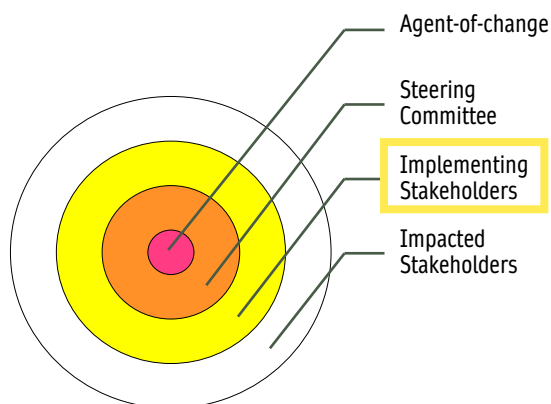


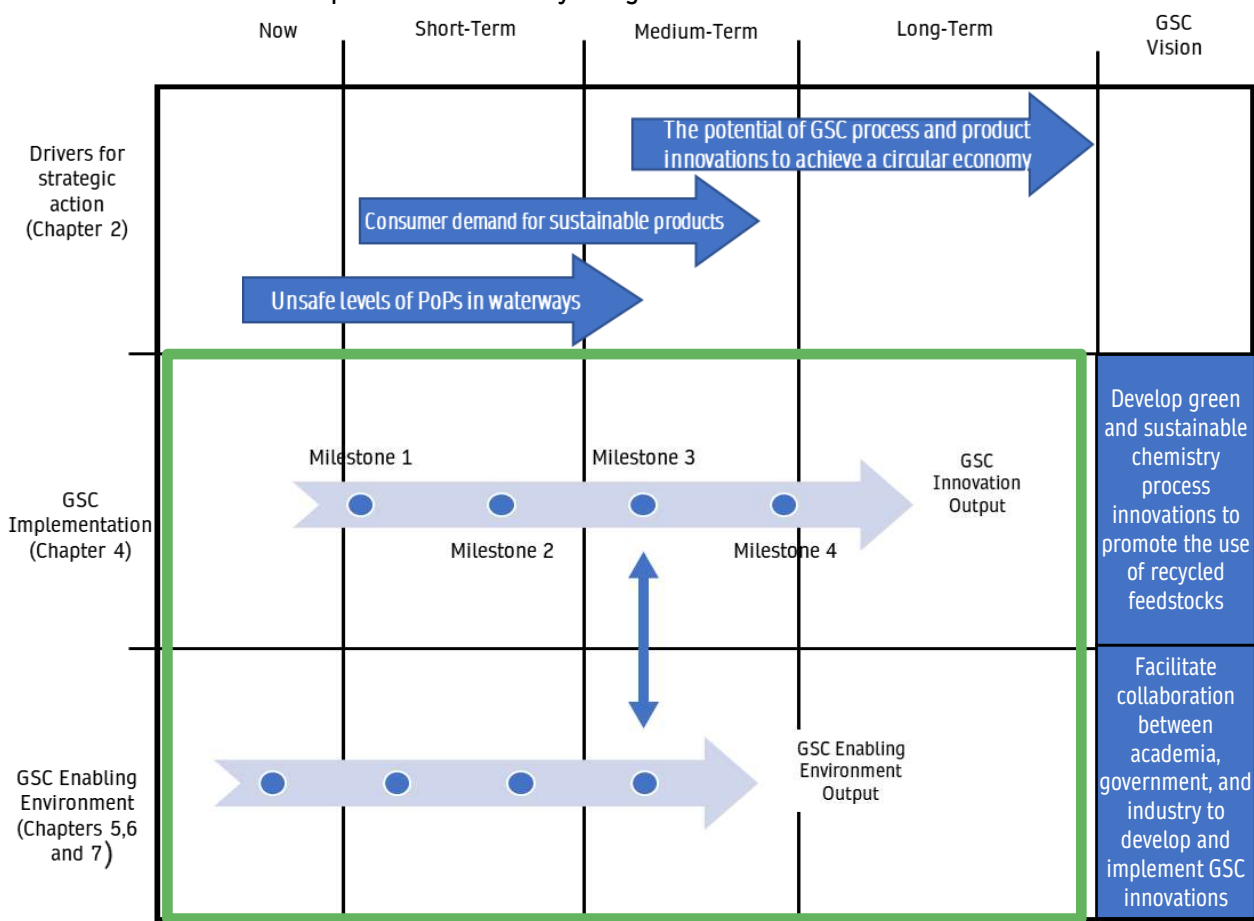
Phase III – Make an Action Plan

How do we get there?



Developing an action plan will require extensive consultation with stakeholders at each step. A lack of input from stakeholders may result in impossible timelines, or actions that do not lead to the desired outcomes. Upon defining the concrete outcomes, it may be necessary to bring in additional stakeholders to provide input on certain topics and activities that require their expertise.

