



ETIA  
ECOTECHNOLOGIES

# California Forest Biomass Working Group

Biogreen technology presentation

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# CALIFORNIA FOREST BIOMASS WORKING GROUP

# ABOUT VOW AND ETIA



# IMPORTANCE OF CARBON REDUCTION



## Corporate Social Responsibility

Carbon mitigation strategies and roadmaps to become climate neutral becoming a cornerstone activity for industrial groups

## Fossil fuel independence

Increasing effort towards elimination of coal and natural gas in the industry driven by both price uncertainty as well as sustainability

## Future is electric

Growth of the renewables providing easy access to low carbon electricity and prioritizing it as main energy source

## Carbon tax increase

Considered as most powerful tool to combat the climate change, carbon tax is increasing rapidly

## Waste generation

Increasing amount of waste and residues resulting from activities and demanding efficient valorisation



# CALIFORNIA FOREST BIOMASS WORKING GROUP

## KEY FEATURES



**Complete solution for your business**



**Strong business model**



**Wide range of feedstock**



**Powered by electricity**



**Precision of treatment**



**Adjustable operating conditions**



**Track record of over 15 years**

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**Biogreen<sup>®</sup>**  
Continuous pyrolysis since 2003

# CALIFORNIA FOREST BIOMASS WORKING GROUP

# BIOGREEN: SPIRAJOULE INSIDE

Spirajoule - Electrically heated screw conveyor

Process temperature **easily adjusted** up to 850°C (1200°C under development)

## Industrial and proven technology

Simple, easy to operate

Robust, low maintenance

Plug flow system, homogenous treatment

Fossil free technology

Flexible: capacity to reach each product specifications

A precise, continuous and homogenous treatment for high quality final products

## MAIN APPLICATIONS:

HEATING IN CONTROLLED  
ATMOSPHERES

Oxidising conditions  
(power to heat)

Reducing conditions  
(pyrolysis)



