#ChemelotCircularHub

Chemelot
Circular Hub

Leading Circularity

WHO WE ARE

The Chemelot Circular Hub is an ambitious **transition program** and investment agenda to enable the shift **towards a net zero circular chemistry**, aiming at becoming Europe's first and leading circular hub.

This program has been developed and is being implemented by a **triple helix partnership** comprising:

* TNO, Maastricht University, Zuyd University of Applied Sciences, Vista college;
* DSM, Sabic, Fibrant, Chemelot Industrial Park, Brightlands Chemelot Campus, the Green Chemistry New Economy platform;
* the municipality of Sittard-Geleen, the province of Limburg and the investment agency LIOF.

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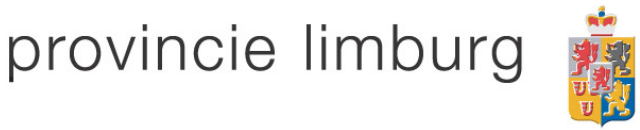
Partnership



WHAT WE DO

mission

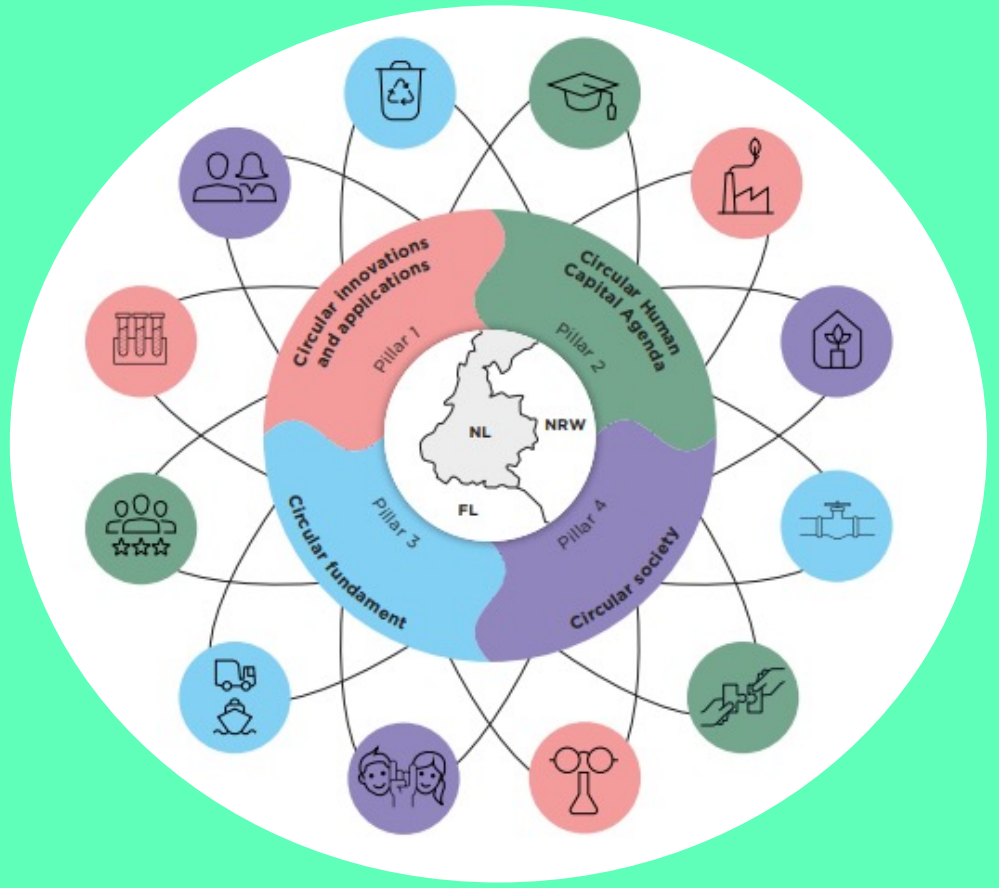
The program is built upon **4 pillars**, focusing on:

1_technological innovation,

2_state-of-the-art infrastructure,

3_human capital and digitalisation,

4_ the inclusion of citizens and other stakeholders.



