

Future Plastic Circular Supply Chain Tour Teesside

What to expect today...

9.30 - Delegate Arrival

10.00 - Presentations

11.00 - Break

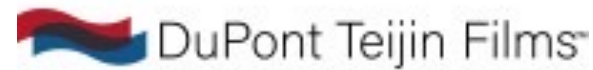
11:15 - Facility Presentations

12:00 - Lunch

1:00 - Facility Tours

3.00 - Close (Green & Blue)

5.00 - Close (Yellow)



TEES VALLEY MAYOR

Chris Beck

Tees Valley Combined Authority

TEESWORKS

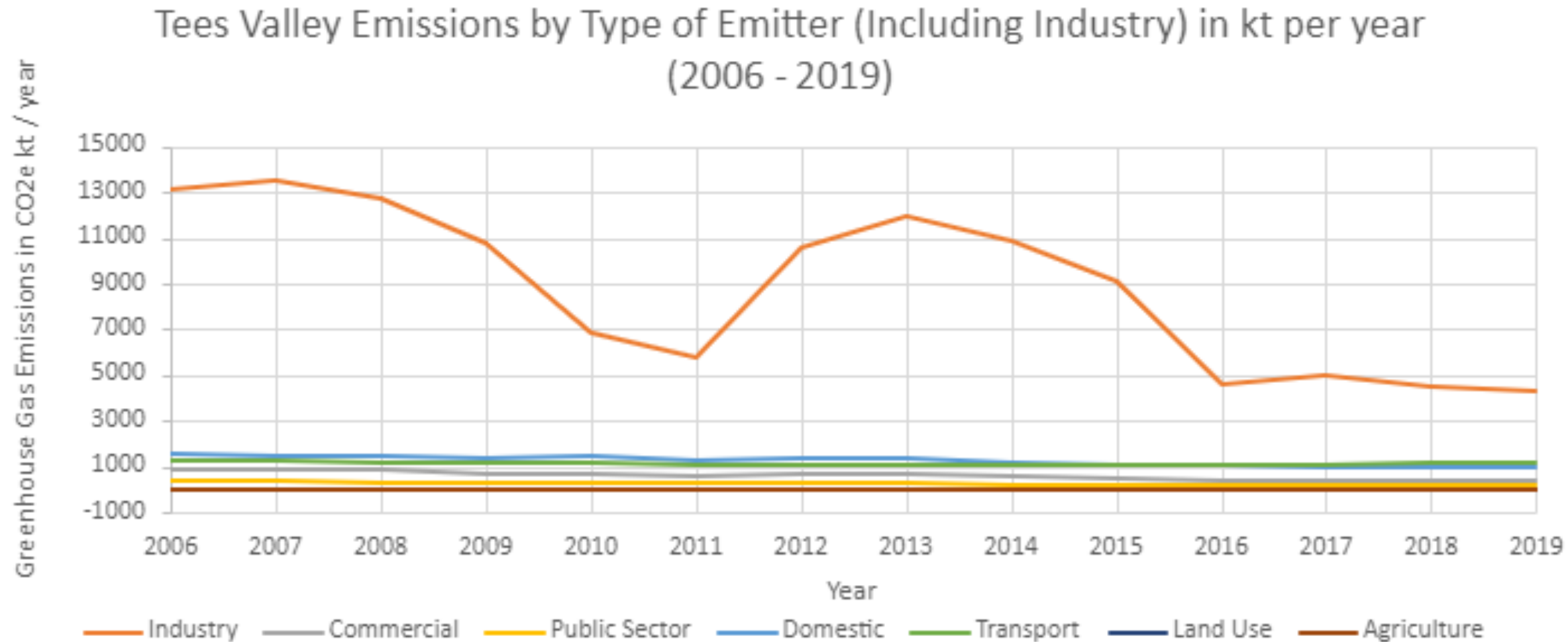
TEES VALLEY COMBINED AUTHORITY

Chris Beck | Group Director of Clean Growth and Innovation

LOCATION



TEES VALLEY CO₂ EMISSIONS



WHY THE TEES VALLEY

- Proximity and ease of access to **North Sea Storage**
- Deepwater port for **CO₂ / H₂ / NH₃ transport**
- **5.6%** of UK industrial emissions.
- History of decarbonisation planning > **Teesside Collective**
- Existing **pipe corridors** and infrastructure
- Operational **H₂ storage & distribution**.
- Import of **26% of UK's natural gas** through CATS.
- **Development Land**





Teesside Freeport



ROUTE TO NET ZERO

- It is not just about emissions
- Also need to consider effect on current businesses
- Need to consider economic opportunities
- Need to create jobs



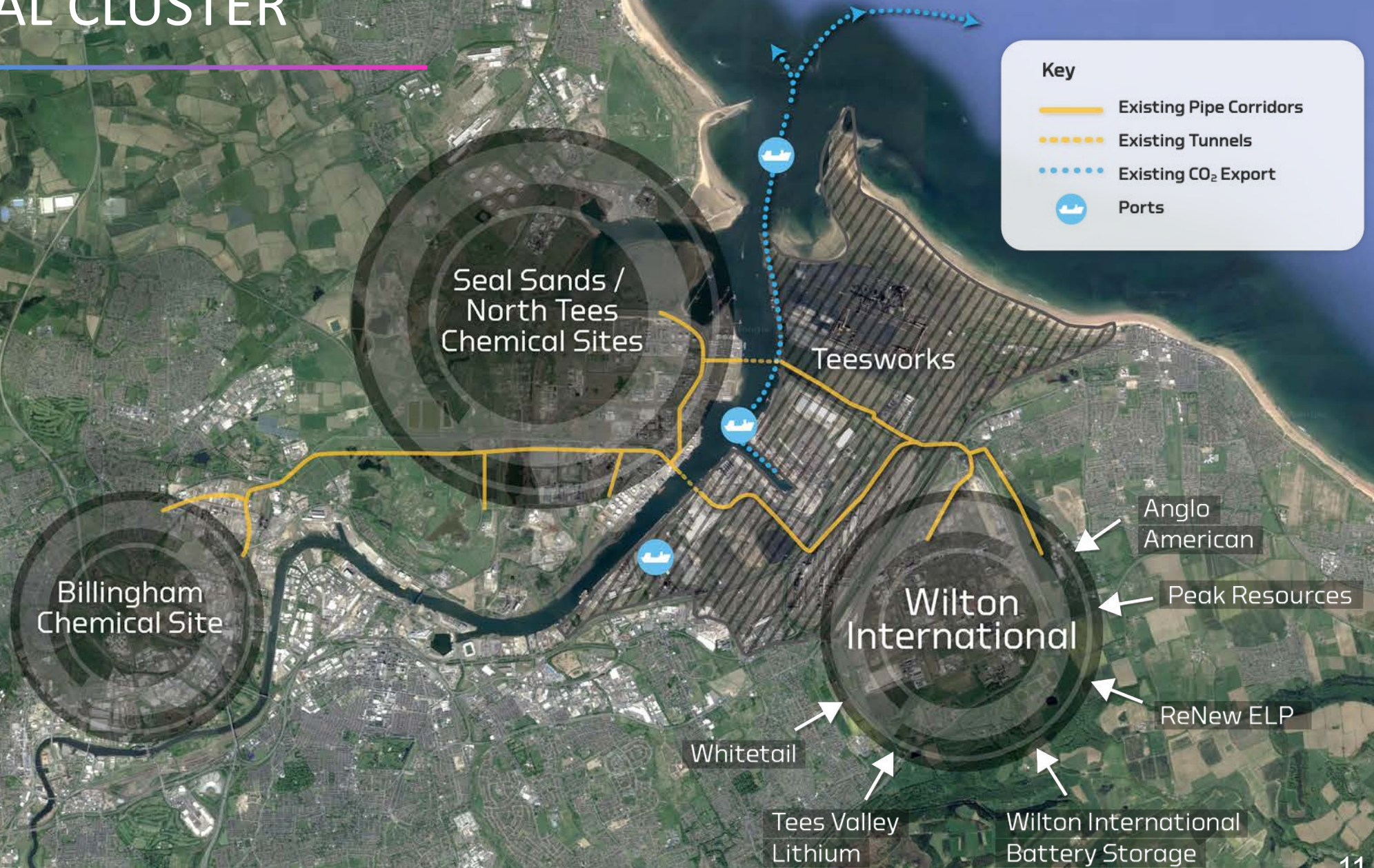
ROUTE TO NET ZERO

- Net Zero Strategy – First draft Sept
- Five Pillars
 - Heavy Industry
 - Industry
 - Residential
 - Transport
 - Nature and Resources

But we started 20 years ago!



CHEMICAL CLUSTER



ROUTE TO CLUSTER NET ZERO



HYDROGEN



H2Teesside,
Hygreen



H2NorthEast



Department
for Transport
Transport Hub

PROTIUM

Green Energy



RENEWABLE POWER SECTOR



Net Zero
Teesside



WHITETAIL
CLEAN ENERGY

EFW PROJECTS



sembcorp



MGT
Teesside

OFFSHORE
WIND

equinor 

 SSE

CARBON CAPTURE, USAGE & STORAGE



Net Zero
Teesside

GROUND ZERO FOR NET ZERO

Creating the world's first Net Zero industrial cluster by 2040

- The go-to region to develop clean gas, hydrogen and low-carbon technologies
- The most developed and deliverable CCUS project – Net Zero Teesside
- UK's largest Green and Blue hydrogen projects
- Premier offshore wind location
- Multimillion-pound investments from SeAH Wind,, Net Zero Teesside, bp



EAST CO₂AST CLUSTER

Northern
Endurance
Partnership



NORTH SEA

145km

103km

MIDDLESBROUGH ●

DARLINGTON ●

PROJECTS IN TEESSIDE
INCLUDING

Net Zero
Teesside



BOC



bp



CF



kellas



NZE
Power



suez

TV ERF

8 RIVERS

UP TO 10 MTCO₂E CAPTURED

HULL ●

GRIMSBY ●

SCUNTHORPE ●

● YORK

● LEEDS

● SHEFFIELD

PROJECTS IN THE HUMBER
INCLUDING

ZEROCARBON
HUMBER



drax



equinor



MITSUBISHI
POWER



sse
Thermal



TRITON POWER



uni
per



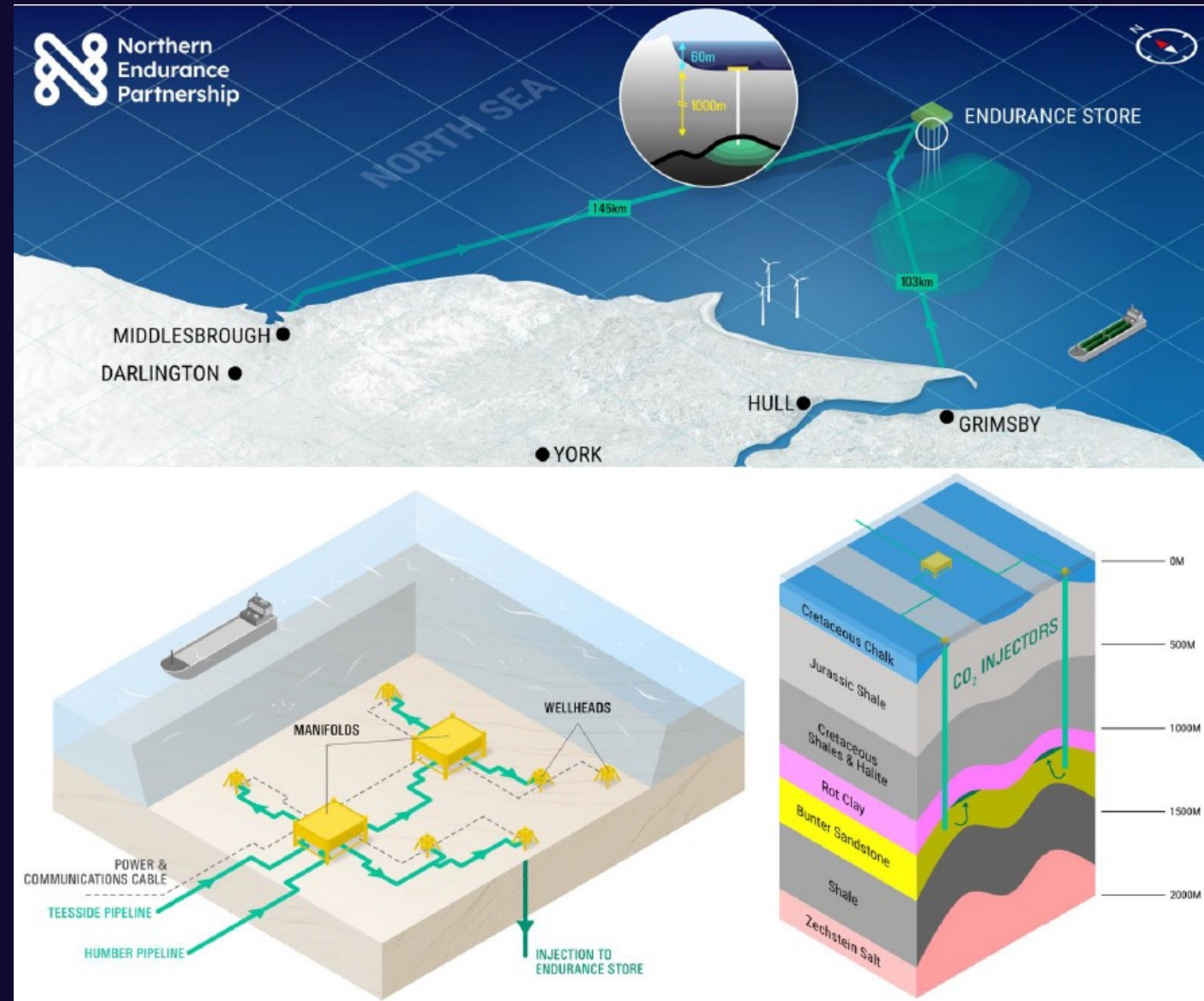
VELOCYS

17+ MTCO₂E CAPTURED



THE ENDURANCE CARBON STORE

- **First of a kind** offshore low carbon CCS infrastructure in the UK
- CO₂ injection into a **saline aquifer** is a worldwide proven concept
- Largest saline Aquifer in the southern North Sea – **capacity to store 450m tonnes of CO₂** with potential to extend to ~1 billion tonnes with nearby stores
- Includes **CO₂ pipelines** from Teesside and the Humber
- Compression and pumping systems to a common subsea manifold and well injection site at the **Endurance store**



