



## CLIMATE ACTION PATHWAY

# INDUSTRY

### Action Table

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2021

## ACTION TABLE STRUCTURE AND APPROACH

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The purpose of this Industry Action Table document is to highlight specific, promotable, and time-bound actions with a sector-based approach, to deliver the 2050 Industry vision outlined in the Pathway Vision. This Action Table is presented in two main sections. **Heavy industry** sectors within this document refer to Aluminium, Cement and Concrete, Chemicals, Metals and Mining, Plastics, and Steel sectors. **Light industry** is represented by Fashion, Consumer goods, ICT and Mobile, and Retail sectors.

Within each section, this document presents a deep dive into the pathway for the selected industry sub-sectors. Each sub-sector is summarized, and a high-level system map and its change levers are described. “S-curves” show how the change levers can accelerate progress towards an exponential sector transformation. For each section, tables include recommended actions for selected actors<sup>1</sup> to take by 2021, 2025, 2030, and 2040, to achieve an outcome aligned with 1.5°C level of ambition by 2050. Existing initiatives supporting the actions of the United Nations (UN) Secretary General’s 2019 Climate Summit are listed, followed by further references to related activities and analysis for each sub-sector.

The many sectors represented in the Industry Pathway have synergies with other major sectoral pathways, especially [Energy](#), [Transport](#), and [Human Settlements](#). There are also interrelationships between Industry sub-sectors, for example steel and aluminium with metals and mining. While not explicitly represented in pathways, Industry also intersects with health, water, and gender, and is critically linked to the efforts to advance a just transition.

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<sup>1</sup> Policymakers (national, subnational, local levels); Financial Institutions; Technology Providers and Innovators; Business and Service Providers; Civil Society.

## CONTRIBUTIONS

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*Under the leadership of the High-Level Champions and through the Marrakech Partnership for Global Climate Action (MPGCA), the development of this Climate Action Pathway was managed by the World Business Council for Sustainable Development (WBCSD) in collaboration with the MPGCA Industry Thematic Group).*

**Stakeholders consulted include:** Allianz Global Investors, ArcelorMittal, Arup, BHP, BT Group, British Retail Consortium, C40 Cities, Cambridge University, Cambridge Institute for Sustainability Leadership, The Carbon Leadership Forum, The Climate Group, the B Team, International Chamber of Commerce (ICC), E3G, The Energy and Resources Institute (TERI), the Energy Transitions Commission, Ellen MacArthur Foundation, Ericsson, Facebook, The Food and Agriculture Organization of the United Nations (FAO), Generation Investment Management, Green Alliance, Greenpeace, UNFCCC Fashion Industry Charter for Climate Action, Global Efficiency Intelligence, GSMA, Initiative for Responsible Mining Assurance (IRMA), International Council on Mining & Metals (ICMM), International Renewable Energy Agency (IRENA), ITUC Just Transition Centre, International Union for Conservation of Nature (IUCN), Mission Possible Partnership, Ocean Conservancy, Organization for Economic Co-operation and Development (OECD), Orange Group, Plastics Europe, Responsible Steel, Royal Dutch Shell, SABIC, Stockholm Environment Institute, The Sustainability Consortium, TalkTalk plc, Textile Exchange, RMI, UK Steel, Unilever, Waste and Resources Action Plan (WRAP), World Bank, World Gold Council, World Resources Institute (WRI), the World Steel Association, World Wide Fund for Nature (WWF), UK Food and Drink Federation, Unilever, Ingka Group (IKEA), The Consumer Goods Forum, Accenture, Adidas, Apparel Impact Institute, Arvind Ltd., Bangladesh Garment Manufacturers and Exporters Association, Boston Consulting Group, British Fashion Council, Business for Social Responsibility, China National Textile and Garment Association, Conde Nast, Fabrikology, Fashion for Good, Futerra, Global Fashion Agenda, H&M Group, International Finance Corporation, Fashion Pact, PUMA, Smart Freight Centre, Stahl, Sustainable Apparel Coalition, Tal Apparel and the Vietnam Textile and Garment Association.

***This document does not represent a consensus view.***

## OVERVIEW – SECTOR STRUCTURE

All sectors include both Mitigation and Adaptation/Resilience components

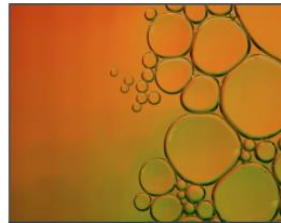
### Heavy Industry Sectors



Aluminium



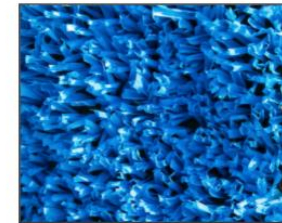
Cement  
& Concrete



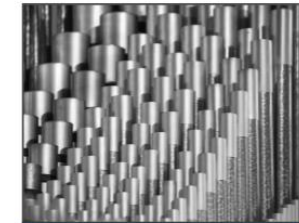
Chemicals



Metals & Mining

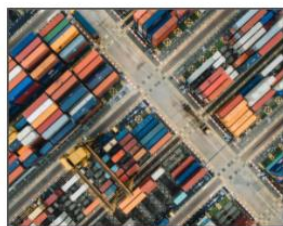


Plastics



Steel

### Light Industry Sectors



Fast Moving  
Consumer Goods



Fashion



ICT & Mobile



Retail

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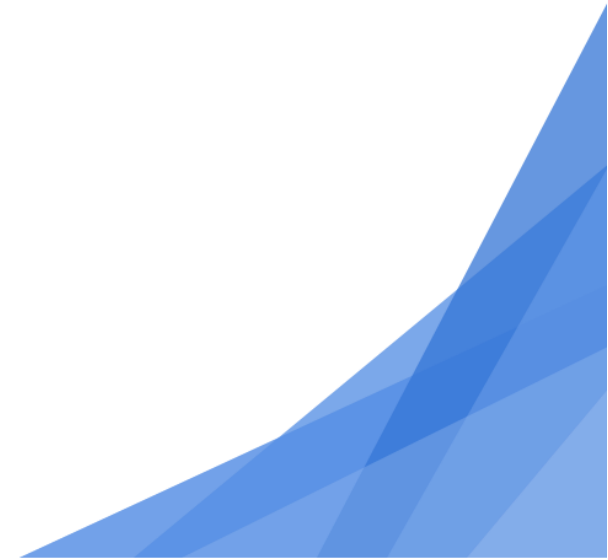


# ALUMINIUM

## Action Table

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2021



## 1. ALUMINIUM - INTRODUCTION

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- The aluminium part of this Action Table outlines a set of necessary stakeholder actions to be taken in 2021, 2025, 2030 and 2040, to accelerate the transition to a net-zero carbon aluminium industry. **The necessary pathway is steep but is technically feasible.** It will involve considering regional and national specificities - and managing the risk of “carbon leakage”. For the total mining and production processes, total global average emissions vary, but most reported values are between 12 and 17 metric tonnes of CO<sub>2</sub> per tonne of aluminium. Globally, the aluminium industry is currently responsible for about 1.2 billion tonnes of CO<sub>2</sub> per year, equalling about 2 per cent of total global emissions.
- More than 90 per cent of aluminium emissions stem from the primary production process. Total emissions are increasing because of the growing demand for aluminium in a context where the supply of electrical energy generated from renewables is limited. The global demand for aluminium is expected to increase by 80 per cent by 2050, reaching 170 million tonnes.<sup>2</sup>
- The focus on high-impact interventions, such as decarbonisation of electricity, reduction of direct emissions, increase recycling, and material efficiency, will be able to dramatically reduce industry emissions. Over 60 per cent of the industry’s carbon footprint is attributed to electricity consumption, which currently is mostly coming from fossil fuel sources.
- Therefore, the **first avenue for decarbonization** must be to maximize the use of low-carbon energy in aluminium production as well as to deploy and scale carbon capture, utilisation and storage (CCS/U) facilities to maximise the use of low-carbon electricity – produced for example through the use of renewables or fossil-fuel plants with CCS/U.
- As approximately one third of the emissions stem from the processing of aluminium, the **second key avenue for decarbonization** is the substantial improvement of existing technologies. There is a need to switch to technologies that can provide heat and steam without the unabated use of fossil fuels and for the development, deployment, scaling up of carbon anode replacement technologies and potentially the use of CCS/U.
- The **third avenue** is the application of circular economy strategies which can significantly reduce the need for carbon-intensive primary aluminium (such as design for recycling and the increased collection of post-consumer scrap). In Europe it is estimated that about 50 per cent of the continent’s aluminium<sup>3</sup>.

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<sup>2</sup> International Aluminium Institute.

<sup>3</sup> Circular Aluminium Action Plan.

- Aluminium is a potential key contributor to emissions reductions in international supply chains and to the transition to greener business models. “Demand for aluminium is driven by a transport sector that needs to improve fuel efficiency and reduce energy use and emissions through lighter cars, trucks and trains. The positive expansion in aircraft capabilities and size coupled with safe air travel has been greatly enabled by advances in aluminium technology. Furthermore, aluminium is a key to zero-energy buildings, solar applications and packaging that preserves food and drinks and requires less energy to transport”.<sup>4</sup>
- However, currently there is no unified approach to what can be called “green aluminium”. This needs to change in order to support demand creation for green aluminium and avoid cases of carbon leakage due to unequal regulatory requirements. For example, the establishment of a low-carbon aluminium trading platform (as announced by the London Metal Exchange in 2020) would be a crucial step in the right direction as it provides for more transparency and brings low-carbon solutions closer to consumers. Collaborative pilot projects with key consumers (e.g. in the packaging and automotive industry) are ongoing, and more projects, demonstrating that the transition can work, are needed. Overall, the successful decarbonization of the aluminium industry will rely on joint action across the value chain from all stakeholders. Commitments by aluminium companies need to be made and concrete roadmaps developed, including the establishment of science-based targets (SBTs) for a 1.5°C pathway. Companies in the sector still face a number of challenges in setting up SBTs. Therefore, the Science Based Targets initiative (SBTi) is working on a project with the International Aluminium Institute (IAI) to identify barriers to and opportunities for science-based target setting, as well as options for next-generation resources.<sup>5</sup>
- The purpose of this action table document is to highlight specific and promotable actions to deliver a decarbonization vision for this sector. In the pathway, industry averages are used to reflect the trajectories of the sector. Different countries will develop at different speeds, based on their different starting points, policy frameworks, ambitions, and available technology. There may be deviations from the timeline due to national specificities and geographical differences, but such deviation should not be perceived as a reluctance to support the transition of the sector.

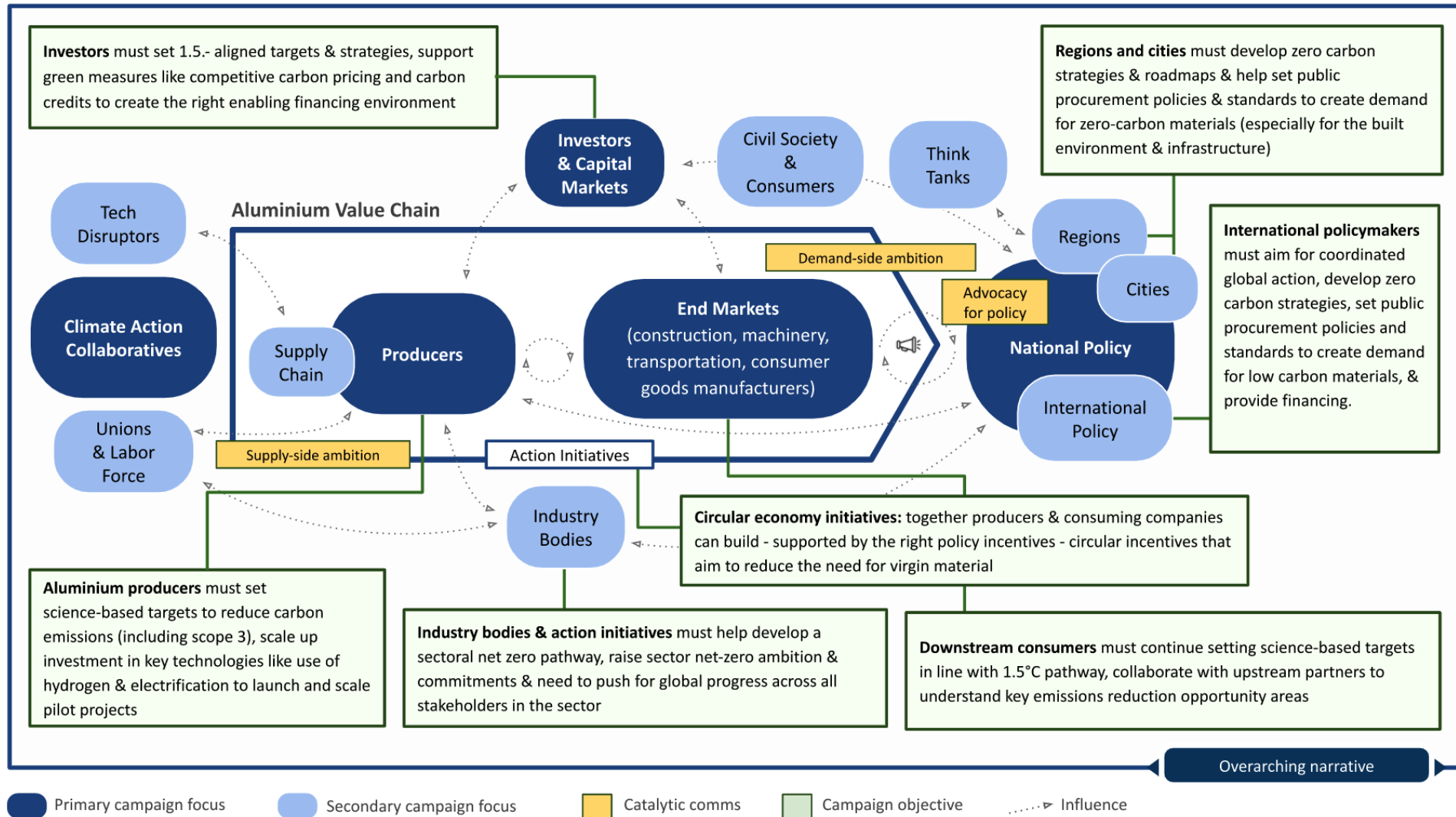
<sup>4</sup> Aluminum Production in the Times of Climate Change: The Global Challenge to Reduce the Carbon Footprint and Prevent Carbon Leakage.

<sup>5</sup> Science Based Targets – Aluminium Guidance.



## 2. ALUMINIUM SYSTEM MAP

These stakeholders have complementary objectives to support the overall campaign for the aluminium industry to achieve net-zero emissions by 2050.



### 3. ALUMINIUM SECTOR CHANGE LEVERS

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- **Policymakers:** Commitment from policymakers to ensure long-term access to low-carbon energy in aluminium production is essential to unleash the transition and investments necessary. International cooperation has a key role to play in creating technological and financial frameworks that support the transition pathway in a global and commoditized industry. High-emitting countries will need to work collaboratively with industry to design policies for an effective transition. There are several avenues policymakers can take to encourage decarbonization efforts, whether through the penalization of high-carbon producers, including setting mandatory carbon reductions, carbon intensity criteria, border carbon adjustments and emissions trading systems or tariffs; or incentivisation of good practices, such as subsidizing or incentivizing investment in renewable energy or CCS/U projects.
- **Finance:** Sector-wide decarbonization will require investments of between USD 0.5 trillion and 1.5 trillion over the next three decades. Businesses need access to capital to retrofit parts of the current production capacity and invest in new production technologies as well as new energy sources and innovative sorting techniques. Investments in new smelting technologies and new low carbon smelters will be key drivers for improving performance, cost, and the implementation of climate resilient solutions. Businesses shall need to align their investments with solid 1.5°C pathways. Investors on the other hand shall incentivize asset owners to commit to or implement ambitious net-zero emissions targets. Intensified joint action from public and private sector stakeholders is needed to increase funding for collaborative action on research, design and development projects, (e.g. for new technologies). Collaborative financing of projects (e.g. for renewable energy or CCS/U), for example through regional collaboration, will reduce the costs and risks and will allow technologies to become viable at scale. This would include financing from private as well as public sources.
- **Technology providers and innovators:** Current technologies are not yet mature enough for aluminium producers to reach net zero at a reasonable cost and at the speed required. Additional innovation is needed to improve existing and develop new technologies. There needs to be an immediate focus on the development and deployment of carbon-free smelting processes (including inert anodes and CCS/U) as well as the provision of zero-carbon heat and steam through the production process. Sectoral roadmaps need to be built to outline opportunities, including the use of hydrogen and CCS/U in aluminium production processes.
- **Business and service providers:** Aluminium producers will need to make clear and dedicated decarbonization commitments in line with the 2050 industry pathway. The producers must strive to decarbonize the production of aluminium: from sustainable mining to low-carbon and carbon-free smelting. To speed up this process, it would be valuable if the sector collaborated to establish a clear definition for “low-carbon and green aluminium”. This will also help to scale efforts, like the London Metals Exchange plans to launch a spot-trading platform for low-carbon aluminium, which has the potential to increase transparency in production and supply-chains.

- The aluminium decarbonization roadmaps also need to include prioritized commitments and investment plans for future net-zero emission manufacturing capabilities and for retrofitting existing plants. In parallel, companies need to recognize aluminium scrap as valuable input material and a way to decrease emissions and to build the necessary infrastructure to realize this opportunity. Progress towards decarbonization will be faster if ongoing cross-industry pilot programs around green aluminium will be successful. More of such collaborations (e.g. with industries such as automotive, construction, and packaging) paired with supportive public procurement rules and smart standard setting will be necessary to establish strong demand signals, which in turn drive the scaling up of the production of green aluminium in the medium term.
- **Workers and the trade unions that represent them** are engaged through social dialogue processes to proactively manage economic transitions and uncertainties, while holding and creating rewarding, healthy and decent jobs. This involves setting up Just Transition processes as defined by the ILO with social partners and other relevant stakeholders.<sup>6</sup>
- **Civil society:** Social demand for climate action and environmentally friendly products is changing the values of governments and non-governmental organizations (NGOs) and the behaviours of businesses. Civil society organizations play a key role in raising and strengthening public awareness and holding key actors accountable. The IAI gathers and publishes cross-industry data and the Aluminium Stewardship Initiative (ASI) measures members' sustainability performance against a broader standard. Industry stakeholders need to intensify the collaboration with these organizations and commit to data disclosure in order to assess progress against setting targets.

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<sup>6</sup> ILO, "Guidelines for a just transition towards environmentally sustainable economies and societies for all" [https://www.ilo.org/global/topics/green-jobs/publications/WCMS\\_432859/lang--en/index.htm](https://www.ilo.org/global/topics/green-jobs/publications/WCMS_432859/lang--en/index.htm)

## 4. SECTOR S-CURVE

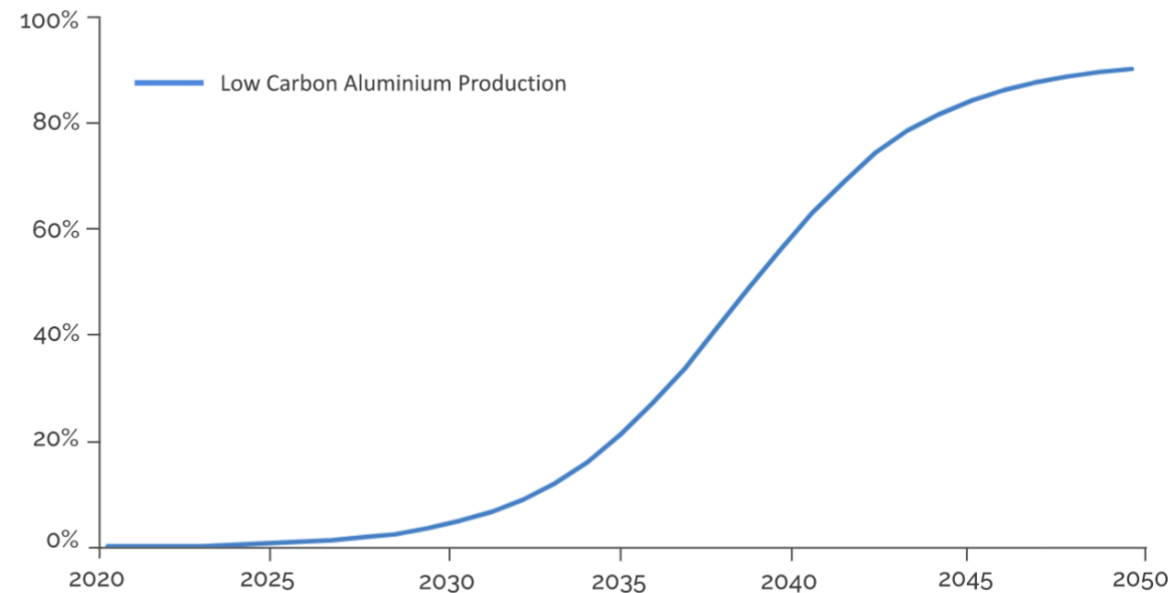
The S-curve models the development of zero-carbon aluminium production until 2050. Several companies are working on low carbon aluminium production now. A joint definition is still lacking in the industry. The goal is to reach 100 per cent zero carbon emission aluminium by 2050. This will not happen in a straight line, and depend on the accelerated implementation of new technologies, enabled by new policy frameworks and availability of financing for an accelerated transition.

### Zero Carbon Aluminium S-Curve model

100% zero carbon emissions in 2050 will require 20% in 2035

#### Zero Carbon Aluminium S-Curve Model

Zero Carbon Aluminium Production as a share of global production



Note: based on a smoothed sigmoid curve forced to 100% at the end given the starting point.  
Source: High Level CHampions, 2020

## 5. ALUMINIUM ACTION TABLE

The S-curve models the development of zero-carbon aluminium production until 2050. Several companies are working on low carbon aluminium production now. A joint definition is still lacking in the industry. The goal is to reach 100 per cent zero carbon emission aluminium by 2050. This will not happen in a straight line, and depend on the accelerated implementation of new technologies, enabled by new policy frameworks and availability of financing for an accelerated transition.

Nexus				
	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>				
<b>Develop zero-carbon strategies</b> , set public procurement policies and standards to create demand for low or zero carbon materials and increase usage in low or zero carbon applications, products & services (e.g. EV, green buildings, renewable power generation & transmission)	<ul style="list-style-type: none"> <li>Strategies and policies development initiated in main thematic areas such as: competitiveness/carbon leakage, technology /innovation, carbon border adjustment, demand, and circular economy</li> </ul>	<ul style="list-style-type: none"> <li>Standards for product development developed at latest</li> </ul>	<ul style="list-style-type: none"> <li>Integrated systems approach established - between material/product procurement, resource efficiency (use phase) and circular economy</li> </ul>	<ul style="list-style-type: none"> <li>Cradle to cradle materials traceability enabled</li> </ul>
Support the development of <b>novel technologies</b> in smelting (carbon free electrolysis) and refining & recycling (zero-carbon heat & steam)		<ul style="list-style-type: none"> <li>Supportive policy frameworks are implemented</li> <li>Competing carbon free smelting technologies close to market</li> </ul>	<ul style="list-style-type: none"> <li>Deployment in new smelting capacity</li> </ul>	<ul style="list-style-type: none"> <li>Retrofit to existing non-CCS/U electrolytic cells</li> </ul>
<b>Mobilize progressive business and partner voices</b> in priority countries & regions, ensuring 1.5°C- warming limit is a strategic goal		<ul style="list-style-type: none"> <li>Commitment to supply long term, reliable, competitive, firm, renewable or CCS/U power to aluminium smelters</li> </ul>	<ul style="list-style-type: none"> <li>New smelting capacity only using low/zero carbon power</li> </ul>	<ul style="list-style-type: none"> <li>Existing grid-connected capacity to utilize</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>Encourage direct advocacy in priority countries</b> , sub-national regions to develop zero-carbon materials processing strategies and roadmaps	<ul style="list-style-type: none"> <li>• Commitments from policymakers to end fossil-fuel subsidies</li> </ul>	<ul style="list-style-type: none"> <li>• Commitment to supply long term, reliable, competitive, firm, low carbon or CCS/U power to aluminium smelters</li> </ul>	<ul style="list-style-type: none"> <li>• New smelting capacity only using low/zero-carbon power</li> </ul>	<ul style="list-style-type: none"> <li>• Existing grid-connected capacity to utilize</li> </ul>
Drive <b>downstream market pull</b> via value chain advocacy for initiatives at state, regions/cities levels which establish strong building codes for new and retrofit buildings and infrastructure (including cable and wiring standards), low-carbon materials standards and green procurement policies	<ul style="list-style-type: none"> <li>• Focus on accelerated EV deployment (network infrastructure, battery technology and fleet development)</li> </ul>	<ul style="list-style-type: none"> <li>• EV light-weighting standards – lifecycle-based approach</li> </ul>	<ul style="list-style-type: none"> <li>• Seek commitments from downstream to demand low carbon, in addition to supply side decarbonization (scope 3)</li> </ul>	<ul style="list-style-type: none"> <li>• Support maximized collection &amp; recovery of available scrap, while recognizing the limited availability of post-consumer scrap</li> </ul>
<b>Provide a clear coordinated, stable, and predictable policy framework on national &amp; international level (e.g. G20)</b> to enable investment in the right decarbonization pathway(s)	<ul style="list-style-type: none"> <li>• Smelter lifetimes historically 30+ years, drawing constant electricity for whole of life</li> </ul>	<ul style="list-style-type: none"> <li>• Support investment in materials and alloy separation technologies</li> </ul>		<ul style="list-style-type: none"> <li>• Commitment to 95% post-consumer scrap collection across all segments: collect &amp; utilize</li> </ul>
Plan and support the development, validation and deployment of CCS/U technologies and infrastructure for electricity, heat & hydrogen production and potentially process emissions	<ul style="list-style-type: none"> <li>• 2021-23: policy establishment for industrial clustering - shared CCS/U services between industries (regional hubs) e.g. shared service benefit/tax benefit</li> </ul>	<ul style="list-style-type: none"> <li>• Initial deployment of CCS/U to power generation units (China, India, GCC)</li> </ul>	<ul style="list-style-type: none"> <li>• Development of technology &amp; deployment of CCS/U to thermal units across alumina refining, casting &amp; recycling processes</li> <li>• Development of technology &amp; deployment of CCS/U to electrolytic cells (that use carbon anodes)</li> </ul>	
Energy Policy		<ul style="list-style-type: none"> <li>• Support accelerated deployment of (firm) renewable energy on the grid.</li> </ul>	<ul style="list-style-type: none"> <li>• Support (existing) smelter connection to (renewable) grids</li> </ul>	<ul style="list-style-type: none"> <li>• Support investment in new (greenfield) (renewable) grid-connected smelters, utilizing carbon-free electrolysis technologies</li> </ul>

	By 2021	By 2025	By 2030	By 2040
Allocate public funding for target-driven <b>research programs</b> with quantitative objectives 10-15 years ahead	<ul style="list-style-type: none"> <li>Allocate funding to the development of carbon anode free smelting technologies</li> </ul>	<ul style="list-style-type: none"> <li>Allocate funding to reach clear progress between 2021 and 2025 in thermal energy replacement technologies (heat &amp; steam), including electrification &amp; hydrogen</li> </ul>	<ul style="list-style-type: none"> <li>Allocate funding in refined primary aluminium production technologies (ore to metal route)</li> </ul>	
Realize principle of “shared burden” of emissions along the value chain	<ul style="list-style-type: none"> <li>Start discussing format of regulation</li> </ul>	<ul style="list-style-type: none"> <li>Regulation ready for implementation</li> </ul>	<ul style="list-style-type: none"> <li>Start implementing with full implementation towards 2035</li> </ul>	<ul style="list-style-type: none"> <li>Maximize recovery - design and manufacture for value retention (extended “polluter pays”-idea)</li> </ul>
Develop a <b>R&amp;D &amp; innovation framework</b> to facilitate new breakthrough technology development & encourage better coordination between actors along the value chain (incl. customers), industry, academia, service providers and energy sector	<ul style="list-style-type: none"> <li>Technology innovation hubs initiated, potentially as part of aluminium clusters” to replace reduced R&amp;D centres within companies</li> </ul>	<ul style="list-style-type: none"> <li>Alloy development centres initiated, bringing together producers and customers</li> <li>Focus on new markets for casting alloys</li> </ul>	<ul style="list-style-type: none"> <li>Alloy standards and specifications amended to enable better recovery post-use and support markets for alloys of all quality</li> </ul>	<ul style="list-style-type: none"> <li>Policies established to reduce remelting cycles pre-consumer</li> </ul>
Work towards establishing market mechanisms ( <b>implicit or explicit carbon price</b> ) to ensure current energy and carbon policies do not have a significant impact on the competitiveness of decarbonizing the aluminium sector			<ul style="list-style-type: none"> <li>Set carbon price of USD60-100 per tonne of CO<sub>2</sub></li> </ul>	
Encourage industrial/corporate circular waste management practices that bring benefits to other sectors’ decarbonization pathways	<ul style="list-style-type: none"> <li>Policies established to explore bauxite residue use in other industries, reducing energy and materials demand</li> </ul>	<ul style="list-style-type: none"> <li>10% bauxite residue reuse</li> </ul>		
Set minimum baseline standard on ethical/responsible sourcing of metals through spot trading platform at London Metal Exchange (LME)	<ul style="list-style-type: none"> <li>LME rules understood by its listed brands and other interested market participants (e.g. suppliers, commodity trading houses etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Review of effectiveness of LME responsible sourcing rules. Consideration of inclusion of broader set of sustainability criteria</li> </ul>	<ul style="list-style-type: none"> <li>Responsible sourcing criteria include baseline expectations for environmental factors (including emissions) for all metals, with possible target set for zero carbon (on a per metal basis)</li> </ul>	<ul style="list-style-type: none"> <li>Work in progress to ensure all LME-listed metals, including aluminium, are on track for zero-carbon targets</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Develop Markets for post-consumer castings	<ul style="list-style-type: none"> <li>Strategies are being developed</li> </ul>		<ul style="list-style-type: none"> <li>developed markets (and innovative applications) for post-consumer castings (from used internal combustion engine vehicles), as existing ICE opportunities for these alloys decline</li> </ul>	
Lay the policy groundwork to support deployment of CCS/U	<ul style="list-style-type: none"> <li>Set cross-industrial, long-term strategy on CCS/U, including volume targets for 2030, 2040, and 2050</li> <li>Map industrial sites to geological storage resources at the national level</li> </ul>	<ul style="list-style-type: none"> <li>Government procurement and new product standards support growing demand for recycled CO<sub>2</sub> (e.g. in building materials), captured from production facilities</li> <li>Considered use of tax incentives and carbon pricing mechanisms support the first major cross-industrial CCS/U networks</li> </ul>	<ul style="list-style-type: none"> <li>New regulatory frameworks are needed to clarify international obligations and liabilities associated with leakage from geological formations</li> <li>Clearer processes established for project approvals</li> </ul>	<ul style="list-style-type: none"> <li>Governments set asset-level CCS/U strategies, including target sites for deployment in the final decade to net zero, targeting the remaining hardest-to-abate emissions from heavy industry</li> </ul>
<b>2. Financial Institutions</b>				
Incentivization of investments in the transition	<ul style="list-style-type: none"> <li>Major institutional asset owners continue to push businesses to set net zero emissions targets, voluntarily disclose under TCFD</li> <li>Engage with a) national governments to build case for low carbon policies; b) value chain to incentivize collaborative action</li> <li>Explore/announce investment in aluminium companies with credible carbon neutral plans</li> <li>Leading investors explore investment and business cases for green aluminium facilities, within cross-sector collaborative efforts, and begin structuring</li> </ul>	<ul style="list-style-type: none"> <li>Major institutional asset owners continue to push businesses to set net zero emissions targets</li> <li>Participate in dedicated funding of first wave of commercial scale aluminium projects</li> <li>Continue engaging with value chain to encourage carbon neutral targets and mitigation</li> <li>Increase preferential investment in aluminium companies with credible plans</li> </ul>	<ul style="list-style-type: none"> <li>Major institutional asset owners continue to push businesses to set net zero emissions targets</li> <li>Participate in dedicated investment of 10 commercial scale aluminium facilities</li> <li>Scale up preferential investment in low carbon-committed primary producers; begin divesting from carbon-intensive producers</li> <li>Investor alignment raises cost of capital for new carbon-intensive production facilities, increasing competitiveness of green and low carbon cement</li> </ul>	<ul style="list-style-type: none"> <li>Public-private processes and techniques for managing stranded high aluminium production assets ramp down as regional supply/demand mismatches resolve</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Incentivization of investments in the transition	<ul style="list-style-type: none"> <li>Greater clarity established regarding the needed investment for aluminium sector's transition</li> </ul>		<ul style="list-style-type: none"> <li>Public-private processes and techniques for managing stranded high carbon aluminium production assets institutionalized</li> </ul>	
Tie new <b>investment</b> to 2050 1.5°C pathway (e.g. rebuild of smelters, tech innovation, tie finance to performance: taxonomy)		<ul style="list-style-type: none"> <li>Develop clear plans to shift investment portfolios towards low-carbon infrastructure and technologies</li> </ul>	<ul style="list-style-type: none"> <li>Investment in novel and circular business models (e.g. materials leasing) effectuated</li> </ul>	
Increase availability of capital to <b>retrofit existing capacity</b> , connect to grid, add CCS/U to power, thermal and electrolytic units				<ul style="list-style-type: none"> <li>2050: 100% renewable or CCS/U grid connected or captive renewables CCS/U</li> </ul>
Encourage <b>public-private sector partnership</b> to bring technologies under development to commercial readiness	<ul style="list-style-type: none"> <li>Develop public-private partnerships to invest in research, design and development projects</li> </ul>	<ul style="list-style-type: none"> <li>Increase funding directed at driving innovation and maximize the likelihood of more fundamental breakthroughs</li> </ul>	<ul style="list-style-type: none"> <li>Institutionalized financing mechanisms and incentive structures for industry decarbonization</li> </ul>	
Provide a variety of financial mechanisms to <b>enable deployment of CCS/U</b> , where appropriate	<ul style="list-style-type: none"> <li>Raise awareness &amp; build knowledge across financial around the multi-decade CCS/U opportunity</li> <li>More robust estimates of the current financing gaps (approx. USD35bn committed out of USD500bn required to reach first gigaton of CCS/U across heavy industry)</li> </ul>	<ul style="list-style-type: none"> <li>A clear CCS/U finance roadmap is created to 2050, at national level via public-private partnership</li> <li>Readily available capital grants; credit guarantees; guaranteed offtakes and contracts for difference continue to finance a range of capture, transport and storage initiatives</li> </ul>	<ul style="list-style-type: none"> <li>Broad suite of finance instruments available in core geographies</li> </ul>	
<b>3. Technology Providers and Innovators</b>				
Continue to <b>improve energy efficiency</b> in own processes; new capacity utilizing best available technologies (BAT)	<ul style="list-style-type: none"> <li>All new capacity installed at best available technologies (BAT)</li> </ul>		<ul style="list-style-type: none"> <li>Retrofit/improvement of 100% of existing capacity to perform at 2020 benchmark performance</li> </ul>	

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Direct process, thermal and auxiliary materials <b>emissions</b>	<ul style="list-style-type: none"> <li>2021: Have a sector wide roadmap in place for how to achieve the goals, and ensure alignment with related initiatives, e.g. TCFD, CDP, SBTi</li> </ul>	<ul style="list-style-type: none"> <li>2025: Sector broadly committed, and 10% reduction achieved</li> </ul>	<ul style="list-style-type: none"> <li>2030: At industry average, 30 % reduction achieved. Have an implementation map ready and each piece of new technology is in pilot scale (minimum)</li> <li>2040: reduced direct emissions by 50% (industry average)</li> </ul>	<ul style="list-style-type: none"> <li>Reduction of 60 to 70% of direct process, thermal and auxiliary materials emissions (roughly equivalent to scope 1 and 3, categories 1,3 and 4)</li> </ul>
CCS/U deployment for electricity decarbonization, direct emissions and thermal related emissions	<ul style="list-style-type: none"> <li>Sectoral roadmap to outline opportunities for CCS/U, incl. cross-sectoral industrial clusters or hubs</li> <li>Global gap analysis for location of production facilities vs. geological storage sites</li> </ul>	<ul style="list-style-type: none"> <li>Technological development of CCS/U to electrolytic cells</li> </ul>	<ul style="list-style-type: none"> <li>Commercial deployment of CCS/U to electrolytic cells (that use carbon anodes)</li> </ul>	<ul style="list-style-type: none"> <li>Clear strategy and project pipeline in place, for large scale deployment of CCS/U for the residual emissions from thermal units across alumina refining, casting &amp; recycling processes</li> </ul>
Development of inert anode	<ul style="list-style-type: none"> <li>Create more transparency around various pilot projects on inert anodes – with a view to exchange lessons learned and speed up the development process</li> </ul>	<ul style="list-style-type: none"> <li>Inert anodes: commercial process in place and used by several of world's top 10 producers</li> </ul>		
Accelerate the processes of <b>electrification</b> as a key lever towards emissions reduction	<ul style="list-style-type: none"> <li>Develop draft policies by 2021</li> </ul>	<ul style="list-style-type: none"> <li>Policies implemented: <ul style="list-style-type: none"> <li>in alumina refining</li> <li>in casting &amp; semis manufacture</li> <li>in recycling</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>At least 50% of all thermal processes grid connected with renewable power</li> </ul>
100% removal of GHG emissions from electricity by 2050 (via renewables, low carbon and CCS/U)	<ul style="list-style-type: none"> <li>Establish sectoral commitment to the 2050 goal of “100% removal of GHG emissions from electricity by 2050”, incl. 3-5 global frontrunners published clear roadmaps for a) grid connected producers: uptake of green energy, b) captive/self-generated: commitment to connect smelters &amp; power stations to grid</li> </ul>	<ul style="list-style-type: none"> <li>elaboration of company &amp; regional strategies (e.g. China, Middle East)</li> </ul>	<ul style="list-style-type: none"> <li>Company Roadmaps established</li> </ul>	

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Explore the potential of renewably produced hydrogen as a replacement fuel for thermal processes	<ul style="list-style-type: none"> <li>• Opportunities for hydrogen use in aluminium processes articulated as part of sectoral roadmap</li> <li>• R&amp;D spending dedicated on a 100% calcining process using hydrogen</li> </ul>	<ul style="list-style-type: none"> <li>• Pilot plant[s] (alumina refining) operational</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial availability of hydrogen combustion units in refining, casting, and other thermal processes</li> </ul>	
Alloy sorting technology & deployment		<ul style="list-style-type: none"> <li>• Investments in building alloy sorting capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Closed loop alloy sorting streams has become the norm</li> </ul>	
<b>4. Business and Service Providers</b>				
Improve product design to enable increased energy and materials efficiency	<ul style="list-style-type: none"> <li>• Commitments made towards full material traceability</li> </ul>	<ul style="list-style-type: none"> <li>• Mixed materials management strategies implemented from customers</li> <li>• Material leasing strategies elaborated</li> </ul>		<ul style="list-style-type: none"> <li>• Materials full traceability achieved</li> </ul>
Recycling	<ul style="list-style-type: none"> <li>• Recognize aluminium scrap as valuable input material and a way to decrease emissions across industry</li> </ul>	<ul style="list-style-type: none"> <li>• Define recycling roadmap with estimations of needed infrastructure, investment needs, R&amp;D etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Have large scale aluminium sorting and remelting plants gaining back full value from recycling; start implementation in Europe or North America</li> </ul>	<ul style="list-style-type: none"> <li>• 95% collection rates for end-of-life products and full value recovery of collected scrap</li> </ul>
Companies are setting targets for emissions reductions, allocating adequate staff time and funding to explore and implement decarbonization solutions and working with others along the value chain to ensure that emissions reduction is maximized	<ul style="list-style-type: none"> <li>• 2022: 10% of global aluminium production committed to net zero aligned pathway</li> </ul>			



