



WtW & E: Waste-to-Worth and Energy
Turning organic wastes into valuable resources
Valorisation des Déchets en Produits de valeur
et en Énergies renouvelables



The Development Team

Experienced project developers teamed up to roll out innovative waste treatment technologies in France:

C4B Finances Holding / Atlantis Développement:

C4B Holding is currently developing

- Approx. 100 MW Wind and PV plants in Champagne/France
- Plastic-to-Oil plants in Ghana and Nigeria
- Biogas plants in The Netherlands

and is focused on project development, structuring and financing of Renewable Energy and “Waste-to-Worth” projects holding respective contracts with technology providers.



Atlantis is focused on

- Technical evaluation of innovative technologies
- Feasibility evaluation and preparation of approval processes

The President of Atlantis is also President and Partner at

HPC International, HPC AG and HPC Envirotec SAS:

an international Engineering Company Group specializing in Environment, Public Health and Renewable Energies providing additional services to the Development Team.



Waste Feedstock Provider:



The Development Process

Project Starting Basis and 4 Conditions:

1. **Waste feedstock supply** (about 20 000 – 200 000 t/y) on a long-term contractual basis,
2. **Off-take of the salable products** can be ensured on a long-term contractual basis,
3. **Site with sufficient area for an ICPE-Facility** (about 2 – 6 ha + including the 200 m safety border for waste treatment) on a >15 years long-term leasing basis (or purchase),
4. **Political will and support** for a Circular Economy “Waste-to-Worth” and/or Energy (WtW & E) industrial project (Municipalities, Authorities, Neighborhood, etc.).

Potential Partners for these 4 Points are invited to contact the Investment Consortium !



The Development Process

Activities and Services

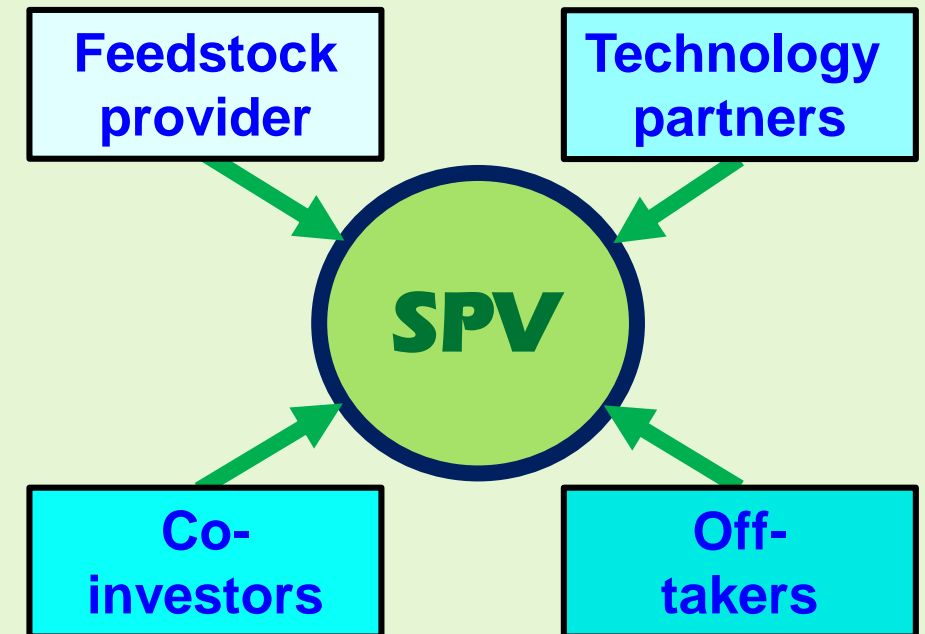


- **Detailed Technology Due Diligence** concerning technology viability and profitability,
- **Technical and commercial feasibility studies** for specific projects, waste types and quantities (based on real waste processing tests) involving only approved International technology providers,
- **Selection of the most suitable and proven technology** (HTP, PHP, PPT, PTC, etc.):
 - **Only 6 from 40 international technologies** (USA, France, D, CH, Canada)
 - **Ensure Technology transfer to France !**
- **Structuring of the projects and Investments & Financing,**
- **EPC planning and implementation** including all necessary sustainability, environmental and HSE studies (Health, Safety and Environment).