Archimedes – 287 BC  
Screw conveyor

**Electrified**

Joule effect  
Screw as a resistance heater

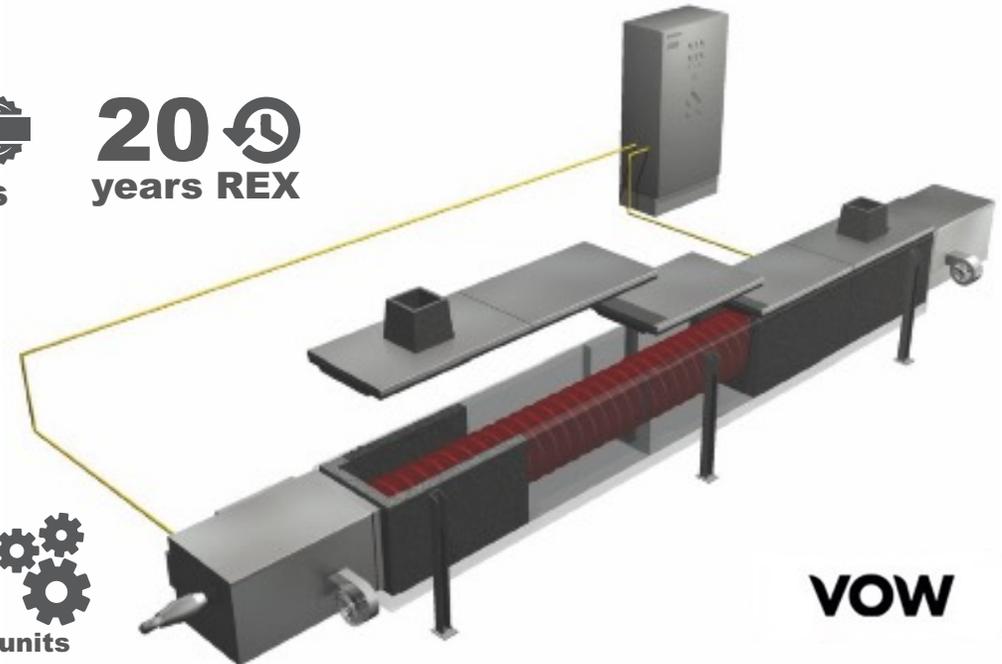


ETIA – 1999  
Electrically heated screw conveyor

**10**   
patents

**20**   
years REX

**150**   
installed units



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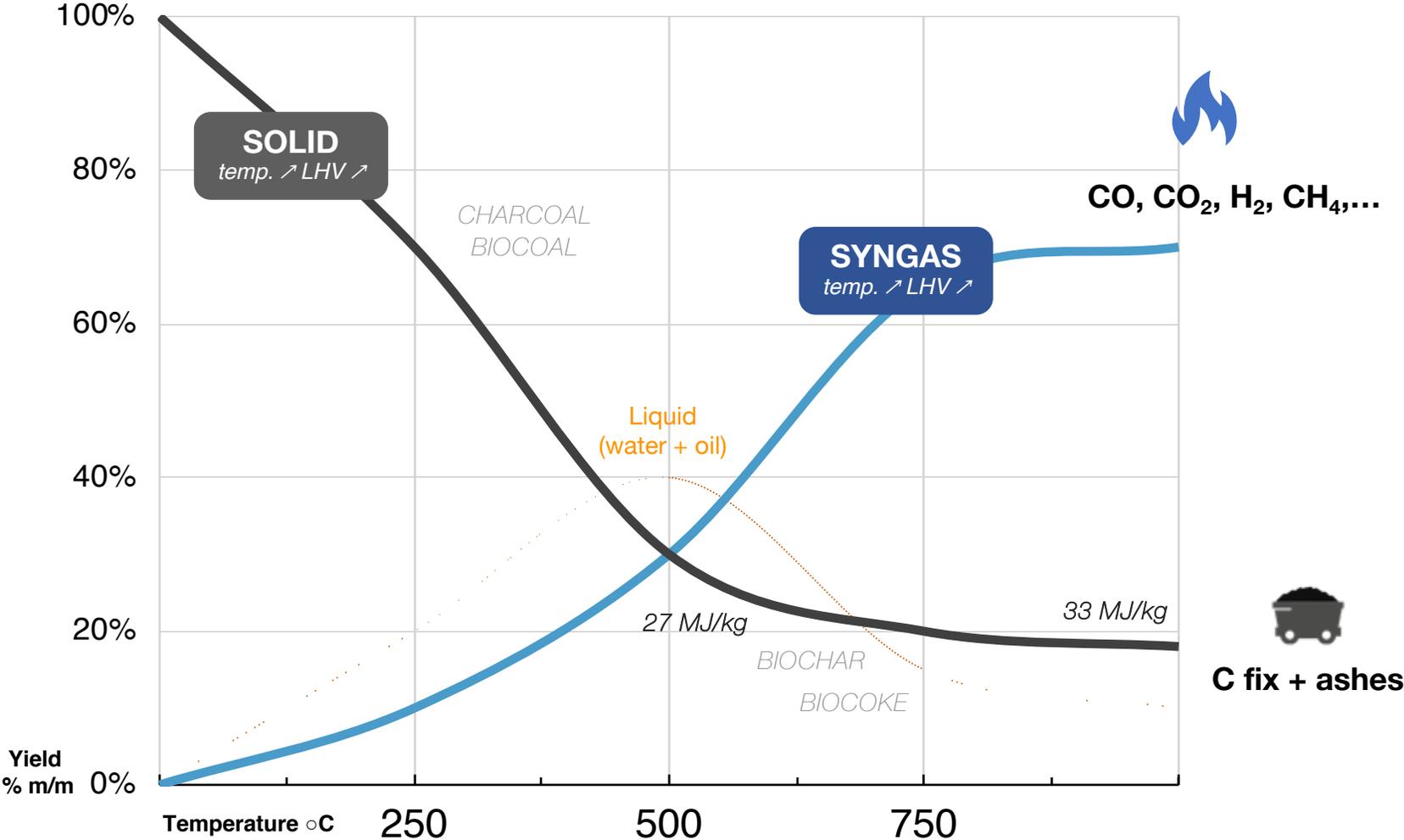
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# SPIRAJOULE IMPLEMENTATIONS

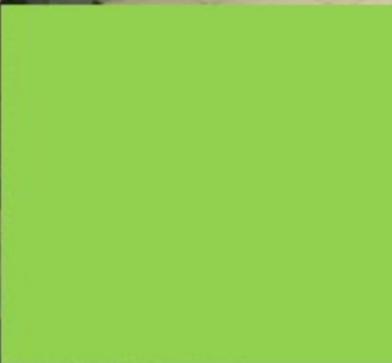


# CALIFORNIA FOREST BIOMASS WORKING GROUP

## FINE TUNED PROCESS CONDITIONS



# CALIFORNIA FOREST BIOMASS WORKING GROUP TESTING CENTERS



Our strategy: world-wide  
competence centers.