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Develop (sectoral and corporate) <b>roadmaps to net-zero carbon emissions by 2050 (including scope 3)</b> , including recycling and clear specifications of how transitional solutions will be phased out over time. This will build on IAI pathway to 2050, technological scenarios that need development	<ul style="list-style-type: none"> <li>Scrap availability &amp; potential articulated (IAI Material flow model)</li> <li>Technological scenarios developed (IAI GHG Pathways WG)</li> <li>Electrical energy, thermal processes &amp; aluminium specific processes quantified (IAI)</li> </ul>	<ul style="list-style-type: none"> <li>75% of global production committed to roadmap</li> </ul>	<ul style="list-style-type: none"> <li>100% of global production commitment</li> </ul>	
Towards net-zero <b>manufacturing</b>			<ul style="list-style-type: none"> <li>10 % of global production capacity</li> <li>First net-zero smelter fully operational</li> </ul>	<ul style="list-style-type: none"> <li>By 2050 - Net Zero primary aluminium product</li> <li>Cradle to gate (100% renewable energy, zero emissions electrolysis - e.g. inert anode), zero emission alumina (electrification with renewables, and /or hydrogen), zero emission transport of products, electrification of casting processes, zero emission auxiliary materials (e.g. caustic soda)</li> </ul>
Develop cross sectoral <b>partnerships</b> which can deliver greater <b>materials efficiency and circularity</b> and will create <b>demand</b> for green products and services, e.g. make commitments to ‘green purchasing’ of industrial/building components	<ul style="list-style-type: none"> <li>Commitment from consuming companies/sectors to source % of their supply from sustainable (certified) sources</li> </ul>	<ul style="list-style-type: none"> <li>Shift towards service-oriented approach implemented</li> <li>10% materials traceability</li> </ul>	<ul style="list-style-type: none"> <li>Material leasing models implemented</li> <li>50% materials traceability</li> </ul>	<ul style="list-style-type: none"> <li>100% materials traceability</li> <li>100% sustainable sourced metal commitment</li> </ul>
Develop market infrastructure for transparency, pricing and trading allows participants to realize financial value at London Metal Exchange (LME)	<ul style="list-style-type: none"> <li>Launch of LME platforms to enable (i) disclosure of sustainability rated metrics by metal owners/producers and (ii) spot trading platform to facilitate the pricing and trading of metal based on sustainability, transparency and comparability</li> </ul>	<ul style="list-style-type: none"> <li>Strong liquidity and market interest established for low carbon aluminium</li> <li>Data used to launch new contracts / products / platforms to support market segment growth</li> </ul>	<ul style="list-style-type: none"> <li>Core sustainability contracts launched on central exchange platform (or amendments made to existing contracts)</li> </ul>	<ul style="list-style-type: none"> <li>Work on track to ensure all exchange-traded contracts are “sustainable” – as defined by the market demand</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Design for reuse and recycling - establishment of systems for original equipment manufacturers		<ul style="list-style-type: none"> <li>OEMs have system in place to keep separate alloys of differing qualities in the pre-consumer scrap recovery process</li> </ul>	<ul style="list-style-type: none"> <li>Standard established for OEMs to incentivize separation of scrap at end of product life</li> </ul>	
Water usage and recycling	<ul style="list-style-type: none"> <li>Develop and set targets to reduce water consumption per ton of aluminium produced</li> <li>Develop and set targets to increase the usage of recycled water in all stages of production</li> </ul>			
Responsible deployment of CCS/U in partnership with other sectors	<ul style="list-style-type: none"> <li>Cross-industry partnerships must identify clusters or “hubs” of industrial sites, that offer the potential to share a common transport and storage infrastructure, further reducing operational costs</li> </ul>	<ul style="list-style-type: none"> <li>Public declarations from major industry players, laying bare any intentions to rely on CCS/U, including portfolio-level targets</li> <li>Ten major CCS/U industrial hubs or networks reach FID, for commencing operations by 2030</li> </ul>	<ul style="list-style-type: none"> <li>National-level CCS/U targets are matched with commitments from industrial clusters and storage capacity that is technically validated</li> </ul>	<ul style="list-style-type: none"> <li>Any industry operator publishes asset-level roadmap for deployment of CCS/U</li> </ul>
Workers and their organisations	<ul style="list-style-type: none"> <li>Social partners engage in social dialogue processes to facilitate the implementation of the roadmap.</li> </ul>	<ul style="list-style-type: none"> <li>Sector and company Just Transition plans are set up to create and guarantee quality jobs and decent work.</li> </ul>		
<b>5. Civil society</b>				
Push for <b>adequate labelling</b> of lifecycle and embedded carbon intensity of products and services to create traceability and be a powerful tool for strengthening consumer awareness		<ul style="list-style-type: none"> <li>Technologies development beyond labelling – real time and user-oriented data; articulation of responsibility by consumers to take action (post purchase), not just at point of sale; this includes driving behaviour, waste management and recycling, product integration as well as standardization</li> </ul>	<ul style="list-style-type: none"> <li>Consumer carbon budgets in place that account for full lifecycle</li> </ul>	



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Non-profits, NGOs support the development of regional roadmaps				<ul style="list-style-type: none"> <li>• Consumer demands have mainstreamed development of circular business models in developed and developing countries</li> <li>• Social dialogue models proven, standardized, and scaled across communities to support just transition</li> </ul>
Water	<ul style="list-style-type: none"> <li>• Encourage consistent reporting of water data, especially in the company's environmental impact reporting system.</li> <li>• Develop cohesive methodology for collecting and reporting water data</li> </ul>			
Strengthen transparency regarding emissions disclosure and reporting	<ul style="list-style-type: none"> <li>• IAI refined carbon footprint guidance and scope 3 guidance published (2021)</li> <li>• ASI's updated Performance Standard released for public consultation</li> </ul>	<ul style="list-style-type: none"> <li>• 25% industry disclosure of emissions in line with IAI guidance</li> </ul>	<ul style="list-style-type: none"> <li>• 50% industry disclosure of emissions in line with IAI guidance</li> </ul>	<ul style="list-style-type: none"> <li>• 100% industry disclosure of emissions in line with IAI guidance</li> </ul>
Just transition	<ul style="list-style-type: none"> <li>• Just transition commissions, representing business, labour and government, create industrial just transition roadmaps which include adequate resourcing for development of new, high quality labour standard jobs, upskilling and redeployment of workers</li> </ul>			

## 6. ALUMINIUM - EXISTING INITIATIVES

Mission Possible Platform: Aluminium for Climate	An initiative of high-ambition organizations under the Mission Possible Partnership which was launched in 2019 with a view to accelerate the development of low-carbon smelting and refining processes, increasing renewable energy sourcing, and increasing recycling rates.
International Aluminium Institute	Association of aluminium producers, representing more than 60% of global aluminium production.
Aluminium Stewardship Initiative	Launched to foster greater sustainability and transparency throughout the aluminium industry, and to ensure a sustainable supply chain.
London Metal Exchange – Responsible Sourcing Initiative	The LME has introduced responsible sourcing requirements for all brands listed for good delivery on the LME.
International Council on Mining and Metals (ICMM)	ICMM was founded in 2001 to improve sustainable development performance in the mining and metals industry. That includes the Material Stewardship Facility.
AluQuebec Cluster	The Quebec aluminium industrial cluster is a non-profit organization with a mission to foster synergies between stakeholders at the national and international levels and aluminium industry stakeholders in Quebec.
Business Ambition for 1.5C	An urgent call, issued by a broad coalition of business, civil society and UN leaders, to set science-based targets aligned with limiting global temperature rise to 1.5°C above pre-industrial levels. The campaign is led by the Science Based Targets initiative, We Mean Business Coalition & UN Global Compact.
Science Based Targets Network	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to help companies develop and set science-based targets.
We Mean Business Coalition	Global non-profit coalition working with the world’s most influential businesses to take action on climate change, catalyzing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
Leadership Group for Industry Transition (LeadIT)	Accelerating the transition of all industry sectors to low carbon pathways to reach net-zero carbon emissions by 2050.
Climate Action 100+	Investor network to ensure the world’s largest corporate greenhouse gas emitters take necessary action on climate change.



## 7. ALUMINIUM - FURTHER REFERENCES

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Science Based Targets	<a href="#">LINK</a>
European Aluminium	<a href="#">LINK</a>
IAI Greenhouse Gas Pathways to 2050	<a href="#">LINK</a>





# CONCRETE & CEMENT

## Action Table

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2021



## 1. CONCRETE AND CEMENT - INTRODUCTION

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A clear decarbonization pathway exists for the cement and concrete industry; however, it will take a more ambitious and coordinated effort from all stakeholders to achieve adequate progress in time.

The current global demand for cement, the main ingredient of concrete, is expected to rise from 4.2 billion tonnes per year to 4.7 billion tonnes in 2050. Global CO<sub>2</sub> emissions from the cement and concrete industry amount to around 2.2 gigatonnes per year, with a business-as-usual scenario predicting a rise to 2.3 gigatonnes by 2050.<sup>7</sup> The emissions originate from direct process emissions (1.2 gigatonnes), heat emissions from fuel combustion (0.75 gigatonnes) and from smaller indirect emissions in the supply chain.<sup>8</sup> The starting point for the transition is challenging: most of the CO<sub>2</sub> emissions result from the unavoidable chemical process in the cement production (known as calcination) and the development of new technologies to decarbonize cement and concrete might not be scalable for years.<sup>9</sup> It is therefore believed that “cement is almost certain to be the most difficult and costly sector of the economy to decarbonize”.<sup>10</sup> To date, the sector has delivered 19 per cent reduction in CO<sub>2</sub> emissions since 1990 but recognises that it needs to accelerate its actions as expressed by leading producers in the [Global Cement and Concrete Association’s climate ambition statement](#). In order to make the transition happen, a combination of supply-side and demand-side measures will be required, ranging from material efficiency, reuse and recycling across the construction value chain, decreased material intensity, increased energy efficiency and the scaling-up of more investments in breakthrough technologies.

Concrete is the second most consumed product in the world (after water). It is a key product in the built environment, and therefore the decarbonization ambition for the cement and concrete sector must be grounded in a “systems approach” for the built environment. This includes developing a focus to reach net-zero emissions for buildings and infrastructure in a life-cycle and material neutral approach, which will need to be promoted through the revision of building standards and the establishment of procurement guidelines by public and private sector stakeholders. Establishing this clear demand signal will support an accelerated adaptation of low carbon cement and concrete products.

The content of this pathway needs to be aligned with the Climate Action Pathway for Human Settlements. In this space, there is an urgent need to create value chain collaborations, establish shared vision and engage actors on the demand side. Therefore, international cooperation will play a significant role in driving key businesses along the value chain to set science-based targets and net-zero commitments.

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<sup>7</sup> Technology Roadmap – low carbon transition in the cement industry, IEA & CSI.

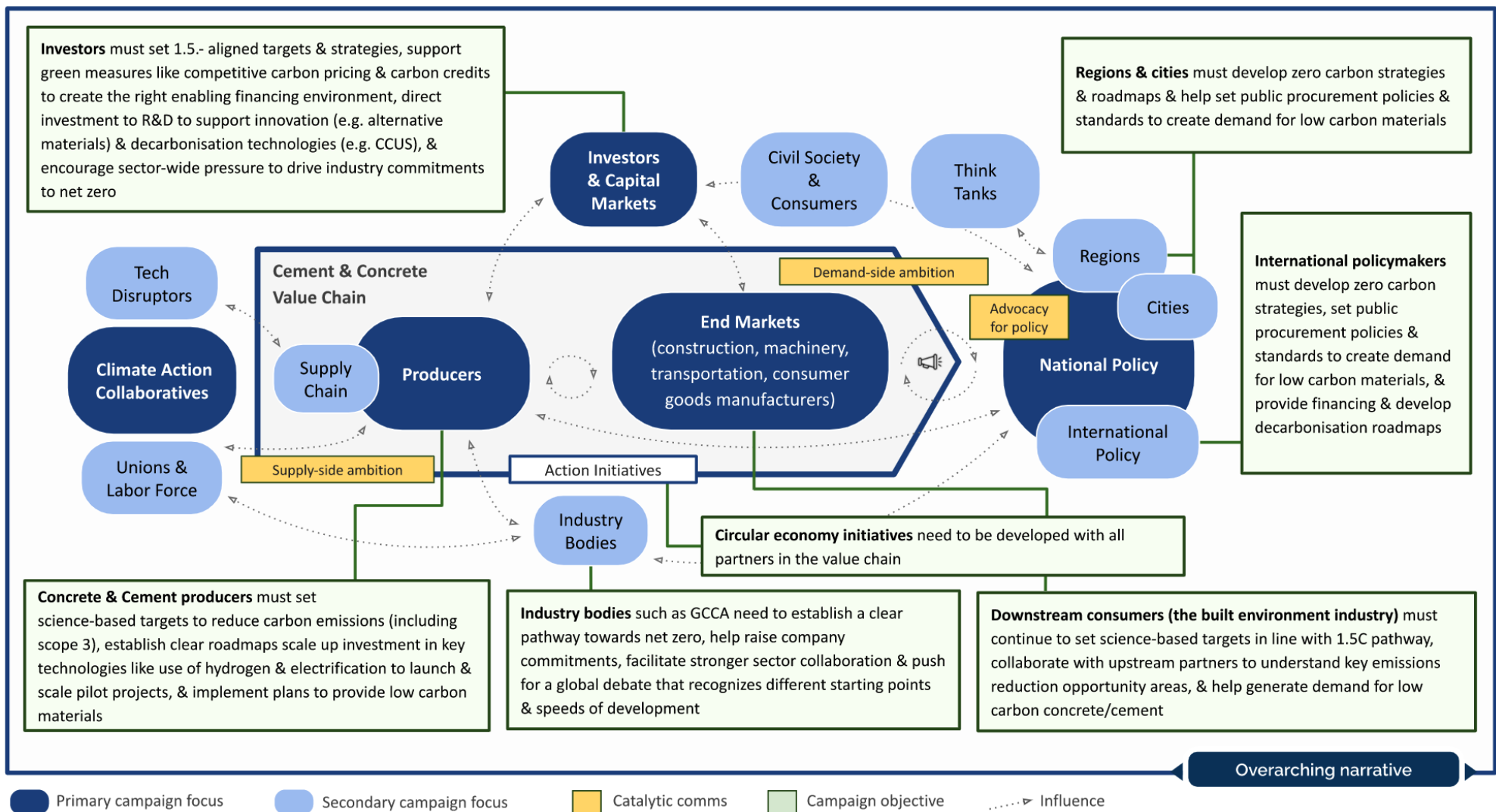
<sup>8</sup> Mission Possible - Sectoral Focus Cement, ETC.

<sup>9</sup> Laying the Foundation for zero-carbon cement.

<sup>10</sup> Mission Possible - Sectoral Focus Cement, ETC.

## 2. CONCRETE AND CEMENT SYSTEM MAP

These stakeholders have complementary objectives to support the overall campaign for cement & concrete industry to achieve net-zero emissions by 2050



### 3. CONCRETE AND CEMENT CHANGE LEVERS

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Finding ways to produce carbon neutral concrete and cement is a major contribution to a sustainable built environment. This action table is directly related to the action table of the Human Settlements' Climate Action Pathway.

- **Policymakers:** The establishment of global and national roadmaps for the concrete and cement industry are an urgent priority; the Swedish roadmap for “fossil free competitiveness” is a good example thereof.<sup>11</sup> In the second half of 2021, the Global Cement and Concrete Association (GCCA) will launch its sectoral roadmap, which will build on commitments already issued by several industry frontrunners and regional organisations (e.g. Cembureau Carbon neutrality Roadmap in Europe) and should provide a strong framework for further implementation. At the same time, the sector needs to contribute to and will benefit from changes in policy frameworks for the built environment. Joint efforts are required to review and establish building regulations and specifications aimed at achieving carbon neutrality of the built environment over its entire life cycle, including during the use phase and at the end of life. Driving a strong demand signal through public and private procurement policies to use green concrete and cement for infrastructure projects will help to increase the demand for these products. This will foster an environment for decarbonization. At the same time, there are important opportunities through improvements in material efficiency within the building sector combined with greater reuse and recycling of cement and concrete.<sup>12</sup> Governments should also enable the establishment of clean energy grids to respond to increasing energy needs associated with advanced technologies, such as CCS/U, and support the use of fuels that are less carbon intensive in cement kilns. The development of strategies for national roadmaps for CCS/U is also recommended.
- **Technology providers and innovators:** A technology leap for cement manufacturing is needed to decarbonize the sector. Although many of the relatively straightforward gains have already been made, there is still scope for improvement in energy efficiency. Concrete and cement producers to immediately establish or update their strategies for best available technologies and lay out transition plans for outdated plants by 2030. China, for example, has become a centre of innovation in this space. Europe and the United States, among others, are starting to lag on energy efficiency, due to the continuing use of older equipment.<sup>13</sup> Another important avenue is the substitution of fossil fuels by residual (non-recyclable) waste, for example biomass. This has proven to be a successful strategy to affect change in the short term. A key challenge is to ensure the availability of biomass waste and residual waste on a sustainable and competitive basis. Furthermore, there is a need to continuously develop the options for clinker substitution and the scaling up of its usage while more radical options, such as the introduction of novel and carbon-negative cements, are still under development. While this is a potentially very impactful and cost-

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<sup>11</sup> Roadmap for Fossil-free Competitiveness.

<sup>12</sup> Mission Possible - Sectoral Focus Cement, ETC.

<sup>13</sup> Making concrete change - innovation in low-carbon cement and concrete

effective solution, the deployment is still hampered by a lack of demand for low-carbon concrete and cement and the uncertain availability of substitute materials in certain geographies.

To prevent the industry process emissions from being released into the atmosphere, there is a need to develop efficient and commercially viable large-scale solutions to utilize carbon dioxide in industrial processes (e.g. carbon utilization) and to store carbon dioxide geologically (e.g. carbon storage) or in products through mineralisation (e.g. CCS/U). The key challenges are the capital investment required in the absence of clear policy frameworks. Therefore, long-term public and private initiatives need to be established to develop national roadmaps, which can provide planning security for industry and enable industry collaboration on a large scale. Significant initiatives will be required in research and development; thus, pre-competitive research networks, such as Innovandi, must be strengthened.

- **Business and service providers:** As a global industry association, GCCA will launch a sector roadmap in 2021, which will lay out detailed plans to reduce the sector's CO<sub>2</sub> footprint and effort towards delivering carbon-neutral concrete by 2050. While several frontrunners in the industry have announced clear targets, the industry faces a dilemma: pressure from the public and financial investors to abate quickly; however, there is no economic rationale yet to do so. This can only be tackled in a two-pronged approach. On the one hand, concrete and cement suppliers need to sign up to net-zero commitments, develop roadmaps and strategies and continue to invest in technological improvements. Announcements about the establishment of the first net-zero carbon cement production plant in 2030 have been made; more of these lighthouse projects are needed. Suppliers also need to work on a broadened offering for "green cement", for which it would be useful to establish a clear standard with minimum requirements. In the next decade, the availability of green cement and concrete should be ensured in all markets globally.

On the other hand, cross-sectoral collaborative action needs to be intensified with all key stakeholders driving materials demand in the built environment, which also will positively affect the demand for green cement. Suppliers must work closely with the whole value chain to establish more transparent targets, implement standards for tracking and certifying embodied carbon and supporting increases in regional carbon prices. Business and innovative service providers can also close the existing gaps to successfully implement circular economy strategies and shift towards more circular approaches (increase in recycle and reuse, materials efficiency, and material substitution) and the accelerated reduction of material input.

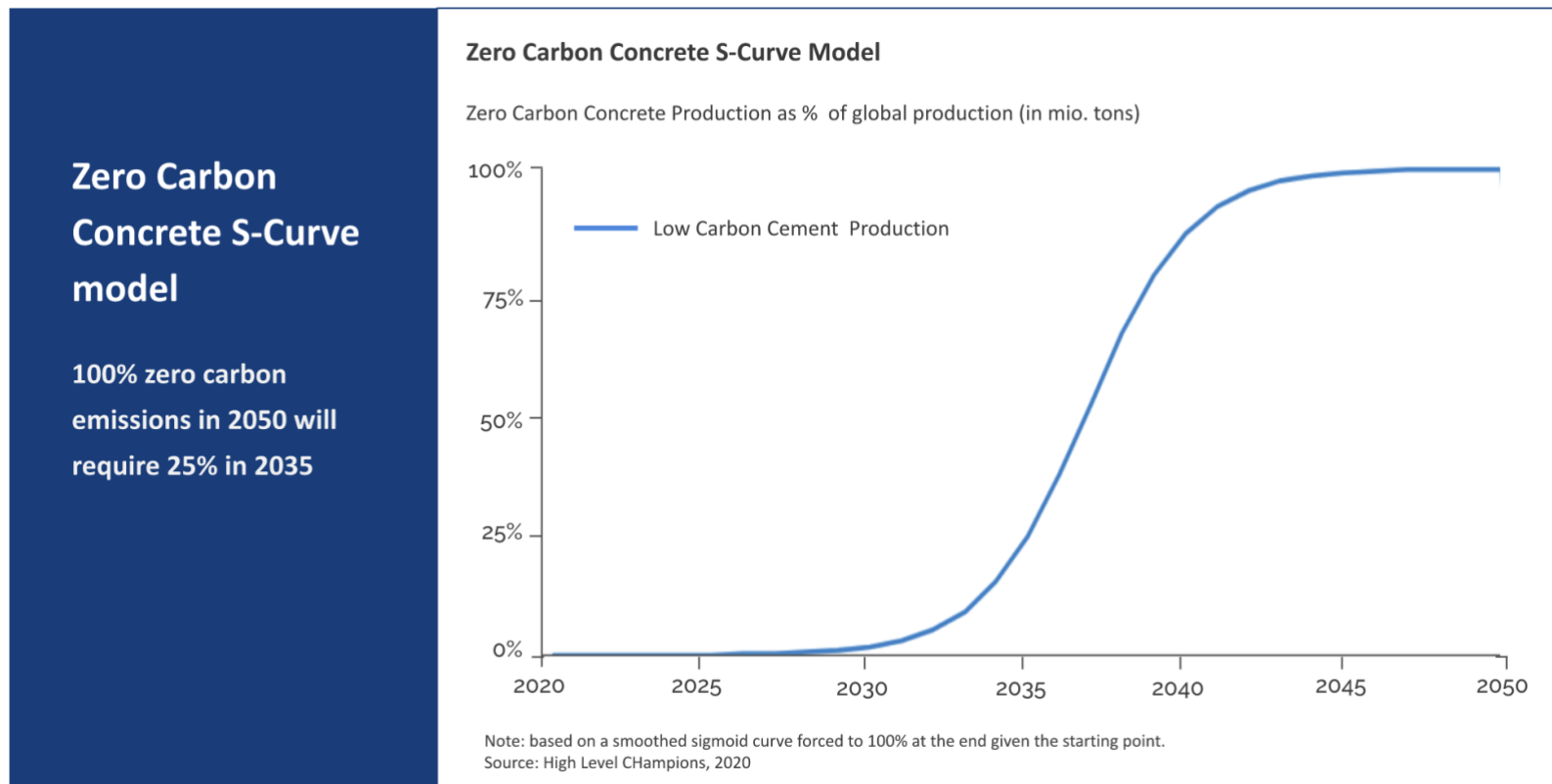
- **Workers and the trade unions that represent them** are engaged through social dialogue processes to proactively manage economic transitions and uncertainties, while holding and creating rewarding, healthy and decent jobs. This involves setting up Just Transition processes as defined by the ILO with social partners and other relevant stakeholders.<sup>14</sup>
- **Civil society:** Social demand for climate action and environmentally friendly products is changing the values of governments and NGOs and the behaviours of businesses. Civil society organizations play a key role in raising and strengthening public awareness and holding key actors accountable. Efforts are needed to educate the broader public about the need to shift to “green materials” in the built environment, also to increase the social acceptance of higher costs related to these. In this regard, the action table also suggests working closely with city networks, such as C40, to ensure commitment from cities to developing embodied carbon strategies.

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<sup>14</sup> ILO, “Guidelines for a just transition towards environmentally sustainable economies and societies for all” [https://www.ilo.org/global/topics/green-jobs/publications/WCMS\\_432859/lang--en/index.htm](https://www.ilo.org/global/topics/green-jobs/publications/WCMS_432859/lang--en/index.htm)

## 4. CONCRETE S-CURVE

The S-curve models the development of zero-carbon concrete production until 2050. Several companies are working on low-carbon concrete production at the moment. A joint definition is still lacking in the industry. The goal is to reach 100 per cent zero-carbon emission concrete by 2050. This will not happen in a straight line and will depend on the accelerated implementation of new technologies, enabled by new policy frameworks and availability of financing for an accelerated transition.



## 5. CEMENT AND CONCRETE ACTION TABLE

This pathway is building on all the great work various organizations and individuals have been contributing over so far. In the pathway, industry averages are being used to reflect the trajectories of the sector. Different countries will develop at different speeds, based on different starting points, policy frameworks, ambitions, and available technology. There may be deviations from the timeline due to national specificities and geographical differences, but such deviation should **not** be perceived as a reluctance to support the transition of the sector.



	By 2021	By 2025	By 2030	By 2040
<b>1. Policymakers (national, subnational, local levels)</b>				
<b>Encourage direct advocacy in priority countries, sub-national regions to develop zero carbon materials processing strategies and roadmaps</b>	<ul style="list-style-type: none"> <li>Global Cement and Concrete Roadmap to be published: targets and timelines to carbon neutral concrete by 2050</li> <li>Establish China &amp; India “competitiveness and low carbon” dialogue, including on cement industry”</li> </ul>	<ul style="list-style-type: none"> <li>Regional/national cement roadmaps to be updated/published</li> </ul>	<ul style="list-style-type: none"> <li>Progress against Global Cement and Concrete Roadmap reported</li> <li>Roadmaps are updated</li> </ul>	<ul style="list-style-type: none"> <li>Progress against Global Cement and Concrete Roadmap reported</li> <li>Roadmap updated</li> </ul>
<b>Develop zero carbon strategies, set public procurement policies and standards to demand for low or zero carbon and resilient whole life solutions for built environment assets (national, subnational &amp; local - countries, states, regions), including recycled materials</b>	<ul style="list-style-type: none"> <li>Agree and publish strategy and timeframe for Paris-aligned procurement policies to reduce whole life carbon. Publish Paris-aligned procurement policies. Establish method of measurement of carbon impact for publicly procured built environment assets</li> </ul>	<ul style="list-style-type: none"> <li>Publish standards (targets) based on library of projects.</li> <li>Update procurement policies</li> </ul>	<ul style="list-style-type: none"> <li>Update standards (targets) based on library of projects.</li> <li>Update procurement policies</li> </ul>	<ul style="list-style-type: none"> <li>Update standards</li> <li>Update procurement policies</li> </ul>





	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>Develop zero carbon strategies, set public procurement policies</b> and standards to demand for low or zero carbon and resilient whole life solutions for built environment assets (national, subnational & local - countries, states, regions), including recycled materials	<ul style="list-style-type: none"> <li>This needs to be alongside standards and procurement rules that build resilience to current and future climate risks</li> <li>Initiate collation of library of projects in order to establish benchmarks.</li> </ul>			
<b>Adoption of use of Environmental Product Declarations (EPDs) in procurement</b> to choose supply of material which are identical in terms of performance	<ul style="list-style-type: none"> <li>Push forward the adoption of EPDs</li> </ul>	<ul style="list-style-type: none"> <li>All manufacturers have published Environmental Product Declarations for 40% of their product range in developed markets</li> </ul>	<ul style="list-style-type: none"> <li>All manufacturers have published Environmental Product Declarations for their product range</li> </ul>	
<b>Energy:</b> Accelerate the processes of electrification as a key lever towards emissions reduction	<ul style="list-style-type: none"> <li>Develop draft policies</li> </ul>	<ul style="list-style-type: none"> <li>Producers have developed strategies for electrification of processes and transport</li> <li>Implemented policies</li> </ul>		<ul style="list-style-type: none"> <li>Ensured industrial access to abundant and competitively priced renewable energy to meet increasing energy needs linked to low-carbon technologies</li> <li>100% renewable energy usage for electricity</li> </ul>
<b>Lay the policy groundwork</b> to support deployment of CCS/U	<ul style="list-style-type: none"> <li>Set cross-industrial, long-term strategy on CCS/U, including volume targets for 2030, 2040, and 2050</li> <li>Map industrial sites to geological storage resources at the national level and assess the necessary transport infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Government procurement and new product standards support growing demand for recycled CO<sub>2</sub> (e.g. in building materials), captured from production facilities</li> <li>Considered use of tax incentives and carbon pricing mechanisms support the first major cross-industrial CCS/U networks</li> </ul>	<ul style="list-style-type: none"> <li>New regulatory frameworks are needed to clarify international obligations and liabilities associated with leakage from geological formations</li> <li>Clearer processes established for project approvals</li> </ul>	<ul style="list-style-type: none"> <li>Governments set asset-level CCS/U strategies, including target sites for deployment in the final decade to net-zero, targeting the remaining hardest-to-abate emissions from heavy industry</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Provide a variety of financial mechanisms to enable deployment of CCS/U, where appropriate	<ul style="list-style-type: none"> <li>Raise awareness and build knowledge across financial around the multi-decade CCS/U opportunity</li> <li>More robust estimates of the current financing gaps (approx. USD35bn committed out of USD500bn required to reach first gigaton of CCS/U across heavy industry)</li> </ul>	<ul style="list-style-type: none"> <li>A clear CCS/U finance roadmap is created to 2050, at national level via public-private partnership</li> <li>Readily available capital grants; credit guarantees; guaranteed offtakes and contracts for difference continue to finance a range of capture, transport and storage initiatives</li> </ul>	<ul style="list-style-type: none"> <li>Broad suite of finance instruments available in core geographies</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
Invest in innovation for carbon capture and utilization technologies	<ul style="list-style-type: none"> <li>Global gap analysis for location of production facilities vs. geological storage sites</li> <li>Increased investment in utilization methods for CO<sub>2</sub> in built materials, reducing curing time and produce more durable concrete</li> </ul>	<ul style="list-style-type: none"> <li>First commercial deployment of CCS/U to cement production facility</li> <li>Ten new cement facilities reach FID for retrofitting CCS/U</li> </ul>	<ul style="list-style-type: none"> <li>Every major player has technological process in place for storing CO<sub>2</sub> in cement</li> </ul>	<ul style="list-style-type: none"> <li>Clear strategy and project pipeline in place, for large scale deployment of CCS/U for the residual emissions from thermal units across alumina refining, casting &amp; recycling processes</li> </ul>
Businesses lead responsible deployment of CCS/ in partnership with other sectors	<ul style="list-style-type: none"> <li>Cross-industry partnerships must identify clusters or 'hubs' of industrial sites, that offer the potential to share a common transport and storage infrastructure, further reducing operational costs</li> </ul>	<ul style="list-style-type: none"> <li>Public declarations from major industry players, laying bare any intentions to rely on CCS/U, including portfolio-level targets</li> <li>Ten major CCS/U hubs or networks reach FID, for commencing operations by 2030</li> </ul>	<ul style="list-style-type: none"> <li>National-level CCS/U targets are matched with commitments from industrial clusters and storage capacity that is technically validated</li> </ul>	<ul style="list-style-type: none"> <li>Any industry operator publishes asset-level roadmap for deployment of CCS/U</li> </ul>
Move towards lower carbon intensity fuels & biomass		<ul style="list-style-type: none"> <li>20% substitution of fossil fuels by waste derived fuels (as a percentage of energy mix) globally</li> <li>Countries have policies in place to ensure waste collection, pre-treatment, &amp; sorting for fuel substitution by cement industry</li> </ul>	<ul style="list-style-type: none"> <li>60% alternative fuels in OECD countries being used, 20% in emerging economies</li> </ul>	
Development of low carbon cement & concrete standards	<ul style="list-style-type: none"> <li>Continue to develop cement standards to incorporate new cements, recognizing the criticality of safety and resilience</li> </ul>		<ul style="list-style-type: none"> <li>Develop concrete standards to incorporate performance requirements in lieu of minimum cement contents, recognizing the criticality of safety and resilience</li> </ul>	

	By 2021	By 2025	By 2030	By 2040
<b>2. Financial Institutions</b>				
Incentivization of investments in the transition	<ul style="list-style-type: none"> <li>Major institutional asset owners continue to push businesses to set net zero emissions targets, voluntarily disclose under TCFD</li> <li>Engage with a) national governments to build case for low carbon policies; b) value chain to incentivize collaborative action</li> <li>Explore/announce investment in cement companies with credible carbon neutral plans,</li> <li>Leading investors explore investment and business cases for green cement facilities, within cross-sector collaborative efforts, and begin structuring</li> <li>Greater clarity established on the needed investment for concrete/cement sector's transition</li> </ul>	<ul style="list-style-type: none"> <li>Major institutional asset owners continue to push businesses to set net zero emissions targets, voluntarily disclose under TCFD</li> <li>Participate in dedicated funding of first wave of commercial scale cement projects</li> <li>Continue engaging with value chain to encourage carbon neutral targets and mitigation</li> <li>Increase preferential investment in cement companies with credible plans</li> </ul>	<ul style="list-style-type: none"> <li>Major institutional asset owners continue to push businesses to set net zero emissions targets, voluntarily disclose under TCFD</li> <li>Participate in dedicated investment of 10 commercial scale cement facilities</li> <li>Scale up preferential investment in low carbon-committed primary producers; begin divesting from carbon-intensive producers</li> <li>Investor alignment raises cost of capital for new carbon-intensive production facilities, increasing competitiveness of green and low carbon cement</li> <li>Public-private processes and techniques for managing stranded high carbon cement production assets institutionalized</li> </ul>	<ul style="list-style-type: none"> <li>Public-private processes and techniques for managing stranded high cement steel production assets ramp down as regional supply/demand mismatches resolve</li> </ul>
Enable production and storage of <b>renewable energy</b> / renewable energy infrastructure, and increase % used in production.	<ul style="list-style-type: none"> <li>Develop strategy to use renewable energy for indirect energy in cement manufacture and related processes</li> </ul>	<ul style="list-style-type: none"> <li>Implement strategy to use renewable energy for indirect energy in cement manufacture and related processes</li> </ul>		<ul style="list-style-type: none"> <li>Eliminate indirect energy emissions through renewable energy sources where available</li> </ul>
Continue to improve <b>energy efficiency</b> in own processes.	<ul style="list-style-type: none"> <li>Cement producers to updated/developed strategies for adoption of Best Available Technology and implementation</li> </ul>	<ul style="list-style-type: none"> <li>Transition plans in place to close plants that are using outdated/energy inefficient plants (e.g. wet kilns)</li> </ul>	<ul style="list-style-type: none"> <li>Inefficient plants (e.g. wet kilns) closed</li> </ul>	

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>3. Business and Service Providers</b>				
Increase use of waste heat recovery	<ul style="list-style-type: none"> <li>As part of GCCA roadmap, establish ambitious plan – depending on geography – to fully materialize the potential of waste-heat recovery</li> </ul>			
Strengthen research and knowledge exchange	<ul style="list-style-type: none"> <li>Continue to strengthen Innovandi – the Global Cement and Concrete Research Network to reduce carbon emissions in cement and concrete production (launched and supported by GCCA)</li> </ul>	<ul style="list-style-type: none"> <li>Extend the Innovandi research program or similar programs to reduce carbon in the design and use of concrete</li> </ul>	<ul style="list-style-type: none"> <li>Have 50% of global cement production included/affiliated to research network</li> </ul>	
Commitment to reduce scope-1 carbon intensity	<ul style="list-style-type: none"> <li>All global market leaders are committed to reducing scope 1 emissions intensity below 500Kg CO<sub>2</sub>/t cementitious material by 2030</li> </ul>	<ul style="list-style-type: none"> <li>20% substitution of fossil fuels by waste derived fuels (as a percentage of energy mix); Policies in place that substitute this target</li> </ul>	<ul style="list-style-type: none"> <li>-40% in CO<sub>2</sub> intensity (kg CO<sub>2</sub>/t cementitious) on a 1990 basis (using existing technology)</li> </ul>	<ul style="list-style-type: none"> <li>2040: cement to clinker ratio of 0.70 (according to IEA ETP 2020 Sustainable development scenario)</li> </ul>
Strengthen circular economy approaches	<ul style="list-style-type: none"> <li>Assess material efficiency measures in GCCA Roadmap</li> <li>Identify clear circular economy strategies and evaluate impact thereof (part of GCCA Roadmap)</li> </ul>	<ul style="list-style-type: none"> <li>Increased use of recycled materials (concrete and demolition waste)</li> <li>Efficiency in the use of cement in concrete. Improvements in concrete quality control</li> </ul>	<ul style="list-style-type: none"> <li>GCCA Concrete Guidelines became a global industry standard for material efficiency and reduction of waste</li> </ul>	<ul style="list-style-type: none"> <li>Buildings are decomposable, selective demolition is the standard procedure and concrete structures are reused</li> </ul>
Toward net-zero manufacturing	<ul style="list-style-type: none"> <li>Market leaders committing to large-scale industrial pilots in the use of advanced technologies such as CCS/U in at least one region</li> </ul>	<ul style="list-style-type: none"> <li>Technological &amp; financial feasibility achieved for several large scale industrial CCS/U projects (with government commitment and support)</li> </ul>	<ul style="list-style-type: none"> <li>First 3 net-zero cement plants in operation in North America and/or Europe</li> </ul>	
Development & Availability of low carbon cement & concrete in all markets globally - also by local companies	<ul style="list-style-type: none"> <li>Availability of low carbon cement &amp; concrete offering in target markets by global market leaders</li> </ul>	<ul style="list-style-type: none"> <li>2025: Construction codes and standards are adapted to incentivize procurement and usage of low carbon cement &amp; concrete (aiming at public procurement ~30% usage of low carbon products)</li> </ul>	<ul style="list-style-type: none"> <li>Availability of low carbon cement &amp; concrete in all markets globally - also by local companies. Market share approx. 30%</li> </ul>	<ul style="list-style-type: none"> <li>Net-zero cement &amp; concrete available on the market worldwide (without offset)</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Develop roadmaps towards carbon neutral concrete towards a net zero world: including provision of measures for climate risk	<ul style="list-style-type: none"> <li>Manufacturers of cement to establish targets in global sectoral 1.5°C aligned roadmap (e.g. as required by Global Cement and Concrete Association for their full members) and publicly report: covering &gt;30% of global cement production. (e.g. as required by Global Cement and Concrete Association for their full members)</li> </ul>	<ul style="list-style-type: none"> <li>By 2025: Producer Company Targets to accord with industry roadmap (Global Cement and Concrete Association 2050 Roadmap) and publicly report</li> <li>100% of GCCA members committed to the roadmap.</li> <li>50% of global production have assessed climate risk in their business and value chains; strategy in place for mitigation</li> </ul>	<ul style="list-style-type: none"> <li>By 2030: Have an implementation map ready and each piece of new technology in pilot scale (minimum)</li> </ul>	
<b>4. Civil Society</b>				
Labor unions push for energy efficiency and green investments as part of COVID bailouts, just transition policy support	<ul style="list-style-type: none"> <li>Just transition commissions, representing business, labour and government, create industrial just transition roadmaps which include adequate resourcing for development of new, high quality labour standard jobs, upskilling and redeployment of workers</li> <li>Social partners engage in social dialogue processes to facilitate the implementation of the roadmap.</li> </ul>	<ul style="list-style-type: none"> <li>Social dialogue models proven, standardized, and scaling across communities to support just transition</li> <li>Sector and company Just Transition plans are set up to create and guarantee quality jobs and decent work.</li> </ul>		
Water	<ul style="list-style-type: none"> <li>Encourage consistent reporting of water data, especially in the company's environmental impact reporting system.</li> <li>Develop cohesive methodology for collecting and reporting water data</li> </ul>			

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Non-profits, NGOs support the development of regional roadmaps; consumer-facing campaigns		<ul style="list-style-type: none"> <li>Consumer demand generation campaigns accelerate development of circular business model</li> </ul>	<ul style="list-style-type: none"> <li>International campaigns for circular, zero embodied carbon, infrastructure, and assets</li> </ul>	<ul style="list-style-type: none"> <li>Consumer demands have mainstreamed development of circular business models in developed and developing countries</li> <li>Social dialogue models proven, standardized, and scaled across communities to support just transition</li> </ul>
Mobilization of city governments to increase demand for carbon neutral concrete	<ul style="list-style-type: none"> <li>At least 50 cities join the Clean Construction Forum to start taking action on embodied emissions and clean construction over the year to follow</li> </ul>	<ul style="list-style-type: none"> <li>300 city governments have taken action on embodied emissions and clean construction, for instance by developing embodied carbon strategies in a community of practice and/or adopting regulations to mandate/incentivize low-carbon materials and materials efficiency, such as materials reuse and recycling</li> </ul>		

## 6. CONCRETE AND CEMENT - EXISTING INITIATIVES

Concrete Action for Climate Initiative	A partnership between the Mission Possible Partnership, represented by the World Economic Forum, and the Global Cement and Concrete Association to develop clean cement standards, stimulate demand for cleaner products, and enlarge the circle of progressive companies committing to net-zero targets.
GCCA - Global Cement and Concrete Association	Industry association with global representation. membership accounting for nearly 50% of global cement production capacity.
National & regional concrete/ cement associations (all are GCCA affiliates)	The national and regional concrete/cement associations are GCCA affiliates (incl. CEMBUREAU, FICEM, MPA etc.)
We Mean Business Coalition	Global non-profit coalition working with the world’s most influential businesses to take action on climate change, catalysing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
Leadership Group for Industry Transition (LeadIT)	Accelerating the transition of all industry sectors to low carbon pathways to reach net-zero carbon emissions by 2050.
Climate Action 100+	Investor network to ensure the world’s largest corporate greenhouse gas emitters take necessary action on climate change.
Net Zero Asset Owner Alliance	Group of asset owners working to transition their investment portfolios (more than 2.4 trillion USD globally) to net-zero GHG emissions by 2050 consistent with a maximum temperature rise of 1.5°C.
WBCSD Built environment project	Program that looks at the whole built environment value chain and the impact of all materials in it.
Concrete Sustainability Council	CSC results from the planned or partly already recognized recognition by international systems for assessing the sustainability of buildings.
Innovandi	Industry led consortium that ties together the cement and concrete industry with scientific institutions to drive and support global innovation.



