Second Amendment to the RM2021 Roadmap

TRACE

Leaving a positive trace on people and planet through a circular economy

Innomission 4
Roadmap update 2025

trace
a transition towards
circular economy

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Executive Summary

This Roadmap 2024 (RM2025) is the second amendment to the foundational Roadmap 2021 (RM2021) for InnoMission 4, the flagship initiative within TRACE, focused on a circular economy with a focus on plastics and textiles. The purpose of this amendment is to take heed of the evolving societal, political, industrial, and scientific landscapes and align with new EU regulations, advancements in circular economy practices, and the evolving needs of stakeholders.

The roadmap amendment addresses the need for clearer focus and prioritization, as recommended by Innovation Fund Denmark. While RM2021 established TRACE as a key driver of systemic circular change, the amended roadmap emphasizes maintaining momentum by aligning InnoMission 4's operations with updated definitions of circular economy and sustainability that resonate with key stakeholders, such as the EU. This alignment is crucial to ensure TRACE's relevance in expanding international cooperation and funding activities.

Over the last two years, TRACE has evolved into a mission-driven association overseeing 27 projects, including 8 newly added projects from Pool 2.2 and Pool 3.2. While TRACE currently oversees 27 projects, including 8 newly added projects from Pool 2.2 and Pool 3.2, not all of them are completed yet. These projects all respond to milestones of the RM2021 matrix, ensuring systemic synergies and cross-value chain collaboration. However, the 8 new projects initiated in Q4 2024 are not included in RM2025.

TRACE's mission is to drive collaboration and knowledge creation across all actors to make systemic circular transitions a reality. This is achieved through three key roles—Builder, Harmonizer, and Pathfinder. With a systemic approach, TRACE enables collaboration beyond what any single actor could achieve alone. Its core capability—integrating solutions across entire value chains through scalable proof-of-concept Circular Economy Systems —drives broader systemic change. These models test critical assumptions, prove feasibility, and deliver measurable impact, making them scalable and replicable globally.

Through strategic learning, TRACE has identified key challenges, shaping its mission. The table below hightlight TRACE's achievements in tackling these.

Table 1. Key Achievements

Key Achievements	Linked Challenge	Future Prioritized Key Areas	Case Example
Scalable PoC CE-Systems integrating solutions across value chains: Serving as blueprints for circular infrastructure.	Systemic Complexity: PoC CE-Systems help navigate the societal, environmental, and economic complexity of value chain transitions.	Scaling PoC CE-Systems: TRACE will expand local pilot projects to build momentum for national and international circular infrastructure.	Circular Textile Pilots Project: Municipal collaborations develop circular procurement strategies for textiles, reducing waste and resource consumption while enhancing durability.
Cross-sectoral collaborations aligning stakeholders' efforts toward systemic circular impact: TRACE Academy facilitates connections between academia, industry, and policymakers.	Collaborative Necessity: Achieving systemic change requires aligned efforts across stakeholders and sectors.	Integrating Education and Capacity Building: TRACE Academy will expand its offerings of workshops, educational programs, and best practices to equip leaders for circular transitions.	Change4Circularity Project: Engages 30,000–50,000 students in Denmark to collect data on plastic waste, fostering education and collaboration while generating actionable insights.
Engaged stakeholders in co-creating innovative solutions for systemic challenges in textiles and plastics: TRACE drives co-creation to embed solutions in society.	Behavioral Insights: Solutions must address human behaviors and encourage practical adoption.	Strengthening Stakeholder Engagement: TRACE will collaborate with policymakers, NGOs, and industries to overcome legislative barriers and align with the EU's Circular Economy Action Plan.	Mattresses Reuse and Recycle Systems Project: Develops approaches for reusing and recycling mattresses by involving manufacturers, waste managers, and other stakeholders to reduce landfill contributions.
Concrete projects and partnerships ready for internationalization: TRACE's innovations provide scalable solutions for global circular transitions.	Communication and Alignment: Clear communication ensures stakeholder roles are aligned and solutions are ready for scaling.	Systemic Innovation with Concrete Results: Projects will foster innovation across design, production, and recovery, creating scalable solutions for circular systems.	Biocomposites to Substitute Plastic Project: Utilizes agro-industrial byproducts (e.g., cellulose nanofibers) to develop sustainable packaging alternatives, reducing reliance on virgin plastics.
Expanded global presence through international collaborations: TRACE leverages expertise to expand its impact globally.	Communication and Alignment: Stronger regional and international collaborations enhance systemic circular transitions.	Internationalization: TRACE will align with EU funding programs (Horizon Europe, LIFE) and international partners, fostering synergies with organizations like the Ellen MacArthur Foundation and PACE.	TRACE is developing collaborations with international stakeholders to scale circular solutions globally, particularly in Nordic and EU contexts.

The evaluation of TRACE's projects demonstrates a high level of satisfaction among partners, reflecting TRACE's ability to facilitate collaboration and drive impactful outcomes. 80% of partners rated the projects as meeting or exceeding expectations, underlining TRACE's effectiveness in delivering tangible results.

Key findings highlight effective project execution, ensuring smooth implementation and measurable progress; strong collaboration, fostering cross-sectoral partnerships that accelerate circular innovation; and demonstrable progress, contributing to systemic circular transitions with scalable solutions.

Challenges, such as resource alignment, were mitigated through proactive adjustments, and lessons learned emphasize the importance of early partner alignment to ensure shared objectives and efficient execution, as well as strengthening synergies between projects to maximize impact.

Key Roadmap Insights by Chapter

Introduction & Rationale – The roadmap update ensures alignment with evolving EU regulations, industrial advancements, and TRACE's systemic innovation mission.

Navigating Internal & External Changes – TRACE has matured into a mission-driven association, refining its role in shaping cross-sectoral collaborations and responding to policy shifts.

Enhancing Capabilities for Circular Transition – The Circular Readiness Level (CRL) and pilot PoC CE-Systems provide data-driven insights to scale systemic circular solutions.

Impact Evaluation & Project Learnings – High partner satisfaction, strong collaboration, and lessons on aligning resources, optimizing synergies, and overcoming systemic barriers.

Strategic Positioning & Future Direction – TRACE is bridging research, industry, and policy, strengthening its role as an orchestrator of circular economy transitions at a global level.

Funding & Next Steps – A structured approach to securing national and international funding, ensuring long-term sustainability for TRACE's mission and impact-driven projects.

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A transition to a circular economy is a prerequisite for meeting societal climate and environment goals – and partnerships play a pivotal role in this transition. TRACE is a partnership with very strong actors and can drive this transition by creating new knowledge, new collaborations and tangible results.

Mikkel Stenbæk Hansen, Director of Circular Economy, Novo Nordisk, Chair of the Board, TRACE

Introduction:
Rationale for Updating The Roadmap

The original roadmap (RM2021) for InnoMission 4: A Circular Economy Focused on Plastics and Textiles 2030/2050 was developed through extensive collaboration among researchers from Danish universities and key institutions, including Alexandra Institute, Teknologisk Institut (part of Denmark's GTS institutes), VIA University College (UCL), Force Technology, and Nationalmuseet (Denmark's National Museum). These efforts laid a strong foundation for systemic change in plastics and textiles, uniting diverse stakeholders under a shared vision.

Since its publication, the societal, political, industrial, and scientific landscape has evolved significantly. TRACE itself has undergone substantial development, officially launching Innomission 4: A Circular Economy Focused on Plastics and Textiles as its flagship program in Q3 2022, with the initiation of its first funding pool, the appointment of a CEO, and the establishment of a management group and advisory group. These developments have created both opportunities and challenges, requiring updates to Innomission 4's strategic direction to ensure continued relevance and impact. At the same time, TRACE has evolved as an association, serving as a platform for enabling systemic circular transitions across sectors, with Innomission 4 as its central initiative driving this mission.

Impact in this phase of TRACE's work is understood as the creation of systemic capabilities and learnings that pave the way for measurable outcomes. By fostering collaboration, developing metrics like the Circular Readiness Level (CRL), and embedding solutions in societal contexts, TRACE builds the conditions for achieving its mission while enabling future quantifiable results.

As TRACE's flagship project, Innomission 4 addresses systemic challenges in plastics and textiles by advancing circular transitions through collaboration, innovation, and Proof-of-Concept CE systems. While this roadmap, RM2025, is specifically tailored for Innomission 4, its success is closely linked to TRACE's role as an association providing the infrastructure, governance, and collaborative frameworks essential for achieving ambitious project goals.

This amended roadmap, Roadmap 2025 (RM2025), builds upon the foundations of RM2021 by transitioning from broad vision statements to actionable projects with measurable impacts. It incorporates new targets for 2022–2026, aligns with updated EU regulations, and emphasizes scalable Proof-of-Concept CE systems and international collaboration. This roadmap also introduces the Circular Readiness Level (CRL), a groundbreaking metric that TRACE is developing to track and measure circular maturity across value chains, providing a framework for long-term systemic progress.

To address these evolving dynamics, TRACE has identified five key challenges that shape its mission and inform RM2025.

Introduction to Challenges and Approach

Creating systemic change to transition to a circular economy is inherently complex, requiring solutions that are not only innovative but also societally embedded. TRACE has identified several key challenges that shape its mission, all linked to the overarching goal of enabling the transition to a circular economy. These challenges are closely tied to TRACE's roles as a builder, harmonizer, and pathfinder, and its system design requirements of desirability, feasibility, and viability. These interconnected principles form the foundation for addressing systemic transitions effectively. The challenges underscore the multifaceted nature of driving impactful change in value chain systems and highlight the crucial role TRACE plays in overcoming them.

1. Defining and Measuring Impact to Drive Transformation
2. Navigating Systemic Complexity with Integrated Solutions
3. Building Bridges Through Collaboration
4. Understanding Behavior to Enable Adoption
5. Harmonizing Efforts for Systemic Impact

These challenges frame TRACE's insights, strategies, and approach, which are deeply informed by its experimentation across value chains and sectors. The organization's work has given rise to new learnings that inform this roadmap, emphasizing the integration of solutions that are desirable, feasible, and viable—principles drawn from system design requirements.

Reading Guide: Contextualizing the Roadmap Evolution

This document, Roadmap 2025 (RM2025), represents the second amendment to RM2021, refining its broad visions into specific, measurable actions. By integrating evolving priorities and insights, RM2025 ensures continued impact and relevance.

Key milestones in the roadmap's evolution include:

- **Roadmap 2021 (RM2021),** the original roadmap – Established foundational objectives and a mission-driven framework for InnoMission 4's transition to a circular economy by 2030 and 2050.

- **Roadmap 2022 (RM2022),** the first amendment to RM2021, identified key inflection points for systemic circular transitions: Compliance (Baseline Established), Transparent (Demonstration Achieved), Integrated (55% Non-Virgin/Fossil Materials), Restorative (Absolute Decoupling), and Regenerative (Fully Circular Economy, North Star Vision by 2050). It integrated strategic learnings from early-stage projects (Pools 1 and 2) to align activities with these tipping points while adapting to policy and market dynamics.

- **Roadmap 2025 (RM2025),** the second amendment, builds on these insights by accelerating progress toward key tipping points in circular transitions. It advances Proof-of-concept Circular Economy Systems (PoC CE-Systems), scales pilots, refines metrics, and strengthens systemic interventions to drive measurable impact. Aligned with IFD's Impact Framework, RM2025 also reinforces TRACE's international strategy, expanding collaborations with EU policies, global circular economy initiatives, and funding programs to scale systemic solutions beyond Denmark. Looking ahead to 2025-2027, TRACE will intensify efforts to activate tipping points, ensuring long-term transformation across value chains.

Key updates can be found in the following chapters:

- Chapter 2: Navigating New Internal and External Changes
  Outlines TRACE's evolving role, systemic leadership approach, and the shifting regulatory and political landscape shaping its direction.

- Chapter 3: Enhancing Capabilities for Systemic Circular Transitions
  Introduces the Circular Readiness Level (CRL) as a key metric and explores TRACE's

role in driving systemic change through projects and frameworks.

- **Chapter 4: TRACE's Impact Over the Last Years**
  Highlights key achievements, progress on Innomission 4 objectives, and evaluations showcasing TRACE's ability to foster systemic change and collaboration.

- **Chapter 5: Strategic Positioning and Future Directions**
  Explores TRACE's positioning as a leader in the circular economy, outlines its roadmap for scaling initiatives, and identifies future opportunities for systemic impact

- **Chapter 6: Funding Strategy and Next Steps**
  Aligns TRACE's funding strategies with its goals, outlining plans to diversify funding sources and strengthen international collaborations

By linking RM2025 to measurable outcomes and strategic initiatives, this roadmap ensures TRACE's efforts remain impactful and adaptive, aligning with national and international goals to drive the transition to a regenerative circular society.

