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CUBIC

NOVEL BIOBASED MATERIALS TO IMPROVE CIRCULARITY

Improving the circularity of complex plastic multi-material composites using novel biobased materials in B2B semi-finished products

Products with composites, pressure cylinders a technology in sports equipment

DITF, Denkendorf, Germany

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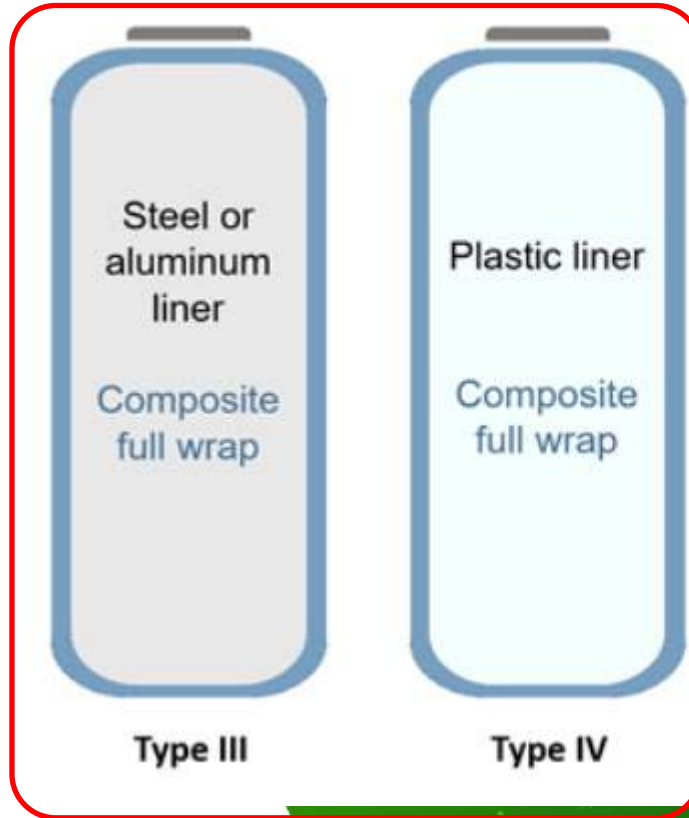
Types of Cylinders