## 7. CONCRETE AND CEMENT - FURTHER REFERENCES

Mission Possible Platform: Reaching net-zero carbon emissions from Harder-to-Abate sectors by 2050	<a href="#">Link</a>
Ellen MacArthur Foundation & Material Economics: Completing the Picture: How the Circular Economy Tackles Climate Change	<a href="#">Link</a>
Fraunhofer ISI: Industrial innovation: Pathways to deep decarbonization of industry	<a href="#">Link</a>
World GBC: Bringing Embodied Carbon Upfront	<a href="#">Link</a>
CNCA/C40: Embodied Carbon Policy Framework	<a href="#">Link</a>
ETC: China 2050 A fully developed rich zero carbon economy	<a href="#">Link</a>
CEMBUREAU: 2050 carbon neutrality roadmap	<a href="#">Link</a>
WBCSD: Transforming the Built Environment	<a href="#">Link</a>
C40- Clean Construction Forum	<a href="#">Link</a>
IRENA: Reaching Zero with Renewables	<a href="#">Link</a>





# CHEMICALS

## Action Table

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2021



## 1. CHEMICALS – INTRODUCTION

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The purpose of this part of the Action Table is to highlight specific, promotable actions to deliver the vision for the Industry thematic area, with a sector-based approach focused on chemicals.

The global chemicals sector – responsible for five per cent total global emissions (1.5 Gt total direct emissions per year) – faces a necessary but challenging path to decarbonization.<sup>15</sup> A total of 60 per cent of direct CO<sub>2</sub> emissions from the sector come from three primary chemicals: n-fertiliser ammonia (30 per cent), ethylene (16 per cent) and methanol (14 per cent).<sup>16</sup> Ethanol and methanol are used as feedstock in the production of complex chemicals like plastic polymers.

As at May 2021, six per cent of major global chemical companies by revenue (per the target company list as defined by the [High-Level Champions](#)) has joined the [Race to Zero](#).<sup>17</sup> This campaign calls for a net-zero target on carbon emissions by 2050 or sooner evidenced by interim science-based targets (SBTs). Businesses can join committing to [UNGC Business Ambition for 1.5](#) and setting SBTs in line with the criteria and recommendations of the [Science Based Targets initiative \(SBTi\)](#).<sup>18</sup> The Race to Zero Breakthrough Ambition calls for 20 per cent of supply actors (e.g. chemical companies) by revenue in a given sector to join the Race to Zero.<sup>19</sup>

Upstream fuel and feedstock switching to waste or bio-based inputs – enabled through technologies like carbon capture use and storage (CCS/U) – is key to decarbonize the chemicals sector, as petrochemical feedstock accounts for 12 per cent of global oil demand.<sup>20 21</sup> More efficient product use downstream, such as reduced fertilizer user, and end-of-life management, through chemical and mechanical recycling, is also necessary.

This Action Table draws together insights from existing decarbonization pathways, roadmaps, and guidance, supported by a multi-stakeholder consultation process across the Marrakech Partnership Industry Thematic Group. For more information, please see “Further References” section.

*With thanks to the following organizations for their contributions: International Renewable Energy Agency (IRENA), Mission Possible Partnership, Royal Dutch Shell, World Bank, and World Resources Institute (WRI).*

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<sup>15</sup> Mission Possible Platform and the Energy Transitions Commission, reaching net zero carbon emissions from harder-to-abate sectors by mid-century: Plastics sectoral focus, [LINK](#).

<sup>16</sup> Mission Possible Platform and the Energy Transitions Commission, reaching net zero carbon emissions from harder-to-abate sectors by mid-century: Plastics sectoral focus, [LINK](#).

<sup>17</sup> Internal High-Level Champion team analysis.

<sup>18</sup> UNGC Business Ambition for 1.5C calls on companies to set a net-zero target in line with a 1.5C future, in line with criteria and recommendations from the Science Based Target initiative, [LINK](#).

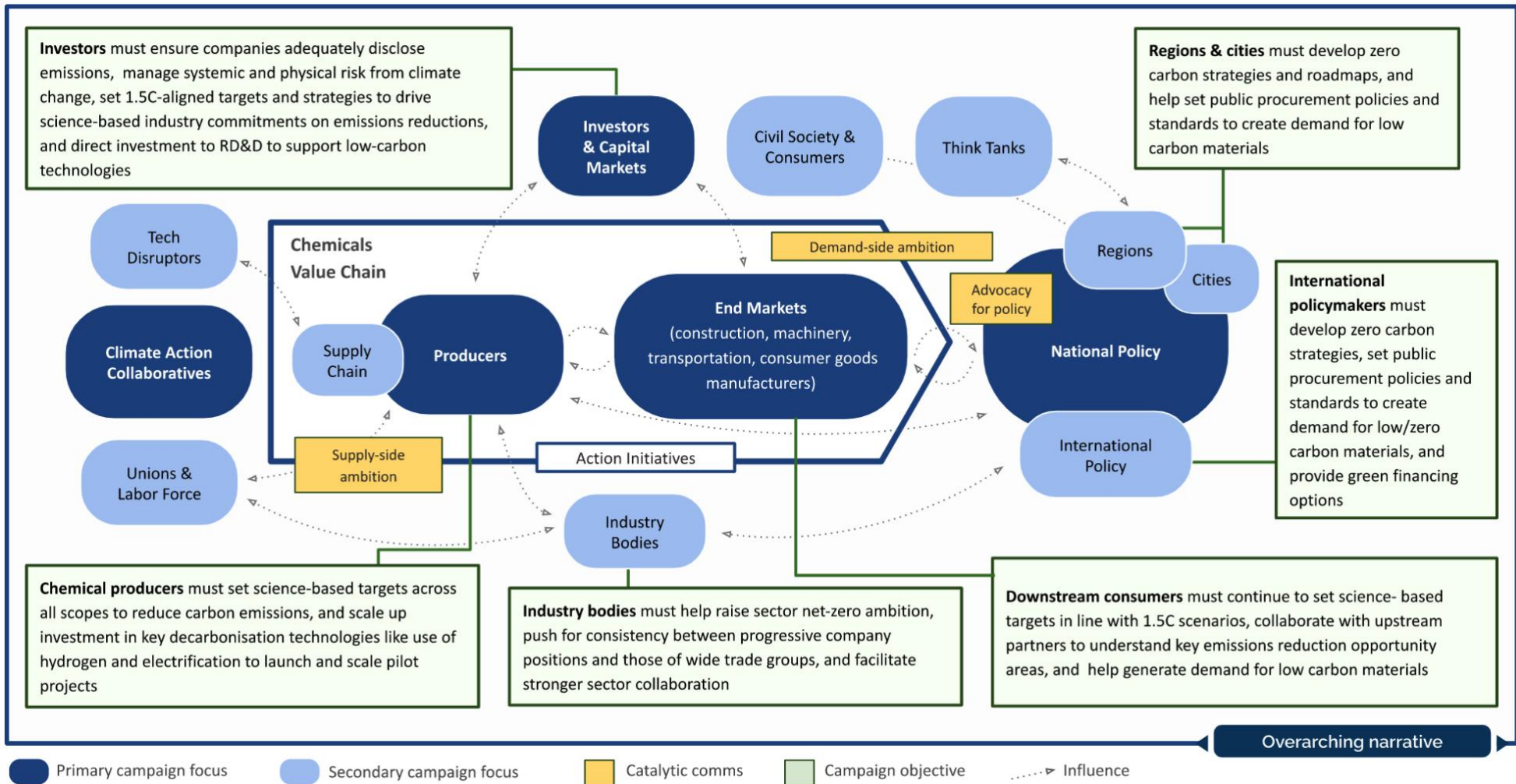
<sup>19</sup> In line with the Race to Zero Breakthroughs released in January 2021, <https://racetozero.unfccc.int/breakthroughs/>. The 20 per cent of supply actors were chosen as part of a wide theory of change in line with Rogers’ bell curve of diffusion of innovations or technologies.

<sup>20</sup> IEA, The Future of Petrochemicals, <https://www.iea.org/fuels-and-technologies/chemicals>.

<sup>21</sup> In line with the Race to Zero Breakthroughs released in January 2021, <https://racetozero.unfccc.int/breakthroughs/>.

## 2. CHEMICALS – SYSTEM MAP

Sectoral decarbonisation requires a systems-wide approach which fully integrates internal and external factors. Collaboration is critical between policymakers, industry players and non-state actors to drive systems transformation.



### 3. CHEMICALS – CHANGE LEVERS

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- **Policy** and international actors must develop clear guidance on access to affordable renewable energy, acknowledging the urgent need to find solutions for key sectors such as petrochemicals. They must help phase out fossil fuel and petrochemicals sector subsidies and establish clear carbon emissions reduction ambition, such as that of the European Union (EU) Green Deal and its Circular Economy Action Plan 2020.<sup>22</sup> They should direct public funding to support pilot projects scaling a range of low-carbon technologies and promote significant investment in public-private partnerships and Research, Development and Demonstration (RD&D) programs to boost capacity to deliver on such pilots.
- **Finance** is critical to scale up new, climate-smart technologies and move away from old, carbon-intensive technologies. Investors and financial institutions should work with industry to co-design public-private de-risking financing mechanisms to help mobilize capital for large-scale deployment of low-carbon technologies.
- **Technology** is a key lever for enabling low-carbon chemical production. Actors must collaborate with ecosystem partners, and allocate significant RD&D, to develop and scale low-carbon technology solutions, exploring the use of alternative material inputs like biomass or waste product, scaling renewable electrification, boosting low-carbon hydrogen production capacity, and exploring CCS/U solutions.
- **Businesses** should openly report and disclose emissions reduction targets to 2050 or earlier, supported by interim science-based targets, and consider the full lifecycle of emissions associated with their products in the process. They should realize this ambition by actively participating in collaborative decarbonization initiatives with partners and peers.
- **Civil society** plays a role in strengthening public awareness of the externalities or “hidden costs” of carbon-intensive chemical production and use throughout the value chain. Actors should help influence policy by advocating for focus on key sectoral issues like renewable energy provision, conducting research and supporting pilot technology projects, and holding actors to account.

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<sup>22</sup> European Commission, State of the Union 2020, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_20\\_1599](https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1599).

## 4. CHEMICALS – S-CURVE

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Change is not linear. Industries, policymakers, and commentators have been caught off-guard before by the pace of change that can erupt in markets, technologies, and societies.<sup>23</sup> Tipping points are reached after periods of little or no change, and they lead to accelerating exponential shifts towards full transformation. A critical lead indicator of transformation in the chemicals sector is the adoption of renewable electricity.<sup>24</sup> This S-curve models the adoption of renewable electricity required in the global chemicals sector, in line with the Race to Zero Breakthrough Outcome.<sup>25</sup>

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<sup>23</sup> We Mean Business, The Shape and Pace of Change in the Electricity Transition, October 2020, [LINK](#). This first report from We Mean Business on the dynamics of Ss-curves focuses on renewable power because of the electricity sector's critical role in leading the global transition to a net-zero carbon future.

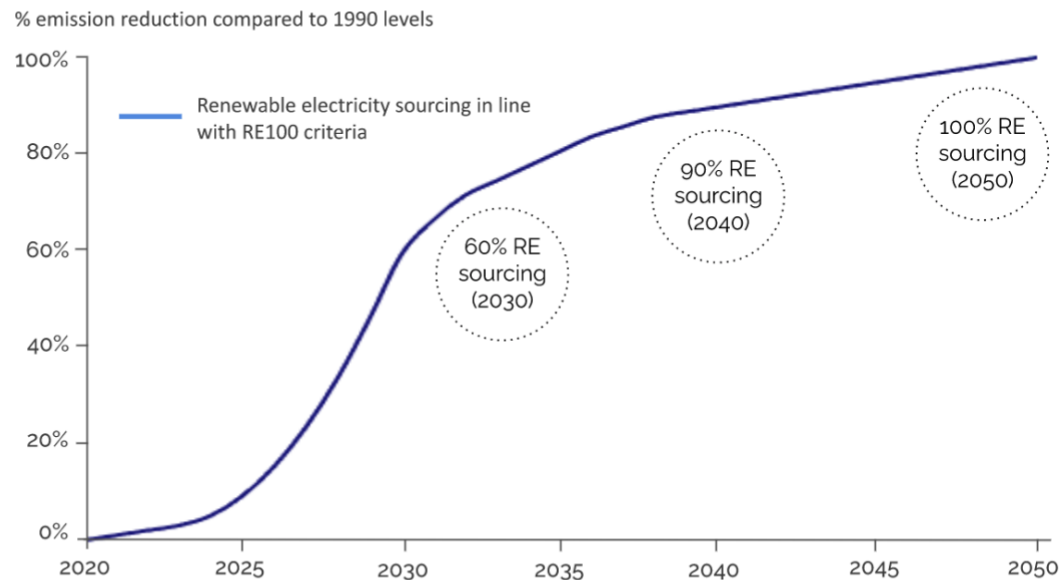
<sup>24</sup> WEF, Electrification cluster, Collaborative Innovation for Low-Carbon Emitting Technologies in the chemical industry, [LINK](#). "Green electricity replacing fossil energy sources is seen as the key lever for GHG emission reduction in the chemical industry and related value chains."

<sup>25</sup> In line with the Race to Zero Breakthroughs released in January 2021, [LINK](#).

## 4. CHEMICALS – S-CURVE

**Renewable electricity sourcing to 2050 as key lever for global chemicals sector (in line with RE100 minimum criteria)**

**Renewable electricity sourcing milestones for the chemicals sector, based upon indicative 's-curve' (% renewable electricity sourcing)**



Milestones in line with RE100 criteria. All corporate members must have a renewable power strategy that includes credible deadlines for achieving 100% renewable electricity (RE) by 2050. Minimum requirements are: 100% by 2050 with interim steps of at least 60% by 2030 and 90% by 2040. Data presented on a forced smooth sigmoid curve. Source: RE100

## 5. CHEMICALS – ACTION TABLE



	By 2021	By 2025	By 2030	By 2040
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>• Key countries legislate net-zero GHG emissions targets (5 countries legislated as at February 2020, ETC, Making Mission Possible, September 2020)</li> <li>• Prioritize development of clear guidance on access to affordable renewable energy, acknowledging the urgent need to find solutions for key sectors, such as petrochemicals. (IRENA, Global Renewables Outlook, 2020)</li> <li>• Implement framework to honour emission abatement potential of CCS/U and bio-based technologies.</li> <li>• Encourage a more dynamic EU emissions trading system (ETS) with allocation based on actual production and including indirect emissions. (CEFIC, European chemistry for growth, April 2013)</li> <li>• Develop a RD&amp;D and innovation framework to facilitate technology development and encourage better coordination between industry needs and academic research. (CEFIC, European chemistry for growth, April 2013)</li> </ul>	<ul style="list-style-type: none"> <li>• Leading countries, states, and regions establish clear net-zero carbon strategy and roadmap for action.</li> <li>• Continue to advocate for an implicit or explicit carbon price to ensure current energy and carbon policies do not have a significant impact on the competitiveness of decarbonizing the chemicals sector. (UK Industrial Decarbonisation &amp; Energy Efficiency Roadmaps to 2050, Chemicals, March 2015).</li> <li>• Eliminate energy subsidies that are barriers to the use of more energy efficient technology e.g. high capital costs or replacement challenges. (IEA &amp; ICCA &amp; Dechema, Technology Roadmap, May 2013)</li> <li>• Develop end-of-life and circular economy metrics for mandatory reporting.</li> <li>• Develop clear and widespread guidance on access to affordable renewable energy.</li> </ul>	<ul style="list-style-type: none"> <li>• Major countries, states, and regions establish clear net zero carbon strategy and roadmap for action.</li> <li>• Widespread acceptance and use of competitive carbon price, targeting over USD100/ton CO2 before 2030). (ETC, Making Mission Possible, September 2020)</li> <li>• Food waste halved per capita in the EU by 2030, driven by more efficient nitrogen fertilizer use. (European Commission Circular Economy Action Plan, March 2020)</li> <li>• Establish clear long-term quantitative targets for zero-carbon electricity capacity, reflecting greatly increased supply need for green electrification, reaching USD30/MWh all-in cost in best locations and USD60/MWh in worse locations by 2030, with firm targets for 2030 to drive accelerated investment. (ETC, Making Mission Possible, September 2020)</li> </ul>	<ul style="list-style-type: none"> <li>• All countries and major states and regions establish clear net-zero carbon strategy and roadmap for action.</li> <li>• Establish clear long-term quantitative targets for zero-carbon electricity capacity, with indicative targets for 2050. (ETC, Making Mission Possible, September 2020)</li> <li>• Governments set asset-level CCS/U strategies, including target sites for deployment in the final decade to net-zero, targeting the remaining hardest-to-abate emissions from heavy industry.</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>• Prioritize food waste reduction by improving use efficiency of ammonia fertilizer. (European Commission Circular Economy Action Plan, March 2020) in line with farmer insurance and supporting policy mechanisms.</li> <li>• Identify public funding and investment support for the development and deployment of higher technology readiness levels (TRL 7-9) low-carbon technologies.</li> <li>• Foster a market environment with clear policy signals that rewards supply of low-carbon and circular products, despite the higher complexity of value chains, e.g. ambitious GHG standards. (ETC, Making Mission Possible, September 2020)</li> <li>• Set cross-industrial, long-term strategy on CCS/U, including volume targets for 2030, 2040, and 2050 and mapping of industrial sites to geological storage resources at the national level.</li> </ul>	<ul style="list-style-type: none"> <li>• Realize actions to 2024 as outlined in the European Commission Chemical Strategy for Sustainability. (EU Chemical Strategy for Sustainability Annex, October 2020)</li> <li>• Government procurement and new product standards support growing demand for recycled CO<sub>2</sub> (e.g. in building materials), captured from production facilities, with considered use of tax incentives and carbon pricing mechanisms support the first major cross-industrial networks.</li> </ul>	<ul style="list-style-type: none"> <li>• New CCS/U regulatory frameworks to clarify international obligations and liabilities associated with leakage from geological formation, with clearer processes established for project approvals.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>• Engage chemical companies to develop and achieve SBTs through new sustainability-linked investment and lending products. (e.g. SBTi)</li> <li>• Identify opportunities to co-design public-private de-risking mechanisms to mobilize capital for large-scale deployment of low-carbon technologies. (ETC, Making Mission Possible, September 2020)</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage top global chemical companies to report and close on emissions intensity.</li> <li>• Ensure all major investors have a clear net-zero target and engagement strategy in place, in line with a 1.5°C pathway.</li> <li>• Work together with the chemical industry to better understand changes in funding requirements of a low-carbon chemical sector and funding opportunities of such a transition. (IEA &amp; ICCA &amp; Dechema, Technology Roadmap, May 2013)</li> </ul>	<ul style="list-style-type: none"> <li>• Divest from companies who refuse to report and disclose emissions intensity.</li> <li>• Ensure a significant share of the investor community have a clear net-zero target and engagement strategy in place, in line with a 1.5°C pathway.</li> <li>• Invest massively in renewable energy power generation capacity and develop clear plans to divest fossil-fuel based power through time, to help reach &gt;50 % renewable electricity globally by 2030. (ETC, Making Mission Possible, September 2020)</li> </ul>	<ul style="list-style-type: none"> <li>• Fully align investment portfolios with companies reporting on and disclosing emissions intensity, in line with sector guidance from TCFD.</li> <li>• Ensure a significant majority of the investor community have a clear net-zero target and engagement strategy in place, in line with a 1.5°C pathway.</li> </ul>





	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>Establish a robust transition finance taxonomy clearly identifying which activities and companies are on a trajectory aligned with climate targets and which are not, building on the work undertaken by the European Commission with the Sustainable Finance Taxonomy. (ETC, Making Mission Possible, September 2020)</li> <li>Develop a more granular investment roadmap mapping the nature and quantum of investment required over time to transition key value chains to low and eventually zero carbon. (ETC, Making Mission Possible, September 2020)</li> <li>Encourage chemical companies to disclose metrics related to emissions intensity with a supporting narrative, given there is no single intensity-based metric for the chemicals sector that can provide complete comparability. (WBCSD TCFD Chemical Sector Preparer Forum, July 2019)</li> <li>Encourage investors to ask companies to set science-based targets in line with 1.5°C.  Raise awareness and build knowledge with key finance actors around opportunity of CCS/U. E.g. more robust estimates of the current financing gaps (approx. USD35bn committed out of USD500bn required to reach first gigaton of CCS/U across heavy industry).</li> </ul>	<ul style="list-style-type: none"> <li>Allocate public funding for target-driven research programs with quantitative objectives 10-15 years ahead (key research areas include biomass, process improvements, CCS/U).</li> <li>Create clear CCS/U finance roadmap to 2050, at national level via public-private partnership, with considerations of capital grants; credit guarantees; guaranteed offtakes and contracts for difference continue to finance a range of capture, transport and storage initiatives.</li> </ul>	<ul style="list-style-type: none"> <li>Remove fossil-fuels subsidies and tax carbon and other GHGs, targeting over USD100/ton CO2 before 2030. (ETC, Making Mission Possible, September 2020)</li> </ul>	

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>3. Technology Providers and Innovators</b>	<ul style="list-style-type: none"> <li>Focus on leveraging agricultural waste as biomass feedstock to avoid competition with food production. (Mission Possible Partnership (MPP) Low-Carbon Emitting Technologies (LCET) for the chemical industry initiative – Biomass Utilisation Cluster - see future milestones for progress updates)</li> <li>Support commercial-scale carbon capture and use technologies as a key innovation priority. (MPP LCET initiative – Carbon Capture and Utilisation Cluster - see future milestones for progress updates)</li> <li>Accelerate the processes of electrification as a key lever towards emissions reduction. (MPP LCET initiative – Electrification Cluster - see future milestones for progress updates)</li> <li>Develop and scale up low-carbon hydrogen production technologies. (MPP LCET initiative – Alternative Hydrogen Production Cluster - see future milestones for progress updates)</li> <li>Develop plastic waste processing technologies. (MPP LCET initiative – Waste Processing Cluster - see future milestones for progress updates)</li> </ul>	<ul style="list-style-type: none"> <li>Technology readiness level of at least two key biomass technologies increased.</li> <li>Technology readiness level of electrification processes (e.g. e-cracking), low-carbon hydrogen production, and CCS/U technologies increased.</li> <li>Several large-scale low-carbon hydrogen demonstration projects in operation in prioritized regions.</li> <li>Technology readiness level of key technologies for mechanical and chemical recycling increased.</li> </ul>	<ul style="list-style-type: none"> <li>At least 2 large-scale biomass supply demonstration projects in operation in prioritized regions.</li> <li>Several large-scale CCS/U demonstration projects in operation in prioritized regions.</li> <li>Several large-scale clean electrification demonstration projects (1-10 tons/h) in operation in prioritized regions. Prerequisite: Access to sufficient and affordable green energy.</li> <li>Proliferation of large-scale low-carbon hydrogen demonstration projects on global scale.</li> <li>Several large-scale (50-200 kilo tons) plastic waste demonstration projects in operation in prioritized regions.</li> </ul>	<ul style="list-style-type: none"> <li>Proliferation of large-scale biomass supply demonstration projects on global scale. Conversion of biomass into a broad set of chemicals enabling gross decarbonization of the sector (&gt;90 % GHG emission reduction).</li> <li>Proliferation of large-scale CCS/U demonstration projects on global scale.</li> <li>Proliferation of large-scale clean electrification demonstration projects on global scale. Shift of energy input from fossil fuels to emission free energy, &gt;50% of total energy demand emission free.</li> <li>Multiple commercial-scale low-carbon hydrogen plants established.</li> <li>Proliferation of large-scale demonstration projects on global scale. Recycling of 100,000 kilo tons of waste into chemicals and plastics.</li> </ul>
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>20% of major chemical companies by revenue of the High-Level Champion target company list join the UNFCCC Race to Zero campaign. (UNFCCC Race to Zero Breakthroughs)</li> </ul>	<ul style="list-style-type: none"> <li>All major global chemical companies set SBTs in line with 1.5°C pathway, supported by explicit commitment on net-zero emissions reduction. (SBTi)</li> </ul>	<ul style="list-style-type: none"> <li>All chemical companies set SBTs in line with 1.5°C pathway.</li> <li>All major chemical companies to source 60% renewable electricity by 2030. (e.g. in line with RE100)</li> </ul>	<ul style="list-style-type: none"> <li>All chemical companies delivering on science-based targets for emissions reduction in line with 1.5°C pathway.</li> <li>All major chemical companies to source 90% renewable electricity by 2040 (E.g., in line with RE100)</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>Major chemical companies set SBTs aligned with 1.5°C trajectory, following the SBTi chemicals sector Sectoral Decarbonisation Approach. (SBTi Chemicals Scoping Document, December 2020)</li> <li>Expand zero-carbon electricity and electrification commitments, e.g. RE100 and encourage value chain partners further downstream to do the same. (ETC, Making Mission Possible, September 2020)</li> <li>Improve product design to enable increased energy and materials efficiency. (Material Economics, Industrial Transformation 2050, 2019)</li> <li>Improve material efficiency and recycling through greater value chain collaboration. (ETC, Making Mission Possible, September 2020)</li> <li>Manage use of fertilizers through reduction or more efficient use, as a key influencer of ammonia demand. (Material Economics, Industrial Transformation 2050, 2019)</li> <li>Advocate ambitious international agreements on carbon pricing, targeting over USD100/ton CO2 before 2030. (ETC, Making Mission Possible, September 2020)</li> </ul>	<ul style="list-style-type: none"> <li>Strengthen capability of reporting and emissions disclosure through scenario analysis to assess long-term risks and opportunities under future climate states. (WBCSD TCFD Chemical Sector Preparer Forum, July 2019).</li> <li>Leading chemical companies disclose further climate-related metrics, such as revenues from low-carbon products, low-carbon solution RD&amp;D, and capital expenditure, in line with TCFD recommendations. (WBCSD TCFD Chemical Sector Preparer Forum, July 2019)</li> <li>Focus on implementing incremental improvements and deploying best practice technologies to provide substantial energy savings and emissions reductions compared to business as usual. (IEA &amp; ICCA &amp; Dechema, Technology Roadmap, May 2013)</li> <li>Promote global and regional co-operation on reducing energy and/or emissions via industry associations. (IEA &amp; ICCA &amp; Dechema, Technology Roadmap, May 2013)</li> <li>Sector and company Just Transition plans are set up to create and guarantee quality jobs and decent work.</li> </ul>	<ul style="list-style-type: none"> <li>Widespread acceptance and use of competitive carbon price, targeting over USD100/ton CO2 before 2030. (ETC, Making Mission Possible, September 2020)</li> <li>All major chemical companies disclose operational metrics, such as greenhouse gas emissions and operational efficiency.</li> <li>Businesses consider all value chain outputs (emissions, by-products, end-products) as a resource that can be traded to create economic value. (Deloitte, The 2030 decarbonisation challenge: Chemicals)</li> </ul>	<ul style="list-style-type: none"> <li>Widespread reporting and emissions disclosure across the sector</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>Invest in RD&amp;D projects, especially pilot plants, focused on key technology priorities: biomass, electrification, waste processing, low-carbon hydrogen, and CCS/U as required. (ETC, Mission Possible: Reaching net zero from harder-to-abate sectors, November 2018)</li> <li>Improve company emissions disclosure and reporting in line with TCFD recommendations. (WBCSD TCFD Chemical Sector Preparer Forum, July 2019)</li> </ul>			
<b>5. Civil Society</b>	<ul style="list-style-type: none"> <li>Engage with consumers on food waste reduction to reduce the amount of food required and subsequently fertilizer (ammonia) needs. (Material Economics, Industrial Transformation 2050, 2019)</li> <li>Push for adequate labelling of lifecycle and embedded carbon intensity of products and services to create traceability and enable consumer awareness</li> <li>Advocate for increased membership/uptake of key sector initiatives/programs/trade associations to demonstrate climate leadership.</li> <li>Support development of clear target-setting guidance to set SBTs (e.g. through SBTi).</li> <li>Social partners engage in social dialogue processes to facilitate the implementation of decarbonisation roadmaps.</li> </ul>	<ul style="list-style-type: none"> <li>Academic and research organizations undertake or stimulate academic and national laboratory research on large volume/high energy use processes. (IEA &amp; ICCA &amp; Dechema, Technology Roadmap, May 2013)</li> <li>Academic and research organizations take action with industry leaders to identify top prospects for reducing technical barriers. (IEA &amp; ICCA &amp; Dechema, Technology Roadmap, May 2013)</li> <li>Sector and company Just Transition plans are set up to create and guarantee quality jobs and decent work.</li> </ul>		

## 6. CHEMICALS - EXISTING INITIATIVES

Business Ambition for 1.5C	UNGC Secretariat campaign asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5°C above pre-industrial levels.
Science Based Targets Network	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to showcase companies that set science-based targets.
We Mean Business Coalition	Global non-profit coalition working with the world's most influential businesses to take action on climate change, catalysing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
World Business Council for Sustainable Development (WBCSD) Chemicals Group	Global, CEO-led organization of over 200 businesses working together to accelerate the transition to a sustainable world. Chemicals Group brings together 12 companies to drive sustainable solutions across value chains, to influence cross-sectoral systems transformation.
Leadership Group for Industry Transition (LeadIT)	Accelerating the transition of all industry sectors to low carbon pathways to reach net-zero carbon emissions by 2050.
Climate Action 100+	Investor network to ensure the world's largest corporate greenhouse gas emitters take necessary action on climate change.
Mission Innovation	Dramatically accelerate public and private global clean energy innovation, including doubling their current research and development investments in the sector over 5 years.
Mission Possible Platform Collaborative Innovation for Low-Carbon Emitting Technologies	Accelerates the development and upscaling of low-carbon emitting technologies for chemical production and related value chains.
World Economic Forum Chemicals & Advanced Materials Program	Exclusive community of peers. Partners in the community take an active role in the industry transformation and advance multi-stakeholder initiatives to deliver greater sustainability, resilience, and performance into a variety of socioeconomic systems.
Together for Sustainability (TfS)	Joint initiative and global network of 26 chemical companies, delivering the de facto global standard for environmental, social and governance performance of chemical supply chains.
Renewable Carbon Initiative	Membership initiative which aims to support and speed up the transition from fossil carbon to renewable carbon for all organic chemicals and materials.



Sustainable Process Industry through Resource and Energy Efficiency (SPIRE)	European Association of cement, ceramics, chemicals, engineering, minerals and ores, non-ferrous metals, pulp and paper, refining, steel, and water sectors to ensure the development of enabling technologies and best practices to contribute to a resource efficient process industry.
RE100	Global initiative led by The Climate Group and CDP, bringing together the world’s most influential businesses committed to 100% renewable electricity.
EV100	Global initiative led by The Climate Group, bringing together forward-looking companies committed to accelerating the transition to electric vehicles.

## 7. CHEMICALS - FURTHER REFERENCES

Mission Possible Platform: Reaching net-zero on carbon emissions - Plastics	<a href="#">Link</a>
Mission Possible Platform: Reaching net-zero on carbon emissions	<a href="#">Link</a>
Fraunhofer ISI: Pathways to deep decarbonization of industry	<a href="#">Link</a>
CISL: Industrial Transformation 2050	<a href="#">Link</a>
CEFIC: European chemical industry roadmap (to 2030)	<a href="#">Link</a>
WBCSD: SDG chemical sector roadmap	<a href="#">Link</a>
VNCI: Dutch chemical industry roadmap	<a href="#">Link</a>
UK government: Chemicals sector decarbonization strategy	<a href="#">Link</a>



Mission Possible Platform: Low Carbon Emitting Technologies initiative	<a href="#">Link</a>
European Commission: Circular Economy Strategy	<a href="#">Link</a>
IEA/ICCA/Dechema: Technology Roadmap	<a href="#">Link</a>
IEA: The Future of Petrochemicals	<a href="#">Link</a>
TCFD Chemicals Sector Preparer Forum	<a href="#">Link</a>
Making Mission Possible: Delivering a net zero economy	<a href="#">Link</a>



# METALS & MINING

## Action Table

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2021





## 1. METALS AND MINING – INTRODUCTION

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The purpose of this part of the Action Table is to highlight specific and promotable actions to deliver the vision for the Industry thematic area, with a sector-based approach focused on metals and mining. For more information on steel and aluminium specifically, please refer to the respective sector pathway.

The global mining industry, which is responsible for four to seven per cent of total global greenhouse gas (GHG) emissions, is early on its journey to achieve emission reduction goals and faces pressure to manage climate risk and build climate resilience.<sup>26</sup> However, as at May 2021, only two per cent of major metals and mining companies by revenue (per the target company list as defined by the [High-Level Champions](#)) has joined the [Race to Zero](#).<sup>27</sup> This campaign calls for a net-zero target on carbon emissions by 2050 or sooner evidenced by interim science-based targets (SBTs). Businesses can join by committing to [UNGC Business Ambition for 1.5](#) and setting SBTs in line with the criteria and recommendations of the [Science Based Targets initiative](#) (SBTi).<sup>28</sup> The Race to Zero Breakthrough Ambition, set by the High-Level Champions, calls for the 20 per cent of supply actors (e.g. metals and mining companies) by revenue in a given sector to join the Race to Zero.<sup>29</sup>

The production of minerals like graphite, lithium, and cobalt could increase by nearly 500 per cent by 2050 to meet the growing demand for clean energy technologies.<sup>30</sup> Demand signals need to come from a wide range of end markets including infrastructure and urban development, power and electricity, mobility, manufacturing, retail/consumer, and telecommunications.

A critical route to decarbonization includes boosting renewable energy supply and storage, as mining emissions are largely driven by electricity supply. This is the foundation of the Race to Zero Breakthrough Outcome for the metals and mining sector, focused on scaling renewable electricity commitment across the sector.<sup>31</sup> The sector must drive operational efficiency improvements, boost electrification, and scale waste reduction and recycling across commodities like steel and aluminium. Electricity and low-carbon hydrogen use will be key to decarbonize production.

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<sup>26</sup> McKinsey & Company, Climate Risk & Decarbonisation: What every mining CEO needs to know, January 2020, [LINK](#). For more information on resilience, please refer to the Resilience Climate Action Pathway.

<sup>27</sup> Internal High-Level Champion team analysis.

<sup>28</sup> UNGC Business Ambition for 1.5C calls on companies to set a net-zero target in line with a 1.5C future, in line with criteria and recommendations from the Science Based Target initiative, [LINK](#).

<sup>29</sup> In line with the Race to Zero Breakthroughs released in January 2021, [LINK](#). The 20 per cent of supply actors were chosen as part of a wide theory of change in line with Rogers' bell curve of diffusion of innovations or technologies.

<sup>30</sup> World Bank, Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, [LINK](#).

<sup>31</sup> In line with the Race to Zero Breakthroughs released in January 2021, [LINK](#).

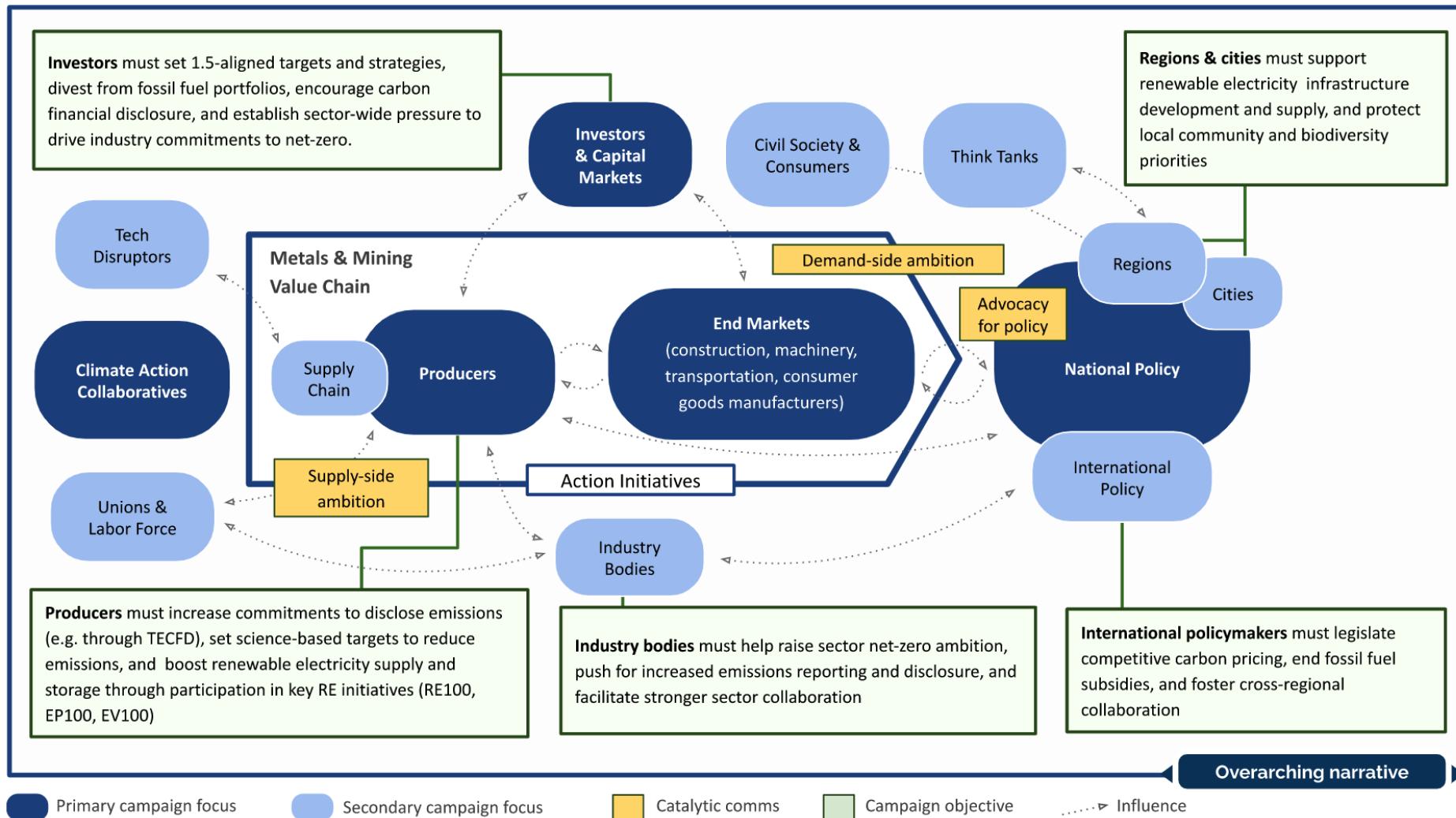


This Action Table draws together insights from existing decarbonization pathways, roadmaps, and guidance, supported by a multi-stakeholder consultation process across the Marrakech Partnership Industry Thematic Group. For more information on these initiatives, please see “Further References” section.

*With thanks to the following organizations for their discussions: BHP, The Food and Agriculture Organization of the United Nations (FAO), International Council on Mining and Metals (ICMM), Initiative for Responsible Mining Assurance (IRMA), Organization for Economic Co-operation and Development (OECD), World Bank, and World Gold Council.*

## 2. METALS AND MINING – SYSTEMS MAP

Sectoral decarbonisation requires a systems-wide approach which fully integrates internal and external factors. Collaboration is critical between policymakers, industry players and non-state actors to drive systems transformation.



### 3. METALS AND MINING – CHANGE LEVERS

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- **Policy** and international cooperation have a key role to implement subsidies, mandate taxes, support Paris Agreement-aligned public procurement, encourage low-carbon and climate-resilient investment, and establish/promote standards, particularly in a sector with a complex geographical and political landscape. Policymakers should ensure that GHG emissions originating from mining operations are integrated into UNFCCC nationally determined contributions (NDCs). They should support industry transition at scale, enabling competitive carbon pricing, renewable energy storage and supply, as well as wider environmental regulation particularly in key mining operating regions.
- **Finance** is critical to scale up new, climate-resilient technologies in the mining sector and help set expectations on sustainable performance. Investors are increasingly demanding the mining industry improve its Environmental, Social and Governance (ESG) performance and asking companies to address the emissions intensity of the assets in their portfolios. The finance community must help promote widespread industry use of responsible mining standards, encourage actors to set clear, science-based emissions reduction targets with roadmaps for action, and encourage supply chain collaboration on sustainable mining activity.
- **Technology** is a key driver for improving performance, cost, and social acceptance of new climate-resilient solutions. For the mining sector, solutions include transport and process electrification, and increased renewable energy supply and storage like solar photovoltaic. Technology is critical for upstream mining companies to green their operations and provide competitive and climate-smart metals and minerals to their customers downstream.
- **Businesses** on the supply-side (i.e. mining companies) must align with a decarbonization agenda through increased emissions disclosure and set explicit and science-based net-zero commitments. They must focus on sustainable and “climate-smart” portfolio management and reprioritization, noting mineral demand increases to 2050.<sup>32</sup> Finally, they should boost renewable energy supply and storage.
- **Civil society** plays a role in strengthening public awareness of the externalities or hidden environmental and social costs of unsustainable mining practices on biodiversity, water use, and local communities. NGOs, researchers, thinktanks, and others should continue to run awareness campaigns, launch calls to action, address research gaps and improve information around sustainable choices, ultimately holding key actors to account.