SOUTH BANK



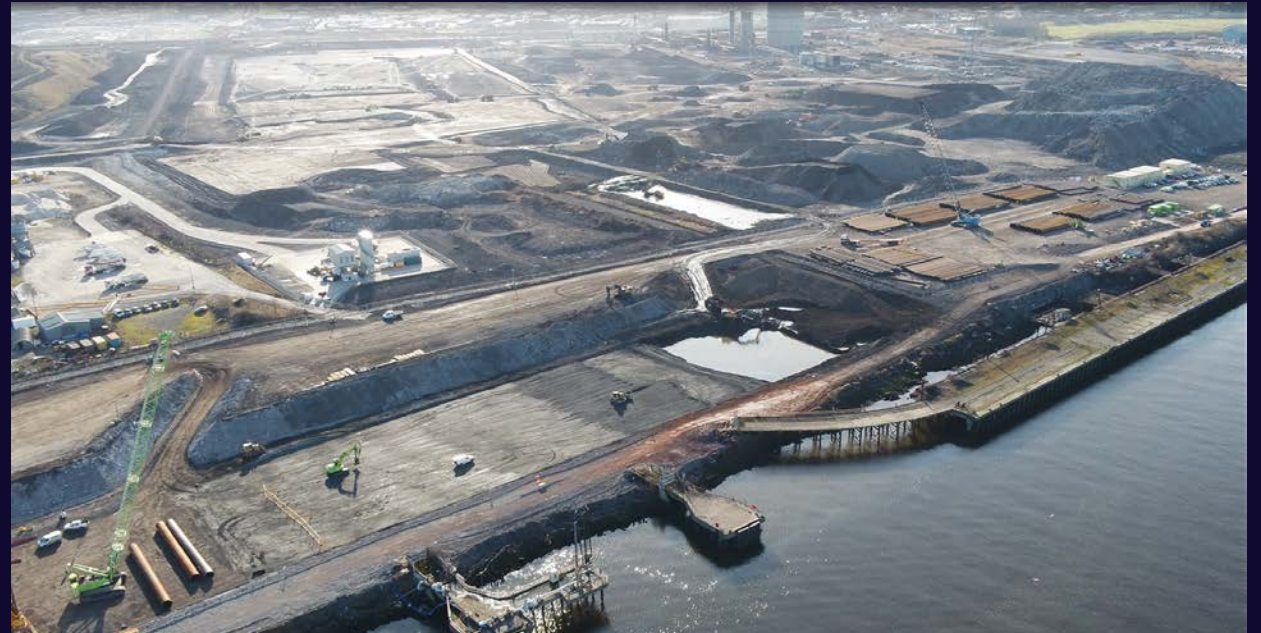
PROGRESS SLIDE ON SOUTH BANK

- £107million investment from UKIB – its first ever
- Phase One 450metres to be complete by March 2023
- Planning permission granted for 76,500m² wind turbine blade manufacturing facility

January 2021



February 2022



HYDROGEN



Region has existing hydrogen storage caverns



Currently produce more than 50% of the UK's hydrogen



Hydrogen pipework connecting major cluster sites



Tees Valley announced as the DfT Hydrogen Transport Test Hub



Significant hydrogen production planned on and around Teesworks

PROJECTS

Blue hydrogen

- Kellas (1GW plant)
- bp (1GW plant)

Green hydrogen – linked to renewable energy production

- Protium (up to 60MW)
- EDF (hydrogen connected to near shore wind)
- bp (500MW)

HYDROGEN TRANSPORT

- DfT Hydrogen Transport Test Hub
- Major trials bidding for funding
- Looking at Airport Operations



HYDROGEN FOR THE HOME

- Northern Gas Networks proposal for up to 2,000 homes and businesses in Redcar to be heated with hydrogen gas from 2025
- Plans for residents and businesses to be powered by locally produced hydrogen
- Teesside targeted as hub for green hydrogen production by 2025



CIRCULAR ECONOMY

Waste / bio feed to :

- Bio ethanol
- Diesel
- Sustainable Aviation Fuel
- Bio Coal
- Bio LPG
- Power



CIRCULAR ECONOMY

alfanar – Lighthouse Green Fuels Project

- Sustainable aviation fuel from waste
- £1billion investment
- Potential to produce 80% less greenhouse gas than its fossil fuel equivalent



Circular Fuels - Bio Gas - LPG from Waste

- £150million investment at Teesworks site



Thank you

Paul Davidson

Smart Sustainable Packaging Challenge



Smart Sustainable Plastic Packaging Challenge

Paul Davidson
Challenge Director



UK Research
and Innovation



Innovate
UK



Natural
Environment
Research Council

The SSPP Plan 2019 - 2025

To deploy £60m of public funding alongside £149m of private money using a combination of:

- **Early stage enabling research (~£8m)**
- **Collaborative R&D (~£12m)**
- **Large scale demonstrator projects (~£38m)**

Supporting **bold, ambitious innovation** to bring about wholesale change in the UK's ability to:

- **Reduce**
 - **Reuse**
 - **Recycle**
- } its plastics packaging and so dramatically reduce the amount of plastics entering the environment. “Recovery” is NOT part of the SSPP plan.

Activity & Scope



7 Competitions



57 funded projects



Balanced Portfolio

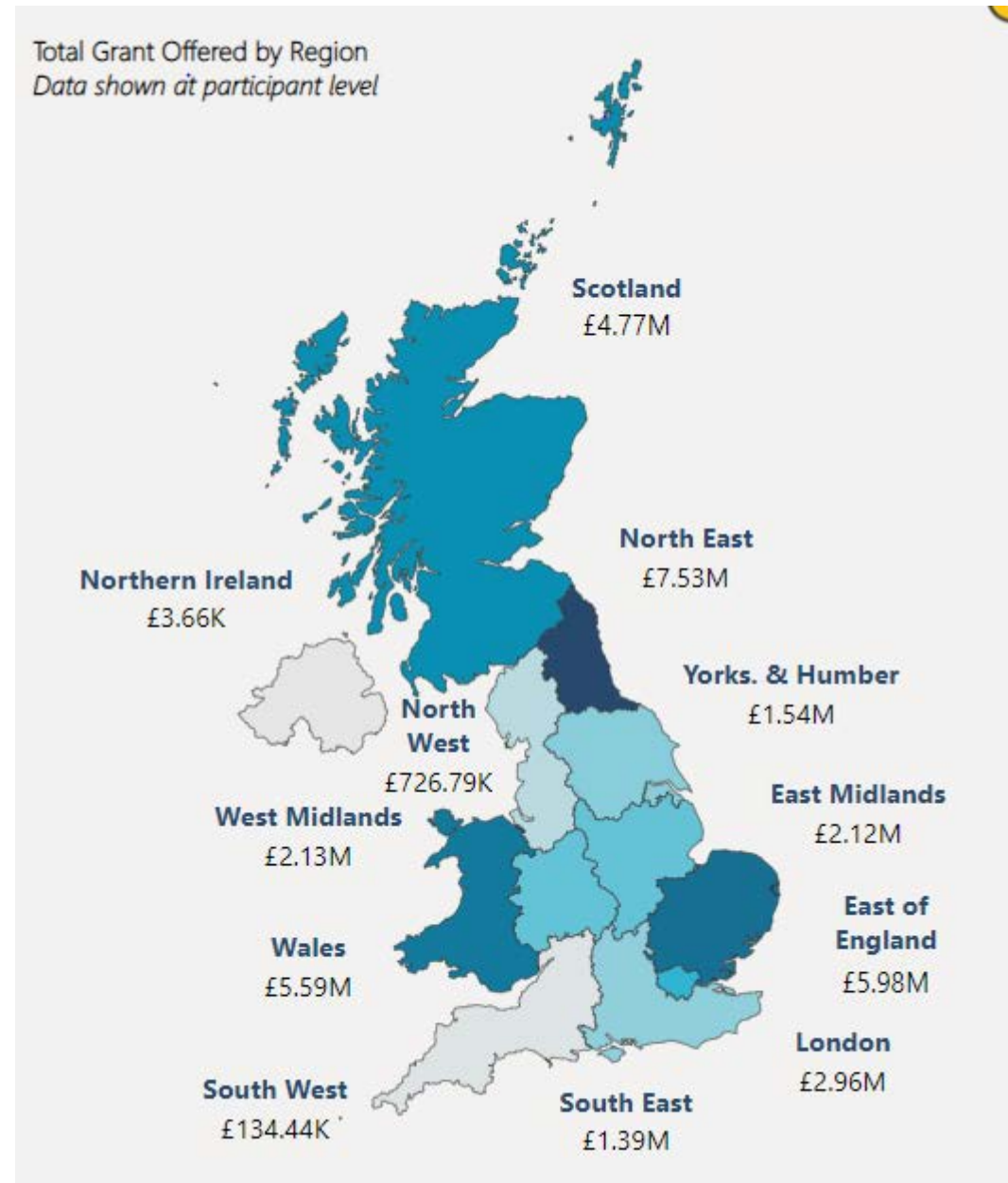


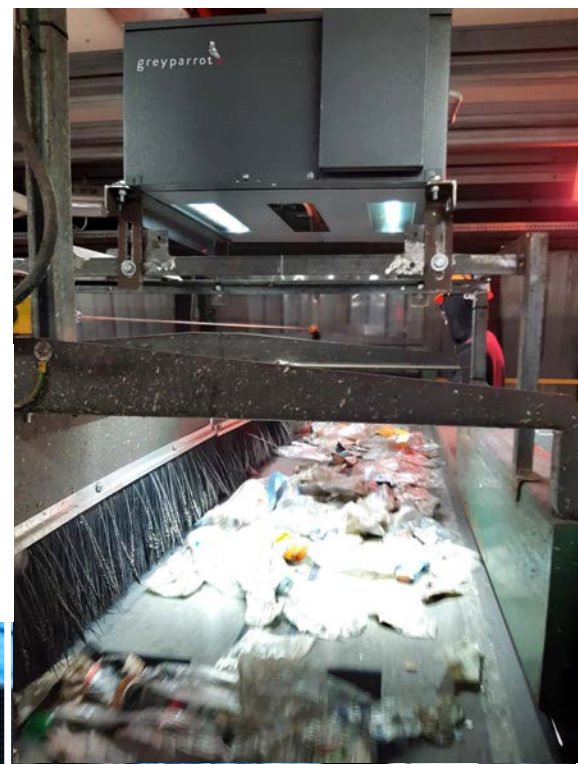
Collaborative

- Brand and retailers
- Polymer & packaging sectors
- Technology providers
- Recycling sector
- Academia & NGOs



UK Research
and Innovation





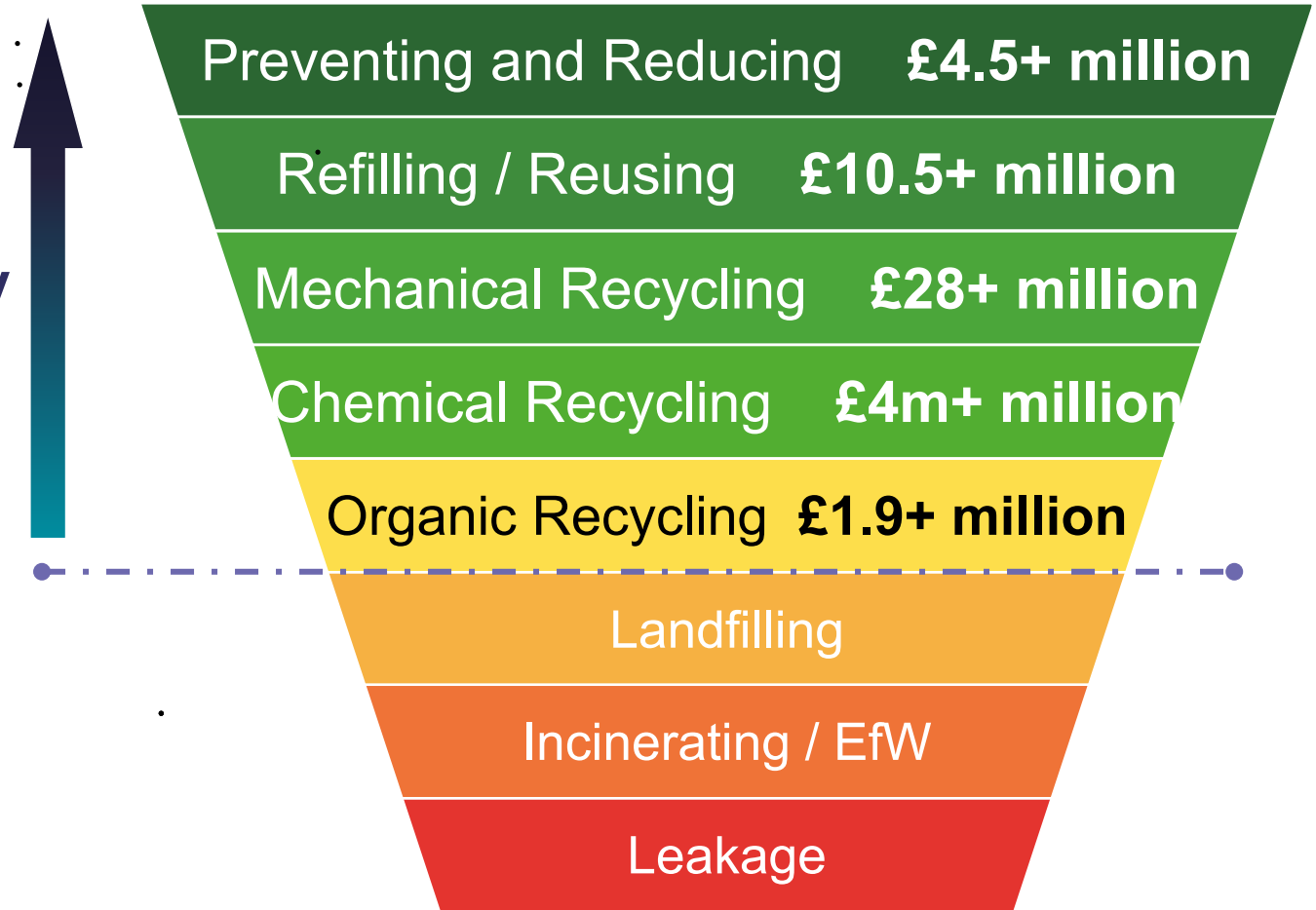
Balanced Portfolio



UK Research
and Innovation

SSPP Portfolio

- 7 Funding Competitions
- 57 funded projects
- Collaborative/multi-disciplinary
 - Recycling industry
 - Packaging industry
 - Brand and retailers
 - Academia
- Balanced approach

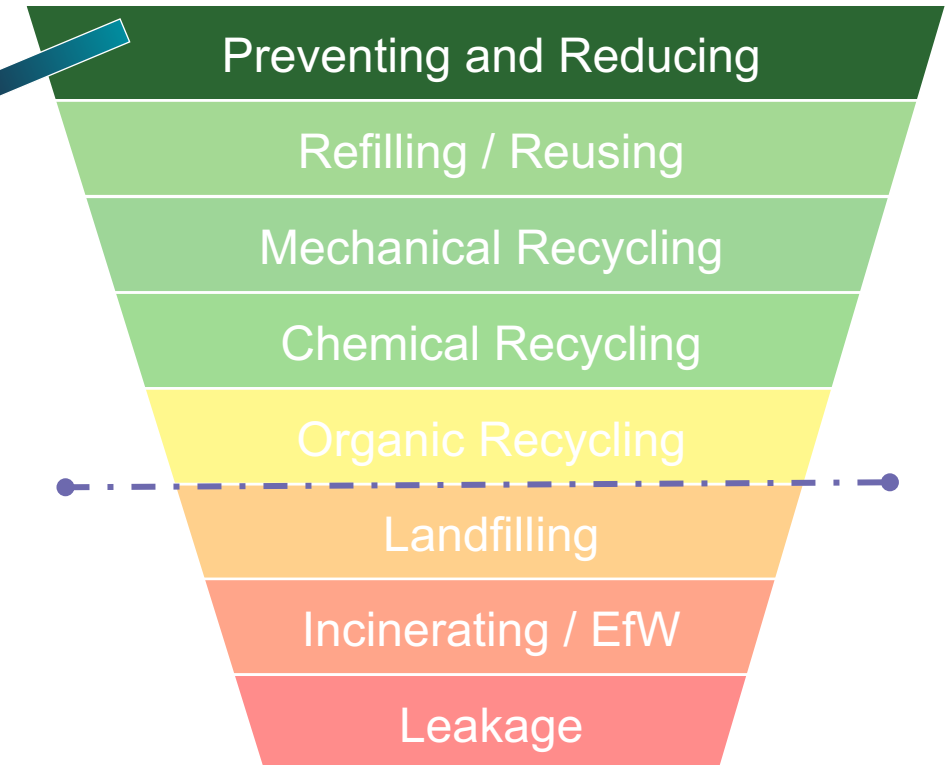


SSPP Portfolio – Prevention/Reduction

£4.5+ million

11 research and feasibility projects including:

- novel **biodegradable / edible biopolymers** to displace plastic
- **process optimisation** solutions to reduce material wastage in plastic packaging manufacturing
- **packaging design innovation** to support reduction through behaviour change
- **circular systems** for food-to-go packaging



SSPP Portfolio – Reuse & Refill

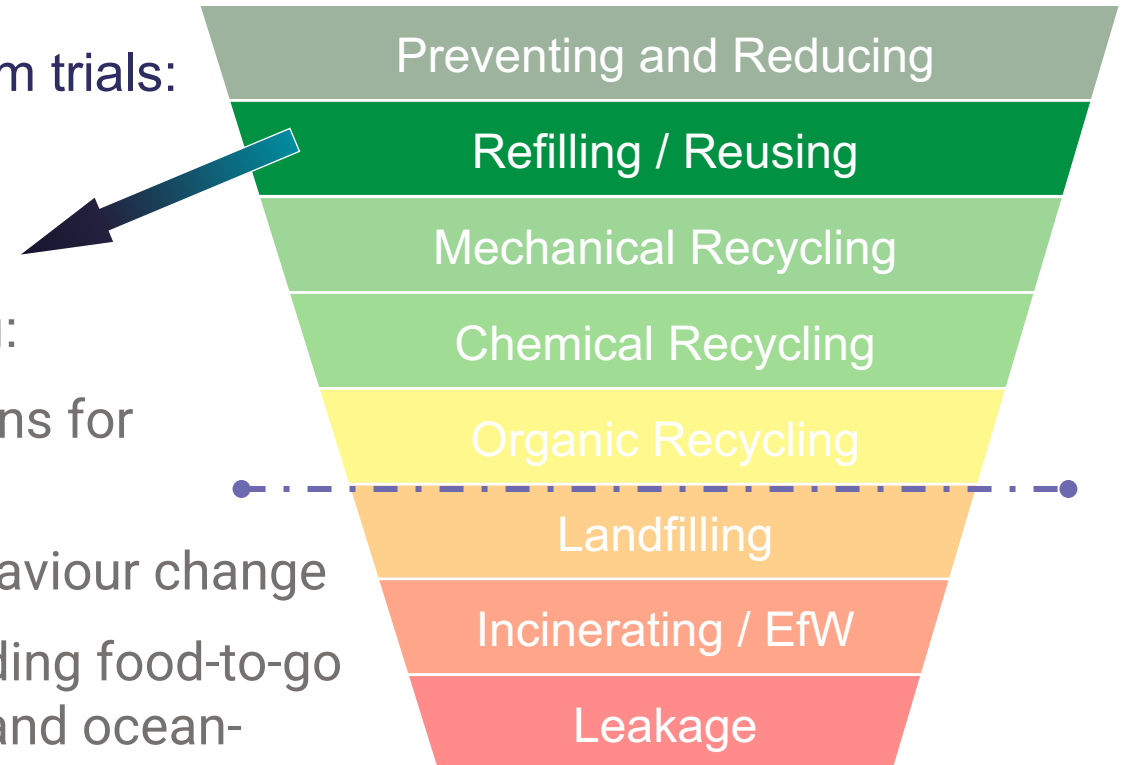
£10.5+ million

2 Large-Scale Demonstrators – whole system trials:

- Unpackaged Systems
- Return Refill Repeat

14 research and feasibility projects including:

- **identification, tracking & cleaning** solutions for reusable/refillable packaging
- **consumer perception**, incentives and behaviour change
- **circular systems and reuse models** including food-to-go packaging, milk, personal care products, and ocean-plastic derived water bottles



SSPP Portfolio – Mechanical Recycling

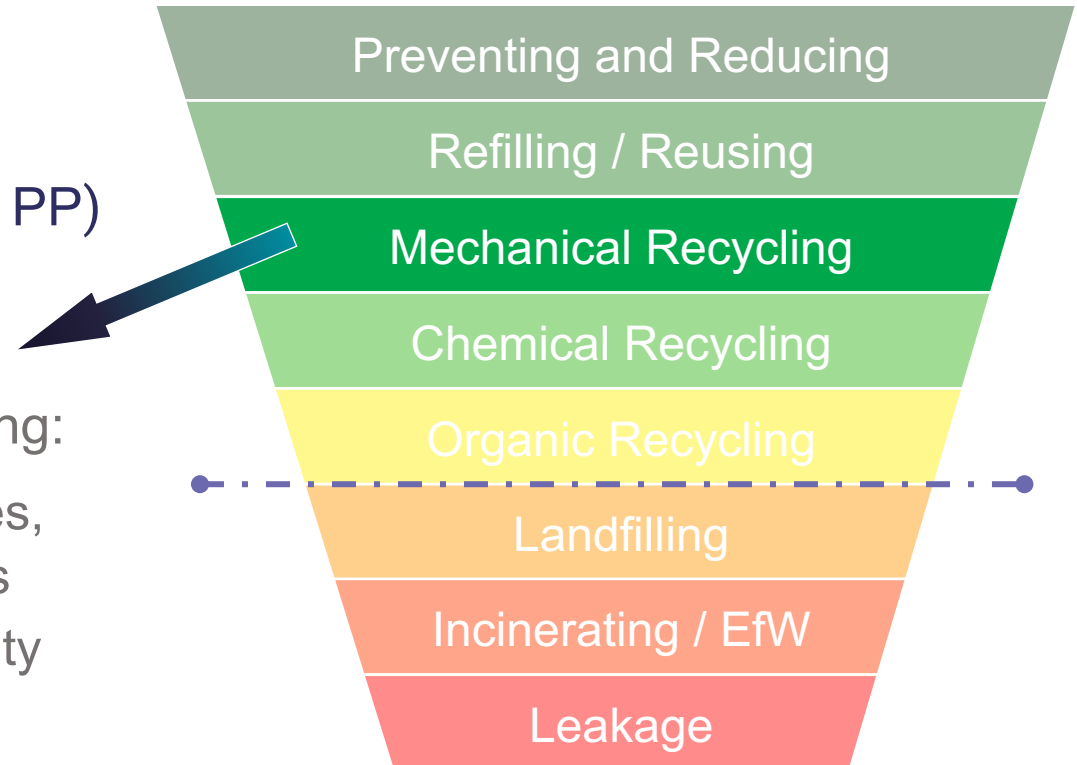
£28+ million

4 Large-Scale Demonstrators:

- Veolia (PET full loop)
- Cleanstream (separation of food & non-food PP)
- Uncaptured Unrecycled (mixed plastics)
- Post-consumer films (film separation)

and 15 research and feasibility projects including:

- Novel **food-grade quality recycling** processes, including a super-critical CO₂ cleaning process
- **Barrier film** innovations to increase recyclability
- Systemic and **behaviour change** research
- Polymer **identification and sorting** technologies



SSPP Portfolio – Chemical Recycling

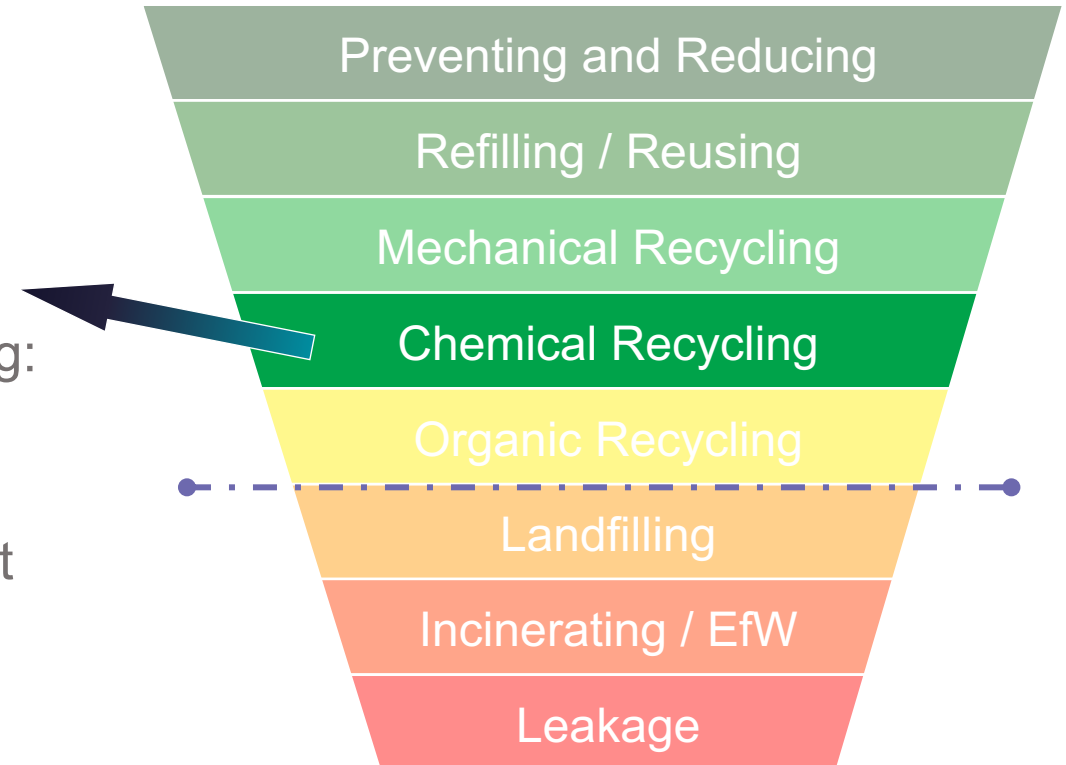
£12+ million

2 Large-Scale Demonstrators:

- ReNew ELP (hydrothermal)
- Recycling Technologies (thermal cracking)

and 4 research and feasibility projects including:

- Microwave assisted pyrolysis
- Use of super-critical water as a green solvent
- Plastics to plastics – pyrolytic and fractional distillation process

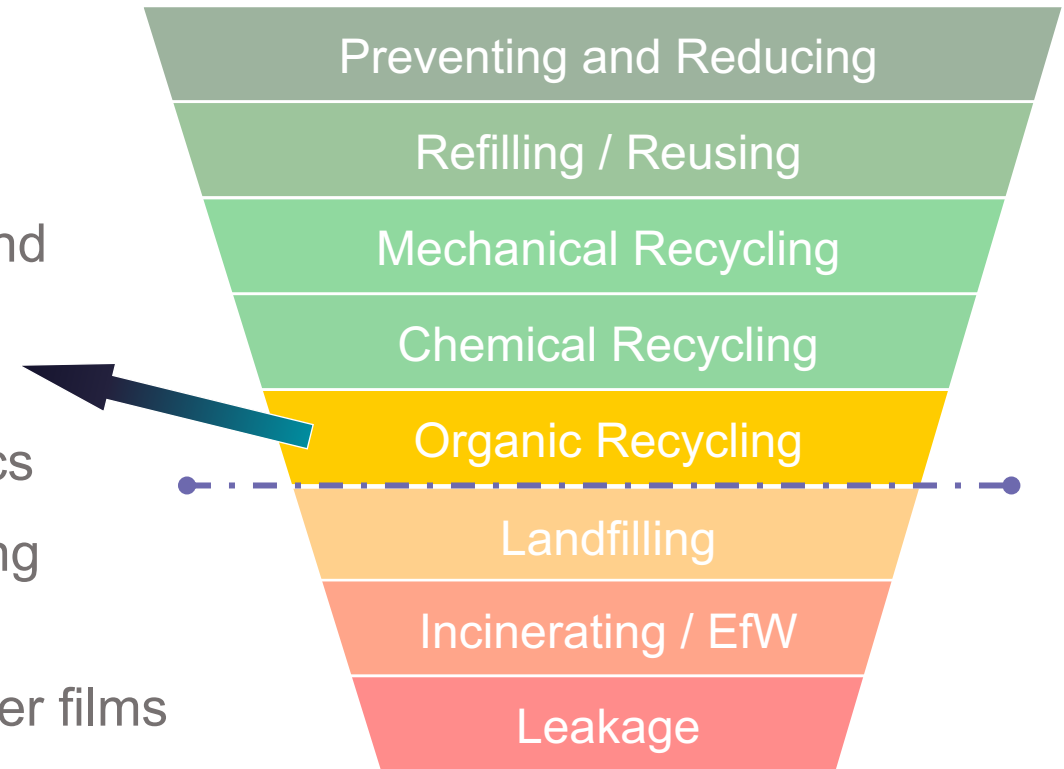


SSPP Portfolio – Organic Recycling

£1.9+ million

4 research and feasibility projects including:

- Assessing the **integration of compostable packaging** in existing UK waste collection and treatment infrastructure
- Compostable packaging as a targeted alternative to the main hard-to-recycle plastics
- **Foamed biopolymer** formulation for replacing expanded polystyrene and PVC in PTTs
- **Bio-produced nylon** for recyclable multi-layer films



Films and flexible packaging recycling



THE CHALLENGE...

- 22% of all UK consumer plastic packaging in 2020
- 8% was recycled in 2021
- Challenging for current sorting & mechanical recycling processes

Impact Recycling project

Demonstrator plant to separate post-consumer mixed flexible plastic packaging using a wet, density-based separation technology to separate multi-layer and mono-layer flexible

Uncaptured Unrecycled Plastics project

Demonstrator plant for the recovery, sorting and recycling of post-consumer plastic packaging, including films and flexibles, from mixed waste streams (e.g. reject material from Materials Recycling Facilities and on-the-go/food retail outlet waste)

Also on films and flexibles...



Recently launched... FlexCollect

UK's biggest flexible plastic household collection and recycling pilot

- funding for local authorities to roll out and operate pilot collections
- Government and whole value chain working together to:
 - building an evidence base
 - share learning
 - provide key insights into operational issues.

Funding for **CEFLEX** to undertake a comprehensive testing programme to better understand the sortability and mechanical recyclability of flexible packaging and to generate robust, independent and credible data to update and improve their D4ACE design guidelines.



Plastics Circular Economy Centre?

