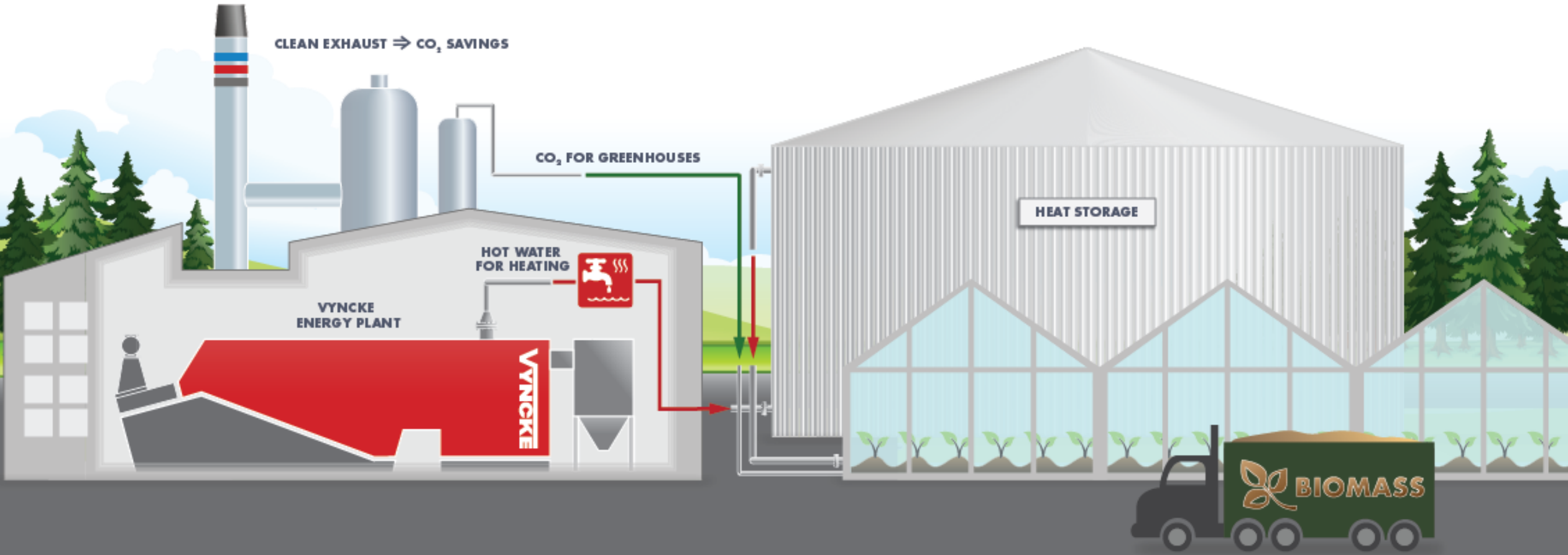
SUMMARY



INTRODUCTION | THE GROWING CIRCLE



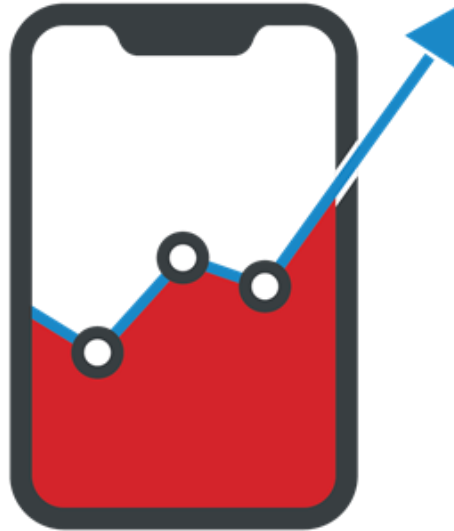
INTRODUCTION | THE GREENHOUSE PACKAGE





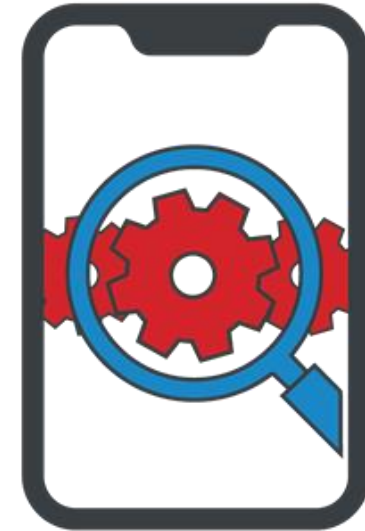
CARBON CAPTURE UNIT

- Purified & stored
- Distributed independent to heat & light
- Same quality to CO₂ gas CHP



HIGH EFFICIENCY TECHNOLOGIES

- Improves feasibility
- Improves long term returns
- Reduces risks



TRANSPARENCY BY AUTOMATION

- Let's you focus on your business
- Solution to day-to-day challenges
- Reduces potential down-time



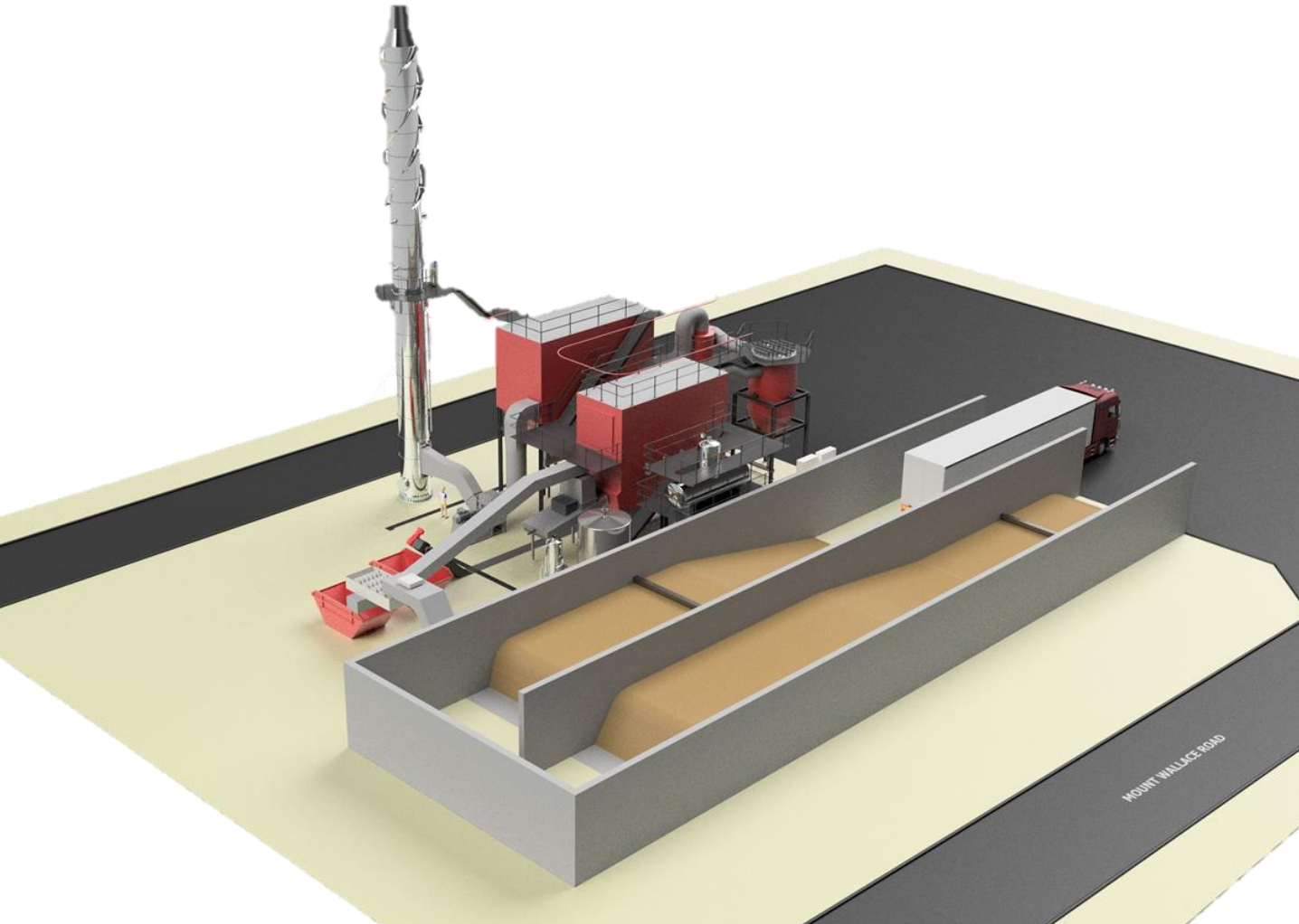
INTRODUCTION & OVERVIEW

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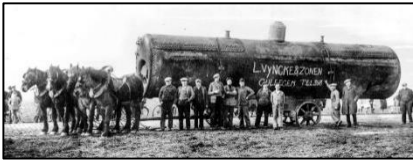
- Previously known as RCR ENERGY
- Now part of the WINDSOR GROUP
- 50 years of experience providing thermal plants in New Zealand
- Team of 30+ engineers in Napier



