



TAKING  
**COOPERATION**  
FORWARD

 Udine, 05/10/2021

 **D.T3.3.2 - Experience Exchange Workshop**  
*Pilot implementation in Udine (Italy)*

 CITYCIRCLE | UNIVERSITA' DI UDINE | PATRIZIA SIMEONI, GIOVANNI CORTELLA,  
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# WHERE WE STARTED FROM...

## ■ Industrial-Urban Symbiosis

- The presence in the area of two "service plants"
- The presence of an adjacent industrial area.
- The presence of thermal waste (heat otherwise dissipated) and fuels deriving from the construction of a waste treatment plant



# TIMELINE OVERVIEW



## Data collection



- Visits to the plants
- Analysis of technical documents

## Technology identification



- Waste recovery and energy efficiency oriented technologies

## Scenario identification



Identification of best feasible scenarios based on different synergies combination possibilities

## Preliminary solution



- Technical environmental assessment preliminary solutions identification
- Solutions' strength and weaknesses identification

## Business model draft

- Business model structuring
- Technical economic environmental assessment solutions identification

## Decision support system development

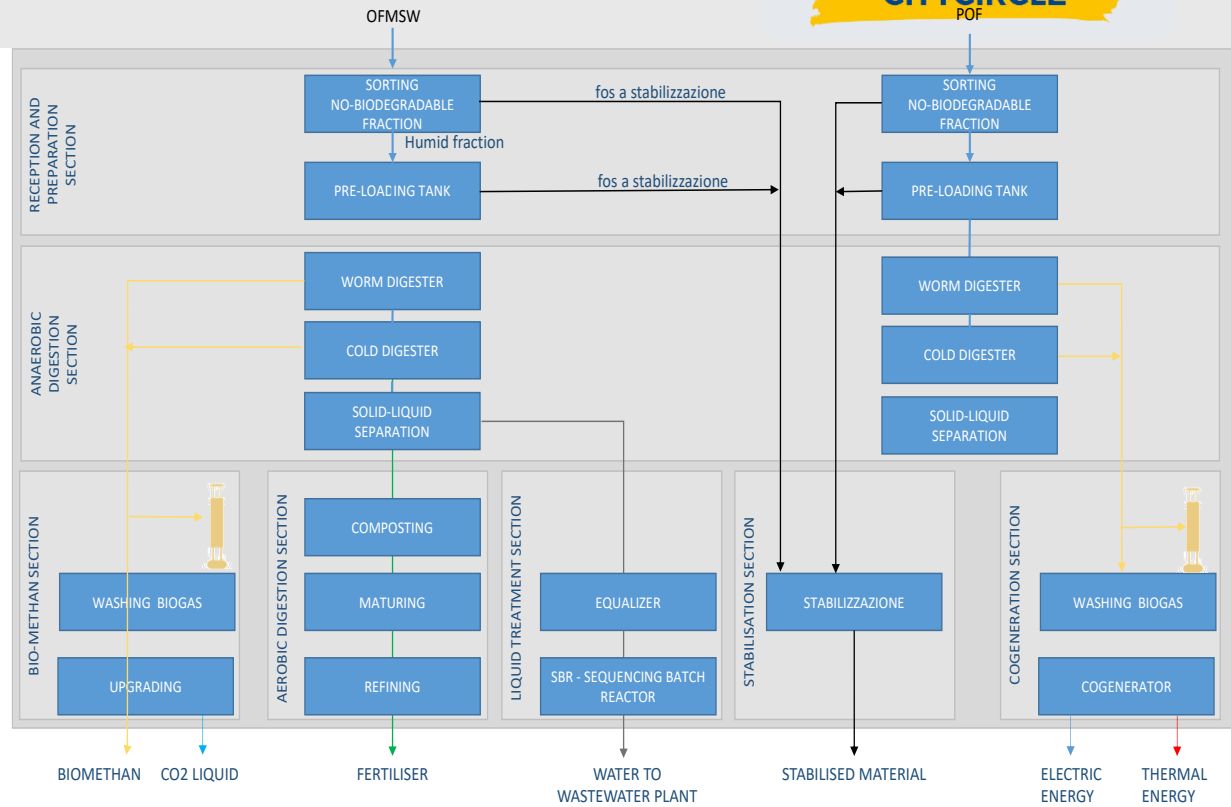
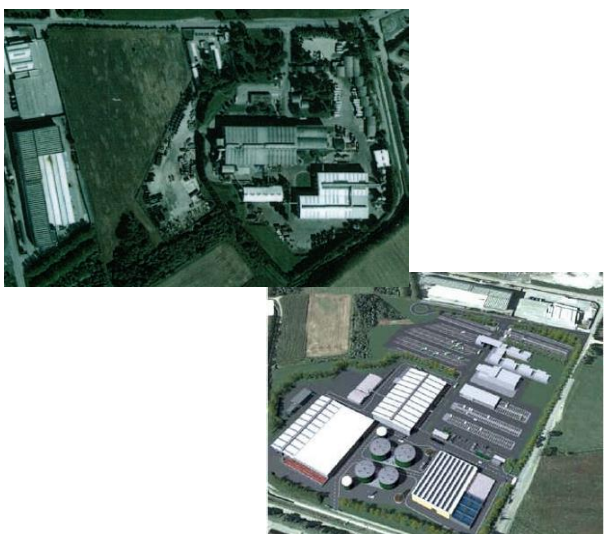
- Multi-objective modelling
- Scenario simulation
- Best compromise solution identification