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<sup>32</sup> World Bank, “Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition”, <https://www.worldbank.org/en/topic/extractiveindustries/brief/climate-smart-mining-minerals-for-climate-action#:~:text=A%20new%20World%20Bank%20Group,demand%20for%20clean%20energy%20technologies>.

## 4. METALS AND MINING – S-CURVE

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Change is not linear. Industries, policymakers, and commentators have been caught off-guard before by the pace of change that can erupt in markets, technologies, and societies.<sup>33</sup> Tipping points are reached after periods of little or no change, and they lead to accelerating exponential shifts towards full transformation. One key route to decarbonizing the mining industry is boosting renewable energy supply and storage, as mining emissions are largely driven by electricity supply.<sup>34</sup> Therefore, this S-curve models the adoption of renewable electricity required in the global mining sector as a lead indicator for transformation, in line with the Race to Zero Breakthrough Outcome.<sup>35</sup>

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<sup>33</sup> We Mean Business, The Shape and Pace of Change in the Electricity Transition, October 2020, [LINK](#). This first report from We Mean Business on the dynamics of S-curves focuses on renewable power because of the electricity sector's critical role in leading the global transition to a net-zero carbon future.

<sup>34</sup> Rocky Mountain Institute, Decarbonisation Pathways for Mines, 2018, [LINK](#). "For many mining companies a good first step for carbon reduction is cleaning up electricity supply [...] compared to other heavy industries - such as cement, steel, and chemicals [...] a large proportion of mining industry emissions are driven by electricity supply."

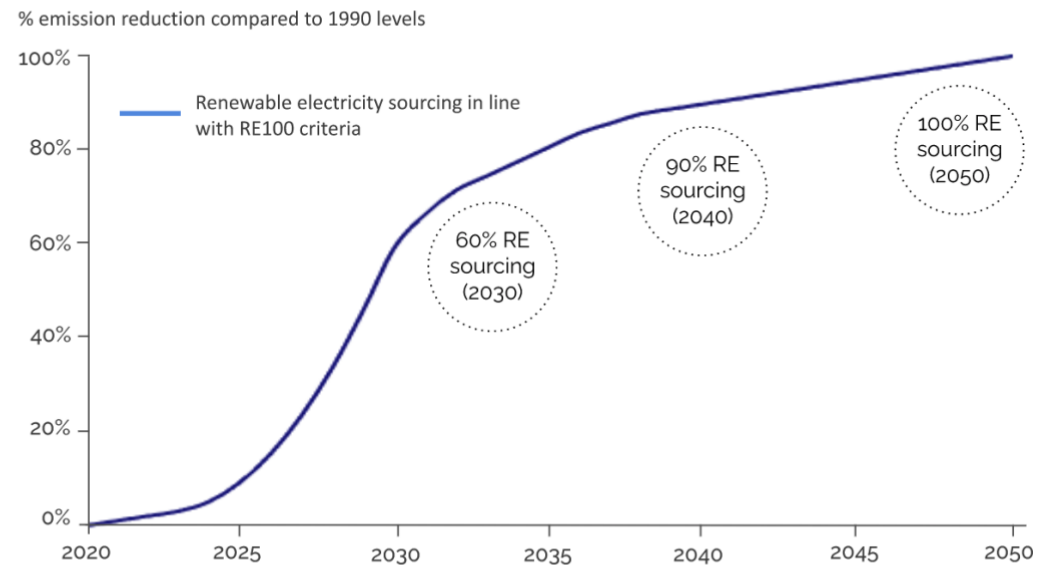
<sup>35</sup> In line with the Race to Zero Breakthroughs released in January 2021, [LINK](#).



## 4. METALS AND MINING – S-CURVE

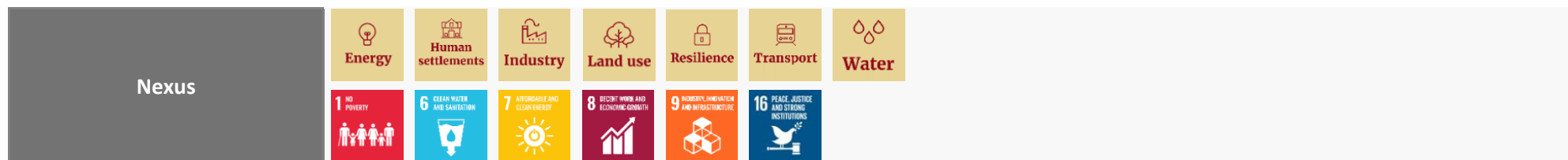
Renewable electricity sourcing to 2050 as key lever for global metals & mining sector (in line with RE100 minimum criteria)

Renewable electricity sourcing milestones for the metals & mining sector, based upon indicative 's-curve' (% renewable electricity sourcing)



Milestones in line with RE100 criteria. All corporate members must have a renewable power strategy that includes credible deadlines for achieving 100% renewable electricity (RE) by 2050. Minimum requirements are: 100% by 2050 with interim steps of at least 60% by 2030 and 90% by 2040. Data presented on a forced smooth sigmoid curve. Source: RE100

## 5. METALS AND MINING– ACTION TABLE



	By 2021	By 2025	By 2030	By 2040
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>Ensure GHG emissions originating from mining operations are integrated in UNFCCC nationally determined contributions (NDCs), including setting renewable targets for scope 1 and 2 emissions.</li> <li>Prioritize development of clear guidance on access to affordable renewable energy, noting urgent need to find solutions for key sectors such as iron and steel. (IRENA, <a href="#">Global Renewables Outlook</a>, 2020)</li> <li>Adopt innovative approaches to environmental regulation to build climate resilience, through performance-based regulation specifying targets for environmental performance, environmental impact assessments, and economic incentives. (<a href="#">UNDP, Managing mining for sustainable development</a>, April 2018)</li> </ul>	<ul style="list-style-type: none"> <li>Mandate GHG reporting requirements across scopes 1-3 for metal exchanges.</li> <li>Encourage all leading mining companies to adopt leading practice guidance on responsible business &amp; ESG performance. (e.g. <a href="#">ICMM Mining Principles</a> or <a href="#">OECD Due Diligence guidance</a>)</li> <li>Continue to advocate for an implicit or explicit carbon price, with some flexibility for competitive low-carbon commodities like steel. (<a href="#">Mission Possible Partnership, Making Mission Possible</a>, Sept. 2020)</li> <li>Continue to support and expand multi-stakeholder social dialogues.</li> <li>Support R&amp;D investment to support technology and innovation development on key solutions, e.g. zero-emission vehicles, energy storage solutions, and high-temperature process</li> <li>Actively support leading sector initiatives. (E.g. <a href="#">World Bank Climate Smart Mining Initiative</a>)</li> </ul>	<ul style="list-style-type: none"> <li>Ensure all large-scale mining companies report on net-zero emission pathways to 2050 for scope 1 and 2 emissions.</li> <li>Continued financial assistance to support scale-up of zero-carbon commercial scale production capacity for key commodities like steel and aluminium and hard-to-abate process. (Refer to commodity-specific steel and aluminium pathways for more)</li> <li>Significant ramp-up in advocacy for social dialogues and other support requirements for workforce facing mine or plant closure.</li> <li>Widespread acceptance and use of competitive carbon price, targeting over USD100/ton CO<sub>2</sub> before 2030. (<a href="#">ETC, Making Mission Possible</a>, Sept. 2020)</li> <li>Scale non-pricing measures such as public sector procurement requirements for large capital projects to include quota of low/zero-emissions concrete and steel (e.g. 10%).</li> </ul>	<ul style="list-style-type: none"> <li>Strong regulations and incentives in key producing and manufacturing regions reduce energy-intensive primary production and promote zero-carbon mining operations and secondary production of key commodities.</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>• Drive shift to more circularity, reduce/reuse/ recycle (RRR), and remanufacturing by ensuring recycling regulation, defining economic benefits for the recycling sector, and ensuring holistic lifecycle assessments. (<a href="#">WEE, Mining &amp; Metals in a Sustainable World 2050</a>, September 2015)</li> <li>• Explore forums to share knowledge on just transition experiences from other sectors and co-launch social dialogues.</li> <li>• Promote and adopt existing government guidance on mining policy. (<a href="#">IGF, Guidance for Governments</a>, July 2018)</li> <li>• Encourage state/co-owned companies in steel manufacturing, construction, automotive, infrastructure, and other end-customers to set net-zero targets by 2050 with interim science-based emissions reduction targets.</li> </ul>			
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>• Encourage investors to ask companies to set science-based targets in line with 1.5°C.</li> <li>• Support disclosure of financial climate risk under the Task force for Climate-related Financial Disclosures (TCFD). (<a href="#">TCFD Recommendations</a>, 2017)</li> <li>• Actively manage climate-related financial risk, including through engagement, divestment (e.g., from businesses with continued heavy reliance on fossil fuels), and other means. (<a href="#">TCFD Recommendations</a>, 2017)</li> </ul>	<ul style="list-style-type: none"> <li>• Support R&amp;D investment to support technology and innovation development on key solutions, e.g. zero-emission vehicles, energy storage solutions, and high-temperature process.</li> <li>• Ensure all major investors have a clear net-zero target and engagement strategy in line with a 1.5°C pathway.</li> <li>• Institutional asset owners continue to push businesses to set net-zero emissions targets, through increasingly mandatory disclosure.</li> </ul>	<ul style="list-style-type: none"> <li>• All institutional asset owners continue to push businesses to set net-zero emissions targets.</li> <li>• Significant share of commercial financiers and asset owner portfolios are climate-aligned.</li> </ul>	<ul style="list-style-type: none"> <li>• All major investors with portfolios aligned with a 1.5°C trajectory and engagement strategy.</li> <li>• Vast majority of commercial financiers and asset owner portfolios are climate-aligned.</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>Major institutional asset owners push businesses to set net-zero emissions targets.</li> <li>Investors make available to mining companies and key suppliers investment mechanisms (e.g. impact funding or transition bonds) to support GHG mitigation initiatives (e.g. piloting, trials, testing, technology development).</li> </ul>	<ul style="list-style-type: none"> <li>All ratings agencies incorporate environmental, social and governance (ESG) factors into ratings methodologies.</li> <li>Investors continue to offer wider range of investment mechanisms for mining sector stakeholders to support GHG mitigation initiatives.</li> <li>All major investors integrate climate change as part of their risk management process (e.g. with OECD <a href="#">guidelines</a> and <a href="#">standards</a>).</li> </ul>		
<b>3. Technology Providers and Innovators</b>	<ul style="list-style-type: none"> <li>Reduce on-site emissions from mines by improving energy efficiency (e.g. using more fuel-efficient diesel engines).</li> <li>Reduce on-site emissions from mines through direct or indirect electrification of mining processes (e.g., use of low-carbon hydrogen fuel, electrifying gas appliances, truck electrification).</li> </ul>	<ul style="list-style-type: none"> <li>Minimize the operational impact of diesel exhaust by 2025 in underground operations. (ICMM, <a href="#">Innovation for Cleaner Safer Vehicles Program</a>)</li> <li>Mine sites begin to shift to large shares of renewable energy (depending on investment cycles, grid development, and broader renewable energy deployment).</li> </ul>	<ul style="list-style-type: none"> <li>60% of global mine electricity supplied by renewables by 2030. (E.g. in line with <a href="#">RE100</a>)</li> </ul>	<ul style="list-style-type: none"> <li>GHG emission-free surface mining vehicles introduced. (ICMM <a href="#">Innovation for Cleaner Safer Vehicles Program</a>)</li> <li>90% of global mine electricity supplied by renewables by 2040. (E.g., in line with <a href="#">RE100</a>)</li> </ul>
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>Top 20% of mining companies by revenue of the High-Level Champions' target company list join the UNFCCC Race to Zero campaign. (<a href="#">UNFCCC Race to Zero Breakthroughs</a>)</li> <li>Leading mining companies set science-based targets verified by credible third-party assurance provider (e.g. <a href="#">SBTi</a>) to include scope 3 when over 40% of total GHG emissions.</li> <li>Invest in developing a renewable/zero emission power supply (e.g. through green PPAs, storage, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>All major mining companies set science-based targets in line with 1.5°C pathway, supported by explicit commitment on net-zero emissions reduction.</li> <li>Leading mining companies have material mines independently verified as meeting a comprehensive and rigorous ESG standard for mining. (Examples include <a href="#">ICMM Mining Principles</a> and <a href="#">IRMA</a>)</li> <li>Leading mining companies and SMEs to have developed full climate resilience plans, accounting for adaptation, mitigation, and resilience – addressing the full lifecycle of their operations.</li> </ul>	<ul style="list-style-type: none"> <li>All major mining companies to source 60% renewable electricity by 2030. (E.g. in line with <a href="#">RE100</a>)</li> <li>Major mining companies have material mines independently verified as meeting a comprehensive and rigorous ESG standard for mining.</li> <li>All major mining companies align with climate-related financial disclosure practices.</li> <li>Most construction, automotive, infrastructure, and other end-customers have set net-zero by 2050 commitments covering scope 3 emissions.</li> </ul>	<ul style="list-style-type: none"> <li>All major mining companies to source 90% renewable electricity by 2040. (E.g. in line with <a href="#">RE100</a>)</li> <li>Major mining companies have majority of their mines certified as meeting a comprehensive and rigorous ESG standard for mining.</li> <li>Major mining companies well-positioned to deliver 500% increased demand for climate-smart minerals by 2050. (World Bank, <a href="#">Minerals for Climate Action</a>, May 2020)</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>• Mining companies expand zero-carbon electricity and electrification commitments and encourage value chain partners further downstream to do the same.</li> <li>• Take action to support policies that help achieve a low-carbon transition. This could include reporting transition risks, aligning financial remuneration policy with low-carbon objectives, implementing climate risk management measures, and withdrawing from associations. (<a href="#">TCFD Recommendations, 2017</a>)</li> </ul>	<ul style="list-style-type: none"> <li>• Reprioritize portfolio to manage reduced demand for commodities (e.g. coal), mixed demand for others (e.g. iron ore, lead, chromium, manganese), and increased demand for climate-smart minerals (e.g. nickel, cobalt, lithium, rare earths, copper). (McKinsey, <a href="#">Climate risk and decarbonisation</a>, January 2020)</li> <li>• All major mining companies integrate climate change as part of their risk management process (e.g. with <a href="#">OECD guidelines</a> and <a href="#">standards</a>).</li> <li>• Leading companies in key demand sectors, e.g. steel manufacturing, construction, automotive, infrastructure, and other end-customers set net-zero by 2050 and interim emission reduction targets.</li> <li>• Sector and company Just Transition plans are set up to create and guarantee quality jobs and decent work.</li> </ul>		<ul style="list-style-type: none"> <li>• All major mining companies set clear, ambitious CO<sub>2</sub> emission reduction targets in line with 1.5°C pathway.</li> <li>• All mining companies align with climate-related financial disclosure practices.</li> </ul>
<b>5. Civil Society</b>	<ul style="list-style-type: none"> <li>• Initiate multi-stakeholder dialogue on how to reduce GHG emissions and minimize environmental impacts from extraction while meeting demand for minerals required to facilitate a green transition.</li> <li>• Support industry to develop science-based target methodology on emissions reduction.</li> </ul>	<ul style="list-style-type: none"> <li>• Stakeholders reach agreement at national level on how extractives can best reach environmental goals whilst supplying global mineral demand required.</li> <li>• Build and launch international campaigns for circular, zero-carbon infrastructure, assets, and products.</li> <li>• Encourage leading mining companies to take other critical steps (see Business &amp; Services actions).</li> </ul>	<ul style="list-style-type: none"> <li>• Support social dialogue convenings at local and regional levels to manage impending stranded assets and community jobs transitions.</li> </ul>	<ul style="list-style-type: none"> <li>• Social dialogue models proven, standardized, and scaling across communities to support just transition.</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>5. Civil Society</b>	<ul style="list-style-type: none"> <li>• Influence policy makers through pressure and thought leadership, launching campaigns, and raising awareness of key issues/topics to drive the right low-carbon, climate-resilient policy and decision-making.</li> <li>• Promote inclusive, resilient, and sustainable consumer behaviour, encouraging a preference for recycled products, reusing products, and alternative ownership models. (<a href="#">WEF, Mining &amp; Metals in a Sustainable World 2050</a>, September 2015)</li> <li>• Advocate for increased membership/uptake of leading climate-focused initiatives/programs in the mining sector.</li> <li>• Social partners engage in social dialogue processes to facilitate implementation of decarbonisation roadmaps.</li> </ul>	<ul style="list-style-type: none"> <li>• Sector and company Just Transition plans are set up to create and guarantee quality jobs and decent work.</li> </ul>		

## 6. METALS AND MINING - EXISTING INITIATIVES

Powering Past Coal Alliance	Advance the transition away from coal power generation without CO <sub>2</sub> emission reductions.
Leadership Group for Industry Transition (LeadIT)	Accelerating the transition of all industry sectors to low carbon pathways to reach net-zero carbon emissions by 2050.
Business Ambition for 1.5C	UNGC Secretariat campaign asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5°C above pre-industrial levels.
Science Based Targets Network	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to help companies develop and set science-based targets.
International Council on Mining & Metals (ICMM)	International organization dedicated to a safe, fair, and sustainable mining and metals industry bringing together 27 mining and metals company members and over 35 national, regional, and commodities association members.
Initiative for Responsible Mining Assurance (IRMA)	Offers true independent third-party verification and certification against a comprehensive standard for all mined materials.
Intergovernmental Forum on Mining, Minerals, Metals & Sustainable Development (IGF)	Supports more than 75 nations committed to leveraging mining for sustainable development.
World Bank Climate-Smart Mining Initiative	Helps resource-rich developing countries benefit from the increasing demand for minerals and metals, while ensuring the mining sector is managed in a way that minimizes the environmental and climate footprint.
Transitions Pathway Initiative (TPI)	Global, asset-owner led initiative which assesses companies' preparedness for the transition to a low-carbon economy.
Extractive Industries Transparency Initiative (EITI)	Global standard to promote the open and accountable management of oil, gas, and mineral resources.
World Economic Forum (WEF) Mining and Metals Industry Community	High-level group of peers dedicated to ensuring the long-term sustainability of the mining and metals industry and value to society, comprising chief executives and chairs from partner organizations.



RE100	RE100 is a global initiative led by The Climate Group and CDP, bringing together the world’s most influential businesses committed to 100% renewable electricity.
EV100	EP100 is a global initiative led by The Climate Group, bringing together forward-looking companies committed to accelerating the transition to electric vehicles.

## 7. METALS AND MINING – FURTHER REFERENCES

World Economic Forum: Mining & Metals in a Sustainable World 2050	<a href="#">Link</a>
Rocky Mountain Institute: Decarbonization Pathways for Mines	<a href="#">Link</a>
World Economic Forum (WEF): Digital Transformation Initiative: Mining & Metals Industry	<a href="#">Link</a>
UNDP: Managing mining for sustainable development	<a href="#">Link</a>
Transition Pathway Initiative (TPI): Carbon Performance Assessment in the Diversified Mining Sector	<a href="#">Link</a>
European Copper Institute (Copper Alliance): Copper’s Contribution to a Low-Carbon Future	<a href="#">Link</a>
ICMM: Adapting to a change climate - building resilience in the mining and metals industry	<a href="#">Link</a>
The Warren Centre: Zero Emission Copper Mine of the Future	<a href="#">Link</a>
UNDP, CCSI, SDSN, WEF: Mapping mining and the SDGs	<a href="#">Link</a>



Making Mission Possible: Delivering a net zero economy

[Link](#)

Gold and climate change: The energy transition

[Link](#)

The UN Common Guidance on Resilience

[Link](#)



# PLASTICS

## Action Table

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2021



## 1. PLASTICS – INTRODUCTION

The purpose of this part of the Action Table is to highlight specific and promotable actions to deliver the vision for the Industry thematic area, with a sector-based approach focused on plastics.

The global chemicals sector – responsible for five per cent total global emissions (1.5 Gt total direct emissions per year) – faces a necessary but challenging path to decarbonization.<sup>36</sup> A total of 60 per cent of direct CO<sub>2</sub> emissions from the chemicals sector come from three primary chemicals – n-fertilizer ammonia (30 per cent), ethylene (16 per cent) and methanol (14 per cent).<sup>37</sup> Ethanol and methanol are used as feedstock in the production of complex chemicals like plastic polymers. Emissions related to feedstock production and end of life are also significant.<sup>38</sup> This is a key challenge, as demand for plastics has outpaced that of all other bulk materials, such as steel, aluminium or cement, and ethylene production and emissions are forecast to triple over the next thirty years to 2050.<sup>39</sup>

There are several routes to decarbonizing the plastics sector. Addressing demand is key, through restricting single-use plastic (SUP) wherever possible.<sup>40</sup> Encouraging a circular economy for plastics through recycling and reuse is also critical. Improving energy efficiency and decarbonizing the production process through solutions like electrification and carbon capture use and storage (CCS/U) are important too. Finally, decarbonizing feedstock through alternative inputs, such as waste and biomass are part of the solution to reducing emissions. Renewable electricity and the use of low-carbon hydrogen will be crucial to decarbonize production; scaling renewable electricity use is the foundation of the Race to Zero Breakthrough Outcome for the plastics sector, focused on scaling renewable electricity commitment.<sup>41</sup> Biomass solutions could also be part of the solution and could be prioritized for plastics, particularly to compensate for end-of-life emissions. Solutions vary by end-market and geography, but a globally coordinated approach is key on key issues like product design and waste management to realize and deliver solutions locally.

<sup>36</sup> Mission Possible Platform and the Energy Transitions Commission, reaching net zero carbon emissions from harder-to-abate sectors by mid-century: Plastics sectoral focus, <https://www.energy-transitions.org/publications/mission-possible-sectoral-focus-plastics/>.

<sup>37</sup> Mission Possible Platform and the Energy Transitions Commission, reaching net zero carbon emissions from harder-to-abate sectors by mid-century: Plastics sectoral focus, <https://www.energy-transitions.org/publications/mission-possible-sectoral-focus-plastics/>.

<sup>38</sup> Mission Possible Platform and the Energy Transitions Commission, reaching net zero carbon emissions from harder-to-abate sectors by mid-century: Plastics sectoral focus, <https://www.energy-transitions.org/publications/mission-possible-sectoral-focus-plastics/>. Estimates vary, but analysis from the Energy Transitions Commission and Material Economics calculate that CO<sub>2</sub> emissions from primary plastics production and use could amount on average to 5.1 tons of CO<sub>2</sub> per ton of plastic produced.

<sup>39</sup> Mission Possible Platform and the Energy Transitions Commission, reaching net zero carbon emissions from harder-to-abate sectors by mid-century: Plastics sectoral focus, <https://www.energy-transitions.org/publications/mission-possible-sectoral-focus-plastics/>. Plastic production is forecast to triple over the next thirty years (322Mt in 2015 to 818Mt projected in 2050), with a corresponding rise in emissions (732Mt CO<sub>2</sub> in 2015 to 2,105Mt CO<sub>2</sub> projected in 2050).

<sup>40</sup> This is a particular challenge given the increased use of SUP - especially the use of personal protective equipment (PPE) - throughout the global COVID-19 pandemic (since March 2020).

<sup>41</sup> In line with the Race to Zero Breakthroughs released in January 2021, <https://racetozero.unfccc.int/breakthroughs/>.



As at May 2021, six per cent of major chemical companies (proxy for plastic producers) by revenue (per the target company list as defined by the [High-Level Champions](#)) has joined the [Race to Zero](#).<sup>42</sup> This campaign calls for a net-zero target on carbon emissions by 2050 or sooner evidenced by interim science-based targets (SBTs). Businesses can join by committing to [UNGC Business Ambition for 1.5](#) and setting SBTs in line with the criteria and recommendations of the [Science-Based Target initiative \(SBTi\)](#).<sup>43</sup> The Breakthrough Ambition, set by the High-Level Champions, calls for 20 per cent of supply actors (e.g. chemical companies) by revenue in a given sector to join the Race to Zero.<sup>44</sup> Refer to the Consumer goods (consumer goods) and Retail pathways for more information on the top users of plastic (largely packaging).

This Action Table draws together insights from existing decarbonization pathways, roadmaps and guidance, supported by a multi-stakeholder consultation process across the Marrakech Partnership Industry Thematic Group. For more information, please see Further References.

*With thanks to the following organizations for their discussions: Ellen MacArthur Foundation, Green Alliance, Greenpeace, International Union for Conservation of Nature (IUCN), Ocean Conservancy, Mission Possible Partnership, Royal Dutch Shell, Waste and Resources Action Programme (WRAP), and World Wide Fund for Nature (WWF).*

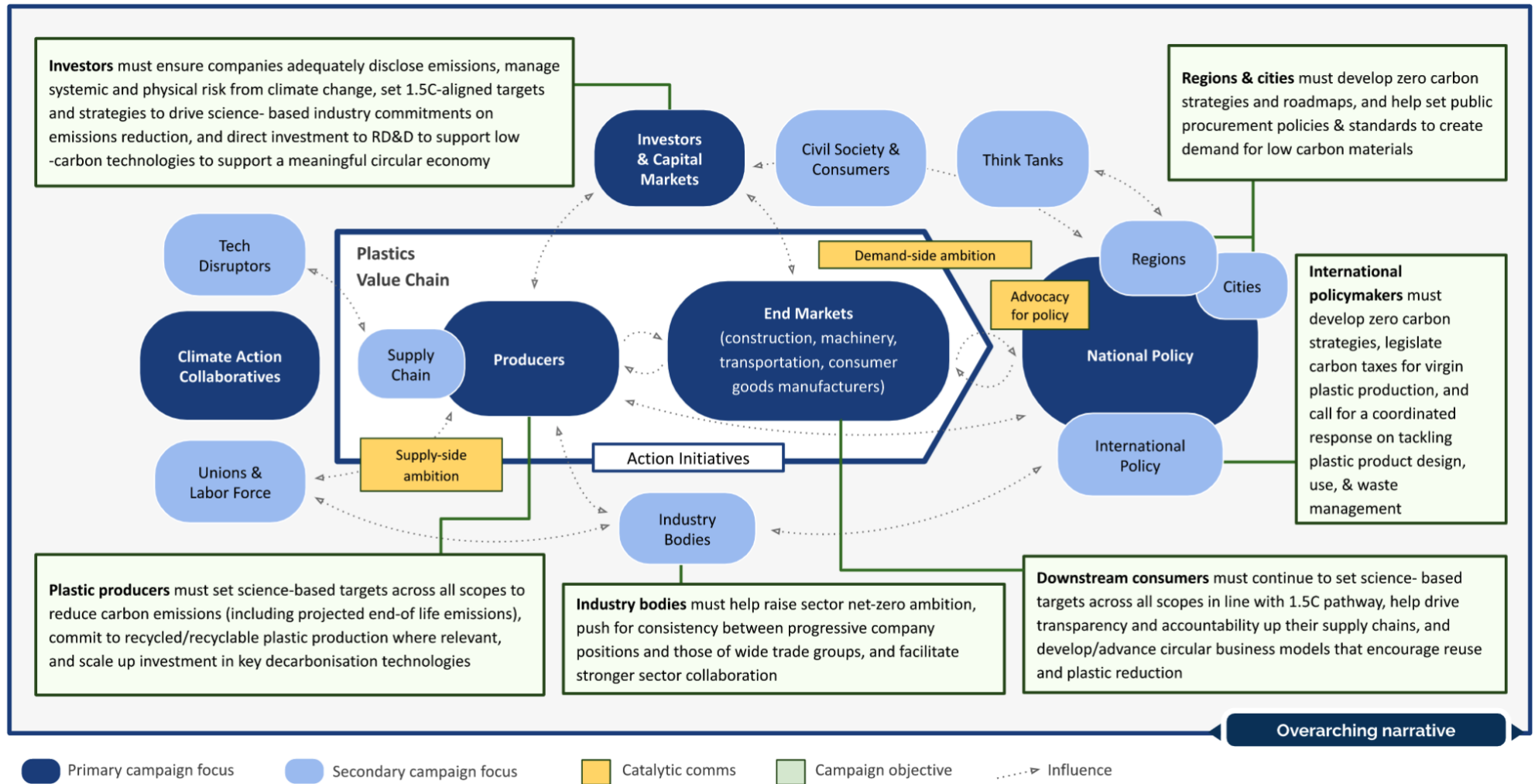
<sup>42</sup> Internal High-Level Champion team analysis.

<sup>43</sup> UNGC Business Ambition for 1.5C calls on companies to set a net-zero target in line with a 1.5C future, in line with criteria and recommendations from the Science Based Target initiative, <https://unglobalcompact.org/take-action/events/climate-action-summit-2019/business-ambition>.

<sup>44</sup> In line with the Race to Zero Breakthroughs released in January 2021, <https://racetozero.unfccc.int/breakthroughs/>. The 20 per cent of supply actors were chosen as part of a wide theory of change in line with Rogers' bell curve of diffusion of innovations or technologies.

## 2. PLASTICS – SYSTEMS MAP

Sectoral decarbonisation requires a systems-wide approach which fully integrates internal and external factors. Collaboration is critical between policymakers, industry players and non-state actors to drive systems transformation.



### 3. PLASTICS – CHANGE LEVERS

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- **Policy** and international cooperation have a key role to set level of ambition and vision for transition to low-carbon circular plastic economy, mandate fees like Extended Producer Responsibility (EPR), support public procurement, encourage investment, support new emergent technologies, and establish/promote standards. Policymakers should work to phase out fossil fuel and petrochemicals sector subsidies to ensure that recycled and low-carbon products can become cost-effective alternatives to meet consumer demand. Policymakers should establish clear carbon emissions reduction ambition, such as that of the EU Green Deal and its Circular Economy Action Plan 2020<sup>45</sup> and deliver on circular economy and waste management targets, such as EU targeting 100 per cent plastic packaging reusable or easily recycled by 2030.<sup>46</sup> Finally, they must define longer-term policy actions beyond 2025–2030 with more interim milestones set to 2050.
- **Finance** stakeholders like investors can help develop and deploy existing and new financial instruments to drive needed changes in infrastructure, innovation, and business models (such as EPR fees and carbon pricing).
- **Technology** is a key driver for advancing new business models and services that allow for reduction and reuse of materials, as well as an enabler for production innovation. Technology solutions across the sector range from increased use of biomass as a chemical input, increased use of electrification and low-carbon hydrogen, boosted waste processing capacity, and development and use of CCS/U where necessary.
- **Businesses** should consider the full lifecycle of emissions associated with their products in setting net-zero emissions reduction targets, with interim science-based targets. They should also promote circular product redesign, using less plastic or alternative materials where possible, and commit to significant RD&D investment in key low-carbon technologies to reduce emissions where production continues.
- **Civil society** plays a role in strengthening public awareness of the externalities or hidden costs of carbon-intensive plastic production and poor waste management (e.g. biodiversity impacts). Civil society actors can also influence policy by advocating for climate-supportive legislative change, conducting research and supporting pilot projects, particularly new circular business models and low-carbon products, and holding actors to account.

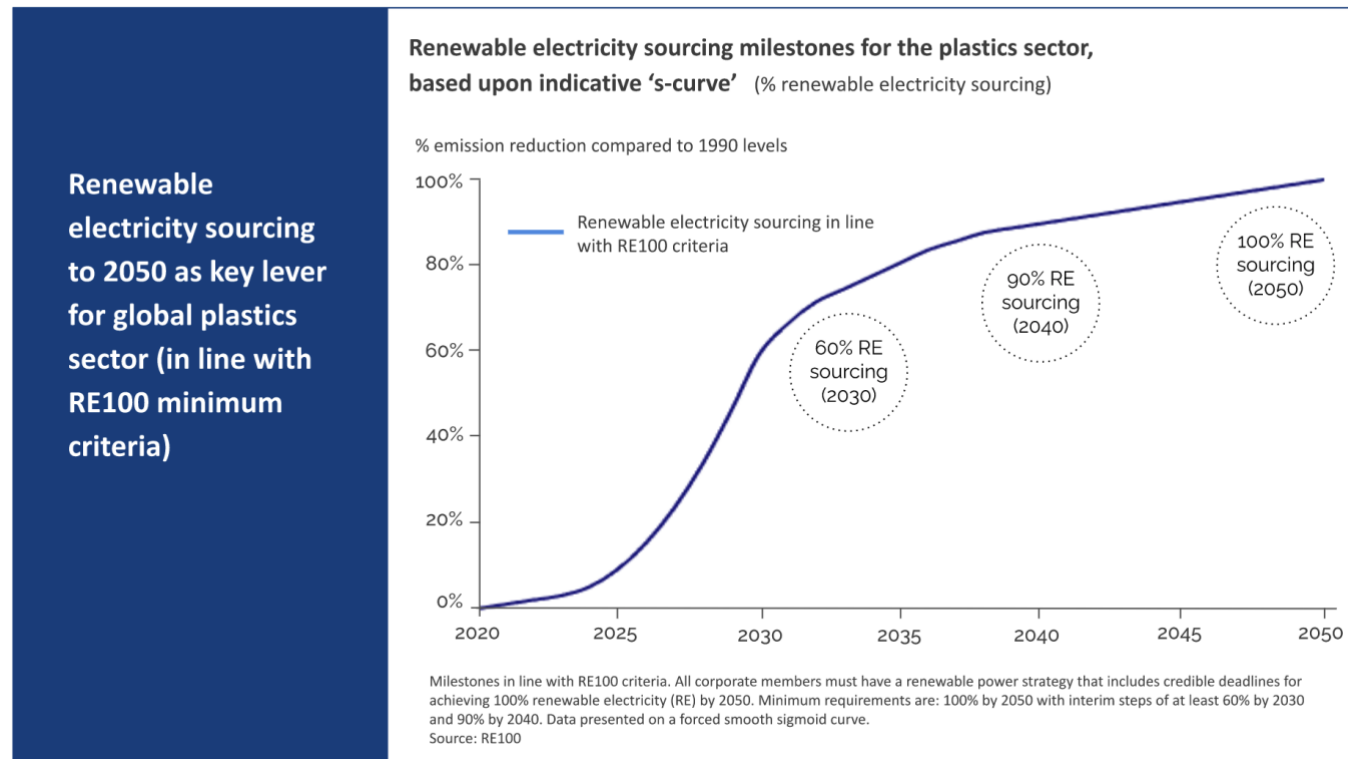
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<sup>45</sup> European Commission, State of the Union 2020, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_20\\_1599](https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1599).

<sup>46</sup> European Commission, A European Strategy for Plastics in a Circular Economy, <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0098&from=EN>.

## 4. PLASTICS – S-CURVE

Change is not linear. Industries, policymakers, and commentators have been caught off-guard before by the pace of change that can erupt in markets, technologies, and societies.<sup>47</sup> Tipping points are reached after periods of little or no change, and they lead to accelerating exponential shifts towards full transformation. A critical lead indicator of transformation in the chemicals sector (proxy for plastics) is the adoption of renewable electricity.<sup>48</sup> This S-curve models the adoption of renewable electricity required in the global chemicals sector.



<sup>47</sup> We Mean Business, The Shape and Pace of Change in the Electricity Transition, October 2020, [LINK](#). This first report from We Mean Business on the dynamics of S-curves focuses on renewable power because of the electricity sector’s critical role in leading the global transition to a net-zero carbon future.

<sup>48</sup> WEF, Electrification cluster, Collaborative Innovation for Low-Carbon Emitting Technologies in the chemical industry, [LINK](#). “Green electricity replacing fossil energy sources is seen as the key lever for GHG emission reduction in the chemical industry and related value chains.”

