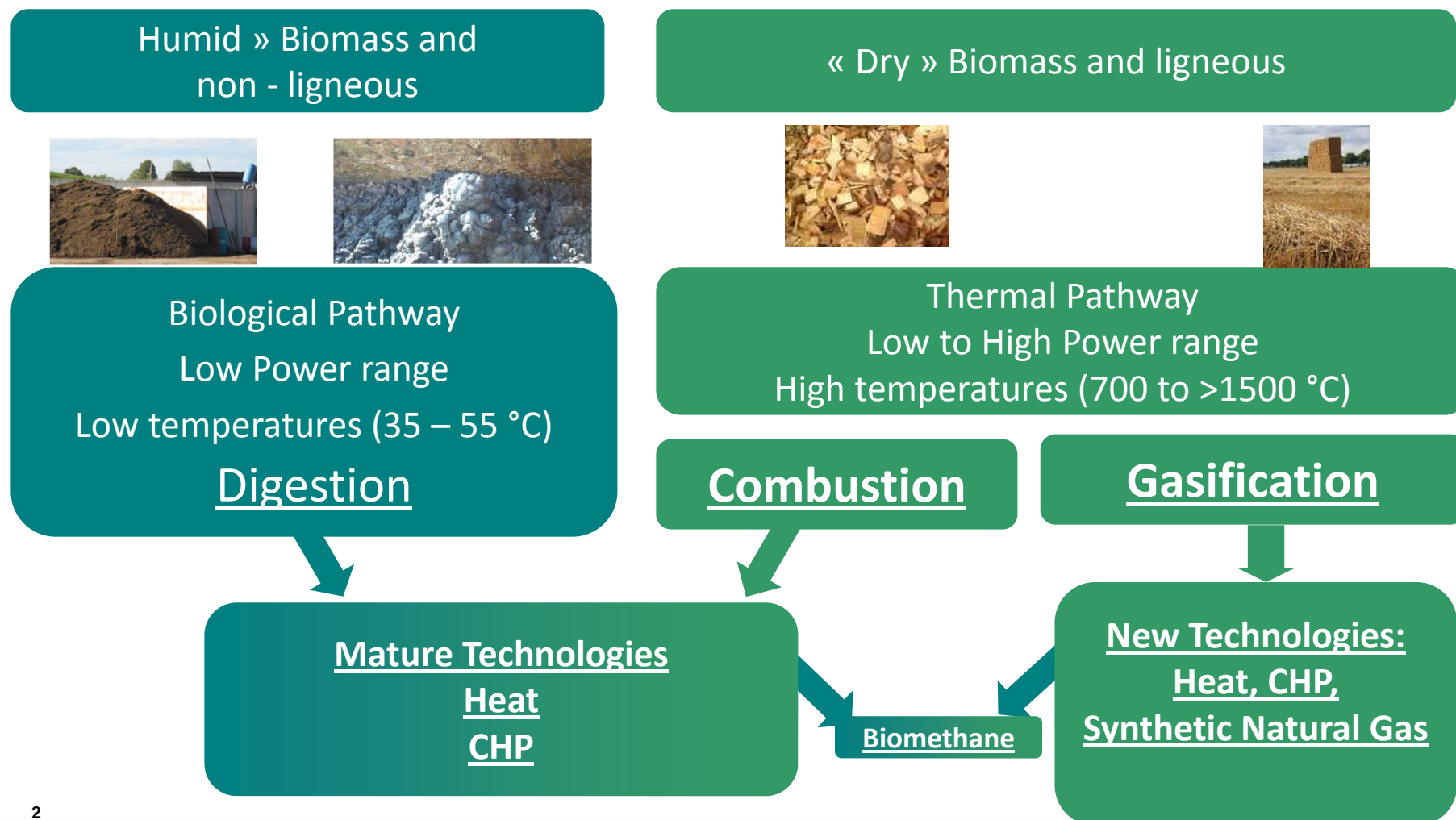


Syngas for Today and Biomethane 2G for Tomorrow as Opportunities to Green the Gas Market