# STAKEHOLDERS



NET S.p.A.



Parameters	Value
OFMSW amount treated in the plant (t/yr)	35,000
POF amount treated in the plant (t/yr)	19,000
Wood-cellulosic waste amount treated (t/yr)	12,500
Electric energy production (MWh/yr)	1,046
Bio-methan production from OFMSW (Nmc)	3,788,481
for veicles (Nmc)	400,000
electricity fed into the grid (Nmc)	3,388,481
Total amount of fertilizer (t/yr)	17,484
Stabilised waste to recovery/landfill (t/yr)	13,020
Liquid amount to the wastewater plant (t/yr)	31,025

→ 520 m<sup>3</sup>/h biogas  
↘ 320 m<sup>3</sup>/h biogas

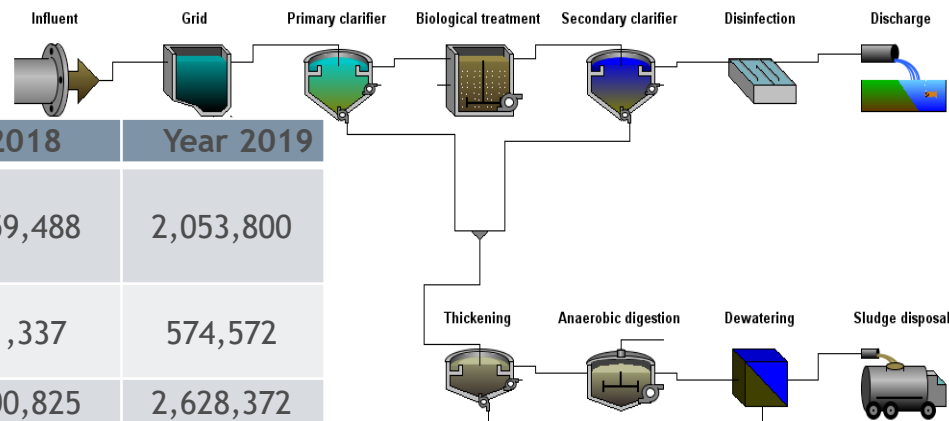
COOPERATION FORWARD



# STAKEHOLDERS

## CAFC S.p.A

Parameter	Year 2018	Year 2019
Electricity consumption (from the grid) (kWh/yr)	1,859,488	2,053,800
Electricity consumption (from biogas) (kWh/yr)	541,337	574,572
Total electricity consumption (kWh/yr)	2,400,825	2,628,372
Heat consumption (from natural gas) (kWh/yr)	694,919	646,903
Heat consumption (from biogas) (kWh/yr)	400,000	336,000
Total thermal consumption (kWh/yr)	1,094,919	982,903
Treated wastewater (m <sup>3</sup> /month)	945,542	1,116,694
Sludge amount treated in the digester (m <sup>3</sup> /yr)	50,027	52,295
Specific biogas production (Nm <sup>3</sup> /m <sup>3</sup> sludge)	5.41	5.51
Specific biogas production (Nm <sup>3</sup> /ton of volatile solids-VS)	160.30	171.74
Sludge desiccation unit electricity consumption (MWh/yr)	1600	