This phase of the practical guidance builds upon phase II by organizing the concrete outcomes of the action plan into “GSC Innovation” and “GSC Enabling Environment” outputs. The outcomes and timelines can be inserted into the road map chart as shown by the green box below.



Phase III – Make an Action Plan

How do we get there?

Identify outputs that contribute to achieving the vision for the strategic action.



Collaboration between stakeholders in this step will aim to determine the concrete outcomes from the strategic action. The high-level goals from phase II can inform the selection of these outcomes to ensure that they align with the vision of the strategic action. This section of the practical guidance presents examples of outcomes, and approaches to determine and organize them.



As with, the high-level goals, it may be useful to organize the action plan, to align with the Framework Manual.

The “Implementation” aspect of the strategic action (middle row of the roadmap chart) **may draw on chapters 2, 3 and 4 of the Manual**

which answers “What” green and sustainable chemistry is. To the right are examples of concrete outcomes or “GSC Innovation Outputs” which contribute to achieving the high-level “GSC implementation” goals from phase II.

GSC Innovation Output

Eliminate the use of potassium permanganate in textile manufacturing

Design and implement a process which uses carbon dioxide as a principal feedstock

Eliminate chemical additives in plastic products that hinder recycling

High-level “GSC implementation” Goal

Improve worker safety through the implementation of green and sustainable chemistry process innovations

Develop green and sustainable chemistry process innovations to promote the use of recycled feedstocks

Advance the circular economy through green and sustainable chemistry innovation

Stakeholder Example: R&D Boundary Conditions



Proklean, a bio-tech start-up from India, describes a concrete outcome of their strategic action to advance green and sustainable chemistry using boundary conditions for the research and development of their products.

All products must:

- Be at least 80% bio-based
- Readily biodegradable
- Non-toxic

UNEP’s Objectives may also be useful in setting boundary conditions which products, solutions or actions should adhere



GSC Enabling Environment Output

Develop and implement a government program to financially incentivize the use of green and sustainable technologies by SMEs

Design and implement a modified chemistry curricula which integrates green and sustainable chemistry concepts

Form a collaborative technology center which connects key stakeholders to develop green and sustainable chemistry innovations

High-level GSC “enabling environment” goal

Improve support to SMEs and start-ups to support the development and implementation green and sustainable chemistry innovations.

Improve training of university students to advocate for and develop green and sustainable chemistry innovations

Facilitate collaboration between academia, government, and industry with the mission of developing and implementing green and sustainable chemistry innovations

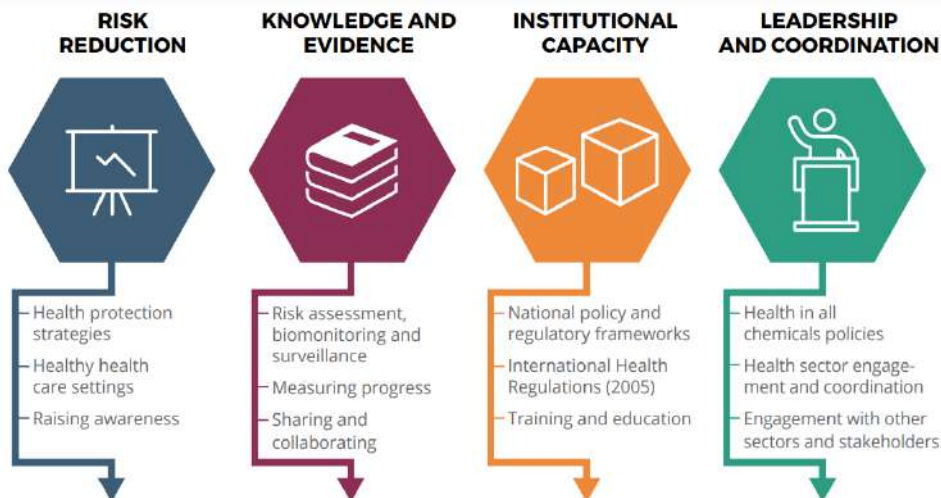
Setting concrete “GSC enabling environment outputs” to achieve the “high level GSC enabling environment” goals (bottom row of the road map chart) can **draw upon chapters 5, 6 and 7 of the Framework Manual**, which aim to answer the question of “**How**” the vision of green and sustainable chemistry can be achieved.

Advancing GSC Innovation in Developing Countries

At a workshop for GSC entrepreneurs in Berlin ([outcome report here](#)) stakeholders indicated that developing countries presented favorable conditions for green and sustainable chemistry action. Lower market density and the potential to “leap-frog” to advanced technologies were mentioned as enabling the speedy and impactful implementation of green and sustainable chemistry innovation. Participants highlighted the following as key approaches to advance green and sustainable chemistry innovation in developing countries. These approaches can be integrated into the strategic action through the selection of relevant GSC “Enabling Environment” outputs

- i) Better infrastructure and tools to support research
- ii) Strengthen collaboration mechanisms
- iii) Streamline and protect intellectual property
- iv) Improve access to relevant knowledge, including literature

The WHO Chemicals Road map organizes its actions into four distinct areas - risk reduction, knowledge and evidence, leadership and coordination - Each “action area” aims to result in an outcome which will contribute to the achievement of the overall objective of the strategic action.