VYNCKE IN A NUTSHELL | THE FAMILY

1st GENERATION

Louis VYNCKE



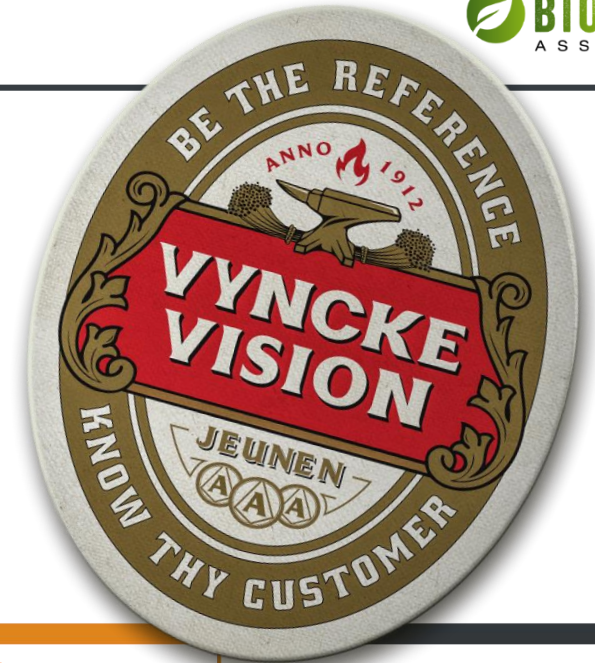
1912-1940

3rd GENERATION

Dirk VYNCKE



1972-2002



1940-1972



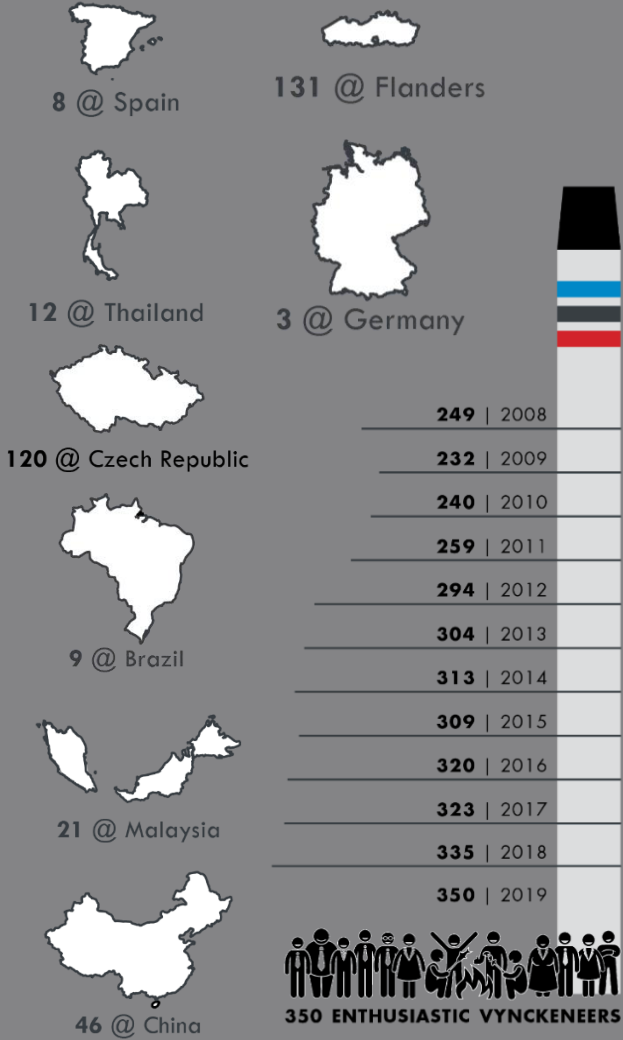
Michel VYNCKE
2nd GENERATION

2002-...



Peter & Dieter VYNCKE
4th GENERATION





COMBUSTION

We are true firemakers! Helping you harness energy through combustion is what we do for a living.

INDUSTRY

Our mission is to energize the industry with respect for our nest.

BIOMASS & WASTE

Organic & solid matter used as a fuel provides a CO₂ neutral source of energy.

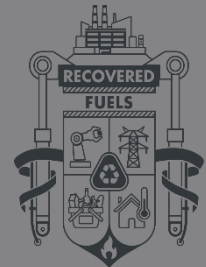
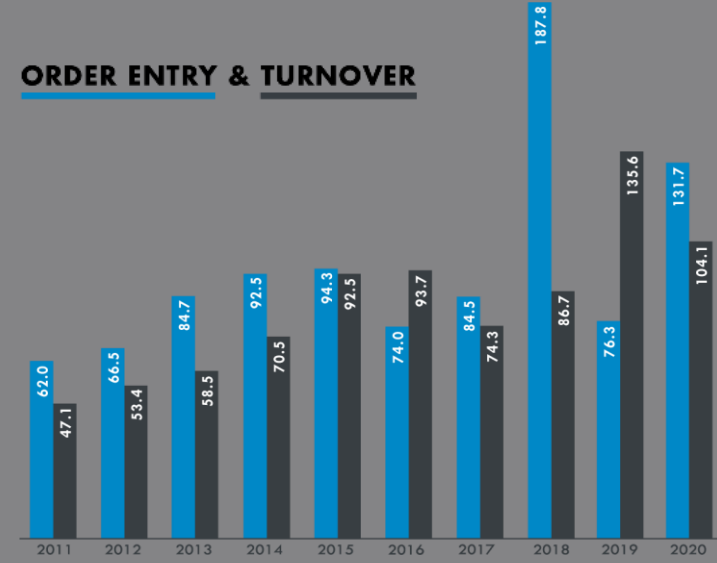
CLEAN

ENERGY

TECHNOLOGY



ORDER ENTRY & TURNOVER



INTRODUCTION & OVERVIEW

VYNCKE & WINDSOR IN A NUTSHELL

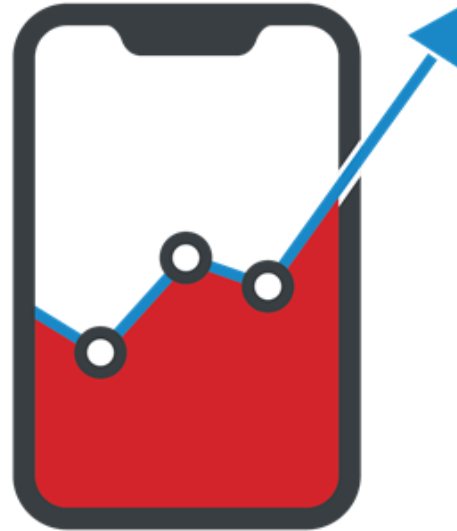
THE SOLUTIONS : WHAT'S IN IT FOR YOU ?