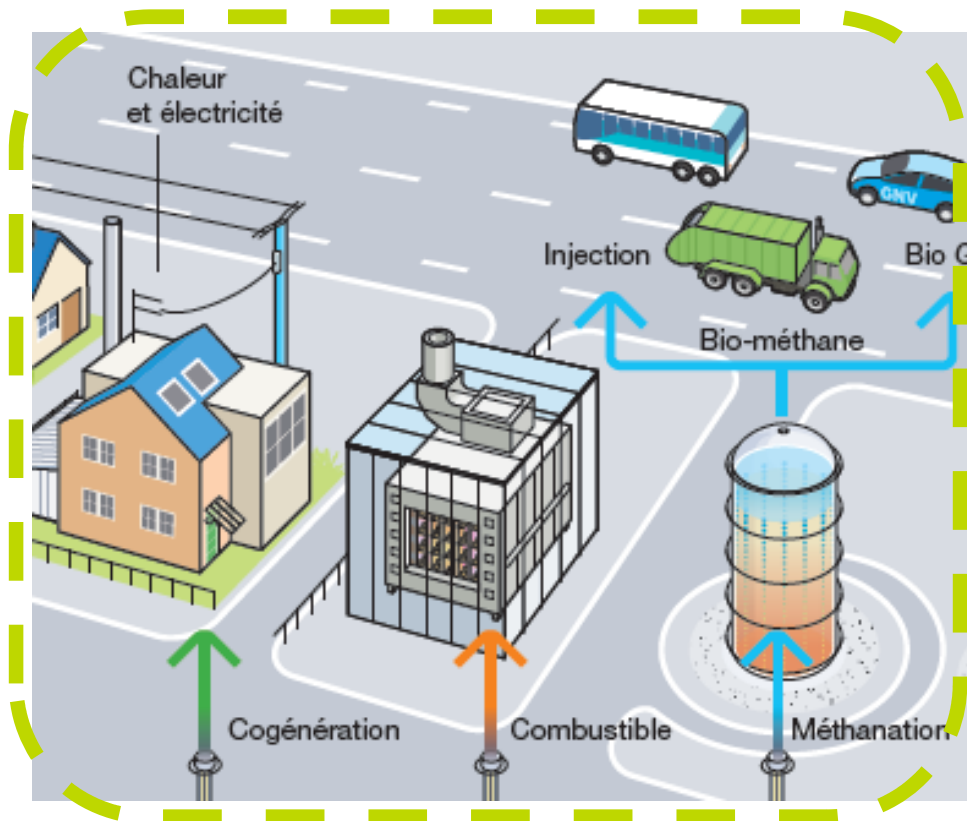
IGRC 2011, Seoul – Thursday 20th October 2011

Olivier BORDELANNE on behalf of Marc PERRIN
GDF SUEZ – Research & Innovation Division - CRIGEN

■ Digestion and gasification: two different schemes for different biomass



■ Gasification : Three targeted markets, but with different maturities



- ▶ A decentralized vision
- ▶ Small installations at the closest form resources
- ▶ Local Valorization of Heat
- ▶ Optimized Energy Efficiencies

2008

2012

2017

2020

■ Why gasifying wood instead of burn it?

• CHP Case

- Enhance electricity production compare to conventional technology (HP Steam boiler + Steam Turbine): +30 to + 75%
- Keep independent power and heat production



