



PLASTIC RECYCLING FOR THE CIRCULAR ECONOMY

CARLOS MONREAL, FOUNDER AND CEO



A GROWING PROBLEM – A GROWING AWARENESS

The problem is not plastics themselves, but plastic waste....

20x

The use of plastics has increased twentyfold in the past half-century

1M+

Every day more than 1 million tonnes of plastics are produced worldwide

8M+

Every year more than 8 million tonnes of plastic waste leaks into the ocean

14%

Only around 14% of plastic packaging is recycled worldwide (14% incinerated, 40% landfilled)

GROWING MOMENTUM TO TACKLE PLASTIC WASTE :



Media campaign and societal awareness



Chinese import restrictions



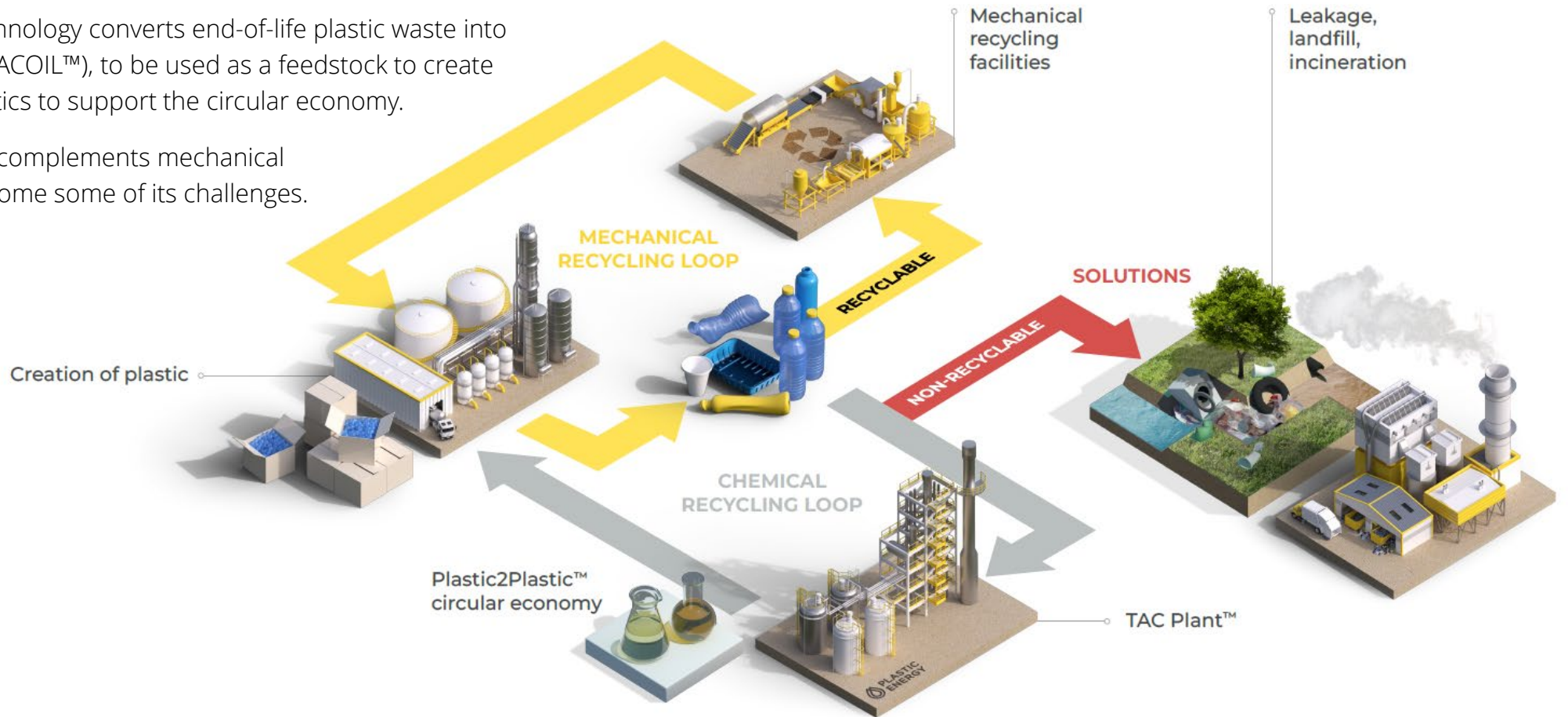
Policies and voluntary commitments to increase recycling and improve waste management



CHEMICAL RECYCLING PROVIDES A SOLUTION

Plastic Energy's technology converts end-of-life plastic waste into hydrocarbon oils (TACOIL™), to be used as a feedstock to create clean recycled plastics to support the circular economy.