Navigating New Internal And External Changes

Internal changes

TRACE's Role as an Association

TRACE was established to provide the governance, infrastructure, and strategic leadership necessary to enable mission-driven projects like Innomission 4: A Circular Economy Focused on Plastics and Textiles. Over the past year, TRACE has sharpened its systemic perspective to more explicitly address environmental challenges while enhancing societal well-being. This dual focus strengthens TRACE's license to operate and broadens its appeal to stakeholders across academia, industry, and policy.

At the heart of this evolution is TRACE's updated vision and mission, agreed upon by the board of directors in 2024.

TRACE's vision: Leaving a positive trace on people and planet through a circular economy.

TRACE's mission: We drive collaboration and knowledge creation across all actors to set the path for implementing circular solutions within plastics and textiles.

This focus enhances TRACE's ability to collaborate with stakeholders across academia, industry, and policy.

TRACE's systemic leadership is characterized by three roles

Systemic change is inherently complex. The interconnected crises—spanning environmental, social, and economic dimensions—are not only difficult to understand but even harder to address. To drive meaningful change, it is essential to reduce complexity—both in defining the challenge and in clarifying TRACE's role in solving it.

TRACE's mission is to drive collaboration and knowledge creation across all actors to make systemic circular transitions a reality. This is achieved through three key roles—Builder, Harmonizer, and Pathfinder.

1. Building Scalable Circular Systems (The Builder Role)
The Challenge: Transitioning to a circular economy requires tangible Proof-of-Concept Circular Economy Systems (PoC CE-Systems) that demonstrate how entire value chains can operate cohesively. Without such systems, circular economy efforts risk remaining

aspirational rather than actionable.

TRACE's Role: TRACE builds focused PoC CE-Systems that address critical assumptions, test feasibility, and deliver measurable impact. These models provide actionable blueprints for transitioning to a circular economy.

Core Strength: Demonstrating real-world, scalable solutions for systemic change.
Why It Matters: Actionable systems are the foundation for transitioning from vision to reality in the circular economy.

2. Harmonizing Collaboration Across Sectors (The Harmonizer Role)
The Challenge: Solving interconnected crises requires collaboration across diverse stakeholders—industries, researchers, policymakers, and civil society. However, achieving alignment between these actors is inherently difficult due to competing interests and priorities.

TRACE's Role: TRACE acts as a harmonizer, fostering cross-sectoral and cross-disciplinary collaboration. TRACE aims to ensure that stakeholders can effectively contribute to shared objectives and systemic change.

Core Strength: Ensuring collaboration across disciplines, sectors, and political divides.
Why It Matters: Aligning diverse stakeholders is essential for achieving sustainable change at scale.

3. Charting the Path for Systemic Change (The Pathfinder Role)
The Challenge: Systemic change requires a clear roadmap to guide efforts and align stakeholders. Without direction, efforts risk fragmentation and inefficiency.

TRACE's Role: TRACE acts as a pathfinder, synthesizing research, bridging knowledge gaps, and mapping actionable pathways to transition toward a circular economy.

Core Strength: Bridging knowledge gaps and guiding systemic transitions.
Why It Matters: A research-backed, actionable roadmap is critical for aligning efforts and driving cohesive progress.

These roles allow for clear communication of TRACE's direction and purpose, both internally and externally, ensuring mission success. They provide clarity and direction to

TRACE's efforts in facilitating collaboration across sectors, disciplines, and geographies toward a unified transition to a regenerative circular economy. A clear sense of who we are and what we do prevents TRACE from becoming a 'project hotel' with an incoherent portfolio.

System design requirements for TRACE

TRACE's success in driving a systemic transition to a circular economy relies on building proof-of-concept circular systems that are scalable internationally - spanning geographies and social contexts. This requires are desirable, feasible, and viable.

Desirability: TRACE ensthat solutions serve the common good by engaging stakeholders in co-creation processes and aligning efforts across sectors. This shared ownership and societal alignment create a strong foundation for embedding circular principles within industries and communities. Projects like CircularTEX, which provided sustainable furniture procurement guidelines, demonstrate how co-creation fosters alignment and desirability among stakeholders and policymakers.

Feasibility: TRACE's work is grounded in practicality and evidence-based methods, ensuring proposed solutions are feasible even amid the urgency of systemic transitions. The introduction of the CRL provides a metric for measuring progress across value chains, from individual products to entire systems. By complementing existing metrics such as Technology Readiness Level (TRL) and Societal Readiness Level (SRL), CRL helps identify critical inflection points and guide stakeholders in aligning their efforts for maximum impact.

Viability: : To ensure long-term impact, TRACE prioritizes regenerative solutions that restore and enhance natural and social systems while adapting to evolving challenges. By extending product life cycles and embedding sufficiency-based circular economy principles, TRACE's projects, such as Design2.Use, demonstrate how long-term frameworks can preserve value and regenerate resources rather than merely minimizing waste. These initiatives ensure that circular systems actively contribute to ecosystem restoration, material circulation, and long-term resilience, making them adaptable and sustainable in the face of future uncertainties.

By synthesizing these principles—desirability, feasibility, and viability—TRACE ensures its solutions are innovative, actionable, and aligned with systemic goals to drive circular transformation.

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TRACE is a unique offer to businesses, knowledge institutions and organisations that seeks knowledge and partners and would like to contribute to a transition to a circular economy.

Mikkel Stenbæk Hansen, Director of Circular Economy, Novo Nordisk, Chair of the Board, TRACE

The North Star Vision for Innomission 4

The North Star Vision for Innomission 4: A Circular Economy Focused on Plastics and Textiles 2030/2050 aligns with Denmark's 70% GHG reduction targets by 2030 and the goal of achieving net zero by 2050. As depicted in Figure 1, this vision underscores the mission's commitment to fostering systemic circular transitions in plastics and textiles, emphasizing sustainability, innovation, and cross-sector collaboration.

To achieve this, Innomission 4 focuses on building pilots and scalable PoC CE-Systems that provide practical pathways for implementing circularity in society.

Achieving the North Star Vision requires a fundamental transformation of all aspects of the societal ecosystem. This systemic change requires collaboration through a mission-based partnership approach. By identifying barriers, setting targets, and building a scientific foundation, Innomission 4 plays a central role in advancing this vision.

While the North Star Vision is specific to Innomission 4, TRACE provides the governance, infrastructure, and funding mechanisms that support its realization. TRACE's enabling role ensures Innomission 4 can operationalize this vision through concrete projects and measurable impacts, maintaining alignment with both mandatory and supplementary goals.

Current Status and Focus Areas

Innomission 4's key focus areas for the coming years include:

- Developing a scientific baseline for impact assessment, ensuring alignment with RM2021 and evolving regulatory frameworks.
- Developing and refining the CRL metric to provide a structured framework for assessing circular economy progress.
- Achieving demonstration and demonstrating 55% use of non-virgin and non-fossil materials across plastics and textiles.
- Consolidating scalable Proof-of-Concept CE-Systems to support the development of a circular infrastructure in Denmark and beyond.

As illustrated in Figure 1, the North Star Vision provides a strategic framework that connects these focus areas to Denmark's broader climate and circular economy goals. By aligning its activities with this vision, Innomission 4—supported by TRACE—ensures the transition toward a regenerative circular society is both actionable and impactful.

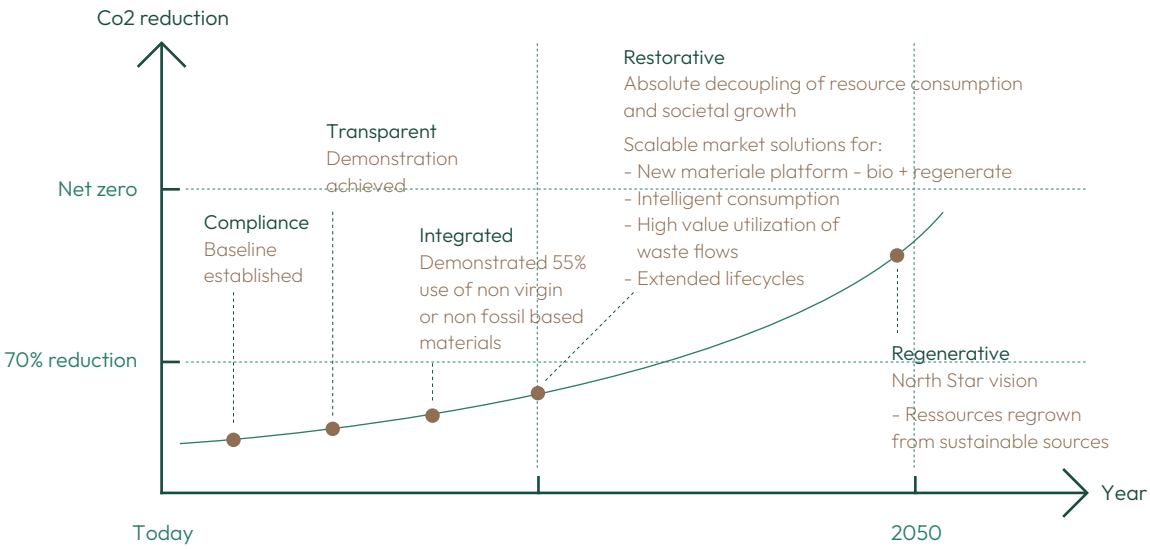


Figure 1: The North Star Vision for Innomission 4, illustrating key inflection points on the pathway to 2030 and 2050.

TRACE's Integration of the IFD Impact Framework

TRACE leverages the IFD Impact Framework to drive systemic circular economy transitions, ensuring strategic learning, measurable impact, and scalable solutions. The RM2022 tipping points provide a structured yet flexible foundation, guiding progress from baseline compliance to full circular regeneration while remaining adaptable to new insights and policy developments.

A top-down and bottom-up governance model aligns strategic direction with industry-driven innovation, with the Board Impact Committee overseeing continuous refinement. The TRACE roadmap, updated biennially, integrates these learnings to enhance relevance, impact measurement, and policy alignment. Each tipping point follows the PLUSS criteria—transformative, strategic, measurable, and time-bound—ensuring TRACE remains on track for systemic circular change.

By embedding structured learning, adaptive governance, and impact-driven execution, TRACE ensures its circular economy solutions are mission-driven, scalable, and market-aligned.

External Context: Adapting to a Dynamic Landscape

Circular Economy In the Context of EU Resilience and Competitiveness

The European Union increasingly frames the circular economy (CE) as a strategic tool for resilience amid rising global uncertainty. Escalating geopolitical tensions, critical raw material shortages, and economic volatility have exposed Europe's dependence on external suppliers, prompting urgent action to secure stable and sustainable supply chains. The EU's push for open strategic autonomy is no longer just a longterm ambition but a pressing necessity, as disruptions in energy, minerals, and industrial inputs threaten European competitiveness.

In her 2024–2029 political guidelines, European Commission President Ursula von der Leyen called for a "more circular and resilient economy," emphasizing that strengthening Europe's resource independence is essential to mitigating supply shocks and ensuring long-term economic stability. The forthcoming Circular Economy Act, expected in Q4 2026, is set to play a key role in this transition by advancing policies that reduce waste, increase resource efficiency, and secure secondary raw material markets.

In their position paper, Prevention is Better than Cure: How Circularity Can Put Europe Ahead of the Game, the European Environmental Bureau (EEB) highlights the Circular Economy Act's potential to enhance Europe's resource resilience and strengthen circularity as a driver of competitiveness.

The EEB references Commissioner for Environment, Water Resilience, and a Competitive Circular Economy, Jessika Roswall, who, in her written replies to the European Parliament, emphasized that "resources represent the largest input cost for the European manufacturing industry, making the prudent and rational use of resources critical for competitiveness" (Nov. 2024).

Circular systems keep materials in circulation longer, limits ressource uptake and waste, and reduce reliance on external suppliers, aligning with the EU's broader strategy to minimize economic vulnerabilities. The EEB argues that demand management is now not just an environmental objective but a geostrategic necessity.