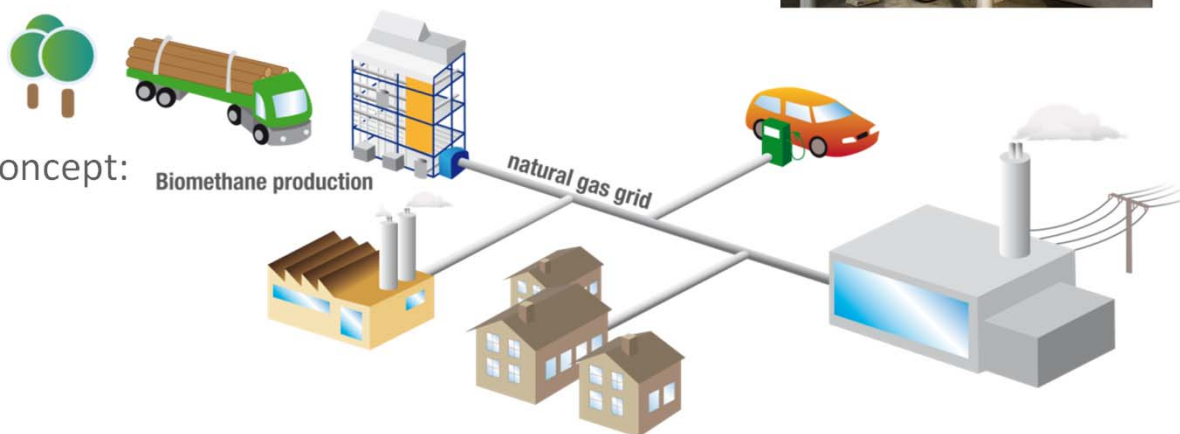
• Material Industry Case (glass, brick, metal, ...)

- Unique renewable solution for Direct Heating Furnaces (NG or oil)

