

A large industrial chemical plant with numerous tall distillation columns, pipes, and structural steel. Overlaid on the image are several concentric, glowing blue circular lines that resemble energy waves or a digital signal, centered over the middle of the facility.

Chemical Recycling

A technology enabling the recycling of plastics complementary to mechanical recycling

November 10, 2022

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OMV Chemicals & Materials



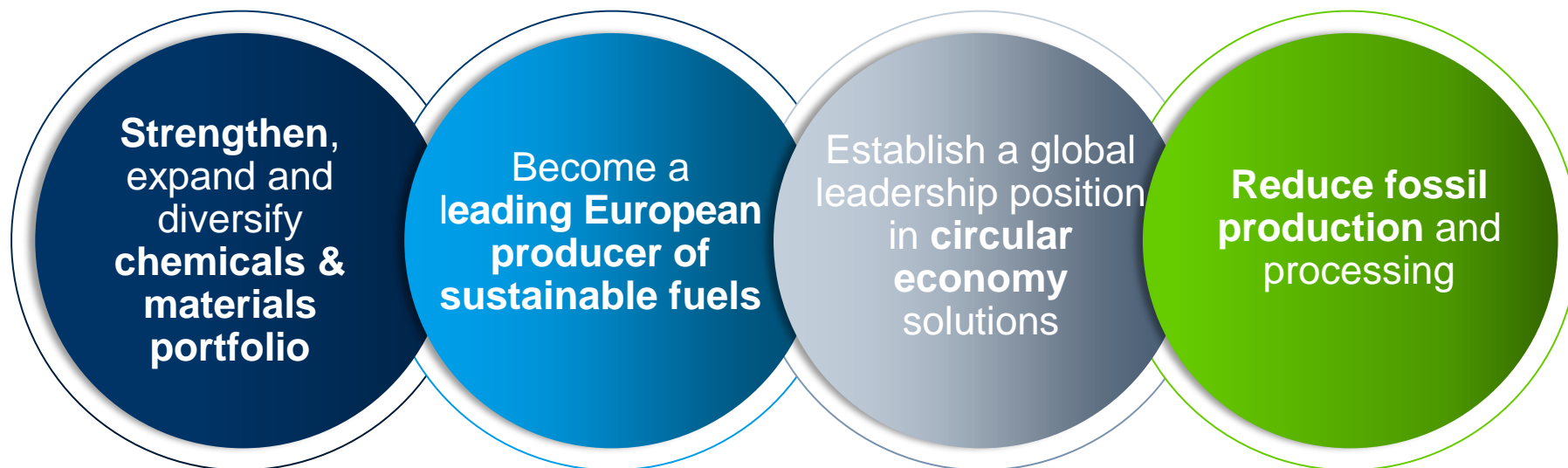
OMV STRATEGY 2030

FROM VALUE CHAIN TO VALUE CIRCLE

The Core of our Strategy

Leading in sustainable fuels, chemicals and materials

Net zero by 2050 in Scope 1, 2 and 3



All business segments will contribute to the transformation

Business segments



Chemicals & Materials

- Become a **global leader in specialty polyolefin** solutions, with a significantly strengthened position in Asia and North America
- **Scale up the circular business** and diversify into **new high-value chemicals and materials** for long-life applications



Refining & Marketing

- Reconfigure refining in the direction of **renewable fuels and chemical feedstock** production with deeper chemicals integration
- Provide **mobility solutions** by building a sustainable fuels business and **growing Retail** through non-fuel business and e-mobility