This approach aligns with the Competitiveness Compass, presented by the European Commission in January 2025, which provides a strategic framework for revitalizing European industry. Based on Mario Draghi's report on the future of European competitiveness,

the Competitiveness Compass identifies three key imperatives:

- Closing the innovation gap
- Aligning decarbonization with competitiveness
- Reducing excessive dependencies

Circular economy policies directly contribute to these goals by reducing resource dependencies, boosting industrial innovation, and enhancing Europe's longterm economic resilience. The Competitiveness Compass highlights the untapped economic potential of circularity, particularly in remanufacturing and recycling industries, which could generate new jobs and economic opportunities across Europe.
By embedding circularity into its broader competitiveness agenda, the EU positions itself as a leader in sustainable industrial transformation while ensuring a secure, selfsufficient, and resilient economy.

Evolving Definition of Circular Economy

In RM2021, it was stated that Innomission 4 would align with the European vision, strategy, and definitions of the circular economy. However, since the release of RM2021, the EU definition of the circular economy has evolved, leading to TRACE adopting the following definition:

> "The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended.
> In practice, it implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible thanks to recycling. These can be productively used again and again, thereby creating further value.
>
> This is a departure from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern. This model relies on large quantities of cheap, easily accessible materials and energy."

To facilitate sufficient and effective waste reduction, the EU bases its policies on the principles of the waste hierarchy:

> The waste hierarchy applies as a priority order in waste prevention and management legislation and policy. It is the cornerstone of European Union (EU) waste policies and legislation and is laid down in the EU Waste Framework Directive (Directive 2008/98/EC).

The full EU definition of the circular economy and the waste hierarchy can be accessed on the European Parliament and EUR-Lex websites for the most up-to-date information.

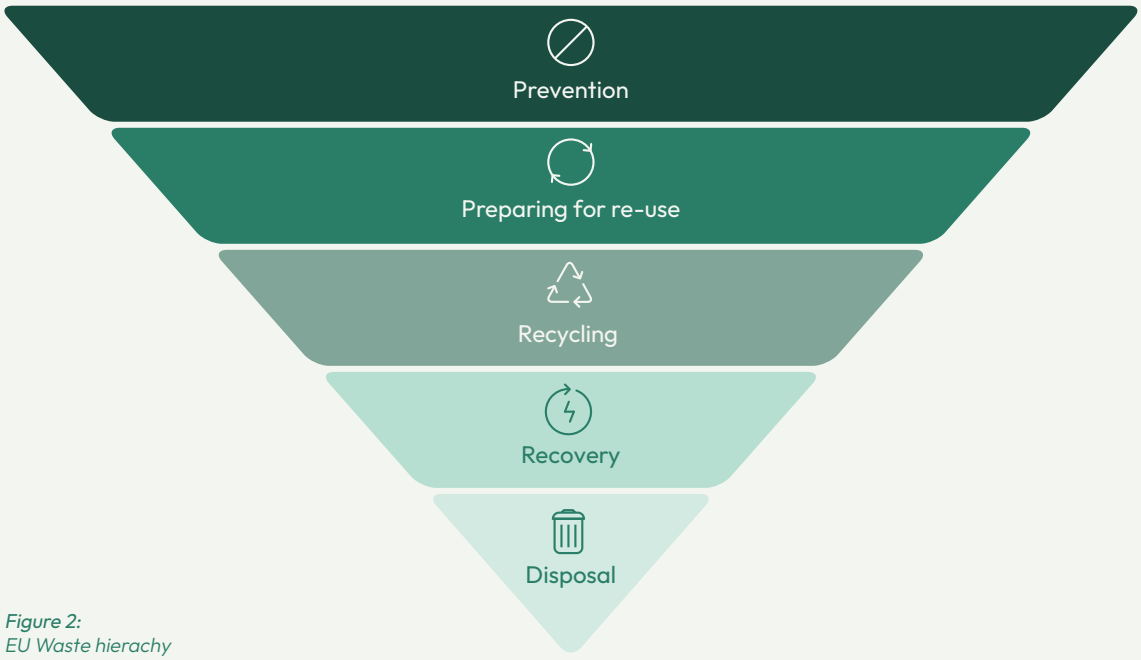


Figure 2:
EU Waste hierachy

Circular Economy Requires Systemic Change

Since 2017, the **Circle Economy Foundation** has released annual Circularity Gap Reports. In 2024, it published a global Circularity Gap Report, a country-specific report for Denmark, and its first industry-specific report focusing on the textile industry.

The **global Circularity Gap Report 2024** highlights a central question: *"How can we ensure people's wellbeing while operating within our planet's key boundaries across air, land and water? This is the ultimate question of our time."*

Thus, the circular economy serves as a tool to align society with planetary, environmental, and social boundaries.

The need for a more systemic approach to circularity and its connection to the planetary boundaries framework is also reflected in the **Danish Confederation of Industry's 2024 Circular Economy Policy:**

> "Circular economy can be seen as a means to an end. The goal is an economy where the needs of society are met—both for present and future generations—within the planetary boundaries"
> (translated from Danish)

The Circularity Gap Report for Denmark emphasizes that achieving a circular transition requires systemic change, with a particular focus on circular infrastructure. Key points from the report include:

- **Circular Solutions:** The report advocates for circular solutions, such as using regenerative materials, designing for disassembly, and promoting the reuse and recycling of materials.
- **Policy and Investment:** Bold policies and investments are needed to create a level playing field for circular practices. This involves adjusting fiscal policies, leveraging public investment, and ensuring circular solutions become economically viable compared to traditional linear approaches.
- **Skills and Expertise:** Building circular infrastructure requires a skilled workforce. The report stresses the importance of education and training to equip the workforce and citizens with the necessary skills for implementing circular practices.

Overall, the Circularity Gap Report 2024 emphasizes the need for a systemic shift toward circularity in infrastructure to reduce environmental impacts and enhance sustainability.

These findings align closely with TRACE's role, particularly in developing the skills and expertise needed within its partnership. TRACE interprets the expertise required for circular infrastructure as extending far beyond purely technical solutions. It integrates both STEM (Science, Technology, Engineering, and Mathematics) and SSH (Social Sciences and Humanities) disciplines. In accordance with RM2021, achieving circular transitions requires systemic change in policy and industry, as well as shifts in consumption, culture, and behavior.

The industry-specific Circularity Gap Report for the textile sector highlights that the textile industry is only 0.3% circular. It identifies overproduction of cheap, low-quality clothing as the primary barrier to circularity. The report explores scenarios for increasing circularity based on the planetary boundaries framework and stresses the need for systemic change through collaborative efforts.

TRACE excels in facilitating cross-sectoral collaboration by uniting key stakeholders across the value chain to address critical challenges, such as overproduction and low-quality clothing. Through its systemic approach, TRACE ensures the textile industry progresses toward circularity while staying within planetary boundaries.

Evolving Political Framework

Since the RM2021, the political landscape has changed. New strategies and legislation have been launched from the EU and implementations thereof have commenced. This part of the RM amendment sketches out these new realities and how the RM2021 initiatives must be refined when going forward.

In order to ensure that the roadmap update reflects the most central update to the political landscape, the trade organizations Danish Plastics Association and Danish Fashion and Textiles (DM&T) have provided consultancy on the most relevant legislative updates. This consultancy has served as point of departure for the description of changes to the political landscape elaborated below.

Textile Sector: Regulatory and Market Drivers

With regards to textiles, the EU strategy for sustainable and circular textiles was launched in March 2022 referring to more than 16 regulatory initiatives needed to transform the industry from linear to circular by 2030. Following the vision of the strategy that has the

out-phasing of the fast fashion business model as its overall target, reduced volume of durable, repairable and recyclable products will become the norm, producers will take responsibility for their products, including when they become waste, and the circular textiles ecosystem will thrive, driven by sufficient capacities for innovative fibre-to-fibre recycling.

For this vision to unfold, certain regulatory initiatives will be critical. These include in particular: 1) revision of the Ecodesign for Sustainable Product Regulation (ESPR) and the introduction of mandatory design requirements and a Digital Product Passport (DPP) for all textile products; 2) revision of the Waste Framework Directive (WFD) and the introduction of an extended producer responsibility for textiles. In addition to that, the textile industry will – as other industries – be subject to increased requirements on due diligence and sustainability reporting under the Corporate Sustainability Due Diligence Directive (CSDDD), the Forced Labour product ban and the Corporate Sustainability Reporting Directive (CSRD).

This means that between the time of RM2021 and RM2025 amendment, the textile sector has gone from limited regulation (not including technical textiles and work wear), towards a scenario with substantial regulation. This situation calls for a new emphasized focus on how to align research, industry and policy in a sector that has been dominated by silo initiatives and a lack of collaboration. In DK, DM&T has called for a national action plan and the establishment of a national knowledge centre with the aim of bringing together the various stakeholders currently working with CE initiatives and knowledge build-up. The action plan mentions TRACE as a central player for strengthening collaborative research while ensuring that Danish strongholds are nurtured and further developed. In the Danish Budget Law for 2024, 40 million DKK has been allocated over the years 2025-2028 to initiate this process, with TRACE as a central partner. In sum, there is no doubt that TRACE has a pivotal role to play in the further development and transition of the Danish textiles sector.

Plastic Sector: Regulatory and Market Drivers

For plastics, significant regulatory updates are found in the new Packaging and Packaging Waste Regulation (PPWR), the new Regulation on Recycled Plastic Materials and Articles intended for food contact, and the implementation of the Single-Use Plastics Directive. Furthermore, amendments to the REACH (Registration, Evaluation, Authorisation, and Restriction of Chemical Substances) are also relevant to TRACE, as REACH covers single chemical substances and substance mixtures.

EU regulations can be of great importance to TRACE if polymers are no longer exempt from REACH and if restrictions on plastic chemicals such as PFAS are further strengthened and enforced. These new legislative initiatives seek to promote several changes to the European industrial landscape and consumer patterns, which, in combination, can be viewed as being in accordance with the principles of the waste hierarchy and the 3Rs. These include phasing out certain single-use products (Reduce), increasing shares of reuse applications (Reuse), and expanding the European recycling sector (Recycling). Among the measures that aim to drive this circular transition are the requirement of 100% reusable transport packaging within EU countries by 2030 and 40% reuse for packaging between EU countries.

Additionally, 10% of containers for alcoholic and non-alcoholic beverages must be reusable by 2030, with the Commission encouraging a further shift towards 40% reuse by 2040. Recycled content in certain products is also set to increase, with targets for plastic bottles (30% by 2030 and 65% by 2040) and plastic for food contact materials (30% by 2030 and 50% by 2040). TRACE will play an important role in gearing the Danish plastics sector for the transitions facilitated by these legislative changes.

The increase in reuse solutions can only be developed and scaled by establishing societal infrastructure to support this transition. It further requires collaboration across the value chain, which is difficult to obtain without the mission-based development and innovation that TRACE focuses on initiating and developing.

The UN Plastic Treaty negotiations was initiated in 2022, with the historical Resolution 5/14 with the aim to “End plastic pollution”. The resolution:

> “Recognizing the wide range of approaches, sustainable alternatives and technologies available to address the full life cycle of plastics, further highlighting the need for enhanced international collaboration to facilitate access to technology, capacity-building, and scientific and technical cooperation, and stressing that there is no single approach”

This implies that models which integrate science across the full life cycle of plastic will be paramount in the years to come. It also follows that countries that can provide such solutions can be drivers of the needed transition away from the current plastic economy, that is the cause of plastic pollution. TRACE will provide valuable knowledge and innovation that can place Denmark in a leading position in regard to this global change.

Shared Considerations for Plastics and Textiles: The European Restoration Regulation
Following a final vote June 17th 2024 at the Environmental Council, the EU has adopted its new European Restoration Regulation. This unique new piece of legislation will be the first to set legally binding restoration targets for the long-term recovery of nature in Europe. Its overarching objective is to restore 20% of EU's degraded ecosystems by 2030 and all by 2050, also adding time-bound targets for specific ecosystems, habitats, and species.

For TRACE this Regulation means that the ambitious climate targets for the Mission have to be obtained without compromising the Regulation defined time-bound targets for specific ecosystems, habitats, and species. This more holistic approach is also aligned with a planetary boundary's perspective described above.

In practice it will imply that the use of biomaterials will need broader assessments and will become quite restricted, taking into account indirect environmental consequences.

The complementary natures of the internal (North star vision) and external (European Restoration Regulation) are quite challenging at more levels. The European Restoration Regulation, also known as the Nature Restoration Law, is a comprehensive EU law aimed at restoring degraded ecosystems across the continent. The objective of the regulation is to restore ecosystems, habitats, and species across the EU's land and sea areas to ensure the long-term recovery of biodiverse and resilient nature. The regulation also contributes to the EU's climate mitigation and adaptation goals.