Below is a figure which summarizes **ACS's Green Chemistry Education Roadmap**. It may be helpful to visualize how the concrete outcomes from this step can lead to the achievement of strategic action's vision.

Five key outcomes are shown along the journey from setting the vision, to achieving the final goal.

- 1) Determine core competencies for chemistry education
- 2) Integrate green and sustainable chemistry into curriculum guidelines
- 3) Include key green and sustainable chemistry topics in anchoring concepts content maps
- 4) Catalyze integration of systems in thinking into chemistry education
- 5) Develop modules to support implementation of green and sustainable chemistry concepts and skills in the classroom

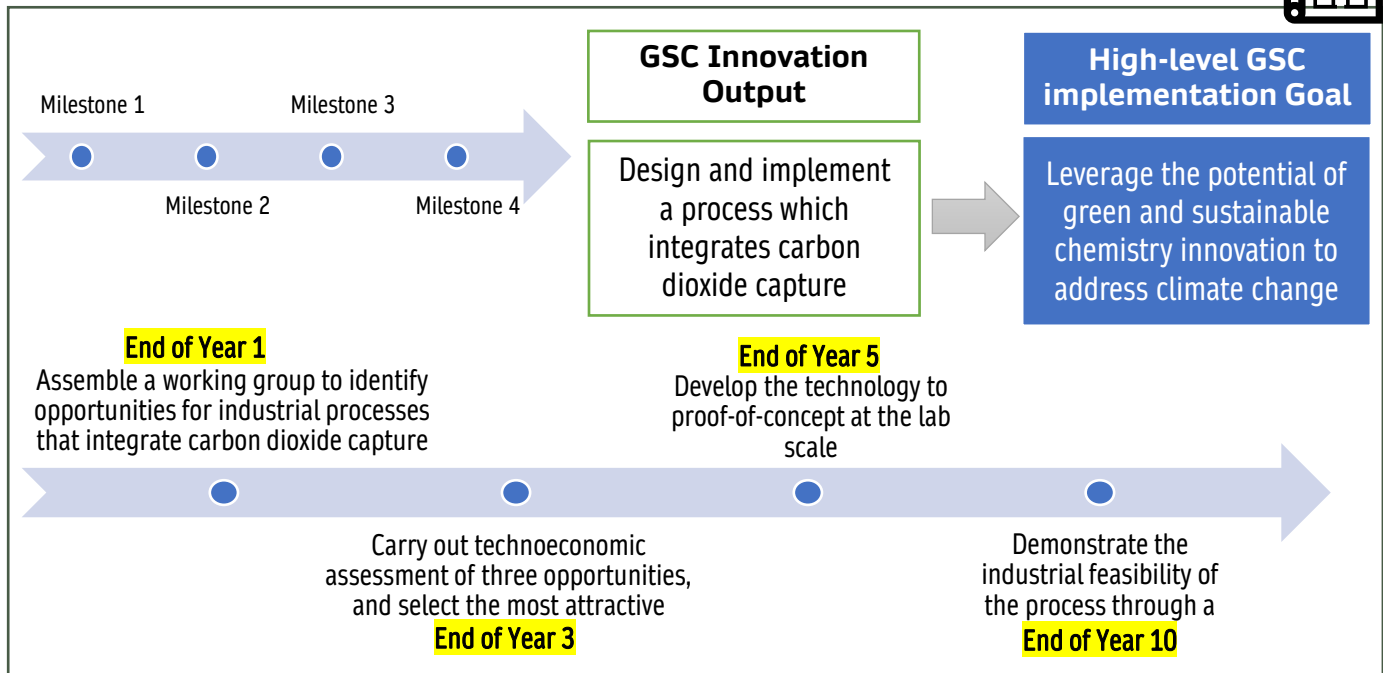


Phase III – Make an Action Plan *How do we get there?*

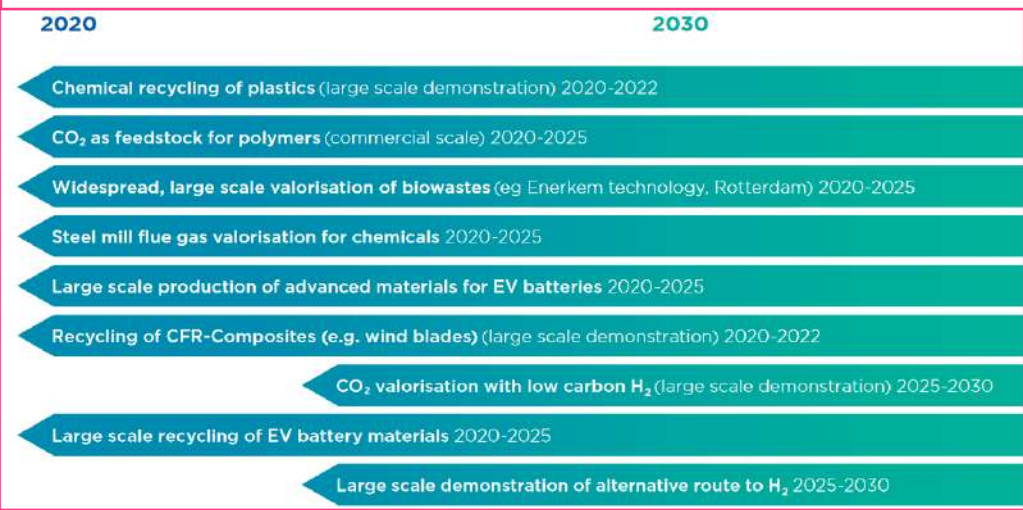
Develop “roadmap routes” which achieve the concrete outcomes from the previous step.