- The UK is already performing well globally (60% of AWEPP Competition finalists are UK based)
- Emerging centres of excellence and clusters:
 - Henry Royce (Manchester) – Collection and Recycling
 - Sheffield/Grantham – Reuse/refill/behaviour change/LCAs etc
 - Portsmouth – Enzymes
 - Plymouth – Marine environment and microplastics
 - UCL – Compostable plastics and alternative materials
- Gaps:
 - Sustainable Petchem at scale (some work around ethylene and bio feedstocks)
 - Retail systems
 - Digital and the resource agenda
 - Monitoring and measurement of plastic flows
 - Quantified understanding of the impact of plastic in the environment

Q. (How) Can Wilton become the first site with a fully circular supply chain?



THANK YOU

EMAIL: paul.Davidson@iuk.ukri.org

www.ukcpn.co.uk/SSPP

www.ukri.org/smart-sustainable-plastic-packaging-challenge/



UK Research
and Innovation



Innovate
UK



Natural
Environment
Research Council

Dr David Hughes

Net Zero Industry Innovation Centre

Net Zero Industry Innovation Centre

Total investment: £13.1m

Estimated completion date: April 2023

The Net Zero Industry Innovation Centre (NZIIC) is an innovative new £13.1m facility and key component of Tees Valley Combined Authority's regional innovation strategy, which will position Teesside firmly at the heart of the UK's green industrial revolution.

Specialised Laboratories

Hydrogen and Decarbonisation lab for carbon capture and utilisation, hydrogen transportation, geological storage of hydrogen and CO₂ and embrittlement mitigation.

Circular Economy and Non-Mechanical recycling lab for valorisation of waste by-products and building re-use into their product offerings. Thermal processing and chemical processing.

Intelligent Energy and Industrial Systems lab for simulation of micro-grids, energy vectors integration and development of intelligent systems

Digital Modelling and Simulation lab for Advanced modelling and simulation for operating industrial assets, real time analysis and visualisation, assisted operations , technological help, remote operations and assisted safety systems.

Processing and Prototyping lab for advanced additive manufacturing with focus on the physical production of components to be manufactured at scale, being repeatable and easily standardised.

Thermal Technologies lab for prevention of corrosion, ceramics production and enhancement of material performance for energy conversion technology.

NZIIC Capabilities

- Carbon Capture Utilisation and Storage
- Characterisation of material performance
- Corrosion analysis of materials
- Green Hydrogen production, Hydrogen Fuel cells
- Smart Energy Lab
- Showcase modelling and VR suite
- Waste Material Recycling



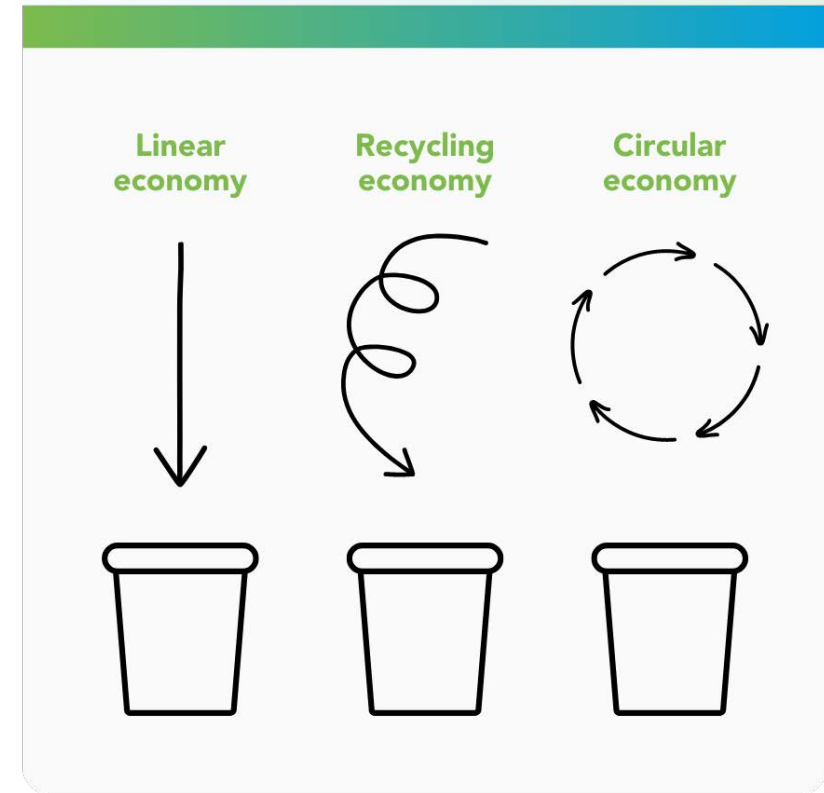
Circular Economy & Recycling Innovation Centre (CERIC)



Only 8.6% of the global economy is circular at present.



TEES VALLEY MAYOR



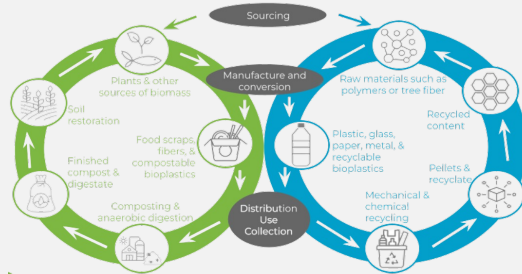
Circular Economy & Non-mechanical Recycling Lab @ NZIIC

The NZIIC focuses on hard to recycle materials in high volumes.



Current CERIC Themes

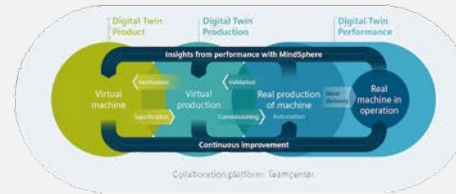
Circular Bio-economy



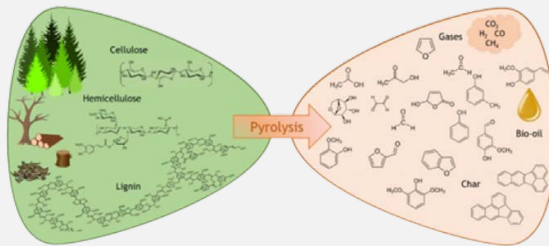
Recovery & Activation of Industrial Solid Wastes



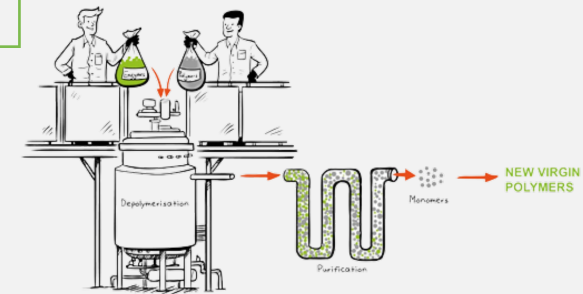
Industrial Digitisation



Pyrogenic Recovery & Treatment

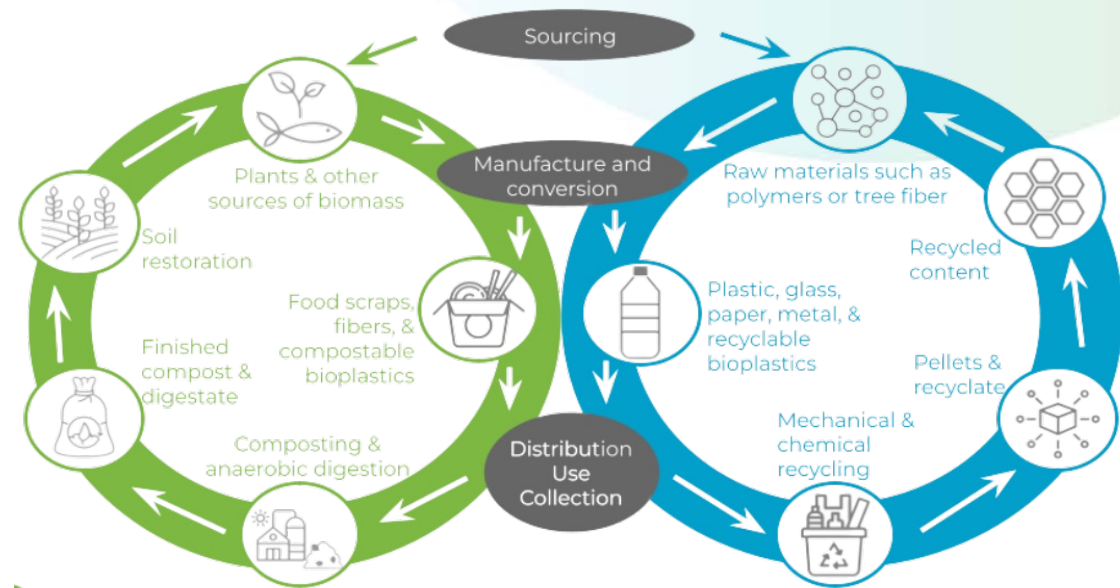


Polymer Recycling



Circular Bio-economy

- Bio-derived polymers
- Food security & bio-feedstocks
- AD digestion
- Biomass energy



Recovery & Activation of Industrial Solid Wastes

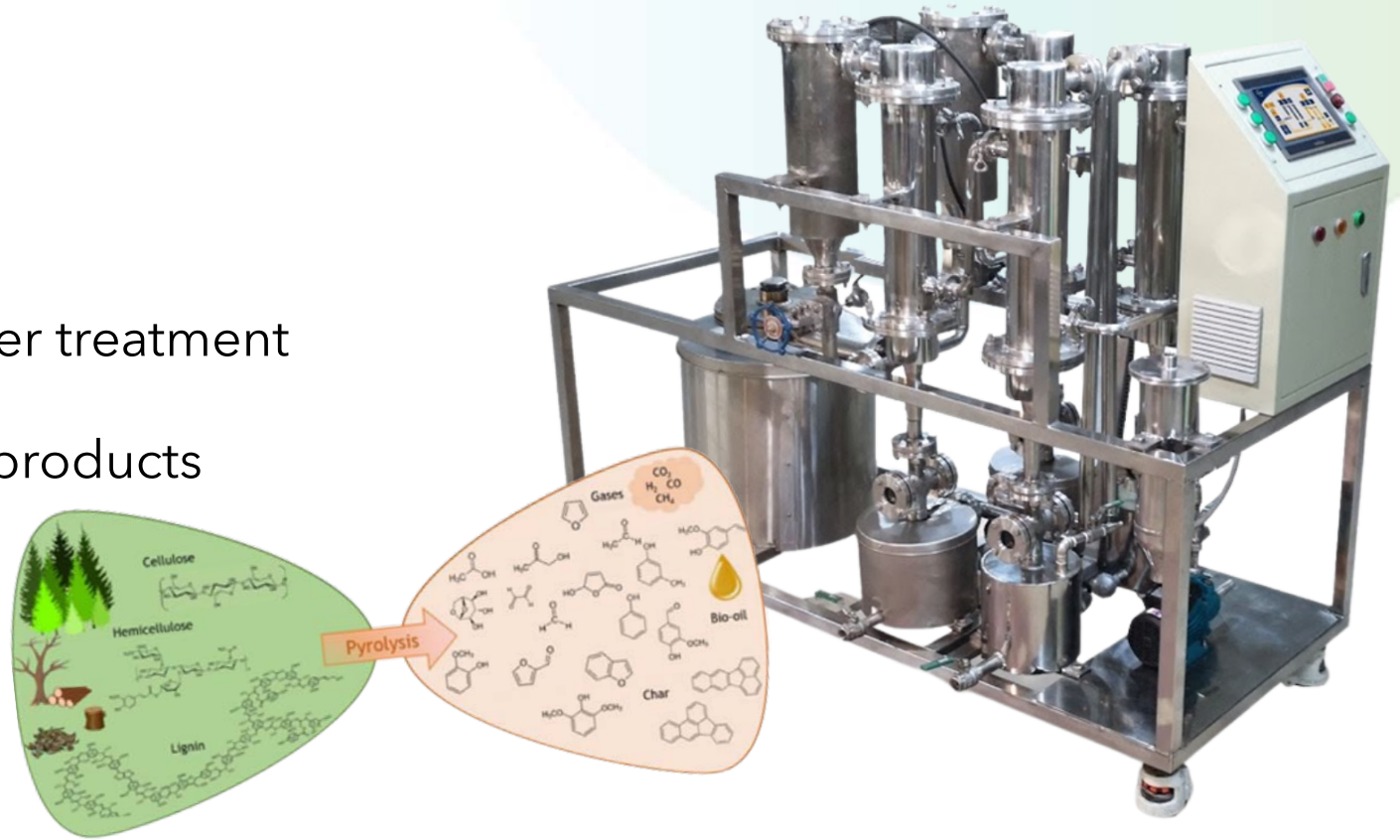
- Soil activation for cementitious materials
- Recovery & binding of metal wastes
- Geopolymers
- Valorisation of pyrolysis wastes



***2/3 of what goes to landfill
in the UK is solid soil &
mineral waste (DEFRA)***

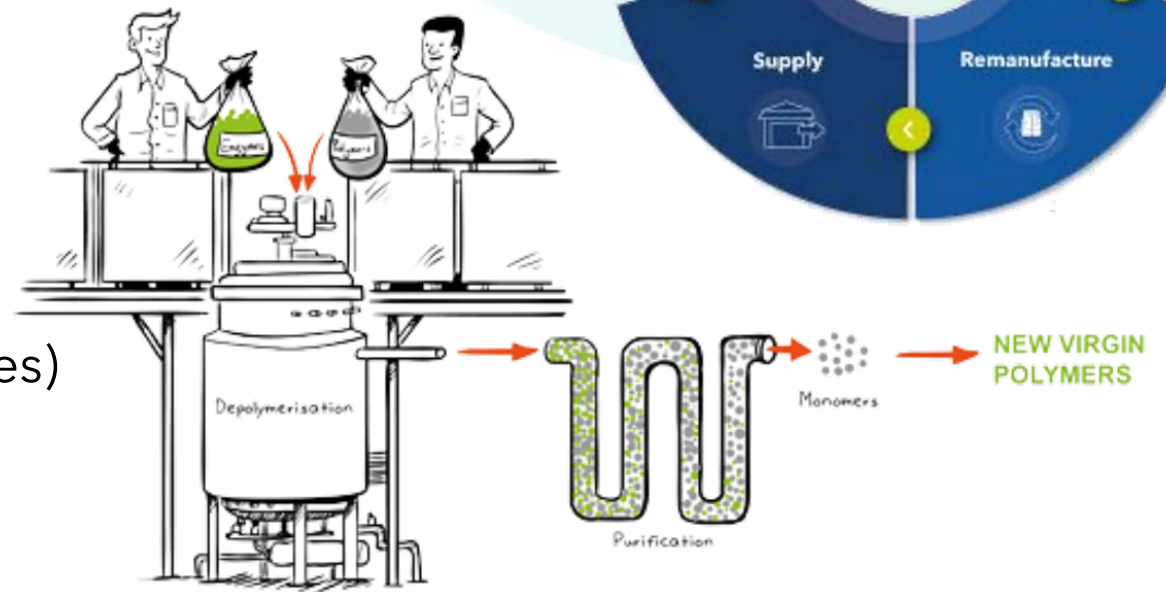
Pyrogenic Recovery & Treatment

- Polymers
- Biomass
- Sewage and waste water treatment
- Valorisation of char bi-products



Polymer Recycling

- Textile recovery
- Chemical recycling
- Recovery and reuse (packaging)
- Polymer re-design
- Composite recovery (fillers and fibres)
- AD digestion



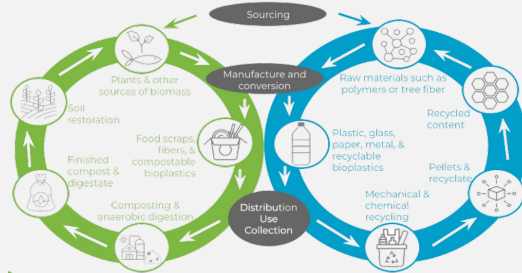
Industrial Digitisation

- Digital Twins/Shadows
- SMART data capture + ML/AI
- Gamification & UI
- Circular Business Models (digital enabled)



Current CERIC Themes

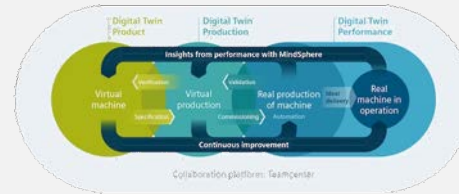
Circular Bio-economy



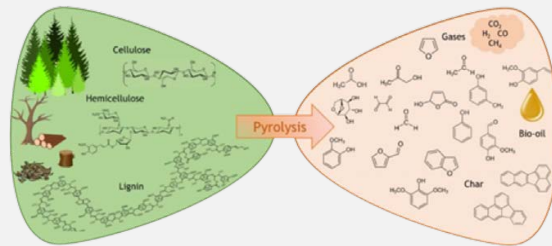
Recovery & Activation of Industrial Solid Wastes



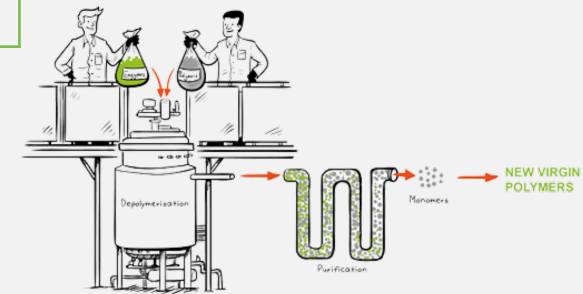
Industrial Digitisation

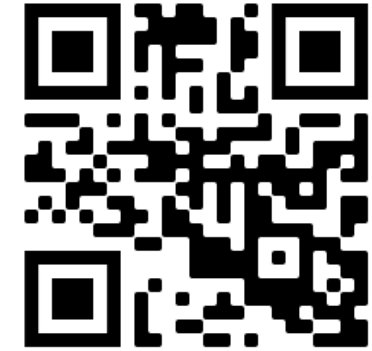


Pyrogenic Recovery & Treatment



Polymer Recycling





Thanks for your time!