Around 100 tests each  
year since 2009



Process performance  
measurement



Analysis of the feedstocks  
and syngas composition



Mass and energy balance  
of the process

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Performing the small scale thermochemical process on pilot equipment provides the information necessary for  
designing industrial unit according to performance and business model validation

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# BIOGREEN PRODUCT RANGE

FROM PILOT SCALE

TO INDUSTRIAL PLANTS



RnD units

Mobile and stationary pilot equipment for testing and development of new bio-based products



Containerised units

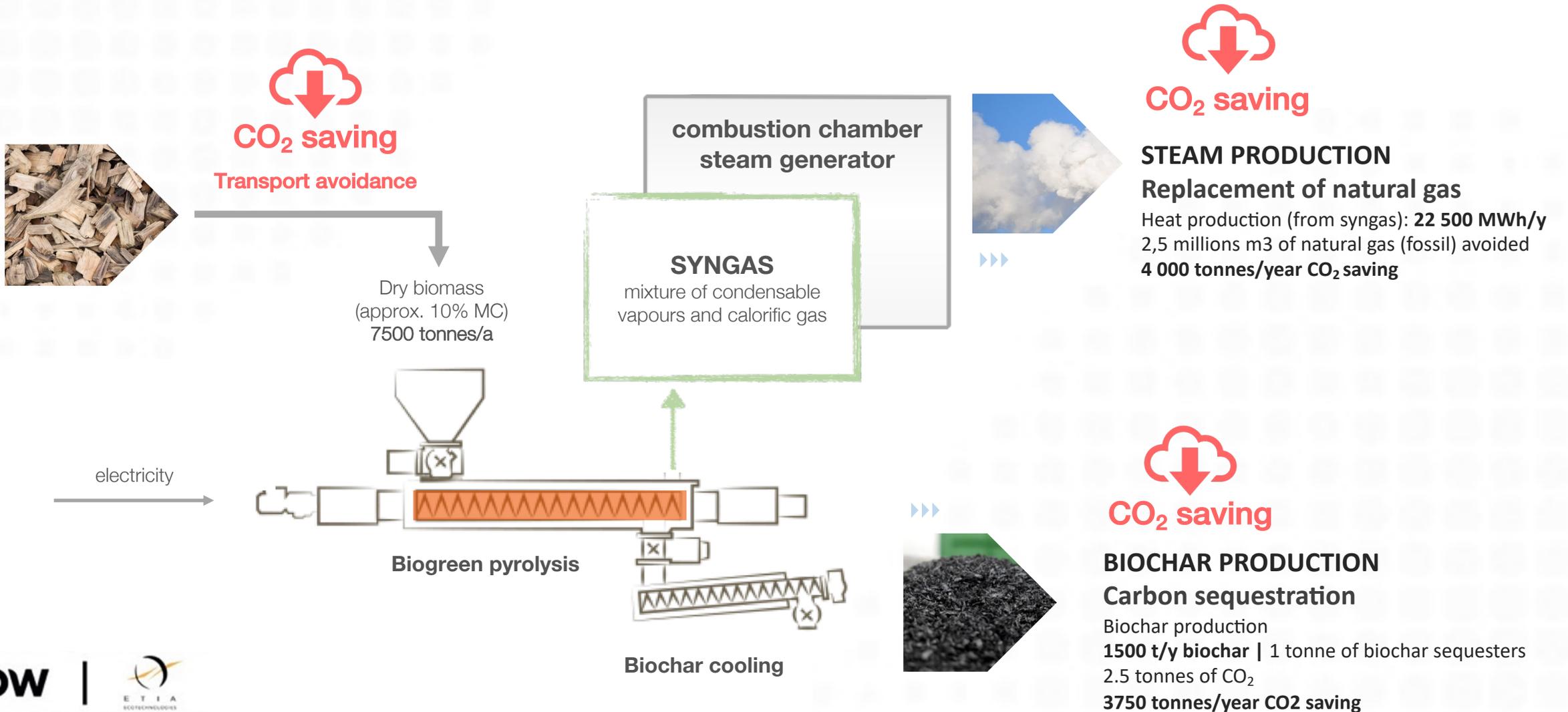
Compact, plug & play equipment for simple installation and easy configuration on site.



Stationary plants

High capacity equipment for stationary applications, often several machines operating in parallel.

# CARBON NEGATIVE SOLUTION



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# BIOCHAR FOR AGRONOMY

**biochar®**

**WATER RETENTION OF NATURAL ORIGIN**

N° Homologation AMM 6150003  
Product certified under the name Hydrochar WB1

Approved for use in organic agriculture in conformity with the regulation of (CE) N° 834/2007

**anses**

**RÉPUBLIQUE FRANÇAISE**

**HYDROCHARB guaranteed composition:**

|                                       |              |
|---------------------------------------|--------------|
| Dry matter min.                       | 80%          |
| Vegetal coal min.                     | 80%          |
| Organic carbon min.                   | 64%          |
| Capacity of water retention (wv) min. | 80%          |
| Granulometry                          | 0.125 - 4 mm |