Type I



Type II



Type III



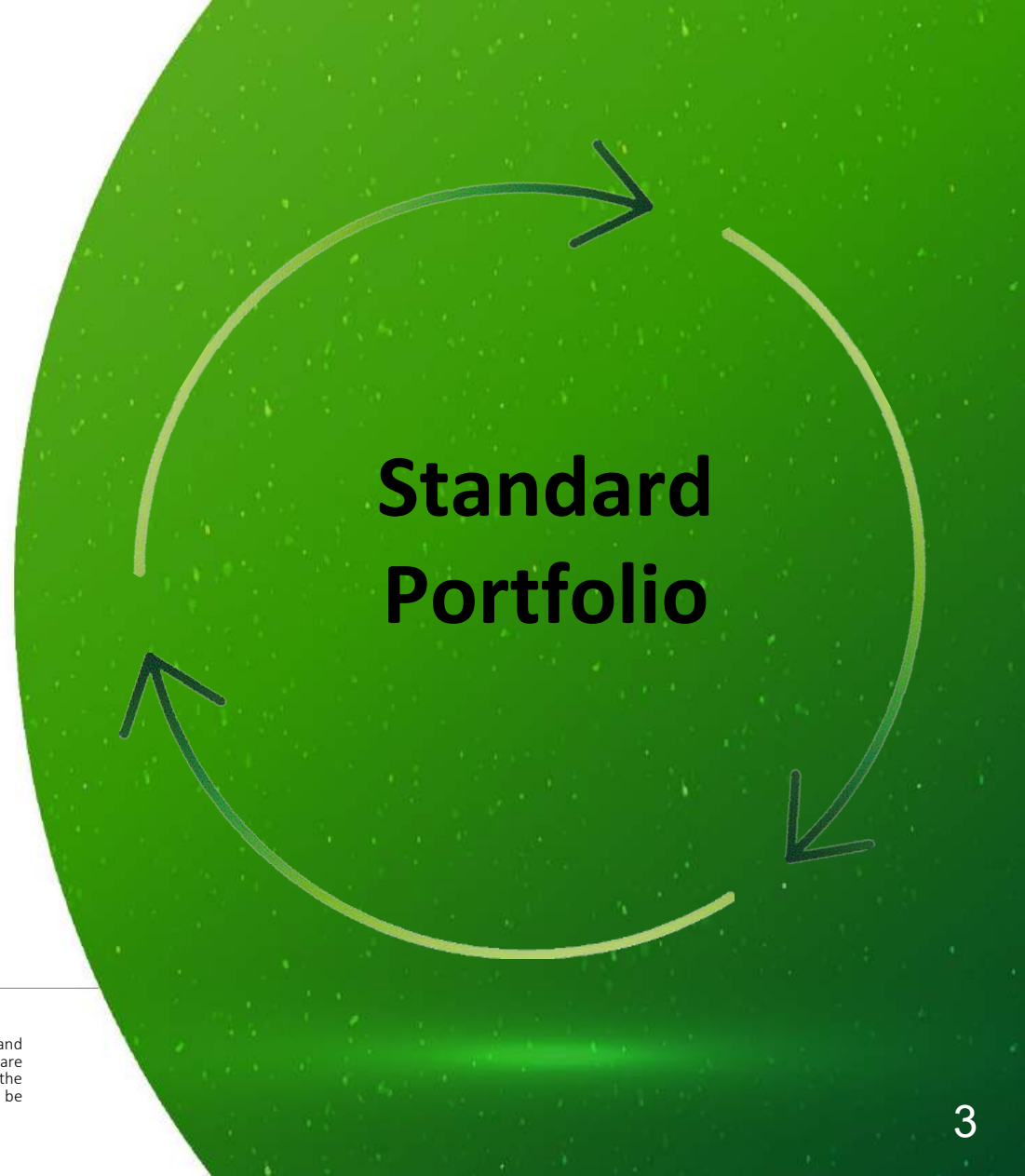
Type IV



Type V



THE CYLINDER



Type III TPED 200 & 300 bar



0,952 kg of
 H_2

17,17 kg of H_2

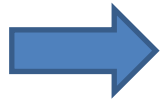
Standard
Portfolio



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Why our cylinders



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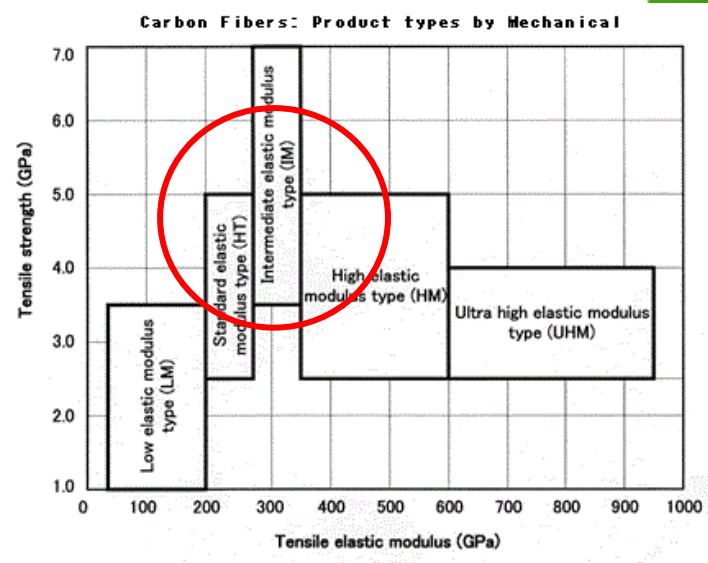
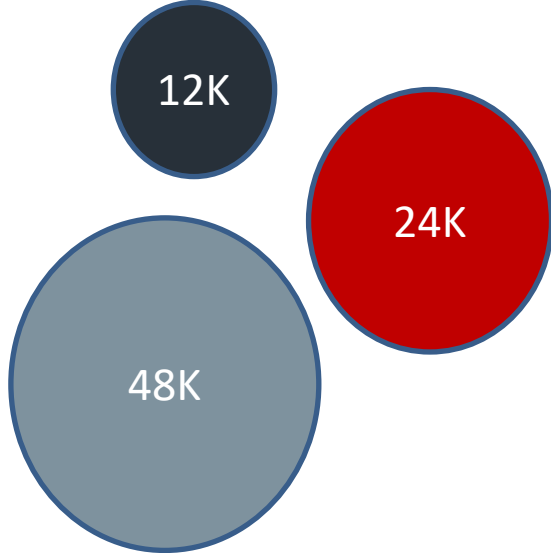
Filament Winding materials