For more information about the Net Zero Industry Innovation Centre, please visit www.nziic.org.uk or scan the QR code above:

Don't forget to stay up to date with our progress by following our socials.



@TU_NZIIC



Net Zero Industry Innovation Centre



NET ZERO
INDUSTRY
INNOVATION
CENTRE



Teesside
University

tees.ac.uk/netzero



TEES VALLEY MAYOR

Chris Holt

NEPIC



nepic *Cluster . Connect . Grow*

Plastic recycling in the North East

Dr Chris Holt, Clean Growth Manager



NEPIC'S PURPOSE

We support the business development needs and interests of the North East process industries.

By working closely with our member companies, we forge meaningful business relationships that allow us to identify opportunities, facilitate connections, promote collaboration and enable growth.



GROWING INDUSTRY & SUPPORTING MEMBERS

Our vision is for a **thriving** chemical processing industry in the **North East of England**



We support your needs

We get to know your business so that we can provide you with the right support and connect you to the right people at the right time.



We protect your interests

We continually address industry challenges and champion the sector to ensure the long term sustainability of chemical processing in the region.



We build meaningful relationships

We have built trusted relationships with manufacturers, operators, supply chain businesses and support organisations.



We identify opportunities

By working closely with members we identify and showcase upcoming business opportunities that supports investment, promotes diversification and inspires innovation.



We promote collaboration

We have developed an established and trusted community that acts as a catalyst for collaboration.



We enable growth

By supporting members at a local level in a collaborative environment, we can facilitate business growth and value for the region.



NEPIC IN NUMBERS

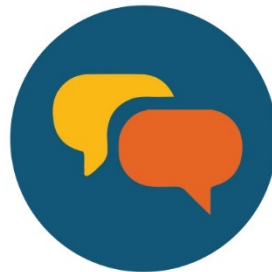
REPRESENTING AN
INDUSTRY THAT
GENERATES
£26 BILLION
OF ANNUAL SALES
& EMPLOYS
190,000



340 member companies



70+ events in 2018
& workshops hosting
2,500 guests



120 industrialists supporting the
members through **mentoring**



6,000 social media followers &
9,000 strong industry database



Led by industry: experienced
Board of 10, Leadership Council of
60 industrialists & **strong team of 12**



Founded in 2004 to reconnect industry,
promote investment & strengthen
supply chain links

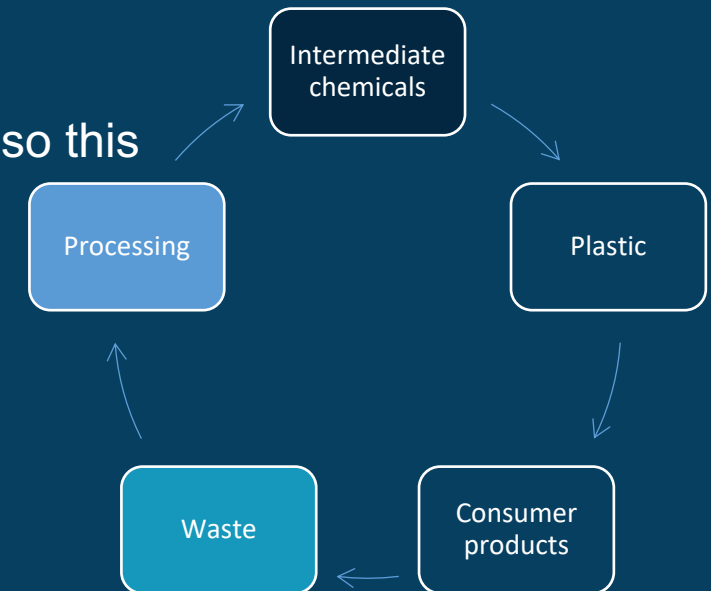
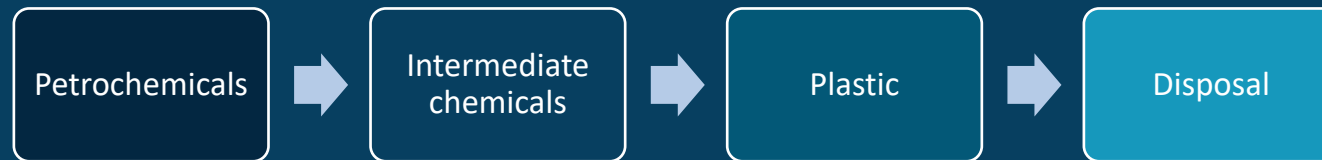


-
- Key**
- Existing Pipe Corridors
 - Existing Tunnels
 - Existing CO₂ Exports
 - Ports
- © Crown Copyright. All rights reserved LA100020947L 2015
- © Copyright The GeoInformation Group 2015
- Map Labels:**
- Exxol Technologies Speciality Chemicals
 - Millfield Composites
 - EDF Energy Nuclear Power Station
 - ConocoPhillips Crude Oil Storage
 - Venator Tioxide
 - Seal Sands / North Tees Chemical Sites
 - ConocoPhillips Crude Oil Processing
 - CATS Importer of Gas
 - Victrex BDF / Composites
 - Lianheteht Fine Chemicals
 - KD Pharma Pharmaceuticals
 - BOC Steam Methane Reformer
 - GE OSW
 - MGT Biomass Power
 - Huntsman Polyurethanes
 - Wilton International RWE OSW Grid Connection
 - ReNew ELP Polymer Recycling
 - Nippon Gases CO₂
 - Alpek PET / Plastics
 - Crop Energies Biofuels
 - FUJIFILM Diosynth Bio Pharmaceuticals
 - Micropore Technologies Formulation
 - Poseidon Plastics Polymer Recycling
 - Applied Graphene
 - Calysta Protein Manufacturer
 - CPI Manufacturing Catalyst
 - SABIC Ethylene (Cracker) / Polythene
 - Nova Pangaea Technologies Biochemicals and Biofuels
 - British Steel Steel / Beams / Manufacturer
 - Anglo American Mineral Processing
 - Net Zero Teesside Power/CCS
 - Bran Sands Effluent Treatment
 - Greenergy Biodiesel
 - Navigator Terminals Chemical Storage
 - Kemira Speciality Chemicals
 - BOC Air Separation Unit
 - Sembcorp Biomass Power Station Power / Utilities
 - Sembcorp EFW Power Station Power / Utilities
 - ENVA Wood Recycling
 - Biffa Polymer Recycling
 - 2M Chemical Blending
 - Materials Processing Institute Materials and Process Innovation
 - Sequens Fine Chemicals
 - Port of Middlesbrough Logistics
 - Stobart Biomass Engineering
 - SABIC Ethane Import Facility
 - Wilton Group Engineering
 - SITA Waste to Energy
 - N&P Group Refuse Derived Fuel
 - SABIC Underground Chemical & Hydrogen Storage
 - PX Teesside Gas Processing Plant
 - APS Growers Greenhouses Waste heat / CO₂ to grow tomatoes
 - Marlow Foods Quorn
 - Frutarom Flavours & Ingredients
 - SNF Speciality Chemicals
 - Johnson Matthey Catalyst
 - CF Industries Nitrogen Fertilisers
 - FUJIFILM Diosynth Bio Pharmaceuticals
 - Sequens Fine Chemicals
 - Mitsubishi Chemicals Acrylics
 - Mitsubishi Chemicals Li-ion Battery / Electrolyte
 - Teesside University
 - Billingham Chemical Site
 - TWI The Welding Institute

Credit: TVCA

Why are we interested in circular economy and biofeedstocks?

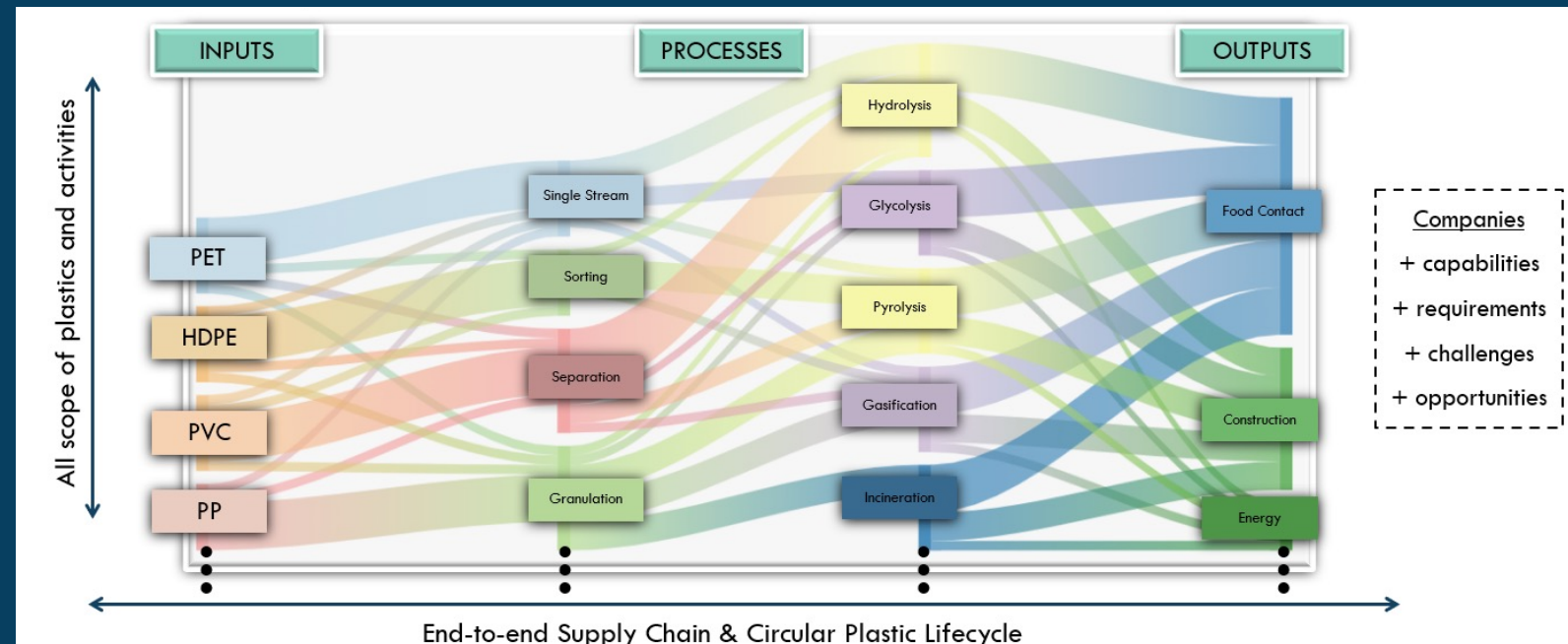
- The majority of the chemical industry is based on carbon
- The only way to replace petrochemicals as a feedstock is to use biomass, waste/byproducts or carbon dioxide
- Without this the chemical industry will always be based on petrochemicals
- Low-carbon feedstocks will be essential to achieve Net Zero so this is one of our major areas of attention



NEPIC Projects - Plastics recycling project



- The 12- month project was carried out with Durham University
- The project involved engaging with the plastics sector to identify current recycling, material flow and opportunities
- Over 100 companies were considered in the supply chain map
- The plastics recycling supply chain is rapidly transforming



Acknowledgements



Thank you to all our project collaborators

Thank you for your time, please let us know if you have any questions?

Chris.holt@nepic.co.uk



Sally Beken

Panel Q&A

www.ktn-uk.org



InnovateUK
KTN

John Twitchen

Stuff4Life

A circular economy for polyester workwear

CPI, 8 November 2022

Introduction

Workwear has a high impact in the UK. There is only limited infrastructure for recycling and manufacture, and the significant supply chain social and environmental costs are unaccounted for.



