



p-CEAMS: The next generation of high performance, quality assured recycled carbon fibre products

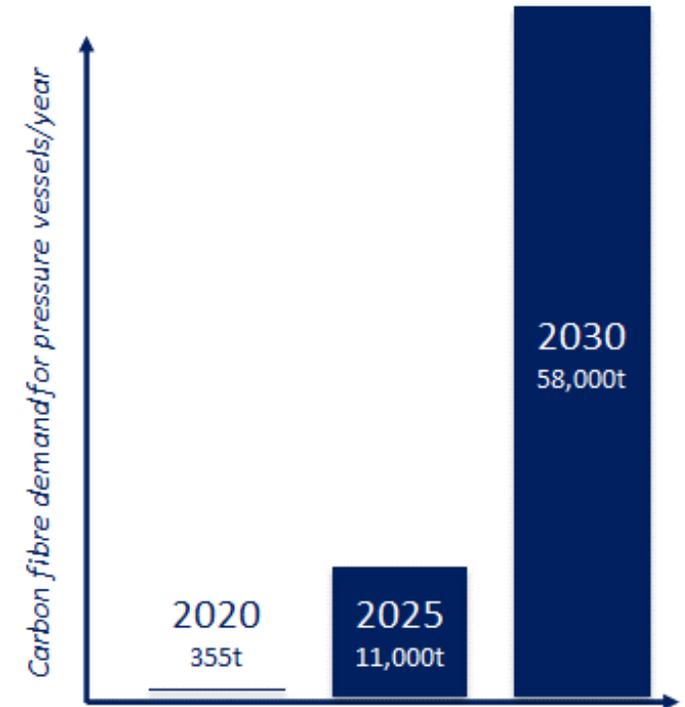
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Composites Critical in Delivering Net Zero 2050

- Demand in 2050 c. x15 in 2030
- **Sovereign capability** issues with impending 15-60% shortage of CF within 5 years
- 58,000t of virgin carbon fibre is needed by 2030 just for land-based hydrogen storage

To meet UK Net Zero targets and ensure UK energy security we need solutions to establish a UK circular economy for carbon fibres which enable high value routes to market



Vision for carbon fibre recycling

Commercial available recycled carbon fibre products are short / discontinuous

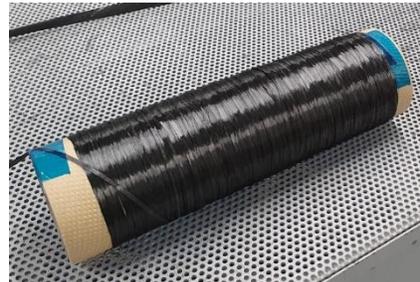


Relegates recycled carbon fibre reuse in lower value applications with limited ability to replace virgin carbon



Value proposition

Continuous recycled carbon fibre can be reclaimed (e.g. from H₂ pressure vessels)



Analogous format as virgin fibre opens the door to use in established high value reprocessing and reuse cases...Greater potential to replace virgin carbon fibre and increase UK resource and energy security

Continuous, aligned, high Vf, high value applications

1 <https://www.elgmetals.com/en-de/news/my-first-news-3/>

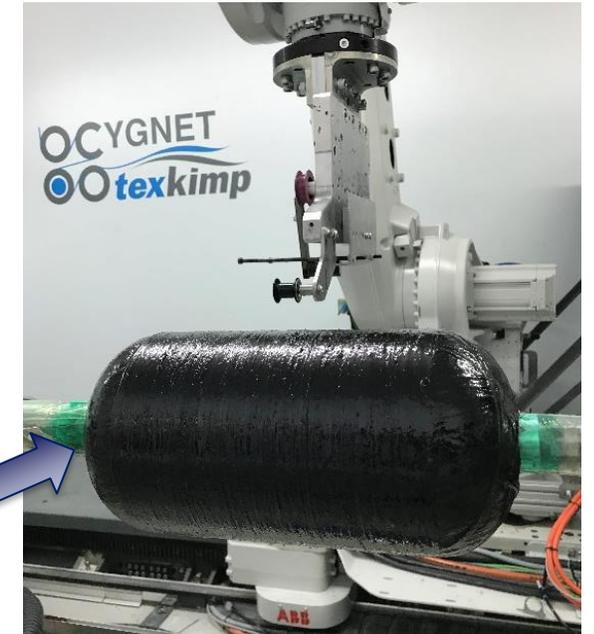
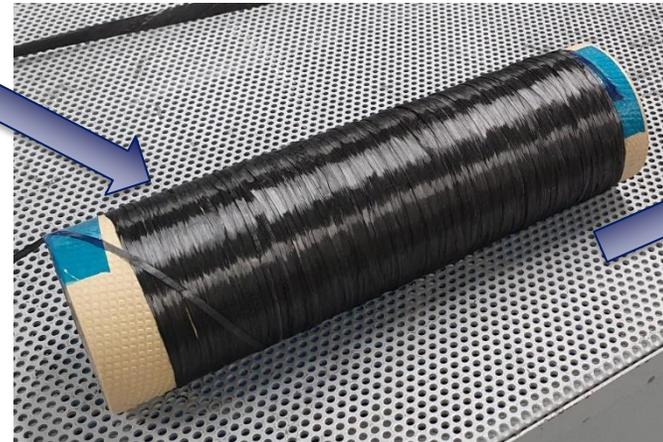
2 <https://www.aeroexpo.online/prod/elg-carbon-fibre-ltd/product-182993-30076.html>