GLASS FIBER



EPOXY RESIN

CARBON FIBER



Filament Winding process

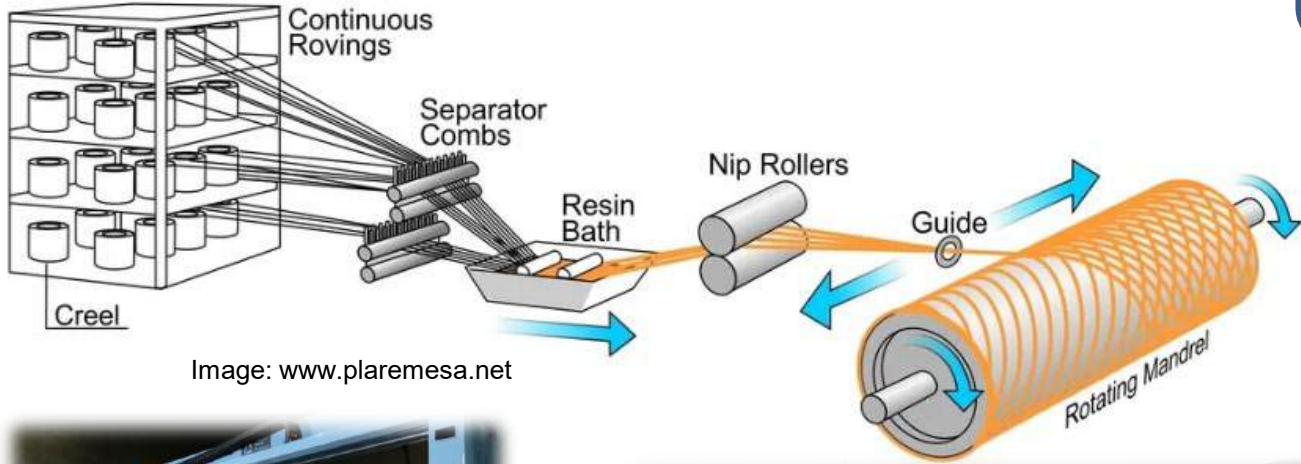


Image: www.plaremesa.net

TOW-PREG
VS
WET-WINDING

+ CURING



Image: www.plaremesa.net

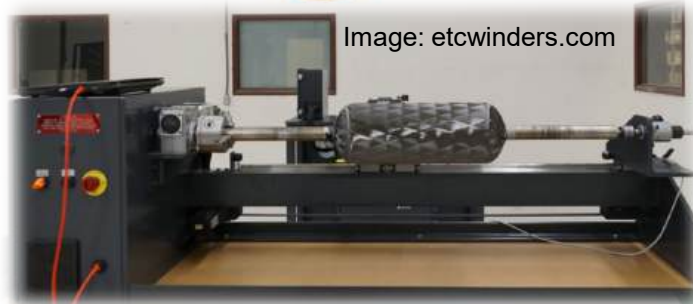


Image: etcwinders.com



Image: pultrex.com

Tests

UNE-EN 12245 / ISO 11119-2: Transportable gas cylinders. Fully wrapped composite cylinders.