Exploration & Production

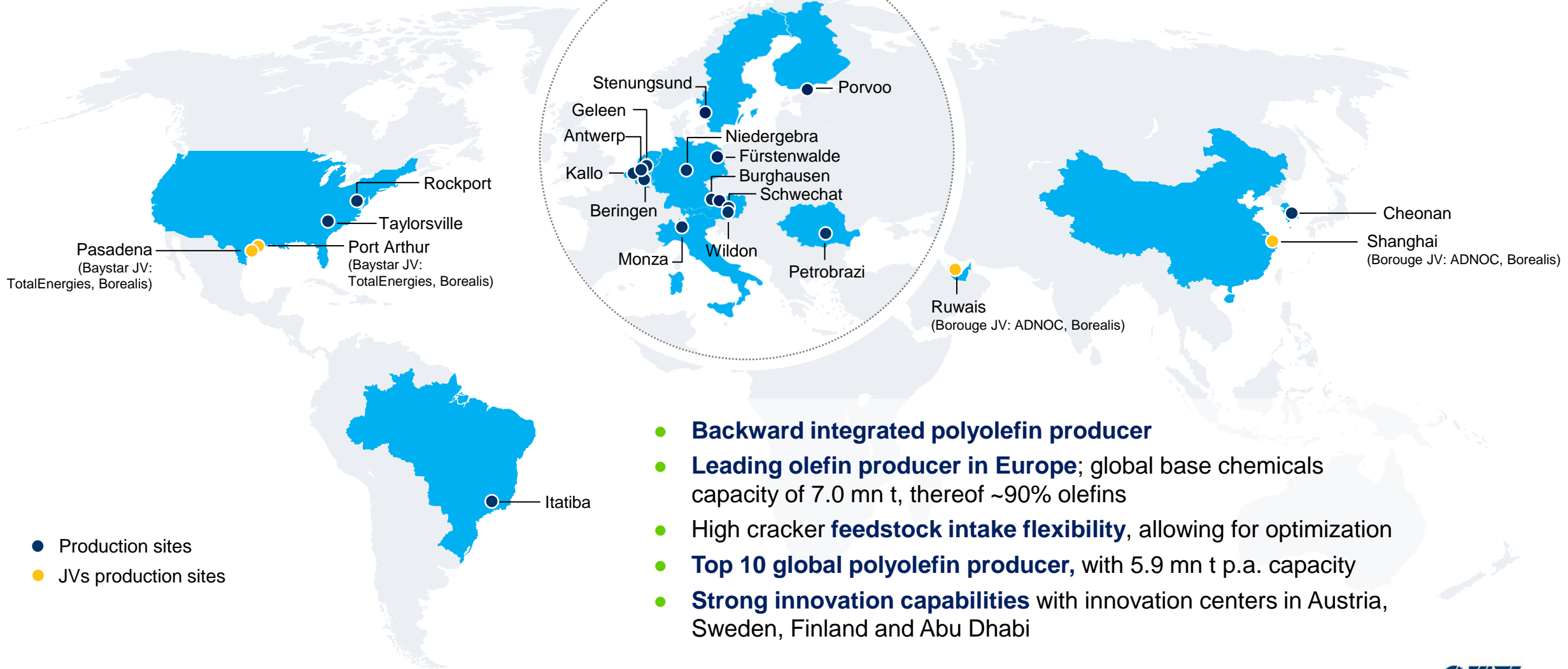
- Leverage existing capabilities to **provide sustainable energy solutions** (geothermal, CCS)
- **Reduce fossil production** gradually and shift to natural gas, as an energy transition fuel until 2030



Build a **sustainable growth business model**, with focus on increasing returns for shareholders

