NAŌDEN

Cogenerating another form of energy

29/04/2021

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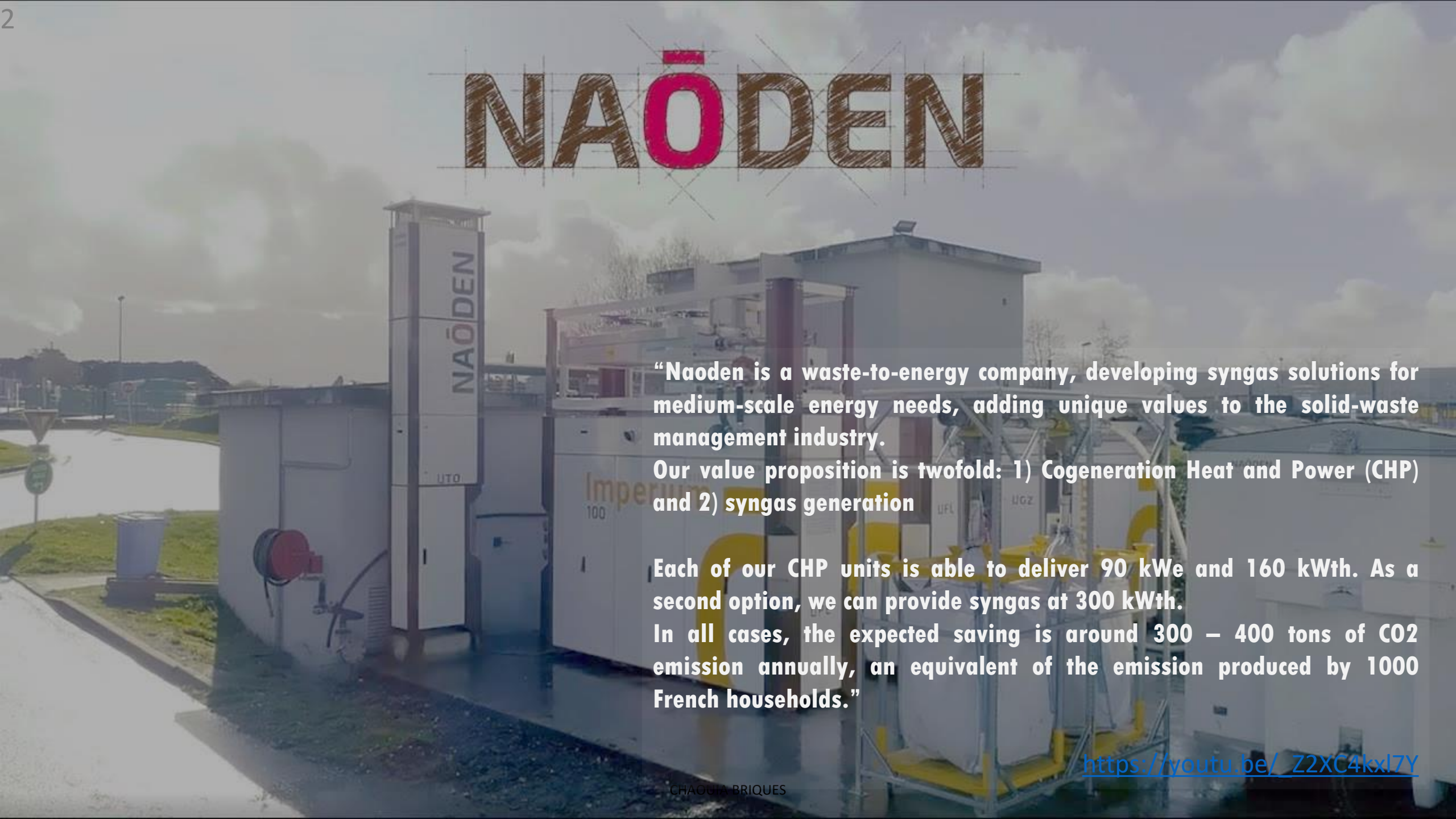