**Packaging:**

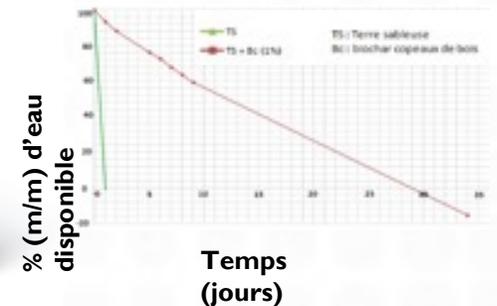
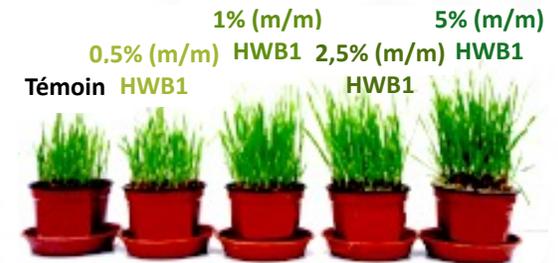
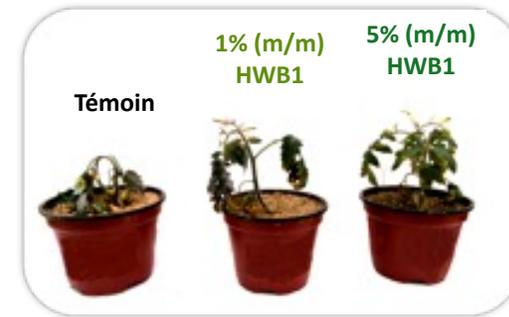
- Supplied in bulk form or pallet:
- Buckets : 0.5 up to 2 liters
- Bags : 5 liters
- Big bags : 1 up to 1,5 m3

**Application method**

|                              | Application method   | Time of application  |
|------------------------------|--|--|
| Direct soil application      | Trees planting or transplants of plants<br>i.e. 15 kg for 1 m <sup>2</sup> of soil                 | Uniform and homogeneous mixture applied into the soil, in the planting hole. |
|                              | Plant division, fruit, vegetable, forest, ornamental species of plants                             | Placement in the planting rows, 10 cm. width applied with 10 cm. depth       |
| Mixing with growing media    | Class seeding<br>1 up to 5% min<br>i.e. 500 à 2500 g per m <sup>2</sup> of soil                    | Mixed with the top 5 cm. of the soil   |
|                              | Plant division, planting of various crops  | 1 up to 5% min<br>i.e. 5 up to 20 g per liter of media                       |
| Mixing with organic additive | Soil preparation<br>1.5 up to 8 (3/4)year<br>i.e. 40 t/ha of mixture with 20% (v/v) Hydrochar(WB1) | Application to the soil amendment or incorporating into the soil.            |
|                              | Soil upgrading<br>0.5 up to 4 (3/4)year<br>i.e. 20 t/ha of mixture with 20% (v/v) Hydrochar(WB1)   | Application to the soil amendment or incorporating into the soil.            |

(\*) based on dry soil, density 1 g/cm<sup>3</sup>

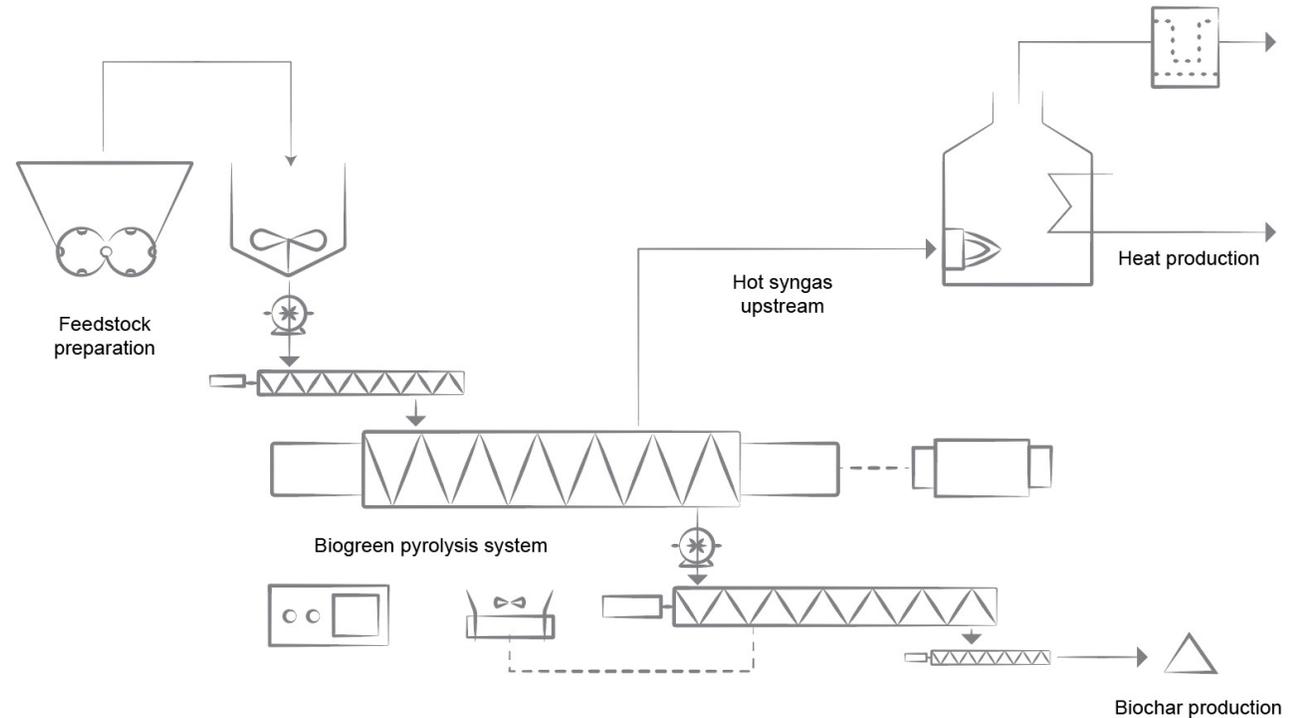
- APPLICATIONS:**
- 1st 100% biosourced water retenter
  - 1st biochar authorized by the french regulation
  - 1st biochar with ECOCERT certification
  - To the soil (sowing, transplanting, planting)
  - Mixed with an organic soil
  - Mixed with a growing medium





