



UNIVERSITY OF
CAMBRIDGE

Centre for Resilience and
Sustainable Development

Workshop Concept Note

Speeding up the Transition to Closed Loop Synthetic Fibre Recycling in the EU textile market by 2030

Details:

Date: 28th February, 2023

Time: 11:00 - 15:00 (London Time)

Zoom: <https://zoom.us/j/97871501053?pwd=SDcxTzBodFJkWXIldlFOWkhlaVJZZz09>

Passcode (if required): 111009

Workshop Research Question:

Where, in the EU fashion system, are the most effective intervention points to leverage the transition towards sourcing fully closed loop synthetic fibres by 2030, what are these interventions, and how will the transition costs be met?

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Key Points

Why do we need this workshop?

The EU Textiles Circularity Strategy will significantly impact the EU textile sector at all stages of the value chain. Other proposed or adopted EU Directives will also significantly impact the sector.

The EU Textiles Strategy provides a 'framework' for action by the industry – but details need to be crafted in collaboration with industry. One approach is to implement changes at strategic points in the fashion system that are powerful enough to leverage transformation:

Where, in the EU fashion system, are the most effective intervention points to leverage the transition towards sourcing fully closed loop synthetic fibres by 2030, what are these interventions, and how will the transition costs be met?

This Workshop will use the Cambridge Boot Camp Methods developed by CRSD, at the University of Cambridge, to identify these leverage points and create ideas for interventions, using the collective and broad knowledge, experience and perspectives across all workshop participants. It will require active participation, discussion and reflection using activities that will be explained by trained facilitators.

Need to Know

- Over time the textile sector will need to switch from using rPET from recycled plastic bottles into fibre to fibre recycling.
- The market for textile waste trading is poorly developed. The exception is the high level of trading of waste to non-EU countries and between EU countries. There are also a rapidly growing number of start up recycling companies using innovative new technologies.
- The EU is the second largest global importer of clothes and textiles and largest exporter. EU regulation will have significant impacts on global value chains – particularly in major production countries - which will need to be equitably and sustainably managed.

Box 1: Key Statistics

- The EU27 discards 2.1 million tonnes of clothing (2018 data) - one of the highest in the world. Average textile consumption per person in the EUA amounted to 6.0kg of clothing, 6.1kg of household textiles and 2.7kg of shoes in 2020 (EEA, 2021).
- Currently there is around 1% fibre to fibre recycling in the EU (EEA, 2019). In theory, McKinsey (2022) estimates, this could increase to around 18-26% of gross textile waste by 2030.
- There could be a 60-70% gap between the estimated supply of recycled fibres (around 1.5 to 1.7 million tonnes) and the estimated demand for recycled fibres (3.9 million tonnes) - which will only account for about 53% of all fibre demand by 2030 (McKinsey, 2022).
- The environmental impact of the textile industry is estimated to be 4-6% of the EU-27 global environmental footprint, with the majority of this impact occurring elsewhere in the world (Kohler et al, 2021).

Issues in Fibre to Fibre Systems Design

- Processes need to be established for the industry to develop consensus around key technical issues as a precursor for 'scaling up'- including technology convergence, standardisation of processes and products and operational rules around reuse versus recycling.
- Establishing commercial scale textile recycling infrastructure projects that are investment

worthy to mainstream investors. Investment potential is estimated to be Euro 6-7billion by 2030 (McKinsey, 2022). Financial and operational models need to be structured to offer competitive returns to investors and generate the needed data.

- Establishing well functioning markets for recycled textiles that deliver fibre to fibre recycling and avoid unintended consequences. Cost effective trading and transport mechanisms, addressing market power, minimum prices for recyclers, product labelling integrity, and keeping 'illegal and unregulated' recycled textiles out of supply chains.
- Ensuring that textile regulation is coherent, consistent and drives systematic change. All relevant policies need to be consistent with the end goal of fibre to fibre recycling – both at the EU level and at the national level - and be consistently interpreted. Systems based regulations need a design that creates new, durable and effective institutions, with their own constituencies (supporters), that strengthen the resources and power of the implementation agency/ies to drive continual improvement over time.
- Managing transition costs across the supply chain in an equitable way. Need strategies to equitably share transition costs across all stakeholders in the value chain – including consumers.
- Facilitating transitions in cultural and commercial norms for both consumers and business managers of brands. Collective systems need to be designed so that consumers actually use them. Brand managers need to accept changes in product design, formulation and manufacturing. Consideration should also be given to the option to reduce the volume of textiles produced.

Opportunities

There are multiple opportunities for EU regulators and industry to collaboratively build out a fibre to fibre recycling system across Europe.

- The project [Sorting for Circularity Europe](#) provides an overview of 100 textile recyclers currently in operation or under development across global supply chains. Capacity in the EU is roughly half of what may be needed. This creates opportunities for investable projects to attract financial players who are actively seeking ESG opportunities. It also provides rich source of knowledge/experience to determine viable options around technology and infrastructure convergence.
- The EU will be undertaking significant consultation and collaboration with industry over 2023/24 to implement the Textiles Strategy. Opportunities to participate are listed in Table 1. [EURATEX](#), [The Policy Hub](#), and, more recently, the [European Fashion Alliance](#) provide opportunities to participate in EU discussions. International textile sustainability fora, such as the [United Nations Environment Programme \(UNEP\) Sustainable and Circular Textiles Program](#) or the [UNFCCC Fashion for Climate Action](#) provide platforms to build collaborative projects across international supply chains.
- There are now a large number of circularity documents, strategies, guidelines and roadmaps available to brands and textile producers to train themselves of sustainability issues. Links to examples are on page 17.
- There is growing evidence that consumers are now actively preferring clothing with sustainability features, but conversion to sales remain limited by price, accessibility and access to appropriate information.
- The finance sector is actively investing in fashion sustainability. This could be pivoted towards

investment in textile fibre to fibre recycling. Ongoing discussions around the [EU Taxonomy Regulation](#) for sustainable finance will be important. There is also a growing venture capital activity in this space.

How to Read this Concept Note

This Concept Note sets out a non-exhaustive summary of relevant background information that may be useful to CPBC participants as is structure in the following way:

- The Background section introduces the concept of systems based approaches to policy and what it can offer the textiles sector and why this workshop focuses on fibre to fibre ('closed loop') recycling for synthetic fibres. It summarises the process that will be used in this research.
- The section "Responses and Challenges" highlights key technical issues relevant to the research question.
- The Section "Challenges and Unknowns" summarises the authors interpretation of the key challenges facing the sector that could benefit from a systems based approach.
- The section on "Opportunities" highlights some potential options of 'quick wins' in using systems based policy design.

Background

The textiles sector has made some good progress towards achieving sustainability and social impact goals. Most of this progress has focussed on new technologies and product/material substitution, with some move towards innovative business models such as renting or resale. Yet, there is a recognition that 'more needs to be done' to reach the scale and speed of change needed.

