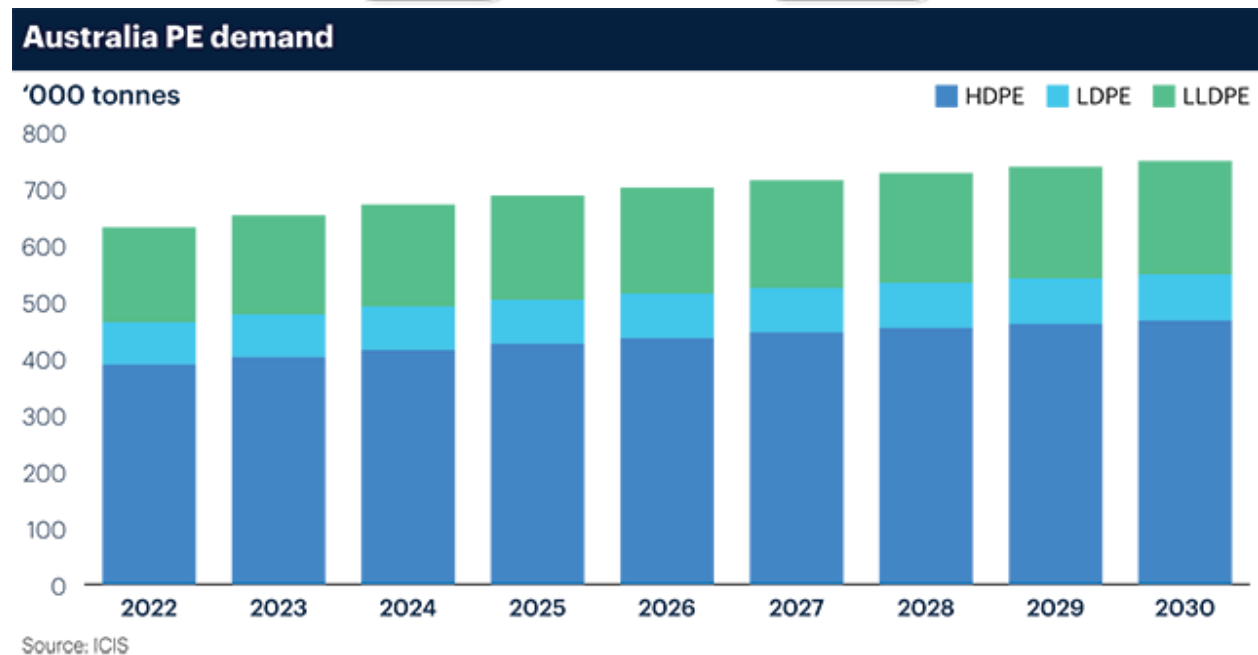


Australia's Qenos pushes into chemical recycling

By **JOHN RICHARDSON** 22 July 2022 15:27 Source: **ICB**

Australia's Qenos appears to be well down the track of creating a new chemical-recycling manufacturing chain that would be a major step change towards meeting local circular plastic packaging targets.



The country's only cracker operator and polyethylene (PE) producer is conducting a joint feasibility study with Cleanaway, a leading Australian

waste management company, to convert 100,000 tonnes of plastic waste into circular PE.

Plastic Energy, the UK-based chemicals-recycling technology provider, has been chosen by Qenos to support the pyrolysis technology assessment for the proposed project. The project would cost several hundred million Australian dollars.

France's Axens will evaluate the use of its Rewind Mix process to upgrade the pyrolysis oil from the proposed new plant to the right quality of naphtha to provide some of the feedstock for Qenos's cracker at Botany Bay in New South Wales.

The 265,000 tonne/year cracker in Botany has six furnaces, a number of which are configured to crack naphtha. But since 1996, following the commissioning of the 1,375km-long Moomba ethane pipeline from South Australia to Botany, the cracker has operated mainly on ethane.

Downstream of the cracker are PE plants with capacities of 85,000 tonnes/year of low-density PE (LDPE) and 130,000 tonnes/year of linear-low density (LLDPE).

The project's feasibility study is expected to be completed in August this year with a final investment decision due next year. Start-up would be in three phases in 2025 and 2026.

It is estimated that the equivalent of a total of some 60,000 tonnes/year circular PE, branded as Alkanew, would be generated by the project.

Qenos also operates another cracker-to-PE complex at Altona in Victoria.

In 2021, some ethylene production was mothballed at the Victoria site, along with 15% of the company's overall PE production because of reduced feedstock supply resulting from the closure of ExxonMobil's refinery at Altona. Qenos is attempting to effectively reinvent the PE manufacturing value chain in a local market that seems ideally suited for

the initiative given its small scale (see the chart below) and a strong legislative and brand owner push to raise recycling levels.

The right quality of plastic waste

“The scale of our project is somewhat dictated by how much can we fit into our cracker without having to reject any conventional feedstock,” said Jeroen Wassenaar, Project Leader Advanced Recycling at Qenos.



“If you back calculate from the yields, the result is about 100,000 tonnes of plastic waste feedstock per annum being fed into the cracker,” he added.

He said that there was no single Australian waste management company that had the quantity or quality of feedstock required. Qenos is, as a result, looking to source feedstock across the wider waste industry.