# CALIFORNIA FOREST BIOMASS WORKING GROUP BIOCHAR PRODUCTION

CONVERSION OF GARDEN WASTE INTO VALUE



VALUE RECOVERY FROM WASTE – CARBON SEQUESTRATION –  
CIRCULAR ECONOMY WITHIN THE REGION

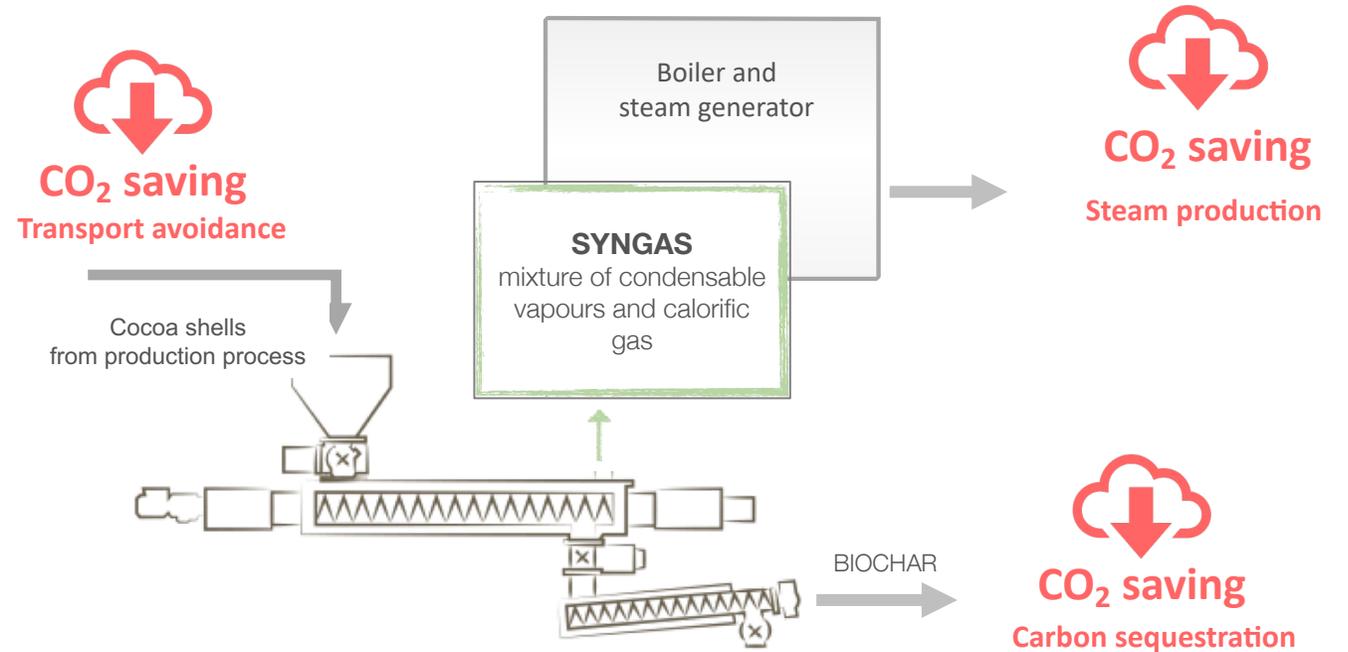
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# CALIFORNIA FOREST BIOMASS WORKING GROUP BIOCHAR AND STEAM