Innomission 4's North Star Vision of demonstrating a 40% use of non-virgin and non-fossil materials must now be achieved in compliance with the European Restoration Regulation. This alignment may significantly constrain the use of certain biomaterials. Furthermore, within a Danish context, this challenge will demand closer coordination among the four InnoMissions, especially concerning land use and the strategic allocation of biological resources.

TRACE continuously adapts its strategic initiatives to align with these evolving definitions and regulations, ensuring that its projects remain compliant and impactful within the broader EU framework.

Enhancing Capabilities for Systemic Circular Transitions

RM2021 aligns closely with emerging regulatory developments; its 32 initiatives broadly underpin many of the political shifts currently underway. However, it is also evident that these initiatives are spread across a wide range of directions and approaches to circular transition.

This breadth is both a strength and a challenge. While TRACE's inclusive approach accommodates diverse definitions and interpretations of the circular economy, it also risks creating uncertainty about TRACE's distinct identity and value proposition, especially compared to other circular economy initiatives.

Moving forward, TRACE will stay true to the foundational ambitions of RM2021 while taking deliberate steps to consolidate its activities and clarify its unique contributions. In practice, this involves focusing on more strategically defined areas of operation. These strategic priorities will be reviewed and updated in future amendments to the roadmap, approximately every two years.

Circular economy with a focus on plastics and textiles 2030 & 2050 Roadmap

A Danish society with full circularity

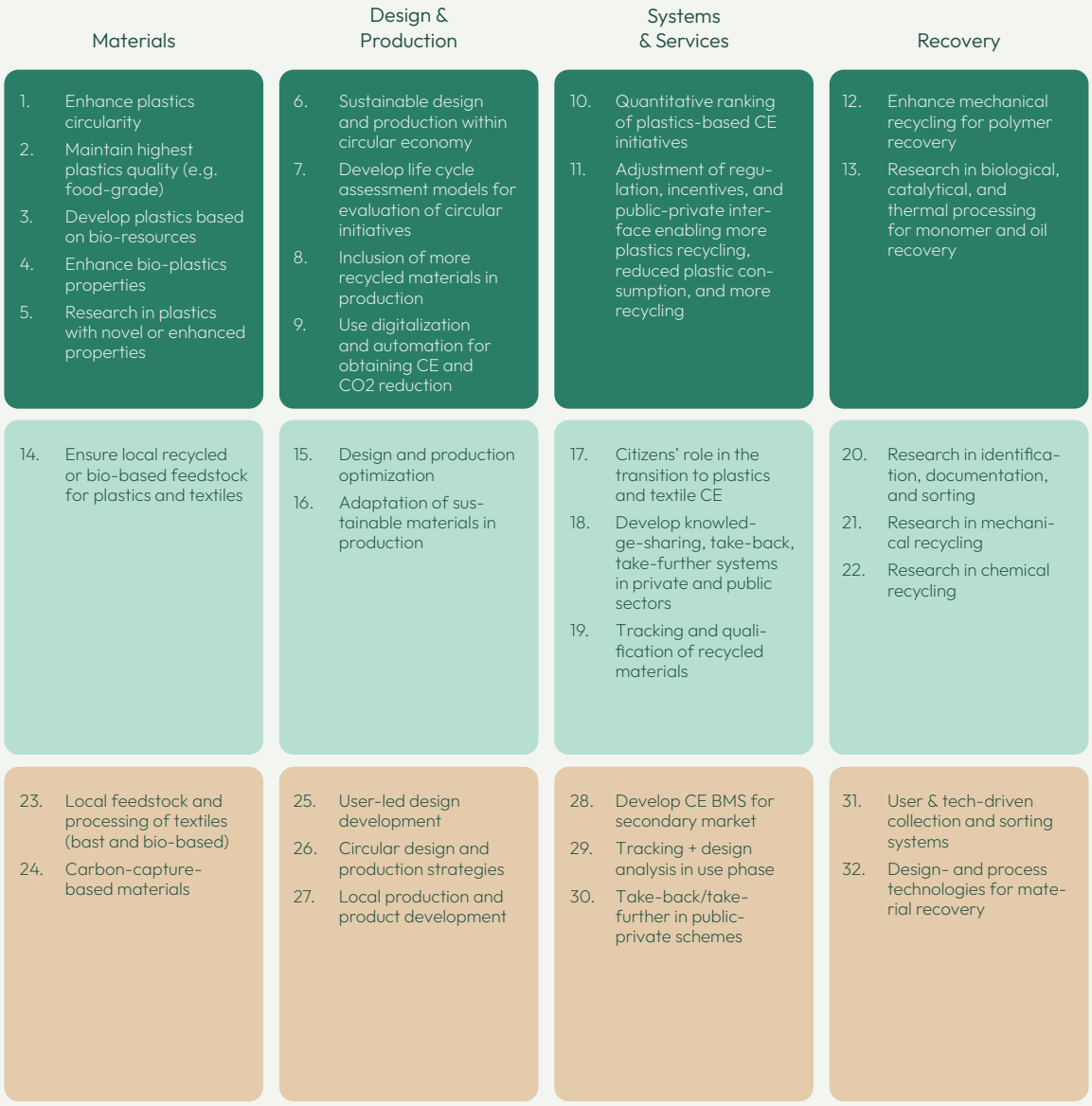


Figure 3. The RM2021 matrix serves as the "Constitution" of the Innomission 4 partnership. Developed collaboratively by over 150 researchers, the matrix provides a common reference point and framework for fostering systemic circular change in Denmark, particularly in plastics and textiles.

While TRACE currently oversees 27 projects, including 8 newly added projects from Pool 2.2 and Pool 3.2, not all of them are completed yet. These projects all respond to milestones of the RM2021 matrix, ensuring systemic synergies and cross-value chain collaboration. However, the 8 new projects initiated in Q4 2024 are not included in RM2025.

A series of efforts has been undertaken to develop frameworks that secure knowledge sharing, strengthen crosscutting themes, and leverage shared research inquiries—all with the goal of fueling the development of a circular infrastructure for plastics and textiles.

TRACE has identified several key challenges that shape its mission, all linked to the overarching goal of enabling the transition to a circular economy. These challenges are closely tied to TRACE's roles as a builder, harmonizer, and pathfinder, and its system design requirements of desirability, feasibility, and viability. These interconnected principles form the foundation for addressing systemic transitions effectively. The challenges underscore the multifaceted nature of driving impactful change in value chain systems and highlight the crucial role TRACE plays in overcoming them.

Five Key Challenges Shaping Innomission 4

1. Defining and Measuring Impact to Drive Transformation

Impact in systemic change extends beyond immediate, quantifiable results. TRACE emphasizes fostering capabilities, building collaborative networks, and embedding solutions within societal contexts to enable longterm transformation. These foundational efforts address systemic barriers, align stakeholders, and develop metrics —such as the Circular Readiness Level (CRL), which serves as a scale, concept, and framework to measure and track circular maturity and systemic progress. This structured approach ensures TRACE creates conditions for sustainable change while pursuing measurable outcomes.

2. Navigating Systemic Complexity with Integrated Solutions

Circular transitions demand solutions that are codesigned to align societal, environmental, and economic contexts. TRACE emphasizes the importance of designing solutions collaboratively across disciplines, sectors, and stakeholders to ensure they address societal needs and are grounded in realworld applicability. This approach focuses on managing the complexity of aligning diverse contexts—whether technical, behavioral, regulatory, or otherwise—ensuring seamless integration into broader systems to achieve longterm societal and market fit. TRACE's work underscores the need for solutions that

support fundamental human needs for wellbeing, aligning with its core principles of desirability, feasibility, and viability.

3. Building Bridges Through Collaboration
Effective systemic change relies on uniting academia, industry, policymakers, and civil society. TRACE acts as a hub for cross-sectoral collaboration, ensuring aligned efforts that create impactful and sustainable systemic transitions. Through its partnerships, TRACE fosters knowledge sharing, joint innovation, and collective action to achieve outcomes beyond the reach of any single actor.

4. Understanding Behavior to Enable Adoption
Behavioral insights are critical to embedding solutions in society. TRACE integrates behavioral research into its projects to meet practical needs, foster societal embedding, and ensure solutions are widely adopted and effective in real-world contexts. This human-centered approach enhances the societal and market fit of systemic transitions.

5. Harmonizing Efforts for Systemic Impact
Stakeholders must see their roles within larger systems to enable effective collaboration. TRACE maintains a systemic overview, harmonizing efforts across value chains to align contributions and create cohesive impacts. This alignment strengthens stakeholder engagement and drives meaningful, measurable progress toward a circular economy.

These challenges frame TRACE's insights and strategies, which are deeply informed by its experimentation across value chains and sectors. This includes piloting collaborative models, engaging diverse stakeholders, and testing scalable solutions that align technical innovation with societal embedding. The organization's work has given rise to new learnings that inform this roadmap, emphasizing the integration of solutions that are desirable, feasible, and viable—principles drawn from TRACE's system design requirements.

Accordingly, this chapter focuses on the activities and progress at both the project level and the intersections between projects.

Developing a Metric: Circular Readiness Level (CRL)

The original RM2021 sets clear targets for GHG emission reduction and certain other key performance indicators (KPIs). The mandate of TRACE is to contribute to these measures and showcase how these impacts are obtained and assessed.

Meeting Northstar ambitions and reduction targets in essence means:

1. Having established a baseline for circularity against which the performance of TRACE can be measured.
2. Meeting the requirements of the Danish law i.e. 70 % GHG emission by 2030.
3. Assessing how the Danish plastic and textile industry are capable of becoming restorative by 2030
4. Asessing how the Danish plastic and textile industry are capable of becoming regenerative by 2050

However, circular transition has evolved and now includes more elements than those that are quantifiable through the initial defined KPIs. The scientific literature on circular economy reflects this, since a general critique relates to the fact that circular economy initiatives often fail to deliver actual changes in society. In the context of TRACE, the importance of more holistic, systemic and interdisciplinary initiatives became apparent during the first phase of the work, where aspects such as knowledge and capacity building across the value chain have proven essential for circular transition.

However, such innovations are not easily quantifiable with traditional KPIs, which implies that there is a need for an impact metric that can be used to measure transition towards circularity. TRACE has therefore initiated work on developing metric to measure and assess levels of maturity for circular transition, the Circular Readiness Level (CRL). The CRL is to be understood as supplementing the already existing metrics of Technology Readiness Level (TRL) and Societal Readiness Level (SRL). The CRL will be essential for TRACE, since it will allow the partnership to assess the development and impact of the funded projects as well as the partnership as a whole, which again is vital for contributing to the North star ambition as well as the mandatory 70% CO2 reduction targets of Trace.

In order to access circular transition two aspects are central; 1) to be able to determine circular tipping points, which guide development of milestones for projects and the TRACE partnership on an overall level, and 2) to have a sufficiently scientific robust assessment metric that can measure this development. These two overall aims are the point of depar-

ture for the development of the CRL. The development of the CRL will be guided by the principles of the waste hierarchy. This implies that processes that lead towards solutions higher in the waste hierarchy will be weighted higher than processes which aim toward lower tiers of the waste hierarchy. Moreover, the CRL will include levels of organizational, systemic and societal tipping point and maturity levels of circular transition.

Hence, the CRL will operate on four different levels to assess the transition on all societal levels. These four levels are: product level, organization level, value chain level and societal level. (see figure 4 as an illustrative concept description of the metric at product level). For each of these levels, a number of categories will be assessed across the four phases across the value chain of the RM2021 matrix; Materials, Design & Production, System and Services, and Recovery.

The metric will also include a weighting between the different categories, to ensure that the most important progress gains the highest impact of the overall score. This weighting will be done by multiplying the specific CRL score with a number between 0-1 and will be guided by the principles of the EU waste hierarchy.