The concrete outputs from the last step will now be accompanied by concrete milestones and timelines. Carrying out this step will result in the formation of the “roadmap routes” that lead to the “destination” or vision of the strategic action. Consulting with stakeholders is critical to ensure that the timelines and milestones are realistic and relevant to the outcomes. This section of the practical guidance provides examples of timelines, using the example concrete outcomes and high-level goals from earlier steps.

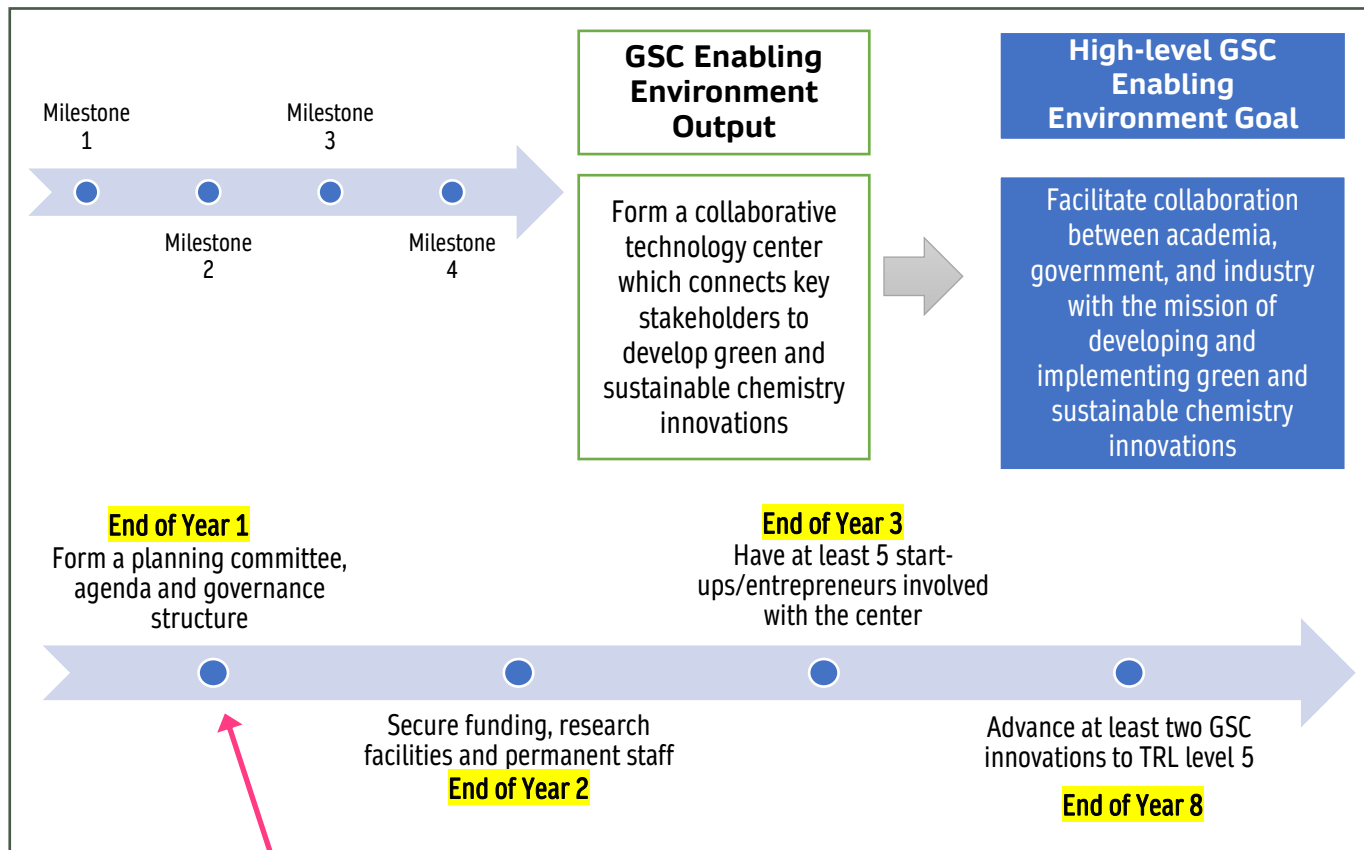


Cefic's mid century vision report sketches out how strategic action by European chemical industry can contribute to a more sustainable Europe in the year of 2050. The image to the right may be a helpful example of “GSC Innovation Outputs” that align with the vision of Cefic’s proposed strategic action.





