

# DERVAL Experimental Farm

« *a Living Lab for energy transition and circular economy* »



# *Derval, an experimental farm to reduce environmental footprints in agriculture*

## Environmental actions since 2008 :

- Evaluation of environmental footprint in dairy production
  - Mineral fertilisation consumption
  - GHG emissions
- Diagnostics for energy consumption in milking activities and adaptations to reduce the consumption (milking robot)
- Supporting farm for the agricultural machinery training center in Nozay :
  - Evaluations of fuel consumption in tractors and farm machinery
  - Trainings on eco-driving for tractors
- Valorisation of manure and digestate (reduction of organic fertilisation)
- Optimisation of feeding systems to reduce enteric methane emissions
- Adaptation to climate change
  - Crop and variety choices to mitigate climate changes



## What we already do :

- Biogas plant : SAS DERVAL Agri-Méthane with 5 other farms and other partners:



Derval  
Agri-Méthane



SUEZ



- Main technical data :
  - Type of process : liquid phase
  - Type of digester : concrete tanks
  - Biogas valorisation : cogeneration
  - Electrical power of the unit: 450 kWe
  - Thermic energy is used through an heat network to the local swimming pool and the local high school heating system
  - 50% of entrants in the digester (circa 10.000 tons) are farm-based coming from the 6 farms in the SAS, the rest is industry by-products collected by Suez



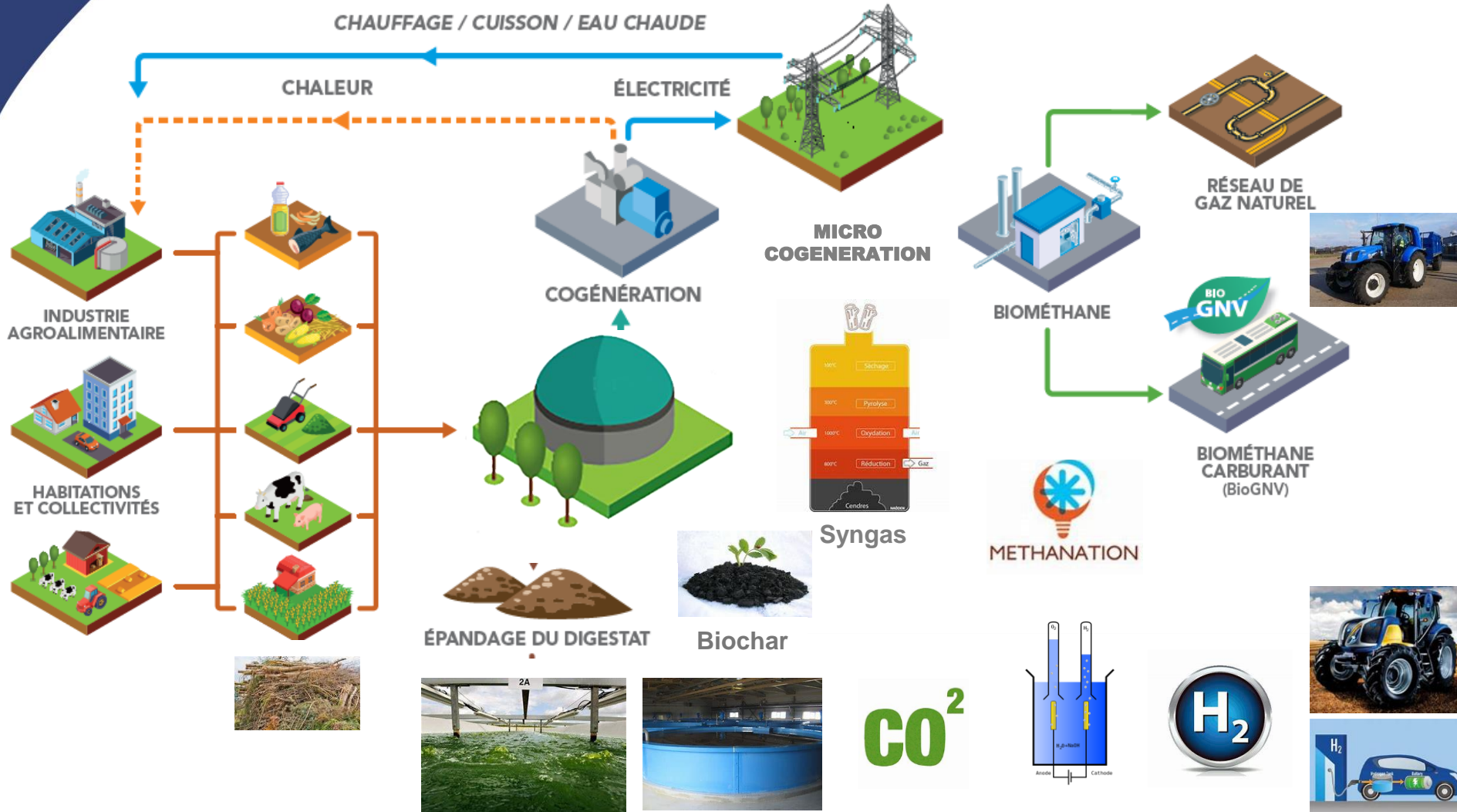
# *Derval, a farm for new ideas: a living lab for energy transition and circular economy*