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CARBON CAPTURE UNIT



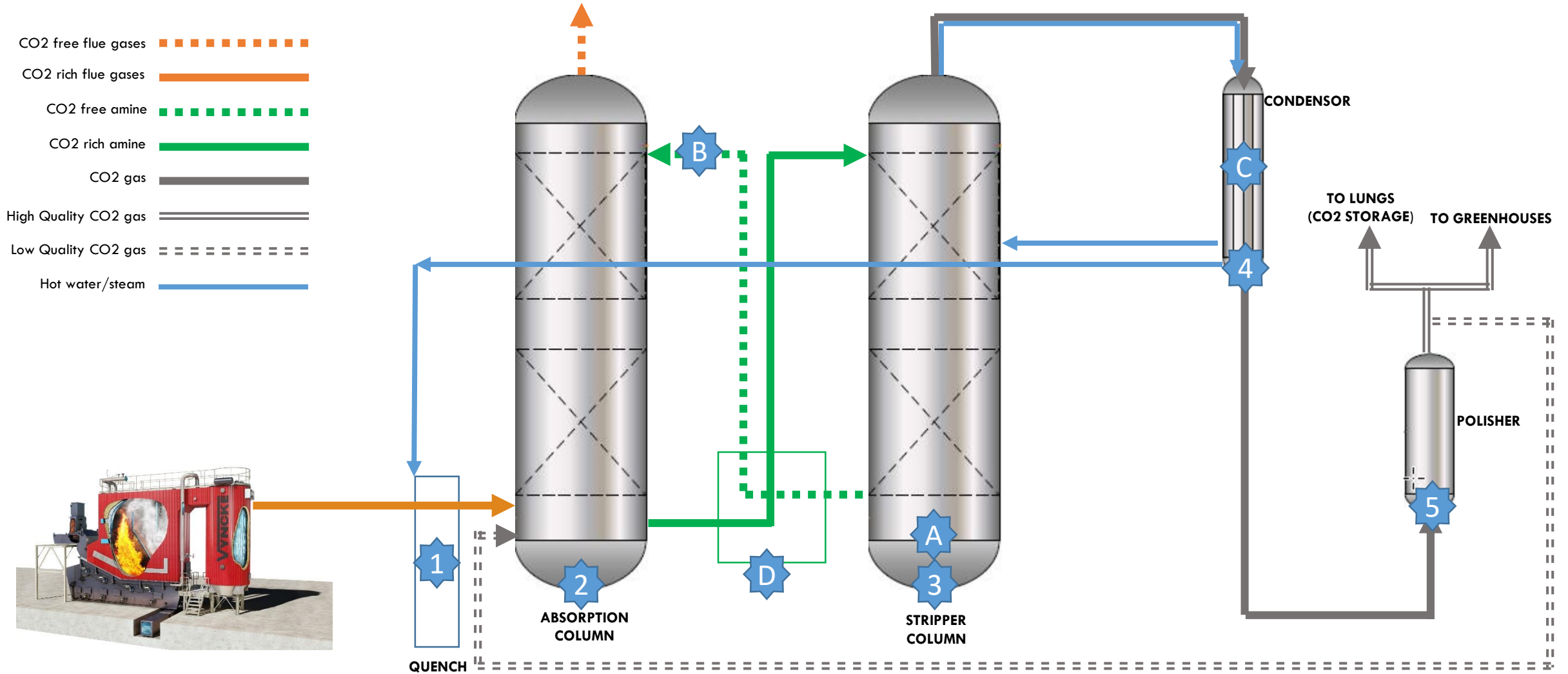
HIGH EFFICIENCY TECHNOLOGIES



TRANSPARENCY BY AUTOMATION



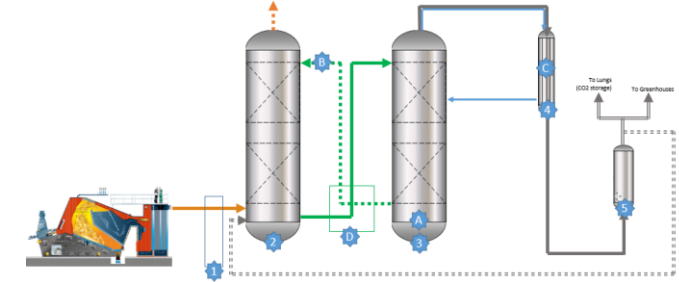
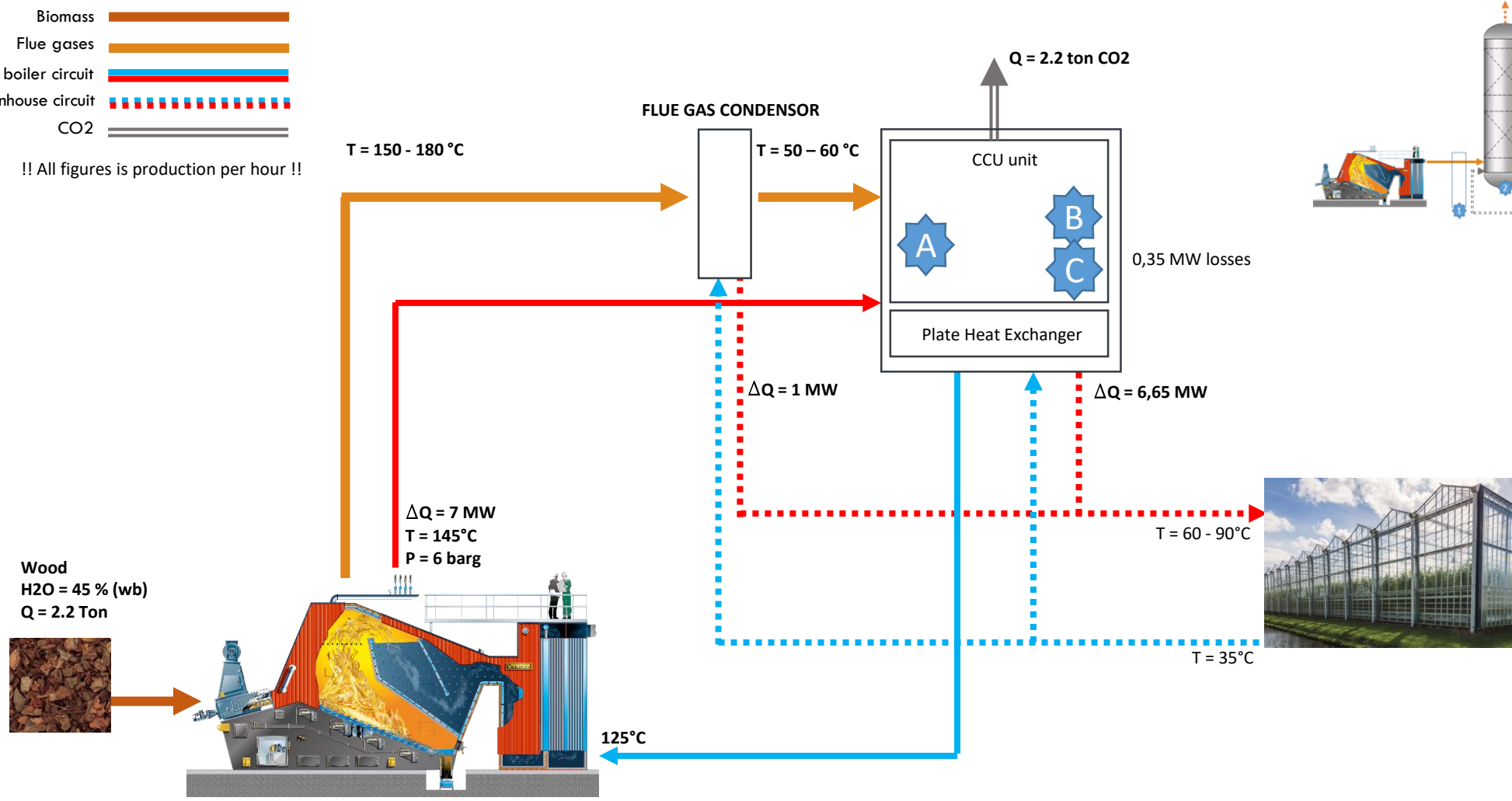
THE SOLUTION | CARBON CAPTURE UNIT - TECHNOLOGY



THE SOLUTION | CARBON CAPTURE UNIT - TECHNOLOGY

- Biomass
- Flue gases
- Water – boiler circuit
- Water – Greenhouse circuit
- CO2

!! All figures is production per hour !!



RULES OF THUMB – TECHNICAL



- 1 ton of woodchips (40%mc) \approx 1 ton of CO₂
- Appropriate emission standards need to be met
 - PM: 5 mg/Nm³
 - No_x 100 mg/Nm³
- Minimum technical/financial viability \geq 1.5 - 2 ton/h CO₂
- Required when there is light (daytime/lighted crop) @ 5,500 equivalent hours/ year

RULES OF THUMB – FINANCIAL



- Feasibility attractive if CO₂ – price \geq 95 – 100 NZ\$
- Reference investment for 2 t/h CO₂ \approx 5M NZ\$
- OPEX \approx 15 NZ\$







SDE++ | STIMULATING RENEWABLE ENERGY

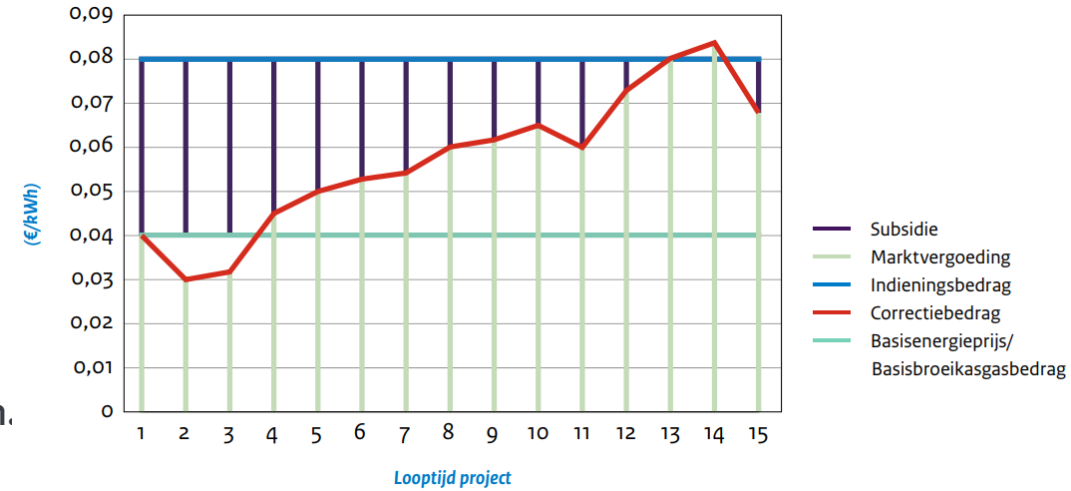
FOCUS: Industrial or non-profit - energy 'prosumers'

PRINCIPLE: Supporting "unfeasible premium" of RE projects vs energy market price. Variable operational subvention.

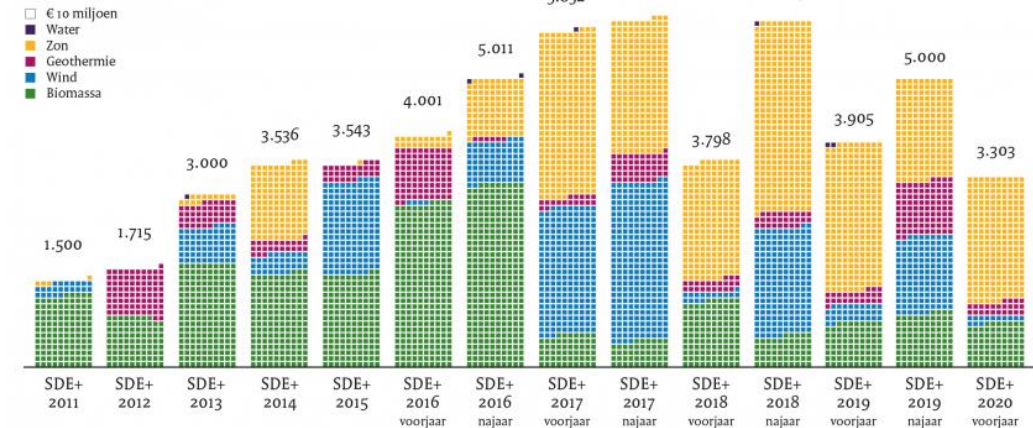
BUDGETS: 5.000.000.000 EUR in 2021

TECHNOLOGY: Changing focus over the different subvention years (renewable electricity/heat/gas; CO₂-reduction)

CRITERIA: Previously mainly for technologies in production of renewable energy (SDE+), currently SDE++ also includes CO₂-reducing technologies: CCS, hydrogen, electrification (boiler), geothermal, heatpumps...