Below is an example of a timeline for a “GSC Enabling Environment Output” to contribute to the achievement of one of the “High-level GSC Enabling Environment Goals”. Using the information gathered from stakeholders on gaps and barriers is key to selecting these outputs.



Stakeholders involved in the formation of the International Sustainable Chemistry Collaborative Centre (ISC3) highlighted the following guiding questions for establishing the Centre

- What are the functions?
- Which stakeholders should be involved?
- How should the governance structure of the institution be?
 - What type of expertise is needed?
 - How much funding is needed?



The European Commission report “[Transition Pathway for the Chemical Industry](#)” lays out a plan with actions and conditions needed to achieve a green transition in the EU chemical industry. In the report, stakeholders identified eight building blocks, which are similar to the “high-level” goals from this guidance. The table below describes some of the actions identified to fulfil the the “SUSTAINABLE COMPETITIVENESS” building block. It describes actions, actors to implement actions and a timeframe.

Topic 4: Innovation and growth of SMEs

Actions	Actors	Timeframe
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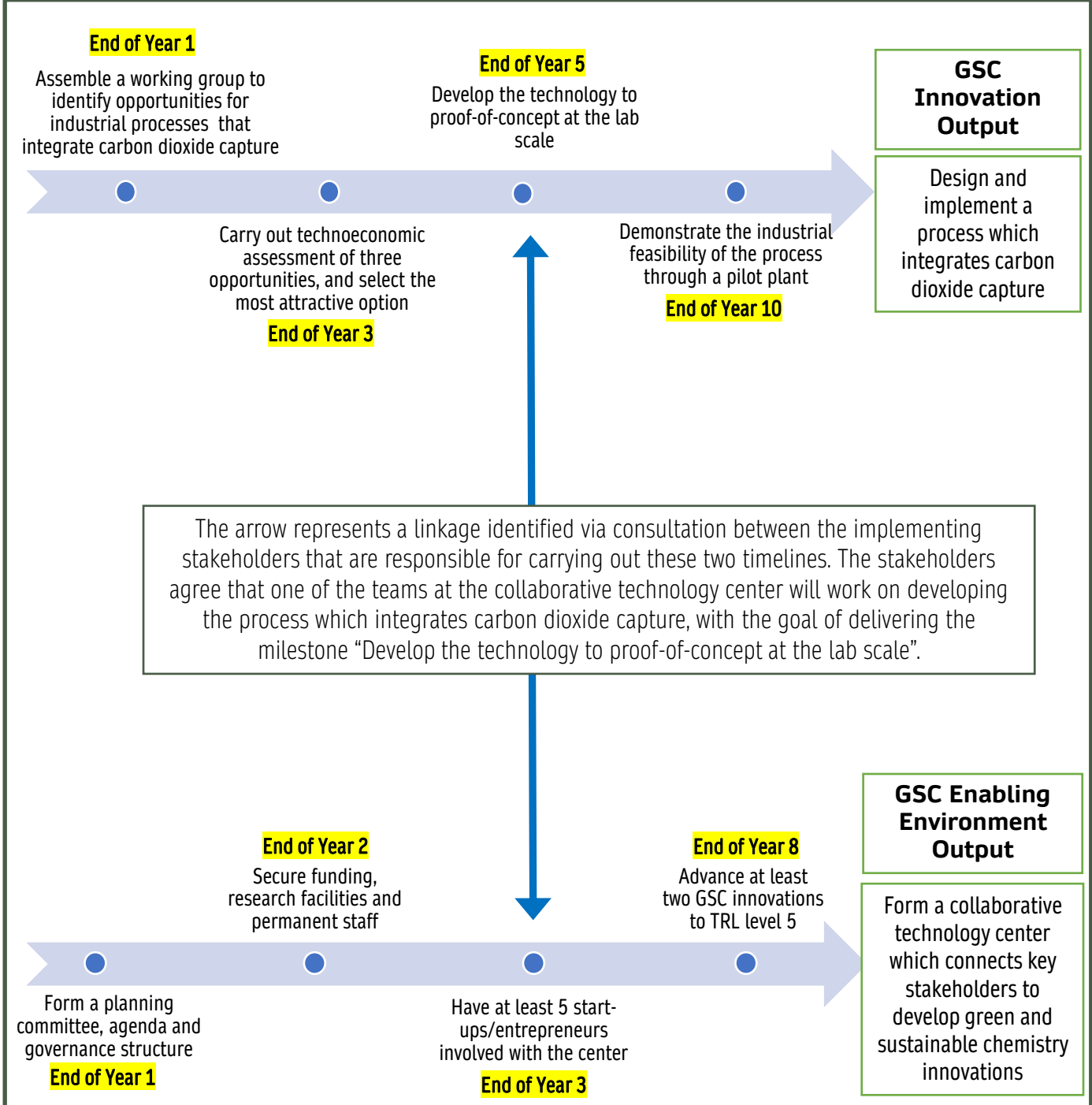
4.1 Strengthen cooperation with the start-up ecosystem

