

Another Look at Chemical Recycling of Plastic

By Joe Ackerman

I am normally not too keen on chemical recycling. It can be (and has been) used as a way of excusing the plastic waste problem as “solvable”, but most schemes just produce pyrolysis oil to be used as fuel with the same net effect as incineration for energy. Yes, it displaces fossil fuels, but closes no loop because demand for new plastic is not diminished. (There is a link to a report on this topic is at the end of this article.) So, when I heard of APK AG Kunststoffe’s Newcycling plant that can selectively dissolve resins out of a copolymer mix and Composite Recycling’s start-up technology targeting waste fiberglass boat hulls, I jumped at the opportunity to see them.

I have no photos inside APK’s plant in Merseburg, Germany because this is a novel technology and they are understandably guarded about the process. They are sourcing financing to open new plants and are currently training 60 additional staff for the new operations.



APK is a full operation facility, processing 8,000 tonnes/yr of polyethylene/polyamide (PE/PA) film through their Newcycle plant and 14,000 t/yr of post-consumer polyethylene film through their standard PE film shredding/washing/extruding process. The Newcycle process is currently geared for end-rolls of post-industrial film that comes to them from all over Germany. It is a layered PE and PA heavy food packaging film where PE provides flexibility and PA gives strength and oxygen/aroma exclusion. This film cannot be processed through an extruder because PA has a higher melting point than the PE and completely clogs the extrusion process.



The received rolls (3 meters long and up to 1 m thick) are cut longways with a hydraulic knife to remove the central cardboard tube and then the film is finely shredded. A solvent is added that attacks only the PE, dissolving it out from the layers of PA and yielding a liquid and a solid fraction. The mix is run through an in-line centrifuge separating the two fractions after which the PA (solid fraction) goes through a filter press to remove residual solvent and then passes through an extruder for pelletization. The solvent in the liquid fraction is flash-vacuum evaporated leaving the PE as viscous liquid that can

be extruded and pelletized. The results are two very clean pelletized plastics that can go into film products again. The economics were not explained, but the PE/PA film likely has a negative commodity price that is more attractive than Waste to Energy price (which was about -200 euros/tonne in April of 2022). The process has also been used to extract pure PE from APK's standard film processing stream waste. A pilot test has been performed to separate a triple mix of PP, LLDPE and PE via specific solvents targeting first LLDPE and then PP.

Web page: <https://www.apk-ag.de/en/>

A short video on the process: https://youtu.be/F_w9_dvo2w8

The second chemical recycling plant was Composite Recycling, a small start-up in Lausanne, Switzerland where pyrolysis is used to glean two value streams from waste fiberglass boat hulls and windmill propellers.



Structural fiberglass is a combination of resin and fiber, with the glass fiber portion making up 30 to 50% of total weight. This fiber is non-combustible so Europe's Waste to Energy plants reject fiberglass due to the high residual ash and resulting in waste fiberglass currently being

sent to landfill. The amount of waste fiberglass feedstock is in the millions of tonnes worldwide. When the fiberglass is heated in the absence of oxygen, the resin is converted to syngas (for heating the kiln) and pyrolysis oil. The process is conducted without any agitation or mixing

(fiberglass sheets are placed on racks within the kiln), so the residual glass fiber is intact and can be re-used in place of new fiberglass. The company founders envision a portable kiln on a truck bed that can be transported to areas where old boats and wind turbine blades are stockpiled, avoiding logistical problems for these large objects. The pyrolysis oil would be sold as feedstock for new resin or fuel (both uses requiring a refinery) and the syngas directly used to heat the kiln.

The web page: <https://composite-recycling.ch/>

A video on the technology can be viewed: <https://www.youtube.com/watch?v=ZHzCGbHJaHg>

An article explaining the downside of chemical recycling:

https://www.researchgate.net/publication/339487915_Challenges_for_a_circular_economy_for_plastics_policy_advice_to_the_CCME?channel=doi&linkId=5e558ec4299bf1bdb83b0412&showFulltext=true)

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