Levels of CRL

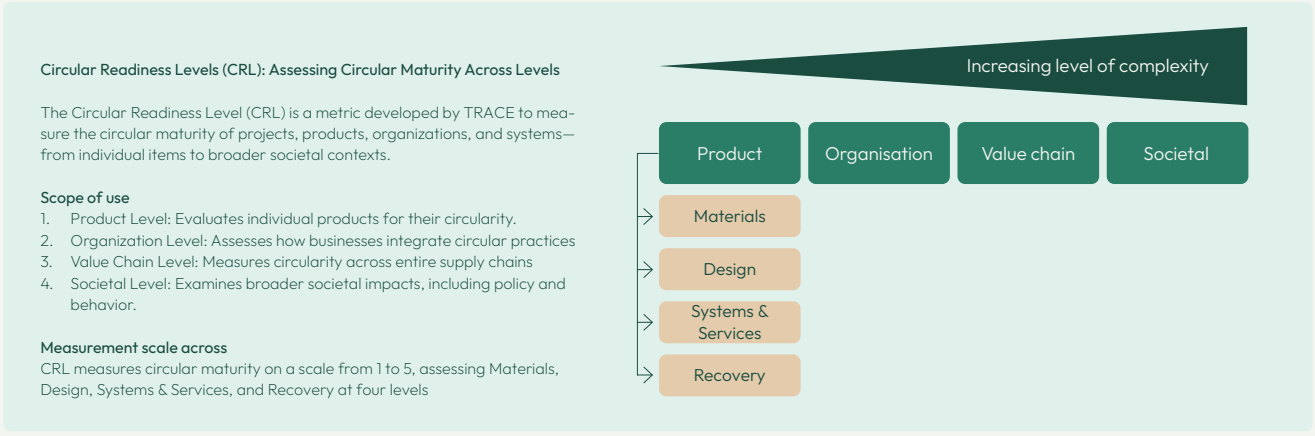


Figure 6: Illustrative concept description of the Circular Readiness Level Metric under development by TRACE.

The CRL metric can be used to assess circular maturity and transition across a multitude of societal organization levels, across the entire value chain, and account for the interdisciplinary and systemic nature of circular development work. Through this, TRACE will gain the ability to assess circular impact in a more holistic manner, and thereby assess projects and developments within the partnership in a comparative manner.

The development of the CRL will be conducted in an abductive manner, which will imply that the partners of TRACE will test the metric after each developmental stage, and that the metric will be refined subsequently. This process aims to ensure that the CRL assessment framework will be developed based on the highest scientific excellence and at the same time be applicable to the partners in reality. By including all partners of TRACE, and thereby harnessing the strength of the mission-based partnership, the framework will enable TRACE to breach the gap between scientific development and actual changes in the societal ecosystem, that circular economy is often criticized for failing to do.

An abductive approach to make it work in reality

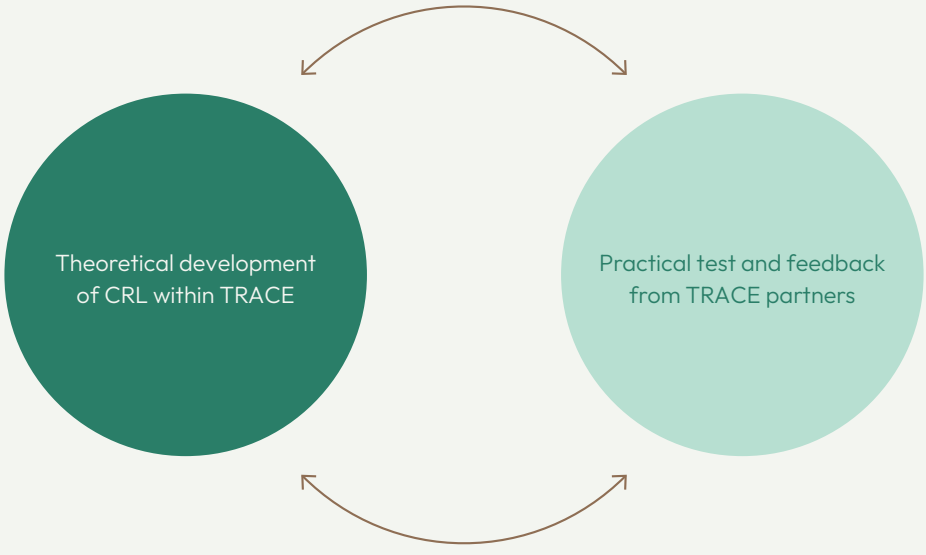
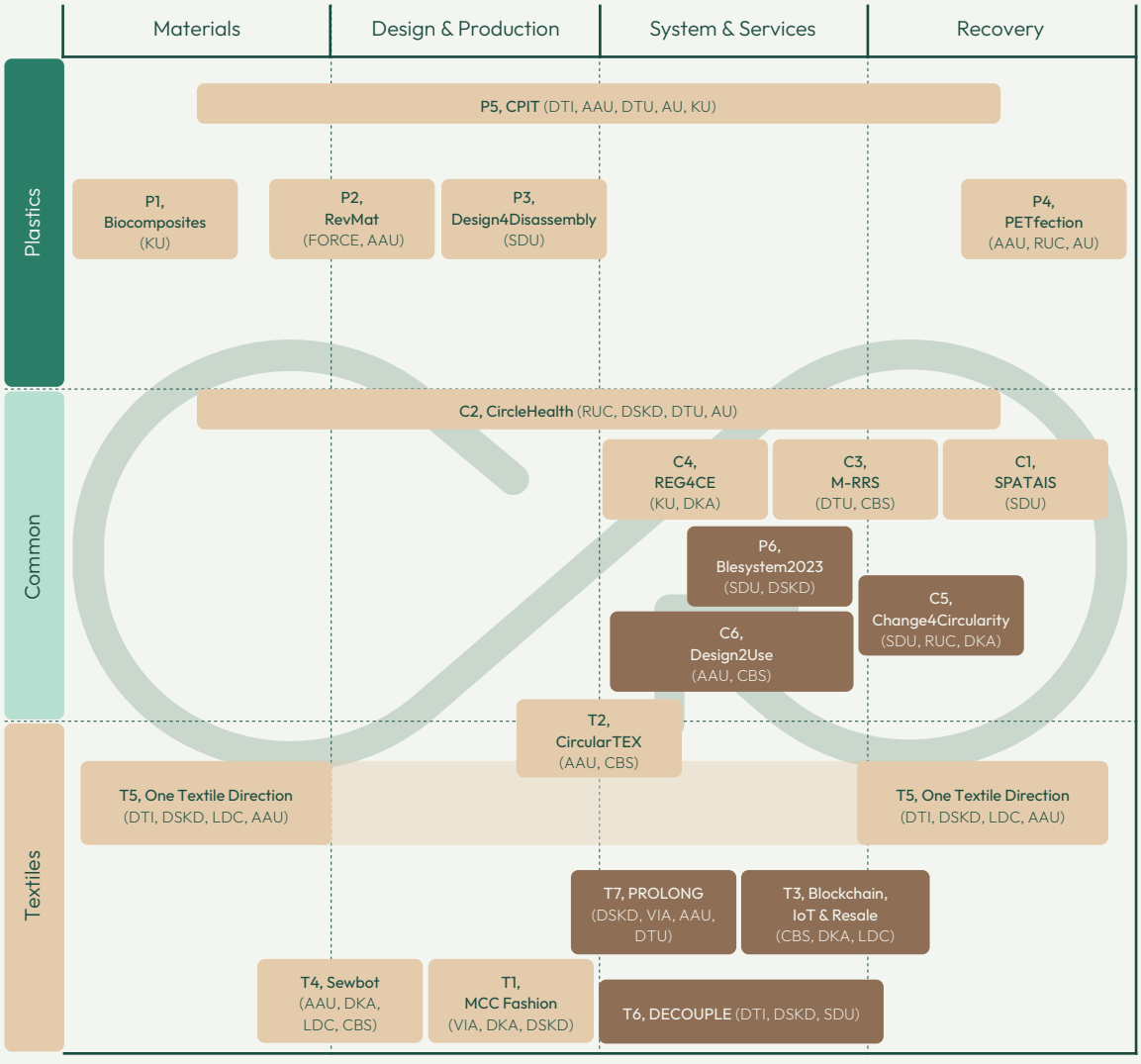


Figure 5: The abductive approach envisioned for the development of the CRL metric. The approach ensures a strong synergy between scientific development and useability, by including partner teat and feedback during the development process.

Overview of Pool 1 and Pool 2 Projects

The projects funded under Pool 1 and Pool 2 are critical components in realizing TRACE's strategic objectives. These initiatives directly address the 5 systemic challenges outlined previously. By integrating knowledge from diverse sectors, these projects provide the foundation for building scalable circular systems in textiles, plastics, and beyond. The following subsections detail the contributions and focus areas of these projects.



Budget per project as a percentage of the total budget for all projects

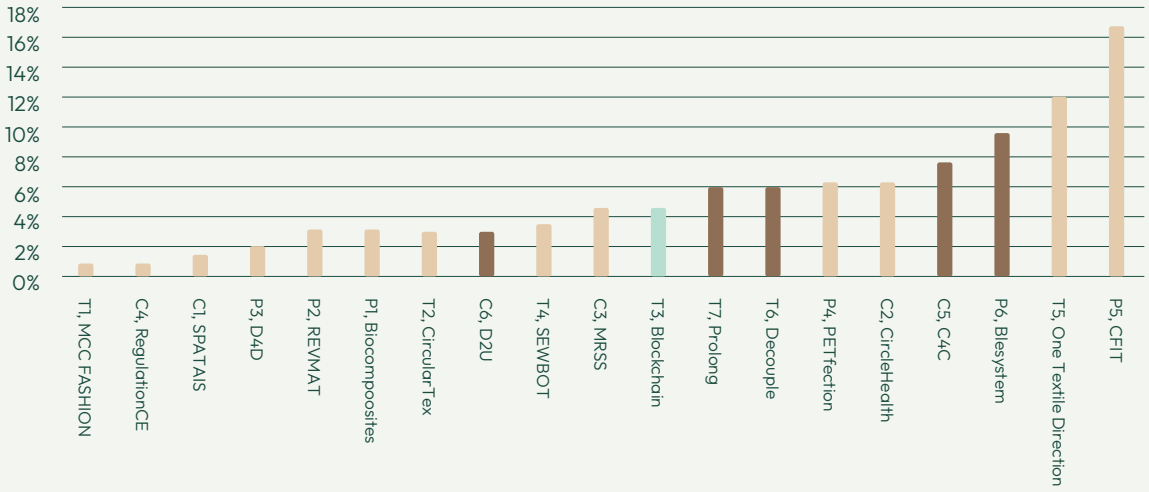


Figure 6: Caption: The 19 projects funded under Pool 1 and Pool 2 by TRACE are all integral elements in facilitating a circular infrastructure for plastics and textiles in Denmark. Guided by the vision in RM2021, these projects foster synergies and learning across projects, material streams, and value chains.

Having examined the content and positioning of the 19 projects, it becomes clear that they span different areas within the RM2021 matrix. Focusing on the individual workstreams of textiles, commons, and plastics, the project activities are distributed as follows:

Circularity Initiatives in Textiles

The textile track currently holds 5 Pool 1 projects and 2 Pool 2 projects, which together constitute various important perspectives on the circularity of textiles. The Pool 1 and 2 projects MCC FASHION – Mass Customization for Circularity, SEWBOT, Prolong, and Decouple are all deeply involved with ways in which new approaches to the design and production of particularly garments can help reduce overproduction and eliminate excess production of both fashion clothing and workwear.

The Pool 1 projects CircularTex and Blockchain, IoT, and Resale investigate, at various levels, how systems and services for more resourceful utilization of existing products can be furthered through collaboration, knowledge sharing, and adjustment of existing procedures.

Finally, the project One Textile Direction focuses on the recovery of textiles, with particular emphasis on recycling and how recycling practices can be matured in a Danish context.

In sum, there is currently very little focus on the start of life of materials. Rather, the focus is on various practices and approaches that can secure more resource efficiency and long-term utilization within the focus areas of product development, product consumption, and post-consumption textile resources.

Circularity Initiatives in Plastics

The plastics track holds 5 Pool 1 projects. In the wide-scoped project Circularity of Industrial Thermoplastic for High-Quality Recycling, the ambition is to pilot an infrastructure model for recycling at the highest possible level, preferably keeping resources in-house at individual partner operations.

The project Biocomposites to Substitute Plastics is focused on materials and investigates how agro-industrial side-streams can be exploited for cellulose nanofibers to be utilized in food packaging.

The projects Reverse Material & Product Requirement Planning and Design for Disassembly both lie in the area of design & production, investigating how recycled and re-used content aligns with recent regulatory requirements and how this informs design development for optimizing resource utilization.

Finally, the project in the area of recovery, PETfection, looks into opportunities for recycling household plastic waste, with particular focus on salvaging, purifying, and handling re-utilization of PET plastics.

In sum, it can be concluded that, until now, there has been a strong focus on the materials level—particularly recycling—and on how more refined sorting systems can support technological solutions. However, there has been relatively less focus on the implications of virgin plastics utilization within design, production, systems, and services.