Well positioned

C&M – Building on our already strong position

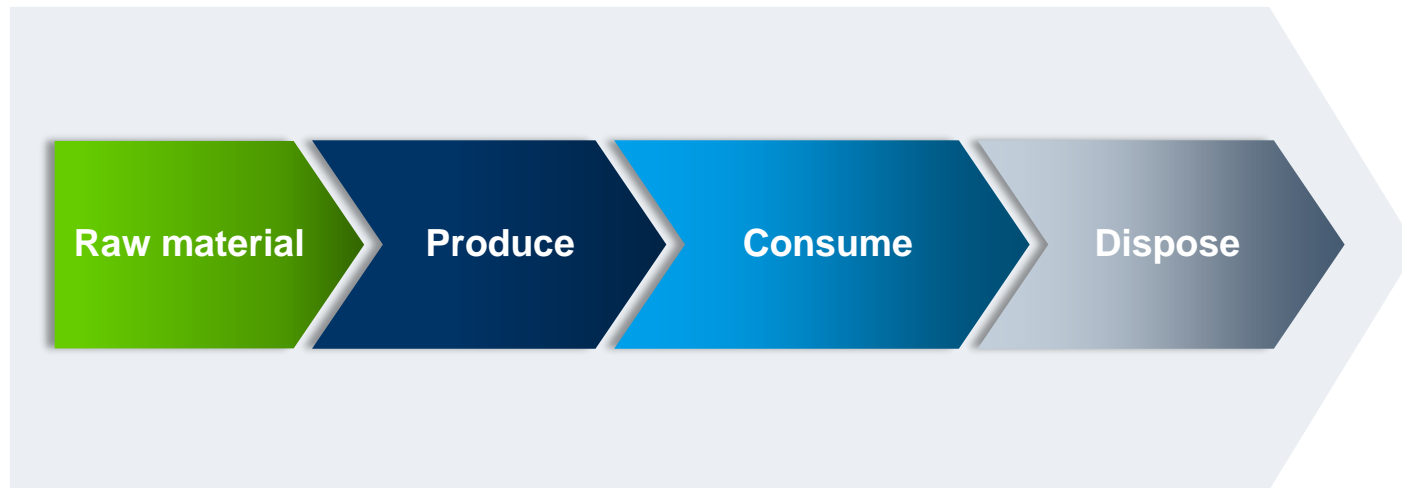


- **Backward integrated polyolefin producer**
- **Leading olefin producer in Europe**; global base chemicals capacity of 7.0 mn t, thereof ~90% olefins
- High cracker **feedstock intake flexibility**, allowing for optimization
- **Top 10 global polyolefin producer**, with 5.9 mn t p.a. capacity
- **Strong innovation capabilities** with innovation centers in Austria, Sweden, Finland and Abu Dhabi

The Core of our Strategy

Fundamental shift from a linear to a circular society

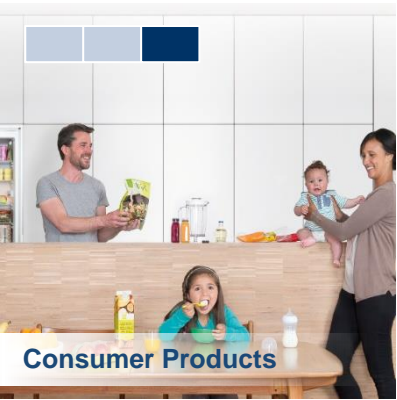
Linear economy



Circular economy



Polyolefin market presence in key growth sectors



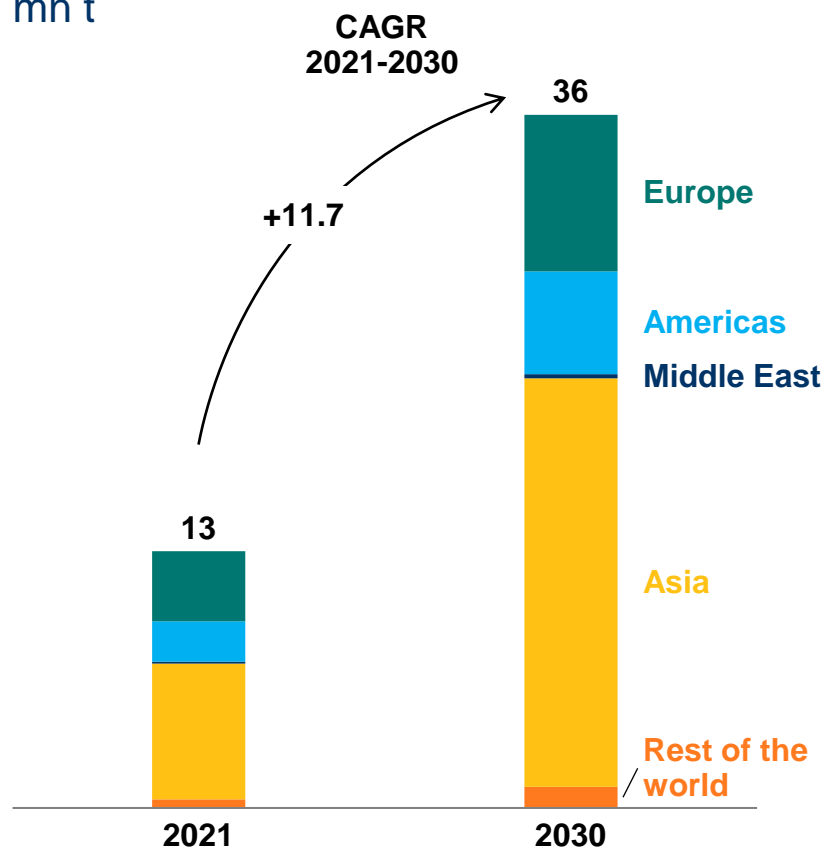
- ▶ **Large share of specialty products** and application know-how, increasing earnings resilience (40% volume share)
- ▶ **Leading global supplier to Energy and Pipe industries**
- ▶ One of the **largest product offerings in the healthcare business**
- ▶ **Market growth above GDP** in almost all segments
- ▶ **Providing polymer solutions with long use-life**