Manufacture and use

- 16,000 tpa of UK workwear
- Composite materials; linear
- Limited washing/laundry



UK infrastructure

- Limited recycling infrastructure
- Downcycling; EfW; landfill
- Scant manufacturing capacity



Externalities + impact

- Fossil-derived, carbon impact
- Social impacts; exploitation
- EPR is on the horizon

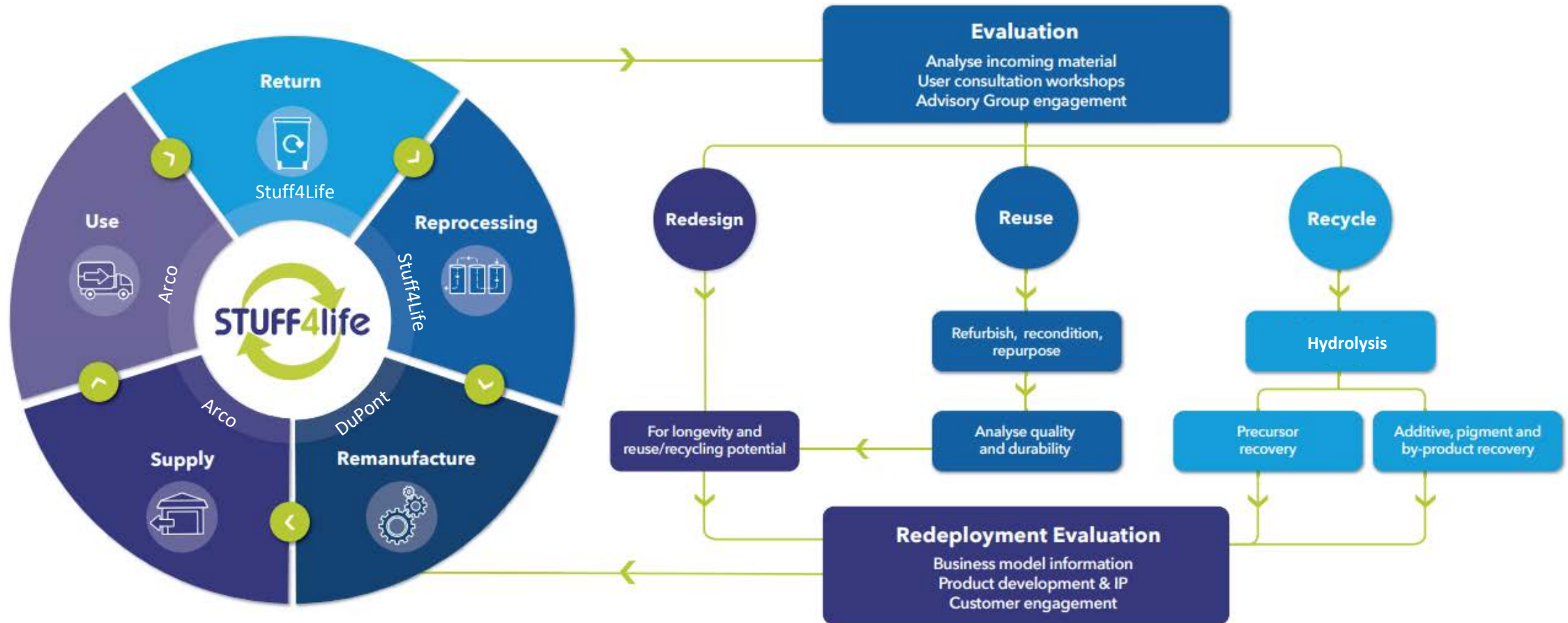
Where it started



Mission

Establish supply chains and technologies to implement the closed-loop recycling of materials and facilitate new servitisation, manufacturing and ownership models, enabling a material circular economy.

The Polymer Circular Economy Process



Collection trial

RECYCLE YOUR HI-VIS VESTS AND SHIRTS!

Please help us to create PPE for life by recycling your hi-vis vests and shirts here.

HI VIS VESTS

Turning old PPE into new PPE

✓

Yes please

- Hi-vis vests
- Short sleeve
- Long sleeve

Yellow ✓ Orange ✓

✗

No thanks

- Jackets
- Trousers
- Helmets
- Goggles
- Gloves
- Masks

These hi-vis garments are made from polyester which can be recycled in the UK and made back into completely new, 100% recycled hi-vis workwear.

Turning old PPE into new PPE

PPE4life

In partnership with **amey**

A photograph of two blue recycling bins for PPE4life. The bins are filled with yellow and orange hi-vis vests. The bins have a yellow top section with the PPE4life logo and a blue bottom section with a sign that reads 'HI VIS VESTS Turning old PPE into new PPE'. The sign also lists 'Yes please' items (Hi-vis vests, Short sleeve, Long sleeve) and 'No thanks' items (Jackets, Trousers, Helmets, Goggles, Gloves, Masks). The bins are placed in a corner of a room.

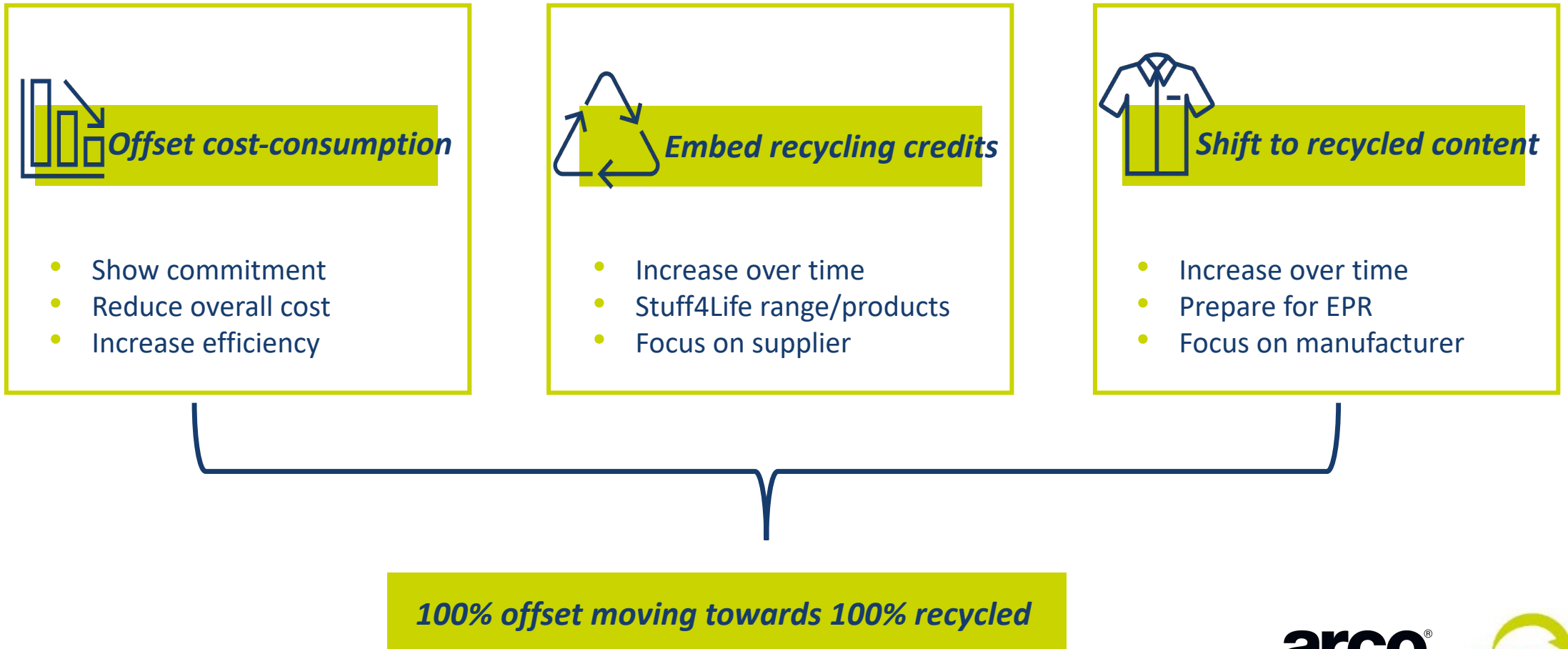
arco[®]
Experts in Safety

STUFF4life



Patent pending

Stuff4Life is working across the supply chain to establish the infrastructure, push and pull factors to deliver a the circular economy for polyester fabric – our starting points is through offset, the end point is recycled content.



CPI scale rig



Thank you

Contact:

John Twitchen: 07841 632761 / it@stuff4.life

The Assembly Hall, Victoria Building, Victoria Road, Middlesbrough TS1 3AP

W: stuff4.life

Dr Yvonne Armitage

CPI

Introduction to CPI

Dr Yvonne Armitage

Director of Biotechnology



**We help companies to
develop, prove, scale-up
and commercialise new
products and processes**



Creating a **healthier** society,
cleaner environment and
a **vibrant** economy...

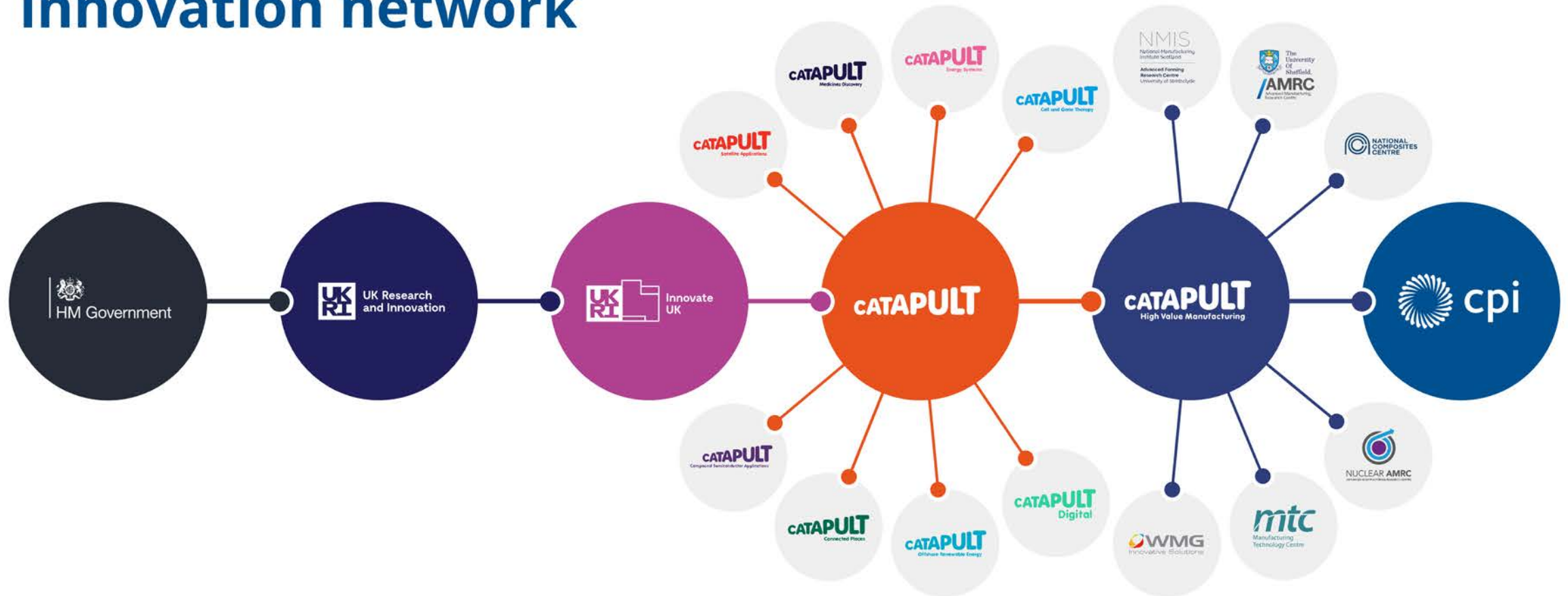


...by ensuring **every** great
invention gets the **best**
opportunity to become a
successfully marketed product.

**We help to deliver, de-risk, and accelerate
your concepts into successful products**



Supported by an extensive innovation network



A focus on high value markets



Pharmaceuticals



Medtech



Agritech



Food, drink and nutraceuticals



Fast-moving consumer goods



Logistics and packaging



Electronics



Energy



Speciality chemicals and materials



Automotive



Aerospace

Our expertise in core capabilities



Biotechnology



Biotherapeutics



Formulation
and materials



Pharmaceutical
processing



Photonics



Printed
electronics



Flexible hybrid
electronics



Digital



Healthcare innovation

- Medicines manufacturing innovation for multi-modalities such as small molecules, biologics, microbiome therapeutics, and nucleic acid therapeutics including oligonucleotides, mRNA, and saRNA
- Development and scale-up of nanotherapeutic delivery systems for intracellular delivery including lipidic or polymeric nanoparticles for mRNA delivery
- Development and scale-up of medical devices including in vitro and point-of-need diagnostics operated under ISO 13485 standards



Innovations to support net-zero

- Development and scale-up of battery materials in support of low carbon mobility
- Development and scale-up of sustainable materials for a range of formulated goods and manufactured goods including packaging materials and sustainable aviation fuel
- Development and scale-up of bio-derived agrichemicals, alternative proteins, and functional ingredients for food, feed, and nutraceuticals
- Development, scale-up, and recycling of circular materials including polymers, textiles, and composites



Digital and data enabled innovation

- Scale-up and market demonstration of data-enabled devices and IoT devices enabled by printed and flexible hybrid electronics
- Digitally-enabled manufacturing innovation of medicines, consumer goods, and other formulated products
- Development and scale-up of smart packaging for a range of consumer products and medicines

State-of-the-art facilities and offices across the United Kingdom



Home to our national centres of excellence in...

Biologics

Medicines Manufacturing

Formulation

Biotechnology

Electronics

Photonics



Let's innovate together
www.uk-cpi.com





19+

**years of helping
business succeed**



1300

**completed
projects**

with a total worth of
over **£500 million**



2200

**business
collaborations**

including over
60% SMEs



601

**highly skilled
staff**

across **10** UK-wide
offices and facilities



**£78.1
million**

**annual turnover
for 2021/22**

Thank you

For more information visit www.uk-cpi.com



Yvonne Armitage

Director of Biotechnology

Yvonne.Armitage@uk-cpi.com

07850 602680

twitter.com/ukCPI



facebook.com/ukCPI



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Let's innovate together
www.uk-cpi.com



Phil Goodier

Biffa

We're changing the way people think about waste

An Introduction to Biffa plc

Leading in UK waste management



£1.3bn*
Net Revenue

~10,000
Employees



c.3,200
Collection
Vehicles



> 230
Locations



7.5m
Tonnes of waste
handled



£99m*
Operating Profit



Collections

Revenue: £877m*

Our mission: To provide the most efficient, low carbon waste and recycling *collections* and related services to Industrial & Commercial (I&C), Municipal and household customers.



Specialist Services

Revenue: £147m*

Our mission: To help customers fulfil their sustainability ambitions by providing bespoke *solutions* including surplus redistribution, integrated resource management and hazardous waste services.



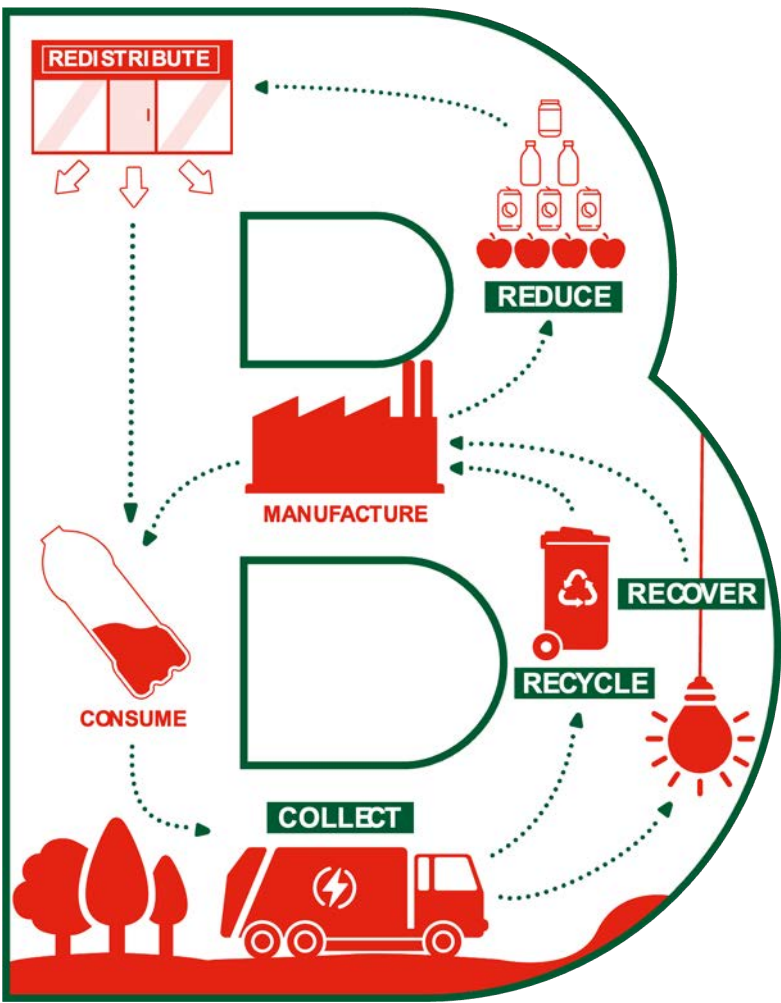
Resources & Energy





Revenue: £271m*

Our mission: To maximise the recovery of resources and Energy from Waste (EfW) through our leading waste *treatment* and processing capabilities.