The Structure

The Development Team will incorporate specific project companies (SPVs) involving interested stakeholders such as:

- **Waste (feedstock) providers,**
- **Energy or product off-takers,**
- **Technology partners,**
- **Co-investors.**



The Technologies

1. Plastic-to-Oil

Medium temperature thermolysis to process plastic waste to:

a) **Pyrolysis Oil as “Syncrude” for the petrochemical industry**

- Sustainable and economic feedstock for Refineries substituting crude oil, closing the “cycle” and carbon footprint reduction,
- Re-engaging functional carbon from plastic waste by using those chemical building blocks for further use in the chemical industry and/or Recycled Plastic Production.

b) **Fuel** (if requested for “Renewable” bio-fuels, e.g. Diesel-Substitute)



The Technologies

2. Waste-to-Syngas

Ultra High Temperature Plasma (HTP) or Pyrogazification (type PHP, PPT, PTC, etc.) to process a broad range of wastes to clean, tar-free Syngas for different utilization possibilities

- **Hydrogen** extraction
- CO and CO₂ separation (for greenhouses)
- Liquefaction to bio-fuels e.g. Diesel-Substitutes
Fuels as **Methanol, OME, DME, etc.**,
and also (bio) Jet-Fuels,
- Chemical production, e.g. Ethanol,
- Methane,
- Gas to grid and/or Electricity generation
- Off-heat utilization



H₂: 99,999 %

Pressure swing adsorption
Adsorption modulée en pression
Druckwechseladsorption,



Syngas' composition examples (dependent on Input)



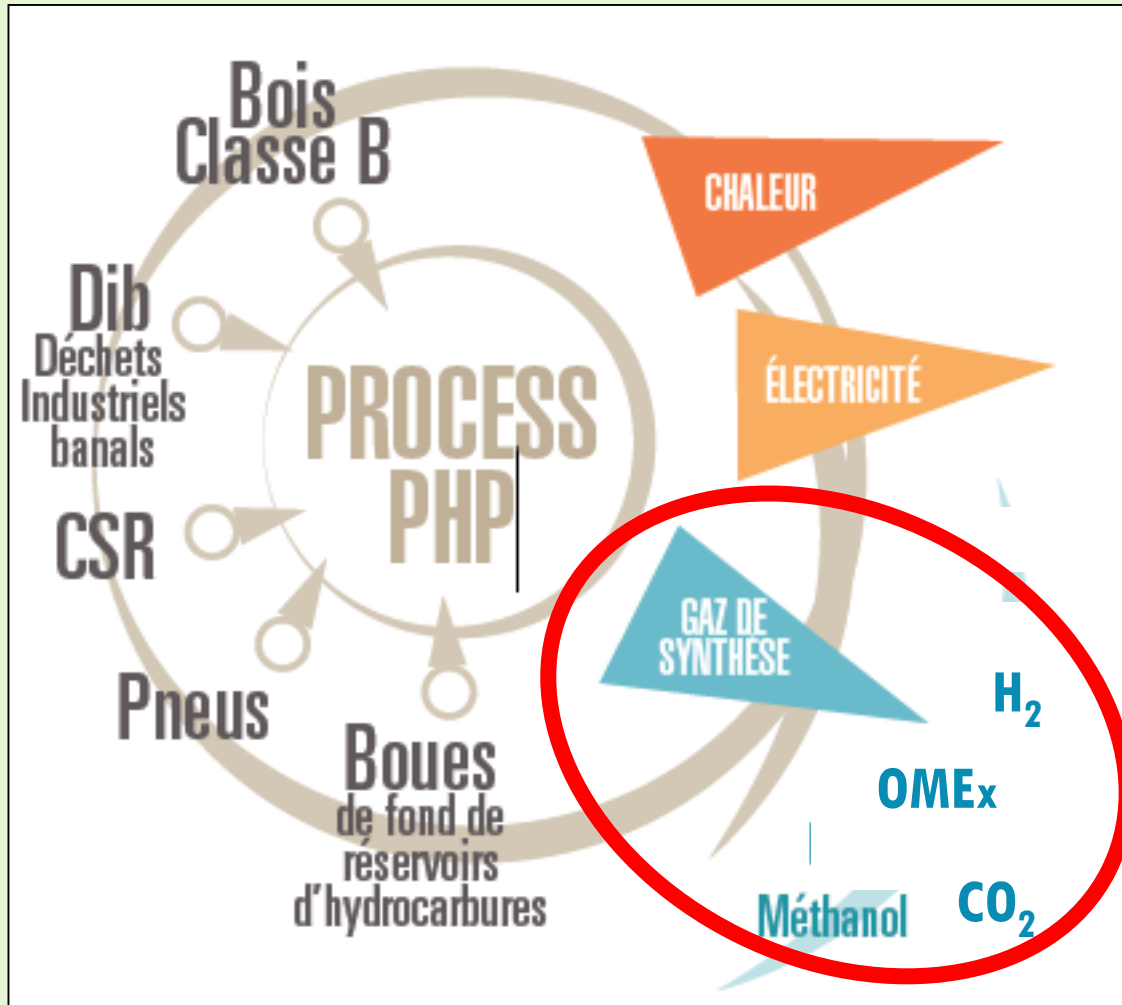
Output in case of Pyrolysis and/or High Temperature Plasma:

→ $H_2 = 33 - 46$ Vol. %; $CO = 38 - 45$ Vol.%,

Rest (CO_2 etc.: 8 - 28 Vol.%)



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PPT Pyrogazification example

Alternatives ?:

**Electrolysis by producing
Nuclear Waste ???**



The Feedstock

1. Plastic-to-Oil

Feedstock shall preferably consist of plastic wastes which are not economically or technically suitable for traditional mechanical recycling to avoid landfill and incineration such as:

- Domestic end-of-life plastic waste, Polyolefins, Polystyrene and others
- Industrial plastics
- Agriculture foils.



The Feedstock

2. Waste-to-Syngas

Nearly all organics, solid and/or liquid such as

- Broad range of plastics / ASR (CSR)
- Tires & rubber
- Industrial manufacturing and production waste and byproducts
- General garbage
- Supermarket returns
- End-of-life-cycle products
- Hospital and other infectious waste
- Toxic, dangerous and hazardous waste
- Agriculture and forestry waste
- Waste water sludge
- Used oils, PCB containing oils
- Environmental pollution cleanups
- Harbor / airport reception facility material

Alternatives ?:

**Incineration with
Dioxin + Hg etc.
Emissions ???**



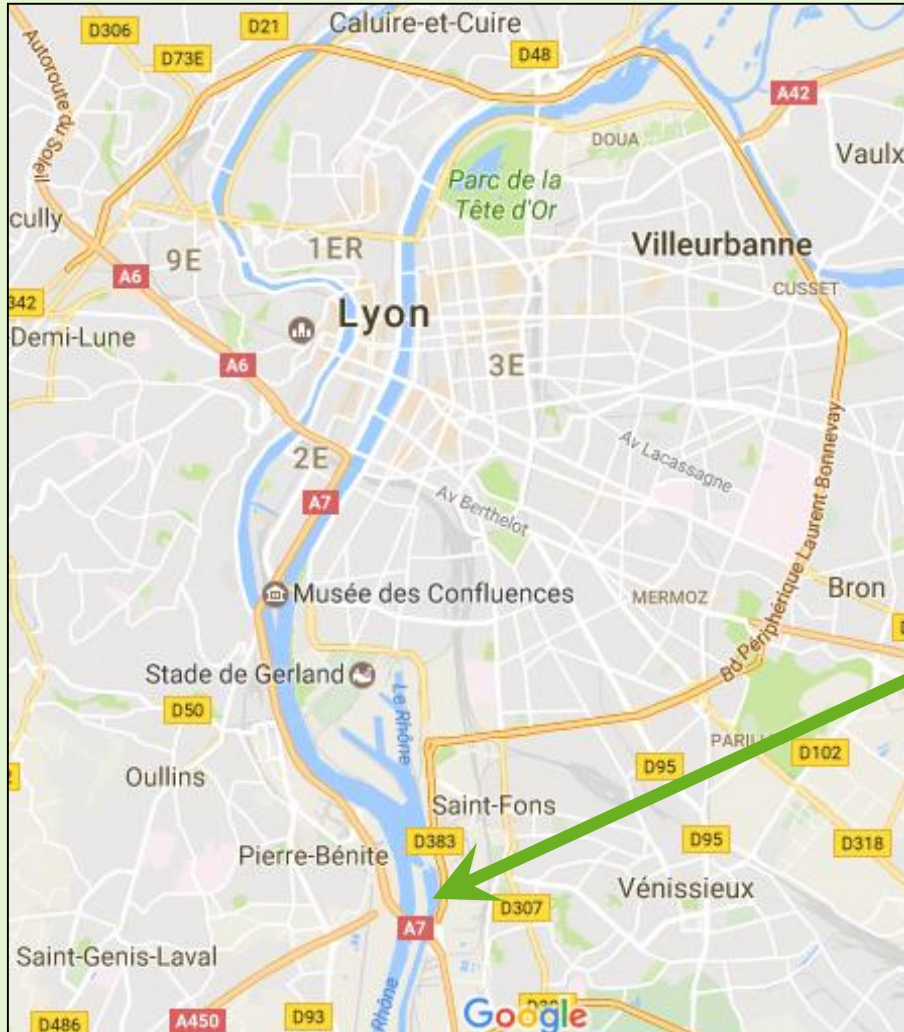
Benefit for local Stakeholders

- **Real Circular Economy** using state-of-the-art technologies,
- **Reinforcement of local waste sorting operations and material recovery,**
- **No landfill, no incineration, no pollution,**
- **Local production of valuable products,**