Experience and research from other sectors that have undergone sustainability transitions (e.g. Geels et al, 2017) demonstrates that scaling up the use of new technologies requires shifts in the institutions within which these operate. Broadly, institutions are the formal and informal 'rules of the game' which make a technology or practise useful in an industry. For example, the exchange of 'tech packs' between brand buyers and a cut-make-trim producer is a type of institution. Regulations and policies such as an extended producer responsibility (EPR) scheme, are another type of (formal) institution. The role of fashion design in the cultural life of Europe is another type of institution. By changing incentives structures, modes of operation and even cultural values, public policies and regulations can help speed up institutional change across an industry – and achieve sustainability goals at a scale and timeframe that makes a difference.

The purpose of this workshop is to support the textiles sector to identify institutions that are needed to provide the mandate and resources (i.e the power) to scale up and speed up the range of activities in the sustainability transition - right across the global value chain.

Systems thinking perspective on the EU Textiles Strategy

In this research project we approach this challenge through the use of systems-based analysis as it applies to policy/strategy making.

Conventional policy thinking about how to promote the circular economy focuses on how a policy will incentivise industry and/or consumers to 'close the loop' either through instruments that increase the supply of recycled materials, the use of recycled materials or to reduce material flow through such as design standards (e.g. Ellen MacArthur Foundation, 2021). In the systems based approach used in this Workshop, evaluating policies against this criteria is only part of the picture.

The key problem is that conventional policy/strategy thinking assumes a (linear) 'cause and effect' between implementing the policy and experiencing the desired outcomes. In real world systems, the

existence of dynamic and ever changing relationships between multi-entities, feed backs, time delays, stocks and flows etc... means that this simple 'cause and effect' relationship breaks down.

This requires a shift from thinking of policy as generating a specific intended behavioural change (while the policy is in place), to thinking about policy as a tool for creating a new system of institutions (rules, supportive stakeholders and cultural norms) that incentivise the kind of behaviour we want. This produces a policy that is resilient, regardless of changes in social, political or economic conditions.

In this CPBC workshop (see Box 2 for more detail) we will start thinking about this problem through two types of activities:

1. Creatively and expansively thinking about the types of institutions (formal, informal, creative, political, economic) that could be developed across the textile sector. We will also identify resources that can support these new types of institutions;
2. To identify the potential unintended consequences and assumptions that could work to undermine the success of the institutions that are generated by task 1. In systems theory we call these 'negative feedback loops'.

At a different stage of research we consider 'positive feedback loops' - that is, those parts of a system that will strengthen the impact of an institution over time - and therefore reinforce the momentum of the transition. Overall, the idea is to identify institutions that can support the textile sector's sustainable transitions and which are:

1. Stable, because they have the resource and mandate to implement change
2. Adeptable and durable to changes in technology, economic, political and social conditions; and
3. Have a constituency of supporters whose interests align with the institution; and
4. The negative tradeoffs and unintended consequences of implementing change are recognised upfront and appropriate actions identified to mitigate them, as required.

To support this way of thinking, a systems based evaluation of policy developed by the CRSD is set out in Table 1 and Figure 1 - which we use to evaluate the policy concepts developed throughout this CPBC Workshop.

The output of this workshop is a set of policy story lines that use strategic leverage points in the EU textile system to implement new institutions that generate transformation change. These storylines can then be used for strategy development, policy development and further research.

Box 2: What is the Cambridge Policy Boot Camp Method?

The Cambridge Policy Boot Camp (CPBC) is a transdisciplinary virtually delivered 'action research' method designed to quickly identify and document potential solutions for a complex policy problem. The method effectively integrates multiple perspectives, from multiple stakeholders and delivers resilient solutions within given contexts, resources and timeframes. It is a tried and tested methodology to discover how to improve policy articulation in complex dynamic situations and leverage uncertainties to build a new pipeline of investable projects. CPBC has influenced 37 counties' policies in 2021-2022.

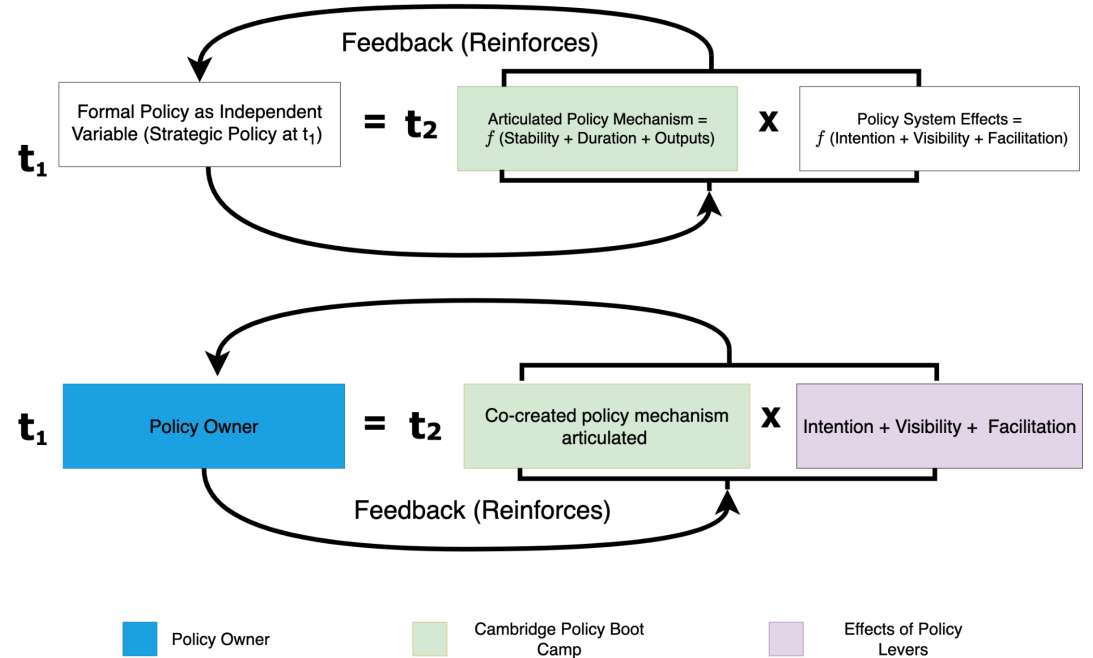
Using a combination of dynamic systems thinking, political economic theories, engineering and medical education techniques and creative design approaches, the CBPC address three core challenges in policy making: **identifying strategic leverage points that will transform systems, unlocking useful knowledge through building trust and collaboration between stakeholders and facilitating buy-in by those stakeholders with the mandate and resources (power) to make a change.** This method was developed by Dr Nazia M Habib, Head of Resilience and Sustainable Development at the University of Cambridge, UK.¹