Cleanaway has local mechanical recycling joint ventures with the Pact Group, an Australian converter, and brand owners Asahi Beverages and Coca-Cola Europacific Partners.

Plastic waste fed into the pyrolysis unit would be mainly PE and polypropylene (PP).

“The Plastic Energy process can also tolerate polystyrene (PS). But this is not interesting to us because it generates a lot of aromatics, and, of course, we are trying to maximise ethylene output,” said Wassenaar.

Polyvinyl chloride (PVC) was the “problem child” because of chlorine and hydrogen chloride that had to be disposed, he said.

But there are no longer big quantities of PVC used in Australian packaging.

The Australian Packaging Covenant Organisation (APCO), a non-profit organisation promoting recycling, has also set targets to reduce PVC content in packaging to make recycling easier.

APCO has introduced guidelines that will by 2025 reduce the use multilayer laminates that contain polyolefins, polyamides and polyvinylidene chloride (PVDC), which is used as an oxygen and water barrier, especially by the meat and dairy industries.

“There might still be some unsuitable laminates by 2025 because there could be some applications where replacement is difficult, but we won’t be seeing the quantities we are seeing today,” said Wassenaar.

Trials for collecting soft plastic from curb sides have been carried out by Cleanaway and the City of Melbourne Council.

“Organic waste can be tolerated to some extent in the pyrolysis process, but one of the issues with organic waste is water. Most food is water. There is a drying step required during pre-processing,” he continued.

Cleanaway is designing a waste-treatment facility to make sure Qenos ends up with the specifications it needs.

On the Australia eastern seaboard alone, there is probably around 1m tonnes/year of suitable plastic waste.

“Because of losses in the feedstock preparation process, you will probably have to source 150-200,000 tonnes of waste a year to get the targeted 100,000 tonnes/year of actual feedstock,” said Wassenaar.

Some chemical-recycling technologies are geared toward the production of transportation fuels that obviously end up generating carbon when they are combusted in engines.

But Qenos says that the Plastic Energy process produces a single fraction of pyrolysis oil that can be upgraded, using the Axens technology to 100% naphtha.

One of the other criticisms of chemical recycling is that it is energy and therefore carbon intensive.

But Qenos contends that life-cycle analysis by BASF, Plastic Energy and the Consumer Goods Forum, show that the project will be relatively carbon efficient.

“The studies are all consistent. Compared with producing virgin PE, the reduction in the carbon impact is about 50%,” said David Francis, General Manager Sales, Marketing, Product Technology, Strategy at Qenos.

“Because you are not producing naphtha via a refinery, with all the connected carbon output, this provides carbon credits,” he added.

“The big message we are trying to communicate on this project is that we’re looking for complete circularity.”

There is also the contribution that the project would obviously make in reducing plastic waste.

In July last year, Australia banned exports of plastic waste, leading to a bigger local disposal problem.

National Packaging Targets have been set by industry and the government with a target date of 2025. APCO has been given the responsibility of helping ensure the targets are met, which are as follows:

- 100% reusable, recyclable or compostable packaging.
- 70% of plastic packaging being recycled or composted.
- 50% of average recycled content included in packaging (revised from 30% in 2020).
- The phase out of problematic and unnecessary single-use plastics packaging.

But Francis contends that individual brand owner targets recycled content are a bigger challenge which cannot be met by mechanical recycling alone – hence, the need for chemicals recycling.

“You cannot provide all the food-grade materials required by brand owners from mechanical recycling alone if you have, say, pledged to do 30% recycled content in your packaging and your business is packaging food,” he said.

Challenges of realising the project

“The biggest challenge is getting access to feedstock that’s on-spec. The second challenge is accessing technology that works and integrating the feedstock into our plant to deliver the yields we are looking for,” said Francis.

The third challenge was getting customers to commit to buying the product which would not be sold regular PE prices, but instead a multiple higher, he said.

“This is a new ecosystem, a new industry and a new product which will remain scarce at least for a decade or so. Our proposal to our customers is around a fixed price not linked to oil, with committed offtakes,” added Francis.

Qenos has held numerous discussions with government officials at the state and federal levels on the benefits of the project, and the Victorian state government is partly sponsoring the feasibility study. The previous federal government, which lost the general election in May, had pledged support.

“We certainly have backing, and we are confident we have a solid business case that is worthy of government support,” said Wassenaar.

Australia’s manufacturing industry has long struggled against cheap overseas competition, often heavily subsidised by governments, and high labour and energy costs.

The eastern states are in the middle of an energy cost and supply crisis.

This is the result of the surge in natural gas costs and tight global supply resulting from the Russia-Ukraine conflict, along with insufficient gas reserved for local supply from the country’s LNG projects. The Qenos project therefore represents a bold, imaginative and very smart attempt to add economic value in a difficult competitive environment.

Given the well documented limitations of mechanical recycling in providing food-grade material, beyond the PET resins sector, a local chemicals-recycling value chain would help local brand owners hit their recycling targets.

With a diminishingly small chance that brand owners will back away from their targets because of strong legislative and public pressure, solutions need to be found.

It estimated that the Qenos project would over the long term generate Aus350m of annual revenues across the whole of this new manufacturing chain and 3,100 new jobs.