PE pressure pipes for gas and water utilities	Power cables	Automotive
~50 years	~40 years	~15-20 years

PP PE approx. volume share in application

Polyolefins feedstock will shift to lower emissions

Recycled polyolefin demand
mn t

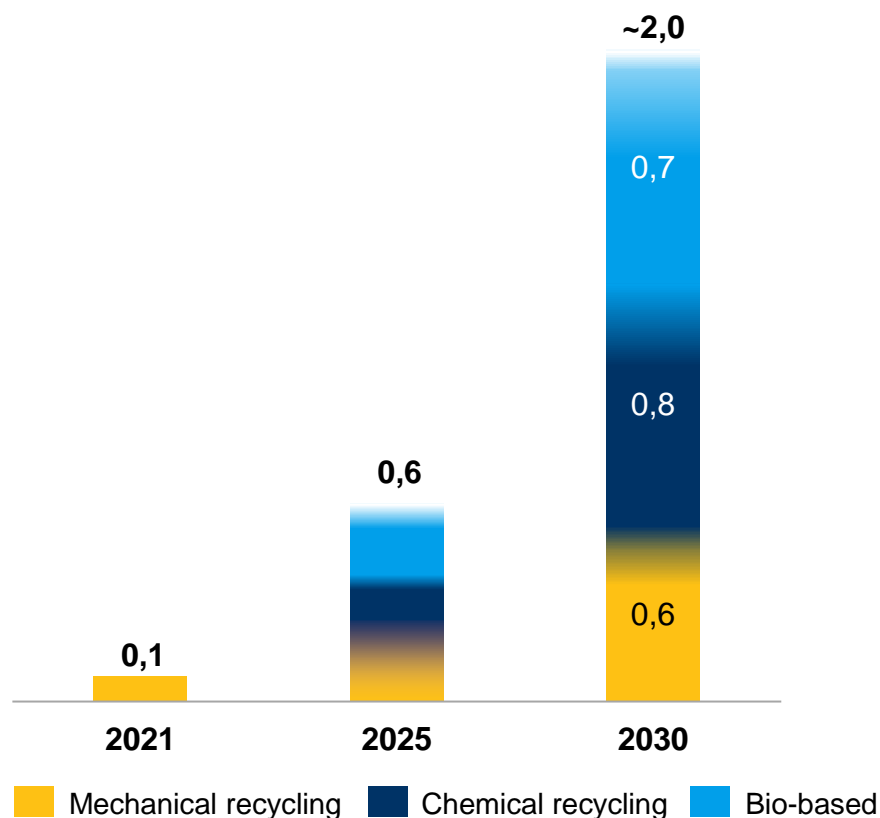


- **Growing three times faster** than global GDP
- Recycled plastics can reduce **up to 50% CO₂ emissions**
- Recycled plastics have become more **commercially competitive** due to advance in technology
- Drivers
 - **New regulations**, e.g. Europe aims to recycle 55% of plastic packaging by 2030
 - **Voluntary commitments** by major brand owners in response to consumer preferences and legislation

Sustainable Polyolefins

Up to 40% of polyolefin volumes in Europe will be based on sustainable feedstock

Sustainable production capacity
mn t



- Capture market potential by leveraging OMV's integrated technology platform and end-to-end position to establish **products and new business models**
- **Ramp up use of circular and bio-based feedstocks** for polyolefin production
- Establish **global sustainability leadership** by expanding through existing JVs, growth platforms and additional partnerships in Asia and North America
- Build **optionality for further emission reduction measures**, e.g. investments in **bioplastics production** or in **bio feedstock**
- **80% of production in Europe**, ~20% in North America, Asia
- Post 2030, the volumes will increase further