¹ <https://www.crsd.landecon.cam.ac.uk/>

Table 1: Policy Criteria Using Systems Thinking

Systems Policy Criteria	Analytical Question
Policy Outputs	
Stability	Is it institutionalised (does it have the mandate and resources to be implemented)?
Durability i.e. robustness during disruption	How effective is the output creation over 5 years?
Negative Feedback Loop	
Dealbreakers	What events or barriers could make this idea impossible to achieve?
Bottlenecks	What resources do you need more of to make this idea succeed? Conversely, what resources or things are in oversupply that could slow down the process of achieving this idea?
Surprises	What broad contextual assumptions are you making that, if they are not true, could undermine the success of this idea?
Positive Feedback Loop	
Visibility	How visible is it to people who benefit from the policy?
Intention	Has it been put forward actively and deliberately to address the specific problem?
Facilitate	Does it facilitate coordination and the required institutional change amongst stakeholders? Does it create a constituency of supports for the policy over time?

Figure 1: Policy Evaluation Using Systems Thinking



The Focus of this Cambridge Policy Boot Camp: EU Sustainable Textiles Strategy

The focus of this workshop is to identify strategic institutional responses to scale up and speed up the sustainability transition in the context of the EU Strategy for Sustainable and Circular Textiles (henceforth the “EU Textile Strategy”).

The EU Textile Strategy was introduced in 2022 to provide the policy and political framework to regulate the sustainability impacts of the EU textiles sector and to move it towards a ‘circular’ business model. This Strategy sets the clear vision for what the EU wishes to achieve, *inter alia* (European Union, 2022):

- All textiles marketed in the EU are durable, repairable and recyclable and made from recycled fibres, are free of hazardous substances and produced in respect of social rights and the environment
- Consumers benefit long from high quality affordable textiles (“fast fashion is out of fashion”)
- Profitable re-use and repair services are widely available
- The sector is competitive, resilient and innovative with sufficient capacities for recycling.

This vision builds on the EU Waste Framework Directive (May 2018), which requires EU Member States to establish systems for separate collection of textile waste by 1 January 2025. This will generate a large stock-pile of reusable, and non-reusable, textile ‘waste/product’ which requires active management (European Environment Agency, 2023) .

The EU Textile Strategy is a multi-level strategy to redesign the future of the textile sector. In this Cambridge Policy Boot Camp (CPBC) the focus is on one element of this - moving towards closed loop synthetic fibre recycling. This topic was selected for 3 reasons:

- It is a complex, technically difficult area of sustainability transformation. However, ongoing changes in textile and plastics regulation make it a strategic crunch point for the sector.
- The EU Textile Strategy provides the broad framework for how the industry should sustainably operate, but the details, particularly the day to day operations, need ‘filling in’ by stakeholders using collaboration across the value chain.
- Much technical and policy analysis work (e.g. McKinsey, 2022, EMF, 2021, European Commission, 2021) has been developed on the issue of textile recycling and circularity for synthetics, including an emerging consensus vision of what can be achieved. The issue now, is how does the textile sector manage the *transition* process to a sector market where fibre to fibre recycling is the norm?

One approach is to consider implementing new rules and regulations in strategic points in the fashion system that are powerful enough to leverage change. Hence, we ask the research question that will guide all activities in this Workshop:

Where, in the EU fashion system, are the most effective intervention points to leverage the transition towards sourcing fully closed loop synthetic fibres by 2030, what are these interventions, and how will the transition costs be met?

This workshop is not a traditional panel discussion. Rather, the workshop will use the Cambridge Boot Camp Methods (Box 2, Appendix 1)) developed by CRSD to drive ideation of breakthrough strategies within systems using the collective and broad knowledge, experience and perspectives across all workshop participants. It will require active participation, discussion and reflection using activities that will be explained by trained facilitators. An overview of the CPBC approach is summarised in Box 2 and Appendix 1.

Responses and Challenges

This background section covers three topics that provide important background context for workshop discussions: the EU Circular and Sustainable Textile Strategy, the state of the market for recycled textiles in the EU and the scope and size of textile material flows through the EU 27.

In the interests of brevity, these topics are presented in summary format with a focus on key analytical insights. Key references included for readers who wish to dive deeper into the issue.

EU Circular and Sustainable Textile Strategy

To deliver on its broad objectives, the EU Textile Strategy builds on the existing plans for textile recycling developed under the Waste Framework Directive in 2018. Key elements of the strategy will be implemented over 2023 and 2024 through a successive number of legal reforms to existing EU Directives (regulations). A summary of the proposed changes under the EU Textile Strategy, the Directive that will be used to implement these changes, and links to further information are set out in Table 2. Note here, the focus is on Directives of relevance to the research question and consequently the items in this table are not an exhaustive list of all relevant elements in the EU Textiles Strategy.

Table 2: Selection of Proposed or Agreed Regulatory Reforms under the EU Textiles Strategy

Initiative	Purpose	Relevant Directive	More Information
Mandatory eco-design requirements	to develop legally binding product specific ecodesign requirements to inter alia increase fibre-to-fibre recycling and mandatory recycled fibre content. Details are yet to be developed and will be subject to an impact assessment.	Ecodesign for Sustainable Products Regulation	Currently open for consultation https://circulareconomy.europa.eu/platform/en/news-and-events/all-news/sustainable-products-commission-consults-new-product-priorities
Digital Product Passport for textiles	to implement a Digital Product Passport incorporating mandatory information requirements on circularity and other key environmental aspects.	Ecodesign for Sustainable Products Regulation	https://environment.ec.europa.eu/publications/proposal-ecodesign-sustainable-products-regulation_en
Textile Labelling Regulation	To ensure that textiles sold in the EU carry a label with information on sustainability, circularity, and country of manufacture.	Textile Labelling Regulation	No consultation process found. Information on existing regulation can be found here:
New standards for Green Claims on sustainable textiles.	To ensure that consumers are provided with relevant use and environmental impact information at the point of sale. Particular attention will be given to the issue of using rPET from the bottling industry with a view to encouraging a switch to fibre to fibre recycling.	Unfair Commercial Practices Directive and the Consumer Rights Directive	https://commission.europa.eu/law/law-topic/consumer-protection-law/unfair-commercial-practices-law/unfair-commercial-practices-directive_en https://commission.europa.eu/law/law-topic/consumer-protection-law/consumer-contract-law/consumer-rights-directive_en#:~:text=About%20the%20directive.-The%20Consumer%20Rights&text=It%20aligns%20and%20harmonises%20national,they%20shop%20in%20the%20EU.