Chemical recycling complements mechanical recycling and overcome some of its challenges.



WHY CHEMICAL RECYCLING?

INCREASE
RECYCLING RATES

- ✓ Preventing pollution
- ✓ Prioritising highest waste management option

INCREASE VIRGIN-QUALITY
RECYCLED CONTENT

- ✓ Increasing food-grade recycling content
- ✓ Supporting development of recycling infrastructure

SUPPORT SUSTAINABILITY
GOALS

- ✓ Reducing dependence on fossil oils and resource depletion
- ✓ Helping brands achieve high percentages of recycled content in packaging





Click the play button above to
watch a short video



PLASTIC ENERGY – WHO WE ARE



GLOBAL LEADER IN CHEMICAL RECYCLING

Convert end-of-life plastic waste into feedstock called TACOIL™



PATENTED TECHNOLOGY

Patented TAC™ process has been developed over the last decade



INDUSTRIAL PLANTS & OPERATIONAL EXPERIENCE

Two industrial and commercial plants operating for the past 7 years



PLASTIC TO PLASTIC PROCESS

Products made from our plastic to plastic process are commercialised on the European market



GLOBAL PARTNERSHIPS WITH FULL VALUE-CHAIN

Long-term agreements with major industry players worldwide



PLASTIC ENERGY – WHO WE ARE

CERTIFICATIONS



Since 2019, our Almeria and Seville plants have been certified through ISCC PLUS following the mass-balance approach



Our Seville plant qualified for the RSB standard in December 2020, and we are the first end-of-life plastics chemical recycler to achieve RSB certification.



Our TACOIL™ made from plastic waste is REACH registered by ECHA. TACOIL™ from our Almeria plant was the first in Europe to receive this certification.



ICPE CONFERENCE
03/02/2023

AWARDS



CEO Carlos Monreal recognised as a Top 40 Power Player in the Chemical Industry (2020, 2021, 2022, 2023)



Recognised as One to Watch in the Circular Economy category



Recognised for leadership in innovative transformative technologies



Received 3 Awards: Innovative Product, Sustainability and Best Overall



Achieved four stars in the Circular Economy category

OUR FEEDSTOCK AND PRODUCT

FEEDSTOCK

- Mixed post-consumer plastic waste
- No need to wash or separate by colour or polymer type



LDPE
HDPE
PP
PS



PET
PVC
EPS
Category 7



PRODUCT

- Hydrocarbon vapours condensed into an oil called TACOIL™
- Output replaces fossil oil in petrochemical crackers



VALIDATION OF THE CIRCULAR ECONOMY

CERTIFIED CIRCULAR POLYMERS

We are the first company worldwide to have successfully validated the circular economy of end-of-life plastics

- Announced at Davos 2019 with Renewi, Plastic Energy, SABIC, Unilever / Vinventions / Walki Group / Tupperware
- Certified circularity and traceability by ISCC PLUS
- Recycled content following mass-balance approach

PROPERTIES:

- Alternative feedstock made from end-of-life plastic waste, replacing traditional fossil oil in the manufacturing process
- TACOIL™ feedstock can be used for food-grade plastic packaging



PROOF OF COMMERCIALISATION OF FOOD-GRADE PACKAGING WITH RECYCLED CONTENT FROM TACOIL™



i. Commercialisation of Magnum ice cream tubs and Knorr pots made with recycled content on the European market



ii. Philadelphia cream cheese packaging in Europe will be made with recycled materials starting in 2022



iii. In 2021 Vinventions launched its Blue Line of wine closures made from recycled plastic



iv. In 2020 REN Clean Skincare used recycled resins in its packaging for Evercalm Global Protection Day Cream



v. The Tupperware® Eco+ Straw Set was the brand's first product to use sustainably sourced food-safe material made out of recycled plastic



vi. Full closed loop example using post-consumer plastic from Tesco which was turned into cheese packaging