Our mission:

*2030: 25% less intake of virgin fossil feedstock (1Mt)

*2050: no more intake of virgin fossil feedstock (4Mt)

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WHAT WE DO

about chemical recycling

As a key stepping stone on the road to circularity, **chemical recycling is one of leading projects of the CCH's innovation pillar,** complementing research and innovation on mechanical recycling, circular design and the use of biogenic resources.

Likely, there will be a **dynamic portfolio of many technologies**, aiming at recycling of plastic waste, biomass-waste and mixed waste.

1 To enable and accelerate the testing and scaling up (pilot and demonstration stages) of the various waste technologies, a **field lab** with facilities required to test waste processing will be set up, with an emphasis on the heavy-duty processes solvolysis and chemical recycling.

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WHAT WE DO about chemical recycling

2 **Drive innovation for pyrolysis**, which can be used to convert hard-to-recycle waste into valuable **cracker feedstocks**, by demonstrating at least 5 pyrolysis technologies on Chemelot and the crackers using 50 ktpa of pyrolysis oil as feedstock by 2025; 400 ktpa by 2030 and 1 Mtpa by 2040 pyrolysis oil.

3 At the same time looking at an even more direct route, directly converting waste to **cracker products** (olefins and aromatics), using an innovative process that finds middle ground between gasification (which breaks waste down to C1-molecules) and pyrolysis (which produces relatively long molecules which are then cracked in crackers). This would eliminate the need to continue to use the existing crackers and generate significant efficiency gains.

4 Also use of **pyrolysis** to convert tyres into carbon black or new rubbers.

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WHAT WE DO about chemical recycling

5 **Gasification** of mixed waste producing hydrogen, which provides an alternative for the current production at Chemelot based on natural gas

6 Recycling of polyamides and polyesters by **depolymerization**, focusing on PA6 and PET, aiming at a demonstration plant producing circular caprolactam at commercial cost and with the lowest (or no) carbon footprint by 2030, while also further increasing PET recycling capacity.

7 Also looking at chemically recycling the epoxy and polyester thermoset composites in windmill blades, where the high amounts of incorporated other materials such as glass fibres pose a challenge requiring innovation.

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WHAT WE DO

about chemical recycling

9 Dissolution to convert plastics like HighImpact PolyStyrene, AcrylonitrileButadieneStyrene and PolyVinylChloride towards their monomers which should be more efficient than the route through gasification and/or pyrolysis but requires innovation to deal with additives like fillers and pigments. The aim is to demonstrate the technology for at significant waste streams by 2025 and to have a commercial plant in 2030 at Chemelot.

10 In addition any remaining CO2 emissions can be captured and re-used, in applications like gas fermentation (converting hydrogen and CO2 with single cell proteins to useful products like fishmeal) and Fischer-Tropsch conversion (combining the CO2 with H2 to produce hydrocarbons like synthetic/bio naphtha which can subsequently be cracked in the existing crackers.

