



R2R CARPET CIRCULARITY



CRUK ANNUAL CONFERENCE 2024

THE BACKGROUND

Annually, around **5 billion pounds** (approximately 2.3 million metric tons) of carpet are disposed of in landfills **globally**.

They degrade very slowly, releasing harmful chemicals and greenhouse gases over time.

Despite some progress in recycling efforts, the majority of discarded carpets still end up in landfills, contributing to environmental pollution and resource wastage.

Less than 5% of the carpet waste is recycled.



WHY IS THAT?

- **Carpet design:** When different materials, like nylon, wool, polyester, are blended together it is difficult to separate them. And if you cannot separate them, it is nearly impossible to recycle them.
- **Lack of infrastructure:** Infrastructure's CAPEX, i.e. collecting systems and processing facilities. Reverse logistics.
- **Economics:** High costs of infrastructure and logistics.



THE PURPOSE OF AQUAFIL'S "R2R" INITIATIVE:

The "**R2R**" initiative aims at engaging Aquafil's clients (carpet manufacturers) to eco-design with Aquafil a **CIRCULAR CARPET**, closing the loop.

The idea is to work closely with carpet manufacturers to produce carpets made with **ECONYL®** regenerated yarn and materials and fibers **compatible with** Aquafil's **ECONYL® regeneration system**.

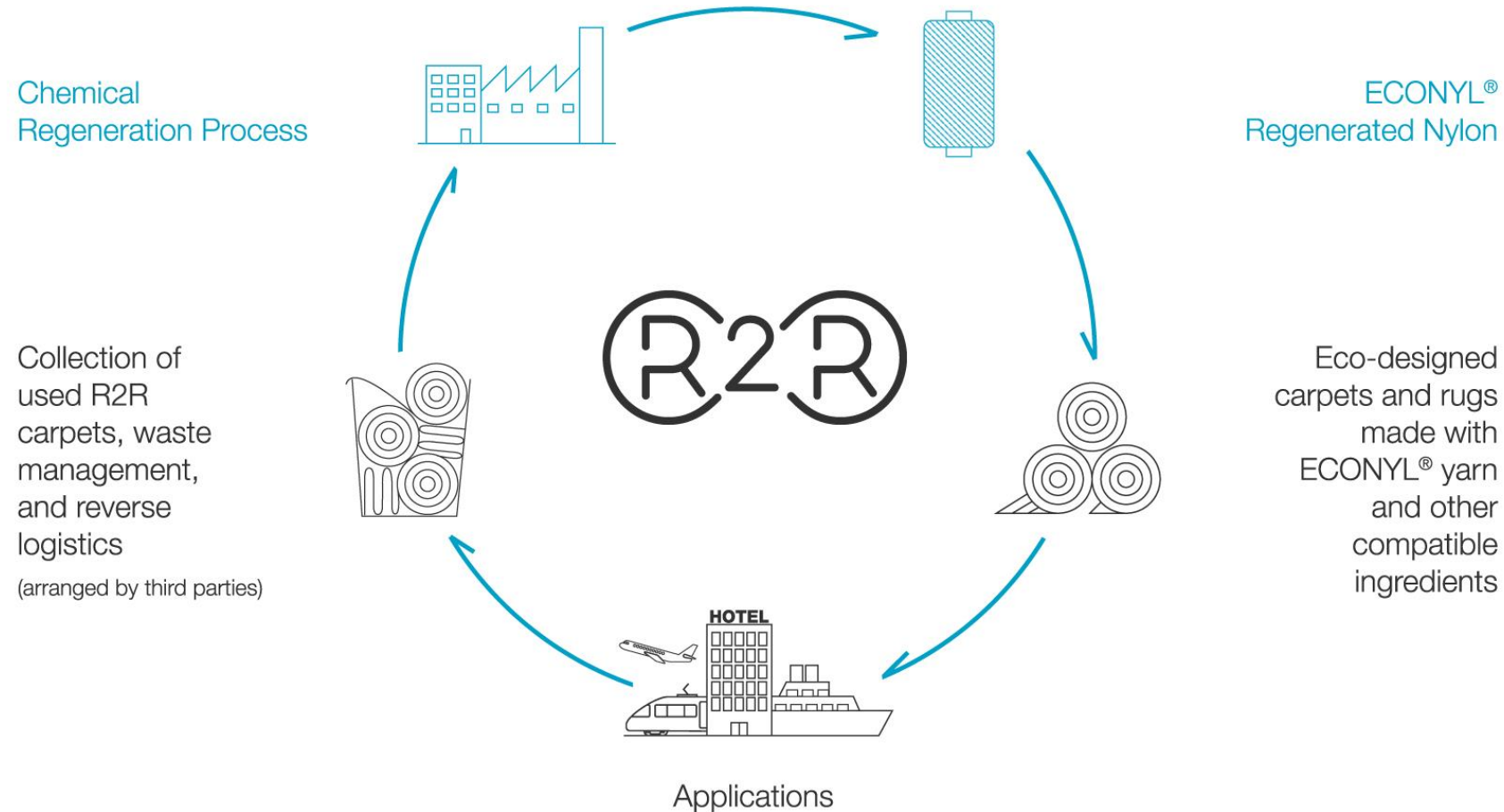
These carpets are designed to be **fully-disassemble** so that Aquafil can recycle them when they reach the end of their useful life.