OMV engages in the entire circular economy value chain

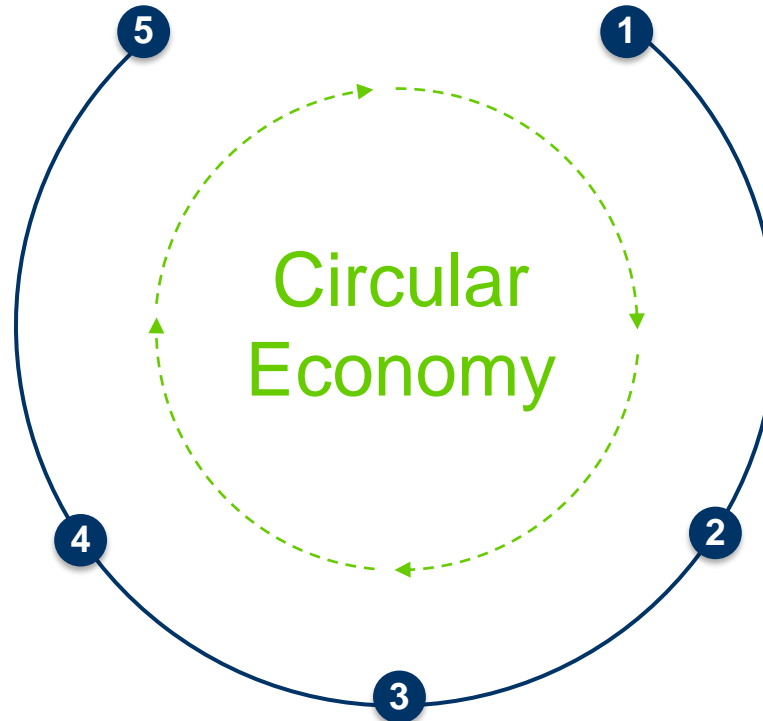
Market access

- Partnerships with brand owners and retailers, e.g.



- Unique full-range customer offer consisting of fossil, bio-based and circular products

Design for recyclability



Integration

- Schwechat**: integration between chemical recycling and refinery
- Renasci**: integrated recycling concept, especially for developing markets and mixed waste streams