## 5. PLASTICS– ACTION TABLE



	By 2021	By 2025	By 2030	By 2040
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>EU to draft legislative proposal for a sustainable product policy initiative. (EU Circular Economy Action Plan, 2020)</li> <li>EU to conduct review to reinforce essential requirements for packaging and reduce (over)packaging and packaging waste. (EU Circular Economy Action Plan, 2020)</li> <li>EU to mandate requirements on recycled plastic content and plastic waste reduction measures for key products such as packaging. (EU Circular Economy Action Plan, 2020)</li> <li>EU to develop policy framework for bio-based plastics and biodegradable or compostable plastics. (EU Circular Economy Action Plan, 2020)</li> <li>EU to lead efforts towards reaching a global circular economy agreement on plastics. (EU Circular Economy Action Plan, 2020)</li> <li>EU to launch initiative to substitute single-use packaging, tableware and cutlery by reusable products in food services. (EU Circular Economy Action Plan, 2020)</li> </ul>	<ul style="list-style-type: none"> <li>United Nations member states to align on a global agreement to set clear direction and guidance on plastic pollution in 2022, with global goals and binding targets. (UN Treaty on Plastic Pollution, October 2020)</li> <li>Leading countries, states, and regions establish clear net zero carbon strategy and roadmap for action e.g. Rwanda and 16% emissions reduction by 2030 &amp; plastic bag ban in 2008. (Republic of Rwanda Updated NDC, May 2020)</li> <li>Realize objectives of Ellen MacArthur Foundation Global Commitment, e.g. all plastic packaging to be recyclable by 2025. (Ellen MacArthur Foundation Global Commitment, 2018)</li> <li>Establish target to reduce single-use plastic packaging by 50% by 2050, with specific emphasis on reuse, and launch a multilateral treaty on plastic pollution with targets to 2030/2040. (UN Treaty on Plastic Pollution, October 2020)</li> <li>For example, China to implement EPR policy in 2025. (Ocean Conservancy, Plastics Policy Playbook, 2019)</li> </ul>	<ul style="list-style-type: none"> <li>Major countries, states, and regions establish clear net zero carbon strategy and roadmap for action e.g. formalized through a multilateral treaty on plastic pollution.</li> <li>All plastics packaging placed on EU market is reusable or easily recycled. (EU Circular Economy Strategy, 2017)</li> <li>At least 55% of all plastic packaging in the EU is recycled. (EU Packaging Directive)</li> <li>Mandate certain materials/technologies for packaging applications (e.g., coffee pods/tea bags/fruit labels made from compostable materials).</li> <li>Zero plastics in nature by 2030. (WWF Plastic campaign, ongoing)</li> <li>Establish clear national policy to standardize material inputs to enable circular design and increase use of recycled content in product design.</li> <li>Incentivize for packaging as a service based on reuse, with innovative financing and material leasing models.</li> </ul>	<ul style="list-style-type: none"> <li>All countries and major states and regions establish clear net-zero carbon strategy and roadmap for action.</li> <li>Establish ambitious regulations on product recyclability across all regions.</li> <li>Impose and gradually tighten embedded carbon intensity standards on packaging, appliances, and other manufactured products by introducing fees for externalities on virgin plastics to correct price balance. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>Establish global financed plastic waste collection with measures that increase the provision of financing and ongoing funding to improve waste collection, e.g. EPR using packaging material fees, landfill fees, etc. (Ocean Conservancy, Plastics Policy Playbook, 2019)</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>• Key countries legislate net-zero GHG emissions targets (5 countries legislated as at February 2020, Making Mission Possible, September 2020)</li> <li>• Endorse and commit to key industry programs addressing product recyclability and reuse (e.g. Ellen MacArthur Foundation Global Commitment, 2018).</li> <li>• Government to support business RD&amp;D agenda to decarbonize the production process, focusing on early-stage demonstration and first industrial-scale pilots of technologies, e.g. low-carbon hydrogen, CCS/U and biomass. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>• Tighter regulation on products (e.g. single use), material use and reuse, product design, waste mgmt., and recycling. (Mission Possible sectoral focus: Plastics, January 2019). For example, EU ban on single use plastics ban due 2021)</li> <li>• Establish clear and transparent standards to better understand how to accomplish carbon intensity standards, with specific guidance on plastic alternatives/substitutes. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>• China to establish Extended Producer Responsibility (EPR) policy framework in 2020. Encourage India, Philippines, Vietnam to push for formal EPR regulation. (Ocean Conservancy, Plastics Policy Playbook, 2019)</li> </ul>	<ul style="list-style-type: none"> <li>• Use regional policy insights to drive national policy on material standardization, circular design, and use of recycled content.</li> <li>• At least 50% of all plastic packaging in the EU is recycled. (EU Packaging Directive)</li> <li>• Streamline polymer types and product designs to facilitate reuse and recycling</li> <li>• Develop new, viable end-markets for recycled plastics to generate demand for recycling (e.g. food-grade recycled PP and HDPE), requiring policy changes, RD&amp;D, and significant investment.</li> <li>• Circular economy objectives are mainstreamed in free trade agreements and other bilateral, regional and multilateral processes and agreements. (EU Circular Economy Action Plan, 2020)</li> </ul>		

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>• Incentivize for recycling and treatment markets to increase demand for post-consumer plastics (e.g. California mandatory recycled-content Assembly Bill 943, September 2020).</li> <li>• Establish a cross value chain mechanism and develop a Global Plastic Protocol to set direction on convergence of material, formats, and after-use systems to promote product standardization and simplification. (Ellen MacArthur Foundation, The New Plastics Economy: rethinking the future of plastics, 2016)</li> <li>• Ensure public/policy support for biomass development transitions away to high priority sectors where possible, e.g. aviation and plastics. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>• Costa Rica eliminates single-use plastics and Mexico City bans number of single-use plastic items in 2021. (UNPRI, The Plastics Landscape, 2019)</li> </ul>			
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>• Develop understanding and definition of “plastic risk” to incorporate into financial and ESG assessments.</li> <li>• Support the scoping and development of the SBTi chemicals sector target-setting approaches. (SBTi Chemicals Scoping Document, December 2020)</li> <li>• Encourage investors to ask companies to set science-based targets in line with 1.5°C.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure all major investors have a clear net-zero target and engagement strategy in place, in line with a 1.5°C pathway.</li> <li>• China to implement EPR policy in 2025. (Ocean Conservancy, Plastics Policy Playbook, 2019)</li> <li>• All major countries to finance critical plastic waste collection measures.</li> </ul>	<ul style="list-style-type: none"> <li>• All regions with a financed plastic waste collection mechanism in place.</li> <li>• Achieve a value-driven system for recovery and recycling of packaging and use of plastic waste as feedstock, based on enhanced material value and policy innovation. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>• All major plastic producers and users align with climate-related financial disclosure practices per TCFD framework. (Recommendations of the TCFD, 2017)</li> </ul>	<ul style="list-style-type: none"> <li>• All major investors with a 1.5°C target and engagement strategy in place.</li> <li>• Global financed plastic waste collection through use of taxes/levies/bans (e.g., Extended Producer Responsibility policy using packaging material fees, landfill fees, etc.).</li> <li>• All plastic producers and users align with climate-related financial disclosure practices per TCFD.</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>• Encourage key regions to finance plastic waste collection through measures such as EPR and landfill fees. China to establish Extended Producer Responsibility (EPR) policy framework in 2020. Encourage India, Philippines, Vietnam to push for formal EPR regulation. (Ocean Conservancy, Plastics Policy Playbook, 2019)</li> <li>• Support policy actions that enable a fee structure to favour secondary/recycled plastics i.e., incentives for recycling industry, preferential procurement, virgin material tax to develop and incentivize recycling and treatment markets. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>• Promote financial guidance on plastic recyclability, e.g. by endorsing and committing to key industry programs (e.g. Ellen MacArthur Foundation Global Commitment, 2018)</li> <li>• Actively endorse and promote the TCFD recommendations on emissions reporting and disclosure with key plastic producers and users. (Recommendations of the TCFD, 2017)</li> </ul>	<ul style="list-style-type: none"> <li>• Lobby for increased statutory targets to drive continued progress on plastic production, use and waste management. For example, collection, reuse, recycling, recycled content targets.</li> <li>• Invest a meaningful amount by 2025 in businesses, technologies, or other assets that work to realize the vision of a circular economy for plastics. (Ellen MacArthur Foundation Global Commitment, 2018)</li> <li>•</li> </ul>		
<b>3. Technology Providers and Innovators</b>	<ul style="list-style-type: none"> <li>• Focus on leveraging agricultural waste as biomass feedstock to avoid competition with food production. (Mission Possible Partnership (MPP) Low-Carbon Emitting Technologies (LCET) for the chemical industry initiative - Biomass Utilisation Cluster - see future milestones for progress updates).</li> </ul>	<ul style="list-style-type: none"> <li>• Technology readiness level of at least two key technologies increased (manufacturing of platform intermediates: biomass to bio-ethylene, biomass to bio-syngas).</li> </ul>	<ul style="list-style-type: none"> <li>• Increasingly, new companies emerge that provide circular solutions (e.g. reverse logistics for packaging or alternatives to disposable plastics).</li> <li>• At least 2 large-scale biomass supply demonstration projects in operation in prioritized regions.</li> </ul>	<ul style="list-style-type: none"> <li>• Proliferation of large-scale biomass supply demonstration projects on global scale. Conversion of biomass into a broad set of chemicals enabling gross decarbonization of the sector (&gt;90% GHG emission reduction).</li> <li>• Proliferation of large-scale CCS/U demonstration projects on global scale.</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>3. Technology Providers and Innovators</b>	<p>Note - must only be considered where alternative decarbonization routes are least available. (Making Mission Possible, September 2020)</p> <ul style="list-style-type: none"> <li>• Support commercial-scale carbon capture and use technologies as a key innovation priority. (MPP LCET initiative - Carbon Capture and Utilisation Cluster - see future milestones for progress updates)</li> <li>• Accelerate the processes of electrification as a key lever towards emissions reduction. (MPP LCET initiative - Electrification Cluster - see future milestones for progress updates)</li> <li>• Develop and scale up low-carbon hydrogen production technologies. (MPP LCET initiative - Alternative Hydrogen Production Cluster - see future milestones for progress updates)</li> <li>• Develop plastic waste processing technologies. (MPP LCET initiative - Waste Processing Cluster - see future milestones for progress updates)</li> </ul>	<ul style="list-style-type: none"> <li>• Technology readiness level of electrification processes (e.g. e-cracking), low-carbon hydrogen production, and CCS/U technologies increased.</li> <li>• Several large-scale low-carbon hydrogen demonstration projects in operation in prioritized regions.</li> <li>• Technology readiness level of key technologies for mechanical and chemical recycling increased.</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Several large-scale CCS/U demonstration projects in operation in prioritized regions.</li> <li>• Several large-scale clean electrification demonstration projects (1-10 tons/h) in operation in prioritized regions. Prerequisite: Access to sufficient and affordable green energy.</li> <li>• Proliferation of large-scale low-carbon hydrogen demonstration projects on global scale.</li> <li>• Several large-scale (50-200 kilo tons) plastic waste demonstration projects in operation in prioritized regions.</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Proliferation of large-scale clean electrification demonstration projects on global scale. Shift of energy input from fossil fuels to emission free energy, &gt;50% of total energy demand emission free.</li> <li>• Multiple commercial-scale low-carbon hydrogen plants established.</li> <li>• Proliferation of large-scale demonstration projects on global scale. Recycling of 100,000 kilo tons of waste into chemicals and plastics.</li> <li>•</li> </ul>
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>• 20% of major chemical companies by revenue (i.e. plastic producers) of the High-Level Champions' target company list join the UNFCCC Race to Zero campaign. (UNFCCC Race to Zero Breakthroughs)</li> <li>• Major chemical companies set science-based targets (SBTs) aligned with 1.5°C trajectory, following the SBTi chemicals sector Sectoral Decarbonisation Approach. (SBTi Chemicals Scoping Document, December 2020).</li> </ul>	<ul style="list-style-type: none"> <li>• All major global chemical companies set SBTs in line with 1.5°C pathway, supported by explicit commitment on net-zero emissions reduction. (SBTi). Note: refer to downstream sector pathways, e.g. consumer goods for more information on commitment.</li> <li>• Eliminate problematic or unnecessary plastic packaging by 2025 (e.g., Ellen MacArthur Foundation Global Commitment, 2018).</li> </ul>	<ul style="list-style-type: none"> <li>• All chemical companies set SBTs in line with 1.5°C pathway.</li> <li>• All major chemical companies to source 60% renewable electricity by 2030, in line with RE100 guidance. (RE100)</li> <li>• Expand system innovations globally (e.g., reuse, new delivery models, bio-benign substitutes, measures to minimize microplastic emissions).</li> </ul>	<ul style="list-style-type: none"> <li>• All chemical companies delivering on science-based targets for emissions reduction in line with 1.5°C pathway.</li> <li>• All major chemical companies (i.e., plastic producers) to source 90% renewable electricity by 2040, in line with RE100 guidance. (RE100)</li> </ul>



	By 2021	By 2025	By 2030	By 2040
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>Expand zero-carbon electricity and electrification commitments, e.g. RE100 and encourage value chain partners further downstream to do the same. (Making Mission Possible, September 2020)</li> <li>Promote business commitment to key industry programs on circular economy (e.g., Ellen MacArthur Foundation Global Commitment, 2018).</li> <li>Industry players individually and jointly invest in RD&amp;D projects that will develop and drive down cost of supply side decarbonization technologies and promote innovation. (Mission Possible sectoral focus: Plastics, January 2019), e.g. 10% of RD&amp;D budget investment in alternative feedstocks.</li> <li>Develop product standardization, e.g. through limiting mixing of materials, shift to recyclable polymers, and expanding recycling processes. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>Improve company emissions disclosure and reporting in line with TCFD recommendations. (WBCSD TCFD Chemical Sector Preparer Forum, July 2019)</li> <li>Leading plastic producers adopt eco-design principles (e.g. design to minimize/for re-use/for ease of recycling) to improve primarily reusability, then recyclability, and the use of recycled content, with an overall reduction in use of unnecessary and excess packaging. (Ocean Conservancy, Plastics Policy Playbook, 2019)</li> </ul>	<ul style="list-style-type: none"> <li>Move from single use towards reuse models where relevant 100% of plastic packaging to be reusable, recyclable, or compostable by 2025 (e.g. Ellen MacArthur Foundation Global Commitment, 2018).</li> <li>Rapidly scale up system innovations including new delivery models (reuse-refill), reverse logistics, incentives for packaging recovery. (Mission Possible sectoral focus: Plastics, January 2019)</li> <li>Major plastic producers explicitly adopt eco-design principles and all plastic packaging used is evidenced as necessary (e.g. for shelf life).</li> </ul>	<ul style="list-style-type: none"> <li>Widespread explicit adoption of eco-design principles and all plastic packaging used is evidenced as necessary (e.g. for shelf life).</li> <li>Businesses consider all value chain outputs (emissions, by-products, end-products) as a resource that can be traded to create economic value. (Deloitte, The 2030 decarbonisation challenge: Chemicals)</li> </ul>	<ul style="list-style-type: none"> <li>All major upstream, midstream, and downstream companies' businesses set science-based targets and net zero by 2050. commitments</li> <li>All plastic producers explicitly adopt eco-design principles.</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>• Drive RD&amp;D agenda, focusing on early-stage demonstration and first industrial-scale pilots of technologies to become cost-effective in the future. (Mission Possible sectoral focus: Plastics, January 2019)</li> </ul>			
<b>5. Civil Society</b>	<ul style="list-style-type: none"> <li>• Encourage NGOs, associations, academics, financial institutions, others to support key industry programs on circular economy (e.g. Ellen MacArthur Foundation Global Commitment, 2018).</li> <li>• Advocate for increased membership/uptake of key sector initiatives/ programs. (see Existing Initiatives or Systems Map for more)</li> <li>• Continue to advocate for measures to severely limit the production and use of plastic packaging and prompt reuse through active NGO networks (e.g. Greenpeace, European Climate Foundation).</li> <li>• Promote consumer behaviour change by lobbying for improved labelling and clear communications around use of plastic packaging.</li> </ul>	<ul style="list-style-type: none"> <li>• Realize leading industry program commitments, e.g. eliminate problematic or unnecessary plastic packaging by 2025. (Ellen MacArthur Foundation Global Commitment, 2018)</li> <li>• Realize leading industry program commitments, e.g. move from single use towards reuse models where relevant 100% of plastic packaging to be reusable, recyclable, or compostable by 2025. (Ellen MacArthur Foundation Global Commitment, 2018)</li> <li>• Businesses and end-consumers receive information at point of purchase on packaging and disposal behaviours through use of data and technology.</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Deliver consumers more services and products transitioned to reuse/innovative business models.</li> <li>• Incentivize consumers and make them aware of key benefits of a circular economy for plastics - with better design, new business models, and innovation products that offer more sustainable consumption patterns. (EU Circular Economy Action Plan, 2020)</li> </ul>	

## 6. PLASTICS - EXISTING INITIATIVES

Business Ambition for 1.5C	UNGC Secretariat campaign asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5°C above pre-industrial levels.
Science Based Targets initiative (SBTi)	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to showcase companies that set science-based targets.
We Mean Business Coalition	Global non-profit coalition working with the world’s most influential businesses to take action on climate change, catalysing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
World Business Council for Sustainable Development (WBCSD)	Global, CEO-led organization of over 200 businesses working together to accelerate the transition to a sustainable world.
Leadership Group for Industry Transition (LeadIT)	Accelerating the transition of all industry sectors to low carbon pathways to reach net-zero carbon emissions by 2050.
Mission Innovation	Dramatically accelerate public and private global clean energy innovation, including doubling their current research and development investments in the sector over five years.
Ellen MacArthur Foundation New Plastics Economy	Applying the principles of the circular economy, the initiative brings together key stakeholders to rethink and redesign the future of plastics, starting with packaging.
Alliance To End Plastic Waste (ATEPW)	Founded by companies that make, use, sell, process, collect and recycle plastics, with a 5-year ambition to divert millions of tons of plastic waste in more than 100 at-risk cities, improve livelihoods for millions, and contribute to a circular economy.
Global Plastic Action Partnership (GPAP)	Brings businesses, international donors, national and local government, community groups and world-class experts together to collaborate on beating plastic pollution by fast-tracking circular economy solutions in coastal countries. Convened by the World Economic Forum (WEF).
Bioplastic Feedstock Alliance (BFA)	Science-driven organization which aims to evaluate diverse bioplastic feedstocks to better understand the potential sustainability opportunities of each, convened by the World Wide Fund for Nature (WWF) and several global leading consumer brand companies.
World Wide Fund for Nature (WWF) ReSource: Plastic	Partnership with businesses to redesign the sourcing, use and disposal of plastics, focused on 100 companies that could prevent 10m tons of plastic waste, part of their flagship No Plastic in Nature campaign.



# STEEL

## Action Table

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2021



## 1. STEEL - INTRODUCTION

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The purpose of this part of this Action Table is to highlight specific and promotable actions to deliver the vision for the Industry thematic area, along a pathway for steel sector decarbonization.

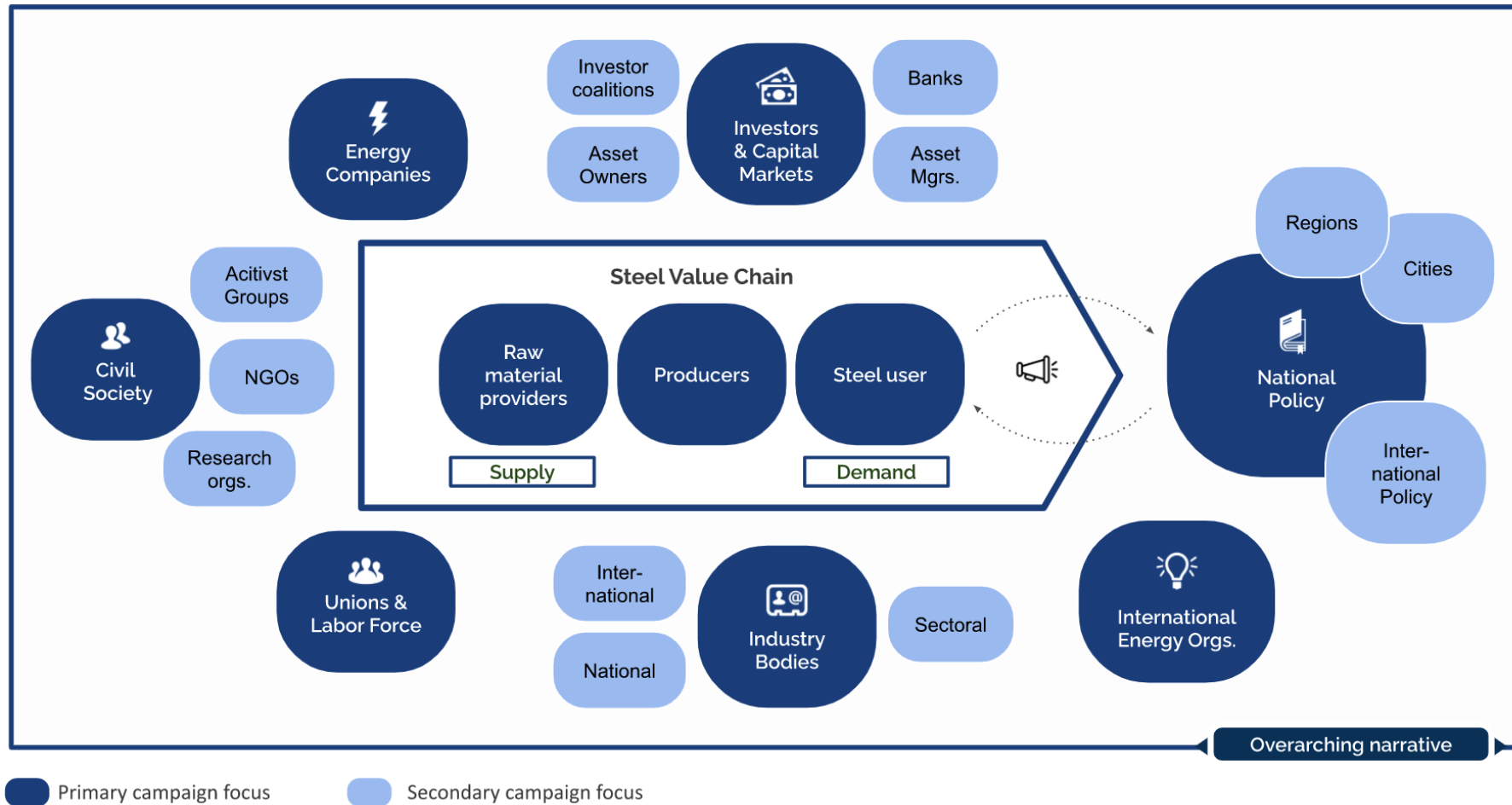
The global steel sector – which was responsible for 9 per cent of global energy-related emissions, or 3.6 Gt CO<sub>2</sub>e, in 2019 – faces a challenging but necessary and urgent path to decarbonization. Of this total, 2.6 Gt CO<sub>2</sub>e, equivalent to 7 per cent of energy sector emissions or 28 per cent of industrial emissions, was closely associated with direct emissions generated in production of the nearly 1,900 million metric tonnes of crude steel, of which nearly three-quarters was from iron ore using metallurgical coking coal. Indirect emissions from electricity and heat generation account for another 1.0 Gt CO<sub>2</sub>e. This includes the electricity consumed by finished steel production, and the scrap steel recycling through electric arc furnaces powered by grid electricity that accounts for 600 million metric tonnes of production. According to the World Steel Association, roughly 53 per cent of steel was produced in China, with the European Union (9 per cent), India (6 per cent), and the United States (5 per cent) the next largest producers.

There are three major components to pathways for reducing global emissions from the steel sector: (i) managing steel demand; (ii) improving the productivity of steel once in use; and (iii) decarbonizing the production of steel. The relative balance of these components will have significant implications for the speed and disruptiveness of the transition for the steel industry and its employees, and the pace of decarbonization, in the context of a capital-intensive and globally competitive commodity sector.

This action table draws together insights from a wide array of existing decarbonization pathways and a multi-stakeholder consultation to derive immediate actions in the next one to five years, and in the long term, for mitigating global emissions from the steel sector. These actions are aspirational, noting the limited potential for a narrowly sectoral approach to deliver steel decarbonization by 2050 as evidenced by the 2020 International Energy Agency (IEA) Iron and Steel Technology Roadmap. This report recently found that the steel sector would not realize net zero before 2070. For more information on these sources, please see “Further References” section.

## 2. STEEL SYSTEM MAP

### Actors | Key Stakeholders for Steel



### 3. STEEL CHANGE LEVERS

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**Clear paths exist to decarbonizing steel by 2050 at minimal additional cost to end customers.** Emerging dynamics could drive these changes on a 2050-aligned timeline. An extended recovery from COVID-19 could encourage uptake of enhanced energy and material efficiency schemes to increase resiliency, with fast-growth developing countries shifting onto capital-efficient, digitalized development models featuring high asset utilization. Concerns over extended supply chains and job insecurity could strengthen the case for protective trade measures and re-shoring, with government outlays for domestic, low-carbon steel production facilities that create or sustain jobs.

- **Businesses:** Designers and architects can help to design buildings and cars for longer lifetimes and reduced waste, reducing primary steel demand in 25 to 40 per cent by 2050. To achieve this, customers, building owners and construction companies must demand, and/or governments regulate, **utilization of material efficiency measures and low carbon materials.** Building developers and owners and automobile manufacturers can **adopt substitutes alongside new practices** (i.e. designing for cross-laminated wood or tension-based structures), driven by changing consumer preferences and synergistic value opportunities (i.e. vehicle light weighting electric vehicles yields battery capacity and weight savings). Convergence of net-zero commitments, fast-moving technologies, and improved design practices could **spark elevated demand for zero-carbon steel.** For example, reduced overspecification of steel can enable adoption of low-carbon steels at zero net cost, driven by building customer, investor-owner, and/or policy requirements. Growing digitalization and remote sensing capabilities could integrate end-to-end product tracking and accounting through value chains to end customers—where additional costs of decarbonized steel are marginal—thus creating premium markets that underlie a lasting business case for decarbonized steel. Finally, business can **collaborate with governments and green finance** to develop at least 20 commercial-scale production facilities this decade, equivalent to 1 per cent of global primary production, in line with the UNFCCC Breakthrough Outcome.
- **Policy:** Policy support can accelerate **collaborative R&D efforts** to speed and scale deployment of low- to zero-commercial scale production facilities. This can be further incentivized by policies that **create downstream demand** through lifecycle emissions standards, preferential procurement of green steel for buildings and automobiles, and other regulatory or trade measures (i.e. carbon border adjustments) can help to create a level playing field for low carbon steel. At the local level, targets to reduce embodied carbon significantly this decade can be set, and cities and regions can share emerging best practices, i.e. evolving codes and standards to deliver against those targets. **Collaboratively**



**developed industrial strategies** using social dialogues between industry, finance, and communities can further help to manage and support technology transitions in communities with expensive and carbon-intensive assets. Overarching and long-term policy frameworks will provide price support for retrofits or, alternately, asset retirement, as with “technology sunset” policies.

- **Finance:** Where production assets are still very young, as in India, investors can support efficiency schemes like Perform Achieve Trade that raise energy efficiency standards by incentivizing businesses to adopt new measures. Where assets are older, investors can search for opportunities to **invest in new and retrofitted green steel production capacity** supplying viable markets like automobiles and buildings, especially where differentiated markets for low-carbon steel exist. Asset managers and owners can continue to **call for enabling actions** like supportive policy and business adoption of science-based net zero emissions targets, while contributing to value chain collaboration to support delivery against those targets. Public and multilateral finance institutions can **support feasibility studies** and investment in renewable hydrogen-based green steel production in locations where renewables resources are particularly strong.
- **Technology:** Additional innovation is required to accelerate the development and deployment of breakthrough technologies like molten oxide electrolysis and carbon capture and storage. As technologies become technically proven, demonstration projects can further increase technology confidence and competitors’ “fear of missing out”, leading to more demonstration projects with policy support, further increasing technology confidence, and further strengthening policy and investor support for new commercial-scale deployments.
- **Civil society:** Over the near- to medium-term, growing social and investor pressure on companies to reduce emissions alongside renewables cost reduction can incentivize action within the industry. Organizations can also facilitate cross-value chain collaboration between mining, energy, and steel companies, and the development of shared pathways and roadmaps for action to deliver net zero by 2050.

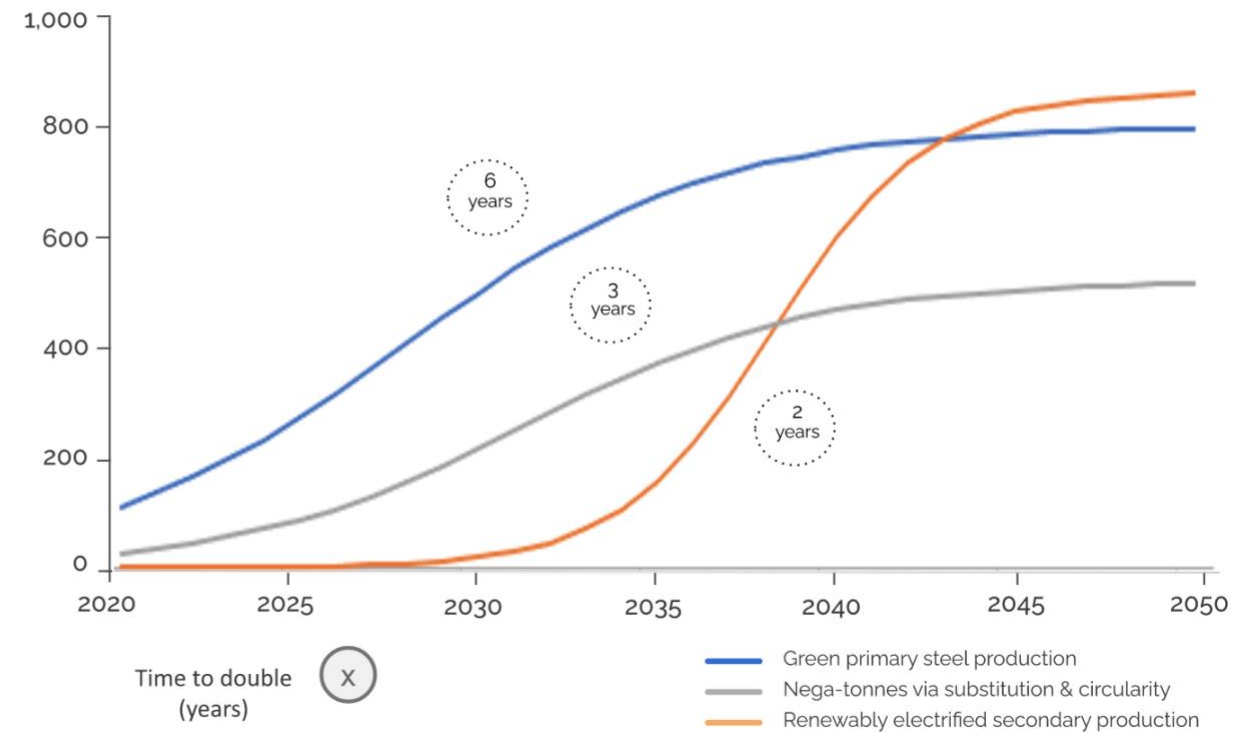
## 4. STEEL S-CURVE

2-6 year





doubling rates  
required to achieve  
efficient, green steel  
markets by 2050

Competing views of global steel market evolution based upon indicative s-curve's [1]

Million tonnes per annum



## 5. STEEL– ACTION TABLE

Nexus	 Energy	 Human settlements	 Industry	 Land use
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	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<p>National governments</p> <ul style="list-style-type: none"> <li>• Advance conversations at among top ten producing countries to manage global primary steel production and address trade issues i.e., carbon trade adjustment mechanisms</li> <li>• Commit to substantially deepen cross-border support for technology RD&amp;D (i.e. molten oxide electrolysis), demonstration (H-DRI, CCS/U) and open-source learnings</li> <li>• Develop multilateral agreement to implement efficiency schemes with supportive financing</li> <li>• Form a “circular green steel buyers’ club” to determine LCA emission standards, require product-specific declarations (EPDs), shared minimum procurement schedules, and circularity policies</li> <li>• Share knowledge on just transition experiences from other sectors and co-launch social dialogues</li> </ul>	<ul style="list-style-type: none"> <li>• Top 10 producing countries set agreed terms and requirements for green steel public procurement and “technology sunset” policies</li> <li>• EU regulators drive carbon prices toward 60 euro/ton with limited free allowances to support competitive low carbon steel; elsewhere policy makers implement graduated product standards</li> <li>• G7 countries institute green steel product requirements</li> <li>• Provide subsidy support to 5-7 commercial scale green steel facilities, of which 3-4 are in high growth developing countries like India</li> <li>• Regional governments announce requirements for environmental product disclosure (EPDs) for construction projects, co-launch regional reuse centres and protocols</li> <li>• City governments develop embodied carbon strategies in a community of practice and/or adopting regulations to mandate/incentivize low-carbon materials and materials efficiency, such as materials reuse and recycling</li> </ul>	<ul style="list-style-type: none"> <li>• “Technology sunset” policies take effect to limit new carbon-intensive (or at least retrofit-ready) production facilities</li> <li>• Continued, significant contributions to funding pools and blended finance mechanisms to support scale up of zero carbon commercial-scale production capacity</li> <li>• Further strengthen building codes and standards in developing countries</li> <li>• Regional governments announce requirements for environmental product disclosure (EPDs) for construction projects, co-launch regional reuse centres and protocols</li> <li>• City governments have developed and launched zero embodied carbon strategies in a global community of practice, have adopted regulations to mandate/incentivize steel reuse and recycling</li> <li>• Significant ramp up in support for social dialogues and financial needs in communities expecting to face plant closure</li> </ul>	<ul style="list-style-type: none"> <li>• Institute and raise carbon prices with supporting trade measures</li> <li>• Mass rollout of content regulations (tradeable quota or certificate system) to increase shares of zero emissions steel</li> <li>• Continued massive contributions to funding pools and blended finance mechanisms to support scale up of zero carbon commercial-scale production capacity</li> <li>• Further strengthen building codes and standards in developing countries</li> <li>• City governments have developed and implemented embodied carbon strategies contributing to net zero embodied carbon in all new buildings</li> <li>• In China, for example strong regulations and incentives continue to reduce primary production and scale up secondary production as steel stocks mature</li> <li>• In India, policies support new zero carbon primary production growth using innovative technologies (i.e., direct electrolysis)</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>• 10 regional governments announce plans to require environmental product disclosure (EPDs) for construction projects, co-launch regional reuse centres and protocols</li> <li>• City governments join the Clean Construction Forum to start taking action on embodied emissions and clean construction over the next year</li> <li>• Set cross-industrial, long-term strategy on CCS/U, including volume targets for 2030, 2040, and 2050 and mapping of industrial sites to geological storage resources at the national level</li> </ul>	<ul style="list-style-type: none"> <li>• Undertake multi-stakeholder social dialogues to set collaborative industrial policy</li> <li>• Government procurement and new product standards support growing demand for recycled CO2 (e.g., in building materials), captured from production facilities, with considered use of tax incentives and carbon pricing mechanisms support the first major cross-industrial networks</li> </ul>	<ul style="list-style-type: none"> <li>• Light weighting requirements in key economies like China reduce domestically manufactured automobiles' steel content by a factor of six (BNEF)</li> <li>• Indian and South-Southeast Asian light weighting, building efficiency and urban design policies adopted</li> <li>• New CCS/U regulatory frameworks are needed to clarify international obligations and liabilities associated with leakage from geological formation, with clearer processes established for project approvals</li> </ul>	
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>• Major institutional asset owners continue to push businesses to set net zero emissions targets, voluntarily disclose under TCFD</li> <li>• Engage with 1) national governments to build case for low carbon policies; 2) value chain (mining companies, customers) to incentivize collaborative action</li> <li>• Explore/announce investment in steel companies with credible net zero plans, green energy providers</li> <li>• Track and support launch of social dialogue processes in carbon-intensive, high cost/low resource steel producing communities</li> <li>• Engage building owner initiatives to encourage material efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Major institutional asset owners continue to push businesses to set net zero emissions targets, voluntarily disclose under TCFD</li> <li>• Structure blended finance / sustainable investment programs to fund early commercial scale assets</li> <li>• Launch technology risk assessment methodologies to begin raising cost of capital for new high carbon facilities</li> <li>• Increase preferential investment in steel companies with credible net zero plans and independently audited site-specific assessments</li> <li>• Participate in social dialogue processes in carbon-intensive, high cost/low resource steel producing communities</li> </ul>	<ul style="list-style-type: none"> <li>• Major institutional asset owners continue to push businesses to set net zero emissions targets, voluntarily disclose under TCFD</li> <li>• Participate in dedicated investment of 20 commercial scale steel facilities</li> <li>• Scale up preferential investment in NZ-committed primary producers; begin divesting from carbon-intensive producers</li> <li>• Investor alignment raises cost of capital for new carbon-intensive production facilities, increasing competitiveness of green and low carbon steel</li> <li>• Public-private processes and techniques for managing stranded high carbon steel production assets institutionalized</li> </ul>	<ul style="list-style-type: none"> <li>• Investments and retirements in low carbon steel production capacity continue to scale, exceed USD1 trillion</li> <li>• Public-private processes and techniques for managing stranded high carbon steel production assets ramp down as regional supply/demand mismatches resolve</li> <li>• Commercial financiers and asset owner portfolios are largely climate aligned</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>• Undertake development of a methodology by which to define and pursue “climate aligned” asset and investment portfolios</li> <li>• Raise awareness and build knowledge across financial sector around the multi-decade CCS/U opportunity</li> <li>• More robust estimates of the current financing gaps (approx. USD35bn committed out of USD 500bn required to reach first gigaton of CCS/U across heavy industry)</li> </ul>	<ul style="list-style-type: none"> <li>• All ratings agencies incorporate ESG into ratings methodologies, begin requiring disclosures on climate risk</li> <li>• A clear CCS/U finance roadmap is created to 2050, at national level via public-private partnership, with considerations of capital grants; credit guarantees; guaranteed offtakes and contracts for difference continue to finance a range of capture, transport and storage initiatives</li> </ul>	<ul style="list-style-type: none"> <li>• Significant share of commercial financiers and asset owner portfolios are climate aligned</li> </ul>	
<b>3. Technology Providers and Innovators</b>	<ul style="list-style-type: none"> <li>• Enhanced RD&amp;D support for industrial-scale demonstration of greenfield and brownfield zero-carbon steel technologies</li> <li>• Additional low carbon steel commercial scale plants enter feasibility studies</li> <li>• Stakeholders strengthen collaboration on RD&amp;D progress through WSA Global Technology Innovation Expert Group, Mission Innovation industry mission</li> <li>• Models for real-time grid carbon intensity for EAFs launched with five companies in developed markets</li> </ul>	<ul style="list-style-type: none"> <li>• More efficient building design tools and practices begin to scale across global platforms</li> <li>• Accelerate international RD&amp;D on low- to mid-TRL steel technologies (i.e., direct electrolysis, CCS/U) and share insights</li> <li>• Bring near-zero carbon material and design alternatives entering into mainstream</li> <li>• Enhanced RD&amp;D support for industrial-scale demonstration of greenfield and brownfield zero-carbon steel technologies</li> <li>• Begin feasibility studies and/or construction on at least 20 commercial scale green steel facilities</li> </ul>	<ul style="list-style-type: none"> <li>• OEMs/steel partnerships deliver 20MMT per annum production capacity green commercial steel facilities</li> <li>• Next generation commercial-scale facilities (aqueous or molten-oxide electrolysis) under feasibility assessment</li> <li>• Further refinement and scale of near-zero carbon material and design alternatives</li> </ul>	<ul style="list-style-type: none"> <li>• OEMs/steel partnerships deliver 400MMT per annum production capacity green commercial steel facilities</li> <li>• Next generation commercial-scale facilities deployed</li> <li>• Further refinement and scale near-zero carbon material and design alternatives</li> </ul>

	By 2021	By 2025	By 2030	By 2040
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>• 10% of steel producers by volume have net zero by 2050 commitments</li> <li>• Leading global producers engage in cross-value chain and -sectoral collaborations and partnerships to identify, invest in new value pools, i.e. Baowu Steel Metallurgy Alliance</li> <li>• Companies with young fleets issue aggregated energy efficiency bonds through domestic/multilateral funding windows</li> <li>• Customers and suppliers boost net zero commitments with specific scope 3 targets</li> <li>• 20 major construction, automotive, infrastructure, other end-customers set voluntary green steel procurement by 2030 commitments</li> <li>• Five leading secondary steel producers co-develop and sign on to real-time grid carbon intensity measurement, tracking, accounting platform</li> <li>• Secondary and finished goods steel manufacturers deepen participation in renewables/PPA markets for direct contracting</li> <li>• Cross-industry partnerships must identify clusters or ‘hubs’ of industrial sites, that offer the potential to share a common transport and storage infrastructure, further reducing operational costs</li> </ul>	<ul style="list-style-type: none"> <li>• 60% of steel producers have SBTI-backed net zero by 2050 commitments and are disclosing in line with TCFD</li> <li>• Leading global producers engage in cross-value chain and -sectoral consortia to invest in value pools, i.e. linked to demand consortia</li> <li>• 100 major construction, automotive, infrastructure, other end-customers have set % green steel procurement by 2030 commitments</li> <li>• Secondary and finished goods steel manufacturers sign (virtual) renewable PPAs to reduce scope 1 emissions by 10% in developed countries</li> <li>• Design and architecture firms adopt tools and processes for optimizing building designs for low carbon and circular steel use, i.e., track embodied carbon on design optioning, build carbon disclosure into contract language</li> </ul>	<ul style="list-style-type: none"> <li>• All steel producers commit to SBTI-backed net zero by 2050 across scopes 1-3 and are disclosing in line with TCFD</li> <li>• First movers reach FID and/or construction for at least 20 commercial-scale production facilities</li> <li>• Producers are actively developing alternative business models and investment cases</li> <li>• Secondary and finished goods steel manufacturers scaling adoption of (virtual) renewable PPAs</li> <li>• Most construction, automotive, infrastructure, other end-customers have set net zero by 2050 commitments covering scope 3</li> <li>• Automakers’ electrification and vehicle sharing business models contribute to reduced demand, incentivizing alternative materials and utilization patterns</li> <li>• 100% steel producers reporting and disclosing in line with TCFD</li> </ul>	<ul style="list-style-type: none"> <li>• Producers’ production asset retirement and turnover on track to deliver net zero production by 2050</li> <li>• Green steel procurement targets among end-users reach a majority of annual production</li> <li>• Secondary and finished goods steel manufacturers’ scope 1 emissions reduced by 100% in developed countries with support of long duration storage technologies</li> <li>• Proven business / value chain models for green steel markets brought to maturity</li> <li>• Producers in high scrap supply markets rapidly shifting production bases to renewably electrified secondary production</li> <li>• Secondary and finished goods steel manufacturers scaling adoption of (virtual) renewable PPAs or otherwise decarbonizing with lower carbon grid electricity</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>5. Civil Society</b>	<ul style="list-style-type: none"> <li>• Non-profits, IOs, NGOs support development of regional roadmaps, i.e. TERI</li> <li>• Labour unions push for energy efficiency and green steel investments as part of COVID bailouts, just transition policy support</li> <li>• Develop independent real-time grid carbon intensity measurement, tracking, accounting</li> <li>• Launch consumer-facing campaigns in sectors in key segments to build demand for low carbon steel</li> <li>• Support the refinement and launch of product certifications and accounting methodologies connected to asset-level carbon intensity measurements</li> <li>• Work with industry to develop science-based target methodology</li> <li>• Increase educational resources and easy to use tools that allow for real-time comparative LCA during the design and specifications process</li> </ul>	<ul style="list-style-type: none"> <li>• Build up consumer demand generation campaigns</li> <li>• Support integration of Life Cycle Inventory datasets</li> <li>• Scale demand-facing consortia development campaigns in key segments</li> <li>• Product certifications, i.e., Responsible Steel, and accounting methodologies are mainstreamed and reach implementation, supporting development of differentiated green steel markets</li> <li>• Facilitate diffusion of material efficiency and design tools and processes into 5% of new buildings demand in high growth developing countries, as well as implementation of enabling building codes and standards</li> <li>• Support the development of an independent nature-based solutions standard and functioning offsets market</li> </ul>	<ul style="list-style-type: none"> <li>• Scale diffusion of material efficiency and design tools and processes to 50% of new demand in developing countries</li> <li>• International campaigns for circular, zero embodied carbon, infrastructure, and assets</li> <li>• Scale demand-facing consortia development campaigns in key segments</li> <li>• Support social dialogue convenings at local and regional levels to manage impending stranded asset and community jobs transitions, especially in developed countries</li> </ul>	<ul style="list-style-type: none"> <li>• Consumer demands have mainstreamed development of circular business models in developed and developing countries</li> <li>• Social dialogue models proven, standardized, and scaling across communities to support just transition</li> </ul>

## 6. STEEL - EXISTING INITIATIVES

Business Ambition for 1.5C	UNGC Secretariat campaign asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5 <sup>0</sup> C above pre-industrial levels.
Science Based Targets Network	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to help companies develop and set science-based targets.
We Mean Business Coalition	Global non-profit coalition working with the world’s most influential businesses to take action on climate change, catalysing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
Leadership Group for Industry Transition (LeadIT)	Accelerating the transition of all industry sectors to low carbon pathways to reach net-zero carbon emissions by 2050.
Climate Action 100+	Investor network to ensure the world’s largest corporate greenhouse gas emitters take necessary action on climate change.
Net Zero Asset Owner Alliance	Group of asset owners working to transition their investment portfolios (more than 2.4 trillion USD globally) to net-zero GHG emissions by 2050 consistent with a maximum temperature rise of 1.5°C.
Center for Climate-Aligned Finance	An “engine room” to help financial institutions partner with their clients, industry leaders, and key buyers to develop practical and scalable solutions to the barriers to climate alignment.
Mission Innovation	Dramatically accelerate public and private global clean energy innovation, including doubling their current research and development investments in the sector over 5 years.
Mission Possible Partnership: Net Zero Steel Initiative	A diverse group of leaders from public, private and civil society sectors working to build a trusted fact base and coalition to support policy and investment decision-making across countries and sectors.
SteelZero	A global initiative by the Climate Group in partnership with ResponsibleSteel that works with leading organizations to send a powerful signal to steel producers, investors, and policymakers to accelerate the transition to wide scale production of net zero steel.