NCC, Cygnet Texkimp & B&M Longworth 2022 Pressure Vessel Sprint Demonstrator

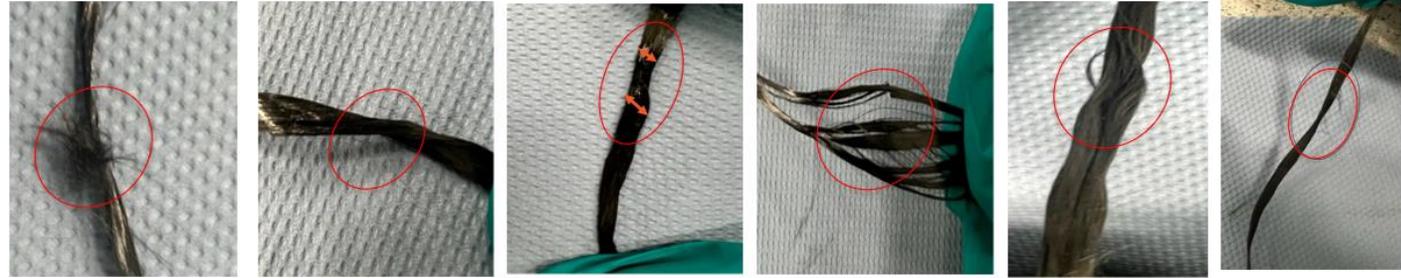
- Insufficient CF production to meet demand
- Prove out viability of recovering continuous fibre from composite pressure vessels

- ✓ Reclaimed using DEECOM process
- ✓ Unwound continuous tow from EOL PV
- ✓ Demonstrator manufacture
- ❖ Showed the art of the possible through collaboration