Proprietary technology

- Chemical recycling: ReOil™**
- Mechanical recycling**

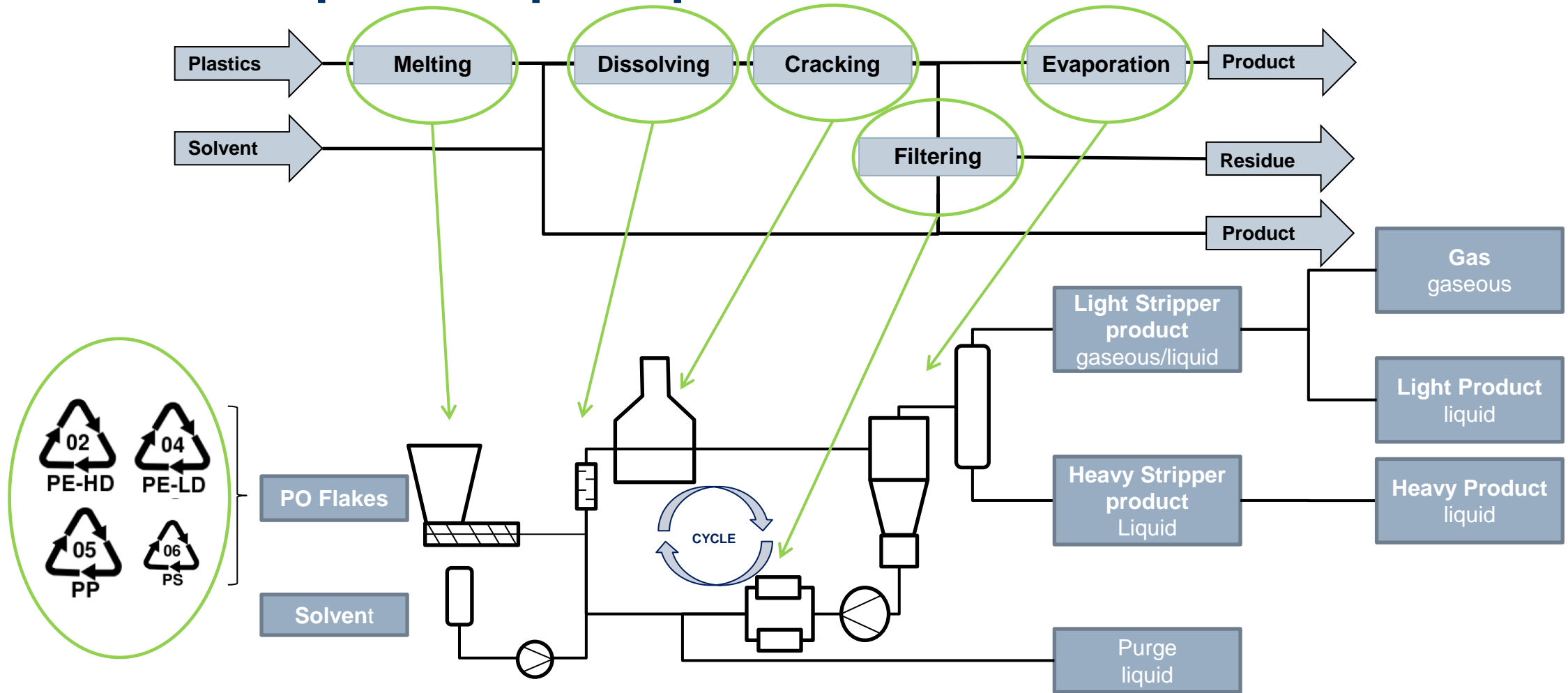


Feedstock access



Chemical recycling

The ReOil™ process principles



- >17.000 pilot cracking hours since 2019; 1000 tons processed; 24/7 integrated operation in the field; ISCC+ certified; internationally patented; scalable

ReOil™ scale up strategy



Development of ReOil licensing business



Lab-plant 0,2



ReOil 0,2 [kg] batch ✓

Realized:
2009

Proof of concept in
the laboratory at
Schwechat Refinery

Pilot 5



ReOil 5 [kg/h] continuous ✓

Realized Start up:
2013
[Capacity: 40t/a]

Development of the
continuous ReOil
process in the pilot
plant facility

Pilot 100



ReOil 100 [kg/h] continuous ✓

Realized Start up:
2018
[Capacity: 600t/a]

Proves the process
works at a larger
scale in the refinery -
focus on
depolymerisation

Demo 2000

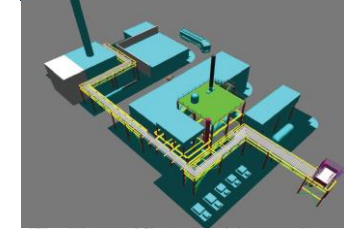


ReOil 2.000 [kg/h] continuous ✓

Planned Start up:
2023
[Capacity: 16kt/a]

Proves the selection
& design of
equipment
and refinery
integration (post- and
hydrotreatment)

Commercial Plant



ReOil commercial [kg/h] continuous

Planned Start up:
2027
[Capacity: 200kt/a]