Harmonisation of Extended Producer Responsibility Rules (EPR)	for textiles with eco-modulation fees t	Waste Framework Directive.	https://environment.ec.europa.eu/news/commission-starts-develop-end-waste-criteria-plastic-waste-2022-04-05_en
EU-wide end-of-waste and by-product criteria	To establish EU wide definitions of waste products and processes	Waste Framework Directive (EU) 2018/851	See above
EU Taxonomy for Sustainable Investment.	To develop a common language and clear definition of what is considered sustainable for investment purposes.	Taxonomy Regulation	https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en#regulation
Developing criteria for safe and sustainable by-design chemicals	Support industry to substitute away from hazardous chemicals and chemicals of concern	Chemicals Strategy for Sustainability	https://environment.ec.europa.eu/strategy/chemicals-strategy_en
Proposal for a new regulation on waste shipments	To supervise and control shipment of textile wastes to non-OECD countries. Allowed only under the condition that such countries notify to the Commission their willingness to import specific types of waste and demonstrate their ability to manage it sustainably.	Proposal for a new Regulation on Waste Shipments (adopted by the European Commission, yet to be adopted by the European Parliament and Council).	https://environment.ec.europa.eu/topics/waste-and-recycling/waste-shipments_en#:~:text=On%2017%20November%202021%2C%20the.rules%20for%20EU%20waste%20exports
Transition Pathways for textile ecosystems	Co-creating with stakeholders, a Transition Pathway for the sector	Transition Pathway for the Textiles Ecosystem	https://single-market-economy.ec.europa.eu/sectors/fashion/textiles-transition-pathway_en
Corporate Sustainability Due Diligence	Proposal by the European Commission establishes a due diligence duty for large and mid sized companies to identify and prevent negative human rights and environmental impacts in supply chains. Incorporated these duties into Directors mandate	Directive on corporate sustainability due diligence(adopted by the European Commission, yet to be adopted by the European Parliament and Council).	https://commission.europa.eu/business-economy-euro/doin-g-business-eu/corporate-sustainability-due-diligence_en#what-are-the-estimated-costs-of-the-new-rules-for-companies
Compulsory recycled content for PET bottles	Mandate that single use plastic PET bottles should contain at least 25% recycled plastic in their manufacture by 2025 (for PET bottles), and 30% by 2030 (for all bottles).	DIRECTIVE (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment	https://eur-lex.europa.eu/EN/egal-content/summary/single-use-plastics-fighting-the-impact-on-the-environment.html#:~:text=The%20directive%20sets%20a%20collection,2030%20(for%20all%20bottles).
Mandatory separate textile recycling	EU members are required to set up separate textile recycling infrastructure by 2025. Potential restrictions on the export of textile waste.	Waste Framework Directive (2018/851)	See above

Source: As indicated in the table.

Overall, EU Textile Strategy anticipated that a combination of the Ecodesign for Sustainable Productions Regulation to extend the lifetime of clothing and new extended producer responsibility rules under the forthcoming Waste Framework Directive will shift the sector away from fast changing fashion trends (REF). This is supported by Directives on information sharing and labelling, standards on green claims and mandatory textile recycling.

Changes in other sectors will also impact on the textile sector - most notably the Single Use Plastics (SUP) Directive.

Globally, recycled polyester makes up 14.8% of total polyester use - 99% of which was sourced from PET plastic bottles (Textile Exchange, 2022)². Using this feedstock, brands have heavily promoted their use of ‘sustainable materials’ and even used it as the basis for executing major financial investments (e.g. Raconteur, 2022).

Changes to the SUP Directive will require bottling companies to increase their recycled content from its current level of 11% to 30% by 2030. Although just 24% of rPET flows into the textiles sector (McKinsey, 2022), this will impact on the availability and price of rPET to the textile sector.

Some of the proposed or existing EU regulations around textile circularity are consistent with the criteria set out in Table 1. For example, the EU has strong processes for institutionalising policy into regulations at the EU level and at the national level. However, the EU Textiles Strategy and its implementing Directives are just frameworks – and much more detail is needed during the implementation phase to establish, at a commercial scale, a fibre to fibre recycling system.

Within this ‘implementation gap’ are many systemic design issues that need explicit policy proposals - for example how will rules be put in place to ensure that recycling of textiles uses technologies that have a lower overall impact than the use of virgin fibres? Developing these implementation policy proposals will be the focus of this workshop.

State of the EU textile to textile recycling market

An important part of moving towards fibre to fibre recycling is the operation of an efficient market for waste textiles. Currently, 53% of all textile waste generated by the EU -27 is exported to non-EU countries, and 32% is exported to other EU Member States. (EEA, 2022)

Evidence on market quality for textile waste is relatively sparse. However, what does exist suggests that, beyond the relatively sizeable and open trade of exported textile waste, significant market development is needed to meet the requirements and ambition of the EU Textiles Strategy.

A summary of the state of the market as assessed by the European Environment Agency (Table 3), highlight issues around generating sufficient demand for recycled textiles and the need for organised standard markets for trading textiles across EU and international borders to reduce the costs of trading. Text in bold indicates where authors of this concept note have updated information from the original EEA Report.

Table 3: State of the EU Textile Waste Markets as a Secondary Resource

Market Assessment Criteria	EU Textile Market
High share of supply and demand with respect to total market size	No. Low demand and downcycling of textile waste to other applications because of the poor quality of textile waste.

² This same report noted that recycled polyester can also be made from other sources such as post-consumer ocean waste, and pre-consumer fabric waste or discards.

Enough stable or increasing supply and demand	No. Low demand.
Open international trade and high tradability	Yes. Significant trade internationally.
High industrial capacity based on secondary material inputs	No. Limited textile-to-textile recycling. Rapidly growing number of start-ups. ³
Non-policy-driven supply and demand	No. WFD includes an obligation for Member States to collect textiles separately by 1 January 2025. Planned introduction of EU reuse/recycling targets. Unclear whether the industry would demand fibre to fibre textile recycling at scale without policy intervention.
Included in compliance schemes for packaging waste or EPR schemes	Partly. Few EU Member States have EPR schemes in place, but their introduction is planned at the EU level.
Does textile recycling compete with using textile waste in energy production?	Yes. Significant share directed to energy recovery even after separate collection.
Reference international or national prices	No
'Organised markets' for trading (e.g. futures)	Partial, rapidly developing tech platforms to link buyers and sellers of textile waste. Needs rapid scaling up. ⁴ EuraTex is also building ReHubs - 5 textile recycling hubs across Europe. No derivative markets to manage risks.
Sufficient information available to both demand and supply actors	No. No information available.
Product specifications are standardised	No. No common European product standards for textiles are set. But there are a few labels such as the EU Ecolabel and OEKO-TEX.
No regulatory barriers to using SRMs as inputs in manufacturing	No information available.

Source: EEA, 2022 analysis based on data from 2018.

Additional analysis from Concept Note authors (in bold).

