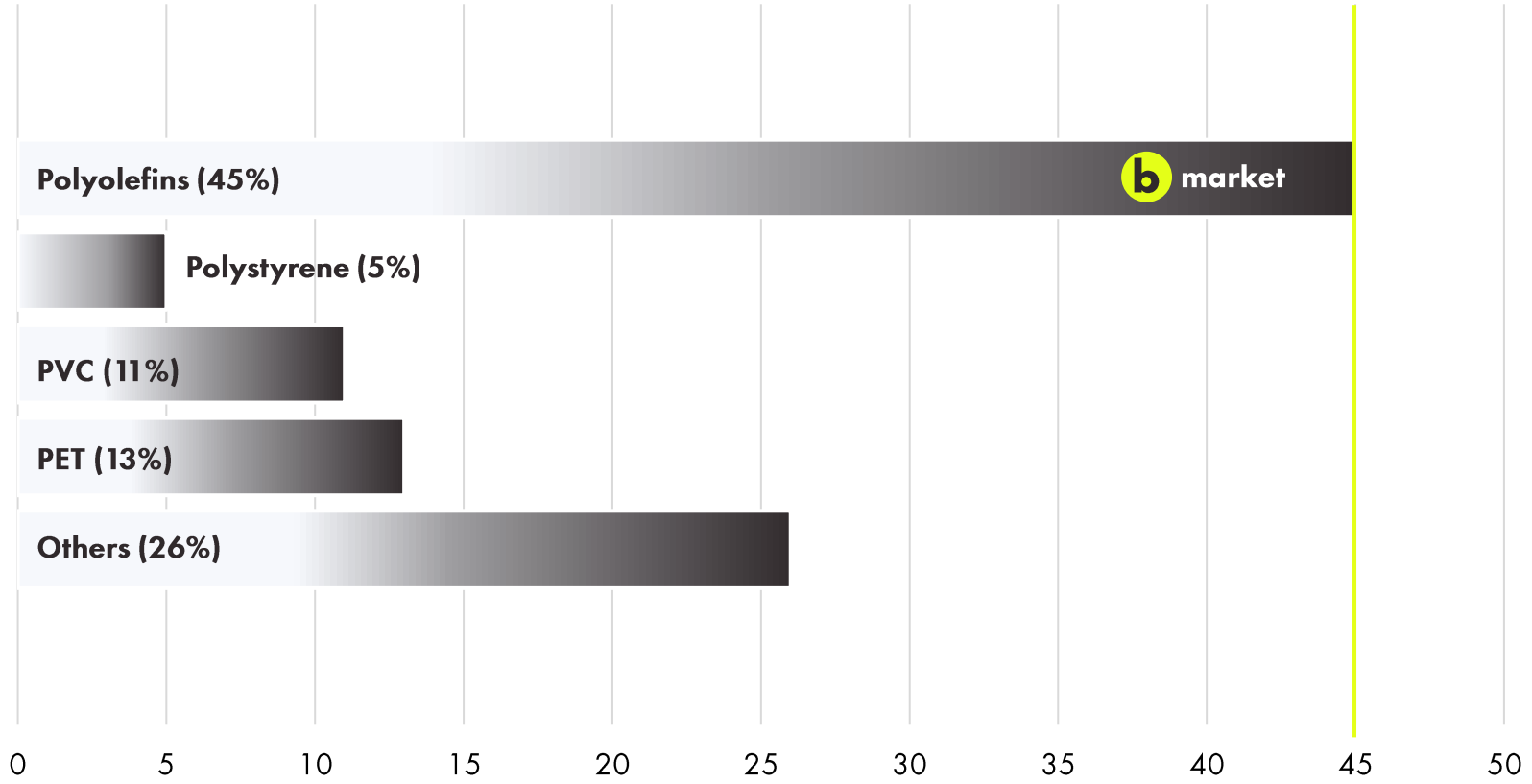
bobine

a plastic to olefins technology.