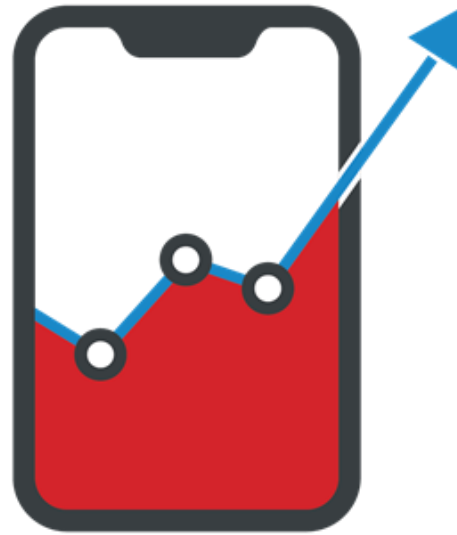


Verplichtingenbudget per technologie in de verschillende SDE+-rondes





CARBON CAPTURE UNIT

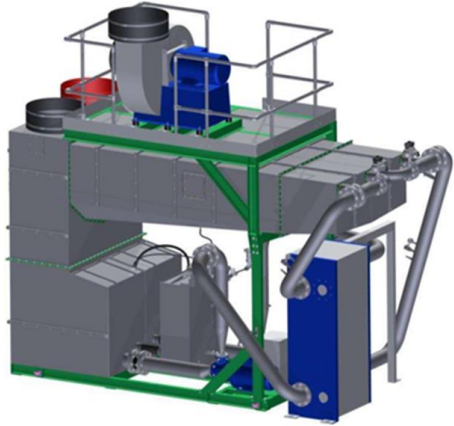


**HIGH EFFICIENCY
TECHNOLOGIES**



**TRANSPARENCY BY
AUTOMATION**





FLUE GAS CONDENSING



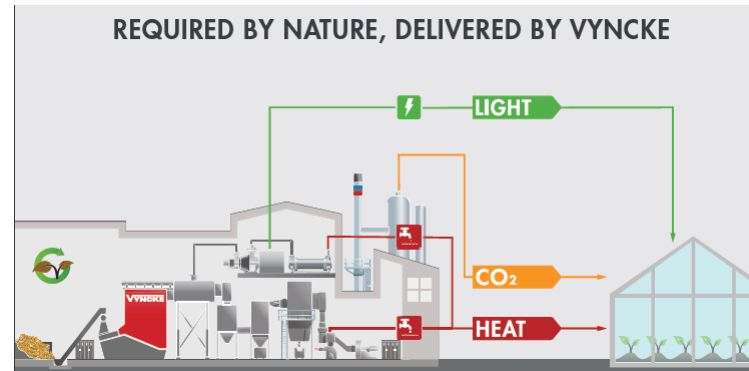
LOW TEMP ECO



COMBUSTION AIR HUMIDIFIERS

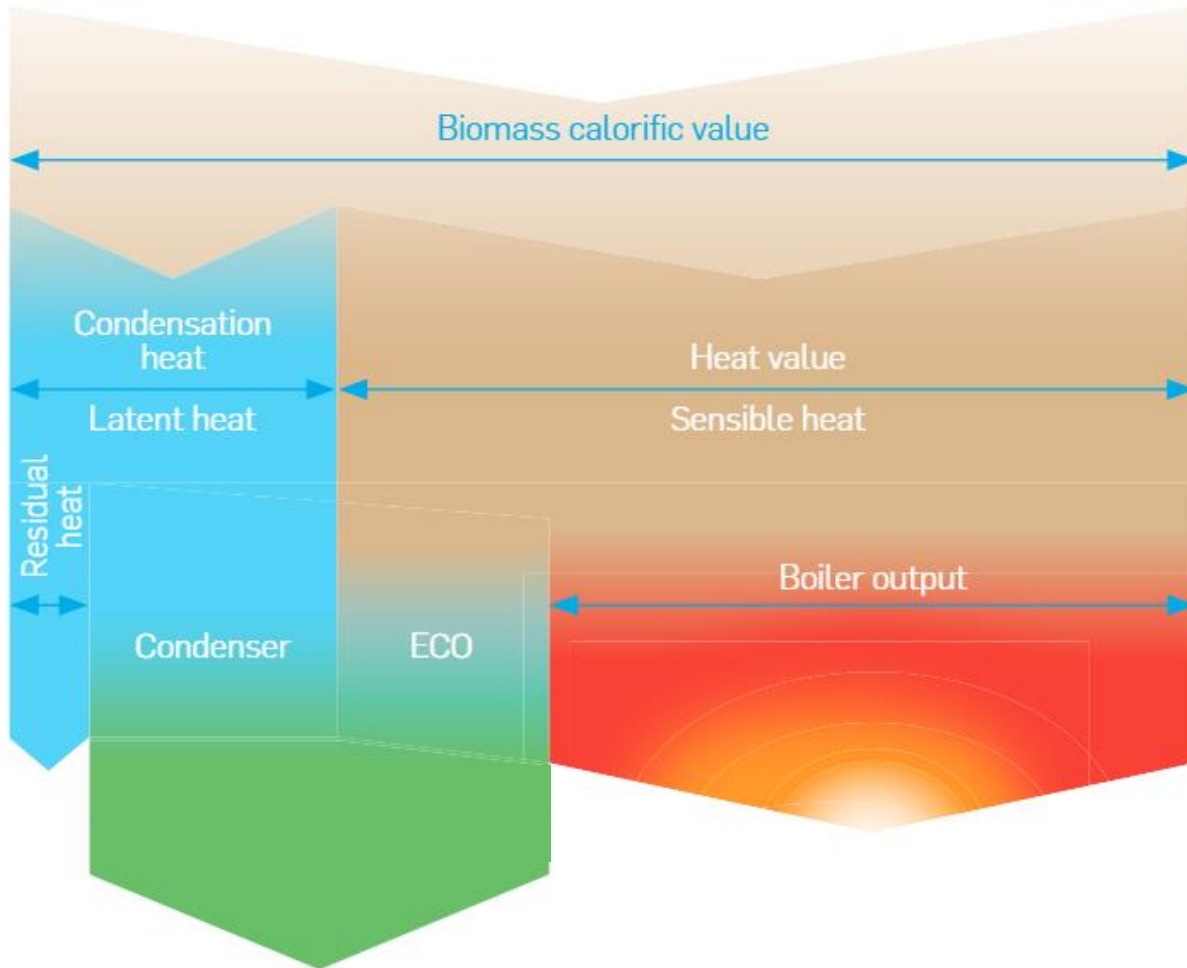


HEAT PUMPS



COGENERATION





CALORIFIC VALUE:

- Lower heating value vs. higher heating value
- Net calorific value vs. gross calorific value

SENSIBLE HEAT:

- Energy (heat) that is added/removed during a process where *temperature changes* but not the *phase*

LATENT HEAT:

- Energy (heat) that is absorbed/released during a process where *the phase changes*

PRACTICAL:

- Biomass boiler manufacturers : efficiency on LHV/NCV
- *Wet fuels*: a lot of latent heat !!



PRINCIPLE Recovery of *sensible heat*

IMPACT Typical increase in efficiency of **5 to 8%**

PRACTICAL IMPLEMENTATION

- Cold sink temperature $< 80^{\circ}\text{C}$ (and well above dew point)
- Stainless steel execution (low flue gas temperatures)
- Installed after the dust filter
- Additional control to prevent condensate (bypass)



PRINCIPLE Recovery of *sensible & latent heat*

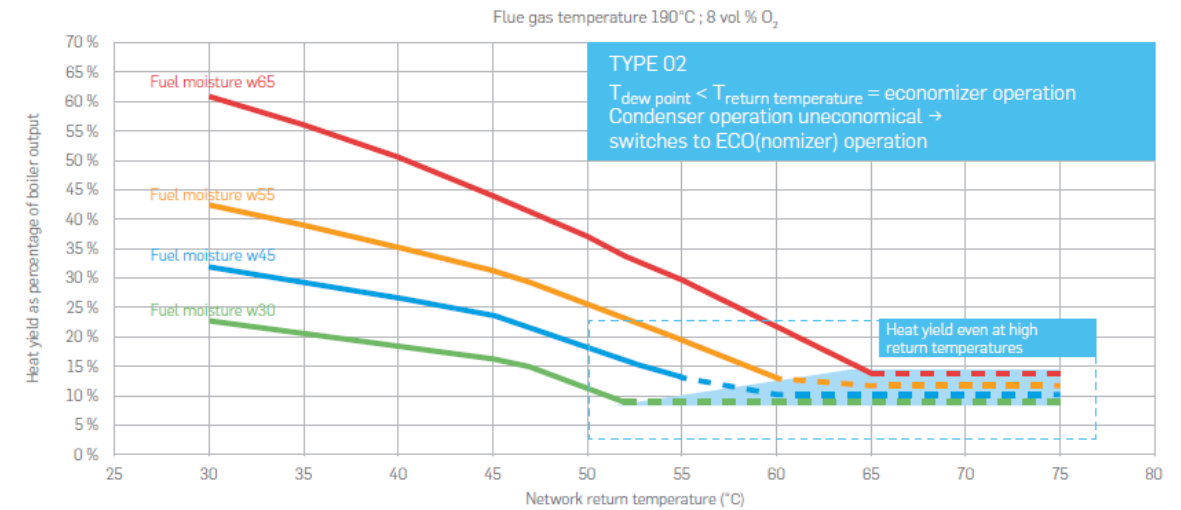
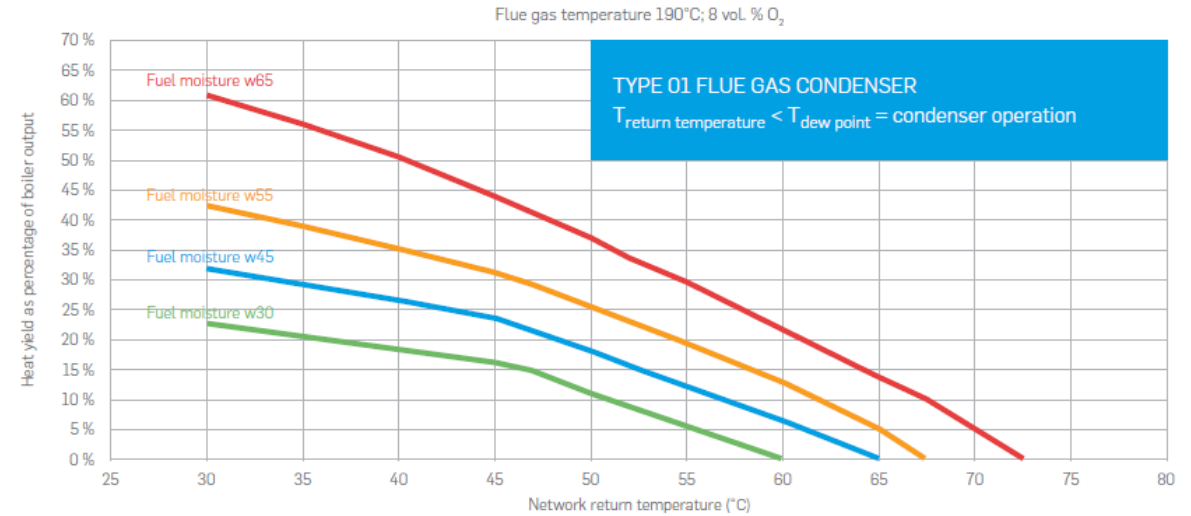
IMPACT Typical increase in efficiency of **10 to 25%**