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GLOBAL PROJECTS: AUSTRALIA



LICENSING AGREEMENT WITH QENOS

- In Q1 2022, Plastic Energy announced an agreement with Qenos in the planning of a major circular plastics manufacturing capability in Australia
- We were chosen to support the Qenos and Cleanaway joint feasibility study, alongside Axens, which will involve the conversion of up to 100,000 tonnes of household soft plastic waste and mixed plastics back into Circular Polyethylene
- Plastic Energy was selected as a technology provider due to our extensive operational experience in Europe over the last 6 years, and our position as a leader in the advanced recycling sector
- The Qenos Circular Plastics Project (QCPP) is the largest proposed circular plastics project in Australia



GLOBAL PROJECTS: ASIA

South Korea 

- License contract between SKGC and Plastic Energy to build advanced recycling plants in South Korea
- First third-party 66kt licensed plant to be commissioned in 2025

Malaysia 
PETRONAS

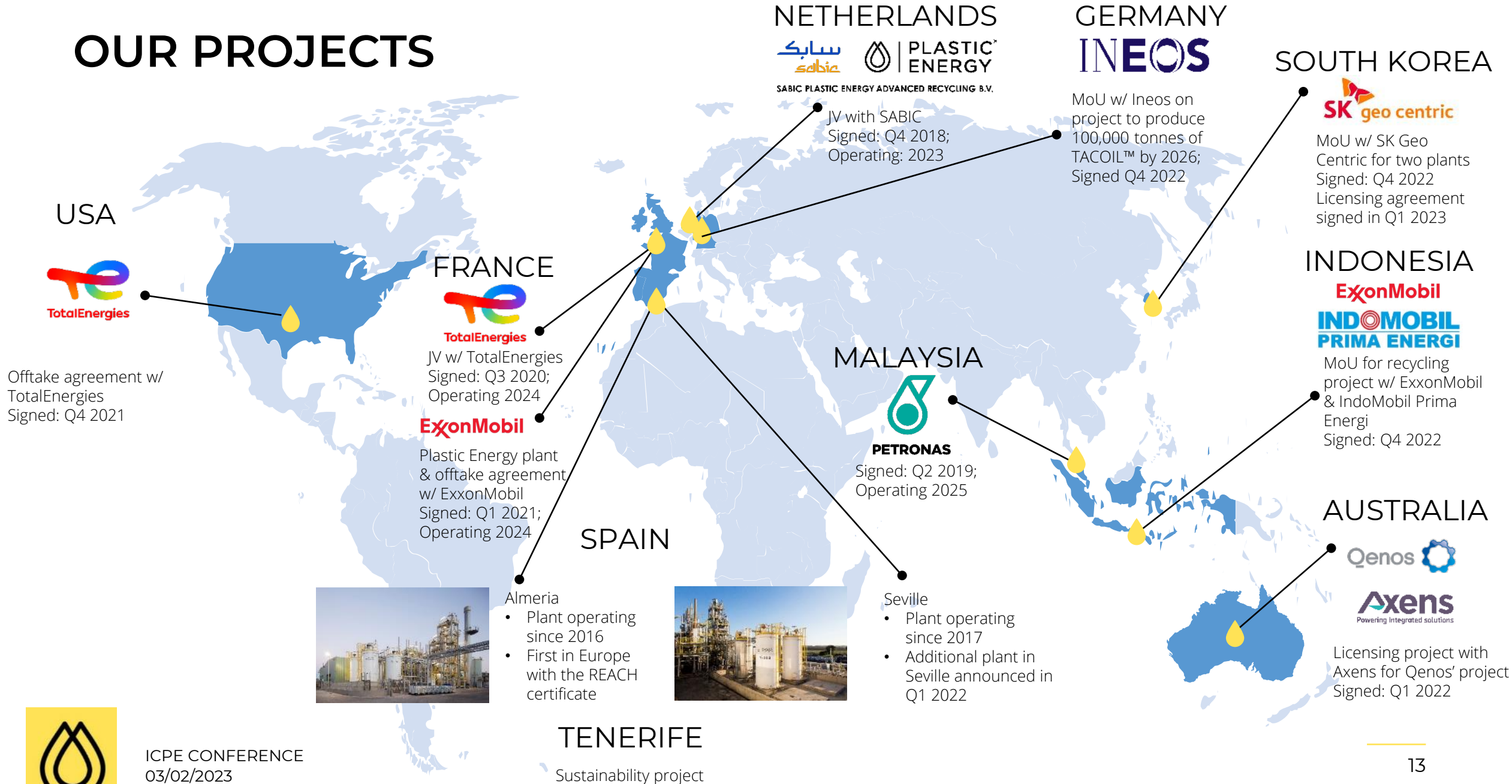
- Agreement with Petronas for a plant in Malaysia, which is expected to be operational in 2025