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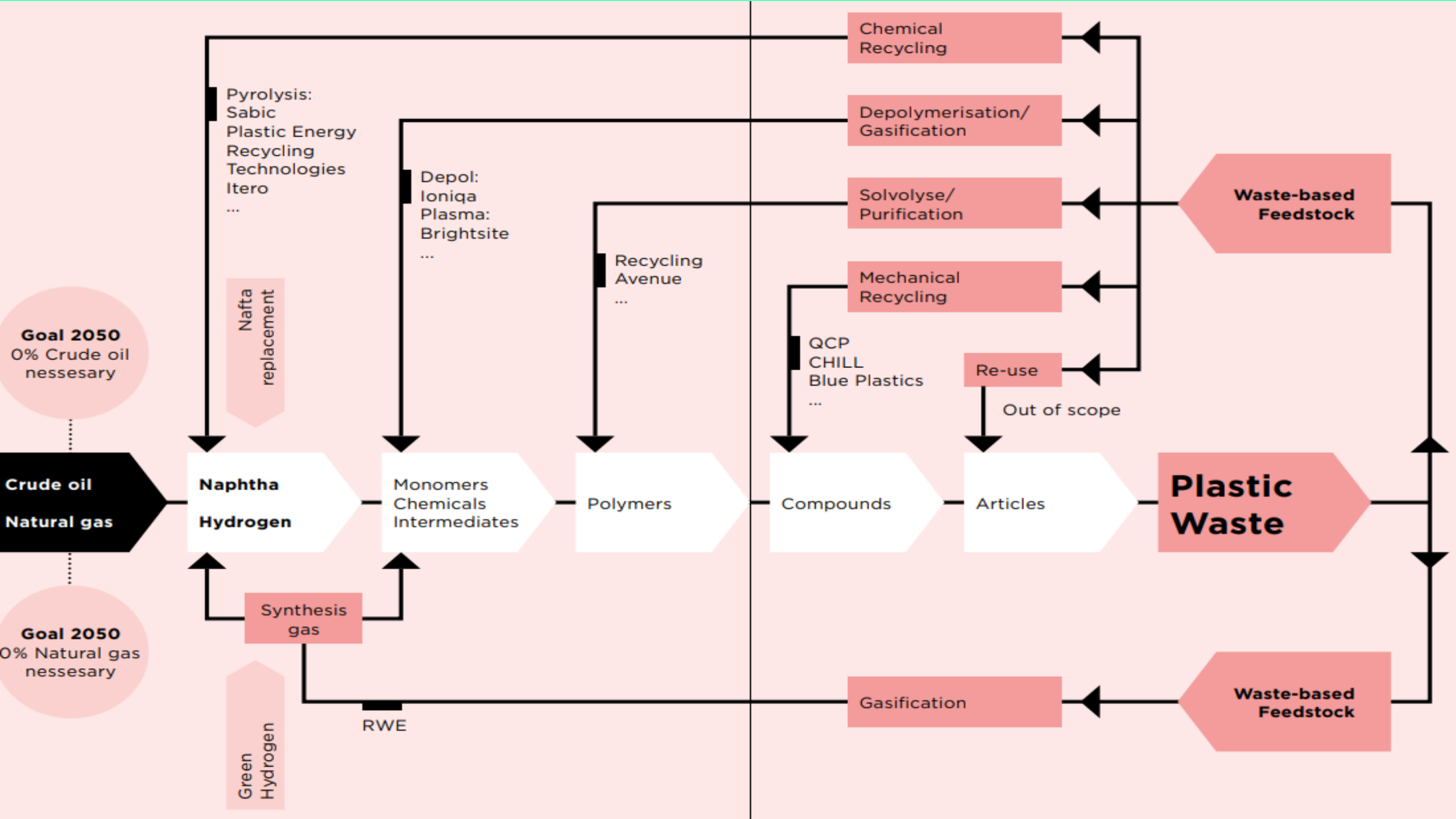
Chemical Recycling
Depolymerisation/ Gasification
Solvolyse/ Purification
Mechanical Recycling
Re-use
Out of scope
Waste-based Feedstock
Pyrolysis: Sabic Plastic Energy Recycling Technologies Itero ...
Depol: Ioniqa Plasma: Brightsite ...
Recycling Avenue ...
QCP CHILL Blue Plastics ...
Nafta replacement
Goal 2050 0% Crude oil nessesary
Crude oil
Natural gas
Naphtha
Hydrogen
Monomers Chemicals Intermediates
Polymers
Compounds
Articles
Plastic Waste
Synthesis gas
Goal 2050 0% Natural gas nessesary
Green Hydrogen
RWE
Gasification
Waste-based Feedstock

WHAT WE BETTER DO TOGETHER

11 Establishing a joint REsource Hub Across Borders to create a quality driven level playing field.

Without security of supply of large enough volumes of feedstock, no chemical recycling. But instead of organizing a competition on the quantities, let's cooperate to set qualifications for both feedstock and recyclates.

12 Testing-Apart-Together different recycling technologies to enable a faster track to innovation.

We are still largely in a process of piloting and demonstrating technologies. There isn't and there won't be one solution. But to avoid shredding money on technologies that are alike, let's get together in the sandpit.

13 Contributing all to implement the Roadmap of the Accelaration Table on Chemical Recycling.

No time to waste.

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