This way the parts made with the **ECONYL® nylon** will be recovered and recycled into new nylon fibers by Aquafil.

The other ingredients will follow **other recycling streams**.



Born Regenerated to be Regenerable by Aquafil



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OVERCOMING THE LIMITS:

**«AQUAFIL CARPET SEPARATION TECHNOLOGY»
PROJECT**

TARGETS OF THE ACS TECHNOLOGY PROJECT

STRATEGIC TARGETS:

- Minimum CAPEX – simple, scalable.
- Minimum OPEX – easy to run, ‘just-by-need’ use allowed.
- Minimum logistic costs – installed at site.
- Flexible technology – multipurpose , easy adjustable for different carpet types.

STRATEGIC TARGETS FOR AQUAFIL:

- Recover more Nylon6 from all carpets to feed ECONYL® plant.
- Support carpet business through circular economy.
- Reinforce strategic partnerships.



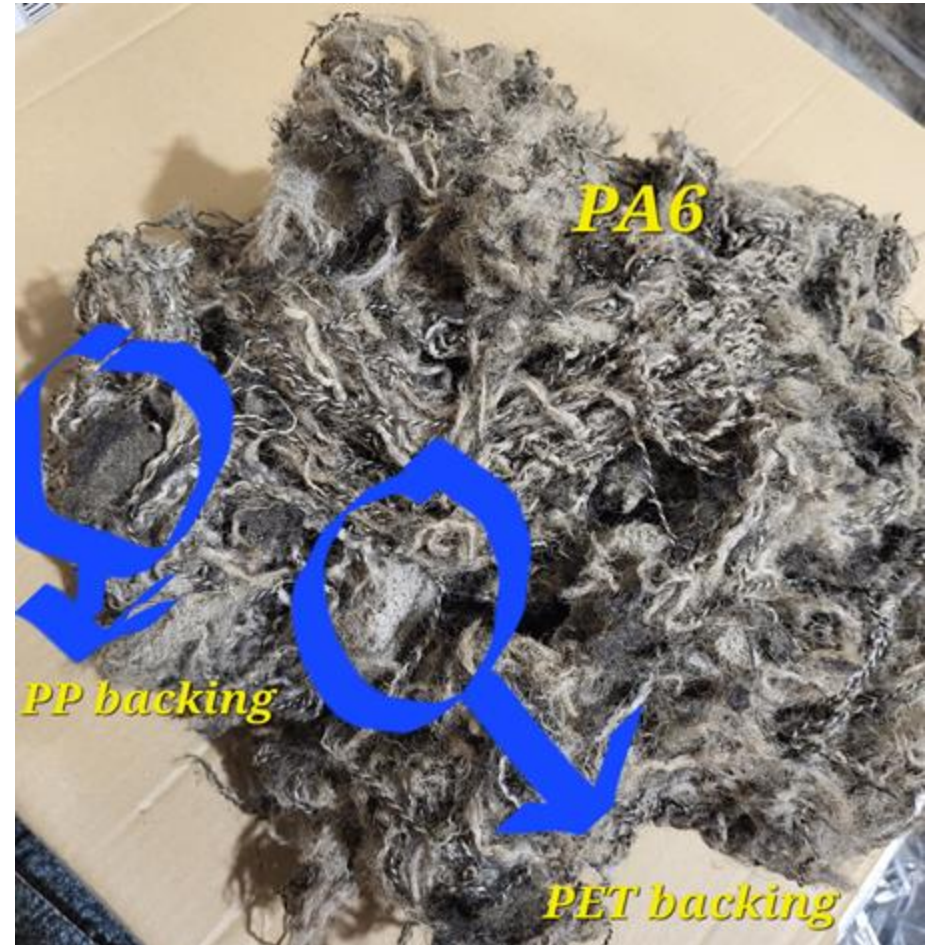
WALL-TO-WALL CARPETS

- Standard **Nylon6 Cut Pile** | woven PP primary and secondary.
- **Nylon6** stream av. 80% purity.
- Precoat still contaminating the fiber: **second step needed**, locally or remotely.
- Filled **latex** shred in fine powder size: **expected to be reusable** as filler for the new carpets.
- Expected productivity of single machine: up to **500kg/h** (small portable, local).



CARPET TILES | TEXTILE PART

- Standard Loop Pile on non-woven **PET primary** (no PET cushion).
- **Nylon** stream abt **80% purity**.