v2 pilot unit _ Parc Cataroux _ France

01. SHORT OVERVIEW OF THE GLOBAL PLASTIC PRODUCTION AND PLASTIC CATEGORIES.

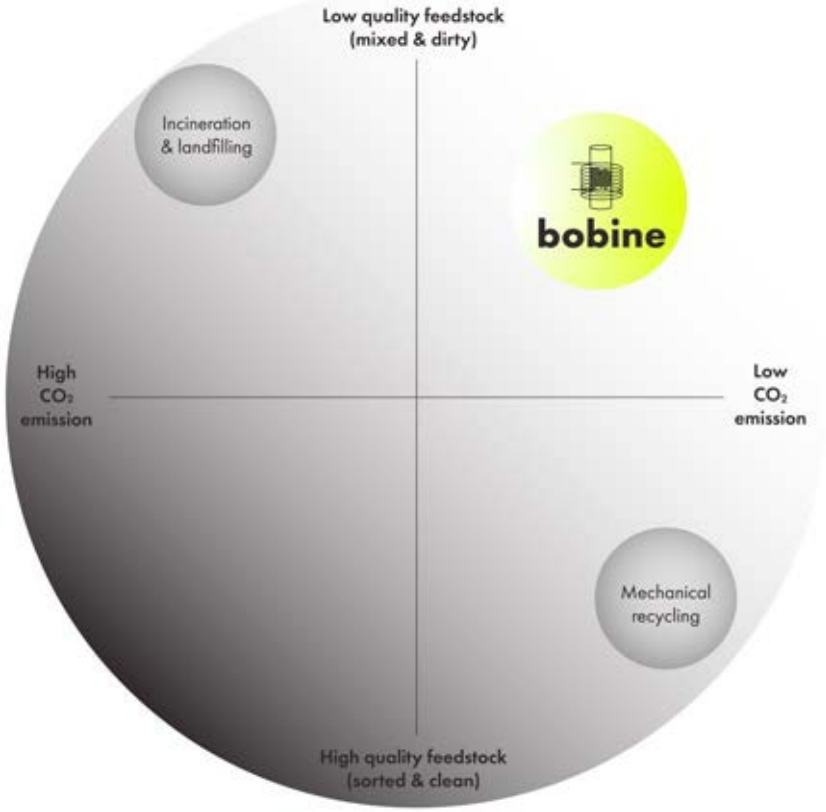


PLASTIC CATEGORIES AND THEIR REPRESENTATIVITY OVER THE GLOBAL PLASTIC PRODUCTION (%)

02. A LACK OF SOLUTION FOR HARD TO RECYCLE POLYOLEFINS WASTES.

- ✓ **Clean and separated rigid PO** wastes compatible with Mechanical Recycling.
- ✓ **Other PO wastes considered as « Hard To Recycle** » are incinerated or landfilled.
- ✓ **bobine** brings a **new recycling offer** on the market**, complementary to the mechanical recycling**.

* Source: Mc Kinsey



EXISTING SOLUTIONS VS FEEDSTOCK & ENVIRONMENTAL IMPACT

03. A CIRCULAR OLEFINS PRODUCTION IMPOSED BY EUROPEAN REGULATION.

A HUGE CIRCULAR OLEFINS MARKET

- ✓ **Olefins** are the first chemicals produced globally with 480 Mt/an, for a trading volume of **250 B $** in 2022.
- ✓ **400 B $** estimated in 2050.
- ✓ Total global olefins production performed in only **220 petrochemical assets.** 80% of production performed by top ten producers*.