DECARBONIZATION OF FOOD SECTOR



VALUE RECOVERY FROM RESIDUES – CARBON SEQUESTRATION  
– CIRCULAR ECONOMY

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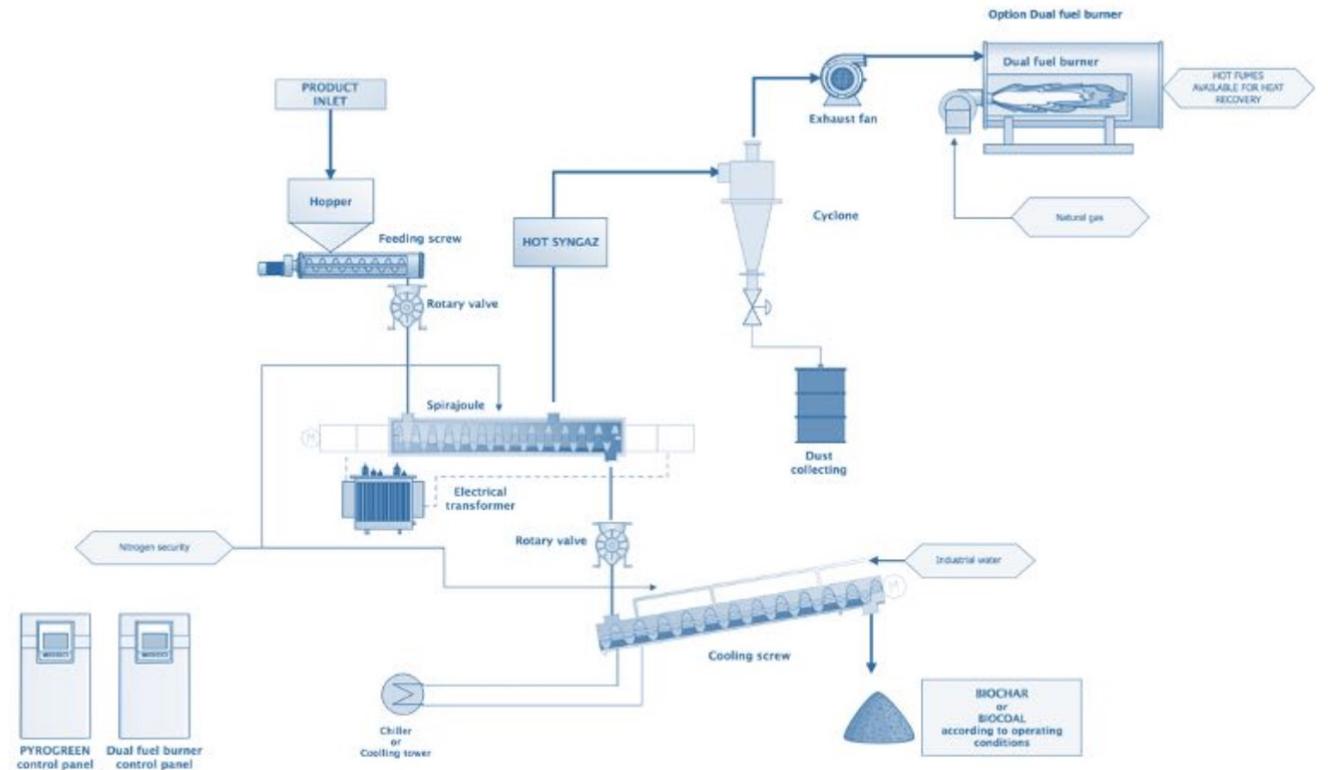




## DECARBONIZE AND ENERGIZE WEBINAR

# BIO-COKE PRODUCTION

DECARBONIZATION OF METALLURGY SECTOR



HIGH CARBON CONTENT BIO-COKE – REDUCTION OF CO<sub>2</sub> EMISSION FROM STEEL MANUFACTURING – SUBSTITUTION OF FOSSIL FUELS

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# OUR OTHER APPLICATIONS



## Minerals treatment

Heat for variety of applications: calcination, dehydration of minerals, catalyst regeneration, devolatilization, sterilisation of inorganic powders and many more