- **Small and big size facilities are possible,**
- **Job creation up to 50 employees.**



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Project Example: Site location (Vallée de la Chimie, south of Lyon)



**Parcel "4"
(3.2 ha)**

Project schedule PHP Lyon

(some steps in parallel)

- Detailed planning, impact and hazard studies: 1 year;
- ICPE authorizations and building permit: 1 year;
- Construction: 1.5 year;
- Beginning of production after T-zero: **2.5 – 3 years maximum.**



Job creation PHP Lyon

➤ Basic Pyrogasification :

- 20 – 25 employees

➤ Pyrogasification + reinforced sorting unit :

- production: 17 - 28 employees (low-skilled);
- research: 4 - 7 employees;
- services & logistics: 4 - 6 employees;
- administration and management: 5 – 9 employees.

- **Total = up to 50 jobs**

Forecast : 3 to 5 years



In short: PHP-Lyon Project Example

- Investment: **Confidential**;
- Up to **50** direct local jobs created;
- **Pooling** of facilities and services (Industry Partners);
- Contribution to the **circular economy**: production of local energy using local feedstock;
- **Flexible** technologies for: Hydrogen, Oils, Fuels (Methanol, OME, DME, etc.);
- **High performance**: about 60 % more energy-efficient compared to incineration;
- **Continuity in the Research (R&D)** on Thermocatalytic and Pyrolytic Technologies and the recovery of residual wastes : Hydrogen, Ecofuels (and/or additives), Heat.



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