The EEA Framework used in Table 3 does not incorporate a 'systems' approach to evaluating markets. For example, the Framework could be expanded to identify and track the management of unintended consequences from market design which could include:

- Impact of the EU Waste Framework Directive requirement to separately collect textile wastes by 2025. This could significantly increase the supply of recycled textiles quicker than the increase in industry capacity – leading to a drop in prices below operating costs. This could lead to textile waste dumping - already a significant issue in many developing countries (e.g. see Ricketts and Skinner, 2023).
- The impact on the EU climate targets from the additional energy use associated with collection, sorting processing and transporting textile waste.

³ Examples include: <https://www.sysav.se/en/siptex/#block3>

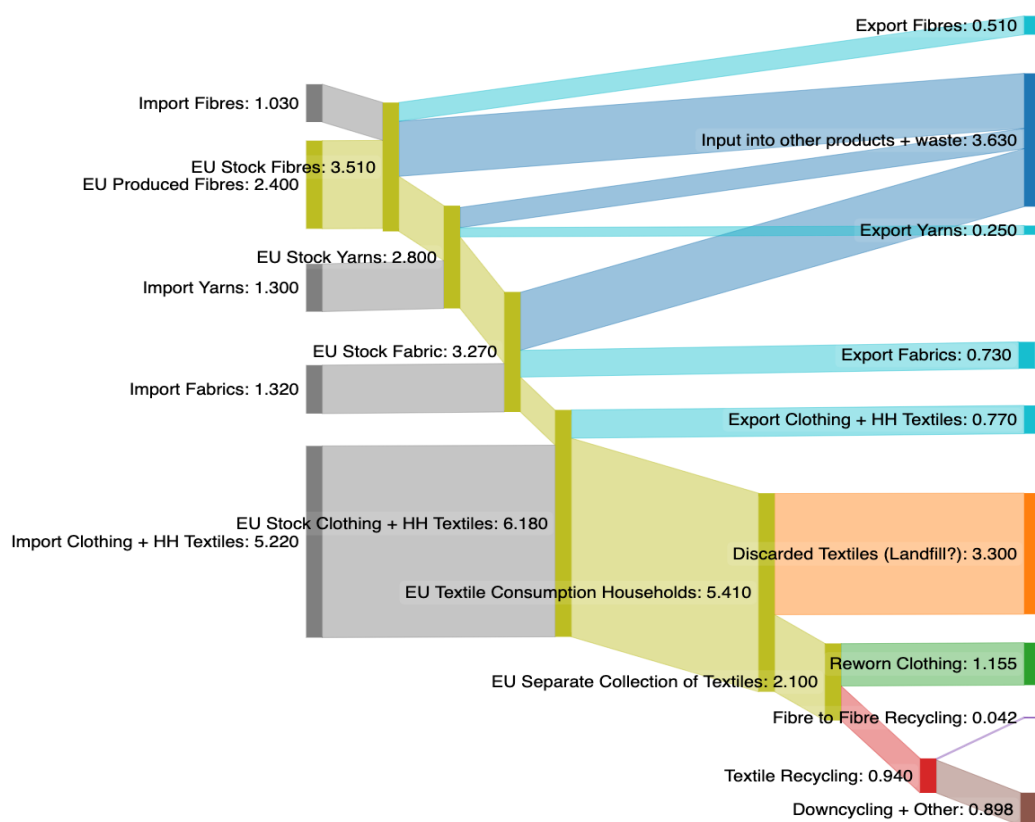
⁴ Examples include: <https://reverseresources.net/about>; <https://tengiva.com/textile-merchants#supplychain>; <https://recycle.refashion.fr/en/>

As a once off report using spot data, the EEA Report does not provide a complete picture of the textiles recycling market, but could serve as a useful framework to evaluate the quality of the market for textile recycling as it develops over time.

The impacts on EU Textile Regulations on globalised supply chains

It is well understood that the EU is the largest importer of textiles and clothing in the world - 21.3% and 34.2% of the total global market – and the second largest exporter in the world (around 21% and 27% market share respectively) (Kohler, et al 2021). Specifically, the EU market imports 84% of all finished clothing and household textiles, 30% of fibres, 46% of yarn, and 40% of fabrics (Figure 2).

Figure 2: Material Flows through the EU Textile System



Units = million metric tons. Source: Data sourced from Kohler et al 2022, Except for data for collected textiles where figures are calculated using waste fraction shares report in Circle Economy & Fashion for Good(2022). Data is for 2018.

The mass flows of materials flowing into and out of the EU textile value chain provides an overview of the relative sizes of imports and exports and recycling levels at each stage.⁵ In the context of the EU Textiles Strategy, three observations may be drawn from Figure 2:

⁵ Given the variation of textile waste estimated between sources, the data in these figures should be considered illustrative only.

1. The amount of discarded textile waste from households moving to landfill is significantly higher than quantities of imported fibres, and roughly the same scale as imported yarns. This could represent an opportunity for import substitution for the EU textiles industry. While that may create jobs and income in the EU, such a strategy will displace employment and income generating opportunities elsewhere - most likely in developing countries.
2. Requirements in the EU TExtils Strategy for imported clothing to meet the same standards of domestically produced garments will mean that textile recycling systems will need to organise trading and logistical systems to transfer recycled textiles between end users in Europe and manufacturers in producer regions - such as Asia.
3. The EU Textiles Strategy is written in a way that assumes closed loop fibre to fibre recycled textiles will be sourced from within Europe itself. However, this is not necessarily the case. Recycled textiles could be sourced from other regions - raising issues around product integrity, labelling and labour standards for collection and processing (e.g. avoiding child labour). This issue is recognised and briefly discussed in the EU Textiles Strategy and will be substantially implemented through instruments such as the [Corporate Sustainability Due Diligence Directive](#) which was adopted in 2022. It is unclear how these new Due Diligence regulations will work for the recycling sector.
4. The EU currently exports around 1.4million tonnes of export waste per year (European Commission, 2022). Current proposals will see a limit on textile waste being exported unless the destination non-OECD country gives explicit permission and demonstrates their ability to manage it sustainably. As yet, what this will mean in practice is yet to be determined - but could impact on the ability to export recycled materials to major producing countries.

Key Challenges and Unknowns

The fashion system comprises more than just the material flows of product from raw materials to consumer to disposal. Rather, the fashion system, as it currently operates within a linear economy, links together a wide constellation of physical materials, industrial, cultural and social practices and norms, psychological processes, economic exchanges, and legal frameworks to deliver a specific purpose - producing and selling clothes.

Shifting to closed loop fibre to fibre recycling will require consideration not only of the physical parts of the supply chain, but also the non-physical elements and how they interact with each other. A simplified supply textile system diagram in Appendix 1 provides an example of the interaction between the physical and non-physical elements.