Responsible Steel	An international, multi-stakeholder standard for responsible production for steelmaking and processing sites.
COMET (Coalition on Materials Emissions Transparency)	An alliance to create a universal greenhouse gas (GHG) calculation framework for the mineral and industrial supply chains.

## 7. STEEL - FURTHER REFERENCES

Mission Possible Platform: Reaching net-zero carbon emissions from Harder-to-Abate sectors by 2050	<a href="#">Link (Steel Appendix)</a>
Ellen Macarthur Foundation & Material Economics: Completing the Picture: How the Circular Economy Tackles Climate Change	<a href="#">Link</a>
Fraunhofer ISI: Industrial innovation: Pathways to deep decarbonization of industry	<a href="#">Link</a>
World GBC: Bringing Embodied Carbon Upfront	<a href="#">Link</a>
CNCA/C40: Embodied Carbon Policy Framework	<a href="#">Link</a>
TERI/ETC: Towards a Low Carbon Steel Sector in India	<a href="#">Link</a>
CEEW: Sustainable Manufacturing for India's Low-carbon transition	<a href="#">Link</a>
RMI/ETC: China 2050: A fully developed, rich zero carbon economy	<a href="#">Link</a>
Ellen Macarthur Foundation: The circular economy opportunity for urban and industrial innovation in China	<a href="#">Link</a>
Material Economics: Industrial Transformation 2050 – Pathways to Net zero Emissions from EU Heavy Industry	<a href="#">Link</a>



CLG Europe: Forging a carbon-neutral heavy industry by 2050: How Europe can seize the opportunity	<a href="#">Link</a>
Grattan Institute: Start with steel – a practical plan to support carbon workers and cut emissions in Australia	<a href="#">Link</a>
IEA Iron and Steel Technology Roadmap 2020	<a href="#">Link</a>
IEA: Material Efficiency in Clean Energy Transitions	<a href="#">Link</a>
McKinsey: Decarbonization of industrial sectors: the next frontier	<a href="#">Link</a>
IDDR: Deep Decarbonization Pathways Project	<a href="#">Link</a>



# CONSUMER GOODS

## Action Table

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2021



## 1. CONSUMER GOODS - INTRODUCTION

The purpose of this part of the Action Table is to highlight specific and promotable actions to deliver the vision for the Industry thematic area, with a sector-based approach focused on consumer goods.

Greenhouse gas emissions for the consumer goods sector are estimated to be 33 Gt CO<sub>2</sub>e annually, while the industry is expected to grow at an average of 5.3 per cent each year for the next two decades. The industry must reduce emissions by more than 50 per cent to meet the 2050 targets required to maintain warming at below 1.5°C.<sup>49</sup>

The consumer goods sector is in a key position to influence consumption behaviour and diets through ingredient sourcing, product design and category choices. More than 80 per cent of the GHG emissions in the consumer goods sector lie within supply chains, yet only 25 per cent of the companies currently engage their suppliers to address these emissions, creating an opportunity to influence upstream emissions with stronger scope 3 target-setting and monitoring.<sup>50</sup> Further strategies to decarbonize the consumer goods sector include tackling commodity-driven deforestation, preserving water used in irrigation of raw materials and in operations, reducing food waste, reducing the usage of harmful refrigerants, moving to zero-carbon logistics, addressing the growing issue of plastic waste, and adopting circular business models. Many low- and middle-income countries still rely heavily on the export of commodities manufactured according to ‘linear’ practices to higher-income countries, meaning they may be negatively affected by shifts to circularity and more sustainable modes of consumption. In order to ensure a just transition, these countries will need support from the international community through targeted assistance programmes if established international trade in such commodities declines in the medium to long term.

Currently, over 28 per cent of major players within the consumer goods sector, who together represent 32 per cent of the sector by revenue, have joined the Race to Zero, by committing to the UN Global Compact Business Ambition for 1.5°C or other partner initiatives including the Exponential Roadmap, The Climate Pledge and SME Climate Hub. The figure is very similar for retail, in which 27 per cent of major players representing 22 per cent of the sector by revenue have committed.<sup>51</sup>

The consumer goods campaign’s Breakthrough Ambition called for the top 20 per cent of major players in the consumer goods sector by revenue to join the Race to Zero.<sup>52</sup> In terms of Breakthrough Outcome, the campaign asks that 30% of suppliers join the Race to Zero by 2025 and as the Sector Goal, that the entire sector be net zero by 2050. While the sector has achieved its Breakthrough Ambition, there needs to be increased focus on action, including mobilizing actors from developing

<sup>49</sup> IPCC & McKinsey. 2016.

<sup>50</sup> Based on companies that report to CDP.

<sup>51</sup> Analysis by Climate Champions. May 2021.

<sup>52</sup> Race to Zero Breakthroughs. 2021. Transforming our Systems Together.

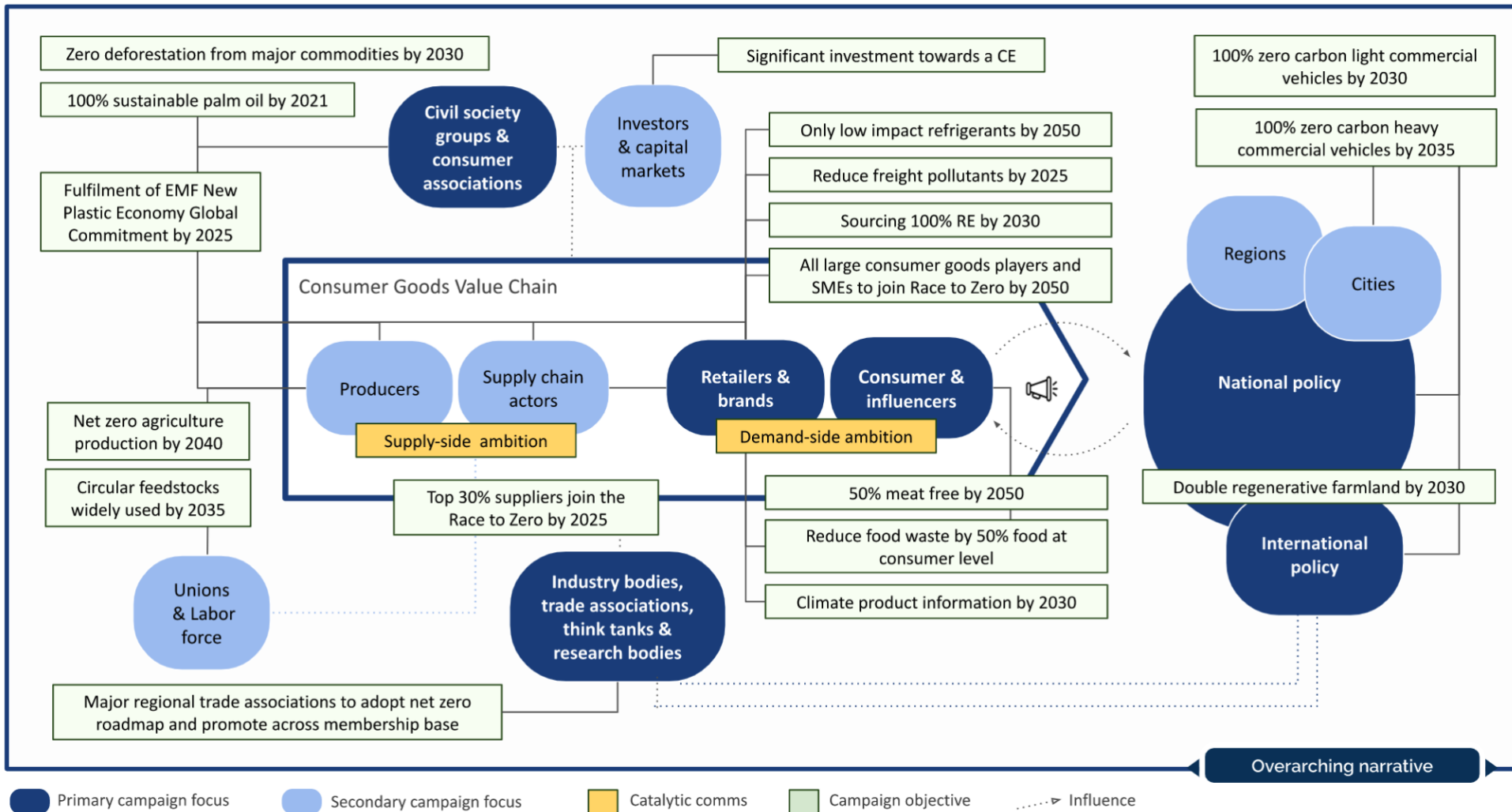
countries and across the value chain to increase commitments to net zero as well as bringing a critical mass of stakeholders together to align on a decarbonisation roadmap to ensure the sector can reach the tipping point that indicates system transformation is inevitable.

As of May 2021, no global decarbonization roadmap has been identified for the consumer goods sector, although there are developments being led by the Consumer Goods Forum in the coming months to define and activate an aligned pathway ahead of COP26. The Action Table featured in this document therefore draws insight from a variety of sources, including the British Retail Consortium’s Climate Action Roadmap for the United Kingdom retail sector launched November 2020.<sup>53</sup> Where indicated, it also includes targets and actions from pathways in sectors adjacent to consumer goods. For more information on these initiatives, please see Further References section.

*With thanks to the following organisations for their discussions: The British Retail Consortium, UK Food and Drink Federation, The Sustainability Consortium, Unilever, The Consumer Goods Forum, the Waste and Resources Action Plan (WRAP) and the World Business Council for Sustainable Development (WBCSD).*

<sup>53</sup> British Retail Consortium. 2020. [Climate Action Roadmap](#).

## 2. CONSUMER GOODS SYSTEM MAP



### 3. CONSUMER GOODS CHANGE LEVERS

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- **Policy** has a key role in accelerating grid decarbonization, deploying low-carbon logistics, directing investment towards circular economy solutions, eliminating deforestation, extending producer responsibility for waste and plastic packaging, supporting regenerative agricultural practices, restoring, and protecting land and helping customers to lead low-carbon lifestyles.
- **Finance** and the investor community can spur the development, scaling and uptake of critical technologies and reallocate capital from old, carbon-intensive assets and practices towards greener ones. Financial mechanisms, such as preferential interest rates, guarantee schemes and risk-sharing facilities, can help scale up the much-needed technologies. Investments in net zero carbon agriculture, the circular flow of products and materials and shared zero-emissions transportation are also required.
- **Technology** and innovation are needed to deliver climate-smart solutions. Focus areas for consumer goods should be in electrifying heavy-good vehicles, eliminating natural gas from heating and cooling processes, scaling supply-chain traceability solutions, developing low-carbon last-mile delivery for growing e-commerce services, overcoming technical barriers to recycling, designing products which minimize in-use consumer emissions footprints, developing effective substitutes for plastic, and shifting to low global warming potential refrigerants and more efficient refrigeration.
- **Business: Supply** chain actors upstream and in the agricultural sector react to the signals set by consumer goods companies, as they look to align with their buyer's decarbonization agendas, forming a key feedback loop. Strengthening standard certification for soft commodities by investing in capacity building for producers will enable brands to preserve integrity in reporting on scope 3 emissions. Supply chains should be transparent, traceable, and working towards a goal of ending deforestation within supply chains. **Demand** on the consumer side can be influenced by consumer goods through category innovation (e.g. alternative proteins as a substitute for meat), product design changes (e.g. increase shelf-life), carbon labelling, and environmentally positive advertising and marketing of brands, creating a positive feedback loop with the rest of the supply chain.
- **Civil society** plays a role in strengthening public awareness of the social and environmental externalities or "hidden costs" of carbon-intensive practices, such as the loss of natural habitats as a result of deforestation, which can be achieved through campaigns and calls-to-action, addressing research gaps and improving information around sustainable choices. Civil society actors can also influence policy by advocating for climate-supportive legislative change, working towards systems transformation, driving collective action, and holding actors across the value chain to account.

## 4. CONSUMER GOODS –ACTION TABLE

Nexus	Energy                         Human settlements                         Industry                         Land use                         Transport				
	2 ZERO HUNGER                         3 GOOD HEALTH AND WELL-BEING                         9 INDUSTRY, INNOVATION AND INFRASTRUCTURE                         11 SUSTAINABLE CITIES AND COMMUNITIES                         13 CLIMATE ACTION				
	By 2021	By 2025	By 2030	By 2040	
<b>1. Policymakers (national, subnational, local levels)</b>					
Support <b>energy decarbonization and set an external carbon price</b> which is aligned with the 1.5°C pathway	<ul style="list-style-type: none"> <li>• Support on-site renewable generation for retailers and landlords, suppliers, and customers</li> <li>• Provide incentives for landlords to move to renewable tariffs</li> <li>• Support electrification of heating systems and transport</li> </ul>				
Develop clear <b>policy guidance related to carbon</b>	<ul style="list-style-type: none"> <li>• Develop consistent carbon accounting and greenhouse gas pricing frameworks</li> <li>• Include land conversion and carbon removals within reporting guidelines</li> <li>• Provide clear policy direction and support for carbon removals</li> </ul>				
Improve <b>building efficiency</b>	<ul style="list-style-type: none"> <li>• Drive building efficiency through green building certification standards and enhanced building efficiency requirements</li> <li>• All commercial buildings to be 70-80% more energy-efficient and all new buildings must be nearly-zero energy buildings (nZEBs) by 2020 (European Parliament)</li> </ul>				
Support <b>infrastructure for electrification</b>	<ul style="list-style-type: none"> <li>• Support investment in recharge infrastructure for electric goods vehicles</li> <li>• Support R&amp;D and deployment of low carbon solutions for heavy goods transport, including incentives to accelerate adoption of new technologies</li> </ul>				
Support <b>regenerative and decarbonized agricultural practices</b>	<ul style="list-style-type: none"> <li>• Invest in R&amp;D and new technologies to aid improvements in productivity and reduce the environmental impact of feed</li> <li>• Increase soil carbon stocks in the first 30-40 cm of soil by 0.4% per year (4 per 1000 initiative)</li> <li>• 20% of major food suppliers by annual production to join the Race to Zero</li> </ul>	<ul style="list-style-type: none"> <li>• Increase soil carbon stocks in the first 30-40 cm of soil by 0.4% per year (4 per 1000 initiative)</li> <li>• Strengthen zero deforestation requirements and commitments</li> <li>• Ensure climate mitigation is core to future agricultural policy</li> </ul>	<ul style="list-style-type: none"> <li>• Double farmland under regenerative practice</li> <li>• Remove &amp; store 100GT of CO2EQ in healthy soil &amp; sustain soil carbon storage ambitions</li> <li>• 50 GT CO2eq are mitigated in food and agriculture by changing agricultural practices and reducing inputs and waste</li> <li>• Net-zero agricultural production in UK</li> </ul>	<ul style="list-style-type: none"> <li>• Entire food and agriculture industry carbon negative by 2050</li> </ul>	



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Restore <b>degraded lands</b>	• N/A	• N/A	• Restore 350mn hectares of degraded lands	• Restore 500mn hectares of degraded lands
Protect land	• N/A	• N/A	• Protect 30% land across the globe	• Protect 50% land across the globe
Act on <b>plastic packaging through Global commitment (EMF) and Plastics Pacts (WRAP)</b> (relevant for “Businesses and Services Providers”)	• N/A	<ul style="list-style-type: none"> <li>• Take action to eliminate problematic or unnecessary plastic packaging (EMF)</li> <li>• Take action to move from single use towards reuse models where relevant 100% of plastic packaging to be reusable, recyclable, or compostable (EMF)</li> <li>• Set an ambitious recycled content target across all plastic packaging used (EMF)</li> </ul>	• N/A	• N/A
Ensure <b>sustainable consumption patterns</b>	<ul style="list-style-type: none"> <li>• Implement extended producer responsibility</li> <li>• Mandate ecolabelling, minimum product standards, and support alternative business models and voluntary agreements</li> <li>• Increase collection/national communications</li> </ul>	•	• Halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses (SDG 12.3)	•
<b>2. Business and Service Providers</b>				
Commit to <b>reducing GHG emissions</b>	• Establish GHG measurement and reporting, specifying how offsets will be phased out	• 20 per cent of major players in the sector by revenue to join the Race to Zero by 2023	<ul style="list-style-type: none"> <li>• Emissions across all scopes to halve, in line with a 1.5 degrees trajectory</li> <li>• Adopt an internal cost of carbon of &gt;GBP 20/ton</li> </ul>	<ul style="list-style-type: none"> <li>• All large consumer goods companies to join the Race to Zero</li> <li>• All SMEs to join the Race to Zero</li> <li>• Raise internal cost of carbon &gt; GBP50/ton</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>Influence supplier action</b> on climate (Scope 3)	<ul style="list-style-type: none"> <li>Start engagement and outreach to suppliers joining the Race to Zero</li> <li>Collect product GHG data and Tier 1 manufacturing GHG data from top suppliers</li> <li>Integrate water impacts into environmental impact assessments and reporting for all major companies</li> </ul>	<ul style="list-style-type: none"> <li>Ensure top 30 per cent of suppliers have joined the Race to Zero and are making sufficient progress towards net zero emissions by 2050</li> </ul>	<ul style="list-style-type: none"> <li>Ensure top 50 per cent of suppliers have joined the Race to Zero and are making sufficient progress towards net zero emissions by 2050</li> <li>CO<sub>2</sub> removals projects implemented and delivering verifiable results</li> <li>Tier 1 suppliers to have zero liquid discharge wastewater treatment facilities in high polluting sectors</li> </ul>	<ul style="list-style-type: none"> <li>Ensure all suppliers have joined the Race to Zero and are making sufficient progress towards net zero emissions by 2050</li> </ul>
<b>Move to zero carbon logistics</b>	<ul style="list-style-type: none"> <li>20 per cent of major automakers and shipping owners / carriers / liners by total revenue committed to the Race to Zero</li> </ul>	<ul style="list-style-type: none"> <li>Run advanced fuel efficiency programs for distribution fleet and drivers</li> <li>Collect GHG performance data from logistics providers to inform decision-making</li> <li>Reduce GHGs and other freight pollutants by 2025 (Green Freight Action Plan)</li> <li>8 per cent of BEV and FCEV sales as a percentage of global MHDV sales</li> </ul>	<ul style="list-style-type: none"> <li>Encourage network/route sharing for optimized efficiency</li> <li>Transition LGV fleet to 100 per cent zero carbon</li> <li>Transition last mile logistics to 100 per cent zero carbon</li> <li>5 per cent adoption of zero emission international shipping fuels</li> <li>15 per cent adoption of zero emission domestic shipping fuels</li> </ul>	<ul style="list-style-type: none"> <li>Transition HGV fleet to 100% zero carbon</li> </ul>
<b>Sustainably source raw materials</b>	<ul style="list-style-type: none"> <li>100% sustainable palm oil (RSPO)</li> </ul>	<ul style="list-style-type: none"> <li>Set up to regularly report progress on tackling supply chain deforestation</li> <li>Support for regenerative agriculture and GHG mitigation on-farm</li> <li>Run programs with suppliers to accelerate decarbonization activities around sourcing</li> <li>Implement carbon dioxide removals projects and ensure verifiable results</li> </ul>	<ul style="list-style-type: none"> <li>Zero deforestation from major commodities (beef and leather, cocoa, palm oil, timber*, pulp* and paper*, rubber, soy), especially in high conservation-value areas</li> <li>* - sourced from sustainably managed forests</li> <li>Embed sustainable design principles in raw material and product specifications</li> </ul>	<ul style="list-style-type: none"> <li>Entire food and agriculture industry carbon negative by 2050</li> <li>Source &gt;90% circular feedstocks</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>Help customers</b> to live low carbon lifestyles	<ul style="list-style-type: none"> <li>• Roll out campaigns to encourage low carbon behaviours</li> <li>• Run employee engagement programs on climate</li> <li>• Develop products which provide energy-efficient solutions for consumers</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing proportion of plant-based food sales in the UK by 50%</li> <li>• Ensure at least 25% of parking spaces used by store customers have access to EV charging</li> </ul>	<ul style="list-style-type: none"> <li>• Increase sale of circular products to 50%</li> <li>• Provide circular services for repair, reuse, resale, and recycling</li> <li>• Provide product climate information to customers on 100% products</li> <li>• Ensure EV charging points are available at all stores for customers</li> </ul>	<ul style="list-style-type: none"> <li>• Increase sale of circular products to 80%</li> </ul>
<b>Act on food waste</b>	<ul style="list-style-type: none"> <li>• Embed a strategy of Target, Measure, Act within own operations, and publicly report on food surplus and waste</li> <li>• Adopt processes that facilitate the redistribution / donation of surplus food</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborate with top 20 suppliers to help them implement Target, Measure, Act</li> <li>• Optimise products and labelling to help customers reduce waste in home</li> </ul>	<ul style="list-style-type: none"> <li>• Halve production and supply chain food waste, including post-harvest losses</li> <li>• Achieve at least a 50% reduction in food waste from own operations, and support top 20 suppliers to achieve the same</li> <li>• Whole chain Food Waste Reduction (FWR) plans in place with all key suppliers</li> </ul>	
<b>3. Technology Providers and Innovators</b>				
Adopt <b>LEDs</b>	<ul style="list-style-type: none"> <li>• Install 100% LEDs in all new buildings (e.g. stores and warehouses)</li> </ul>	<ul style="list-style-type: none"> <li>• Install or retrofit 80% LEDs in existing buildings</li> </ul>	<ul style="list-style-type: none"> <li>• Install or retrofit 100% LEDs in existing buildings</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
Operate <b>efficient sites powered by renewable energy</b>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Largest CPGs to source 50% renewable energy from PPAs</li> <li>• Power all new buildings with renewable energy</li> </ul>	<ul style="list-style-type: none"> <li>• Source 100% renewable electricity (no gas usage)</li> </ul>	<ul style="list-style-type: none"> <li>• Source renewables for all sites' energy needs</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Eliminate <b>hydrofluorocarbon refrigerant gases</b>	<ul style="list-style-type: none"> <li>20% of major residential AC manufacturers by total revenue committed to the Race to Zero</li> </ul>	<ul style="list-style-type: none"> <li>Use only low impact refrigerant gases (max 150GWP) for all new refrigeration installations</li> <li>20% of global AC manufacturers bring to market affordable residential AC units that have 5x lower climate impact than today's units</li> </ul>	<ul style="list-style-type: none"> <li>Reduce HFCs by 79%, to meet EU F-Gas Regulation</li> </ul>	<ul style="list-style-type: none"> <li>Prevent 70bn tonnes CO<sub>2</sub>e by 2050 (Kigali Amendment)</li> <li>Use only low impact refrigerant gases (max 150GWP) for all systems</li> </ul>
Reduce <b>whole lifecycle carbon emissions of buildings</b> (see Human Settlements pathway. Also relevant for "Businesses and Services Providers")	<ul style="list-style-type: none"> <li>All commercial buildings to be 70-80% more energy-efficient and all new buildings must be nearly-zero energy buildings (nZEBs) by 2020 (European Parliament)</li> </ul>	<ul style="list-style-type: none"> <li>32.4 kgCO<sub>2</sub>e/m<sup>2</sup> GHG intensity by 2050 in a 1.5°C scenario and 39.7 kgCO<sub>2</sub>e/m<sup>2</sup> in a 2° scenario (CRREM)</li> </ul>	<ul style="list-style-type: none"> <li>22.4 kgCO<sub>2</sub>e/m<sup>2</sup> GHG intensity by 2050 in a 1.5°C scenario and 29.2 kgCO<sub>2</sub>e/m<sup>2</sup> in a 2°C scenario (CRREM)</li> </ul>	<ul style="list-style-type: none"> <li>9.0 kgCO<sub>2</sub>e/m<sup>2</sup> GHG intensity by 2050 in a 1.5°C scenario and 16.0 kgCO<sub>2</sub>e/m<sup>2</sup> in a 2°C scenario (CRREM)</li> </ul>
<b>4. Civil society</b>				
Tackle <b>food waste</b> (Also relevant for "Businesses and Services Providers")	<ul style="list-style-type: none"> <li>Zero food waste to landfill by 2020, i.e. source separation and collection of food waste from households and businesses (Vision 2020)</li> </ul>	<ul style="list-style-type: none"> <li>Reduce post-farm gate food waste by 40% in the UK vs. SDG12.3 target of 50% by 2030 (Courtauld Commitment)</li> <li>Halve food waste from CPGs (Consumer Goods Forum)</li> </ul>	<ul style="list-style-type: none"> <li>50% reduction in farm to fork (post-farm gate) food waste globally at the retail and consumer levels (Champions SDG 12.3)</li> </ul>	<ul style="list-style-type: none"> <li>50% reduction in food waste globally (EAT-Lancet)</li> <li>50% reduction in pre-farm gate food waste globally (Champions SDG 12.3)</li> </ul>
Ensure <b>sustainable diets</b>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Climate-friendly and healthy diet for 9bn (EAT-Lancet)</li> </ul>	<ul style="list-style-type: none"> <li>Climate-friendly and healthy diet for 10bn by 2050 (EAT-Lancet)</li> </ul>
<b>5. Financial Institutions</b>				
Support development of new investment vehicles like <b>public-private partnerships</b> to invest in R&D projects on innovation priorities and supply chain transformation	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Partner with policymakers and industry to increase inflow of capital to <b>catalyze and scale solutions</b> for a low-carbon economy throughout the sector	<ul style="list-style-type: none"> <li>• Finance better recycling/circular economy and green infrastructure (especially at the farm level)</li> <li>• Finance research into regenerative, agroecological farming practices</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
<b>Shift investment portfolios</b> towards brands with robust environmental credentials, and support accurate and effective ESG assessments	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
<b>Institutionalize financing mechanisms</b> and incentive structures for industry decarbonization	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## 5. CONSUMER GOODS - EXISTING INITIATIVES

Consumer Goods Forum	UNGC Secretariat campaign asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5°C above pre-industrial levels.
The Sustainability Consortium	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to showcase companies that set science-based targets.
World Wildlife Fund	Global non-profit coalition working with the world's most influential businesses to take action on climate change, catalyzing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
Business Ambition for 1.5C	Global industry body driven by membership of over 400 retailers and consumer goods companies in over 70 countries, convening environmental commitment around deforestation, food waste, refrigeration, and raw materials sourcing.
Exponential Roadmap Initiative	Exponential Roadmap Initiative is an accredited partner of the Race to Zero and a founding partner of the 1.5°C Supply Chain Leaders initiative, established to cascade climate action across the supply chain, and the SME Climate Hub.
Science Based Targets initiative	Global non-profit organization working to transform the consumer goods industry by partnering with leading companies to define, develop and deliver more sustainable products.
We Mean Business Coalition	International non-governmental organization working to minimize negative human impacts on the environment.
World Business Council for Sustainable Development	UNGC Secretariat campaign asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5C above pre-industrial levels.
World Economic Forum	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to showcase companies that set science-based targets consistent with the level of decarbonization required by science to limit warming to less than 1.5°C compared to pre-industrial temperatures.
United Nations Framework Convention on Climate Change	Global non-profit coalition working with the world's most influential businesses to take action on climate change, catalyzing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
RE100	Global, CEO-led organization of over 200 businesses working together to accelerate the transition to a sustainable world.

World Green Building Council	Global membership-based organization convening the world’s largest corporations across several platforms and initiatives, including for the reduction of carbon emissions.
EP100	Multilateral environmental agreement setting non-binding limits on greenhouse gas emissions for individual countries.
Cool Coalition	RE100 brings together influential businesses committed to 100 % renewable energy. This initiative is led by the Climate Group in partnership with CDP.
EV100	Non-profit organization and global network of national Green Building Councils in over 70 countries worldwide.
Clean Cargo	A voluntary initiative where corporations pledge to double their energy productivity within 25 years of a chosen baseline. This initiative is led by the Climate Group in partnership with the Alliance to Save Energy.

## 6. CONSUMER GOODS - EXISTING INITIATIVES

Climate Action Roadmap, British Retail Consortium, 2020	<a href="#">Link</a>
Special Report: Global Warming of 1.5°C, Intergovernmental Panel on Climate Change, 2019	<a href="#">Link</a>
Special Report: Climate Change and Land, Intergovernmental Panel on Climate Change, 2019	<a href="#">Link</a>
Foundations for science-based net zero target setting in the corporate sector, Science-Based Targets initiative, 2020	<a href="#">Link</a>
Executive Summary: Consumer Goods, Carbon Disclosure Project, 2019	<a href="#">Link</a>
Opportunities for the Consumer Goods Sector, Ellen MacArthur Foundation	<a href="#">Link</a>



Low Carbon Solutions for a Sustainable Consumer Goods Sector, Consumer Goods Forum, 2017	<a href="#">Link</a>
Improving Supply Chain Resilience to Manage Climate Change Risks, The Sustainability Consortium and HSBC (2020)	<a href="#">Link</a>
The Climate Pledge, Amazon	<a href="#">Link</a>
Carbon Disclosure Project Supply Chain initiative	<a href="#">Link</a>
Montreal Protocol, United Nations Environment Program	<a href="#">Link</a>
Technical report on energy efficiency in HFC-free supermarket refrigeration, Environmental Investigation Agency, 2018	<a href="#">Link</a>
Fashion Charter for Climate Action, United Nations Framework Convention on Climate Change	<a href="#">Link</a>
Partnerships for Forests, Global Resources Initiative	<a href="#">Link</a>
Roundtable on Sustainable Palm Oil	<a href="#">Link</a>
Courtauld Commitment 2025, WRAP (UK)	<a href="#">Link</a>
Healthy Diets from Sustainable Food Systems, EAT-Lancet Commission	<a href="#">Link</a>
Champions 12.3	<a href="#">Link</a>
Sustainable Food Systems and Diets: A Review of Multi-Stakeholder Initiatives, World Wildlife Fund, 2018	<a href="#">Link</a>





# FASHION

## Action Table

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2021



## 1. FASHION - INTRODUCTION

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The purpose of this part of the Action Table is to highlight specific, promotable actions to deliver the vision for the Industry thematic area, with a sector-based approach focused on fashion.

The fashion sector is a highly GHG-intensive industry, with estimated emissions of up to 2.1 billion tonnes of CO<sub>2</sub> annually or four per cent global total. High-demand growth for fashion of up to 63 per cent is anticipated over next 10 years in some emerging markets. This follows the trajectory of the past 15 years, where global production of clothing doubled despite garment utilization dropping by 36 per cent.<sup>54</sup> Under its current trajectory, the fashion industry will miss the 1.5°C pathway by 50 per cent.<sup>55</sup>

More than 70 per cent of emissions in fashion come from upstream activities, including raw material production, preparation, and manufacturing activities, such as weaving and dyeing. The remaining 30 per cent are generated by downstream activities such as transport, packaging, retail operations, usage, and end-of-use.<sup>56</sup> Key carbon impact areas for the fashion sector echoed across industry reports include manufacturing and fiber production, which relates to the sourcing of material alternatives to linear and/or conventionally-produced cotton, polyester, acrylic, nylon, wool, silk, etc.; the procurement of renewable energy; and the phase-out of coal to produce industrial heat.<sup>57</sup> As a downstream and consumer-facing industry, the sector is in a key position to influence consumption patterns as well as in-use impacts. With 17 million tons of textile municipal solid waste generated annually and recycling rates as low as 13 per cent, there is a significant need to consider how the circular economy should continue to be leveraged as a key enabler of behavioural change.<sup>58</sup> Overall, 60 per cent of abatement potential lies in decarbonizing upstream operations, 20 per cent in brands' own operations, and the other 20 per cent on encouraging sustainable consumer behaviour.<sup>59</sup> Other analysis shows that roughly 250 million tonnes of CO<sub>2</sub>e could be reduced through a 50 per cent shift to renewable energy in Tier 2 and 3 producers. Considering that the vast majority of garment workers are women and heavily concentrated in six major producer countries in Asia, it will be critical to ensure a just transition to a zero carbon economy, through interventions such as targeted assistance programmes.<sup>60</sup>

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<sup>54</sup> Ellen MacArthur Foundation. 2017. A New Textiles Economy.

<sup>55</sup> McKinsey and GFA. 2020. Fashion on Climate.

<sup>56</sup> McKinsey and GFA. 2020. Fashion on Climate.

<sup>57</sup> See the Higg Material Sustainability Index (MSI), Mistra Future Fashion (MFF) Fibre Bible part 2, and the Sustainable Clothing Action Plan (SCAP) calculator for more details on high-carbon fibres.

<sup>58</sup> United States Environmental Protection Agency. 2018. Textiles: Material-Specific Data extrapolated figures.

<sup>59</sup> McKinsey and GFA. 2020. Fashion on Climate.

<sup>60</sup> Labour behind the Label. 2020. Gender.

Currently, 49 per cent of major players within the fashion sector, who together represent 50 per cent of the sector by revenue, have joined the Race to Zero. The majority of these companies have done so by committing to the UNFCCC Fashion Industry Charter for Climate Action, which is the official fashion sector partner for the Race to Zero.<sup>61</sup>

The fashion campaign's Breakthrough Ambition called for the top 20 per cent of major players in the consumer goods sector by revenue to join the Race to Zero.<sup>62</sup> In terms of Breakthrough Outcome, the campaign asks that 25 per cent of key raw materials are from lower climate impact sources by 2025 and as the Sector Goal, that the entire sector be net zero by 2050. While the sector has achieved its Breakthrough Ambition, there needs to be increased focus on action, including mobilizing actors from developing countries and across the value chain to increase commitments to net zero as well as continuing to drive implementation efforts towards the industry's decarbonisation roadmap, ensuring that the sector can reach the tipping point that indicates system transformation is inevitable – a minimum of 30 per cent reduction in GHG emissions by 2030, as set out by the Fashion Charter.

This Action Table draws insight from existing industry information collated by the High-Level Champions' team. Key organizations working on analysis and implementation of the apparel sector decarbonization as well as industry representatives have been extensively consulted on this iteration of the document leading up to April 2021. A more detailed version of this Action Table, titled the "Milestones Document", is to be published on the UNFCCC Fashion Charter website in June 2021, which will include further information on the supporting implementation initiatives, programmes, and reports associated with each milestone.

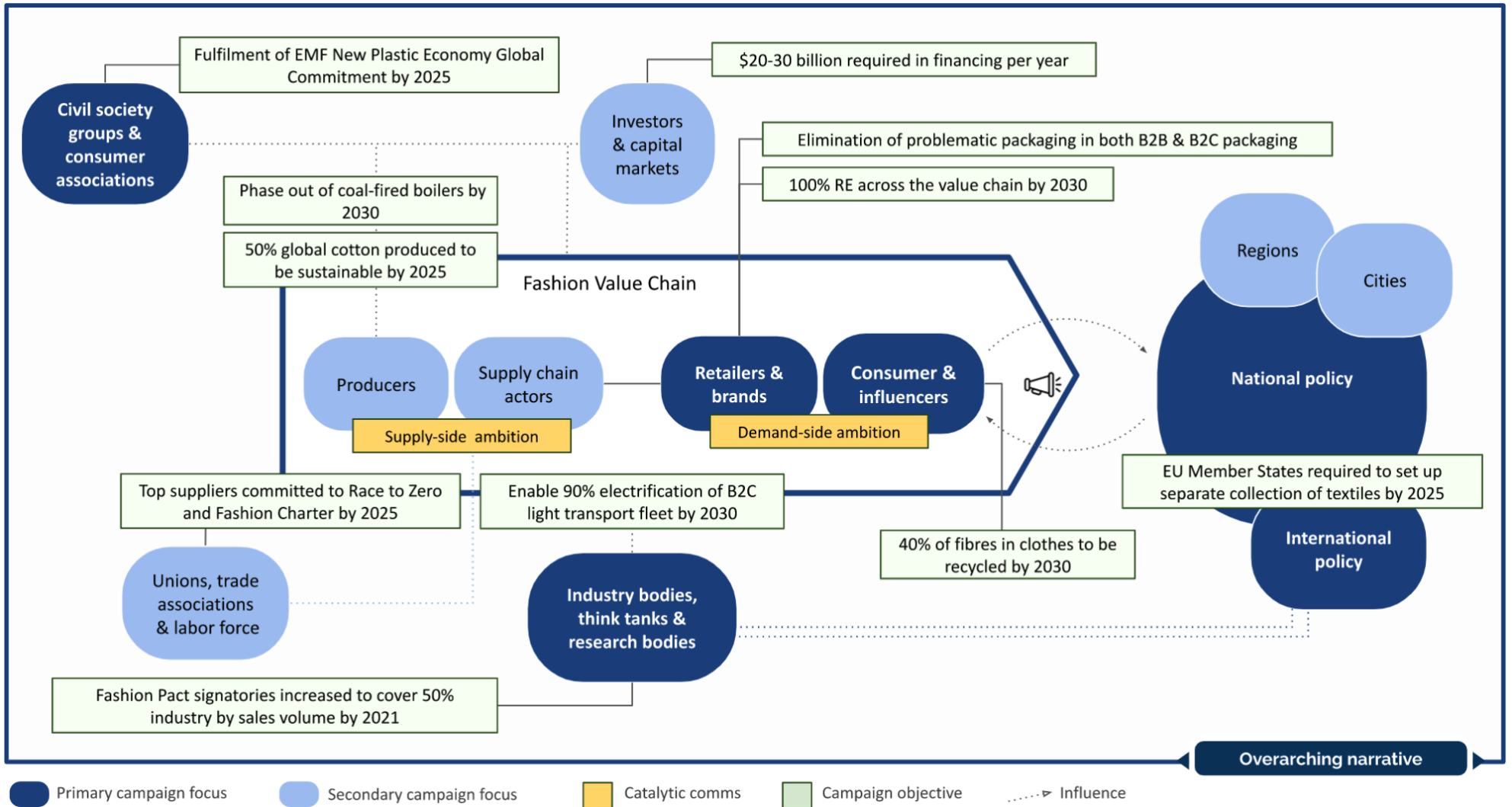
*With thanks to the following organisations for their discussions: Accenture, Adidas, Apparel Impact Institute, Arvind Ltd., Bangladesh Garment Manufacturers and Exporters Association, Boston Consulting Group, British Fashion Council, British Retail Consortium, Business for Social Responsibility, China National Textile and Garment Association, Conde Nast, Fabrikology, Fashion for Good, UNFCCC Fashion Industry Charter for Climate Action, Futerra, Global Fashion Agenda, H&M Group, International Finance Corporation, OECD, Fashion Pact, PUMA, Smart Freight Centre, Stahl, Sustainable Apparel Coalition, Tal Apparel, UNFCCC, Vietnam Textile and Garment Association, Waste and Resources Action Plan, World Resources Institute.*

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<sup>61</sup> Analysis by Climate Champions. May 2021.

<sup>62</sup> Race to Zero Breakthroughs. 2021. Transforming our Systems Together.

## 2. FASHION SYSTEM MAP



### 3. FASHION CHANGE LEVERS

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#### Key levers of change, interventions required and feedback loops

- **Policy** has a key role in creating operating environments for businesses to successfully decarbonize. For example, policymakers can support the shift to renewable energy by catalysing investment in grid decarbonization, develop incentives for manufacturers to move towards renewable tariffs, strengthen extended producer responsibilities and penalties for “fast fashion”, improve recycling infrastructure and standardize taxonomies for material waste, help restore and protect land, ensure coal used for the production of industrial heat is phased out in a timely manner, take action on microfibre pollution in oceans, enable circular economy initiatives and help consumers lead low-carbon lifestyles.
- **Finance** and the investor community can reallocate capital from old, carbon-intensive assets and practices towards greener ones. It can also spur the development, scaling and uptake of critical technologies in fashion such as those for sorting, cleaning, and recycling. Philanthropic capital can support capacity building and investment in producer markets. Finally, given that net income per ton of emissions is far higher for consumer-facing companies than it is for producers in the industry, actors in more developed countries should support those in less developed countries when it comes to financial responsibility for enabling investments. It may fall to actors like Fashion Charter to arbitrate this in the context of aiming to achieve a just transition.<sup>63</sup>
- **Technology and innovation** are needed to deliver and scale synthetic, recycled and alternative fibres for garment production, mechanical and chemical fibre recycling techniques, and virtual and augmented reality concepts, which may support reductions in overall consumer demand.
- **Business: Supply** chain actors, particularly those within manufacturing, are heavily influenced by the climate commitments of consumer-facing brands. To support delivery against such targets, supply chain actors can procure renewable energy, pursue energy efficiency measures in production, embrace innovation, substitute traditional for lower-carbon material fibres, and strengthen standard certification for crops such as cotton by investing in producer capacity-building. **Demand** on the consumer side can be influenced by brands through changing product design, increasing access to circular services and platforms for rental and re-sale, investing in recycling, repair, and reuse of clothing at end-of-life, and promoting greener consumption habits through advertising and marketing, for instance at the point-of-sale, and through social media.