CYLINDER

BURST

✓ WP x 3



FATIGUE

- ✓ P_{65°
- ✓ $N_d = y \cdot 500$
- ✓ $y: n^0$ years

Example:
30 years life
→ 15.000 cycles

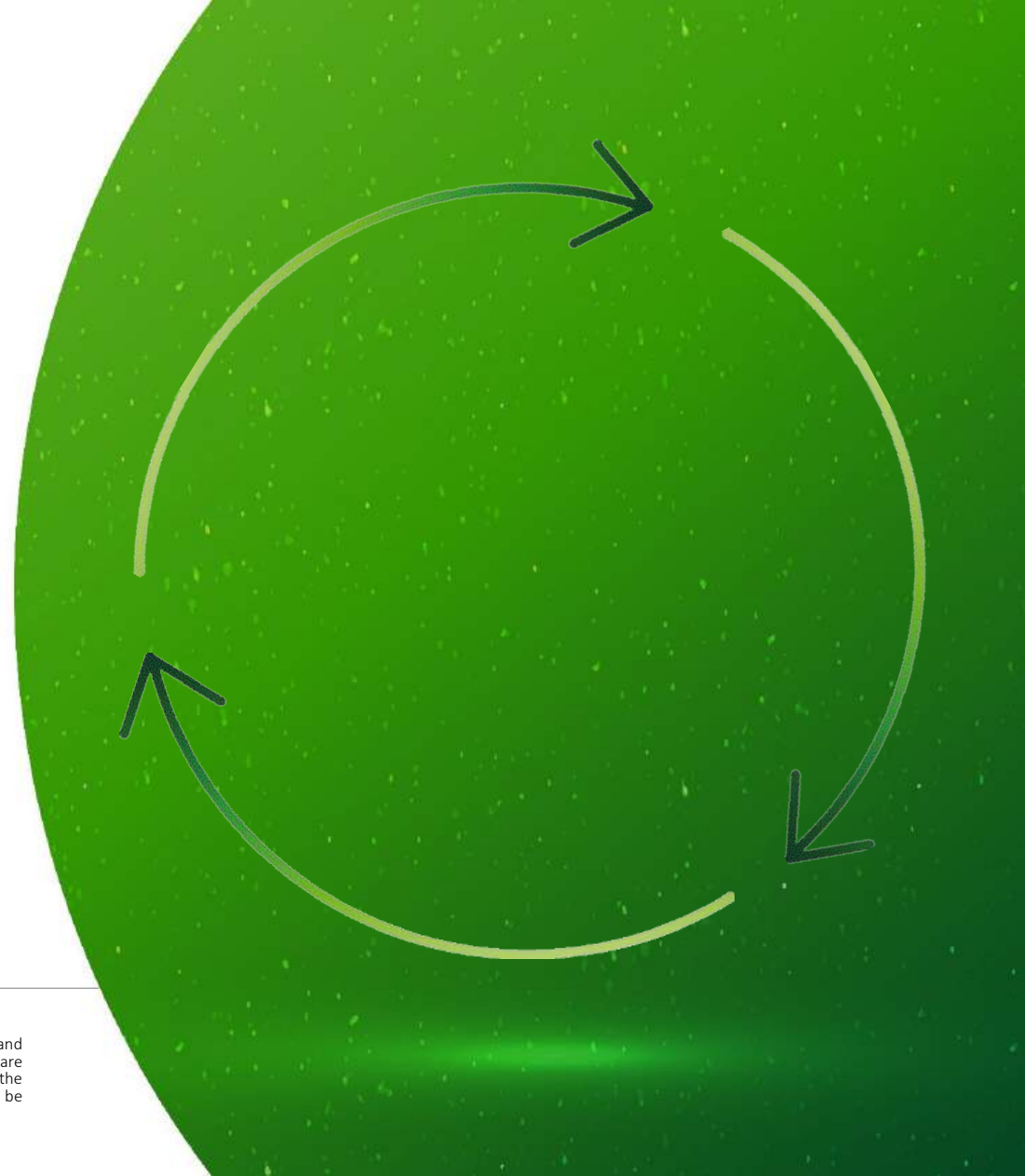
OTHERS

- ✓ **Hydraulic test (WP x 1.5)**
- ✓ Drop test
- ✓ Flaw test
- ✓ Extreme T^a cycle
- ✓ Fire resistance
- ✓

MATERIALS

- Fiber tensile test**
- Matrix ILSS test**
- T_g**
- HDT**
- Viscosity**

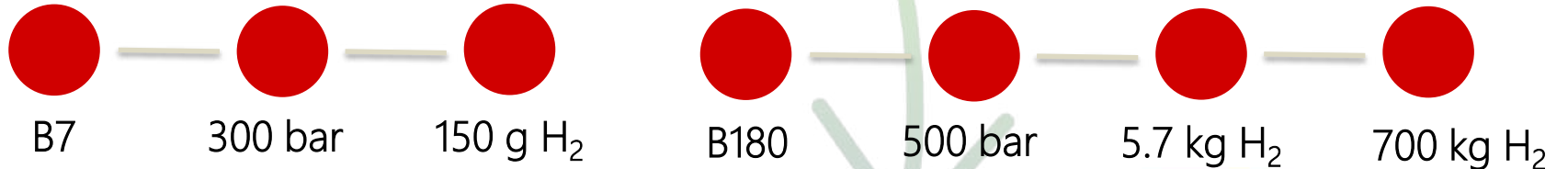
New Developments



Developing hydrogen-based technologies for smart and sustainable heavy-duty transport