Commons: Integrated Circularity for Textiles and Plastics

The commons track holds 4 Pool 1 projects and 3 Pool 2 projects that constitute a mix between textiles and plastics. Covering all four tracks of materials, design & production, systems and services, and recovery, the Pool 1 project CircleHealth investigates how plastics

and textiles flow in and out of hospital settings, and how systemic efforts can be installed to reduce and prolong resource utilization.

In the area of systems and services, the Pool 1 and 2 projects Mattress Reuse and Recycle Systems, Dipersystem, and Design2Use cover a wide range of product types, including interior and hygiene, with the aim of locating opportunities for preventing resources from becoming waste through various co-creation strategies.

Located in the same pillar, the projects Regulation and Promotion of CE and Change-4Circularity have multiple purposes: building data for a more circular assessment policy, while also informing and engaging stakeholder groups such as policymakers, NGOs, industry, and the wider Danish population.

Within the area of recovery, the project Sorting Plastics and Textiles Using AI-Driven Sensing Solutions investigates opportunities for a more refined and efficient sorting of waste streams.

Altogether, the commons track covers a wide range of projects with a strong systems focus, placing them naturally in the systems and services area.

Key Insights Across Projects

The projects funded under Pool 1 and Pool 2 have generated critical insights that advance TRACE's mission of fostering systemic circular transitions. These learnings not only address the systemic challenges outlined TRACE has identified, but also inform the development and application of the Circular Readiness Level (CRL) metric. By identifying recurring themes across projects—such as collaboration, stakeholder engagement, and systemic transitions—TRACE is better positioned to align its efforts with its North Star ambitions. The following key insights reflect TRACE's ability to integrate technical innovation with societal embedding, offering a roadmap for scaling circular solutions across value chains.

Creating systemic change to transition to a circular economy is inherently complex, requiring solutions that are not only innovative but also societally embedded. This complexity highlights the unique challenge TRACE faces in aligning innovative approaches with societal contexts. The insights outlined below address these challenges and demonstrate how TRACE's role integrates systemic goals with actionable outcomes:

Each insight reflects TRACE's response to its overarching challenges, contributing to its mission-driven approach:

1. Cross-Disciplinary Collaboration

- Challenge Addressed: Ensuring alignment across diverse stakeholders.
- Insight: Collaboration has revealed the innovation potential within circular ecosystems, significantly increasing awareness and fostering shared goals.
- Example: The Change4Circularity project engaged 30.000 pupils from public schools and high school.

2. User-Centric Models and Resource Efficiency

- Challenge Addressed: Reducing inefficiency and overproduction.
- Insight: User-centric models optimize resource use by tailoring production to demand, advancing scalable circular systems.
  Example: The MCC Fashion project demonstrated how consumer insights drive waste reduction and efficiency.

3. Product Longevity and Sufficiency-Based Circular Economy

- Challenge Addressed: Extending product lifecycles to preserve value and reduce waste.
- Insight: Highlight strategies for advancing sufficiency-based circular economy principles.
- Example: Design2.Use (starting 2025) will explore circular furniture design, demonstrating feasibility and extended lifespans.

4. Education and Dissemination of Circular Practices

- Challenge Addressed: Preparing future leaders and current practitioners to adopt circular practices.
- Insight: Educational initiatives have addressed barriers to product longevity and aligned company strategies with EU policy.

- Example: Workshops conducted under the project Regulation for promotion of Cicular Economy propagated key circular economy principles for textiles. Also, the

project Change4Circularity developed educational material for pupils across Denmark.

5. Public Procurement as a Catalyst

- Challenge Addressed: Leveraging public procurement to drive systemic change.
- Insight: Embedding circularity into procurement strategies accelerates industry-wide adoption.
- Example: CircularTEX provided sustainable furniture procurement guidelines.

6. Workshops and Systems Thinking

- Challenge Addressed: Promoting a systemic perspective among stakeholders.
- Insight: Systems-thinking workshops encourage stakeholders to understand their roles in the broader transition. TRACE's focus on aligning stakeholders by communicating the big picture—how each actor fits into the grander scheme—has proven crucial in overcoming the complexity of circular systems.

7. Circular Innovation Through Pilot Projects

- Challenge Addressed: Demonstrating practical and scalable solutions.
- Insight: Pilot projects have showcased actionable paths for circular innovation, focusing on reducing, reusing, and remanufacturing.
- Example: CircularTEX developed circular procurement strategies for textiles, emphasizing reuse and extended lifespans.

8. Global Collaboration and Academic Foundations

- Challenge Addressed: Ensuring alignment with international trends.
- Insight: Partnerships with global researchers have expanded TRACE's reach and academic foundation.

Each insight reflects TRACE's response to its overarching challenges, contributing to its mission-driven approach:

Summary of Themes Across Projects

Several key themes have emerged across the projects funded by TRACE. First, the impact of cross-disciplinary collaboration is evident. Projects have significantly increased awareness of the innovation potential within circular ecosystems, with partners recognizing their roles in transforming towards a circular economy. Workshops and collaborative efforts have proven critical in aligning stakeholder contributions with TRACE's systemic goals.

In particular, themes such as resource efficiency, product longevity, public procurement, and systems thinking have become central to TRACE's approach. For textiles, user-centric models serve as a first step toward scalable, customizable production, optimizing resource use while meeting individual customer needs. Similarly, projects in the plastics track emphasize advanced recycling technologies and material innovations to support circular transitions.

The education and dissemination of circular practices also stand out, highlighting TRACE's commitment to fostering future leaders and aligning industry strategies with EU policy. Workshops and pilot projects further reinforce TRACE's systems-thinking approach, offering practical models for scaling circularity across sectors.

By integrating academic research, industry collaboration, and stakeholder engagement, these initiatives contribute to establishing tipping points for a future where circularity is central to production and consumption. TRACE's ability to navigate these themes positions it as a leader in advancing systemic circular transitions.

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The main opportunity is to continue building on the portfolio of complementary projects. It is a challenge to find a way to measure the effect of working with a portfolio of projects, at least to measure it before 2030.

Søren Kristiansen, Senior Director of Technology, LEGO Group, Board Member, TRACE

Ensuring Synergies Between Projects

The projects initiated and completed under TRACE have generated significant insights, pilot testing results, PoC CE-Systems for circular infrastructure, and meaningful outputs in the form of scientific publications and societal impact. However, it has become clear that TRACE's strength lies not solely in the individual projects but in the synergies created between them. The ability to transfer knowledge, recommendations, principles, and implementation models across projects and the broader partnership amplifies TRACE's impact beyond isolated successes.

To this end, the TRACE management group has emphasized that the partnership should not function as a "project hotel"—a collection of siloed initiatives—but rather as a unified collaboration that captures, facilitates, and disseminates knowledge and experiences. This approach fosters collective learning and strengthens the partnership's overall capacity to drive systemic circular transitions.

Evolving the Synergy Approach

Mission-based research is a relatively young field, with few established frame works for fostering synergies. As a result, TRACE has adopted a design-thinking approach, focusing on iterative testing and evaluation to develop collaborative formats. Initial efforts have centered on establishing a shared language and understanding of TRACE's ethos and vision. While these efforts have primarily engaged principal investigators (PIs) of the projects, the next phase will expand to further include project partners and a broader circle of stakeholders—an evolution closely tied to TRACE Academy.

TRACE Academy will play a pivotal role in testing dissemination strategies for project insights, capturing ongoing value, and engaging current and future partners in vibrant knowledge-sharing initiatives. Through these efforts, TRACE aims to create a dynamic environment for debate and collaboration on circular transitions.

Early Synergy Activities

From the outset, synergy-building has been integral to the RM2021 matrix. At the first meeting of PIs for Pool 1 projects in January 2023, a full day was dedicated to cross-project learning and exploring mutual benefits. These sessions have evolved into biannual PI days, where knowledge-sharing formats are continuously refined. As a result, the partnership has seen increasing interest in thematic discussions, shared publication efforts, and the development of new project ideas and infrastructure models emerging from existing initiatives.

TRACE has also introduced "project creation days" to facilitate collaboration among researchers, industry representatives, municipalities, and other stakeholders. These events have proven instrumental in generating viable project ideas and partner constellations. For example, all funded Pool 2 projects originated from the January 2023 creation day in Kolding, and similar success is anticipated for Pool 3.2 following the May 2024 event in Odense.

Refining the Application Process

Building on lessons learned from Pool 1, TRACE implemented a two-step application process to ensure new projects align with existing initiatives and contribute to the partnership's overarching goals. This process begins with an assessment by researchers from the Eureka network under the European Commission, who evaluate applications for their technical and scientific merit. Subsequently, TRACE's board assesses the proposals against "Criteria 4," a set of guidelines introduced in Pool 2 to promote synergies. Applicants must demonstrate how their projects will:

1. Allocate dedicated time for synergy-building activities such as workshops and dissemination beyond individual project levels.
2. Support the development of Denmark's circular infrastructure by linking with existing projects, addressing gaps in the RM2021 matrix, or strengthening ongoing activities.

This rigorous process ensures that all funded projects not only meet scientific and technical standards but also actively contribute to TRACE's mission of systemic change in close connectic with extising TRACE projects.

Future Directions for Synergy Development

Looking ahead, TRACE plans to deepen its synergy efforts by:

- Broadening Stakeholder Engagement: Expanding beyond PIs to include project partners, industry stakeholders, and policymakers.
- Enhancing Dissemination Mechanisms: Developing structured formats for sharing insights and outcomes through TRACE Academy.
- Fostering Cross-Disciplinary Collaboration: Encouraging interdisciplinary dialogue to bridge gaps between STEM and SSH fields.
- Integrating Synergy into Project Lifecycles: Embedding collaborative activities as a core component of project design and execution.

By prioritizing these actions, TRACE aims to maximize the collective impact of its partnership, transforming isolated project outcomes into a cohesive and scalable framework

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The value of the TRACE partnership is first of all the collaborative approach facilitated by the shared roadmap between the research institutions and the many different stakeholders involved in the partnership.

Marie Busck, Head of Sustainability, Danish Fashion and Textile (DM&T), Advisory Group Member,

for systemic circular transitions. Through continued iteration and innovation, TRACE will solidify its role as a leader in mission-based research, driving meaningful and sustainable change across value chains and sectors.

The stronghold of TRACE lies in the synergy between projects

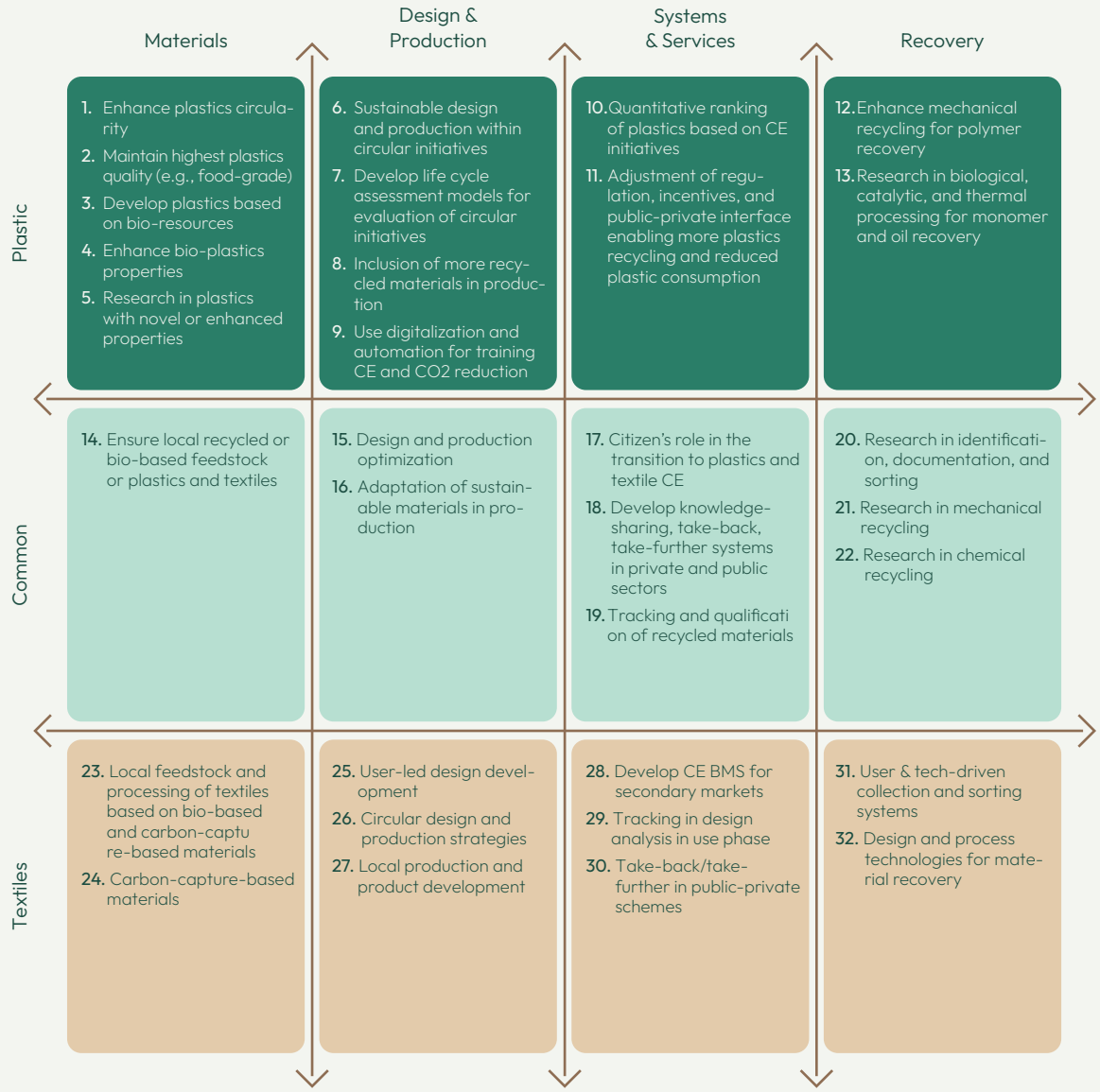

Figure 7. Caption: Focus on the 'glue' between projects and across value chains and material flows is the central focus of the partnership's work. This includes how results and insights from individual projects (which are part of the 32 initiatives in various ways) are captured, embedded, and activated across the partnership's activities..