Indonesia  

- Agreement with ExxonMobil and PT Indomobil Prima Energi on recycling project in Indonesia
- Expected to be for a total of 100 KTA, with the first phase starting up in 2025



OUR PROJECTS



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LICENSING PARTNERSHIP WITH AXENS



- Plastic Energy and Axens have a licensing partnership to provide a fully circular solution for end-of life plastic waste.
- Plastic Energy's TAC™ process converts plastic waste into TACOIL™. Axens' Rewind® Mix process further refines the TACOIL™ to meet specifications for certain petrochemical crackers.
- The first commercial and technical assessment agreement for licensing was signed with Qenos in Q1 2022 for an advanced recycling project in Australia.

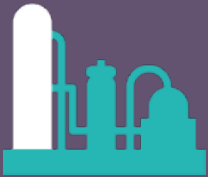


AXENS GROUP INSIGHTS

SOLID EXPERIENCE AND TEAM IN INDIA



Offices in
15 countries



Over
3,000
industrial units
under license



Over
500

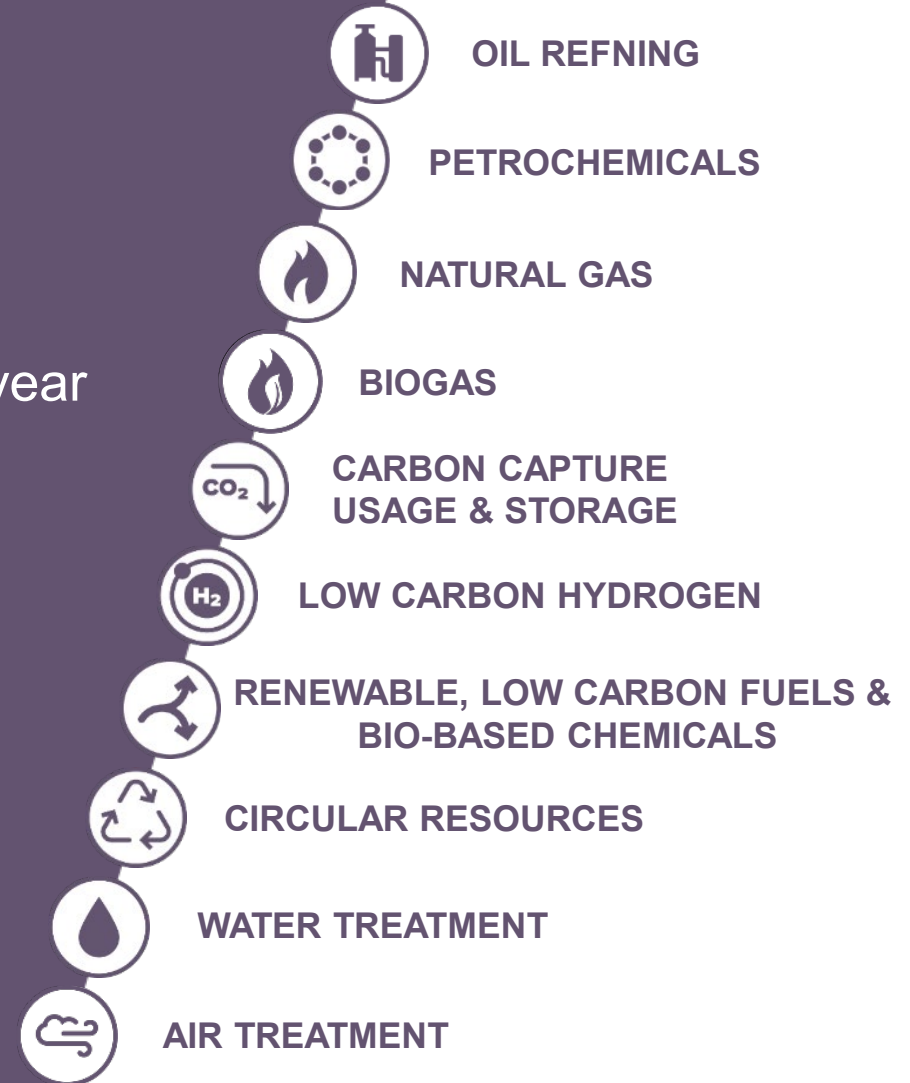
modular units



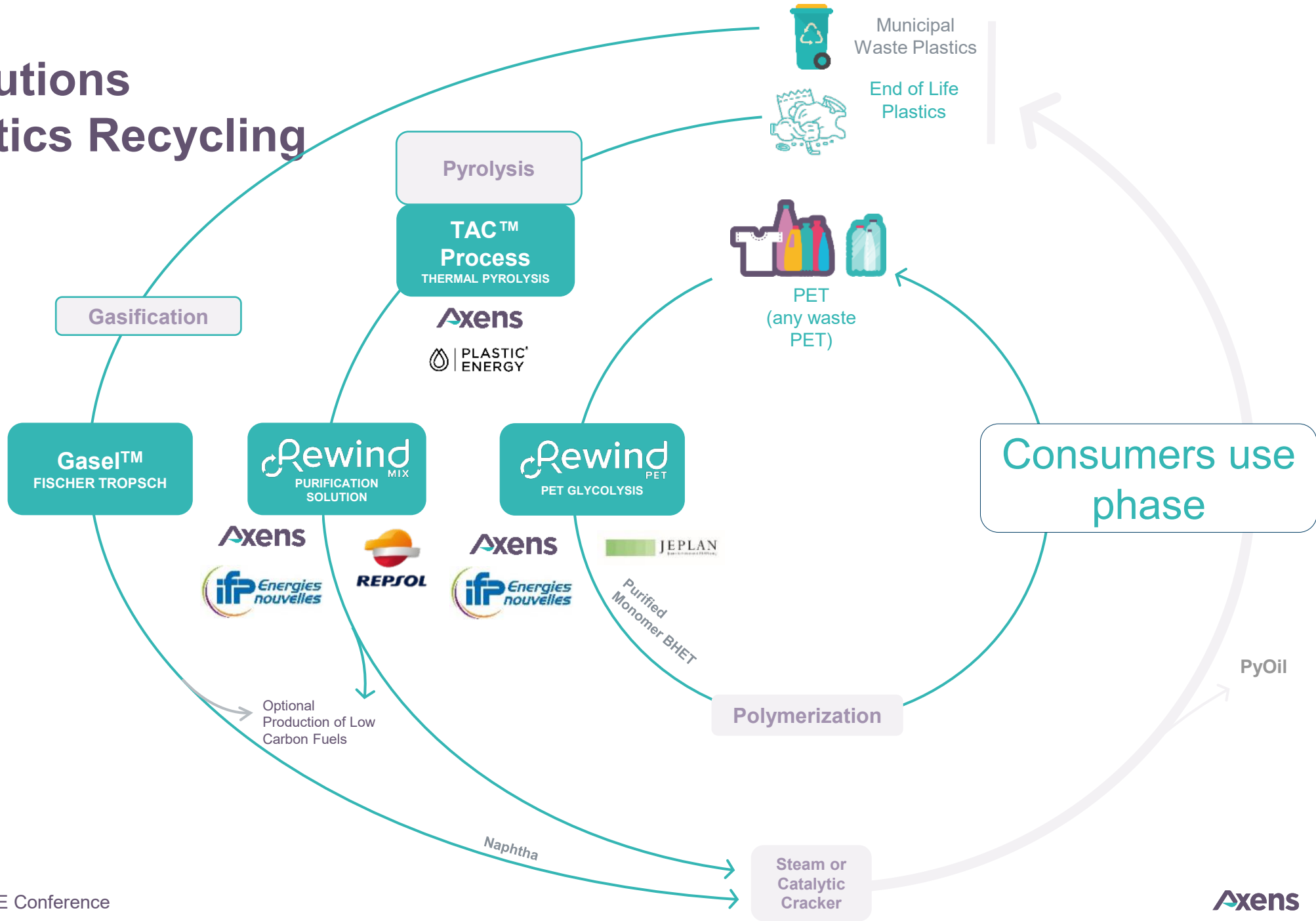
Over
70,000
tons of catalysts
and adsorbents each year
coupled with
catalysts services, inc.
regeneration