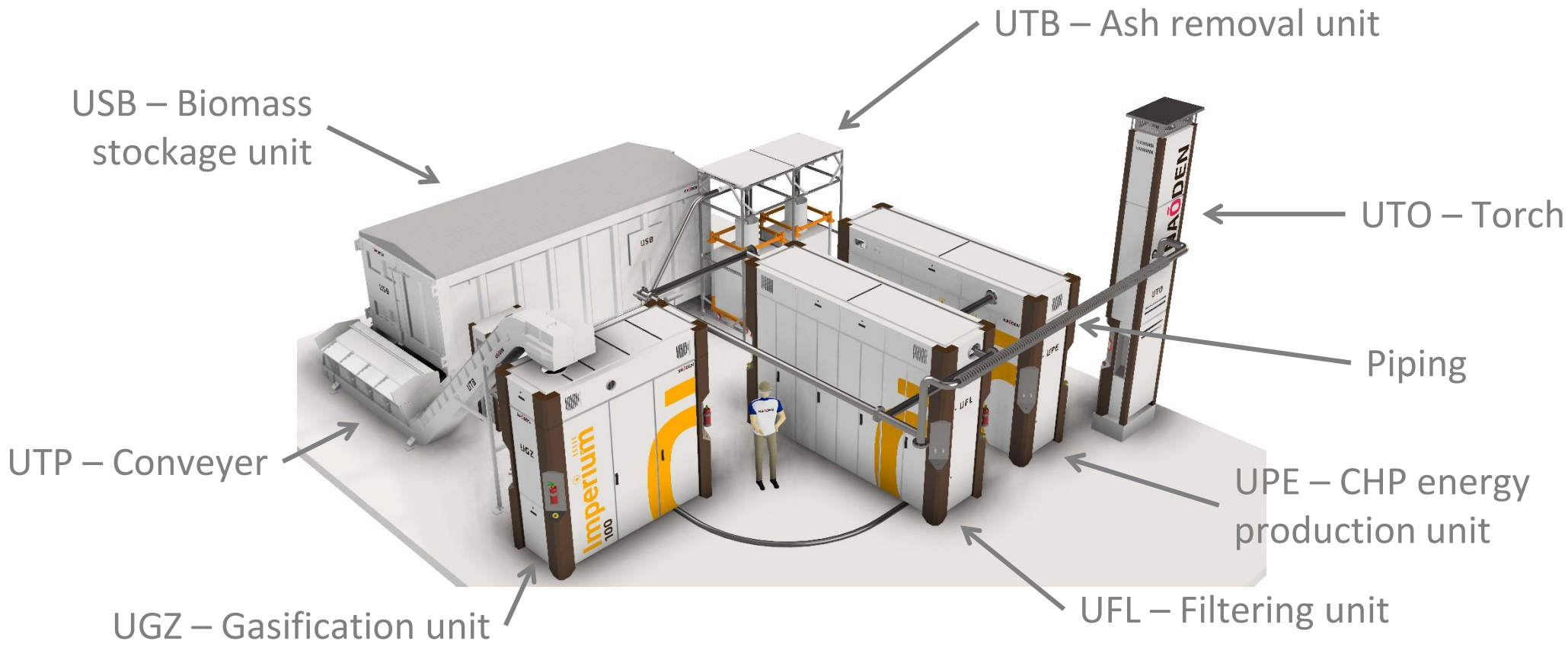
“Naoden is a waste-to-energy company, developing syngas solutions for medium-scale energy needs, adding unique values to the solid-waste management industry.
Our value proposition is twofold: 1) Cogeneration Heat and Power (CHP) and 2) syngas generation

Each of our CHP units is able to deliver 90 kWe and 160 kWth. As a second option, we can provide syngas at 300 kWth.
In all cases, the expected saving is around 300 – 400 tons of CO2 emission annually, an equivalent of the emission produced by 1000 French households.”

https://youtu.be/_Z2XC4kxl7Y

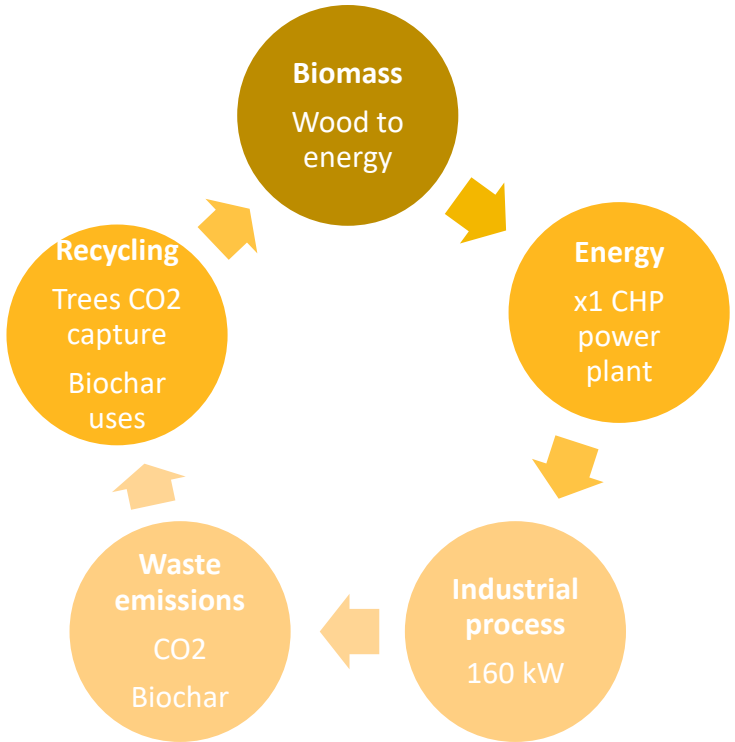
Technical proposition example
Imperium (90 kWe + 160 kWth)