➔ 1550 m<sup>3</sup>/d biogas

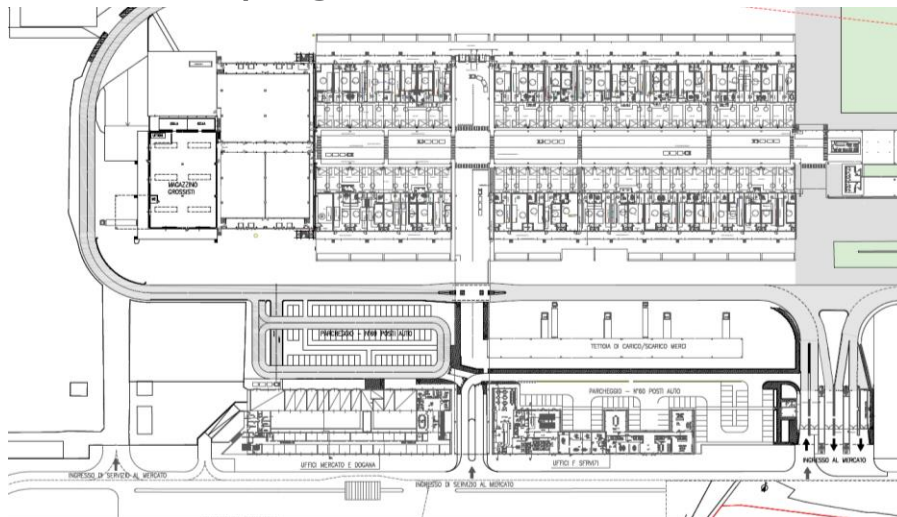
**PLANNED**



# STAKEHOLDERS

## UDINE MERCATI s.r.l

- Interested in renewing its facilities to improve internal logistic and reduce energy consumption
- Electric load:
  - Current: 400kWel
  - After revamping: + 200 kWel



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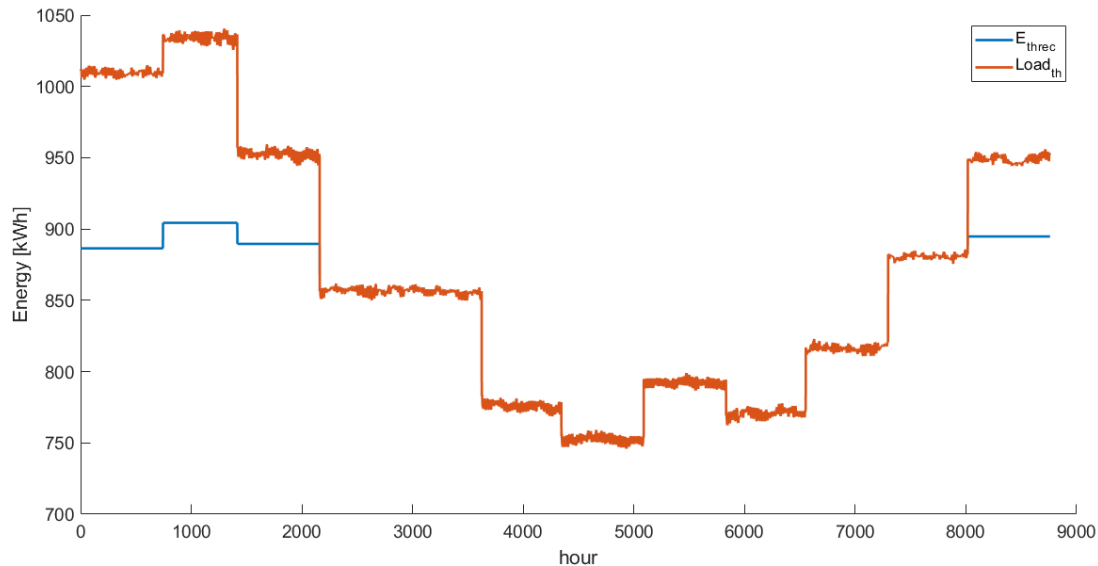
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# SCENARIOS: CAFC-NET SYMBIOSIS