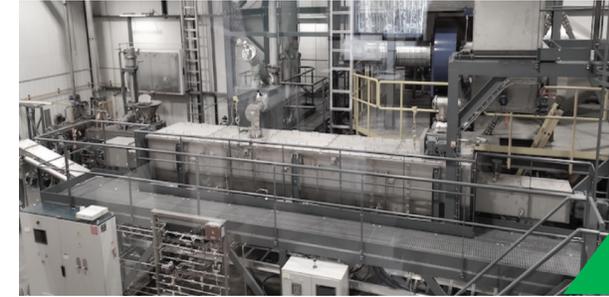
## Biocoal

Replacing fossil coal in power plants by biocoal coming from biomass  
First industrial demonstration unit in Japan to produce biocoal from sewage sludge



## Biocoke

Replace the fossil coal by biogenic fuels (biocoke) in metallurgy industry as a reducing agent  
First pilot plant implemented in Sweden, another two machines under production



## Biochar

Creation of a circular economy with biomass and agriculture residues while keeping carbon in soil  
Producing first certified biochar in France for water retention (Hydrochar WB1)



## Bio-oil

Producing biooil to create liquid flavours and food aromas. Industrial machines in operation with the first implementation done in 2003  
Wood vinegar under development



## Bio-methane and hydrogen

Producing biomethane or/and hydrogen from biomass that cannot be used directly in the digesters  
First pilot plant under evaluation



## Plastics to molecules (CH<sub>4</sub> + H<sub>2</sub>)

Conversion of plastics into gas molecules like methane or hydrogen  
First pilot (R&D) under development and evaluation



## End of Life Tires treatment

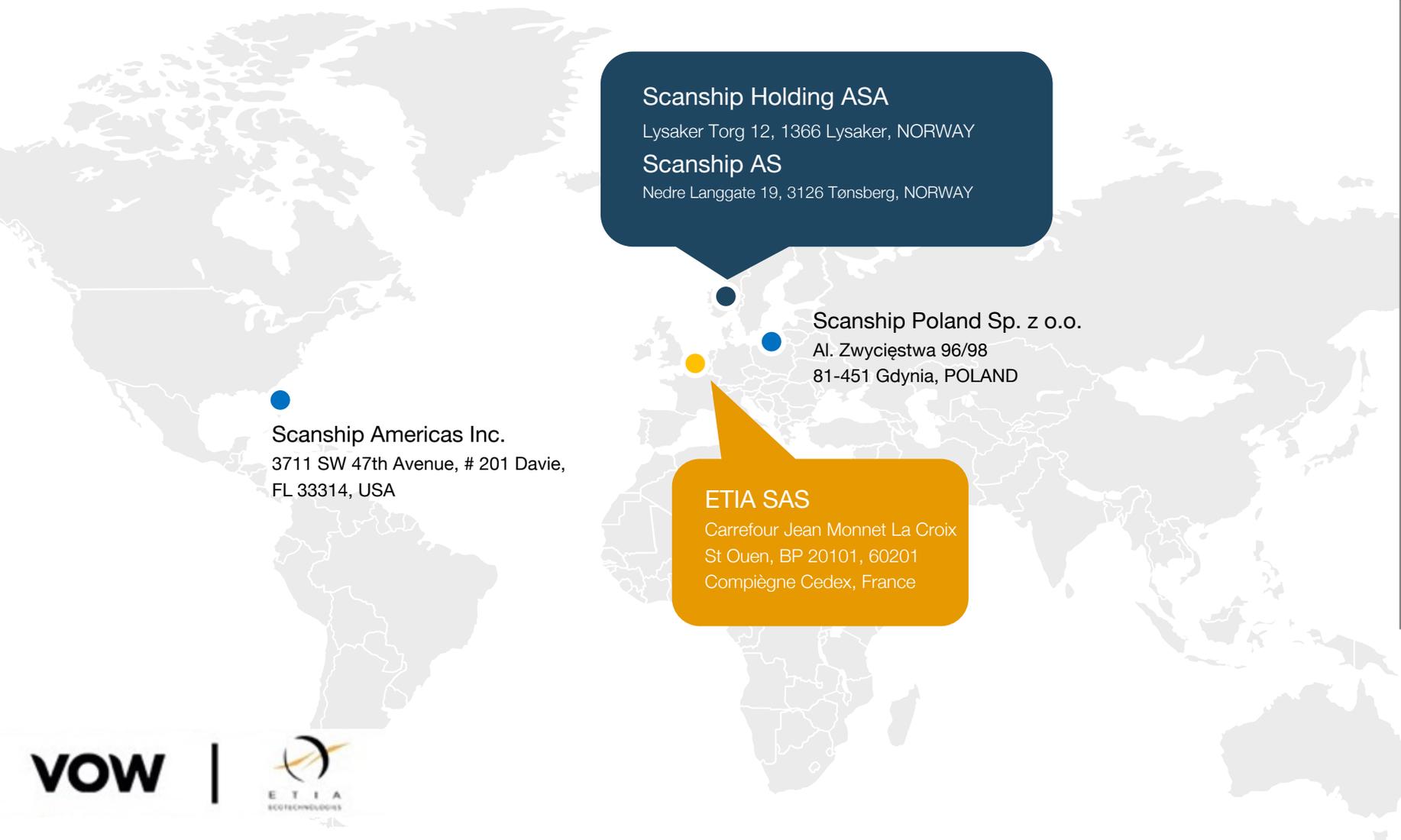
First pilot (proof of concept) realized and successful  
First industrial plant under construction