- Second purification step needed, locally ore remotely (e.g. Aquafil plant).
- Target productivity of single machine **300kg/h**.



CARPET TILES | HEAVY LAYER

THE HEAVY LAYER IS 70% OF THE TILE

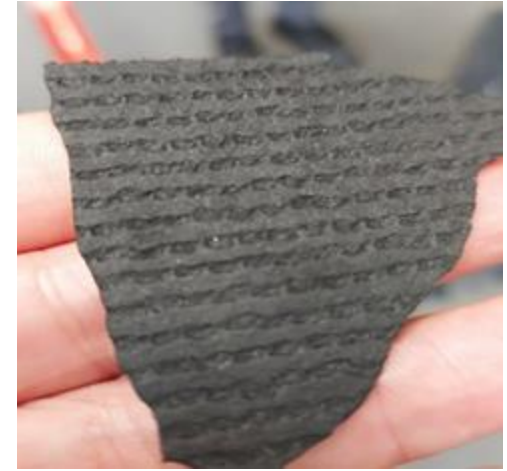
- Good experience with bitumen, PO, and other type of materials – not yet PVC.
- So far not working in case of **PET needlepunch**.
- Target: **reuse of the heavy layer in circular tiles locally in the UK.**



RUBBER MATS

THE RUBBER PART IS 75% OF THE TILE

- Clean separation of the textile part from the rubber.
- Second purification step needed, locally or remotely to achieve a >95% rubber purity.
- Target productivity of single machine 300kg/h
- Rubber to be reused locally e.g. in the UK.



TAKEAWAYS

- Minimum CAPEX – simple, scalable.
- Minimum OPEX – easy to run, ‘just-by-need’ use allowed.
- Minimum logistic costs – installed at site.
- Flexible technology for different carpet types.
- Recover more Nylon6 from all carpets to feed ECONYL® plant without investing in an expensive recycling plant locally.
- Reinforce strategic partnerships with:
 - waste management/treatment companies
 - Carpet Recycling UK
 - manufacturers
 - flooring maintenance service companies
- Current Technology Readiness Level: 5-6/10
- Advanced Pilot Project Phase -> Next Industrialization Steps (end 2025)



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