1st integrated commercial
size and basis for further
roll out

Tech center



Development of ReOil simulation



Chemical recycling ReOil™ status



- Capacity: 16.000 tpa
- Start up: 2023
- Green loan financed

Feedstock

Desired feedstock components

► PP



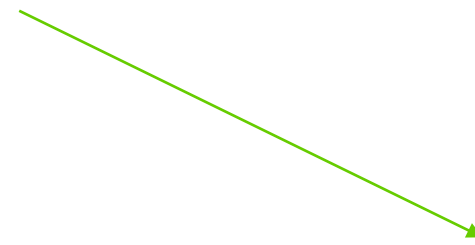
► LDPE



► HDPE



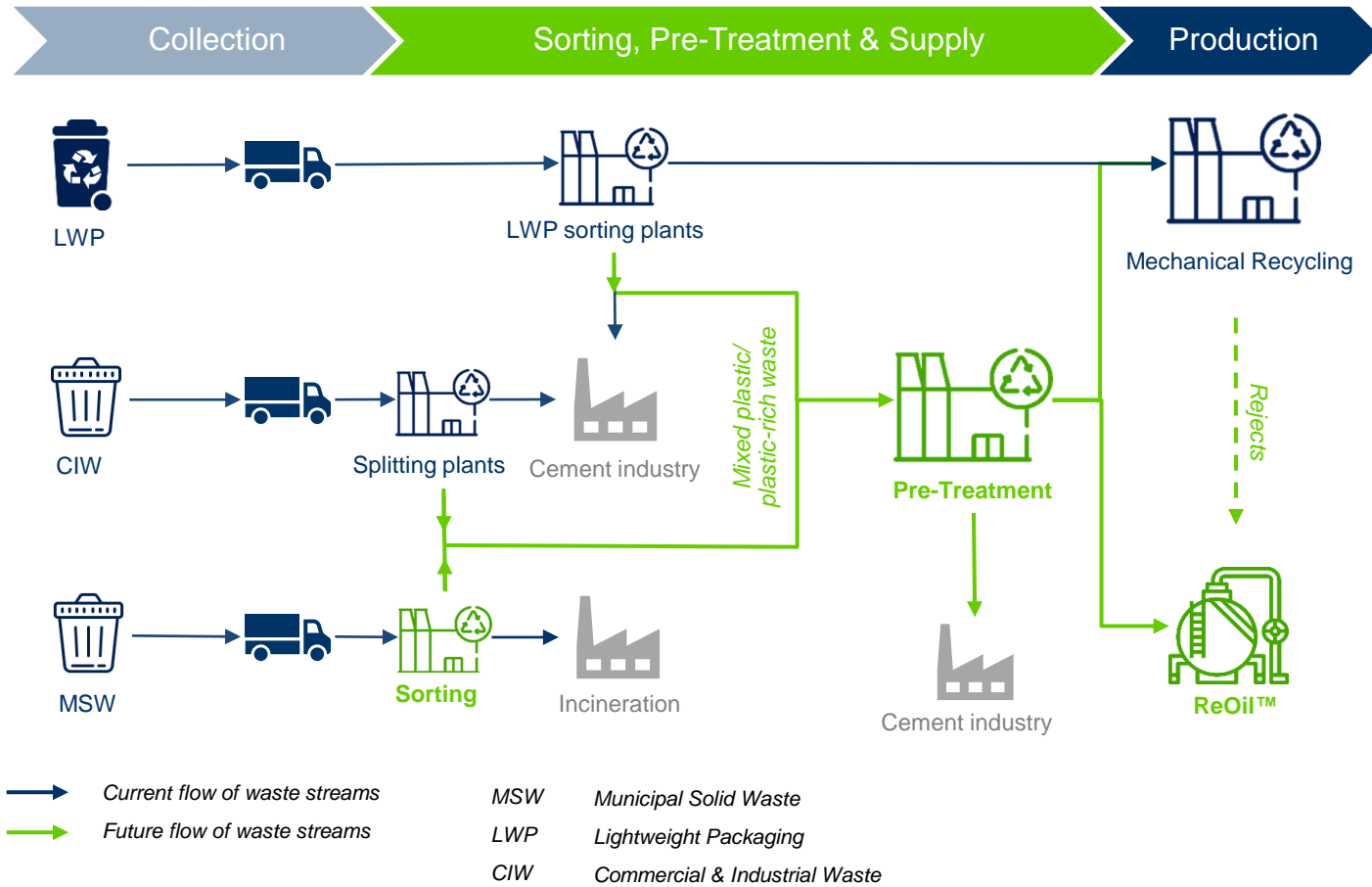
► PS



**Short chain hydrocarbons
and some gas** (and some
coke/inorganics)

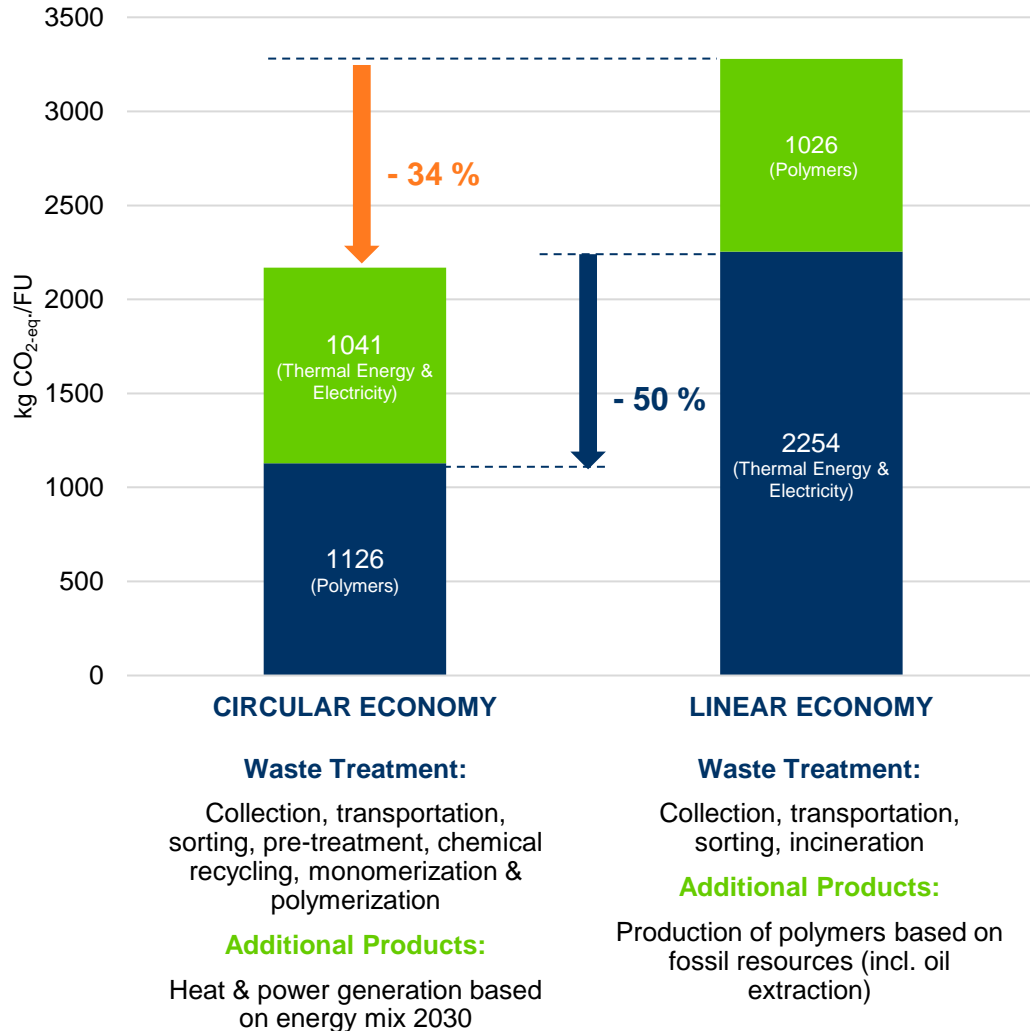
Styrene

ReOil™ feedstock supply strategy



- Feedstock with a PO content of >85w%
- Target waste streams, which are not suitable for mechanical recycling
- Targeted waste streams therefore include:
 - Sorting rests generated during sorting of LWP for mechanical recycling
 - Plastic-rich waste streams which can be sorted from MSW before incineration
 - Plastic-rich commercial and industrial (C&I) waste streams
- Need to be sorted and purified ("pre-treated")
- Develop waste management industry
- Develop tailor-made "Pre-Treatment" solutions together with partners from the waste management industry

Significant benefits shifting to a circular economy



The Life-Cycle-Analysis compares the **environmental footprint** of different **treatments of 1 tonne of pre-sorted mixed plastic waste**:

- **chemical recycling** via ReOil technology and
- **incineration** (= current route).

A “**Waste-to-Gate-Level**”, starting at the origin of waste with the collection and ending with the production of polymers/energy, ensures the **coverage of the whole value chain**.