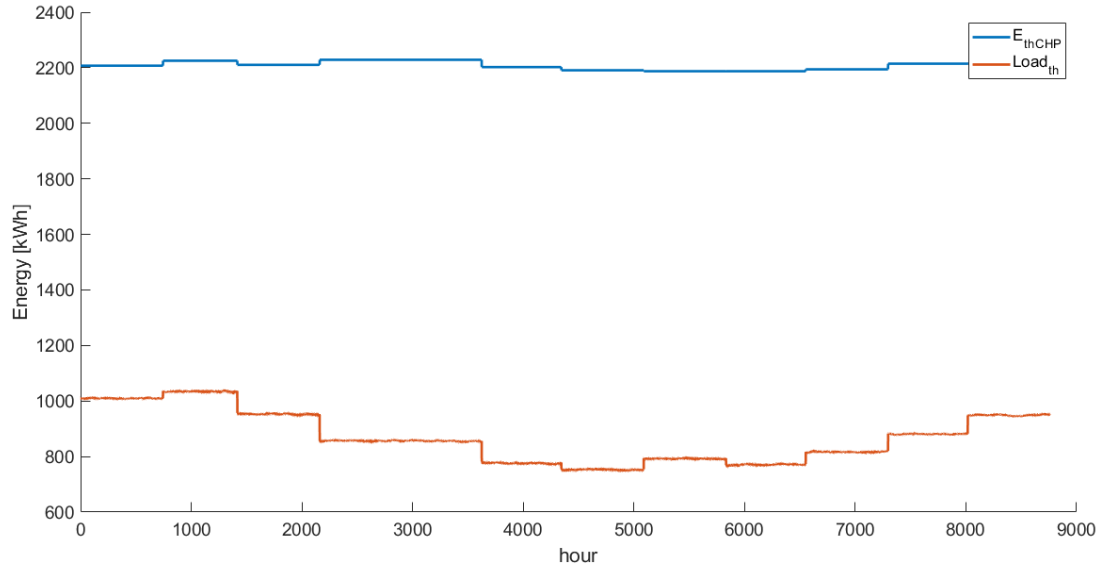


- More than 7000 MWh thermal energy recovered
- 2357,6 tCO<sub>2</sub> emission reduction
- 1034,5 toe primary energy saving





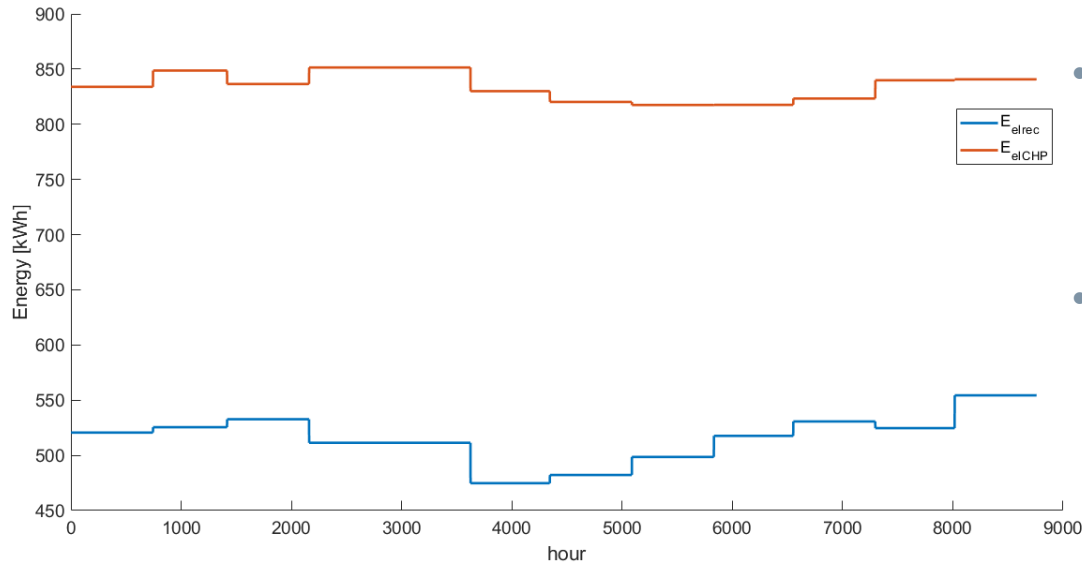
# SCENARIOS: CAFC-NET SYMBIOSIS



- Almost 8000 MWh thermal energy recovered
- 2374 tCO<sub>2</sub> emission reduction
- 1041 toe primary energy saving