EU PPWR REGULATION HIGHLIGHTS

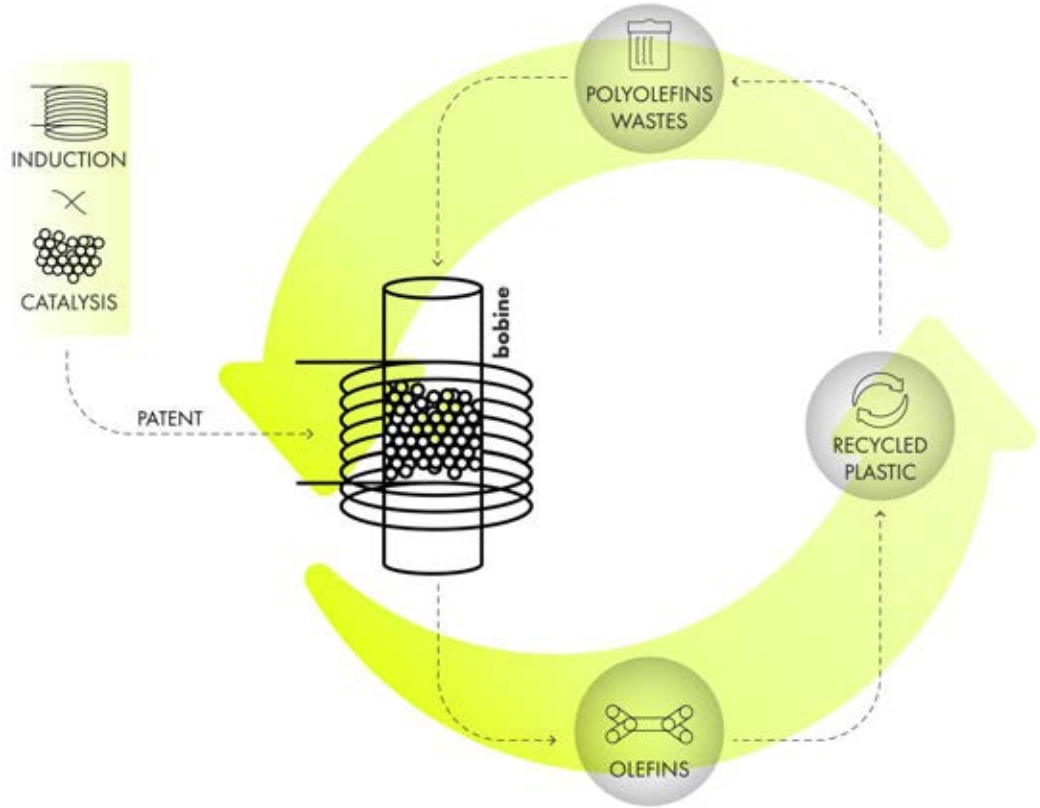
- ✓ **EU PPWR** regulation targets:** only accessible by chemical recycling technologies.

EUROPE	2040
Recycled content in food grade packaging	25%
Chemical recycling capacity needed	5 Mt/year

* **ExxonMobil** (US), SABIC (KSA), Dow Chemical (US), **LyondellBasell** (Netherlands), Sinopec (China), **Shell** (Netherlands), **Formosa** (Taïwan), **TotalEnergies** (France), **Reliance** (India), **Chevron** (US)

** The PPWR (Packaging and Packaging Waste Regulation) sets stringent rules for food-grade and contact-sensitive packaging. Voted by European Parliament in Q4 2023 It aims for gradual implementation starting in 2025, with full compliance expected by 2030 across the EU.

04. A HIGHLY INNOVATIVE OLEFINS PRODUCTION ELECTRIFICATION.



INDUCTION ACTIVATED CATALYSIS NEW TECHNOLOGY

TECHNOLOGICAL BRICK

- ✓ World First Combination of two **mature and robust** technologies.

IP PROTECTION

- ✓ **1 princept patent applied in july 2022**. Exclusive Licence granted by SATT Conectus Alsace.
- ✓ **2 additional patents**.

04B.CHEMICAL RECYCLING TECHNOLOGIES LANDSCAPING BY FEEDSTOCK – EXAMPLES.

POLYOLEFINS
« Advanced »

MONOMERIS CHEMICALS
SYNOVA RENEWABLE TECHNOLOGY
bobine
Anellotech
Plastics2Olefins

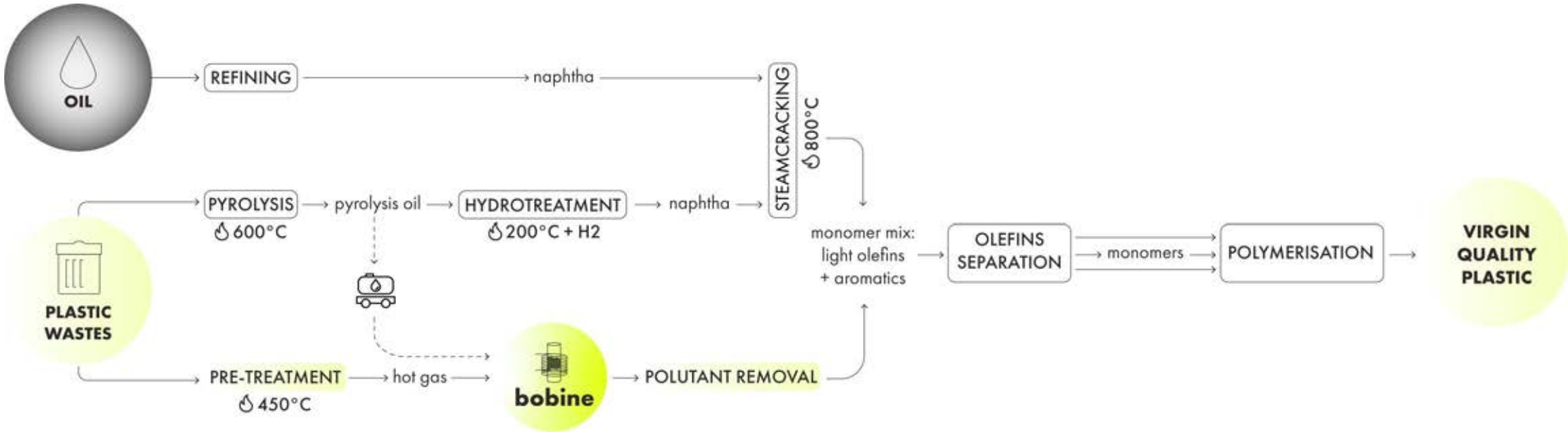
POLYOLEFINS
« Pyrolysis kind »