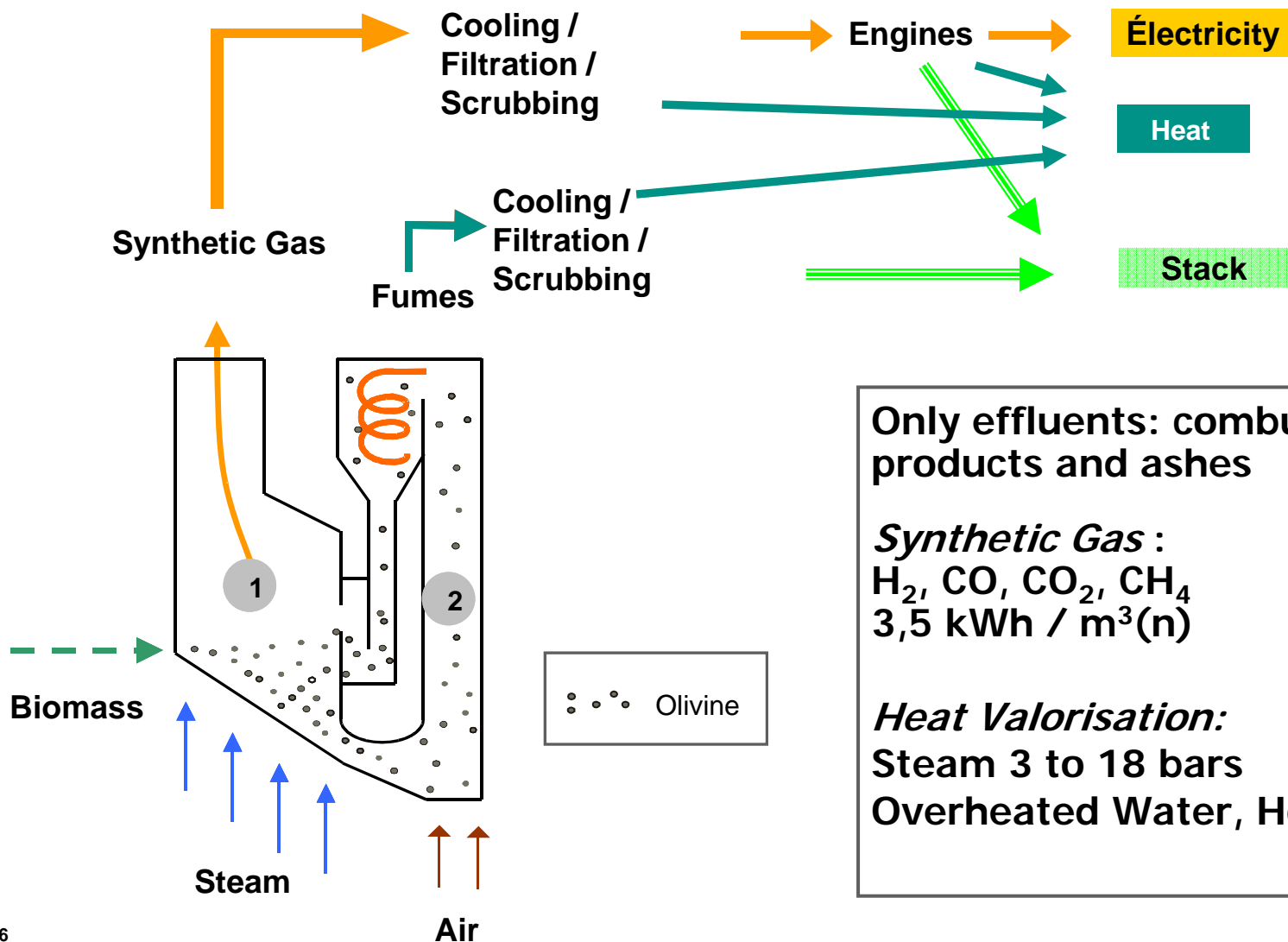


• Tomorrow

- make NG « out of wood »
- Decentralized Energy Plant Concept:
 - Fuel for vehicles
 - Grid gas
 - Electricity
 - Heat
 - Cooling