Proposed power plant components



Key issues

- Renewable electricity generation
- Enhancement of circular economy approach
- Contribution to environment protection
- Reduction of GHG emissions
- Value and utilize local waste production



Recoverable materials

Grain size: 0 - 80 mm
Moisture content < 20%
Rate of fines < 50%


Pallets / Palox


Wood class A


Pruning wood


Fruit shells


Fruit pits


Olive pomace

Coming soon (R&D) :

- **Wood class B**
- **CSR (plastic/textile/cardboard) max 30%**
- **Dried sewage sludge**

Business Model Assumptions

Assumed model:

Heat

- Installed power: 160 kW
- Consumption: 1280 MWhth/year
- Usage: Industrial process
- Fuel: Natural gas
- Cost: 45 €/MWhth

Electricity

- Installed power: 50 kW
- Consumption: 150 MWh/year
- Cost: 100 €/MWh

Waste

- Type: Wood chips
- Quantity: 1000 t/year
- Cost: 0 €/MWh
- Moisture content: 20 %.

  Ideal moisture content: 0-20%

Assumptions for 1x Imperium:

Technical details:

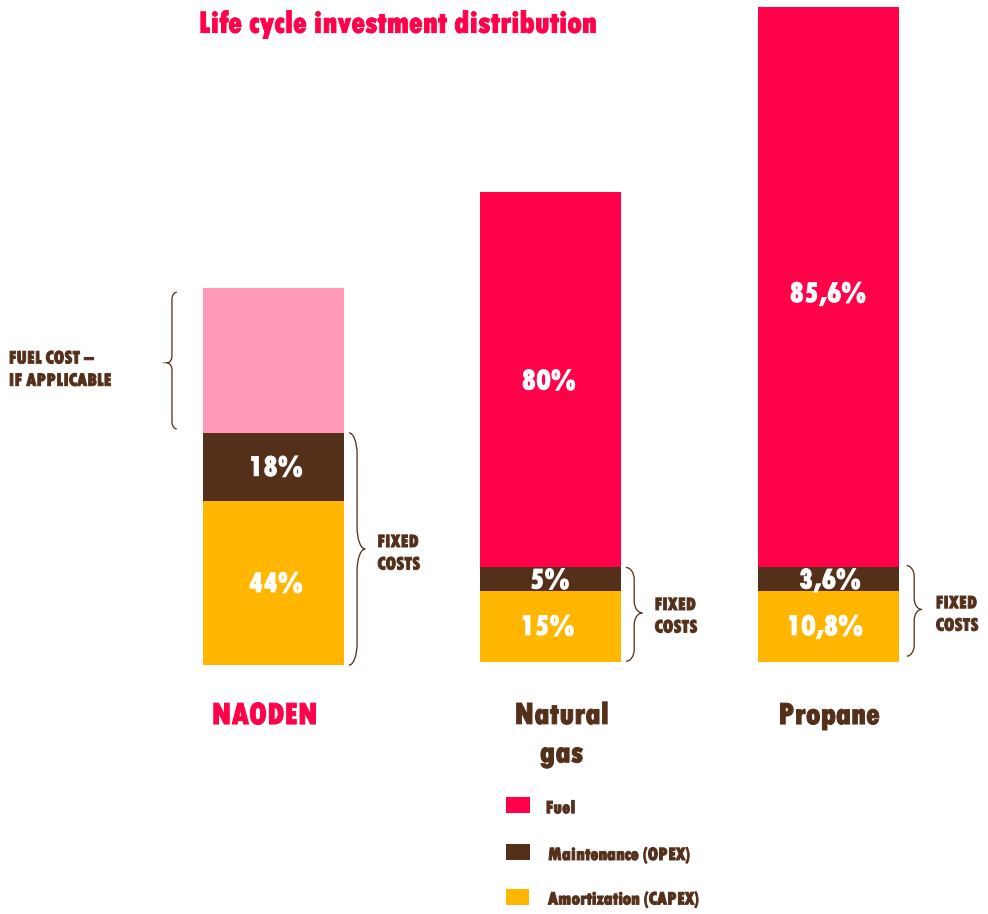
- Biomass consumption: 652 t/year
- Biomass moisture : 20 %
- Biomass PCI: 3,94 MWh/t
- Full load operation: 8000 h/year
- Thermal energy production: 1280 MWh/year
- Electrical energy production: 720 MWh/year

Investment distribution

With Naoden's solution, higher initial CAPEX and maintenance is compensated with drastically reduced **fuel costs or no cost at all,** based on business case. Avoiding volatility of fuel price, we can assure that the NAODEN power plant is the most profitable solution in the medium-long term.

Biomass waste valuation	**Between 500 and 600 t/year/unit**
CO2 emissions reduction	**Between 250 and 450 t/year/unit** **= emissions of 700 to 1300 households**
Return of investment (ROI)	**Between 4 and 8 years project-based**

REDUCTION AND CONTROL OF MWH COST



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