Over
3,500
furnaces sold



Our Solutions for Plastics Recycling

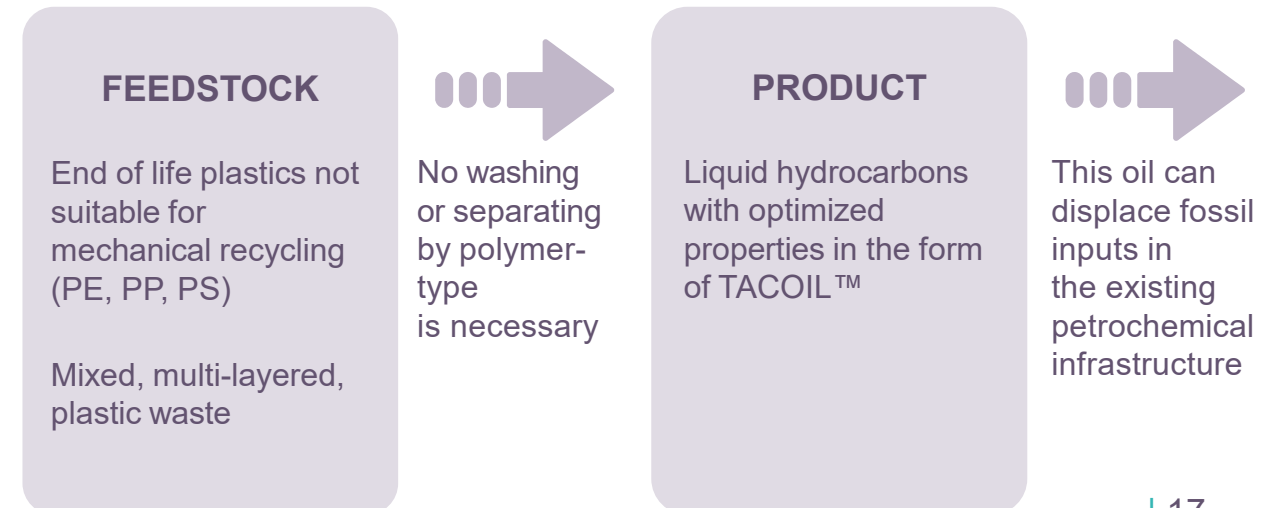


Convert MIXED PE/PP/PS PLASTICS WASTE into FOOD CONTACT PLASTICS

- **TAC™ Process** converts waste into TACOIL™, an oil be used for production of recycled polymers suitable for **food contact and pharmaceutical products**
- **Over 10 years of industrial experience** in waste management thanks to combination of knowhow of Axens and Plastic Energy
- **Zero Risk technology**
Mild temperatures and low pressure
Established maintenance and equipment life cycle regimes
Continuous with no catalyst
- **TAC™ Process** selected by several major petrochemical companies for their plastics chemical recycling project (500kta of cumulated announced capacity by 2025)
- **2 Plants operating** from 2015 and 2017
- Full **modular solutions** for project fast execution and



Mixed Plastics Pyrolysis Plant in Almeria, Spain (Start-Up in 2016)



Convert ANY PYROLYSIS OIL into DROP IN STEAM CRACKER FEEDSTOCK

- Rewind® Mix is a **only single solution** which converts **any plastic pyrolysis** oil into drop in feedstock for steam cracking to make new plastics for any application
- **Confident Technology**
 - ▶ Co-development technology ensures by IFPEN and REPSOL
 - ▶ Built on proven technologies with industrial advanced catalysts and adsorbents
 - ▶ A high-yield/no loss technology with the option of maximizing production of paraffinic naphtha with embedded hydrocracking
- Rewind® Mix **selected by several major petrochemical** companies for their circular polyolefin production
- **Full modular solutions** for project fast execution and overall project cost optimization



Rewind® Mix _3D Model



Axens Integrated & Optimized Solutions for the Full pyrolysis pathway

- Only **one single supplier** for the full chain & **one set of guarantees** from plastic feedstock to virgin naphtha. **Less interface** and combined schedule to **shorten engineering** phases. Full **modular solutions** for project fast execution and overall project cost optimization
- **CAPEX reduction** thanks to optimized design of combined units. Significant **Production costs reduction** thanks to higher yield & unit synergies
- Overall chain optimization to achieve optimal yield, up to **85%wt** from typical plastic waste to cracker feedstock
- **Flexibility** – New feedstocks or specifications in the future ? one single contact point to help and advise. Pilot and industrial units available to perform tests
- Unrivalled **know-how of the chain** via extensive waste feedstock experience and databanks of the different qualities of pyrolysis oil on the market