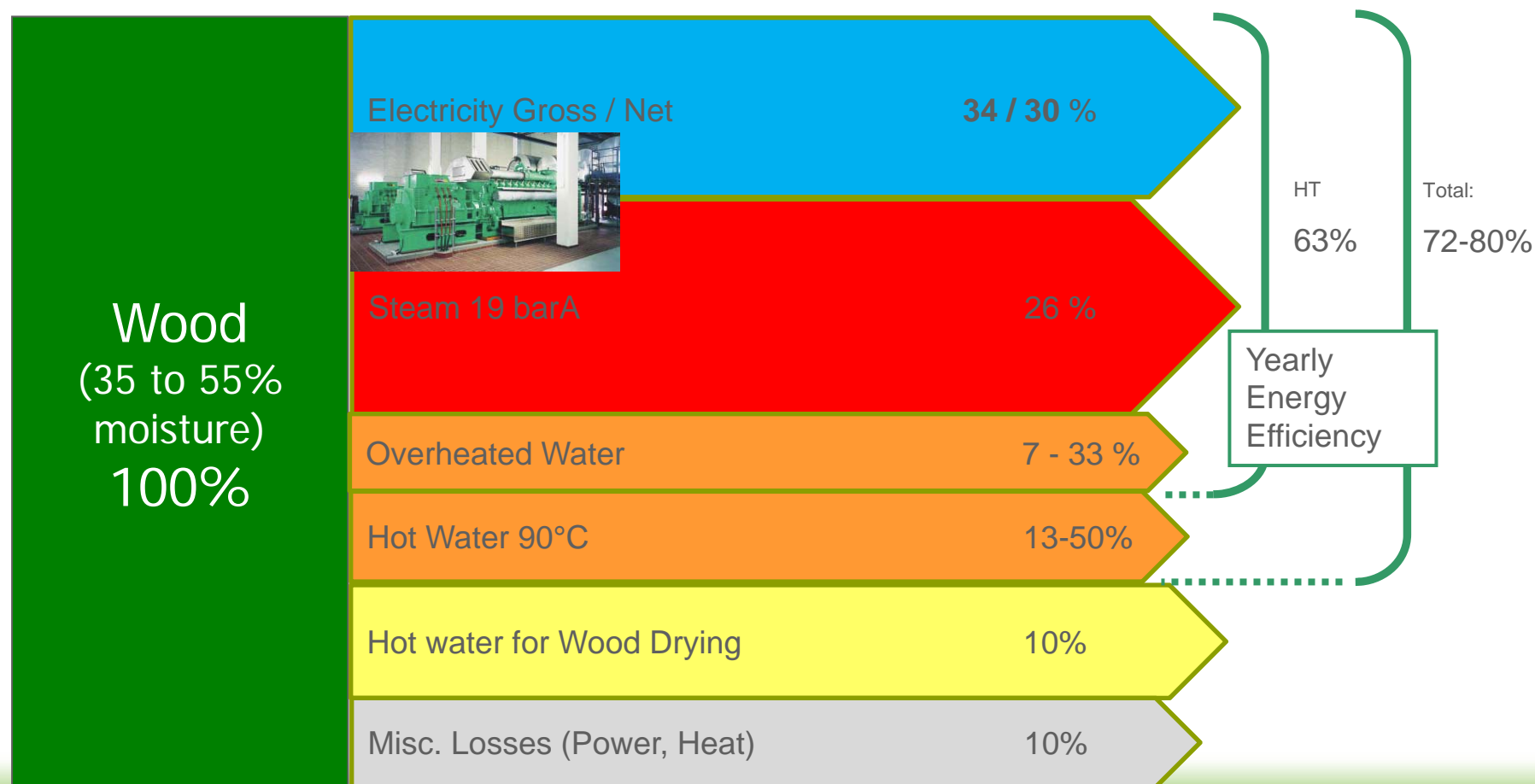


■ REPOTEC Technology (FICFB): Main Characteristics



■ Keys figures of a CHP Gasification Plant

- Power from engine(s) + 1 ORC from 2.5 to 10 MWe, 25 000 to 100 000 t wood / year
- Heat up to 50% from 4 MW to 16 MW
- Power and Heat Production during 20 years, 7 800 h / y



Goals and stakes

- ▶ Development of a Biogas Syngas Production Technology for Glass Melting Furnaces,
- ▶ Saint Gobain Verralia coordinated Project, supported by the French National Research Agency.

Progress

- ▶ Xylowatt gasifier (1 MW fuel) delivered at GDF SUEZ Research Center (St Denis, near Paris)
- ▶ Connection to a 2 MW Combustion Test Cell (Glass Furnace model),
- ▶ Combustion Test in Glass Melting Furnace conditions (800°C preheated air, 1 200°C furnace tem.) with different fuel mix (natural and syngas)
- ▶ Gasifier to be transported next year to St Gobain Oiry site to be hooked up to Glass Melting Furnace under operation.



■ GAYA Project: Bio NG “made out of wood”



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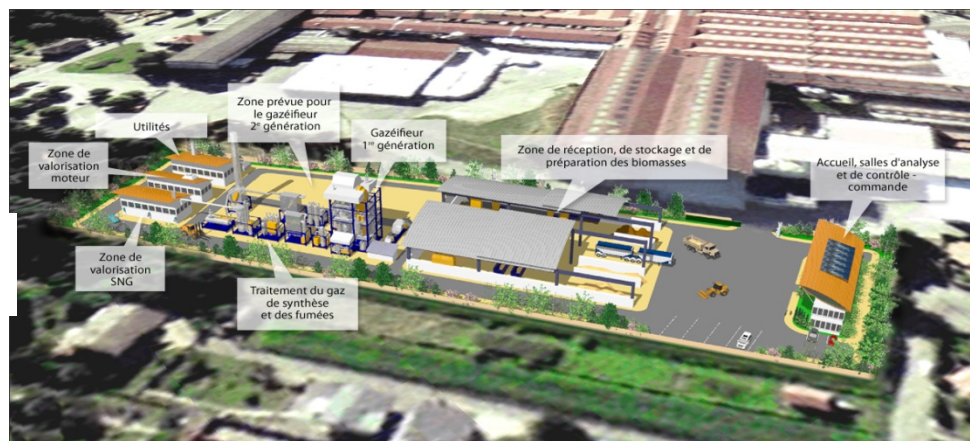
Coordinator