An important goal in this shift is to ensure that textile recyclers, and manufacturers in the global value chain, have access to a reliable and sufficient quality, quantity of recycled textiles at an acceptable price and that contaminants are dealt with effectively. Overall, product quality and functionality will need to be maintained. It is broadly accepted that this will require the development of new technologies, as well as significantly scaling up existing ones, with consequences for existing textile workforce.

Against the background discussion above, this research note highlights challenges facing the textiles system in delivering this goal in terms of the new rules, regulations, process, habits and cultural norms - that is, the new system of institutions - that need to be developed. Here we identify 6 types of challenges that are outlined briefly below.

1. **Establishing industry and policy maker consensus around key technical issues.** A cost effective, well functioning textile recycling system depends on achieving economies of scale

(large scale) across collection, sorting and processing. In turn, this requires some degree of standardisation of processes, products and technologies through collective rule setting that achieves broad industry support. For example, rules are needed to develop standard methods for collecting and sorting across 27 countries so that textiles can be bundled and traded in standard formats. Rules are required for determining when a product should be re-used versus recycling. Scaling will also depend on some type of technological convergence and, with it, industry wide decisions around whether to design out hard to recycle synthetics or to invest in new technology. The EU Directives provide a framework within which these rules are set, but leave the details to be determined through the implementation process. Before these rules can be developed, a process for determining how they are crafted needs to be established.

- 2. Establishing commercial scale textile recycling infrastructure projects that are investment worthy to mainstream investors.** Scaling up textile recycling infrastructure within the EU, and along global supply chains, will require private sector investment which is estimated to be between Euro 6-7 billion by 2030 (McKinsey, 2022). Drawing on the decisions made in challenge 1, this requires developing financial and operational business models that offer competitive returns to investors relative to other opportunities, particularly in the ESG investment market. The right type of data collection and reporting infrastructure is also required to demonstrate delivery against EU regulations. Investable projects will also need to source more skilled and semi-skilled workers for this sector.
- 3. Establishing well functioning markets for recycled textiles that deliver fibre to fibre recycling and avoid unintended consequences.** Related to challenges 1 and 2, this challenge will require the sector developing the information and financial infrastructure required for trading recycled textiles from consumers, back to fibre producers. Key issues include the develop of cost effective robust trading mechanisms, access to financial instruments, addressing market power, minimum price for recyclers, integrity of product labelling, and ensuring that illegally or unregulated textile recycling products - for example collected through the use of child labour - does not enter the market. Cultural norms and business rules will need to be developed to balance supply and demand in the market. For example rules are needed to determine when an item is recycled versus re-used while also encouraging longevity of use, without hoarding – the latter could lead to a drop in available textiles to recycle. Market design will also need to address issues around increasing transport emissions
- 4. Ensuring that textile regulation is coherent, consistent and drives systematic change.** The EU Textile Strategy will be implemented through a broad range of Directives. In addition, a number of other non-textile directives will have indirect or direct impacts of the development of textile recycling markets - for example the SUP or Finance . This dynamic will also likely play out at a national level during the implementation phase. Regulations need to do two things. First, they need to be consistent across all relevant regulations – and be consistently interpreted during the implementation phase. Second, regulations need to drive the development of new, durable and effective institutions, with their own constituencies (supporters), that strengthen the resources and power for implementing the EU Textiles Strategy over time. This requires consideration of the resources available for implementation and enforcement, the level of political visibility and engagement by stakeholders and the public, and consideration of how to encourage technical improvement and increasing demand for recycled textiles over time.
- 5. Managing transitions across the supply chain in an equitable way.** Changes in EU textile regulation will create long term changes to global supply chains - including on employment, income generating and investment opportunities for existing source countries. Strategies need to be developed to manage these changes and share transition costs - such as technology upgrades, transport or training - equitably along the value chain.

- 6. Facilitating transitions in cultural and commercial norms.** Significant changes in behaviour, accepted norms and habits will be required by brands and consumers. This will include implementing collection systems that are widely acceptable to consumers and widely used - thereby ensuring that the flow of textiles for recycling is maintained (Box 4). Business managers/brand managers/commercial managers will need to become comfortable with changes in product design, formulation and manufacturing from a commercial perspective to incorporate recycled content. Noting that the overall objective of the EU Textile's Strategy is to reduce the environmental footprint from textiles, consideration should also be given to the option to reduce the volume of clothing produced.

Box 4. What do consumers think about textile collection methods?

This project will engage SurveyMonkey Respondents Panel to test consumer acceptability of different models of textile collection infrastructure.

Options for different question content and format will be discussed at the workshop.

Opportunities

There are multiple opportunities for EU regulators and industry to collaboratively build out a fibre to fibre recycling system across Europe and its related global supply chains. In this section we highlight potential 'low hanging fruit' and/or time sensitive opportunities that could build upon existing trends. Focusing on these can generate quick wins and political momentum to address more complex issues. Broadly, these fall into opportunities around technology and recycling capacity, policy engagement opportunities, institutional and cultural opportunities, and financial opportunities.

Technology and Recycling Capacity

The project [Sorting for Circularity Europe](#) provides an overview of 100 textile recyclers currently in operation or under development across global supply chains. Sixty-four recyclers are reported to process some type of synthetic fibres while 30 of these facilities operate within the EU. Using the data from this project, the combined existing capacity for synthetic recycling is estimated to come online over the next few years is around 226,440 tonnes, of which about 151,000 tonnes is located in Europe – although there are significant data gaps and this is likely to be a large underestimate. Regardless, there remains a large gap between existing recycling capacity and the estimated level of textile waste available for fibre to fibre recycling of (theoretically) 1.5 million tonnes tonnes by 2030 (McKinsey, 2022). Given the range of estimates in capacity and future growth, these figures need to be treated as indicative.

This active area provides two opportunities. First, there is a significant and growing demand in the financial sector for ESG opportunities. The level of investment required in new technology and capacity could be marketed as an opportunity for capital markets to meet both financial and ESG targets.

Second, the collective experience gained through these pilot and start up projects provides a rich data source for determining viable options around technology convergence, collection and sorting infrastructure and linkages to other parts of the value chain located outside the EU. For example, the EURATEX [Rehubs initiative](#) could provide a strategic platform for these discussions.

Policy Engagement Opportunities for Industry

Over the last 3 years the textile sector in the EU has significantly stepped up its engagement with EU and national regulators through industry bodies such as [EURATEX](#), [The Policy Hub](#), and, more recently, the [European Fashion Alliance](#).

The day to day complexity of the operations of the textile industry lies beyond the scope of the work of policy makers, and therefore key barriers and opportunities, as seen by the sector, are not necessarily known to regulators. Therefore engagement with the EU regulatory consultation process over 2023 and 2024 will be an important opportunity to ensure that regulations do not force the sector to 'mal-adapt' or miss major opportunities for implementing textile to textile recycling.