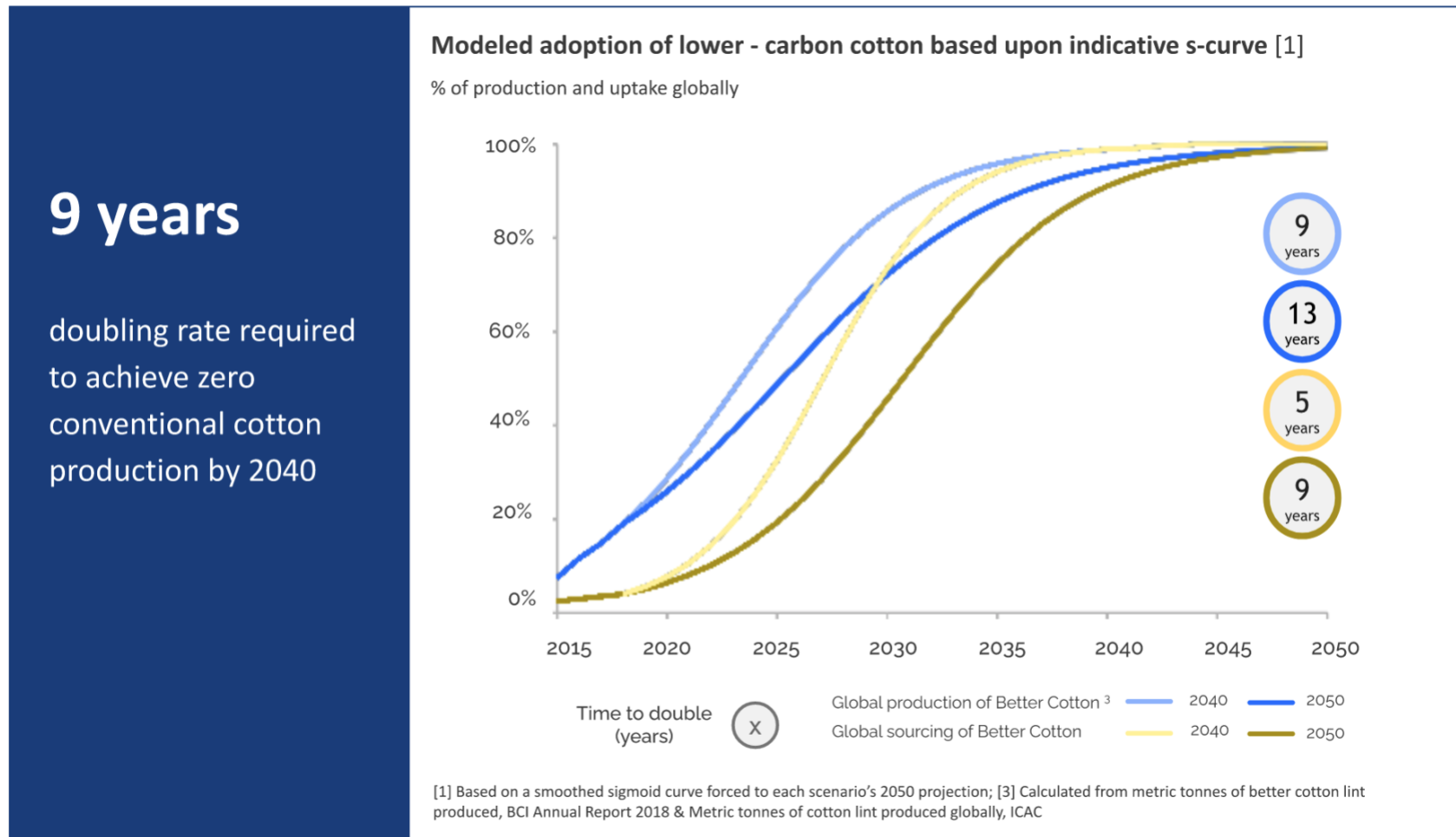
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<sup>63</sup> [Net-Zero Challenge: The Supply Chain Opportunity](#). 2021. BCG.

- **Civil society** plays a role in strengthening public awareness of the externalities or “hidden costs” of carbon-intensive practices. For instance, the high waste volumes and low garment utilization rates characteristic of “fast fashion” business models, can be exposed through campaigns and addressing research gaps. Civil society needs to help ameliorate the projected growth in consumer demand for fashion by urging consumers to reduce their overall consumption of virgin clothing, encouraging the uptake of re-sell, repair, rental and recycle practices, and simplifying on-garment information around sustainable choices. Civil society actors can influence policy by advocating for legislative change such as grid decarbonization in developing countries with high production portfolios. They can also create impact more generally by working towards systems transformation, driving collective action, and holding actors to account.

## 4. FASHION S-CURVE

The S-curve modelled for fashion describes the adoption of lower-carbon cotton as a substitute to traditionally produced cotton. Textile Exchange’s commitment aims for 50 per cent global cotton produced to be sustainable by 2025.



## 5. FASHION ACTION TABLE

Nexus	Energy	Human settlements	Industry	Land use		
	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>				
Standardize definitions for measurement of GHG emissions, circular design impacts and waste taxonomies, with reference to existing industry data sources, standards, and practices	• N/A	• N/A	• N/A	• N/A
Support global transition to low-carbon transport, renewable energy, and energy efficiency through incentives	• N/A	• N/A	• Provide right regulatory incentives to enable 90% electrification of B2C light transport fleet (McKinsey & GFA)	• N/A
Improve low-carbon materials sourcing by incentivising recyclability in design and implementing recycled content requirements through improved farming regulations and capacity building	•	• EU member States required to set up separate collection of textiles by 2025 in support of recycling target of 55% of municipal waste by 2025 (Policy Hub) •	• Public targets being set by major cotton brands for more sustainable cotton sourcing (not later than 2030), incl. increased percentage use of Better Cotton, organic, Fairtrade, CmiA and recycled cotton (WWF, Solidaridad, PAN UK)	• N/A
Ensure a national level transition to a decarbonized energy grid and mix	• N/A	• N/A	• China to generate 50% of total electricity in 2030 from non-fossil fuels incl. renewables plus nuclear (WRI & AII)	• 100% zero carbon electricity grids (RE100)





	By 2021	By 2025	By 2030	By 2040
Create incentives for improved performance and innovation from fashion companies, through interventions such as start-up and technological investment, market access requirements and extended-producer responsibility measures	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Increase scope and regularity of environmental audits (incl. energy performance requirements) in the sector	<ul style="list-style-type: none"> <li>Increase regulatory penalties for companies found to be polluting waterways through fashion production</li> </ul>	<ul style="list-style-type: none"> <li>UK Government reviewing whether proposed tax on virgin plastics by 2022 should be applied to textile products containing less than 50% recycled PET (Environmental Audit Committee)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
<b>2. Financial Institutions</b>				
Support development of new investment vehicles like public-private partnerships to invest in R&D projects on innovation priorities and supply chain transformation	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>USD 20-30 billion required in financing per year by 2030 (BCG, Fashion for Good)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Shift investment portfolios towards brands with robust environmental credentials, and support accurate and effective ESG assessments	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
<b>3. Technology Providers and Innovators</b>				
Maximize material and energy efficiency and reduce waste in the supply chain (Tiers 1-3)	<ul style="list-style-type: none"> <li>Ensure water usage, waste, and pollution are integrated into tracking and reporting of supply chain environmental data in a transparent and traceable way</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>1-2% improvement in the waste generated in the transition from fibre to textiles and in cutting waste in the garment manufacturing stage through better design and modern cutting techniques, reducing scrap production in fabric manufacturing from 12% to 1% (McKinsey &amp; GFA)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Maximize material and energy efficiency and reduce waste in the supply chain (Tiers 1-3)	<ul style="list-style-type: none"> <li>• Improve access to drip irrigation and other water efficient irrigation systems to reduce water waste from evaporation and overflow in cotton production</li> </ul>		<ul style="list-style-type: none"> <li>• 5-10% efficiency gain in the spinning, weaving, and knitting stages, through motor and air pressure modifications in machinery, shift from wet to dry processing, adoption of technologies that consume less energy (McKinsey and GFA)</li> <li>• 80% energy efficiency improvement in wet processing (McKinsey &amp; GFA)</li> <li>• 30% efficiency gain across heating, ventilation, and air conditioning-related equipment and 20% efficiency gain in sewing machines and new technologies equipment upgrades (McKinsey and GFA)</li> <li>• 60% improvement in energy efficiency (Quantis)</li> </ul>	
Innovate to increase sustainable transport solutions	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• 90% electrification of B2C light vehicles transport fleet, improve battery technology and enable rapid digitization (McKinsey and GFA)</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
Increase innovation in development of mechanical and chemical recycling technologies	<ul style="list-style-type: none"> <li>• Baseline: less than 1% of all textiles worldwide are recycled into new textiles (EMF)</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
Reduce overproduction through investment in new technologies and improved forecasting	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction of overproduction from 20% to 10% through improvement in demand forecasting technology and stock management (McKinsey and GFA)</li> <li>• Reduce ecommerce return rates from 35% to 15% (McKinsey &amp; GFA)</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>4. Business and Service Providers</b>				
Commit to reducing GHG emissions and to a net zero target. Quantify, track, and publicly report emissions to best standards of measurement and transparency	<ul style="list-style-type: none"> <li>Align interim 2030 target to 1.5-degree pathway (Fashion Charter)</li> </ul>	<ul style="list-style-type: none"> <li>By 2023, 20% of major fashion companies by revenue committed to net zero through membership in the Fashion Charter (Race to Zero Breakthrough Ambition, Fashion Charter)</li> <li>Explore 2025 whole industry targets through scientific review (UNFCCC)</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>30% (ideally 45%) aggregate GHG emission reductions across Scopes 1, 2, and 3 of the GHG Protocol Corporate Standard by 2030 against a baseline of 2015 latest (Fashion Charter, Race to Zero Breakthrough)</li> <li>40-50% aggregate GHG reduction in product footprint on a 1.5C trajectory, in line with Paris Agreement (WRAP UK)</li> </ul>	<ul style="list-style-type: none"> <li>Net-zero GHG emissions across scope 1, 2 and 3 by 2050 (Fashion Charter, G7 Fashion Pact, Race to Zero Outcome)</li> </ul>
Reduce GHG emissions in owned operations (scopes 1 and 2)	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>100 million tons of CO2 equivalent across Scopes 1, 2, and 3 (approx. 40% reduction) for 22 Chinese companies in Climate Stewardship Initiative (China National Textile &amp; Fashion Council CNTAC)</li> <li>80% efficiency gain in retail operations through switch to LED lighting. Reduce energy consumption across heating, ventilation, and air conditioning equipment in retail operations (McKinsey &amp; GFA)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Source 100% renewable energy (scope 2)	<ul style="list-style-type: none"> <li>In the process of developing a scope 2 target for signatories (Fashion Charter)</li> </ul>	<ul style="list-style-type: none"> <li>50% renewable energy across own operations (Fashion Pact)</li> </ul>	<ul style="list-style-type: none"> <li>100% renewable energy across own operations (Fashion Pact)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Reduce GHG emissions in the supply chain (Tiers 1-3)	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>By 2023, 50% of SAC brand, retail and manufacturer members have set an approved SBT or within 2 years of joining the SAC (Sustainable Apparel Coalition)</li> </ul>	<ul style="list-style-type: none"> <li>45% GHG emissions reduction in Tier 1-3 (Sustainable Apparel Coalition)</li> <li>80% of SAC brand, retailer and manufacturer members have set an approved SBT by 2030 or within 2 years of joining (SAC)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Reduce GHG emissions in the supply chain (Tiers 1-3)			<ul style="list-style-type: none"> <li>100 million tons of CO<sub>2</sub> equivalent across Scope 1, 2, and 3 (approx. 40% reduction) for 22 companies in Climate Stewardship Initiative (China National Textile &amp; Fashion Council CNTAC)</li> </ul>	
Shift to 100% renewable energy in manufacturing (Tiers 1-3)	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Ideally reach 100% renewable energy across the value chain (McKinsey and GFA)</li> <li>60% renewable energy across the value chain (Quantis)</li> <li>Encourage 100% use of renewable energy in all high impact manufacturing processes along the entire supply chains by 2030 (Fashion Pact)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Eliminate coal in textile mills and manufacturing facilities (Tiers 1-2)	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>No new coal fired boilers in Tier 2 suppliers (Fashion Charter)</li> </ul>	<ul style="list-style-type: none"> <li>Phase out of coal fired boilers (Fashion Charter) – under discussion</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Reduce GHG emissions in the value chain (Tier 4 and material production) by scaling the use of existing preferred materials and improved practices (incl. regenerative practices)	<ul style="list-style-type: none"> <li>10% cotton taken up by retailers and brands to be more sustainably produced (Better Cotton Initiative)</li> <li>Ambitious preferred material targets are being set up for cotton (organic, recycled) and Polyester (recycled) (Charter WG2)</li> </ul>	<ul style="list-style-type: none"> <li>15-20% reduction in GHG emissions from core materials by 2025 (Textile Exchange)</li> <li>50% global cotton produced to be sustainable (Textile Exchange)</li> <li>25% of key raw materials are from lower climate impact sources (Fashion Pact)</li> <li>Expand Materials Sustainability Index (MSI) adoption to include 80% of global fashion and footwear materials and processes by 2025 to refine GHG measurement accuracy (Sustainable Apparel Coalition)</li> </ul>	<ul style="list-style-type: none"> <li>45% reduction in GHG emissions across all materials by 2030 (Textile Exchange)</li> <li>Move to mix of 20-30% recycled polyester (rPET) usage and an 11% adoption of alternatives such as organic, recycled or bio-based materials. 10% organic cotton usage, 10% improved man-made cellulose fibre (MMCF) usage (McKinsey &amp; GFA)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Reduce GHG emissions in the value chain (Tier 4 and material production) by scaling the use of existing preferred materials and improved practices (incl. regenerative practices)			<ul style="list-style-type: none"> <li>• 20% energy efficiency improvements for polyester production through switch from coal to electric boilers (McKinsey &amp; GFA)</li> <li>• 40% reduction in use of pesticides and fertilisers in cotton cultivation through targeted spreading (McKinsey &amp; GFA)</li> <li>• GHG emissions reduction targets on Better Cotton is in progress (Better Cotton Initiative)</li> </ul>	
Reduce GHG emissions in freight	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• 30% reduction in freight emissions relative to a 2015 baseline (Smart Freight Centre)</li> <li>• Recalibrate to 90% sea transport and 10% air transport across the industry. Baseline: transport mix is 83% sea transport and 17% air transport (McKinsey &amp; GFA)</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Net-zero freight emissions by 2050 (SFC)</li> <li>•</li> </ul>
Improve packaging material mix and reduce unnecessary plastics	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Elimination of problematic and unnecessary plastics in B2C packaging (Fashion Pact)</li> <li>• Ensure at least half of all plastic packaging is 100% recycled content for B2C (Fashion Pact)</li> <li>• 100% of plastic packaging to be reusable, recyclable, or compostable (United Nations Environment Programme UNEP, WRAP UK)</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure at least half of all plastic packaging is 100% recycled content for B2B (Fashion Pact)</li> <li>• Elimination of problematic and unnecessary plastics in B2B packaging (Fashion Pact)</li> <li>• Increase in recycled content usage in corrugated boxes to 20% and default to 3ply. Halve use of polybags and use 80% recycled low-density polyethylene content (McKinsey &amp; GFA)</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Improve packaging material mix and reduce unnecessary plastics		<ul style="list-style-type: none"> <li>70% of plastic packaging to be effectively recycled or composted (WRAP UK)</li> <li>30% average content to be recycled across all plastic packaging (WRAP UK)</li> </ul>		
Redirect products from landfill and increase optimal recycling	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Increasing recycling from 17% to 30% and increase closed loop recycling rate from 1% to 5% (McKinsey and GFA)</li> <li>40% of fibres in clothing to be recycled (Quantis)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Address consumer use phase GHG emissions impacts	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Consumers to skip 1 in 6 washing loads, wash half of loads at below 30°C and substitute every sixth dryer use with open air drying (McKinsey &amp; GFA)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Switch to lower GHG business models and consumer offers (e.g. rental)	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>1 in 5 garments traded through circular business models (McKinsey and GFA)</li> <li>Grow rental market share to 3% from 1%, refurbishment model market share to 2% from 1% and re-commerce model market share to 12% from 7%. Ensure repairs increase product life by 25% (McKinsey and GFA)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>5. Civil Society</b>				
Increase number of fashion producers and retailers actively engaged in sustainability initiatives	<ul style="list-style-type: none"> <li>Grow Fashion Charter signatory base at double digits each year; baseline 100 company signatories in 2020 (Fashion Charter)</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>2025 growth target for participation in Textile Exchange programs: 2025 sustainable cotton challenge, transitional cotton challenge, CFMB, Impact Incentives, rPET challenge, Climate+ target (Textile Exchange)</li> </ul>	<ul style="list-style-type: none"> <li>2030 growth target for participation in Textile Exchange programs: 2025 sustainable cotton challenge, transitional cotton challenge, CFMB, Impact Incentives, rPET challenge, Climate+ target (Textile Exchange)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Expand capacity-building efforts in producer countries in collaboration with other stakeholders	<ul style="list-style-type: none"> <li>By 2020, support 5 million cotton farmers to improve their livelihoods by adopting sustainable agricultural practices (Better Cotton Initiative)</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Reduce fertilizer and pesticide usage in cotton cultivation by 40% through improved practices such as targeted spreading (McKinsey &amp; GFA)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Promote changes in consumer buying patterns and shift to more circular behaviours, for instance through better communication of on-garment sustainability information and care instructions	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Signal demand for new technical and financial innovations to investor community	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Convene coalitions, networks, forums, and events to drive progress against environmental objectives, and champion climate action throughout the industry	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Gain support of industry federations and conduct Climate Action conferences in top 7 sourcing countries (Charter WG6)</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

## 6. FASHION - EXISTING INITIATIVES

United Nations Framework Convention on Climate Change Fashion Charter for Climate Action	Vision launched at COP 24 by the UNFCCC, the multilateral environmental agreement, for a net-zero fashion sector by 2050 and with the intermediary goal of achieving a 30% reduction in GHGs by 2030 (on the understanding that where possible, organisations should aim higher)
Consumer Goods Forum	Global industry body driven by membership of over 400 retailers and consumer goods companies in over 70 countries, convening environmental commitment around deforestation, food waste, refrigeration, and raw materials sourcing
Science Based Targets initiative	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to showcase companies that set science-based targets consistent with the level of decarbonization required by science to limit warming to less than 1.5°C compared to pre-industrial temperatures
We Mean Business Coalition	Global non-profit coalition working with the world's most influential businesses to take action on climate change, catalysing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy
World Economic Forum	Global membership-based organization convening the world's largest corporations across a number of platforms & initiatives, incl. for the reduction of carbon emissions
RE100	RE100 brings together influential businesses committed to 100 % renewable energy. This initiative is led by the Climate Group in partnership with CDP
EV100	An initiative to accelerate the transition to electro-mobility by 2030
EP100	A voluntary initiative where corporations pledge to double their energy productivity within 25 years of a chosen baseline. This initiative is led by the Climate Group in partnership with the Alliance to Save Energy
Carbon Disclosure Project	A global non-profit that manages a disclosure platform for companies, cities, and other entities on environmental issues including climate change
Clean Cargo	A working group representing over 80% of global container cargo carried and with over 75 shipper, carrier, & freight forwarder members, focused on improving environmental performance in marine container transport using standardized tools for measurement, evaluation, & reporting
World Resources Institute	Global research organization working at the nexus of environment, economic opportunity, and human well-being





Organization for Economic Co-Operation and Development

International organization working with governments, policymakers, and citizens on establishing evidence-based international standards and finding solutions to a range of social, economic, and environmental challenges

## 7. FASHION - FURTHER REFERENCES

Special Report: Global Warming of 1.5°C, Intergovernmental Panel on Climate Change, 2019	<a href="#">Link</a>
Special Report: Climate Change and Land, Intergovernmental Panel on Climate Change, 2019	<a href="#">Link</a>
Foundations for science-based net zero target setting in the corporate sector, Science-Based Targets initiative, 2020	<a href="#">Link</a>
Climate Action Playbook, UNFCCC Fashion Charter for Climate Action, 2020	<a href="#">Link</a>
Fashion on Climate: How the fashion industry can urgently act to reduce its GHG emissions, McKinsey and GFA, 2020	<a href="#">Link</a>
Roadmap to Net Zero: Delivering Science-Based Targets in the Apparel Sector, World Resources Institute and Apparel Impact Institute, 2020	<a href="#">Link</a>
Measuring Fashion: Insights from the environmental impact of the global apparel and footwear industries study, Quantis, 2018	<a href="#">Link</a>
Material Change Insights Report and Preferred Fiber & Materials Report, Textile Exchange, 2020	<a href="#">Link</a>
Roadmap to Zero, Zero Discharge of Hazardous Chemicals	<a href="#">Link</a>
Fixing Fashion: Clothing Consumption and Sustainability, House of Commons Environmental Audit Committee, 2019 (UK)	<a href="#">Link</a>
A New Textiles Economy, Ellen MacArthur Foundation, 2017	<a href="#">Link</a>



The Future of Circular Fashion: Assessing the Viability of Circular Business Models, Accenture and Fashion for Good, 2019	<a href="#">Link</a>
The State of Fashion 2020 Coronavirus Update, McKinsey, 2020	<a href="#">Link</a>
Financing the Transformation in Fashion, Boston Consulting Group and Fashion for Good, 2020	<a href="#">Link</a>
Valuing our Clothes: the cost of UK fashion, Waste and Resources Action Plan, 2017 (UK)	<a href="#">Link</a>
The Policy Hub, Global Fashion Agenda, Sustainable Apparel Coalition and Federation of European Sporting Goods Industry	<a href="#">Link</a>
CottonUP Guide, Cotton2040 and C&A Foundation	<a href="#">Link</a>
Copenhagen Fashion Summit, Global Fashion Agenda	<a href="#">Link</a>
Cotton2040, Forum for the Future	<a href="#">Link</a>
Sustainable Clothing Action Plan, Waste and Resources Action Plan	<a href="#">Link</a>
European Clothing Action Plan, European Commission	<a href="#">Link</a>
New Circular Economy Action Plan, European Commission, 2020	<a href="#">Link</a>
2020 Circular Fashion System Commitment, Global Fashion Agenda	<a href="#">Link</a>
2025 Sustainable Cotton Challenge, Textile Exchange	<a href="#">Link</a>



<b>Platform for Accelerating the Circular Economy, World Economic Forum</b>	<a href="#">Link</a>
Partnership for Cleaner Textiles, IFC and World Bank	<a href="#">Link</a>
Supply Chain Initiative, Carbon Disclosure Project	<a href="#">Link</a>
Higg Index, Sustainable Apparel Coalition	<a href="#">Link</a>
Clean by Design, Apparel Impact Institute	<a href="#">Link</a>
Reports Phase 2, Mistra Future Fashion	<a href="#">Link</a>
Textiles in Europe's Circular Economy, Energy Environment Agency	<a href="#">Link</a>
<b>Textiles 2030 Initiative, WRAP</b>	<a href="#">Link</a>
<b>Changing our clothes: Why the clothing sector should adopt new business models, WRAP</b>	<a href="#">Link</a>



# INFORMATION AND COMMUNICATIONS TECHNOLOGIES (ICT) AND MOBILE

Action Table

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2021



## 1. INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) AND MOBILE - INTRODUCTION

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The purpose of this part of the Action Table is to highlight specific and promotable actions to deliver the vision for the Industry thematic area, with a sector-based approach focused on ICT and Mobile. It provides normative pathways of the industry as a reference for policymakers, and non-State actors, such as investors and industry leaders.

ICT and Mobile sectors account for approximately 1.4 per cent of global GHG emissions.<sup>64</sup> They can decarbonize rapidly and act as change agents for other sectors also strengthening the market push for renewables. The COVID-19 experience has shown how ICT and Mobile are critical for resilience, able to support large changes in work patterns without step changes in energy usage.<sup>65</sup> The sectors established their own decarbonization pathway in line with a 1.5°C scenario with the SBTi, working with the UN International Telecommunication Union (ITU), mobile industry association (GSMA), and the Global eSustainability Initiative. This requires emissions reductions from sub-sectors of 45 to 62 per cent between 2020 and 2030 for network and data centre operators, with further work ongoing for other sub-sectors. A key challenge is to get the entire sector to adopt this pathway together with the frontrunners. This and other pathways emphasize the importance of a switch to renewable energy – it is estimated that 80 per cent of carbon reductions can be achieved by operators and their suppliers switching to renewable energy. Over 20 per cent of ICT and Mobile sectors by revenue<sup>66</sup> have set 1.5°C SBTs or committed to the UN Global Compact Business Ambition for 1.5°C.<sup>67</sup> ICT systems have demonstrated their ability to support ever greater volumes of traffic - and in the COVID-19 pandemic some large changes in distribution of the traffic - without corresponding increases in energy demand. In any future scenario they must also continue to deliver strong efficiency improvements<sup>6869</sup>, decarbonize their own operations, and work with their supply chains<sup>70</sup> to reach net-zero emissions by 2050 at the latest.

These sectors accelerate change in other sectors and have the potential to help them to decarbonize and improve their resilience if framed for this purpose – their enablement effect.<sup>71</sup> They are also a valuable channel for enabling agency in their over five billion end-users, with which the industry regularly communicates through text, email, social media, etc.

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<sup>64</sup> Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement, ITU, 2020.

<sup>65</sup> COVID-19 Network Traffic Surge Isn't Impacting Environment Confirm Telecom Operators, GSMA, 2020.

<sup>66</sup> Analysis by GSMA and Climate Champions, 2021.

<sup>67</sup> Climate Champions analysis of Orbis Financial data extract for company sector revenues, 2020.

<sup>68</sup> The Energy and Carbon Footprint of the Global ICT and E&M Sectors 2010–2015, Sustainability, 2018.

<sup>69</sup> Data centres & networks, International Energy Agency, 2020.

<sup>70</sup> Apple commits to be 100 percent carbon neutral for its supply chain and products by 2030, Apple, 2020.

<sup>71</sup> [https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA\\_Enablement\\_Effect.pdf](https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA_Enablement_Effect.pdf).

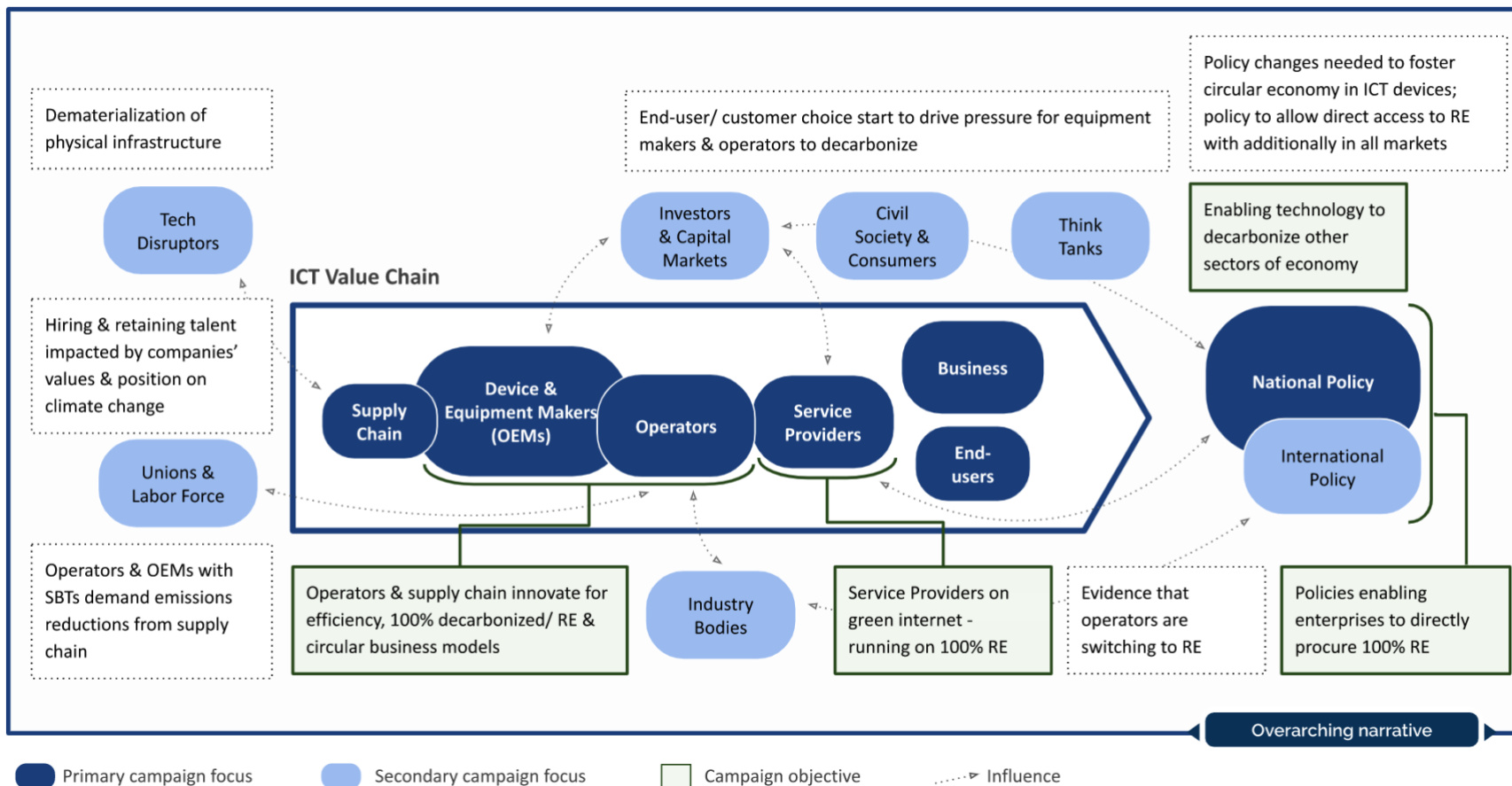


To deliver on this potential they must move quickly on renewable energy in their own operations and supply chains, to decarbonize the internet and improve circularity and energy efficiency in end-user products.

*With thanks to the following organizations and individuals for their discussions: BT Group, Ericsson, Facebook, Graham Trickey, GSMA, Orange Group, TalkTalk plc. The results in this document do not reflect a consensus view.*

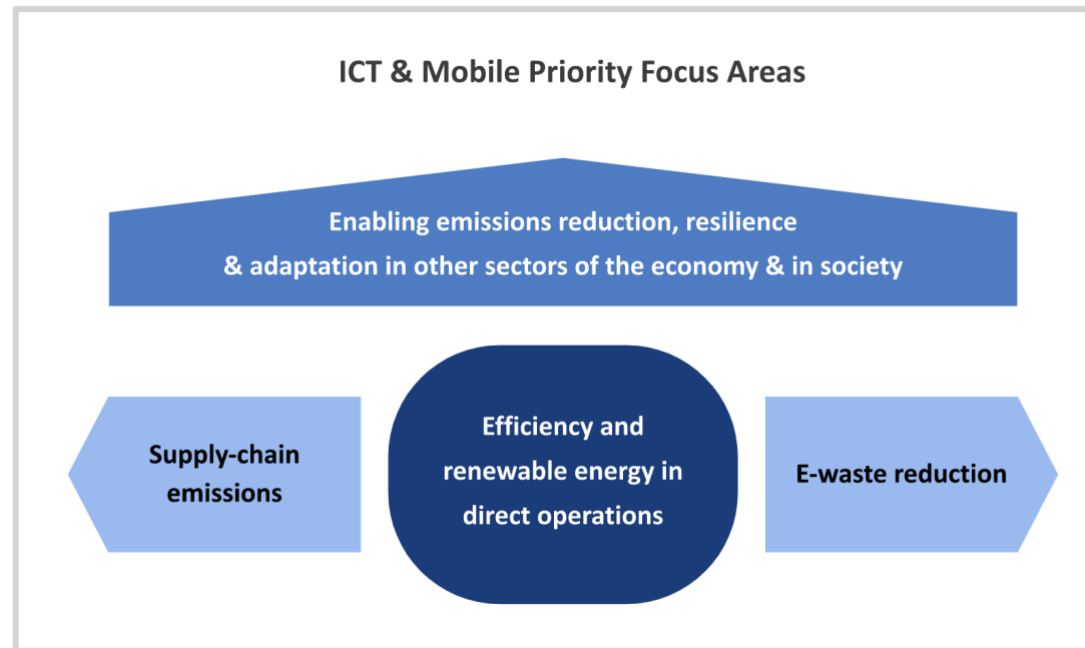
## 2. ICT AND MOBILE SYSTEM MAP

The stakeholders in the ICT and Mobile ecosystem include a complex supply chain: from original equipment manufacturers for network equipment and consumer devices, operators of networks and data centres, to internet and other service providers that run on the operators' networks and facilities. There are also public sector, enterprise, and consumer customers and other end-users. System changes to support resilience and decarbonization are driven by investors, customers and end-users, employees, and the companies themselves. Maximum leverage is achieved by a focus on efficiency improvements and switching to 100 per cent decarbonized energy/renewable energy throughout the value chain, while at the same time not forgetting about embodied emissions to be addressed through, for example, such as increased circularity and extended lifetimes of end-user devices.



### 3. ICT AND MOBILE CHANGE LEVERS

For resilient, decarbonized ICT and Mobile sectors, action is required in four areas, which benefit from or create feedback loops that will drive exponential change within their own systems and the wider economy.



- **Enablement:** ICT and Mobile sectors recognize the commercial opportunities in enabling decarbonization and resilience in other sectors. From teleworking, videoconferencing, social media, e-commerce, and the Internet of Things, through AI, 5G, blockchain and digital twins, ICT is changing the way the economy works. These changes could increasingly drive efficiencies in other sectors including energy, transport, human settlements, health and agriculture. The right policy environment is required to ensure that these efficiencies deliver more resilience and faster decarbonization and not an acceleration of carbon-intensive activities. For example, policies that favour the sharing economy, and promote a shift from material products towards virtualized services, can reduce waste and support economic growth at the same time as decarbonization. This would in turn provide a further driver for decarbonization of the ICT and Mobile



sectors themselves. As an example, assessments of the enablement effect of the Mobile sector indicate that emissions avoided in other sectors are approximately 10 times those of the Mobile sector itself.<sup>72</sup>

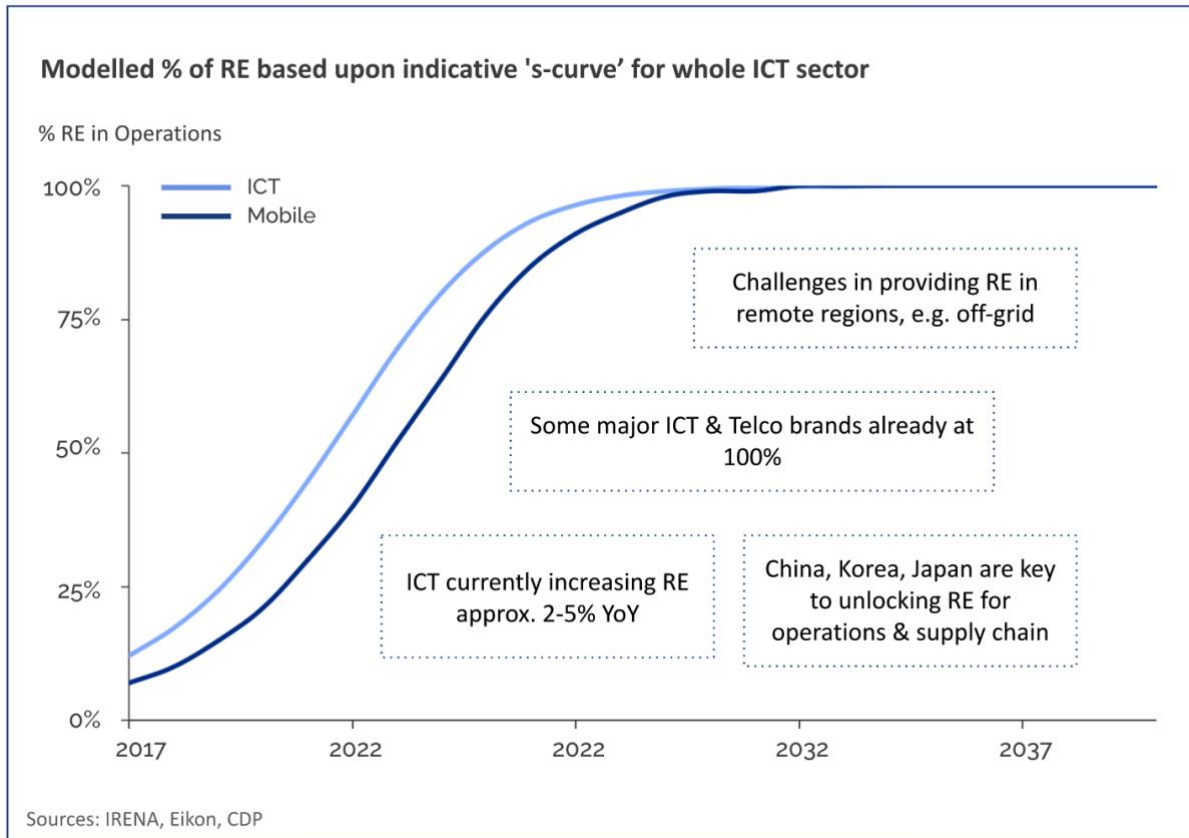
- **Operational efficiency** – ICT and Mobile operators consume large amounts of electricity in their direct operations, which translates in many cases to be one of their largest operating costs. With each new generation of technology, for example ultrafast fibre and 5G mobile, there are new patterns of power consumption as network traffic volumes continue their exponential growth. In the same way, data centre footprints are closely linked to their use of electricity. Until now efficiency measures have managed to mitigate the growth in data and kept the carbon emissions steady over the last decade, however continued efforts are needed to make sure this decoupling is maintained and amplified, e.g. it is important that 5G is built in an energy efficient way and that older technologies are phased out over time. Commercial feedback loops demand that power costs be contained through efficiency improvements and the retirement of less efficient legacy systems, which limits any growth in energy consumption. At the same time, in support of cost containment, the decreasing price of renewables in many markets will accelerate renewable energy (RE) adoption, both in data centres and in telecoms networks.<sup>73</sup>
- **Supply chain** – Equipment manufacturers' and supply chain emissions could represent over half of the total end-to-end value chain GHG footprint for Operators in some markets, depending on the type of electricity used in their own operations. As they pursue SBTs, they will partner with suppliers on their emissions reduction programs, focusing on their disclosures (including on climate-related risks and opportunities, e.g. TCFD) and target setting. Such programs cover emissions reduction activities including product and system energy efficiency, renewables uptake, process efficiency, reducing material waste, smarter logistics, reduced packaging, raw materials with lower embodied carbon, etc. Additionally, many ICT providers are having their own SBTs and other decarbonization commitments, which also could include addressing their suppliers.
- **E-waste** – Public sector, enterprises, and consumer customers for ICT devices are increasingly demanding low-carbon, low-waste products. This is driving equipment suppliers, not only to achieve emissions reductions in their supply chains, but also to innovate in ways that move from a linear economy to a circular one: extending their products' use phase, and expanding options for re-use and recycling, for example.

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<sup>72</sup> The Enablement Effect, GSMA, 2019, [https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA\\_Enablement\\_Effect.pdf](https://www.gsma.com/betterfuture/wp-content/uploads/2019/12/GSMA_Enablement_Effect.pdf).

<sup>73</sup> Growth of crypto currencies in the finance sector highlights their currently increasing and substantial electricity demands. As a very significant cost line for these projects, electricity will be purchased at the lowest cost, which will drive renewables as they demonstrate their cost competitiveness. At the same time, efficiency improvements are being identified which may reduce future electricity demands, e.g. by Ethereum moving to more efficient models, and as new initiatives such as the [Crypto Climate Accord](#) are launched.

#### 4. ACCELERATING ADOPTION OF RENEWABLES FOR ICT AND MOBILE - S-CURVES



Transformations do not occur in straight lines. Tipping points are reached after periods of little or no change, and they lead to accelerating exponential shifts towards a point of saturation. The lead indicator of transformation in the ICT sector is the adoption of renewable energy.

Already large consumers of electricity, the sectors' renewable energy purchases are driving additionality in markets where enterprises can contract directly. For example, the Renewable Energy Buyers Alliance reported that in 2019 half of additional renewable energy capacity, approximately 5GW, that they tracked was purchased by ICT and telecommunications businesses.<sup>74</sup>

Policy changes are required in markets where direct purchases of renewable energy, reflecting the lower costs of solar and wind, are not available. However, the sectors' renewable energy share is growing strongly: many leading ICT and Mobile businesses are already demonstrating 100 per cent. renewables. With policy support, halving of emissions by 2030, following the sector trajectory, and a goal of 100 per cent renewable energy by 2040, are both achievable. And efforts are progressing to find low-carbon alternatives for decentralized operations, e.g. running mobile radio antennae in remote locations where grid supply is unreliable or unavailable, which currently rely on diesel generators to a large extent.

The sectors' breakthrough challenges<sup>75</sup> of achieving 70-80 per cent of electricity from renewables by 2030 is a reflection of this S-curve and aligns with the ITU L.1470<sup>76</sup> and guidance, which assumes a 60 per cent reduction in emissions from electricity use by that date.