INSTITUT
TECHNOLOGIQUE



ECOLE DES MINES D'ALBI
C A R M A U X



« From vegetal to reel »:

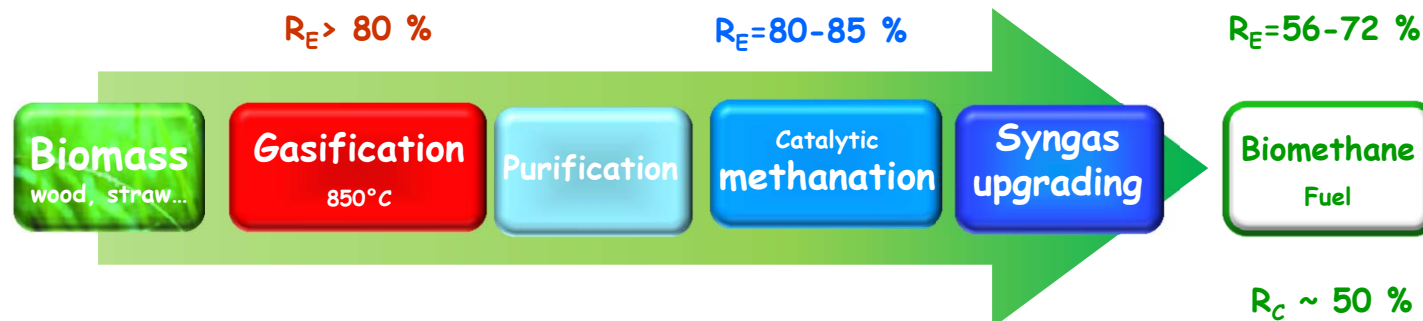
Demonstrate at a pre-industrial scale the technical, economic, environmental and societal validity of gaseous biofuels by thermochemical production