Concluding on capabilities

TRACE has demonstrated remarkable adaptability and commitment to its mission by developing and strengthening its capabilities to address the complexities of circular economy transitions. By building on the foundation established in RM2021, TRACE has evolved into a dynamic and mission-driven partnership that bridges gaps across sectors, disciplines, and value chains.

The introduction of the Circular Readiness Level (CRL) metric will mark a significant step forward, providing a robust metric for assessing circular transitions at multiple levels. This innovative metric highlights TRACE's ability to operationalize systemic change, equipping partners with actionable insights and measurable outcomes.

The breadth of projects under Pool 1 and Pool 2 underscores TRACE's capacity to integrate diverse initiatives into a cohesive strategy. These projects advance circular solutions for plastics and textiles while fostering stakeholder collaboration and driving innovation across value chains.

Key insights from TRACE's projects highlight the importance of cross-disciplinary collaboration, user-centric models, product longevity, and public procurement as levers for systemic change. These efforts are supported by TRACE's ability to engage stakeholders through education, dissemination, and systems thinking, ensuring that technical innovations are societally embedded and scalable.

Moreover, TRACE's focus on creating synergies between projects reinforces its role as a unifying force in the circular economy landscape. By prioritizing shared learning, collaborative formats, and integration across initiatives, TRACE maximizes the collective impact of its partnership, setting a strong foundation for future growth and international collaboration.

Looking ahead, TRACE's strategic emphasis on scaling PoC CE-Systems, operationalizing the CRL, and fostering global partnerships positions it as a leader in advancing systemic circular transitions. With its unique combination of academic rigor, practical application, and stakeholder engagement, TRACE is well-equipped to navigate the challenges and opportunities of a rapidly evolving landscape, ensuring its relevance and impact in achieving Denmark's ambitious circular economy goals and contributing to global sustainability efforts.

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You can only create value in collaboration.

Søren Kristiansen, Senior Director of Technology, LEGO Group, Board Member, TRACE

Trace's Impact Over the Last Years

TRACE has made significant progress in advancing the circular economy over the past few years. TRACE has driven systemic change across industries and sectors through 19 innovative projects supported by 120 partner organizations, including universities, research institutions, industry leaders, and public stakeholders, helping to build a broad and diverse collaborative network.

As part of TRACE's unwavering mandate, we are committed to delivering measurable impact through transparent and robust methodologies. This includes quantifying outcomes such as CO2 reductions and material efficiency improvements. While achieving specific targets, such as the North Star ambition of a 55% reduction in virgin and fossil-based fibers, is an aspirational goal, TRACE cannot promise to deliver exact results at this stage. However, we can guarantee that we are laying a solid foundation to measure the progress we make.

Through metrics like the Circular Readiness Level (CRL), TRACE is able to assess and measure circular maturity across various levels—product, organization, value chain, and societal systems. The CRL allows us to track and report on progress, ensuring that we can demonstrate measurable outcomes that align with our long-term sustainability goals.

While TRACE has made significant strides, it is important to recognize that many projects are still ongoing, particularly those in Pools 2 and 3, which focus on scaling solutions and addressing more complex, systemic innovations. Pool 1 projects primarily targeted foundational concepts and early-stage demonstrations, laying the groundwork for measurable impact. The full potential of TRACE's efforts will emerge as Pools 2 and 3 advance, enabling the implementation and scaling of circular solutions with long-term systemic change in mind. This phased approach ensures that solutions are not only innovative but also practical, scalable, and embedded across societal and industrial systems.

As we continue this work, it is crucial to acknowledge that TRACE is building a robust framework for delivering on its ambitious goals. While not all results are available at this stage, initial findings already demonstrate meaningful progress, and TRACE remains committed to refining and reporting on achievements as we move forward. Impact Measured Through Partner Evaluations

The partner evaluation highlights TRACE's ability to consistently deliver value and maintain strong partnerships. With a focus on collaboration, execution, and resource alignment, the survey results demonstrate high levels of satisfaction:

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TRACE is a unique platform for establishing and supporting strong partnerships across industries and research- and learning institutions which create the platform for innovation and solutions under the banner of sustainability and circularity.

Jens Mortensen, Chief Innovation Officer, Marius Pedersen, Board Member, TRACE

TRACE's key achievements the last three years

Table 2

Key Achievements	Linked Challenge	Future Prioritized Key Areas	Case Example
Scalable PoC CE-Systems integrating solutions across value chains: Serving as blueprints for circular infrastructure.	Systemic Complexity: PoC CE-Systems help navigate the societal, environmental, and economic complexity of value chain transitions.	Scaling PoC CE-Systems: TRACE will expand local pilot projects to build momentum for national and international circular infrastructure.	Circular Textile Pilots Project: Municipal collaborations develop circular procurement strategies for textiles, reducing waste and resource consumption while enhancing durability.
Cross-sectoral collaborations aligning stakeholders' efforts toward systemic circular impact: TRACE Academy facilitates connections between academia, industry, and policymakers.	Collaborative Necessity: Achieving systemic change requires aligned efforts across stakeholders and sectors.	Integrating Education and Capacity Building: TRACE Academy will expand its offerings of workshops, educational programs, and best practices to equip leaders for circular transitions.	Change4Circularity Project: Engages 30,000–50,000 students in Denmark to collect data on plastic waste, fostering education and collaboration while generating actionable insights.
Engaged stakeholders in co-creating innovative solutions for systemic challenges in textiles and plastics: TRACE drives co-creation to embed solutions in society.	Behavioral Insights: Solutions must address human behaviors and encourage practical adoption.	Strengthening Stakeholder Engagement: TRACE will collaborate with policymakers, NGOs, and industries to overcome legislative barriers and align with the EU's Circular Economy Action Plan.	Mattresses Reuse and Recycle Systems Project: Develops approaches for reusing and recycling mattresses by involving manufacturers, waste managers, and other stakeholders to reduce landfill contributions.
Concrete projects and partnerships ready for internationalization: TRACE's innovations provide scalable solutions for global circular transitions.	Communication and Alignment: Clear communication ensures stakeholder roles are aligned and solutions are ready for scaling.	Systemic Innovation with Concrete Results: Projects will foster innovation across design, production, and recovery, creating scalable solutions for circular systems.	Biocomposites to Substitute Plastic Project: Utilizes agro-industrial byproducts (e.g., cellulose nanofibers) to develop sustainable packaging alternatives, reducing reliance on virgin plastics.
Expanded global presence through international collaborations: TRACE leverages expertise to expand its impact globally.	Communication and Alignment: Stronger regional and international collaborations enhance systemic circular transitions.	Internationalization: TRACE will align with EU funding programs (Horizon Europe, LIFE) and international partners, fostering synergies with organizations like the Ellen MacArthur Foundation and PACE.	TRACE is developing collaborations with international stakeholders to scale circular solutions globally, particularly in Nordic and EU contexts.

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TRACE is instrumental in bringing partners together to ensure progress towards more circular and sustainable plastics and textiles value chains.

Lars Mortensen, Principal Adviser, European Environment Agency (EEA), Advisory Group Member, TRACE

Impact Measured Through Partner Evaluations

The partner evaluation highlights TRACE's ability to consistently deliver value and maintain strong partnerships. With a focus on collaboration, execution, and resource alignment, the survey results demonstrate high levels of satisfaction:

Table 3

Overall Satisfaction	100%
Partners that were "satisfied" or "meeting expectations," and 18% rated TRACE as "excellent" or "above expectations."	80%
Satisfaction with Execution	88%
Partners that stated the project execution met expectations, while 14% rated it "above expectations."	74%
Adherence to Project Plans	80%
Partners that indicated the projects "mostly" followed the plan, and 20% said they adhered "completely."	60%
Resource Satisfaction	91%
Respondents that were "satisfied" with resources, while 9% rated them as "excellent/above expectations."	82%

The evaluation of TRACE's projects demonstrates a high level of satisfaction among partners, reflecting TRACE's ability to facilitate collaboration and achieve impactful outcomes. Notably, 100% of partners reported overall satisfaction, underscoring the partnership's effectiveness in driving systemic innovation and enabling valuable cross-sector collaboration.

Satisfaction with the project execution is similarly high. 88% of partners stated that execution met or exceeded expectations, with 74% indicating it met expectations and 14% describing it as "above expectations." Only a small fraction of respondents noted any challenges, highlighting TRACE's effective project management. Partners emphasized the adaptive approach and the commitment of stakeholders as key factors in overcoming obstacles and achieving milestones.

Regarding adherence to project plans, TRACE demonstrated strong alignment with objectives. 80% of partners indicated the projects "mostly" followed the plan, and 20% reported complete adherence. This ability to stay on track, even when adjustments were necessary, demonstrates TRACE's agility in managing challenges while ensuring progress toward project goals. Minor delays in timelines or deliverables were effectively addressed through proactive adjustments, ensuring steady momentum.

Satisfaction with resource availability remains strong, with 91% of respondents expressing satisfaction. 82% were satisfied, while 9% rated resources as "excellent/above expectations." While an additional 9% indicated resource allocation was "below expectations," challenges related to early administrative issues were largely mitigated through collaboration and adaptive management during implementation.

Key lessons learned from the evaluation emphasize the importance of early alignment among partners to streamline resource allocation and ensure clarity of objectives. Stakeholders also highlighted the need for TRACE to continue strengthening synergies across projects to maximize knowledge sharing and cross-disciplinary impact.

Initial results demonstrate TRACE's measurable progress in advancing the circular economy. Metrics like the Circular Readiness Level (CRL) are critical for systematically documenting and assessing impact, ensuring TRACE remains on track to achieve its long-term goals.

Overall, partners view TRACE as a highly effective platform for driving systemic change, fostering innovation, and generating actionable insights across industries and academia. These insights will form the foundation for TRACE's broader impact reporting, which will

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It is extremely valuable for society to get facts and knowledge to act upon. Coherent facts where many aspects have been included because many stakeholders have contributed is really what is needed.

Connie Hedegaard, Former Danish Minister for Climate and Energy, Advisory Group Member, TRACE

explore how quantification efforts align with TRACE's ambitions to achieve measurable environmental impact reductions.

Impact Measured Through Activities

Through 19 innovative projects, TRACE has achieved significant results, demonstrating its broad collaboration and contribution to circular economy solutions. TRACE works with 120 partner organizations, including universities and research institutions driving innovation, industry leaders piloting and scaling solutions, public and policy stakeholders aligning efforts with EU directives and national goals, and global initiatives such as Horizon Europe, LIFE programs, and the Ellen MacArthur Foundation.