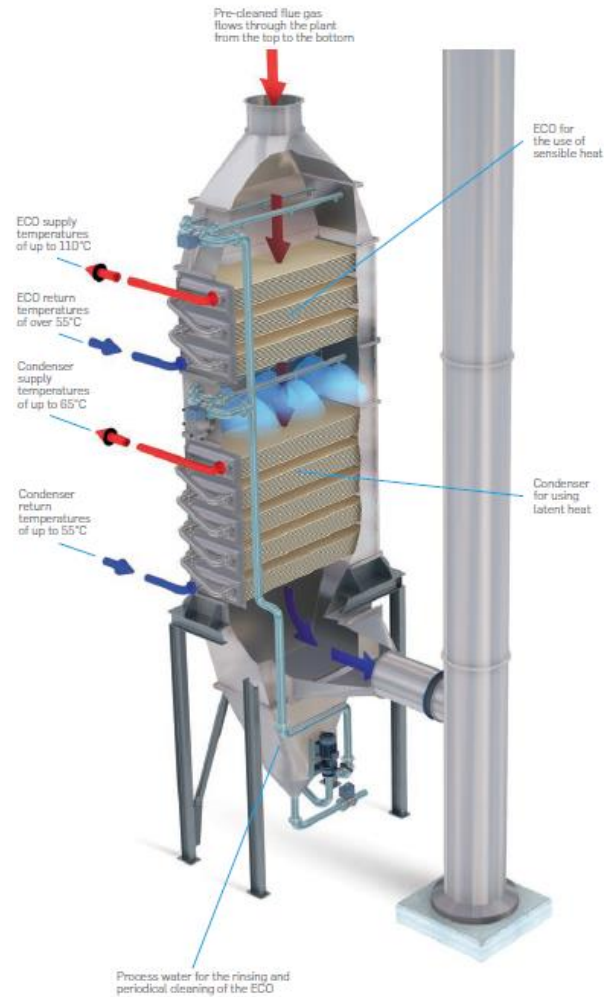
PRACTICAL IMPLEMENTATION:

- Moisture content of fuel $\geq 40 - 45\%$ (dew point!!)
- Average cold sink temperature $\leq 50^\circ\text{C}$
- Stainless steel materials after FGC : ducting & chimney
- Installed after the dust filter

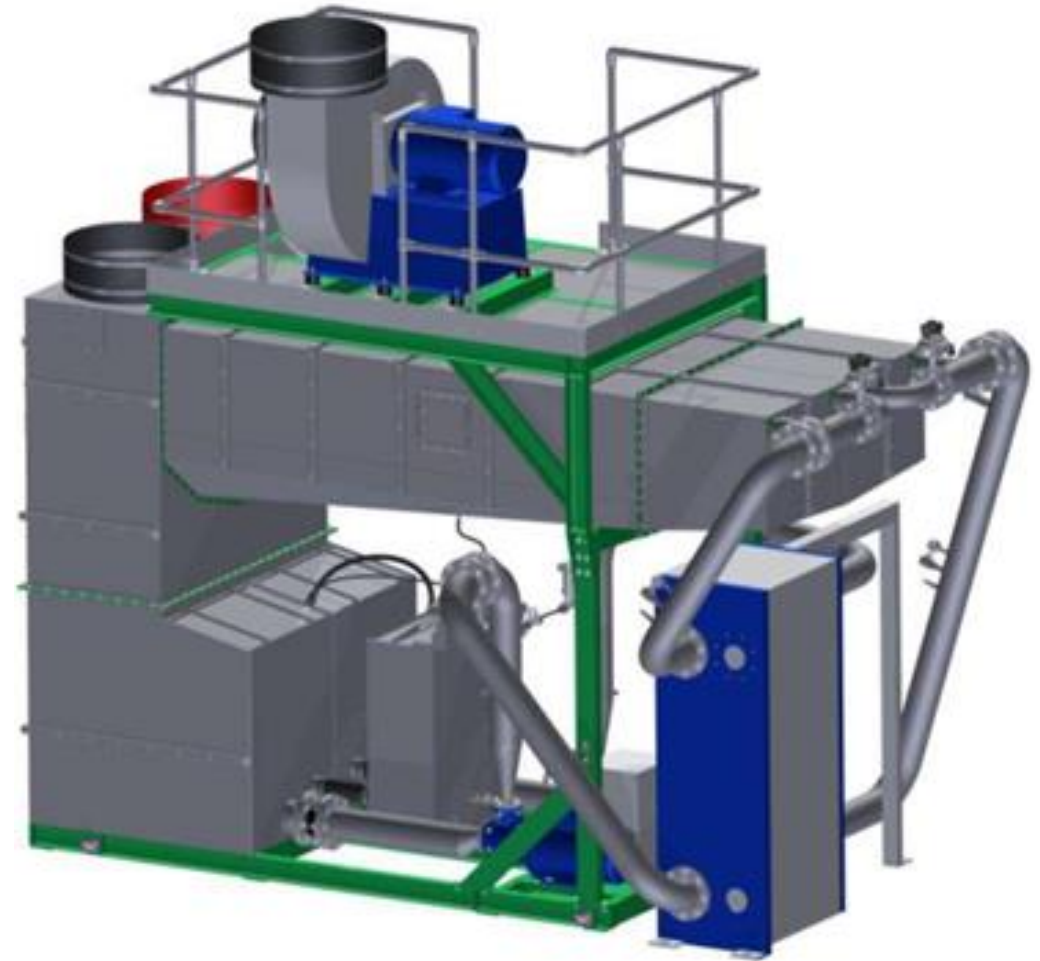
CONSEQUENCES

- Waste water generation (NH_3 , S, Cl)
- Possible need for water consumption with dry fuels