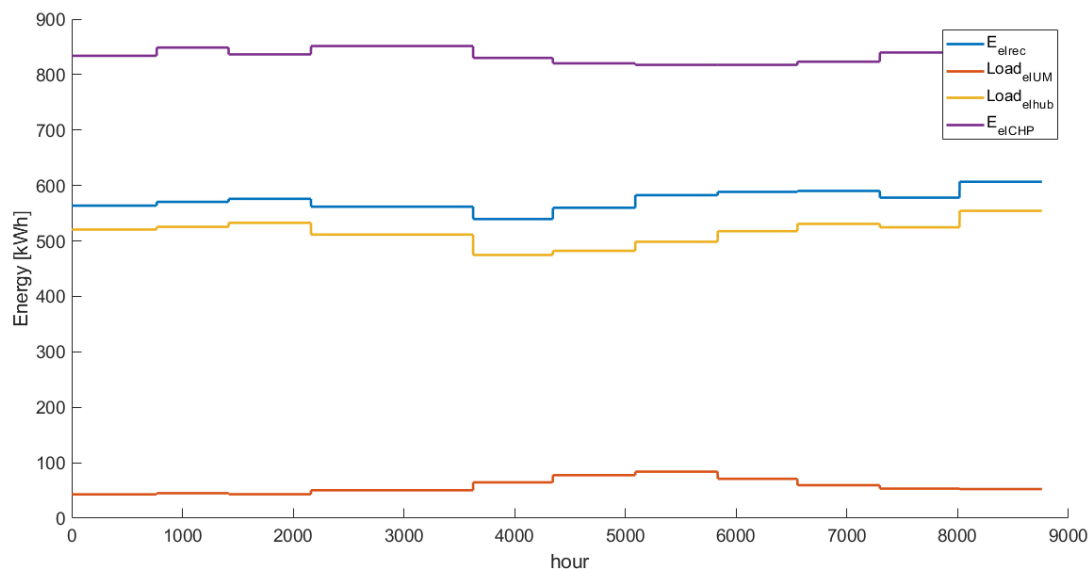
# SCENARIOS: CAFC-NET SYMBIOSIS



- More than 4000 MWh electric energy recovered
- Recovery of remaining energy will lead to 522 toe primary energy saving



# SCENARIOS: CAFC-NET + UDINE MERCATI SYMBIOSIS

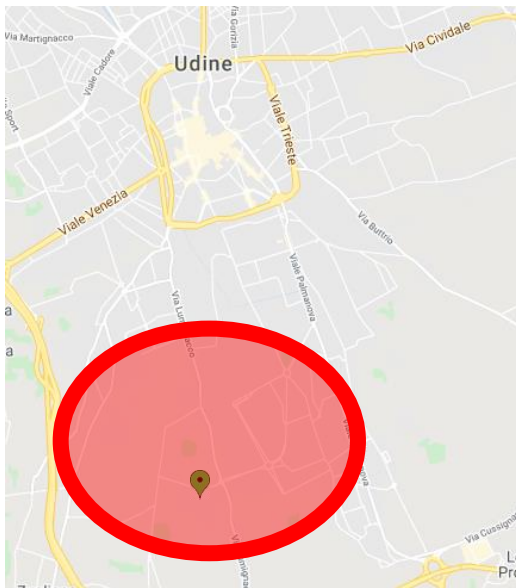
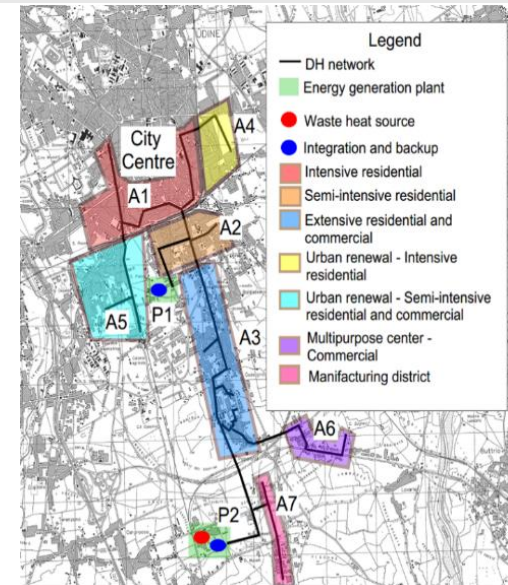


- 5000 MWh electric energy recovered
- 2571,8 tCO<sub>2</sub> emission reduction
- 1129,4 toe primary energy saving