<ul style="list-style-type: none"> Develop tools and policies to promote cooperative buying in compliance with competition rules 	Industry and EU/MS	S
<ul style="list-style-type: none"> Support SMEs in their supply chains also by connecting to EIT Knowledge and Innovation communities 	Industry	S
<ul style="list-style-type: none"> Improve communication by fostering information exchange to promotion success stories 	Industry and EU/MS	S
<ul style="list-style-type: none"> Strengthen the Enterprise Europe Network 	EU/MS	S
<ul style="list-style-type: none"> Develop modular production processes to enable local and regional chemical economies 	Industry	M

The [Roadmap for the Chemical Industry in Europe towards a bioeconomy](#) aims to support strategic action within the chemical sector towards a higher bio-based portfolio, while meeting stringent sustainability criteria. The strategy document lays out sectoral action plans via a group of summary tables. The table for the plastic sectoral action plan is presented below.

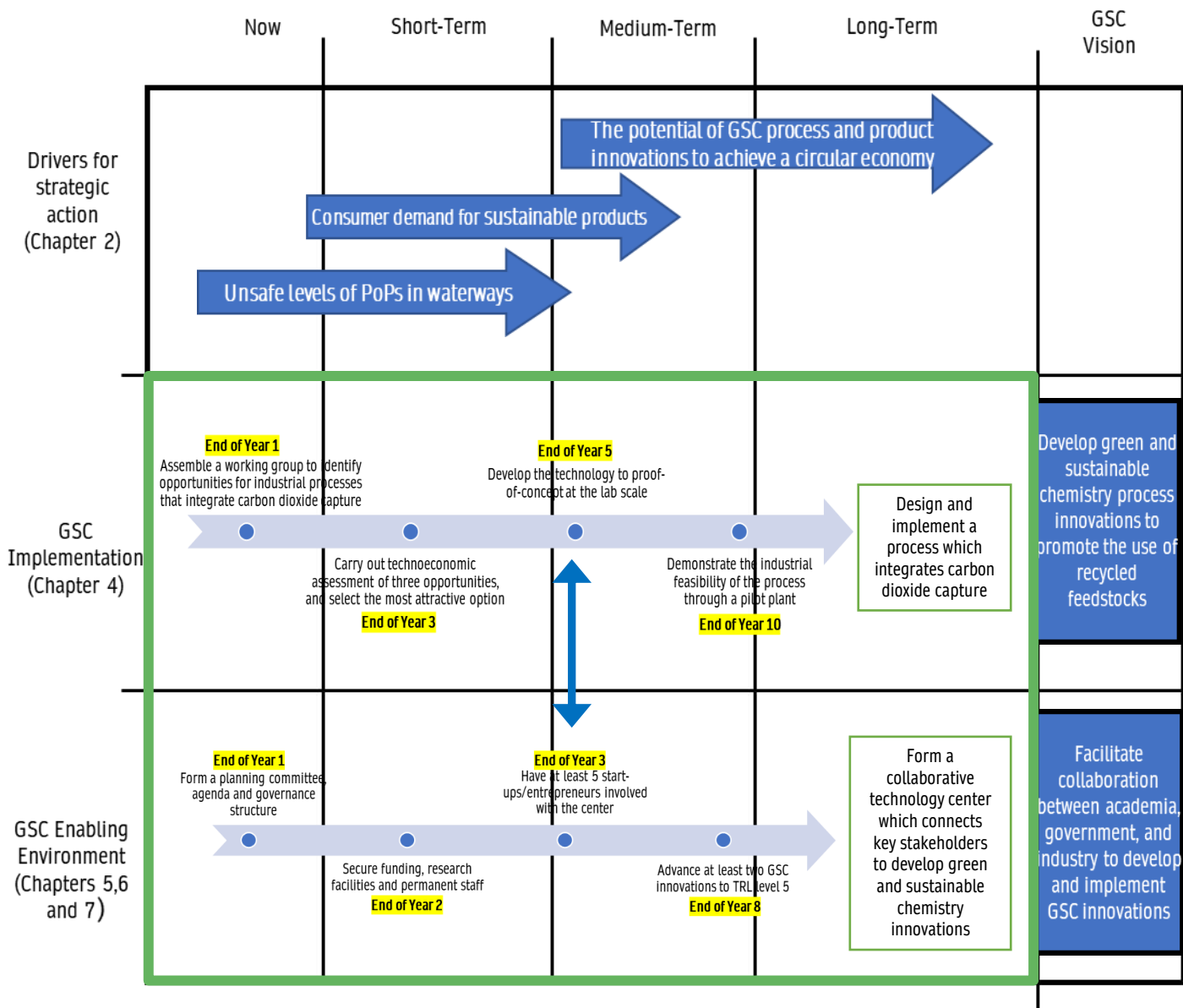
Barriers	Actions	Actors	Timeline
Cost of production in comparison to fossil-based processes is too high	R&D, demonstration scale projects to reduce cost by increasing efficiency of bio-based chemical production	Industry, policy makers, academia	Short-long term
	Develop a specific Strategic Research Innovation Agenda on bio-based plastics to guide future funding decisions	Policy makers, industry	Short-long term
Limitations in relation to product functionality	R&D to improve the performance of chemicals/ materials and match product performance/ functionality with its application	Industry, policy makers, academia	Short-long term
Some bio-based plastics cannot be recycled, e.g. Currently PLA cannot be recycled with other plastics like PET	Utilise and retrofit the existing infrastructure to product bio-based polymers and bio-based polymer building blocks	Industry	Short-mid term
	R&D to develop PLA and other bio-based plastics that are recyclable with regular recycling stream	Industry, policy makers, academia	Short-long term
No clear labelling to differentiate bio-plastics, bio-based plastics and biodegradable plastics	Provide adequate labelling to inform customers of types of bio-based plastics to raise awareness about bio-based plastic alternatives and end of life processing	Policy makers, industry, NGOs	Short-long term