Engagement in policy development provides the textiles sector with opportunities and the platform to collaborate across the supply chain. Participating in international textile sustainability fora, such as the [United National Environment Programs \(UNEP\) Sustainable and Circular Textiles Program](#) or the [UNFCCC Fashion for Climate Action](#) could be used as valuable opportunities to coordinate implementation projects across international borders. The NGOs Fashion Revolution and Fair Trade Advocacy Office have developed a [Policy Dialogue Tool Kit](#) to support small and medium enterprises to participate in policy development.

Institutions

In addition to formal EU policy, there has been an explosion in the range and availability of circularity documents, strategies, guidelines and roadmaps available to brands and textile producers. For example this includes, [Textile Exchange/ UNFCCC Fashion Charter Polyester Challenge](#), [The Ellen McArthur Re-designing the Future of Fashion Project](#), [ASOS Circular Design Guidebook](#). A summary of over 100 of these initiatives, covering almost every issue, at the global level has been compiled by [Common Objective](#).

Collectively these initiatives provide a significant body of knowledge, know-how, information and data sharing that companies can tap into to accelerate their moves towards circularity for synthetic textiles and sustainability more broadly. Drawing on this collective knowledge can allow companies to undertake internal training of staff as required. More broadly, it signals the shift in collective focus from technical matters to systems design.

Culture

There is growing evidence that consumer preferences for sustainability in textiles will not be a barrier to market entry for fibre to fibre recycling. For example, recent research found that 65% of fashion consumers care about the environment (Bain, 2022). However, only roughly 1/3 of consumers often or always converted this concern into purchases of sustainable products (Bain, 2022). Price, accessibility and access to appropriate information remain the key barriers to purchasing sustainable fashion in the EU (You Gov, 2021, Fernandes 2023).

Increasingly, brands are incorporating recycled synthetics into their collections, and these have been well received (see for example [here](#), [here](#)). In its first annual report for the 2025 Recycled Polyester Challenge, the Textile Exchange reports that 132 companies and subsidiaries have signed up to the challenge, with 56% commitment to replacing 100% of their virgin fossil-based polyester with recycled version by 2025 (Textile Exchange, 2022).

Overall, brands now face a receptive market for products made from fibre to fibre recycling, provided that other barriers around information and price can be addressed. Key elements in the EU Textiles Strategy will address information demands from customers (see Table 2).

Finance

Fashion companies are increasing the use of sustainability-linked bonds to finance sustainability initiatives within their supply chains. For example H&M Group issue its first SLB for €500m in February 2021, while Chanel issued \$700m green bond tied to goals on energy and emissions in 2020 (Raconteur, 2022). Tying environmental sustainability targets to financial accountability can add credibility and trust to brand commitments and provide a relatively inexpensive form of capital. However, brands have been criticised for directing these funds into existing technologies - such as the use of rPET from the bottle industry - and not into game changing innovation of the type required for fibre to fibre recycling.

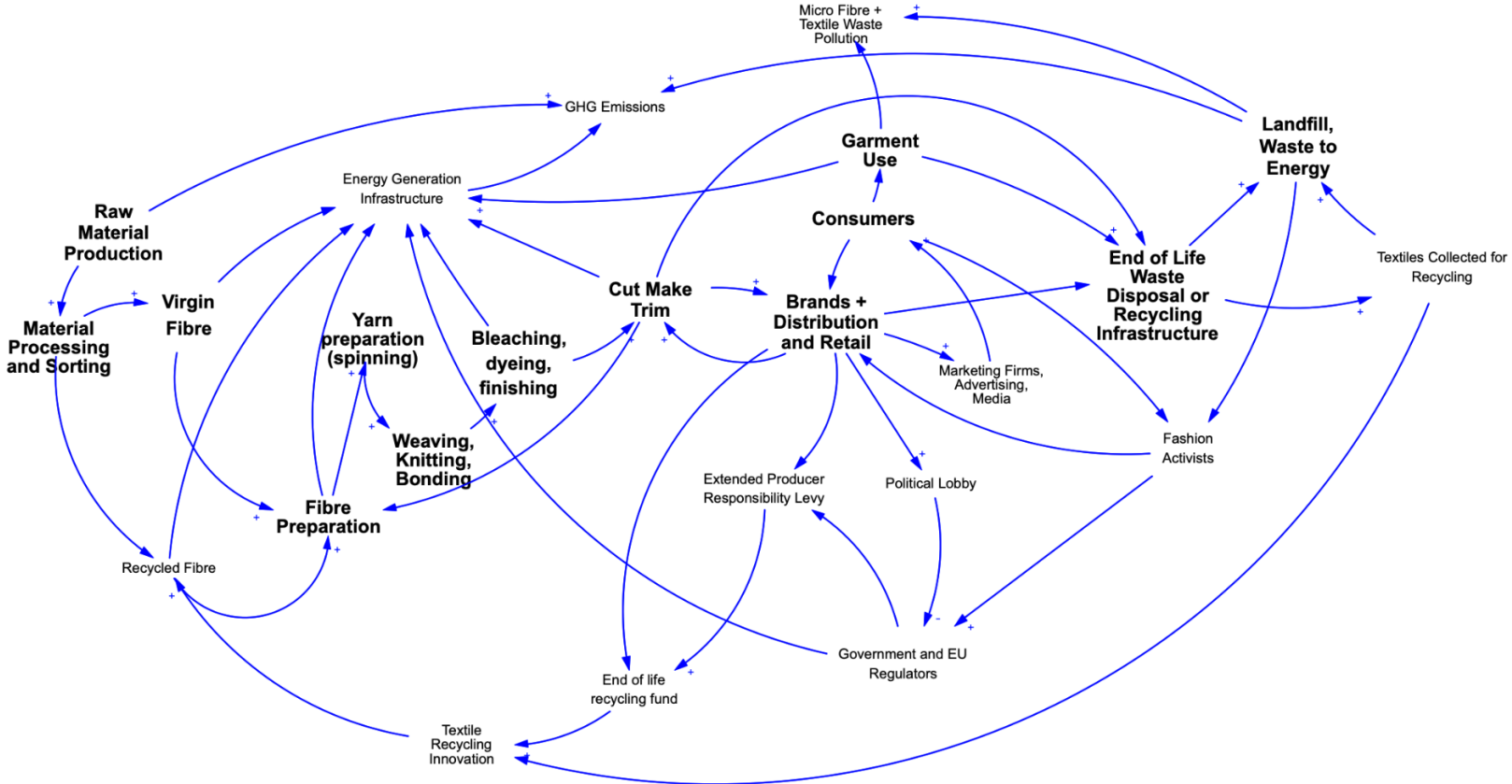
This demonstrates that there are financial actors willing to undertake substantial investments in the sector and there is growing interest more broadly (see [here](#)). The opportunity now is to convert this interest into projects and infrastructure that will underpin a textile recycling system – an opportunity that could be as high as \$218bn worth of investments (Fashion for Good, AI, 2022).