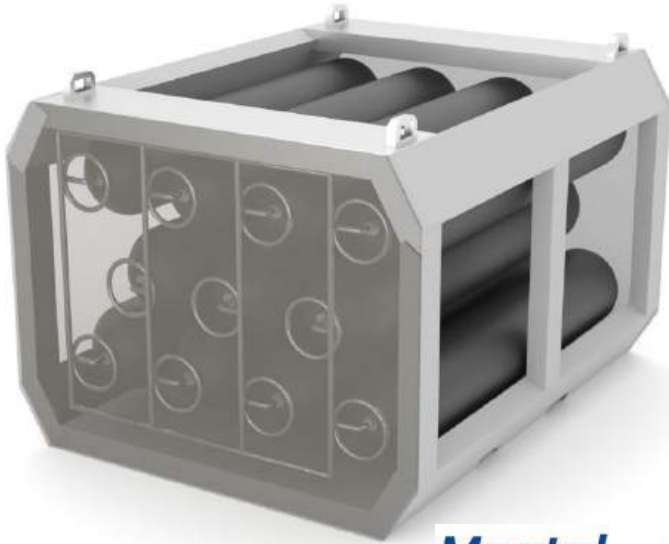


7 & 180 liter cylinder
Type IV – blow molding
Cylinder failure prediction



Improving flexibility of distribution networks with renewable energy, electrolysis, fuel cell and H₂ storage

180 liter cylinder
Type IV - rotomolding
Optimized for stationary application

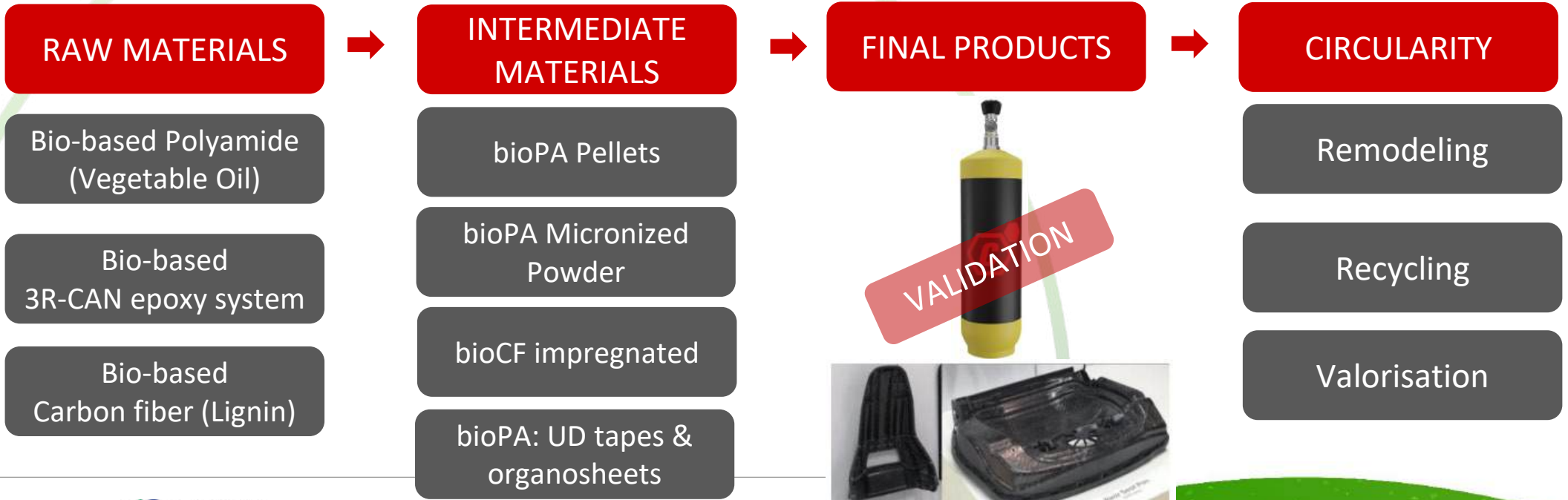


- Type IV - rotomolding
- Improved H₂ capacity with nano-materials:
 - MOF (metal organic framework)
 - Carbon based materials