Stakeholders have highlighted the importance of mechanisms to promote collaboration among stakeholders carrying out the action plan to avoid silos and prevent duplication of work within the strategic action. During this step linkages between the timelines can be identified as one possible mechanism to promote collaboration during the implementation of the strategic action. Below is an example of one such linkage using the two example timelines.



Strategic Action to Advance Green and Sustainable Chemistry Phase III – Step 2

The “routes” consisting of linked timelines and milestones that achieve the defined concrete outcomes can now be inserted into the road map chart. The examples are shown in the example chart below, outlined by the green box.



Phase III – Make an Action Plan *How do we get there?*

Collectively determine the responsibilities and needs of stakeholders to carry out the action plan.



Responsibilities of implementing stakeholders to carry out the timelines towards the achievement of the concrete outcomes will be determined in this step. Clarity, consistency and transparency are key conditions to fulfil when delegating these responsibilities. Consensus building activities to agree on responsibilities can help ensure future achievement of the outcomes.



A R.A.C.I. Chart may be a helpful tool in this step. It can provide an initial organizational framework for the responsibilities and accountabilities of different stakeholders involved in the strategic action process. An example of a RACI chart, corresponding to a hypothetical “GSC Innovation Output” shown in an earlier step is shown here.

RACI Chart for “GSC Innovation Output” <i>Eliminate the use of potassium permanganate in textile manufacturing</i>	
Category	Stakeholder/s
Responsible – Approves of the output activities and assigns the authorised stakeholders	• CTO of Apparel Brand (member of the steering committee)
Authorised – Leads the work on activities to deliver the milestones and final output	• Chief Scientist of the Brands R&D department
Consulted – Stakeholders with relevant expertise to provide technical input	• Academic researchers • Representative from Manufacturing • Labor Representative • Environmental NGO Actor
Informed – Stakeholder groups that will be impacted by the output	• Consumers • Retailer Representative

WHO’s chemical roadmap clearly delineates the role of stakeholders in carrying out the identified actions. Each action is labeled as “WHO secretariat (WHO Sec)” “Member State (MS)” or “Multi-Stakeholder (ALL)” to define the chief stakeholder group responsible for spearheading the action.



MS Develop and implement health promotion and protection strategies and programmes for the life cycle of high-priority chemicals, particularly for vulnerable populations.

MS WHO Sec Establish an international health workforce to be mobilised to respond to chemical emergencies, e.g. contribute to a WHO roster of experts for chemical incidents and emergencies.



The [transition pathway report](#) was co-developed by the European commission in collaboration with EU countries, the chemical industry, NGOs and other interested parties. During the development of the action plan, Stakeholders agreed to define the actors who would be responsible for leading the identified actions. The example action table shown here is for the “SUPPORT TO R&I, TECHNIQUES AND TECHNOLOGICAL SOLUTIONS” building block.