TRACE's 341 contributions underline its role as a driving force for collaboration, innovation, and knowledge sharing, making a significant impact on circular economy development in Denmark and internationally. As the projects progress, the scientific contributions will continue to build over the next coming years, allowing TRACE will solidify its leading position withing circular transition

Table 4

Type	Count
Publications	31
Peer-reviewed scientific articles	13
Reports	3
Other publications	15
Workshops and Events	104
External workshops	19
Project workshops	43
Conference presentations	20
Meetings with key stakeholders	22
Education-Related Contributions	53
Bachelor's theses	6
Master's thesis	21
Phd's	5
Post Docs	7
Teaching modules based on TRACE results	14
Communication Activities	107
Debates	12
Video and podcast projects	12
Media appearances	83
Scientific and Business Results	46
New knowledge contributions	18
New data contributions	7
New strategies and guidelines	2
New prototypes, procedures, and methods	12
New technologies and tools	6
Public tender with circular elements	1
Contributions in Total	341


nutcase

Strategic Positioning and Future Directions

TRACE Strategic Positioning

Mission-based partnerships are gaining considerable interest at various levels, as it is increasingly recognized that no single actor can tackle the circular and sustainable transition alone. However, TRACE has faced challenges due to limited access to well-tested methodologies and approaches for establishing, driving, and accelerating such missions.

The 32 initiatives within RM2021 encompass a broad spectrum of circular economy (CE) approaches, pointing in multiple directions. This has created a need for more focused operations and selective, strategic engagement with these initiatives. TRACE must position itself more strongly within the ongoing projects and networks that promote the circular economy in plastics and textiles. The first two years of TRACE's existence were focused on mobilizing, testing, and consolidating the partnership. Moving forward, the next phase will center on expanding TRACE's activities beyond Denmark to include the Nordic region and the EU.

Drawing from well-established examples such as Denmark's plastic bottle refund system and the use of industrial laundries for textiles, TRACE is increasingly looking for opportunities to build circular infrastructures. This involves focusing on shared facilities, leveraging Industry 5.0 technologies, developing knowledge-sharing networks, supporting collaborative business models for circular infrastructure, and integrating civil society into the process.

A systemic approach is essential to the realization of a circular economy for textiles and plastics, as well as to achieving the TRACE partnership's goals. Collaboration, co-creation, new ecosystems, and open innovation across the value chains are critical. Achieving these objectives requires different competencies and the involvement of key stakeholders, such as researchers from various disciplines, representatives from civil society, and public and private organizations, including SMEs and start-ups. While this approach must be applied within individual projects, the new Pool 3 'Solution' projects will complement, explore, and enable synergies with existing projects in the TRACE Partnership.

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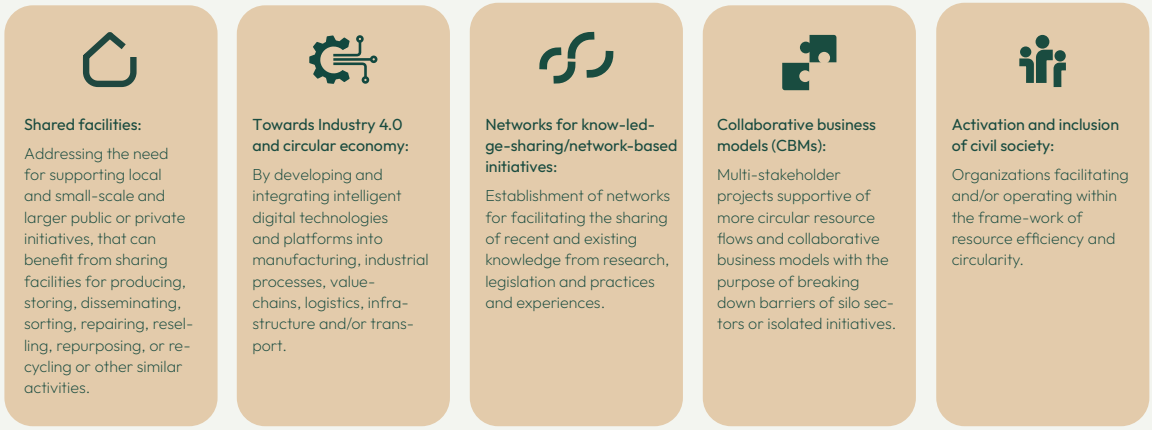
We need to make a huge change in the way we consume the world’s resources – now and in the future. To achieve this, new knowledge, technologies, and collaboration across the entire supply chain are essential.

Christina Busk, Director of Sustainability, The Danish Plastics Federation, Advisory Group Member, TRACE



Building Circular Infrastructures

TRACE has established itself as a key player in Denmark's circular transition, collaborating with national programs and research institutions, such as the Technical University of Denmark (DTU) and the Danish Technological Institute (DTI). At the regional level, TRACE aligns with Nordic initiatives, including those led by the Nordic Council of Ministers and Nordic Innovation. Despite these achievements, TRACE's presence in international and EU initiatives remains primarily exploratory, offering opportunities to strengthen its influence through strategic partnerships and active participation in global CE frameworks.

Within Denmark, the Nordic countries, and the EU, numerous CE initiatives have emerged since 2021. TRACE must strategically position itself in this evolving landscape, establishing clear strategies and value propositions that link with national and regional initiatives, EU cluster strategies, and synergies with other CE initiatives.

The systemic approach is mandatory when applying for projects under this theme, with an emphasis on the following key areas:

- Shared Facilities: Supporting both small-scale and larger public or private initiatives that benefit from shared facilities for activities such as production, storage, sorting, repair, resale, repurposing, or recycling.

- Building Circular Infrastructeres: Integrating intelligent digital technologies and platforms into manufacturing, industrial processes, logistics, infrastructure, and transport to enhance circular economy practices.

- Networks for Knowledge-Sharing: Establishing networks that facilitate the sharing of existing and new knowledge from research, legislation, and practical experiences to further a circular economy.

- Collaborative Business Models (CBMs): Promoting multi-stakeholder projects that foster circular resource flows and collaborative business models, breaking down barriers between siloed sectors and isolated initiatives.

- Activation and Inclusion of Civil Society: Engaging organizations within the resource efficiency and circularity framework to ensure that civil society actively contributes to advancing circular economy goals.

Future Directions and Approaches to Successful Systemic Change

To consolidate its position as a leader in the systemic circular transition, TRACE aims to strengthen its influence both locally and internationally, focusing on key regional collaborations and technological advancements with strict adherence to a systemic approach.

Local and Regional Collaboration

These aims focus on strengthening TRACE's role within Denmark and the Nordic region, creating a foundation for expanding circular economy initiatives locally before moving to international scales.

- Expand Collaboration within Denmark and the Nordics
  Deepen partnerships with national and regional programs (e.g., Nordic Council of Ministers, Nordic Innovation). Focus on sector-specific initiatives in textiles, plastics, and industrial systems to address regional challenges and leverage strengths. Support shared facilities and support shared circular solutions and investments at regional level to scale circular infrastructure.

International Engagement and Scaling

These aims focus on strengthening TRACE's presence and influence at the EU and global levels, integrating international efforts into the broader circular economy transition.

- Increase Engagement with EU Cluster Strategies
  Align with EU funding programs (e.g., Horizon Europe, LIFE) to scale TRACE's initiatives across Europe.
  Build relationships with key EU actors (e.g., European Commission, European Invest-

ment Bank) to influence regulatory frameworks and drive innovation.
Promote networks for knowledge-sharing and collaborative business models (CBMs) across the EU to foster circular economy adoption.

- Form Synergies with Global CE Initiatives
  Establish partnerships with global organizations (e.g., Ellen MacArthur Foundation, Circle Economy, Wuppertal Institute).
  Collaborate with international platforms such as PACE to amplify TRACE's global impact.
  Activate and include civil society globally in circular economy initiatives.

Technological Innovation and Infrastructure Development
This category focuses on advancing the technological capabilities and infrastructure needed to drive circular economy practices at scale.

- Support Shared Facilities for Circular Infrastructure
  Promote small and large-scale shared facilities for activities like production, sorting, recycling, and repurposing.
  Ensure public and private sectors collaborate to improve circular infrastructure at both local and regional levels.

- Integrate Industry 5.0 Technologies into Circular Economy Practices
  Drive the adoption of intelligent digital technologies (e.g., AI-driven sorting, automation, blockchain) in manufacturing, logistics, and recycling processes.
  Enhance circular practices from local manufacturing to global supply chains, leveraging smart technologies for efficiency and sustainability.

Knowledge-Sharing and Collaboration
This category focuses on facilitating the exchange of knowledge, best practices, and research findings across stakeholders and regions.

- Build Networks for Knowledge-Sharing
  Establish and strengthen networks that connect researchers, policymakers, industry leaders, and civil society.
  Facilitate the exchange of knowledge from research, legislation, and practical experiences to drive circular economy innovation.

Foster Collaborative Business Models (CBMs)
Promote multi-stakeholder projects that break down barriers between industries (e.g., textiles, plastics, and waste management).
Create scalable, inclusive business models that align with circular economy principles and contribute to regional and global sustainability goals.

Civil Society Engagement and Inclusion
These aims emphasize the role of civil society in advancing the circular economy and ensuring that the transition is inclusive and participatory.

- Activate and Include Civil Society in the Circular Economy Transition
  Engage organizations and citizens in circular economy initiatives, ensuring broad public participation.
  Promote public awareness campaigns and citizen science projects to drive societal engagement in sustainability practices at the local, national, and global levels.

Funding Strategy and Next Steps

So far, TRACE has almost entirely been funded through IFD funding, and additional industry funding in accordance with IFD rules.

Building on the achievements described above and aligning with the existing roadmap, TRACE will focus on activating new and supplementary funding sources. In the coming years, TRACE aims to expand its efforts in a Nordic, European, and international context, making it necessary to revise the RM2021 funding strategy.

Expanding beyond IFD financing will strengthen and broaden the visions of RM2021 in the following ways:

- **Diversification of Funding Focus:** While IFD funding has been instrumental in advancing technology innovation and maturing solutions, additional funding sources can support complementary areas such as basic research and cross-disciplinary initiatives. This includes research within Social Sciences and Humanities (SSH), which plays a key role in facilitating organizational transitions, cultural change, and civil society engagement—critical for circular capacity-building and societal adoption.

- **Collaboration Across Danish InnoMissions:** Achieving the ambitious goals of RM2021 will require strengthened collaboration with other Danish InnoMissions, including AgriFoodTure, MissionGreenFuels, and Inno-CCUS. This integration of efforts can amplify innovation and ensure systemic transitions across sectors.

- **Engagement at International Levels:** Circular transition is inherently a global challenge. While TRACE continues to advance solutions at national and regional (Nordic/EU) levels, there is a growing need to align and contribute to ongoing global efforts toward establishing a circular economy.

In the following sections, the funding strategy outlines TRACE's approach to activating these new opportunities, with a focus on project types and key national and international funding sources.

National Funding Sources

Short-Term Ambitions (1-2 Years)

Several major national private foundations (e.g., the Novo Foundation, Villum Foundation) support green and sustainability-oriented initiatives. These foundations often align closely with TRACE's ambitions and goals, offering opportunities for synergy. While their traditional focus has been on STEM (Science, Technology, Engineering, and Mathematics), there is an increasing emphasis on SSH initiatives that address societal, cultural, and systemic challenges. TRACE will actively explore and engage with these funding sources to identify opportunities for complementary and mutually beneficial collaborations that can enhance and expand current efforts.

Long-Term Ambitions (3-5 Years)

Other significant national funding sources, including the Lego Foundation, A.P. Møller Foundation, and Realdania Foundation, offer opportunities to support initiatives that align with TRACE's goals. These foundations often prioritize projects that scale innovative solutions, support capacity-building, or contribute to broader societal transitions. Establishing collaborations with these foundations will be critical for TRACE to demonstrate the full-scale applicability of technologies and solutions developed under its mission and to facilitate national societal roll-out.

International Funding Sources

Short-Term Ambitions (1-2 Years)

A significant portion of European Commission funding is directed toward programs like Horizon Europe and the LIFE Programme, which align with TRACE's circular economy and sustainability ambitions. These programs focus on research, knowledge generation, and innovation, making them excellent opportunities for TRACE to advance its priorities and generate new insights.

As part of TRACE's network-building strategy, the EU-Doctoral Network funding option offers a targeted opportunity to foster large-scale knowledge generation over the short term (3-4 years). This initiative can establish a solid foundation for long-term collaboration and capacity-building while creating valuable research outcomes.

Long-Term Ambitions (3-5 Years)

To access and succeed within European funding programs, TRACE will focus on building strong international consortia and networks. Programs like the European Cooperation in Science and Technology (COST) provide valuable opportunities to establish funded research networks that align with TRACE's priority areas. These networks will not only strengthen TRACE's ability to secure future EU funding but also enable national collaborations to scale relevant circular economy technologies.

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