PLASTIC ENERGY
nantek
BLUEALP &
LYB LyondellBasell
OMV
QUANTAFUEL
Pryme making plastics circular

OTHERS
RESINS

AQUAFIL synthetic fibres and polymers
Emery Oleochemicals
agilyx
H&S ANLAGENTECHNIK
POLYLOOP COMPOSITE RECYCLING TECHNOLOGY
PYROWAVE
TEN
CARBIOS
loop INDUSTRIES
EASTMAN

05. FROM END PLASTIC WASTES TO VIRGIN QUALITY POLYMERS.



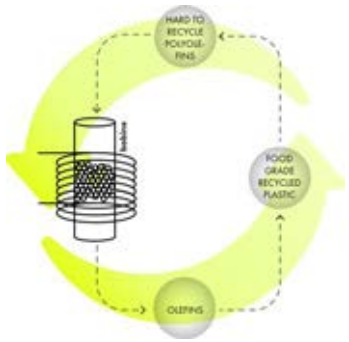
NO STEAMCRACKING FURNACE ✓ | FULL TRACEABILITY ✓ | 100% ELECTRIC ✓ | NO HYDROTREATMENT ✓ | FOOD GRADE & CONTACT SENSITIVE ✓

07. GAINS: COMPETITIVNESS VERSUS PYROLYSIS.

+45%
CONVERSION RATE

-60%
ENERGY DEMAND

-45%
PRODUCTION COST



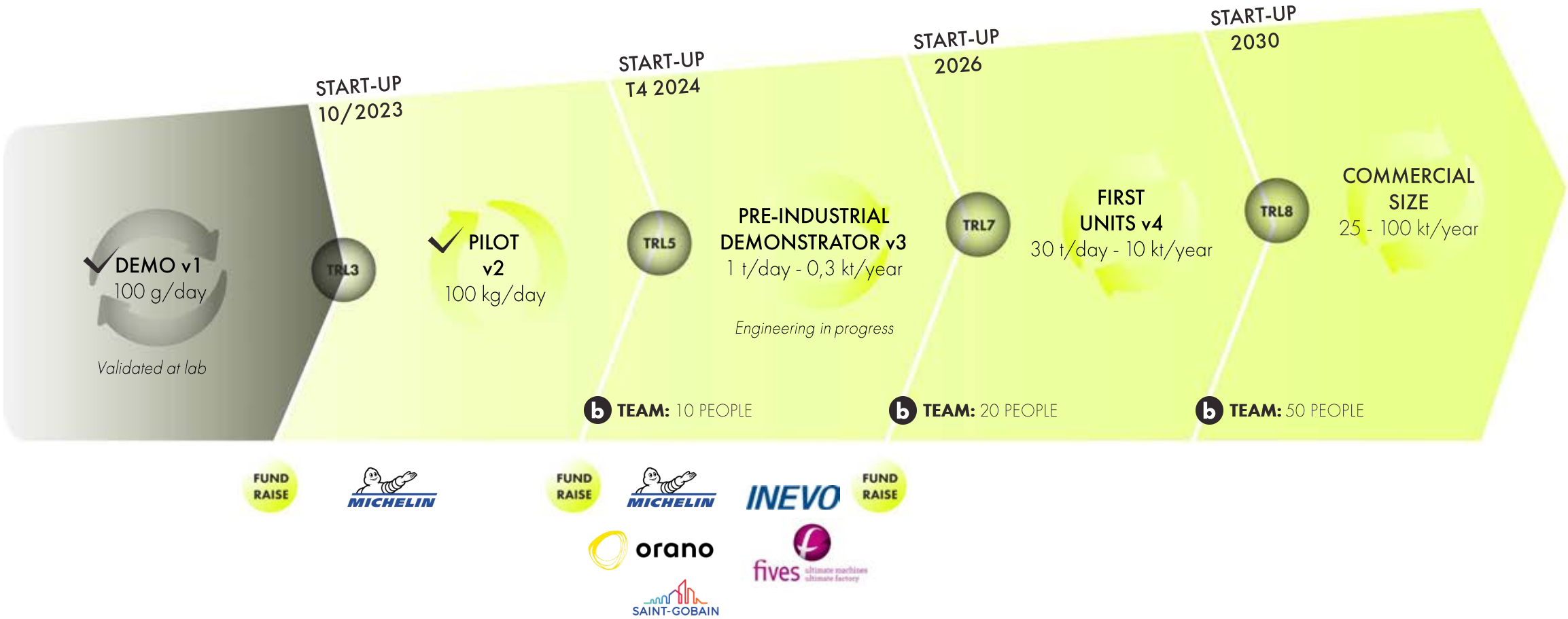
-55%
CO_2 EMISSION

COMPARISON WITH CONVENTIONAL PLASTIC TO PLASTIC* (PtP)

* fuel + naphta + hydrotreatment + steamcracking - Calculations performed by independent consultant.