# SCENARIOS: CAFC-NET + DHN

- DHN:
  - 200 MW (10 in the hub surroundings)
  - 7000 MWh from CHP in heating period (15/10 to 15/4). 1,88 MW continuous



- Work both as a user or as a source



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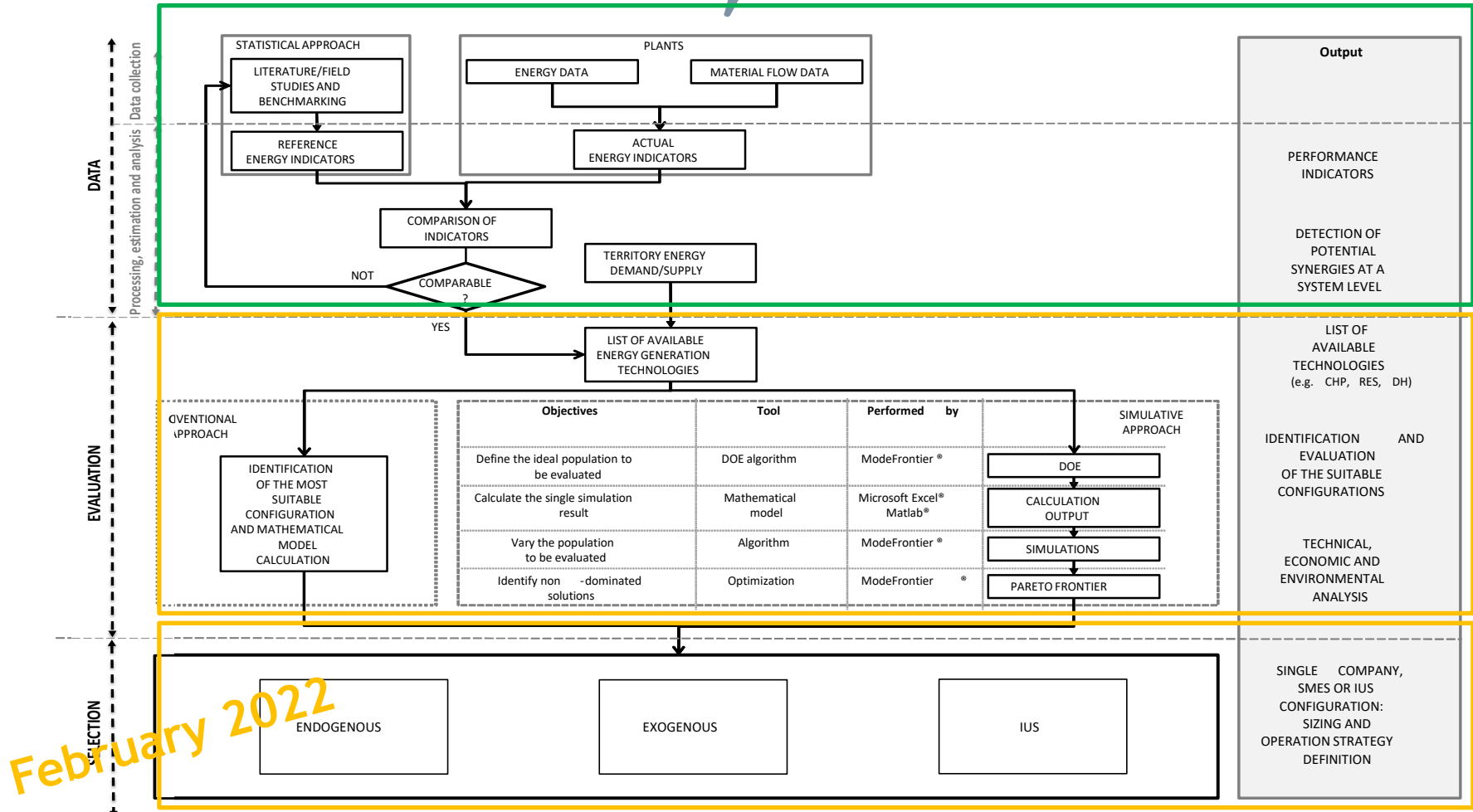
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# TIMELINE OVERVIEW



## Highlights

- Data exchange and collaboration between stakeholders is very important to reach goals
- Industrial symbiosys allows important energy recovery



# CONTACT INFO



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# PROJECT PARTNERSHIP