# QUESTIONS



## DECARBONIZE AND ENERGIZE WEBINAR

# LEARN MORE – CONTACT US



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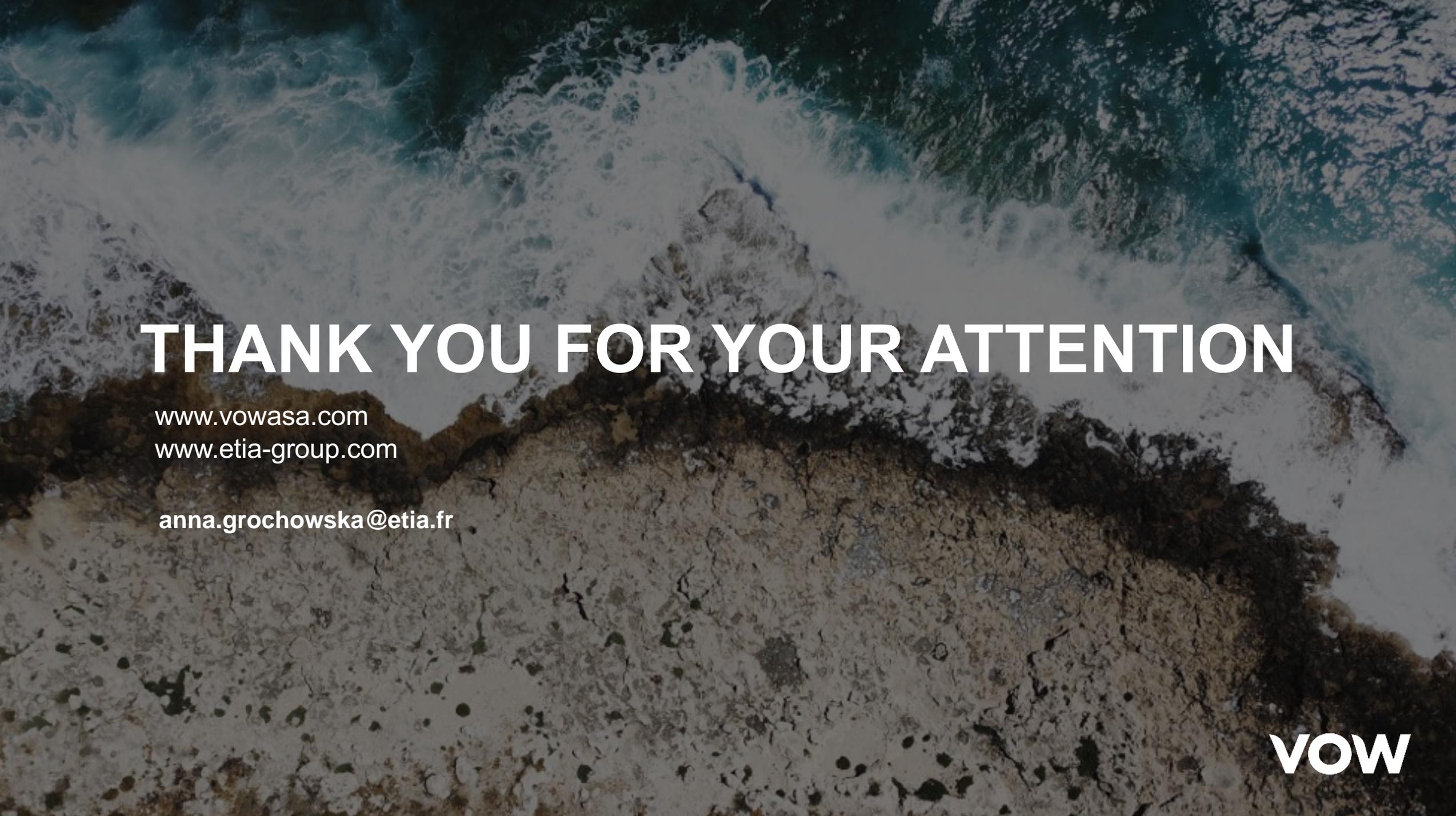
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**THANK YOU FOR YOUR ATTENTION**

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