TUBE (INDIRECT) CONDENSATOR

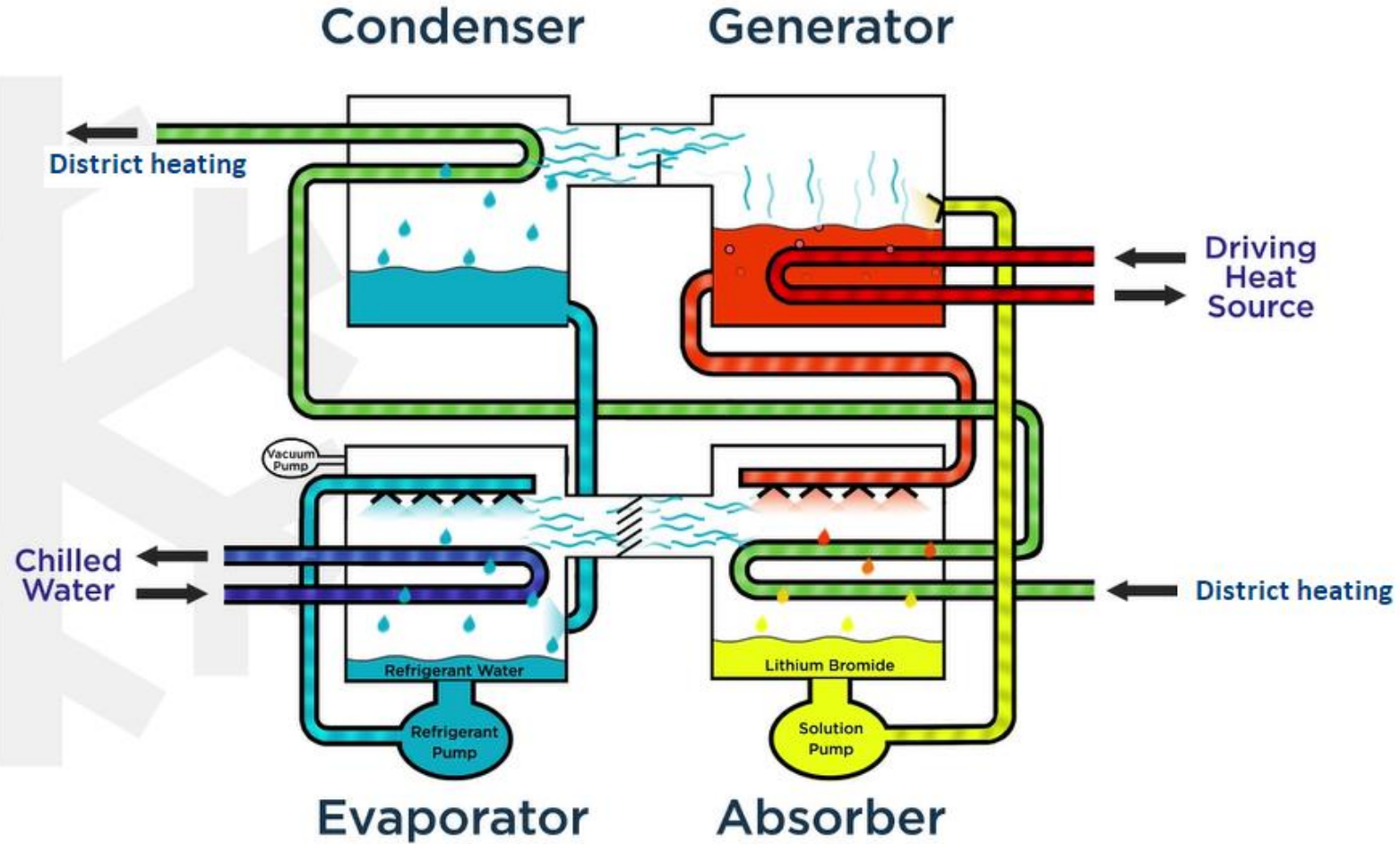


CONDENSING (DIRECT) SCRUBBER

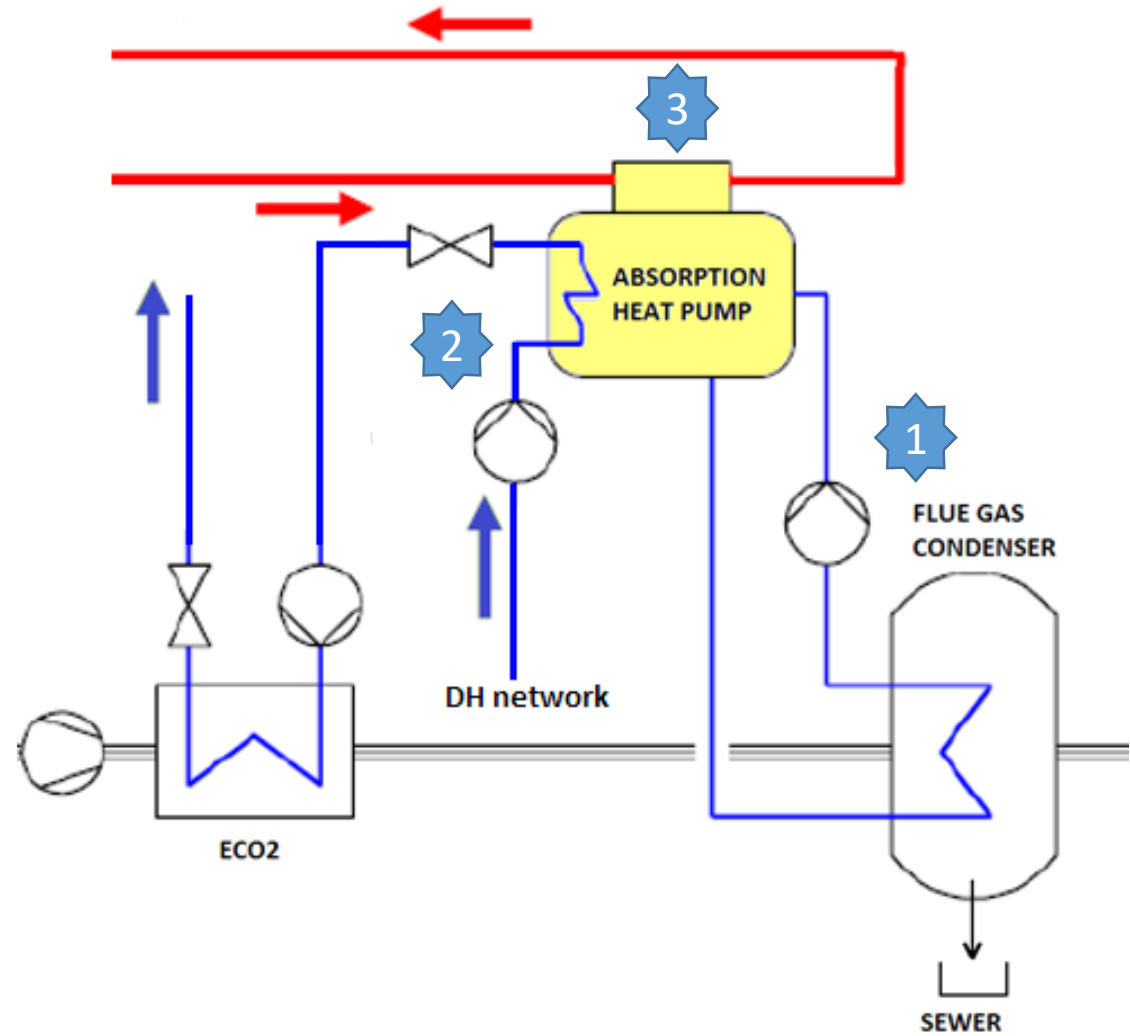


VYNCKE



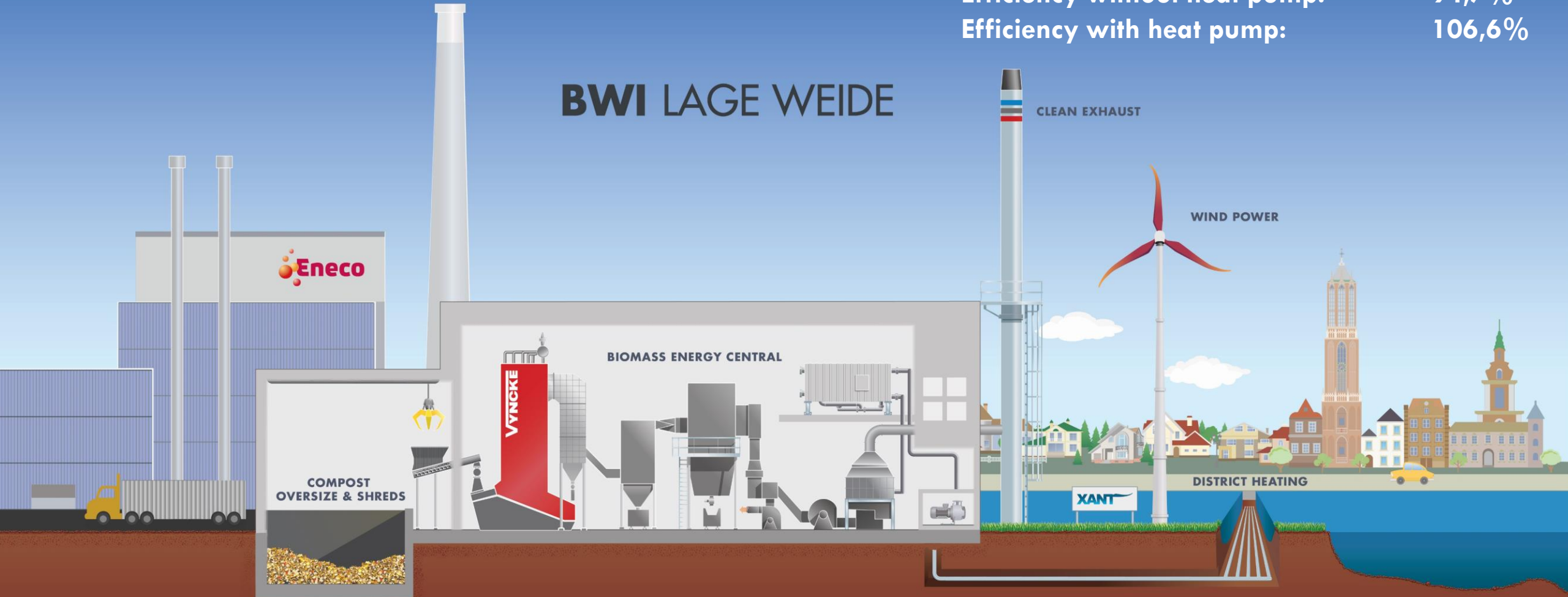


- 1** Waste heat source (flue gas condensate)
- 2** Useful heat output (to process & heating network)
- 3** High temperature source (from boiler)




Efficiency without heat pump: 94,7%
Efficiency with heat pump: 106,6%

BWI LAGE WEIDE






VYNCKE

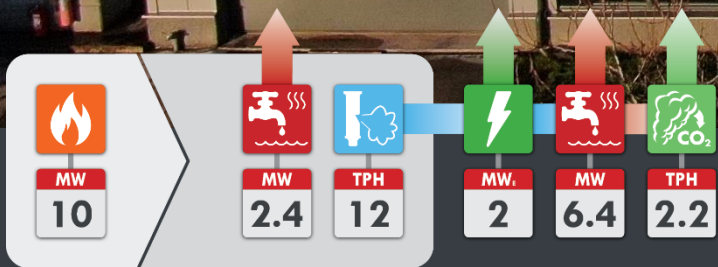
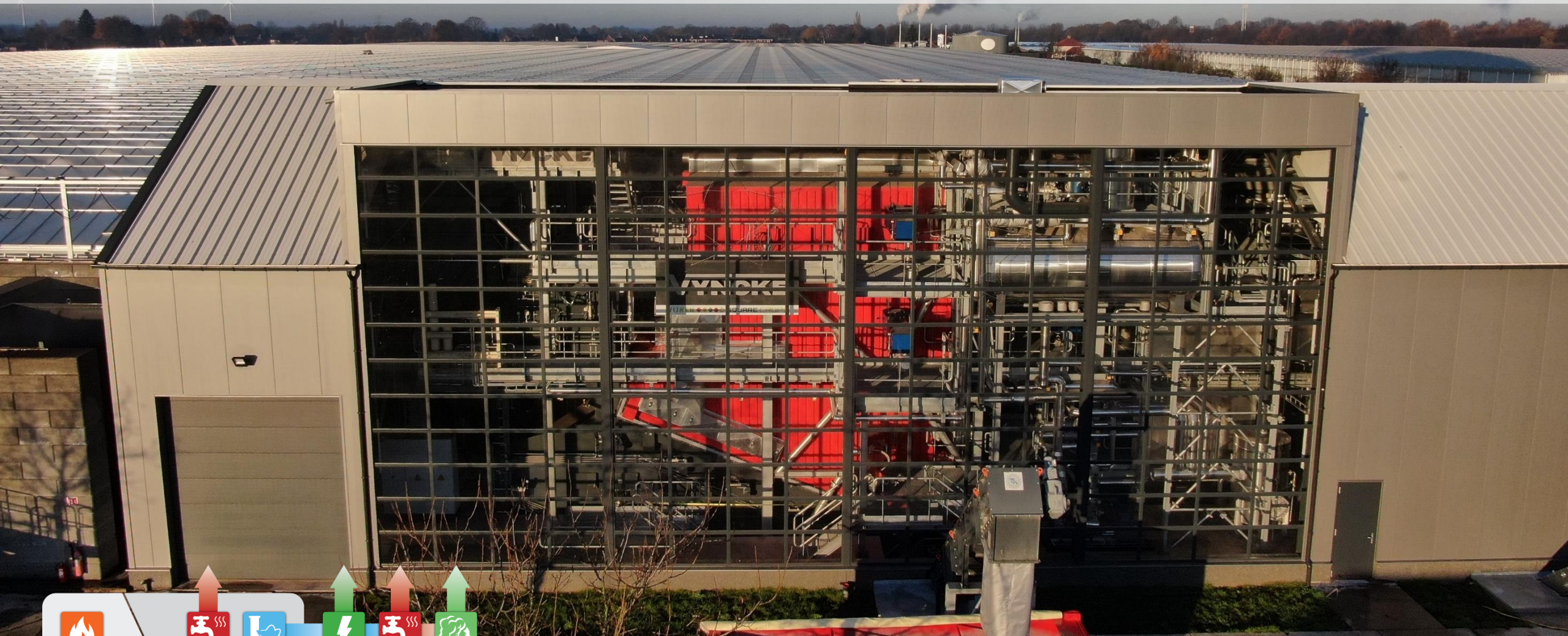