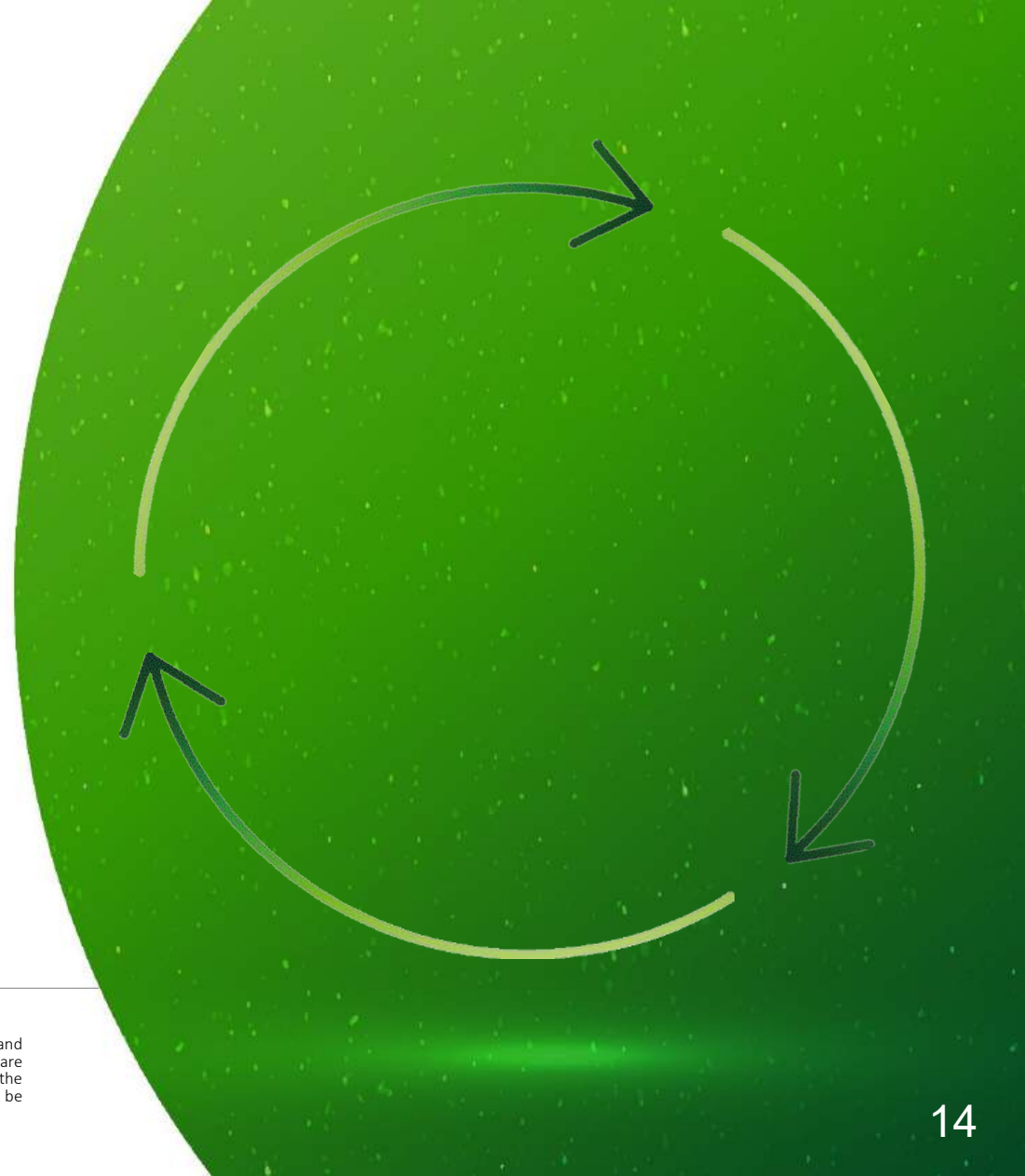
European Consortium for improving the circularity of complex plastic multi-material composites using novel Biobased materials in B2B semi-finished products

Development of biobased carbon fiber and epoxy resin
Validation / Benchmark with commercial materials



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Other Carbon Fiber Developments



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Bio-based Industries
Consortium

Co-funded by
the European Union

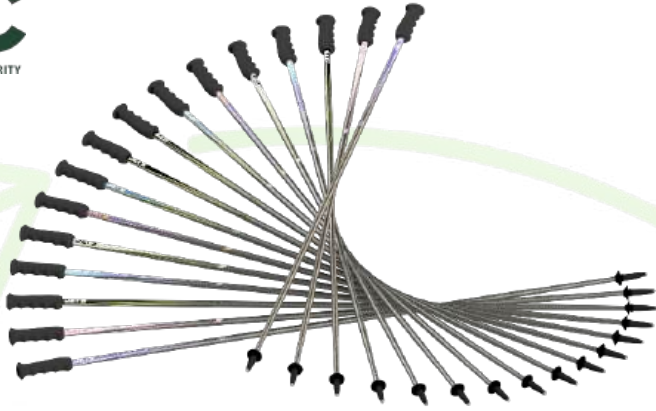
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- ✓ Hand Lay-up
- ✓ In Mould curing
- ✓ Customization



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