road map

08. TECHNOLOGY SCALE-UP ROAD MAP.



09. FOCUS ON OUR SCALE-UP EQUIPMENTS.

scale-up road map

APPLICATION LAB

V1 _ ID CARD

Scale: **1 kg/day**
TRL: **3**

Purpose:
*R&D
*Feedstocks POC

Continuous run max:
*10h

Type of feedstocks:
*Liquid input
*Solid input (wastes)

Operational November 2025

Axel'One

PILOT PLANT

V2 _ ID CARD

Scale: **100 kg/day**
TRL: **5**

Purpose:
*Upstream / downstream integration

Continuous run max:
*100h

Type of feedstocks:
*Real wastes

Under operation

MICHELIN

DEMONSTRATOR

V3 _ ID CARD

Scale: **1T/day**
TRL: **7**

Purpose:
*Petrochemical standard of operation
*Technical validations: benchmark for first units

Continuous run max:
*100h

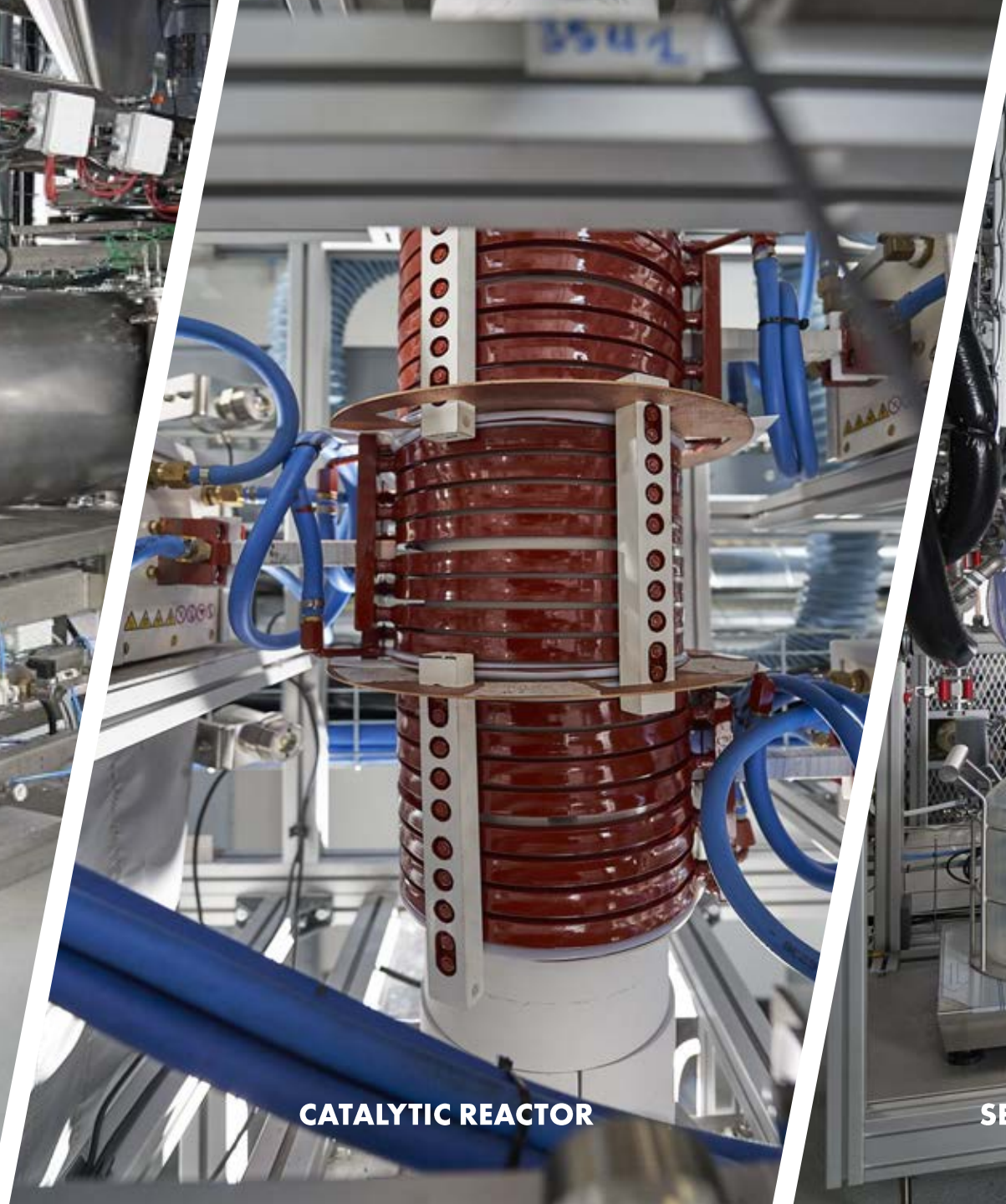
Type of feedstocks:
*Pyrolytic Oils
*Real wastes