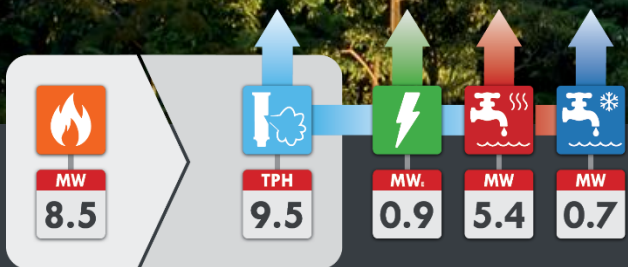
MW
29



MW
31

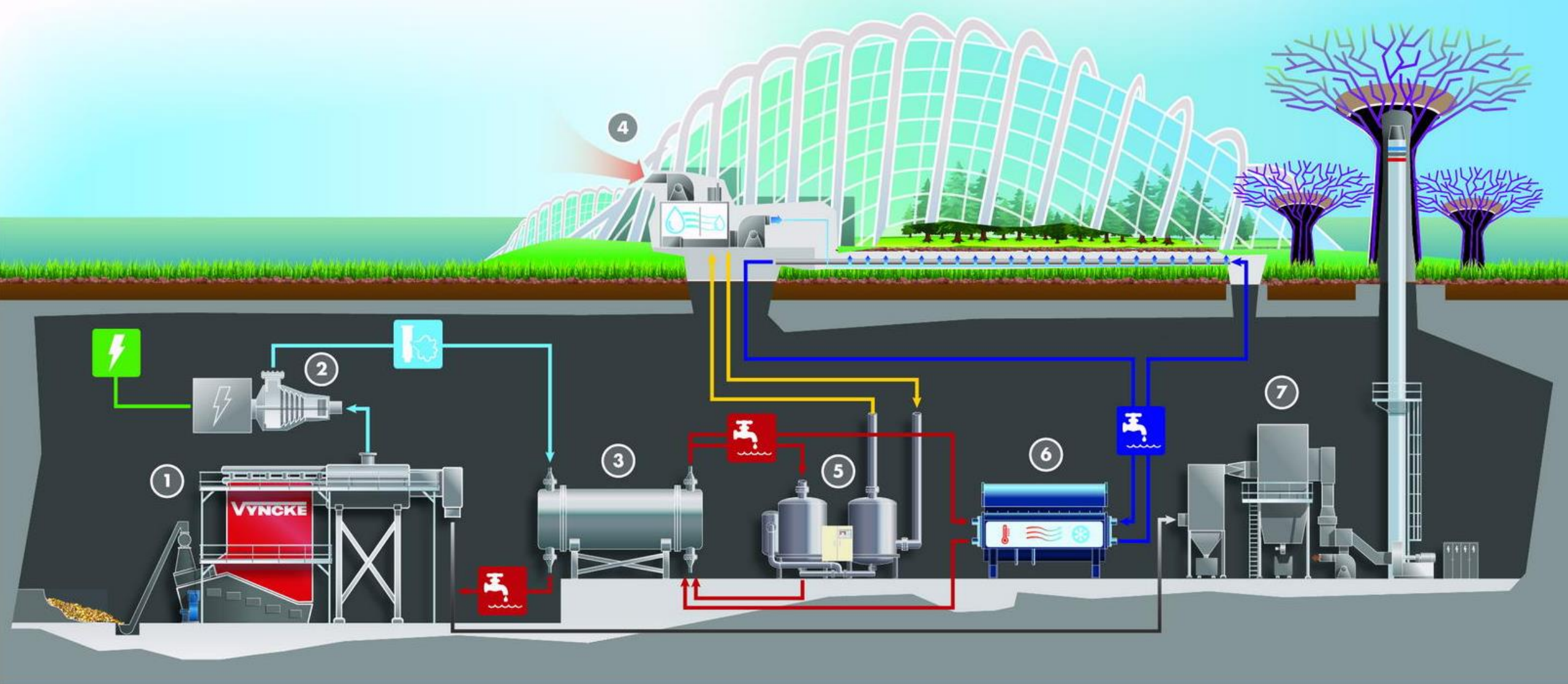






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CLEAN ENERGY TECHNOLOGY
VYNCKE