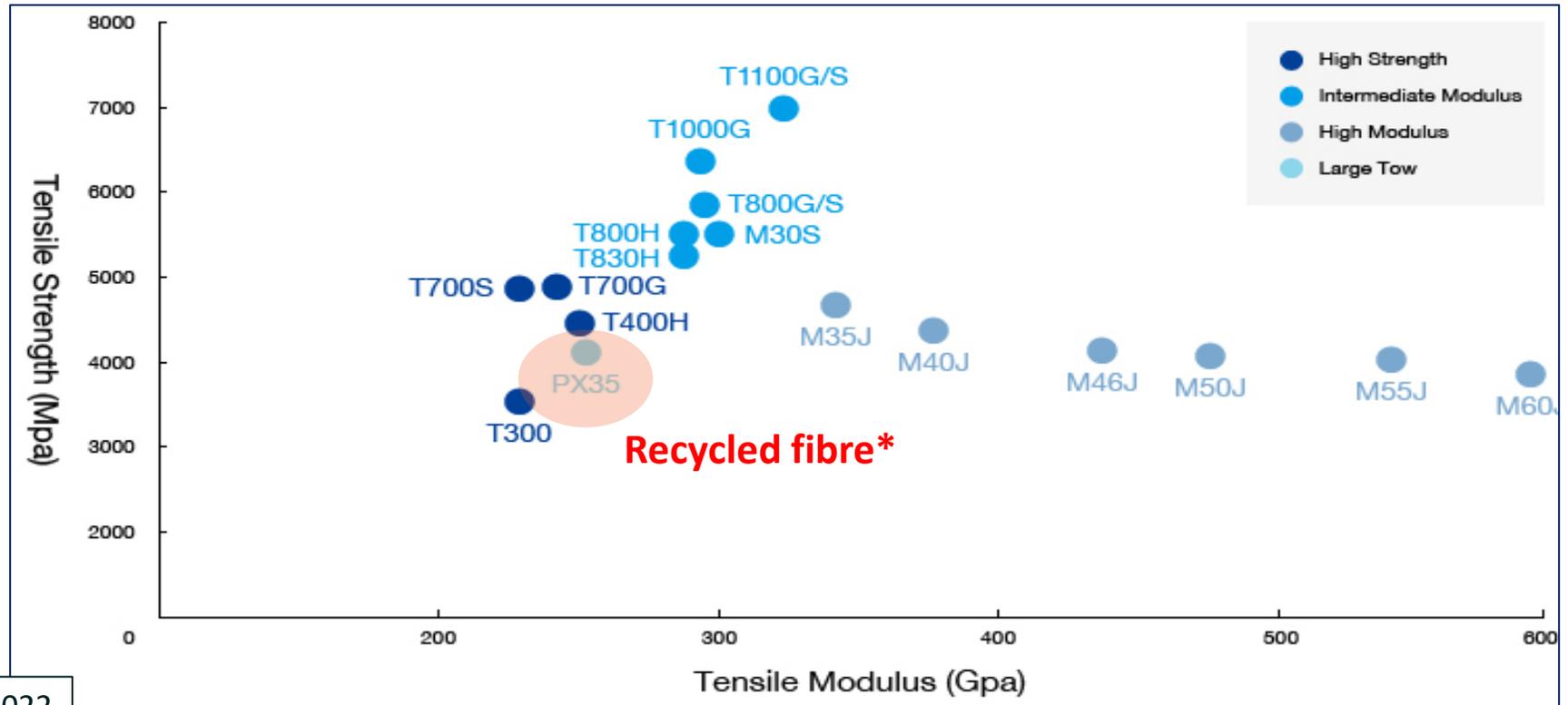


Like most recycled materials these are different to virgin

If only life was that simple....



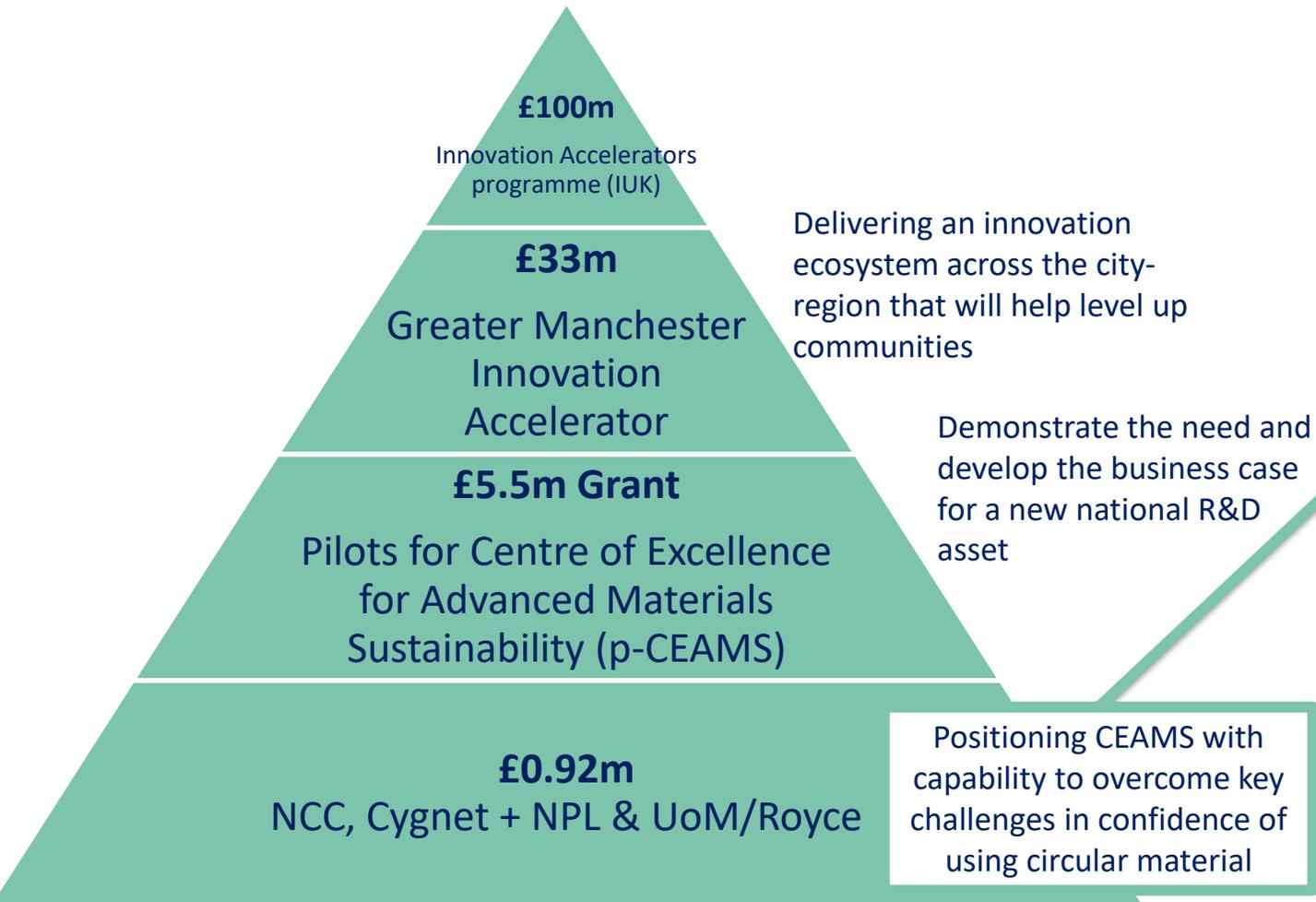
rCF mechanical properties on par with widely used industrial grade virgin materials