Engineering in progress

MICHELIN

v2 pilot

PYROLYSER



CATALYTIC REACTOR

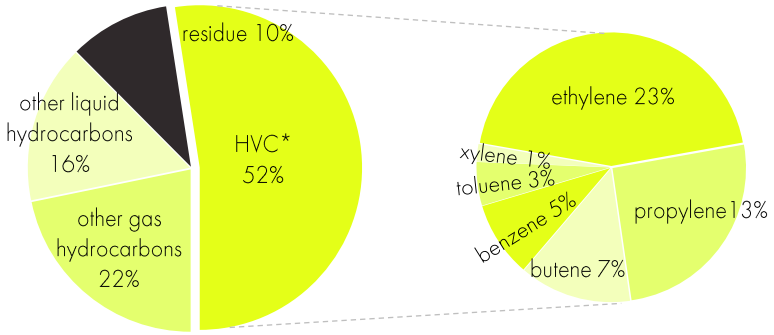
SEPARATOR

MICHELIN fives FEMAG INDUSTRIES PIGNAT

early stage validation

HVC CONVERSION:
60 % polyolefins conversion to HVC

SPEC EXEMPLE OF WASTE MIX TESTED
Min 85% of polyolefins (PE + few PP/PA)
Max 8% other plastic
Max 4% PET
Max 3% paper, card,...
Traces of metal, organics, inorganics



v2 REAL WASTE RX:
Operation time up to now: 200h
Feedstock: real post consumer waste
HVC content reached : always 60%
High process stability

11. THE OPERATIONNAL TEAM.

Vincent SIMONNEAU
CEO
- ✓ 3 years as CEO of a Deeptech Start-up
- ✓ 15 years in O&G Licensing sales

Romain RIVIERE
CTO
- ✓ 13 years as Process Engineer in petrochemistry

Céline COSTECALDE
Head of Projects
- ✓ Project Director on b$ O&G Projects

Fabien GUILLEMAUT
Head of Piloting
- ✓ 25 years on polymer production piloting

Lucas SHERNETSKY
Head of Process
- ✓ 12 years as Lead Process Engineer in O&G

Malaury ROBIN
Field Process Engineer
- ✓ Project fabrication Follow-up
- ✓ Unit Start-up

Pauline PAQUET
R&D Engineer
- ✓ PhD in Polymer Chemistry
- ✓ 5 years experience in petrochemical industry

Léa CORRE
Strategic Coordinator
- ✓ Waste Procurement focus
- ✓ Strategic partnership focus

Julie POISSENOT
Head of quality & management control

Meryl BERTRAND
Marketing & Communication Manager
- ✓ Part-time freelance

15. WANT TO KNOW MORE ABOUT THE TECHNOLOGY?

contact

bobine

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69 100 VILLEURBANNE

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www.bobine-chemistry.com