The ongoing discussions around the [EU Taxonomy Regulation](#) for sustainable finance could play an important role in encouraging this shift in focus.

In addition to these larger funding arrangements, there is a growing venture capital market for textile innovation – with 50 funds listed by Fashion For Good in its [Investor Landscape list](#). fashionforgood.com/investor-landscape. (e.g. Circularity Capital, Fashion for Good), brands providing loans or credit rating with suppliers to secure finance or insurance, brands extending loans to suppliers, financing by development banks and increasing acceptable of (small) sustainability premiums paid by consumers.

Figure 3: Simplified Network Diagram of Textile System with Fibre to Fibre Recycling

This network diagram represents a very simplified map of the entities that operate throughout the textile system and the relationships between them. Conventionally, the focus is on turning the linear physical economy (represented by the bold labels) into a circular physical economy. This diagram highlights the role and influence of many other entities in the system - including marketing firms, EU regulations, fashion activities, energy infrastructure etc... It also highlights the idea that a change in one entity in the system will have flow on effects to all other elements.



Arrows with a “+” sign next to them indicate that an increase in one entity leads to an increase in the other entity. For example, an increase in garment use leads to an increase in end of life waste disposal. This type of diagram (technically a ‘causal loop’ diagram) is used by system based research to identify relationships between entities and the type of feedback loops between them and draw on the analysis by Sterman (2000).

The Cambridge Policy Boot Camp (CPBC)

The Cambridge Policy Boot Camp (CPBC) is a transdisciplinary 'action research' method developed by Dr Nazia M Habib, Founder and Director of the Centre for Resilience and Sustainable Development (CRSD) at the University of Cambridge, UK.

The CPBC is an agile approach designed to quickly identify and document potential solutions for a complex policy problem. The aim is to integrate multiple perspectives, from multiple stakeholders that can provide practical direction for complex decisions and promote resilient solutions within the given context and resources.

Repeating testing and use of the methods with decision makers in over 90 countries demonstrate that the CPBC method delivers more relevant, effective and sharper quality solutions to complex problems, improves the capacity of participant to use 'systems thinking' in developing solutions, and fosters collaboration across stakeholders and buyin to solutions. Policy topics addressed in CPBC exercises have spanned safe repatriation of refugees, food security, public health insurance schemes, resilience policy, upskilling policy for industry 4.0.

CPBC uses a combination of dynamic systems thinking, political economic theories, engineering and medical education techniques and creative design approaches to address three challenges commonly faced in policy making:

1. Unlocking the strategic challenge - complex systems make it difficult to identify strategic leverage points that will transform systems. The CPBC facilitates a rapid, but deep, appreciation of the complexity of the system within which policy makers operate, and to identify the mandate, resources and opportunities available for transformation.

2. Unlocking knowledge through collaboration - the CPBC facilitates creative and critical thinking and collaboration between system stakeholders to unlock powerful insights and identify common ground. This can improve trust between stakeholders and reduce the cost of transformation.

3. Unlocking buy-in and commitment - this acts to engage with external agencies (including media) to secure (implicit) buy-in in the new policy systems, This is an important part of the CPBC design to create potential institutions that can facilitate, promote and secure long term long term solutions for addressing textile fibre to fibre recycling in the EU markets.

Key outcomes from a CPBC workshop include identification of specific strategy and policy ideas, the discovery of tradeoffs, complexities and inefficiencies and the recognition of the resources available to transform systems.

To find out more about the research centre work see <https://www.crsd.landecon.cam.ac.uk/methodologies>

University of Cambridge, UK

No.	Name	Title
1	Dr Nazia M Habib	Associate Professor and Head of Research Centre, Centre for Resilience and Sustainable Development (CRSD), University of Cambridge, UK
2	Dr Hannah Parris	Research Associate of the Centre for Resilience and Sustainable Development (CRSD), University of Cambridge, UK
3	Mr Terry Nicklin	Communication Specialist, the Centre for Resilience and Sustainable Development (CRSD), University of Cambridge, UK
4	Mr Brandon Staats	Research Assistant of the Centre for Resilience and Sustainable Development (CRSD), University of Cambridge, UK
5	Mr Richard Jones	Business Manager, Centre for Resilience and Sustainable Development, University of Cambridge, UK
6	Mr Steve McCauley	Senior Fellow of the Centre for Resilience and Sustainable Development, University of Cambridge, UK
7	Ms Flora Griffiths	Centre Administrator, Workshop Logistics

Agenda

Date: 28th February

Time: 11:00 - 15:00 (London Time)

Zoom: <https://zoom.us/j/97871501053?pwd=SDcxTzBodFJkWXIldlFOWkhlaVJZZz09>

Passcode (if required): 111009

Time	Speakers and sessions
5 min 11:00 - 11:05	Welcome and Introduction (HELLO) Anchor: Mr. Steve McCauley, CRSD Senior Fellow Dr Nazia M Habbib (2 min) Room: Main Session
5min 11:05 - 11:10	Opening Remarks
15min 11:10 - 11:25	Invite Experts To Speak On The Issue Five experts will offer 3 minutes of reflection on the thematic challenge of the Cambridge Policy Boot Camp. Room: Main Session
15min 11:25 - 11:40	Introduce Techniques (BRIEFING) Multiple thinking techniques will be introduced to the participants who are then asked to select one or two techniques to address the CPBC challenge. Room: Main Session
90min 11:40 - 13:10	Group Application (APPLIED THINKING) Groups will be formed and sent to the breakout room where they will use the thinking techniques to analyse the CPBC challenge and come up with tentative solutions. Experts will be assigned to each room to provide further help. 5 Minutes Break (at the discretion of the Facilitator) Room: Breakout rooms
5min 13:10 - 13:15	Break Room: Main room
10min 13:15 - 13:25	NABC Presentation skill (Elevator Pitch) A technique will be introduced to the groups to enable them to summarise their ideas for presentation. Anchor: Dr Nazia Habib Room: Main room
50 min 13:25 - 14:15	NABC Presentation Prep (SMART THINKING) Groups will re-enter the virtual room and rework on their solutions by revisiting the presentation technique. Room: Breakout rooms

30 min 14:15 - 14:45	NABC Presentation All the groups will come back to the main room, and present their ideas one by one to the experts and decision-makers from various stakeholder institutions. Each group is given 5 minutes to present their solution. Room: Main room
10min 14:45 - 14:55	Feedback and Discussions Room: Main Session
5min 14:55 - 15:00	Closing Remark

The Cambridge Team will stay online for the next 30 minutes to answer questions and network with participants.

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