① VYNCKE BOILER

③ HEAT EXCHANGER

⑤ DESICCANT REGENERATOR

⑦ FLUE GAS TREATMENT

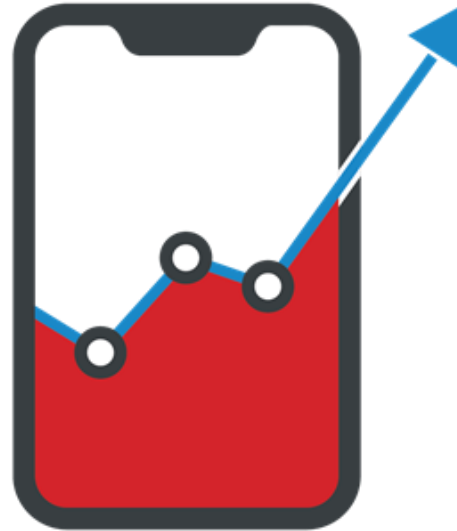
② TURBO GENERATOR

④ DESICCANT DRYER

⑥ ABSORPTION CHILLER



CARBON CAPTURE UNIT



HIGH EFFICIENCY TECHNOLOGIES



TRANSPARENCY BY AUTOMATION





OPERATOR

- VARYING DAILY SHAPE
- QUALIFICATION - EXPERIENCE
- KNOWLEDGE SHARING



GREEN FUEL

- VARIABILITY (HUMIDITY – PARTICLE SIZE)
- SMOOTH STABLE COMBUSTION – RESPONSE TIME
- EMISSION CONTROL



MAINTENANCE

- PLANNING
- EXECUTION TIME
- DOWN TIME



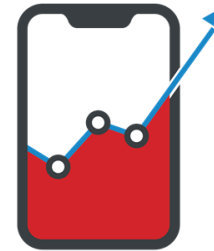
MORE TRANSPARENCY

- CLEARER COMMUNICATION
- ALARMS OVERVIEW
- HIGHER AVAILABILITY
- HEALTH SCORE CARD



OPTIMIZED MAINTENANCE

- REDUCE INTERVENTION TIME
- OPTIMIZE RESOURCES
- REDUCE DOWNTIME



HIGHER PRODUCTIVITY

- EXTENDS PRODUCT LIFE OF CRITICAL COMPONENTS
- IMPROVES EFFICIENCY AND AVAILABILITY OF PEOPLE & ENERGY PLANT



Vyncke test installation
Odiliapeel, The Netherlands

8.7 10

Steam pressure

0.148 bar

↑ 0.148 bar

Combustion hours

1,043.28 h

↑ 1,043.28 h

Firing capacity

0 %

0 %

Oxygen concentration

19.68 %

↑ 19.68 %

Steam pressure

0.148 bar

↑ 0.148 bar

13th May 19 ~ 20th May 19

Compare to

6th May 19 ~ 13th May 19

Overview

Combustion

Overview

General dashboard visualizing the current status of the Vyncke boiler

Steam pressure

17.403 bar

↓ -1.902 bar

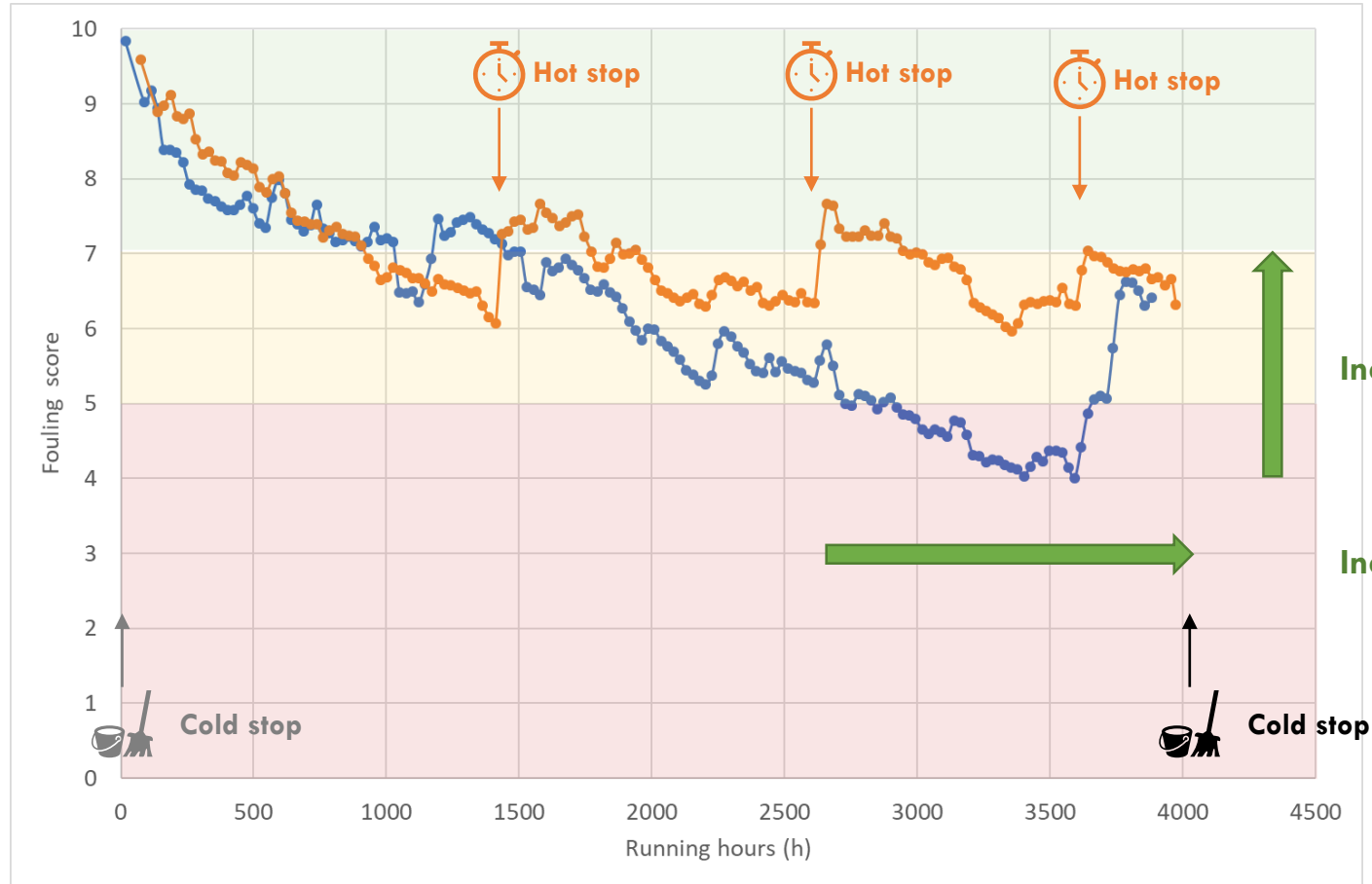
Overall production

9.31 MW

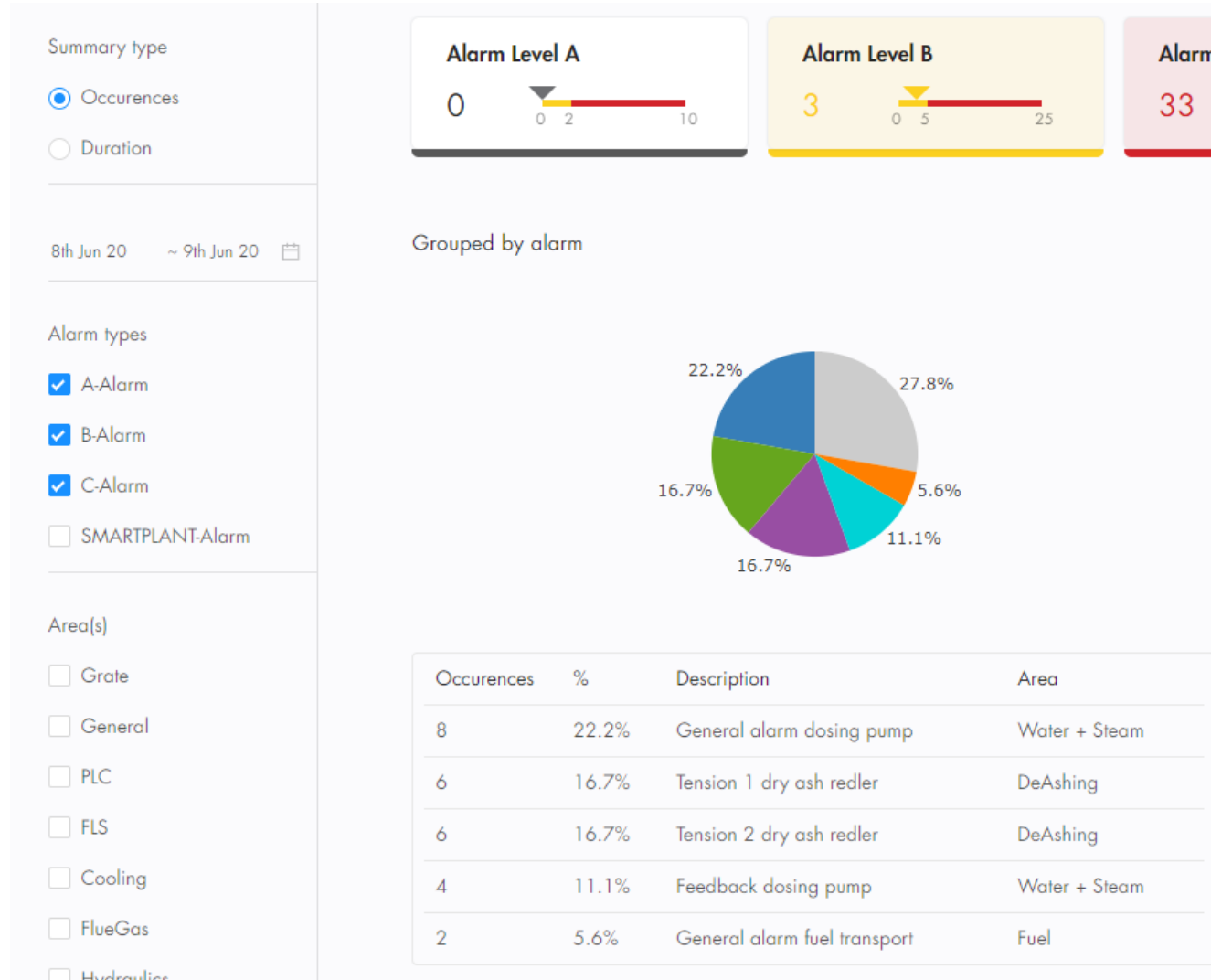
↓ -0.63 MW



THE SOLUTION | AUTOMATION – A REAL LIFE EXAMPLE



THE SOLUTION | AUTOMATION – A REAL LIFE EXAMPLE



VYNCKE & WINDSOR IN A NUTSHELL

INTRODUCTION & OVERVIEW

THE SOLUTIONS : WHAT'S IN IT FOR YOU ?

SUMMARY



SUMMARY | ENERGY PLANT THAT BOOSTS YOUR PROFIT



+ GENERATES ALL THE HEAT, COOLING & POWER YOU WANT:

By using heat from the biomass, you save on bills for natural gas. A cogeneration plant with steam turbine will help you to save on your electricity costs as well and why not look for optimal use with tri-generation.

+ IS READY TO CARBON CAPTURE:

With the addition of a Carbon Capturing Unit, especially adapted to the usage of your solid fuels, you can generate your own CO₂ needed to promote plant growth. So, no more bills for liquid CO₂ and you make your cultivation more sustainable

+ IS FUEL FLEXIBLE & EFFICIENT :

Your combustion system is perfectly fit to burn a variety of solid fuels, thereby reducing your dependency on one single type of fuel. You name it, you burn it! Want to get most out of your feedstock: efficiency tech is there to help !

+ IS FULLY AUTOMATED:

Our energy plant runs automatically and goes unnoticed so you can focus on important things: growing crops!

+ IS AVAILABLE IN NEW ZEALAND:

With the partnership between WINDSOR ENERGY & VYNCKE you have feet on the ground in New Zealand, from idea till your next generation taking over!



SUMMARY | OUR JOURNEY IN THE WORLD OF GREENHOUSES

WIJNEN
SQUARE CROPS

S&A
FRESH PRODUCE

MID-AMERICAN GROWERS

green circle
GROWERS



GARTNERIET

Alfred Pedersen & Søn ApS

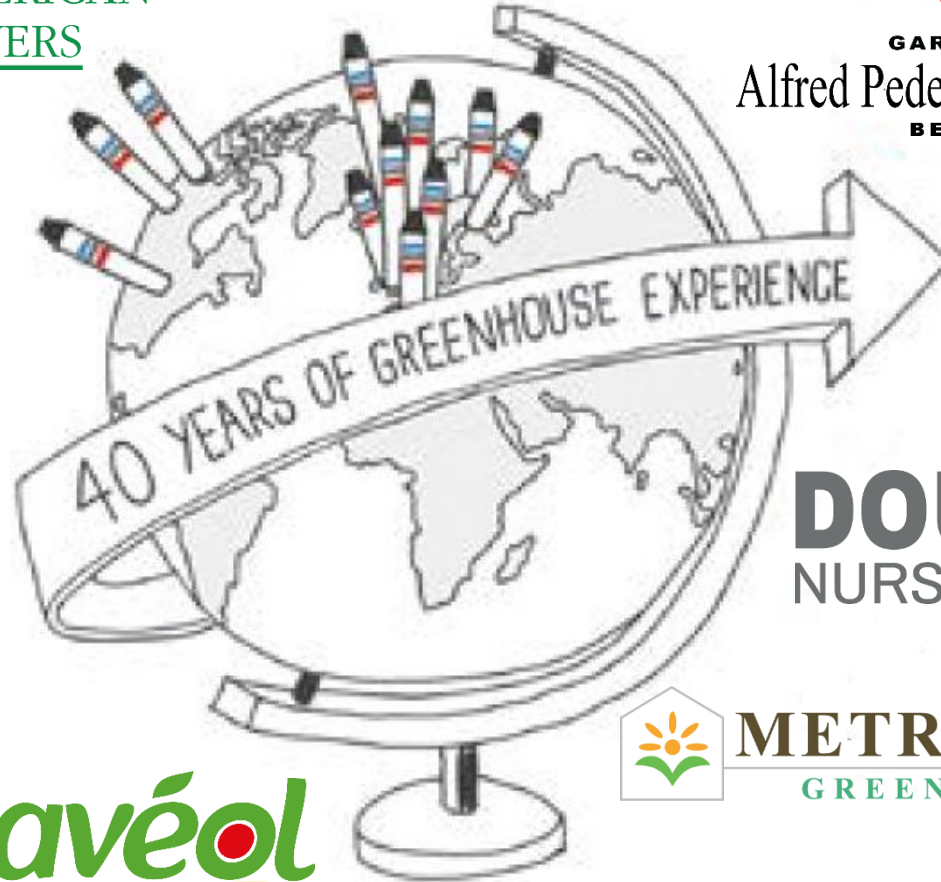
BELLINGE

BelENERGIA
l'investissement renouvelable

Pleasant View
INNOVATIONS IN FLORICULTURE

DES

BAVS
POT- EN TUINPLANTENKWEKERIJ



HORTI POWER

TecnoSEM
PLANTS MARAÎCHERS



HOOGWEG
PAPRIKAKWEKERIJEN

DOUBLE H
NURSERIES LTD

Thomas
PLANTS MARAÎCHERS

rainbow
Growers Group

BEVO
FARMS LTD

METROLINA
GREENHOUSES

bordine's

PRINCE de BRETAGNE

Défendons le goût du frais

Savéol

Kwekerij W.S. Moerman



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QUESTIONS?