## New and emerging topics

- Development of new techniques for local, farm based and bio-based energy production
  - Bio-methane injection, gazeification, electrolysis, BioNGV, hydrogen
- Co-construction, demonstration and spreading of technologies with public and private stakeholders
  - Living Lab members : CEA Tech, IMT, GRDF, Naoden, Derval, CC Châteaubriant–Derval, Agricultural High School of Derval, Sydela...
  - LIVERUR H2020 project: involvement of economical stakeholders, citizens ...
- Development of new energy uses and new business models for valorisation of biomass
  - Gas network, fuelling stations, green mobility
  - Micro-algae production, biochar production and valorisation (feed, fertilisation)



# Derval, a farm-lab to showcase energy and bioeconomy solutions



# *Derval, a farm-lab to showcase energy and bioeconomy solutions – current state of play*

Studies  
Simulation  
Action plans

Real-size  
experiments

Ferme de  
DERVAL



Local actors:  
CC  
Châteaubriant  
- Derval

Multi-actor  
approach –  
Living Lab

Pilots  
Demonstration  
Trials

Sharing  
Dissemination  
Uptake

# Derval, a farm-lab to showcase energy and bioeconomy solutions – next steps

2020

Local potential for  
methanation /  
gazeification

Modelisation /  
unit simulation



1. Supplies: quantities, physico-chemical characteristics of local bio-based resources
2. Current valorisation chains, limits to waste production for the source

1. 20 years ahead prospective for energy use on farm (electricity + heat) and outside the farm (biogas in gas network)
2. Economical and logistical schemes for a renewable biogas value chain in the Derval region

Demonstration:  
feasibility ?

# Derval, a farm-lab to showcase energy and bioeconomy solutions – next steps

2020

Local potential for  
methanation /  
gazeification

Modelisation /  
unit simulation

**Micro-methanation unit  
(10 kWe)**

SAS Derval Agri-méthane  
cogeneration up to 450 kWe

**Gazeification pilot unit ?**



Communauté de communes



Syngas



**MICRO  
COGENERATION**

Demonstration:  
feasability ?



# Derval, a farm-lab to showcase energy and bioeconomy solutions – next steps

## 2020-2021-2022

Biomethane  
Syngas

Digestate  
Biochar

**Potential valorisations:**  
Hydrogen, CO<sub>2</sub>, biomethane  
(cogeneration + electrolysis,  
methanation, steam  
reforming)

**Potential valorisations :**  
fertilisation, feed ...



Demonstration:  
feasibility ?

- Trial and demonstration of biomethane, electrical or hydrogen tractors and machinery
- Co-generation pilot + electrolysis for hydrogen ?
- BioNGV fuelling station ?

Field trials for digestate use  
as fertilisation on grasslands  
Trials for biochar uses ?

# Renewable Biogas : new uses and new business models

## 2020-2021-2022

Heat + CO2

Research study on micro-algae potential (species, use, markets, potential value chains)

Heat + digestat

Pilot reactor for liquid digestate based micro algae



Châteaubriant Derval  
Communauté de communes

Demonstration:  
feasability ?

# *Derval, a farm-lab to showcase energy and bioeconomy solutions – next steps*

## 2020-2021-2022



Exchanges between partners and stakeholders, researchers, experts ... new synergies and collaborations

Sharing  
Dissemination  
Uptake

Open doors on farm, seminars, conferences, local workshops to foster the energy transition

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THANK YOU !!

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