~ 50%

GHG emissions savings, when **chemically recycling** 1 tonne pre-sorted mixed plastic **instead of incinerating** it.

19% of GHG emissions are related to the ReOil process itself – the majority of GHG emissions are related to sorting, pre-treatment and monomerization.

~ 34%

GHG emissions savings, when **shifting from linear to circular economy** – both systems produce the same outputs (polymers, thermal energy, electricity)

- **circular economy:** chemically recycling of mixed plastic waste + heat & power generation based on energy mix
- **linear economy:** incineration of mixed plastic waste & production of polymers based on fossil resources

**Based on a LCA conducted by Fraunhofer Umsicht&ICT according to ISO 14040 and 14044 standards, incl. a peer-review by independent third-parties in 2022.*

Expanding the product range

BORCYCLE™

Borcycle™ M



Advanced mechanical recycling

State-of-the art recycled material and rPO compounds in light colours which overcome challenges in terms of odour and impurities

First generation launched

Borcycle™ C



Chemical recycling

Virgin equivalent
Food grade

For high demanding applications

First generation launched

BORNEWABLES™



Renewable-based POs

Virgin equivalent
Food grade

Carbon footprint reduction

In commercial launch



From value chain to value circle*

*On March 16, 2022, OMV presented its new Strategy 2030, that outlines the Group's fundamental transition to a circular economy.