Topic 9: Developing new techniques and technological solutions (TRL 6 to 7)		
Actions	Actors	Timeframe
9.1 Foster collaboration and partnerships		
<ul style="list-style-type: none"> Increase cooperation between research institutions and universities and industry, fostering applied research and targeting key enabling technologies for industry 	Industry	S
<ul style="list-style-type: none"> Engage in public-private partnerships (e.g. Processes4Planet, Circular Bio-based Europe) to develop and demonstrate energy efficiency and climate neutral, circularity and zero pollution chemical industry processes (<i>link with topic 5.3.</i>) 	Industry and EU/MS	M
<ul style="list-style-type: none"> Develop Chemical Data Spaces with the support of the Data Spaces Support Centre to leverage the potential of data exchange for more transparency and manageability 	Industry	S
9.2 Support for development		
<ul style="list-style-type: none"> Appropriate financial and regulatory support between different levels of technology readiness, including by establishing a community of practice to facilitate the authorisation for first-of-a-kind installations for low-carbon industrial technologies⁴⁸ 	EU/MS	S
<ul style="list-style-type: none"> Co-implement the strategic research and innovation plan (SRIP) for safe and sustainable chemicals and materials to guide future R&I priorities 	Industry and EU/MS	S



Building trust between all involved stakeholders is critical to successful strategic action. Key factors and strategies highlighted by stakeholders foster a trustworthy environment include:

- **Consistency** with what is expected of stakeholders, and what the strategic action aims to achieve
- **Transparency** and access to information, including on how decisions are made regarding the strategic action
- **Demonstrated commitment** to the strategic action process, by the steering committee and other implementing stakeholders

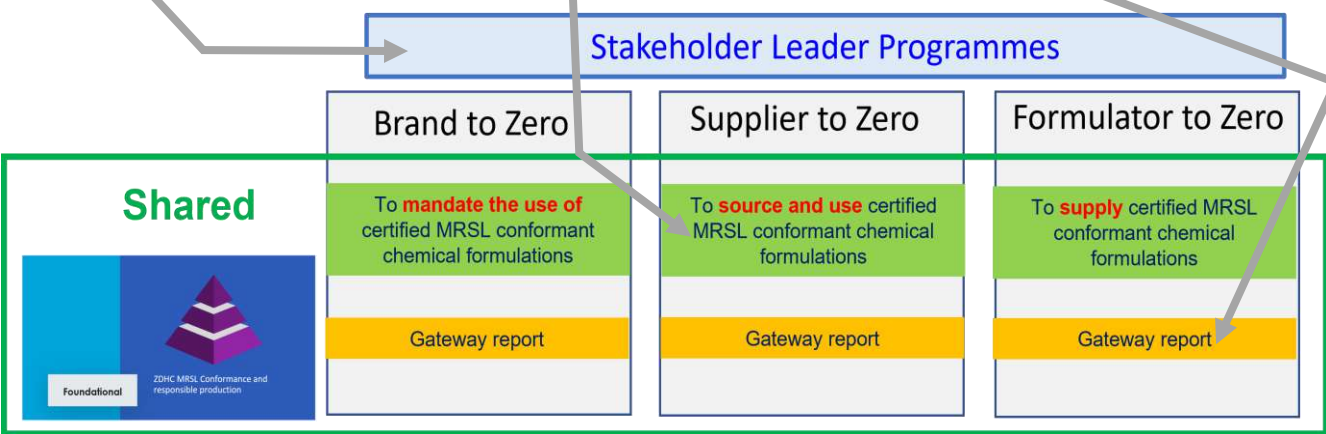


ZDHC uses a “shared responsibilities” system to deliver on the three key trust-building aspects. The approach is illustrated below for each stakeholder group’s (Brands, Suppliers, Formulators) responsibility for implementing a Restricted Substances List (MSRL).

The stakeholder leader programmes provide opportunities for stakeholders to **demonstrate commitment** towards the successful implementation of the strategic action

The responsibilities of each stakeholder is **clear and consistent** - e.g. Suppliers are responsible for sourcing and using the MSRL

Gateway reports allow to track progress on the implementation of the MSRL – promoting **transparency and accountability**



A **road mapping workshop** can be a helpful activity to bring the implementing stakeholders together towards the development of an action plan, especially for the “delegate stakeholders” step. Initial versions of key outputs from phase 3, such as concrete outcomes, timelines and stakeholder responsibilities, can be collectively determined during a road mapping workshop. Furthermore, the workshop can be an opportunity for stakeholders to provide inputs and feedback on outcomes of previous phases, such as the high-level goals, or drivers, serving to build consensus and trust around the strategic action.

Below are some resources to help users of the practical guidance design and hold a workshop that advances the planning process, helping to collectively determine key outputs from phase 3 and more.



[Activities BR.1 and BR.2 from the UNEP Eco-Innovation Manual](#) include helpful guidance to prepare for and carry out a road mapping workshop. These sections of the Manual contain case studies, templates and key tips and tricks that are relevant to the strategic action process to advance green and sustainable chemistry.



A road mapping workshop can be designed around an empty or partially filled out road map chart as has been presented throughout this practical guidance. [The Strategic Roadmap Template With Facilitation Guidance](#) from the University of Cambridge may be a helpful resource to develop an agenda, and to determine the desired outputs from the workshop.

Although the self-facilitating template is geared towards private sector stakeholders, it can be adapted to advance the strategic action planning process described in this practical guidance.

- [Link to download template with facilitation guidance](#)
- [Link to download classic roadmap template](#)