energie atomique • énergies alternatives



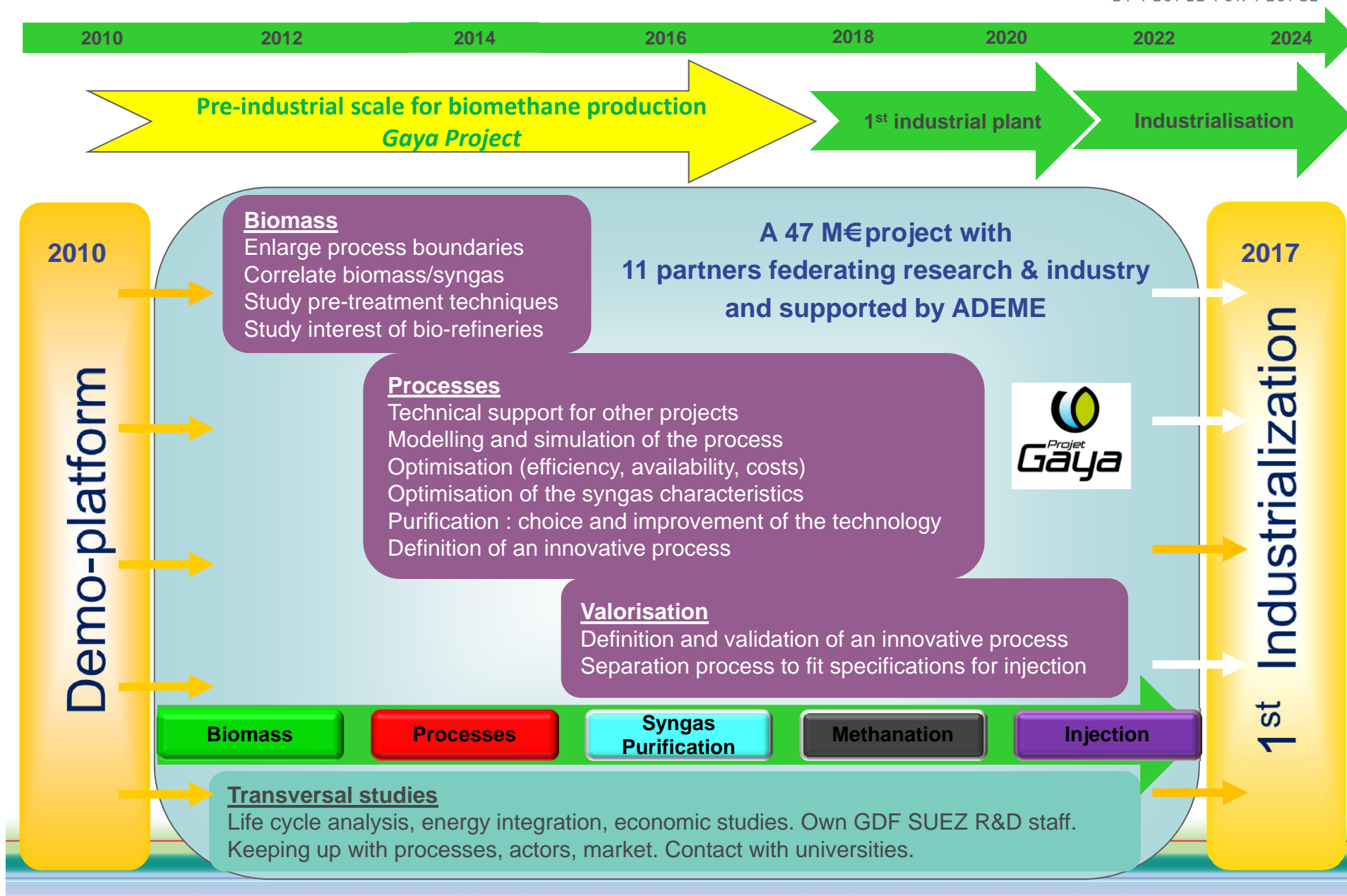
Bio-methane in few figures



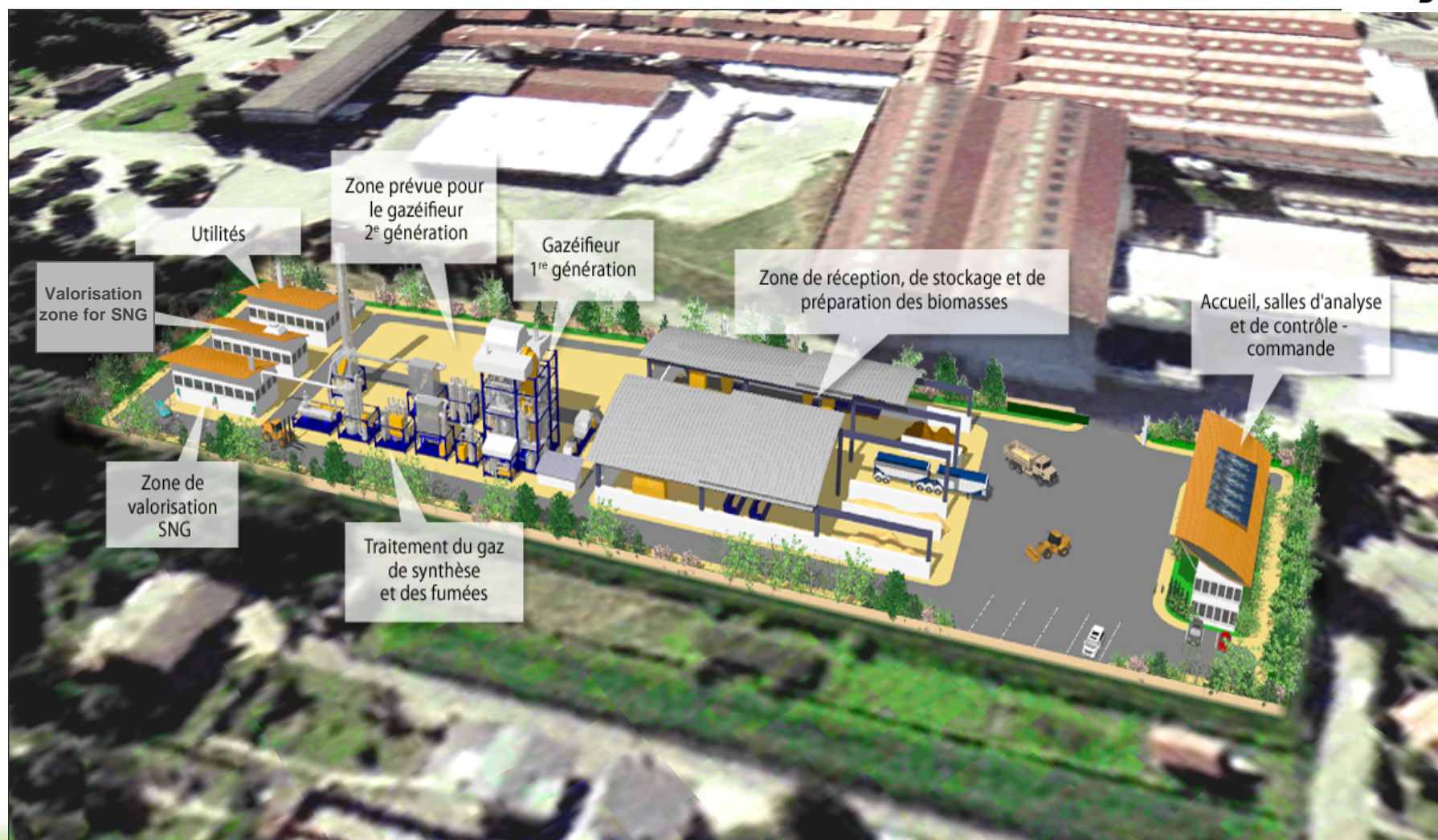
/// Bio-methane, a technological choice in terms of local and sustainable biomass development

- ▶ Very high energy yield: 60-70%
- ▶ Local biomass recovery logic (smaller production units),
 - Reduced transport of the biomass, therefore reducing emissions
 - Enabling the local recovery of all heat produced by the process, which would be difficult for larger installations,
- ▶ Easy and clean transport of bio-methane via the natural gas grid

■ Validate at a preindustrial scale a portfolio of technological solutions



■ Demonstrator's arrangement





Conclusions & perspectives

Gasification, a new route for biomass energy applications:

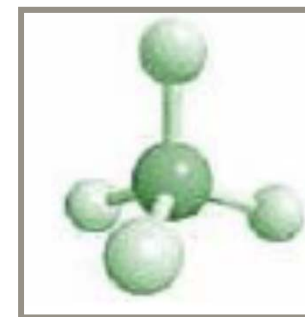
- A **complementary** technology to direct combustion .
- A development of an **environmental-friendly industry** in line with a sustainable development approach.
- A local/regional approach to boost energy efficiency by minimising biomass transport

Applications for today and tomorrow:

- New biomass CHP plants with high average biomass to power conversion efficiency (30-34%, thanks to engine use) while keeping a high overall energy efficiency (72-80%).
- Direct firing of syngas into industrial thermal processes where no alternative exists to introduce a share of renewable energy into fuel mix (glass melting, direct drying, metal processing, brick industry, ...).
- Transformation of syngas into a bio-substitute of natural gas, with the same characteristics but **renewable**..



Thank you for your attention !



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BY PEOPLE FOR PEOPLE

Contact: marc.perrin@gdfsuez.com