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<sup>74</sup> [Renewable Energy Buyers Alliance Deal Tracker](#), 2020.

<sup>75</sup> Launch of the UN Race to Zero emissions Breakthroughs. Please see <https://racezero.unfccc.int/breakthroughs>.

<sup>76</sup> Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement, ITU, 2020.

## 5. ICT AND MOBILE ACTION TABLE

Nexus	Energy	Human settlements	Industry	Land use	Water
	9 ENERGY, INFRASTRUCTURE AND INDUSTRIALIZATION	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>Publish COVID recovery plans addressing the role of digital in delivering zero-carbon economic growth</li> </ul>	<ul style="list-style-type: none"> <li>'Digital first' approach for meetings within public sector has been maintained post-COVID, and promoted across all sectors</li> </ul>	<ul style="list-style-type: none"> <li>Enable rollout everywhere of high-speed broadband, e.g. 'full fiber' and 5G for more efficient connectivity</li> </ul>	
	<ul style="list-style-type: none"> <li>Announce Just Transition policies to increase digital access to all citizens, equally for women and men</li> </ul>		<ul style="list-style-type: none"> <li>Digital divide reduced in developed and developing world in both urban and rural areas, and equally for women and men</li> </ul>	
	<ul style="list-style-type: none"> <li>Enable maximum digitization of developed and developing economies, encompassing data privacy and security considerations</li> </ul>	<ul style="list-style-type: none"> <li>Enact policies for mass digitization: support digital literacy initiatives, and development of locally relevant content</li> </ul>		
	<ul style="list-style-type: none"> <li>All G20 countries commit to providing PPA-type sourcing of renewable energy (RE)</li> <li>Policies to extend reach of RE through grids to reach remote communities</li> </ul>	<ul style="list-style-type: none"> <li>All G20 countries provide PPA-type sourcing of RE</li> </ul>	<ul style="list-style-type: none"> <li>All countries provide PPA-type sourcing of RE</li> </ul>	
	<ul style="list-style-type: none"> <li>Publish requirements for data centres to run 100% on RE by 2030</li> </ul>		<ul style="list-style-type: none"> <li>European and North American data centres run 100% on RE</li> </ul>	<ul style="list-style-type: none"> <li>Data centres globally running 100% on RE</li> </ul>
	<ul style="list-style-type: none"> <li>Draft policies enabling circular economy to increase re-use and recycling of ICT and Mobile devices and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Set new circular economy targets and policies for ICT including network equipment/servers &amp; Mobile devices incl. public procurement of refurbished devices</li> <li>Policy enablers for leasing and rental models introduced to assist circular approach to devices, addressing constraints in customer protection and other legislation</li> <li>An international plan to address illegal e-waste flows in place</li> </ul>	<ul style="list-style-type: none"> <li>Verify effective circular economy public procurement policies, case studies, and e-waste reductions</li> <li>Illegal e-waste flows are eliminated</li> </ul>	

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>1. Policymakers (national, subnational, local levels)</b>	<ul style="list-style-type: none"> <li>Review policies that restrict the sectors from decommissioning old inefficient technologies, e.g. mandatory requirements for circuit switched connectivity</li> </ul>	<ul style="list-style-type: none"> <li>Implement revised policies to facilitate progress in decommissioning old, inefficient technologies</li> </ul>	<ul style="list-style-type: none"> <li>Implement policies to drive migration from old to newer, more efficient technologies, while mitigating impacts on e-waste</li> </ul>	
	<ul style="list-style-type: none"> <li>Develop a framework for evaluation of the effects of using ICT and Mobile in other sectors to enhance and support their decarbonization and resilience</li> </ul>	<ul style="list-style-type: none"> <li>Implement measures to record and credit ICT and Mobile sector for enablement benefits in other sectors</li> </ul>		
	<ul style="list-style-type: none"> <li>Innovate to continue delivering large operational efficiency improvements in products and systems, e.g. 6G and Wifi 6</li> </ul>	<ul style="list-style-type: none"> <li>Launch business models to decarbonize communication, automation and intelligence</li> <li>Business models for end-user device electricity consumption, e.g. incentives for consumers to purchase RE</li> <li>Standards in place which makes energy efficiency a key priority of any emerging technology and its commissioning</li> </ul>		
	<ul style="list-style-type: none"> <li>Develop enablement propositions targeted at other sectors requiring rapid decarbonization or increased resilience, e.g. energy, transport, human settlements</li> </ul>	<ul style="list-style-type: none"> <li>Launch enablement propositions and business cases for other sectors to deliver quantified resilience or decarbonization benefits</li> <li>Establish standardized platforms for communication, automation, and artificial intelligence that other industries can use to reduce their emissions</li> </ul>	<ul style="list-style-type: none"> <li>Implement full connectivity in all industries as a default requirement in products with a climate impact potential</li> </ul>	
	<ul style="list-style-type: none"> <li>First examples of RE self-generation solutions for remote sites</li> </ul>	<ul style="list-style-type: none"> <li>Deploy at scale RE self-generation solutions for remote sites</li> <li>Develop silicon wafer fabrication plants with less water requirement</li> </ul>	<ul style="list-style-type: none"> <li>Apply Artificial Intelligence machine learning solutions in operations to balance availability of RE with local battery storage</li> </ul>	<ul style="list-style-type: none"> <li>Operate remote sites with 100% zero-carbon operations</li> </ul>
<b>2. Financial Institutions</b>	<ul style="list-style-type: none"> <li>The role of Finance is principally related to reallocation of financial capital in favour of net zero ICT and Mobile businesses, creating markets for RE across multiple sectors, and supporting clean tech innovation within these sectors. Finance will also be required for the funding of new business opportunities for ICT and Mobile to ensure increased resilience and decarbonization in other sectors and to clarify what constitutes green finance in these cases, taking a critical stance on what is truly climate positive and voting against climate negative strategies and plans. Finance also has an important role to play in digital inclusion, to recognise the business opportunities in connecting the unconnected.</li> </ul>			

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>3. Technology Providers and Innovators</b>	<ul style="list-style-type: none"> <li>Innovate to continue delivering large operational efficiency improvements in products and systems, e.g. 6G and Wifi 6</li> </ul>	<ul style="list-style-type: none"> <li>Launch business models to decarbonize communication, automation and intelligence</li> <li>Business models for end-user device electricity consumption, e.g. incentives for consumers to purchase RE</li> <li>Standards in place which makes energy efficiency a key priority of any emerging technology and its commissioning</li> </ul>		
	<ul style="list-style-type: none"> <li>Develop enablement propositions targeted at other sectors requiring rapid decarbonization or increased resilience, e.g. energy, transport, human settlements</li> </ul>	<ul style="list-style-type: none"> <li>Launch enablement propositions and business cases for other sectors to deliver quantified resilience or decarbonization benefits</li> <li>Establish standardized platforms for communication, automation, and artificial intelligence that other industries can use to reduce their emissions</li> </ul>	<ul style="list-style-type: none"> <li>Implement full connectivity in all industries as a default requirement in products with a climate impact potential</li> </ul>	
	<ul style="list-style-type: none"> <li>First examples of RE self-generation solutions for remote sites</li> </ul>	<ul style="list-style-type: none"> <li>Deploy at scale RE self-generation solutions for remote sites</li> <li>Develop silicon wafer fabrication plants with less water requirement</li> </ul>	<ul style="list-style-type: none"> <li>Apply Artificial Intelligence machine learning solutions in operations to balance availability of RE with local battery storage</li> </ul>	<ul style="list-style-type: none"> <li>Operate remote sites with 100% zero-carbon operations</li> </ul>
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>Companies commit at scale to Race To Zero by the 2040s and disclose their emissions data as well as climate-related risks and opportunities</li> <li>Companies commit and publish their commitment and strategy at scale to decarbonized energy/RE100 no later than 2040</li> <li>Initiatives launched for Race to Resilience</li> <li>Companies with large vehicle fleets commit at scale to EV100 no later than 2030</li> </ul>	<ul style="list-style-type: none"> <li>ICT sector secures 50% of electricity from decarbonized and renewable sources</li> <li>Mobile sector secures 40% of electricity from decarbonized &amp; renewable sources</li> <li>Supply chain companies commit at scale to RE100 no later than 2040</li> <li>Rapid scaling of end-user bundles with renewable energy suppliers as partners</li> <li>Companies join Race To Resilience at scale</li> </ul>	<ul style="list-style-type: none"> <li>ICT sector secures 80% of electricity from decarbonized and renewable sources</li> <li>Mobile sector secures 70% of electricity from decarbonized and renewable sources</li> <li>Leading sector operators become net generators of RE</li> <li>Companies with large vehicle fleets run 100% zero emission vehicles</li> </ul>	<ul style="list-style-type: none"> <li>100% of sector energy from decarbonized and renewable sources</li> <li>Sector becomes net generator of RE</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>4. Business and Service Providers</b>	<ul style="list-style-type: none"> <li>Companies initiate decommissioning of older generation technologies to accelerate efficiency gains</li> <li>Promote access to climate action best practices and where applicable help address the prevalence of climate misinformation in society</li> </ul>	<ul style="list-style-type: none"> <li>Continue to support exponential growth in data volumes, with only limited or no e increases in power consumption</li> <li>Maximize the use of best energy efficiency approaches in network planning and operation</li> </ul>	<ul style="list-style-type: none"> <li>Older generation technologies decommissioned in most geographies</li> </ul>	
	<ul style="list-style-type: none"> <li>Companies adopt circular economy strategies to reduce raw material usage and e-waste</li> </ul>	<ul style="list-style-type: none"> <li>Majority of digital products are designed with a circular economy in mind</li> </ul>	<ul style="list-style-type: none"> <li>All technology products designed with circular economy in mind</li> </ul>	
	<ul style="list-style-type: none"> <li>Sector leaders advocate for broad climate friendly policy changes</li> </ul>	<ul style="list-style-type: none"> <li>Sector leaders combat internet misinformation on climate change and provide access to climate action best practice.</li> <li>Sector leaders close gender gap in their staffing &amp; deliver on 'same job, same pay'</li> </ul>		
	<ul style="list-style-type: none"> <li>Companies provide public information about emissions and climate impacts</li> </ul>	<ul style="list-style-type: none"> <li>Companies offer Net zero-carbon branded products and services</li> <li>Companies provide consumers and enterprises with emissions information for purchase and use of equipment and services</li> </ul>		
<b>5. Civil Society</b>	<ul style="list-style-type: none"> <li>Industry collaboration on early-warning services for extreme weather events, e.g. fires or floods.</li> </ul>			
	<ul style="list-style-type: none"> <li>ICT and Mobile employees' campaign for acceleration of sector decarbonization</li> </ul>	<ul style="list-style-type: none"> <li>Consumers and employees drive acceleration of circular business models</li> </ul>		
	<ul style="list-style-type: none"> <li>Promote new jobs in clean/green tech</li> </ul>	<ul style="list-style-type: none"> <li>Promote and support initiatives that encourage participation of young women and girls in ICT to help close gender gap and support Just Transition</li> </ul>		

## 6. ICT AND MOBILE - EXISTING INITIATIVES

Business Ambition for 1.5C	UN Global Compact campaign well supported by ICT and Mobile sectors, asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5 <sup>0</sup> C above pre-industrial levels.
Science Based Targets initiative	Collaborative initiative between CDP, UNGC, WRI, WWF, and WMB to showcase companies that set science-based targets. Basis for target setting consistent with the ITU pathway.
We Mean Business Coalition	Global non-profit coalition working with the world’s most influential businesses to take action on climate change, catalyzing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
Exponential Roadmap	Digital industry and other sectors’ roadmap to half emissions each decade.
SME Climate Hub	Initiative to support small and medium-sized businesses to curb carbon emissions to increase competitiveness.
1.5C Supply Chain Leaders	Companies include climate-related targets and performance in their supplier purchasing criteria — and to work with the SMEs in their supply chain to deliver net-zero greenhouse emissions before 2050. They also provide concrete tools, share knowledge and exchange best practices for implementing robust climate strategies through the SME Climate Hub.
The Climate Pledge	Commitment founded by Global Optimism to deliver ‘Paris 10 years early’. Members are multi-sector, and include Amazon and US telco, Verizon.
The B Team	Leadership group of CEOs and their companies, who are working together to accelerate the just transition to net-zero greenhouse gas emissions by 2050.
Coalition for Digital Environmental Sustainability (CODES)	Part of the follow-up to the Secretary-General’s Roadmap on Digital Cooperation, through which recognizes the importance of digital technologies for accelerating environment and climate action.
European Green Digital Coalition	Declaration of companies in EU to achieve net zero by 2040 at the latest, signed by 26 CEOs across ICT sector.



EV100	Establish electric vehicles as the mainstream solution by 2030, guiding companies to 1.5C aligned climate action. Used by partners of the Exponential Roadmap Initiative and the SME Climate Hub. Relevant for decarbonization of operators' fleets.
RE100	Procure 100% of electricity from renewable sources. Supported by major ICT brands.

## 6. ICT AND MOBILE – FURTHER REFERENCES

1.5C Business Playbook	Spin-off from Exponential Roadmap – part of SME Exponential Race to Zero. Now complemented by the SME Climate Hub
Global eSustainability Initiative Smarter 2030 and Digital with Purpose Movement	Digital with Purpose describes how ICT companies engage in SDG delivery and with a specific focus on net zero.
GSMA Enablement Report	Global Mobile operators' industry association estimating mitigation benefits in wider economy.
ITU ICT Sector Pathway	Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement, developed jointly by ITU, GSMA and GeSI for SBTi.
Mobile Sector Guide to Setting Climate Targets	Guidance developed by the GSMA, the ITU, GeSI and SBTi to help operators apply the ICT sector pathway to create their own targets.
Transform to Net Zero	Initiative founded by 10 leading brands in multiple sectors including Microsoft in ICT. Aims to deliver guidance and business plans to enable a transformation to net zero emissions.
Going "All In" – A Climate Policy Guide for Business Leaders	Climate Voice's summary of nine key policies for businesses to advocate on climate action
Digital Technology and the Planet	Royal Society report on the enabling role of digital technology in climate action



# RETAIL

## Action Table

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2021



## 1. RETAIL - INTRODUCTION

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The purpose of this part of the Action Table is to highlight specific and promotable actions to deliver the vision for the Industry thematic area, with a sector-based approach focused on retail.

No comprehensive study has been conducted on the emissions impacts of the retail sector globally, with regards to retailing activities specifically, nor the cumulative emissions profile of retail companies.<sup>77</sup> However, analysis has suggested that the indirect emissions of retail businesses account for approximately a factor of seven within the supply chain and a factor of three across products' life cycles.

As a downstream and consumer-facing industry, the retail sector is in a key position to influence not only consumption behaviours and patterns but also the activities of its suppliers and the consumer goods industry, by setting ambitious scope three targets and improving capabilities to measure and track them effectively. In sending the right demand signals, the retail sector must also ensure that they hold upstream and downstream companies to account on ensuring a just transition, particularly where developing countries are still reliant on the export of commodities to higher-income countries. This is especially relevant in sectors still prone to 'linear' production practices, such as textile, agriculture, and non-repairable consumer goods, which will be impacted by the shift to circularity. Further strategies to decarbonize the retail sector include operating efficient, zero-emissions buildings powered by renewable energy, developing approaches to address water waste and pollution at all stages of the value chain, moving to zero-carbon logistics, sustainably sourcing raw materials and food ingredients, including enabling carbon removal, and helping customers live low-carbon lifestyles.

Currently, over 27 per cent of major players within the consumer goods sector, who together represent 22 per cent of the sector by revenue, have joined the Race to Zero, by committing to the UN Global Compact Business Ambition for 1.5°C or other partner initiatives including the Exponential Roadmap, The Climate Pledge and SME Climate Hub. The figure is very similar for consumer goods, in which 28 per cent of major players representing 32 per cent of the sector by revenue have committed.<sup>78</sup> Major players represent a relatively small percentage of sector revenues in retail, given the industry's disaggregated nature due to the 'long tail' of companies in the sector.

The retail campaign's Breakthrough Ambition called for the top 20 per cent of major players in the consumer goods sector by revenue to join the Race to Zero.<sup>79</sup> In terms of Breakthrough Outcome, the campaign asks that top 30% of suppliers join the Race to Zero by 2025 and as the Sector Goal, that the entire sector be net zero

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<sup>77</sup> The Retail sector includes businesses engaged in the sale without transformation of new and used goods, mainly to the general public, for personal or household consumption or use.

<sup>78</sup> Analysis by Climate Champions. May 2021.

<sup>79</sup> Race to Zero Breakthroughs. 2021. Transforming our Systems Together.

by 2050. While the sector has achieved its Breakthrough Ambition, there needs to be increased focus on action, including mobilizing both multinational companies and SMEs across the value chain and all regions, to increase commitments to net zero.

This Action Table draws insight primarily from the British Retail Consortium’s Climate Action roadmap for the United Kingdom retail sector announced in November 2020.<sup>80</sup> It also includes targets and actions from pathways in sectors adjacent to retail. For more information on these initiatives, please see ‘Further References’ section. A new initiative to engage regional and global specialist retail trade associations on Race to Zero, with the aim of recruiting and supporting them, has been established by the Climate Champions team in partnership with a set of leading global retailers, with support from the World Business Council for Sustainable Development as secretariat. It is hoped that this become a strong coalition of retailers, industry associations, and chambers of commerce working together to ensure the sector can reach the tipping point which indicates that system transformation is inevitable.

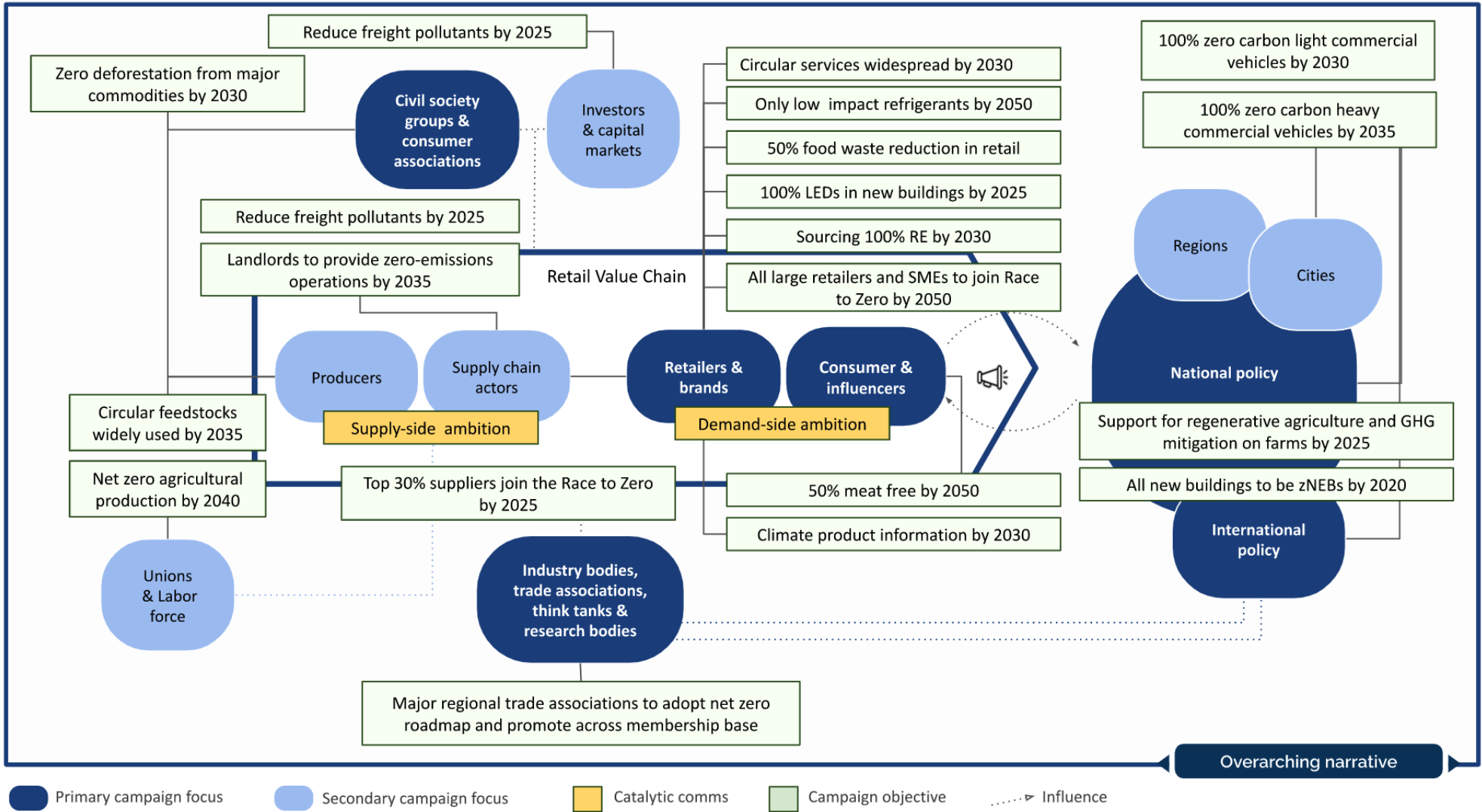
*With thanks to the following organisations for their discussions: The British Retail Consortium, UK Food and Drink Federation, The Sustainability Consortium, Ingka Group (IKEA), The Consumer Goods Forum, the Waste and Resources Action Plan (WRAP) and the World Business Council for Sustainable Development (WBCSD).*

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<sup>80</sup> British Retail Consortium. 2020. [Climate Action Roadmap](#).



## 2. RETAIL SYSTEM MAP



### 3. RETAIL CHANGE LEVERS

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#### Key levers of change, interventions required and feedback loops

- **Policy** has a key role in accelerating grid decarbonization, supporting whole lifecycle decarbonization for buildings, creating incentives for moving towards renewable energy tariffs, improving building efficiency through enhanced certification requirements for landlords (e.g. around renewable energy, energy efficiently, recycling and waste reduction), supporting low-carbon infrastructure for customer travel and logistics vehicle electrification, supporting regenerative agricultural practices enabling carbon removal, restoring and protecting land, and helping consumers lead low-carbon and circular lifestyles.
- **Finance** and the investor community can spur the development, scaling and uptake of critical technologies and reallocate capital from old, carbon-intensive assets and practices towards greener ones, for instance through the development of energy-efficient and circular buildings, powered by renewable energy. Financial mechanisms, such as preferential interest rates, guarantee schemes and risk-sharing facilities can help drive scaling of the much-needed technologies. Investments in net zero carbon agriculture, the circular flow of products and materials and shared zero-emissions transportation are also required.
- **Technology** and innovation are needed to deliver climate-smart solutions. Focus areas for retail will be in the electrification of heavy-good vehicles, designing green and circular buildings fully powered by renewable energy, scaling supply chain traceability solutions including carbon removal in the supply chain, establishing circular logistics set-ups, and shifting to low global warming potential refrigerants and more efficient refrigeration. The development of renewable heating solutions, energy storage systems for the on-site production of renewable electricity or alternatively, the deployment of smart grids to distribute the energy surplus from variable renewable energy sources are other key focus areas.
- **Business: Supply chain actors** react to signals set by retailers, as they look to align with their buyers' decarbonization agendas. In meeting the commitments set by those agendas, suppliers may set science-based or net-zero targets, increase their level of disclosure across all emissions scopes, increase carbon removal in the supply chain in food and renewable materials-based sectors, invest in R&D, and engage their own suppliers further upstream. **Demand** on the consumer side can be influenced by retail through product design changes, material substitution, advertising positive planetary and health impacts of greener products, and marketing and information-sharing at the point-of-sale, creating a positive feedback loop with the rest of the supply chain.

- **Civil society** plays a role in strengthening public awareness of the externalities or “hidden costs” of carbon-intensive practices, through campaigns and calls to action addressing information gaps on the environmental impact - based on the planetary boundaries - of purchasing choices, to encourage sustainable consumption. Civil society actors can also influence policy by advocating for climate-supportive legislative change, working towards systems transformation, driving collective action, and holding actors to account.

**Value chain of the building and construction system<sup>81</sup>**

As building occupants, retailers oversee a key hotspot for building system-related carbon emissions. This diagram has been used to illustrate interdependencies within the system, where stakeholders are part of two connected and converging flows: the *building value chain* and the *influencer value chain*. Emissions for retailers under this model, as “Owners” or “tenants”, would fall under scope 1 or scope 2 emissions. Please see also Built Environment pathway.



## 4. RETAIL ACTION TABLE

Nexus	Energy		Human settlements	Industry	Land use	Transport
	3 GOOD HEALTH AND WELL-BEING	9 ROBUST INFRASTRUCTURE AND INDUSTRIALIZATION	13 CLIMATE ACTION			
	By 2021	By 2025	By 2030	By 2040		
<b>1. Policymakers (national, subnational, local levels)</b>						
Support <b>energy decarbonization and set an external carbon price</b> which is aligned with the 1.5°C pathway	<ul style="list-style-type: none"> <li>• Support on-site renewable generation for retailers and landlords, suppliers, and customers</li> <li>• Provide incentives for landlords to move to renewable tariffs</li> <li>• Support electrification of heating systems and transport</li> </ul>					
Improve <b>building efficiency</b> (see Human Settlements pathway)	<ul style="list-style-type: none"> <li>• Drive building efficiency through green building certification standards, enhanced requirements for landlords, at beginning and end of lease and embodied carbon focus in the construction and renovation of buildings</li> <li>• Enact measures to enable the refurbishment of existing buildings on the high streets</li> <li>• All commercial buildings to be 70-80% more energy-efficient and all new buildings must be nearly-zero energy buildings (nZEBs) by 2020 (European Parliament)</li> </ul>					
Support regenerative and decarbonized agricultural practices	<ul style="list-style-type: none"> <li>• Invest in R&amp;D and new technologies to aid improvements in productivity and reduce the environmental impact of feed</li> <li>• Increase soil carbon stocks in the first 30-40 cm of soil by 0.4% per year (4 per 1000 initiative)</li> <li>• 20% of major food suppliers by annual production to join the Race to Zero</li> <li>• Develop strict regulations and penalties for highly water-polluting companies</li> </ul>	<ul style="list-style-type: none"> <li>• Increase soil carbon stocks in the first 30-40 cm of soil by 0.4% per year (4 per 1000 initiative)</li> <li>• Strengthen zero deforestation requirements and commitments</li> <li>• Ensure climate mitigation is core to future agricultural policy</li> <li>• Report carbon removal and deforestation risks in the supply chain for companies in the food sector and companies using renewable materials</li> </ul>	<ul style="list-style-type: none"> <li>• 50% GT CO<sub>2</sub>eq are mitigated in food and agriculture by changing agricultural practices and reducing inputs and waste</li> <li>• Double farmland under regenerative practice</li> <li>• Remove &amp; store 100GT of CO<sub>2</sub>e in healthy soil &amp; sustain soil carbon storage ambitions</li> <li>• Net-zero agricultural production in the UK (NFU)</li> </ul>	<ul style="list-style-type: none"> <li>• Entire food and agriculture industry carbon negative by 2050</li> </ul>		



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Restore <b>degraded lands</b>	• N/A	• N/A	• Restore 350mn hectares of degraded lands	• Restore 500mn hectares of degraded lands
<b>Protect land</b>	• N/A	• N/A	• Protect 30% land	• Protect 50% land by 2050
Act on <b>plastic and packaging</b> (Also relevant for “Businesses and Service Providers”)	• N/A	<ul style="list-style-type: none"> <li>• Take action to eliminate problematic or unnecessary plastic packaging (EMF)</li> <li>• Take action to move from single use towards reuse models where relevant 100% of plastic packaging to be reusable, recyclable, or compostable (EMF)</li> <li>• Set an ambitious recycled content target across all plastic packaging used (EMF)</li> </ul>	• N/A	• N/A
<b>2. Business and Service Providers</b>				
Commit to <b>reducing GHG emissions</b>	<ul style="list-style-type: none"> <li>• Establish GHG measurement and reporting, specifying how offsets will be phased out</li> </ul>	<ul style="list-style-type: none"> <li>• 20 per cent of major players in the sector by revenue to join the Race to Zero by 2023</li> </ul>	<ul style="list-style-type: none"> <li>• Emissions across all scopes to halve, in line with a 1.5 degrees trajectory</li> <li>• Adopt an internal cost of carbon of &gt;GBP 20/ton</li> </ul>	<ul style="list-style-type: none"> <li>• All large retailers to join the Race to Zero</li> <li>• All SMEs to join the Race to Zero</li> <li>• Raise internal cost of carbon &gt; GBP50/ton</li> </ul>
<b>Influence supplier action</b> on climate (Scope 3)	<ul style="list-style-type: none"> <li>• Start engagement and outreach to suppliers joining the Race to Zero</li> <li>• Collect product GHG data and Tier 1 manufacturing GHG data from top suppliers</li> <li>• Integrate water impacts into environmental impact assessments and reporting for all major companies</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure top 30 per cent of suppliers have joined the Race to Zero and are making sufficient progress towards net zero emissions by 2050</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure top 50 per cent of suppliers have joined the Race to Zero and are making sufficient progress towards net zero emissions by 2050</li> <li>• CO<sub>2</sub> removals projects implemented and delivering verifiable results</li> <li>• Tier 1 suppliers to have zero liquid discharge wastewater treatment facilities in high polluting sectors</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure all suppliers have joined the Race to Zero and are making sufficient progress towards net zero emissions by 2050</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
Move to <b>zero carbon logistics</b>	<ul style="list-style-type: none"> <li>• 20 per cent of major automakers and shipping owners / carriers / liners by total revenue committed to the Race to Zero</li> </ul>	<ul style="list-style-type: none"> <li>• Run advanced fuel efficiency programs for distribution fleet and drivers</li> <li>• Collect GHG performance data from logistics providers to inform decision-making</li> <li>• Reduce GHGs and other freight pollutants by 2025 (Green Freight Action Plan)</li> <li>• 8 per cent of BEV and FCEV sales as a percentage of global MHDV sales</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage network/route sharing for optimized efficiency</li> <li>• Transition LGV fleet to 100 per cent zero carbon</li> <li>• Transition last mile logistics to 100 per cent zero carbon</li> <li>• 5 per cent adoption of zero emission international shipping fuels</li> <li>• 15 per cent adoption of zero emission domestic shipping fuels</li> </ul>	<ul style="list-style-type: none"> <li>• Transition HGV fleet to 100% zero carbon</li> </ul>
Sustainably source <b>raw materials</b>	<ul style="list-style-type: none"> <li>• 100% sustainable palm oil (RSPO)</li> </ul>	<ul style="list-style-type: none"> <li>• Set up to regularly report progress on tackling supply chain deforestation</li> <li>• Support for regenerative agriculture and GHG mitigation on-farm</li> <li>• Run programs with suppliers to accelerate decarbonization activities around sourcing</li> <li>• Implement carbon dioxide removals projects and ensure verifiable results</li> </ul>	<ul style="list-style-type: none"> <li>• Zero deforestation from major commodities (beef and leather, cocoa, palm oil, timber*, pulp* and paper*, rubber, soy), especially in high conservation-value areas</li> <li>• * - sourced from sustainably managed forests</li> <li>• Embed sustainable design principles in raw material and product specifications</li> </ul>	<ul style="list-style-type: none"> <li>• Entire food and agriculture industry carbon negative by 2050</li> <li>• Source &gt;90% circular feedstocks</li> </ul>
<b>Help customers</b> to live low carbon lifestyles	<ul style="list-style-type: none"> <li>• Roll out campaigns to encourage low carbon behaviours</li> <li>• Run employee engagement programs on climate</li> <li>• Develop products which provide energy-efficient solutions for consumers</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing proportion of plant-based food sales in the UK by 50%</li> <li>• Ensure at least 25% of parking spaces used by store customers have access to EV charging</li> </ul>	<ul style="list-style-type: none"> <li>• Increase sale of circular products to 50%</li> <li>• Circular services widely offered for repair, reuse, resale, and recycling</li> <li>• Provide product climate information to customers on 100% products</li> <li>• Ensure EV charging points are available at all stores for customers</li> </ul>	<ul style="list-style-type: none"> <li>• Increase sale of circular products to 80%</li> </ul>

	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>3. Technology Providers and Innovators</b>				
Adopt <b>LEDs</b>	<ul style="list-style-type: none"> <li>Install 100% LEDs in all new buildings (e.g. stores and warehouses)</li> </ul>	<ul style="list-style-type: none"> <li>Install or retrofit 80% LEDs in existing buildings</li> </ul>	<ul style="list-style-type: none"> <li>Install or retrofit 100% LEDs in existing buildings</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>
Operate <b>efficient sites powered by renewable energy</b>	<ul style="list-style-type: none"> <li>Invest in R&amp;D for water smart renewable energy technologies and net zero sites</li> </ul>	<ul style="list-style-type: none"> <li>Largest retailers to source 50% renewable energy from PPAs</li> <li>Power all new buildings with renewable energy</li> </ul>	<ul style="list-style-type: none"> <li>Source 100% renewable electricity (no gas usage)</li> </ul>	<ul style="list-style-type: none"> <li>Source renewables for all sites' energy needs</li> </ul>
Eliminate <b>hydrofluorocarbon refrigerant gases</b>	<ul style="list-style-type: none"> <li>20% of major residential AC manufacturers by total revenue committed to the Race to Zero</li> </ul>	<ul style="list-style-type: none"> <li>Use only low impact refrigerant gases (max. 150GWP) for all new refrigeration installations</li> <li>20% of global AC manufacturers bring to market affordable residential AC units that have 5x lower climate impact than today's units</li> </ul>	<ul style="list-style-type: none"> <li>Reduce HFCs by 79%, to meet EU F-Gas Regulation</li> </ul>	<ul style="list-style-type: none"> <li>Prevent 70bn tonnes CO<sub>2</sub>e by 2050 (Kigali Amendment)</li> <li>Use only low impact refrigerant gases (max 150GWP) for all systems</li> </ul>
Reduce <b>whole lifecycle carbon emissions of buildings</b> (see Human Settlements pathway. Also relevant for "Businesses and Services Providers")	<ul style="list-style-type: none"> <li>All commercial buildings to be 70-80% more energy-efficient and all new buildings must be nearly-zero energy buildings (nZEBs) by 2020 (European Parliament)</li> </ul>	<ul style="list-style-type: none"> <li>32.4 kgCO<sub>2</sub>e/m<sup>2</sup> GHG intensity by 2050 in a 1.5°C scenario and 39.7 kgCO<sub>2</sub>e/m<sup>2</sup> in a 2°C scenario (CRREM)</li> </ul>	<ul style="list-style-type: none"> <li>22.4 kgCO<sub>2</sub>e/m<sup>2</sup> GHG intensity by 2050 in a 1.5°C scenario and 29.2 kgCO<sub>2</sub>e/m<sup>2</sup> in a 2°C scenario (CRREM)</li> </ul>	<ul style="list-style-type: none"> <li>9.0 kgCO<sub>2</sub>e/m<sup>2</sup> GHG intensity by 2050 in a 1.5°C scenario and 16.0 kgCO<sub>2</sub>e/m<sup>2</sup> in a 2°C scenario (CRREM)</li> </ul>
<b>4. Civil society</b>				
Tackle <b>food waste</b> (Also relevant for "Businesses and Services")	<ul style="list-style-type: none"> <li>Zero food waste to landfill by 2020, i.e. source separation and collection of food waste from households and businesses (Vision 2020)</li> </ul>	<ul style="list-style-type: none"> <li>Reduce post-farm gate food waste by 40% in the UK vs. SDG12.3 target of 50% by 2030 (Courtauld Commitment)</li> <li></li> </ul>	<ul style="list-style-type: none"> <li>50% reduction in farm to fork (post-farm gate) food waste globally at the retail and consumer levels (Champions SDG12.3)</li> </ul>	<ul style="list-style-type: none"> <li>50% reduction in food waste globally (EAT-Lancet)</li> <li>50% reduction in pre-farm gate food waste globally (Champions SDG 12.3)</li> </ul>
Ensure <b>sustainable diets</b>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Climate-friendly and healthy diet for 9bn (EAT-Lancet)</li> </ul>	<ul style="list-style-type: none"> <li>Climate-friendly and healthy diet for 10bn by 2050 (EAT-Lancet)</li> </ul>



	By 2021 ▼	By 2025 ▼	By 2030 ▼	By 2040 ▼
<b>5. Financial Institutions</b>				
Support development of new investment vehicles like <b>public-private partnerships</b> to invest in R&D projects on innovation priorities and supply chain transformation	• N/A	• N/A	• N/A	• N/A
Partner with policymakers and industry to increase inflow of capital to <b>catalyse and scale solutions</b> for a low-carbon economy throughout the sector	• N/A	• N/A	• N/A	• N/A
<b>Shift investment portfolios</b> towards brands with robust environmental credentials, and support accurate and effective ESG assessments	• N/A	• N/A	• N/A	• N/A
<b>Institutionalize financing mechanisms</b> and incentive structures for industry decarbonization	• N/A	• N/A	• N/A	• N/A

## 5. RETAIL - EXISTING INITIATIVES

Consumer Goods Forum	Global industry body driven by membership of over 400 retailers and consumer goods companies in over 70 countries, convening environmental commitment around deforestation, food waste, refrigeration, and raw materials sourcing.
The Sustainability Consortium	Global non-profit organization working to transform the consumer goods industry by partnering with leading companies to define, develop and deliver more sustainable products.
Business Ambition for 1.5C	UNGC Secretariat campaign asking businesses to set science-based targets aligned with limiting global temperature rise to 1.5 <sup>0</sup> C above pre-industrial levels.
Exponential Roadmap Initiative	Exponential Roadmap Initiative is an accredited partner of the Race to Zero and a founding partner of the 1.5°C Supply Chain Leaders initiative, established to cascade climate action across the supply chain, and the SME Climate Hub.
Science Based Targets initiative	Collaborative initiative between CDP, UNGC, WRI, WWF, and We Mean Business to showcase companies that set science-based targets consistent with the level of decarbonization required by science to limit warming to less than 1.5°C compared to pre-industrial temperatures.
We Mean Business Coalition	Global non-profit coalition working with the world’s most influential businesses to take action on climate change, catalysing business leadership to drive policy ambition and accelerate the transition to a zero-carbon economy.
World Business Council for Sustainable Development	Global, CEO-led organization of over 200 businesses working together to accelerate the transition to a sustainable world.
World Economic Forum	Global membership-based organization convening the world’s largest corporations across several platforms and initiatives, including for the reduction of carbon emissions.
United Nations Framework Convention on Climate Change	Multilateral environmental agreement setting non-binding limits on greenhouse gas emissions for individual countries.
RE100	RE100 brings together influential businesses committed to 100% renewable energy. This initiative is led by the Climate Group in partnership with CDP.
World Green Building Council	Non-profit organization and global network of national Green Building Councils in over 70 countries worldwide.

<b>EP100</b>	A voluntary initiative where corporations pledge to double their energy productivity within 25 years of a chosen baseline. This initiative is led by The Climate Group in partnership with the Alliance to Save Energy.
<b>Cool Coalition</b>	A unified front that links action across the Kigali Amendment, Paris Agreement and Sustainable Development Goals. It will inspire ambition, identify solutions, and mobilize action to accelerate progress toward clean and efficient cooling.
<b>EV100</b>	An initiative to accelerate the transition to electro-mobility by 2030.
<b>Clean Cargo</b>	A working group representing over 80% of global container cargo carried and with over 75 shipper, carrier, and freight forwarder members, focused on improving environmental performance in marine container transport using standardized tools for measurement, evaluation, and reporting.

## 6. RETAIL – FURTHER LINKS

Special Report: Global Warming of 1.5°C, Intergovernmental Panel on Climate Change, 2019	<a href="#">Link</a>
Special Report: Climate Change and Land, Intergovernmental Panel on Climate Change, 2019	<a href="#">Link</a>
Foundations for science-based net zero target setting in the corporate sector, Science-Based Targets initiative, 2020	<a href="#">Link</a>
Decarbonizing strategies of the retail sector following the Paris Agreement, Energy Policy, 2019	<a href="#">Link</a>
Climate Action Roadmap, British Retail Consortium, 2020 (UK)	<a href="#">Link</a>
Carbon Disclosure Project Supply Chain initiative	<a href="#">Link</a>
Montreal Protocol, United Nations Environment Program	<a href="#">Link</a>



Technical report on energy efficiency in HFC-free supermarket refrigeration, Environmental Investigation Agency, 2018	<a href="#">Link</a>
Global Decarbonization Pathways, CRREM	<a href="#">Link</a>
Building System Carbon Framework, WBCSD	<a href="#">Link</a>
Fashion Charter for Climate Action, United Nations Framework Convention on Climate Change	<a href="#">Link</a>
Courtauld Commitment 2025, WRAP (UK)	<a href="#">Link</a>
Partnerships for Forests, Global Resources Initiative	<a href="#">Link</a>
Global Powers of Retailing, Deloitte, 2020	<a href="#">Link</a>
Alliance to End Plastic Waste	<a href="#">Link</a>
New Plastics Economy, Ellen MacArthur Foundation	<a href="#">Link</a>
Plastics Pact, Ellen MacArthur Foundation and WRAP (UK)	<a href="#">Link</a>