*Based on limited data we have from 2022 sustainable tank demo – will be further explored in current project



NCC is developing QA technology for rCF tows



Develop and demonstrate capability for quality assuring recycled, continuous carbon fibre from composite pressure vessels

- Continue to develop NCC capability in **recycling, quality assurance, inspection, manufacturing**
- NCC access to strategically important region and steer direction of CEAMS – compliment NCC capability
- Strengthen relation with research partners and support SMEs in region



p-CEAMS enabling and demonstrating high value reuse of rCF



DELIVERABLES




Optimise continuous tow recycling


Develop **inline tow inspection** capability


Develop **quality assurance testing** capability


Internal and supply chain **manufacturing demos**

Provide industry with the confidence needed to use recycled CF tows in high value applications

ADDITIONAL COLLABORATIONS



Identify uses / post processing requirements for polymer recyclates

Identify, trial, demo post processing treatments for fibre surface reactivation / functionalisation

Characterise “functional” properties of recycled CFs for multi-functional materials

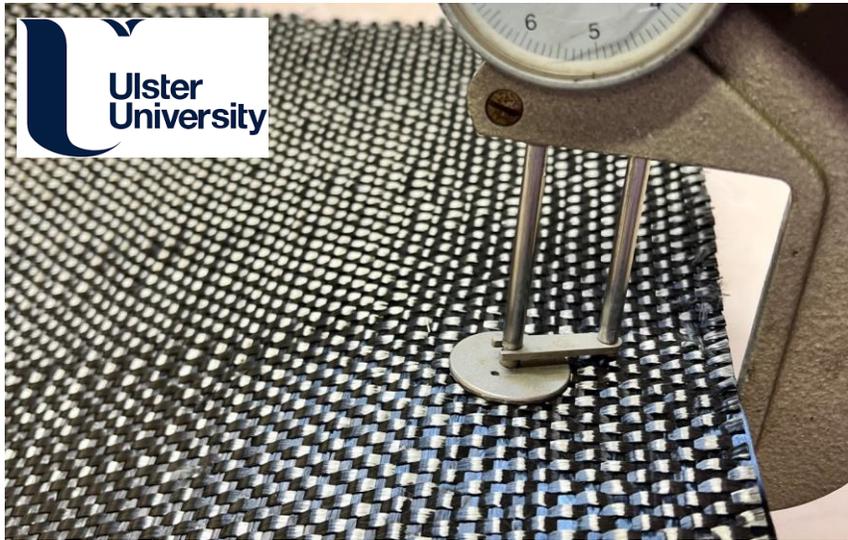


Trials have already kicked off with great success



Pipeline trials / demos:

- TP filament 3D printing
- TS filament 3D printing
- Prepreg / towpreg
- Pultrusion
- AFP/ATL



Let's collaborate!!!