* All financials are FY20 actuals, and include Viridor (y.e Mar-20) and Company Shop Group (y.e. Sep-20)

Delivering on our promises: 3 years on: £500m committed to the UK green economy



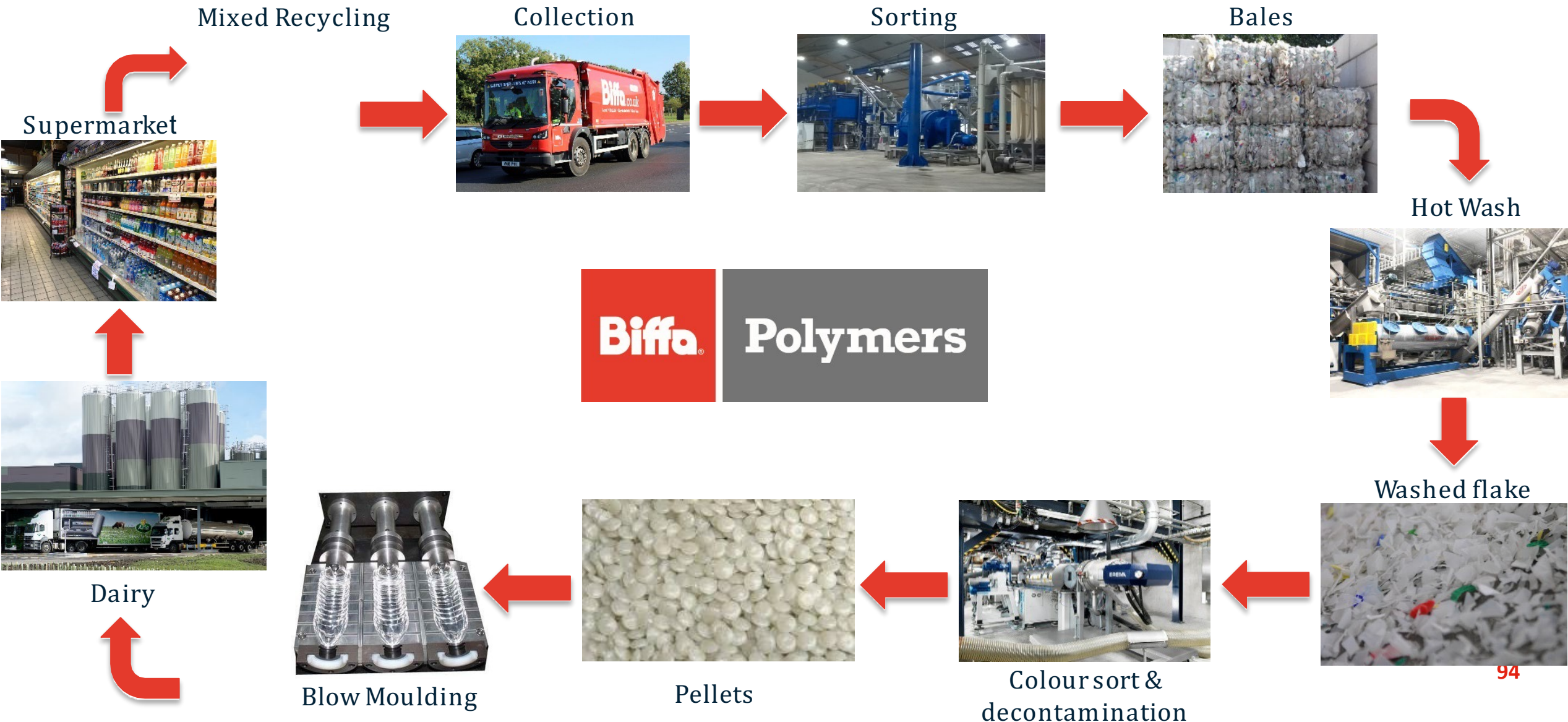
 Collect	To build the UK's largest, most efficient, low carbon waste and recycling collections operation.	£261m
 Reduce	To pioneer and operate the UK's leading waste reduction and redistribution services.	£92m
 Recycle	To develop and operate the UK's leading recycling solutions.	£72m
 Recover	To invest in energy recovery infrastructure as a lower carbon alternative to landfill for our customers' waste that cannot be recycled.	£75m
		£500m

Biffa Polymers – The UK's Leading Plastics Recycling Business

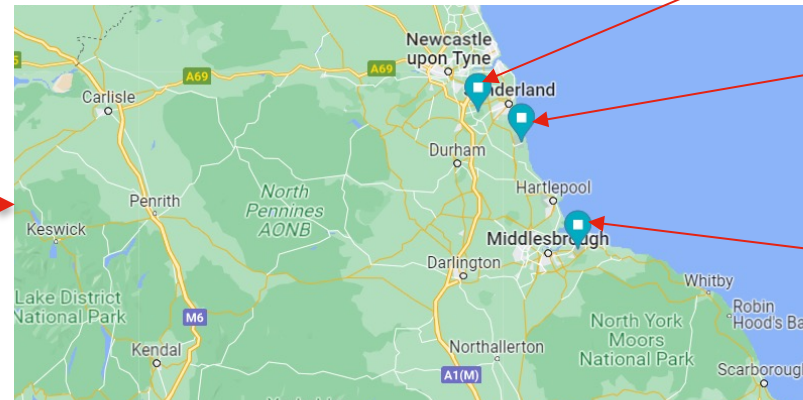


- ▶ Food and non-food grade HDPE, PET & PP recycling.
- ▶ Market growth driven by the **Sustainability Agenda** – reinforced by regulation – Plastics tax, Deposit Return, Export Ban.
- ▶ 3 manufacturing sites : Redcar, Seaham (PET), Washington.
- ▶ 300 employees – and growing!
- ▶ Turnover > £130m
- ▶ 150,000te of processing capacity & 90,000te polymer sold – both growing rapidly.
- ▶ Strong customer relationships including Coca-Cola, Alpla, Müller, Nestle
- ▶ Critical success factors:
 - ▶ Quality & customer service
 - ▶ Manufacturing excellence
 - ▶ Control of feedstock – and maximising internal Biffa supply
 - ▶ Management of growth

A true closed-loop recycling model



Biffa Polymers in the North East of England



Washington :

- rHDPE / rPP flake.

Seaham :

- Food Grade rPET pellet & flake.

Redcar

- Food Grade rHDPE plus non-food grade rHDPE / rPP pellet and flake

Biffa Polymers – The UK's Leading Plastics Recycling Business



Redcar (Our first site)

- ▶ The leading recycler of milk bottles (HDPE).
- ▶ Food grade HDPE and a variety of non-food grade products made from HDPE & PP.
- ▶ £18M expansion underway.



Seaham (PET)

- ▶ Processes 57,000tpa of PET or 1.4Bn bottles!
- ▶ Largest UK facility of its type.
- ▶ A £27.5M investment in 2020/21.

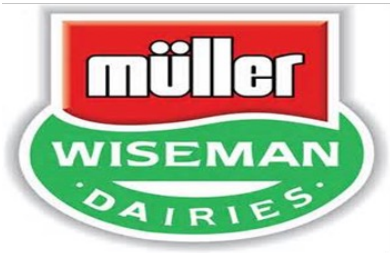


Washington (Polypropylene)

- ▶ Polypropylene wash line operational in June '21.
- ▶ PET rework line operational in July '22.
- ▶ Space available for future expansion.

Strong Customer Partners

Biffa

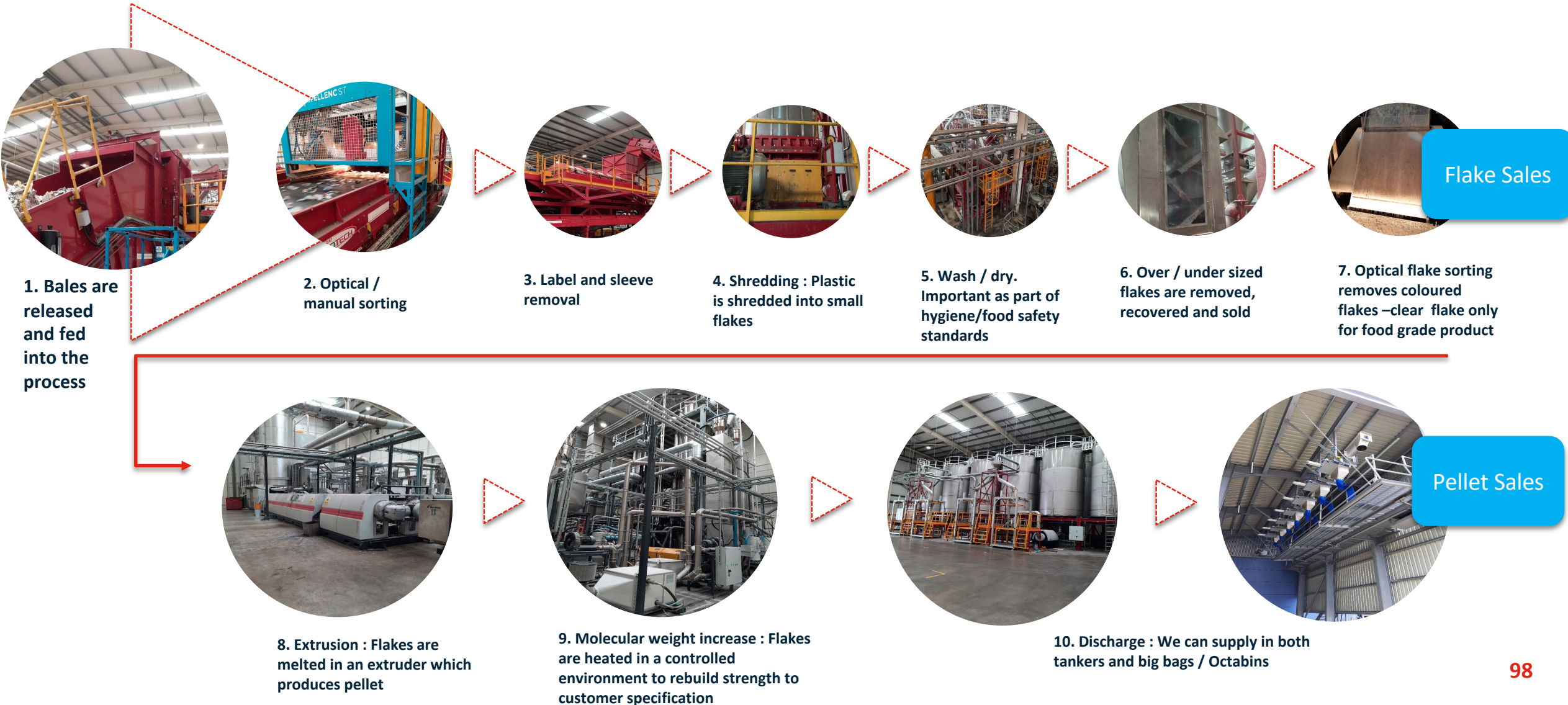


Biffa Polymers – Seaham rPET Food Grade Plant



Recycle

Biffa



We pioneered a Sustainable Industry-wide Model for rHDPE



- Collaboration along the entire supply chain from dairies to supermarkets – the Dairy Roadmap
- In 2008 set a target to achieve 30% recycled content by 2015
- Biffa developed the world's first food-grade standard recycling HDPE plant
- Won the Queen's Award for Enterprise Innovation in 2009
- Industry standardised labels , glues and pigments to boost recycling
- The result is Biffa's recycled plastic is used in 85% of plastic milk bottles



The Way it Should Be. The Perfect Model for a Circular Economy



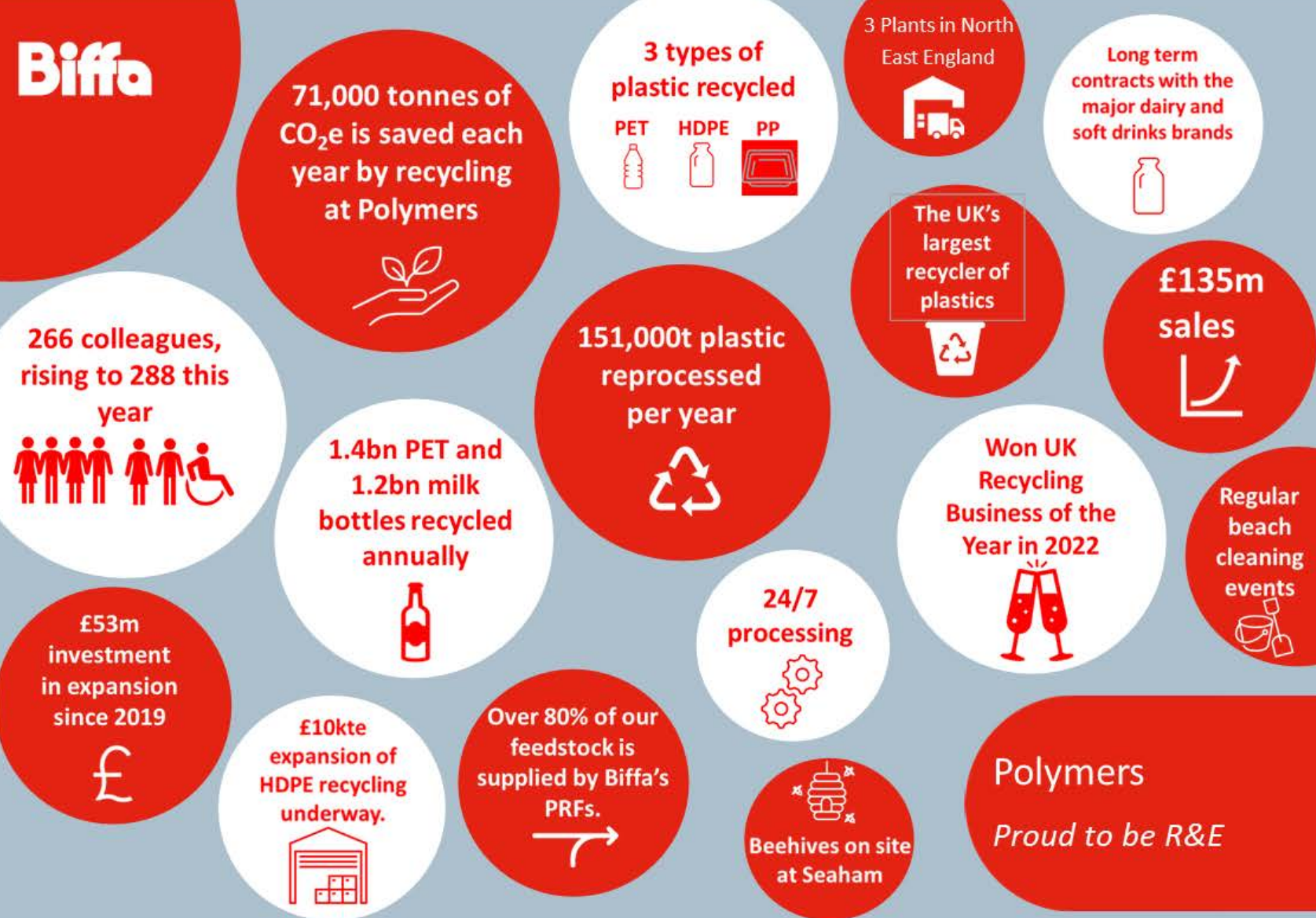
Closed Loop Plastic Recycling Works Well!



But it could be easier & better!

- **Design for recycle:**
 - Avoid mixed polymers where possible (HDPE / PET are OK)
 - Film, shrink-wrapped labels
 - Clear polymers
 - Mono-layer
- **Label for recycle**
 - Guide the consumer with clear, simple messages
 - Eliminate greenwashing
- **Modern infrastructure**
 - Deposit return schemes





Thank you

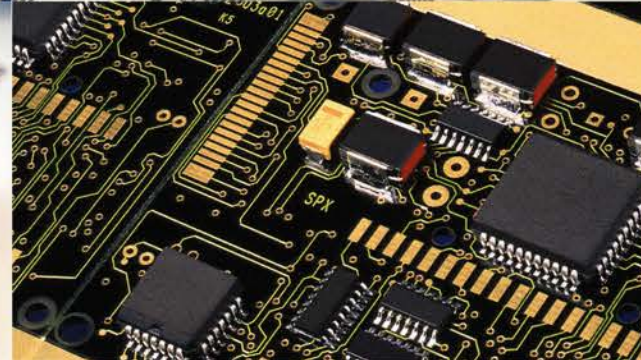
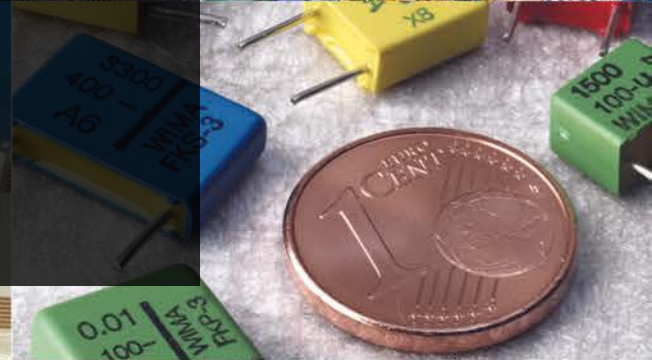
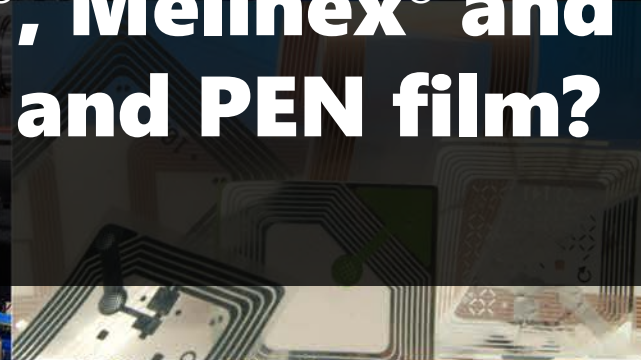
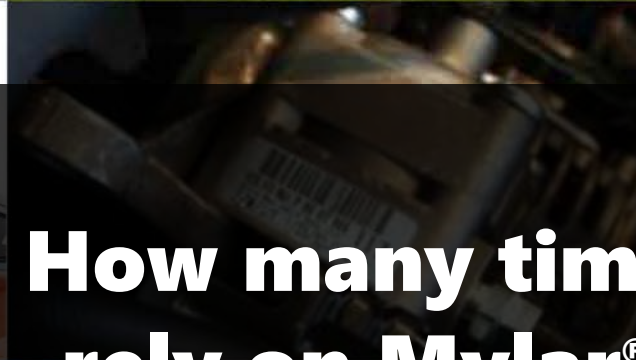
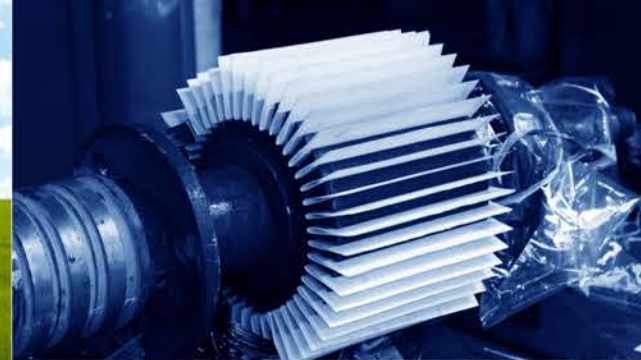
Dave Wall

DuPont Teijin Films



**The world's premier producer of
differentiated PET and PEN films**

Future Plastic Supply Chain Event
8th November, Wilton Centre



**How many times a day do you
rely on Mylar[®], Melinex[®] and
Kaladex[®] PET and PEN film?**

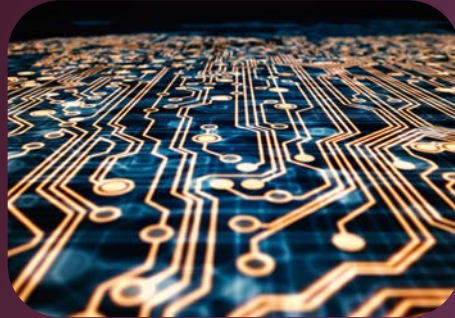
Key Markets



Capacitors



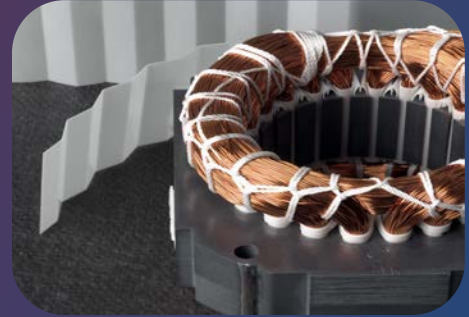
Digital Print &
Labels



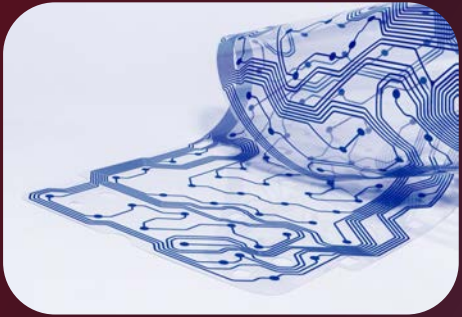
Dry Film Resist



Durable Cards



Electrical
Insulation



Flexible
Electronics



Healthcare



Photovoltaics



Printing Plates



Specialty
Packaging

Investing for the future

Highly experienced technology teams based at manufacturing sites and at our global R&D centre

Over 15% of revenue generated by products developed in the last three years

Unique polymer and film pilot manufacturing plants

World class analytical capabilities tailored to meet customer requirements



A sustainable building block

Low carbon footprint and water usage compared to alternative materials

Commercially available with high quality post consumer recycled content

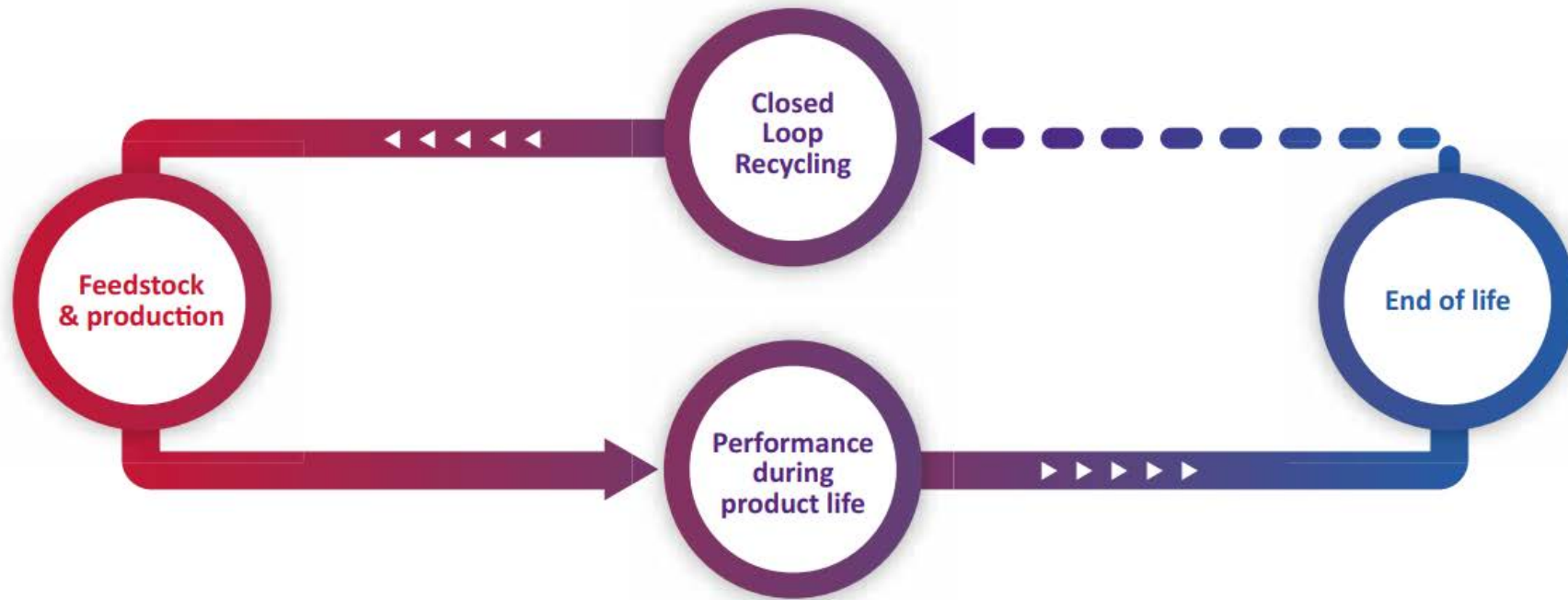
Most recycled plastic globally through best in class high yield recycling processes

Excellent performance/weight ratio minimising plastic use

Halogen free with zero hazardous waste products



A holistic view on product sustainability



We assess the impact of our products across their lifetime and across the full value chain that they are used in

The top seal lidding revolution

We led the move away from rigid punnet lids to top seal lidding films, reducing plastic by 35-50%. Additional material savings were achieved by replacing the label with printed lidding film.

The new pack format is more efficient to store and transport, and resulted in a reduction of in store spoilage.

Hermetically sealed packs offer the possibility to extend product shelf life through modified atmosphere and humidity packaging.



7 AFFORDABLE AND
CLEAN ENERGY



11 SUSTAINABLE CITIES
AND COMMUNITIES



12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



13 CLIMATE
ACTION

Sustainability without compromise

We are committed to the solar industry with multiple product offers for C-Si and thin film PV applications.

Mylar® UVHPET™ products are halogen free making them easier to recycle than alternative products.

Over 200 million modules rely on the protection provided by Mylar® UVHPET™ products with zero reported field failures.



Enabling the electrical revolution

Melinex[®], Mylar[®], and Kaladex[®] PEN films have a long and successful history in automotive electrical and electronic applications such as dashboard and door circuits, occupant sensors, heaters and flat cables.

The increasing electrification of vehicles is creating new applications including EV motor insulation, busbars, ultra-thin films for power capacitors and much greater use of flexible printed circuits for power distribution and connectivity.

Innovative development programmes are working towards PET-based solutions for battery current collectors and separator membranes, and PEN-based systems for fuel cell membrane electrode assembly sub-gaskets.

LuxCR™ process and monomer recycling

Multi-award winning LuxCR™ monomer depolymerization process based in Contern, Luxembourg

Waste PET is depolymerized into BHET, removing contamination and rebuilding material properties

DuPont Teijin Films is pioneering research into future monomer recycling business models, closing the loop for difficult to recycle plastics



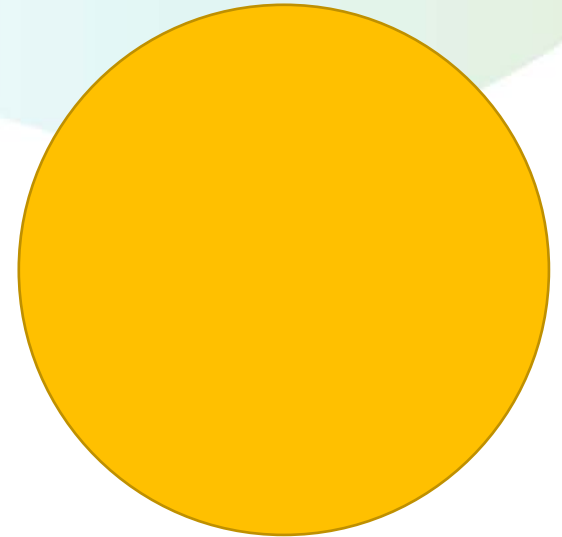
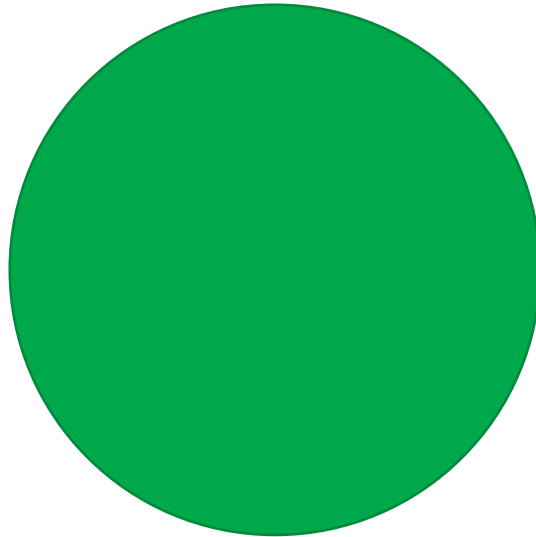
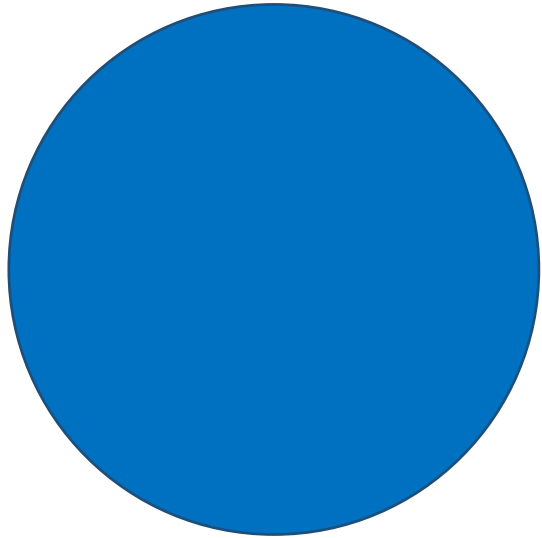
WORLDSTAR
WINNER 2020



Glen Kelly

Health & Safety

Tour Groups...



Thanks for your time!



@TU_NZIIC
@KTNUK



Net Zero Industry
Innovation Centre
Innovate UK KTN