

## Annex to the Climate, Energy and Environment Ministers' Communiqué

# Conclusions regarding the Industrial Decarbonisation Agenda

The G7 Industrial Decarbonisation Agenda (IDA) was initiated in 2021 at the initiative of the UK G7 Presidency and the United States to enhance collaboration among G7 Members, including on regulation, standards, investment, procurements and joint research related to industrial decarbonisation. This work has continued by the German G7 Presidency and the G7 Members agree on taking the process forward.

The IDA set the focus on working on the alignment of the general definition of near zero emission steel and cement production, which could send a signal to markets and could accelerate initiatives that work on market creation, whereas the discussed definition is not intended to imply a specific production pathway or exclude a specific methodology, denote a specific carbon content or entirely rule out any residual emissions. Another focus has been the development of a policy toolbox for the industry transition. For this purpose, the G7 German Presidency commissioned IEA to conduct two workshops on “Achieving Net Zero Heavy Industry Sectors in G7 Members (‘Defining a standard for near zero emission materials production’ and ‘Policy and financing mechanisms’)” and a Report “Achieving Net Zero Heavy Industry Sectors in G7 Members” (IEA Report). The challenge is large, but so is the opportunity for first movers: According to the IEA Report, following the pathway laid out in the IEA’s Net Zero Emissions by 2050 Scenario would imply a global market for near zero emission production in 2030 of around 100 Mt for primary steel and 250 Mt for clinker used in cement. The IEA estimates that G7 members could in aggregate account for around 25 Mt of this output for each material by 2030 (or around 10-15 % of the G7’s combined output today).

The elements presented below in Part A and B reflect the discussion held in the G7 IDA group and are informed by the IEA Report. They provide essential context to the terms of paragraph 77 of the Climate, Energy and Environment Ministers’ Meeting Communiqué of May 2022. They should be seen as conclusions drawn from the IEA Report. They highlight the relevance of the policy toolbox and definitions for decarbonising the industry, while respecting specific national and regional circumstances especially in the hard-to-abate industry sectors.

This document further summarizes joint actions recommended in the IEA Report and discussed in the G7 IDA group. It has been agreed to explore the details of these elements and actions further within the IDA framework, and to review progress adequately. It could be referred to and be built on these elements in other international fora related to industry decarbonisation. Other interested countries are invited to use these elements as guidelines for policy development and implementation.

## Part A: Achieving Net Zero Heavy Industry Sectors

### 1. Industrial Transition Plans and Policies

- Objective: Develop ambitious long-term sustainable transition plans for industry, backed by policy.
- Joint action: By no later than the mid-2020s, develop or update national industry sector roadmaps and plans in collaboration with industry stakeholders, providing a robust signal on the direction and pace of travel by developing clear targets and milestones; back plans with clear policies.
- Note: Governments may choose which policies presented in the toolbox below to use.

### 2. Finance for Near Zero Emissions Demonstration Projects

- Objective: Finance a portfolio of demonstration projects for near zero emission industrial production technologies.
- Joint Action: Within the next one to two years, take decisions on funding for innovation and mitigating investment risks of demonstrating critical technologies, collectively; enabling several full-scale projects in different regions and configurations for each technology at demonstration or large prototype stage today, with a range of representative input material qualities. This could include at least two or three different near zero emission methods to produce both steel and cement.
- Note: International collaboration in this area is important to speed up innovation cycles. Once technologies are ready for deployment, continued international cooperation on technology co-development for first-of-a-kind projects will also be important.

### 3. Finance Mechanisms for Technology Deployment

- Objective: Develop finance mechanisms to support deployment of near zero emission industrial technologies and associated infrastructure.
- Joint Action: Over the next three years, formulate finance strategies to contribute to phase out finance for high-emission technologies, and to shift to the deployment of near zero emission technologies at new and existing domestic industrial plants, as well as for supporting infrastructure (including for CO<sub>2</sub> transport and storage, low emission hydrogen and electricity production and distribution, and improved end-of-life material collection, sorting and recycling); contribute to international finance mechanisms and help coordinate work on industry to support the transition in emerging and developing economies.
- Note: Clear and widely accepted definitions could be used as a guide for access to finance, including for technology-neutral transition finance mechanisms (see Part B).

#### **4. Market Creation**

- Objective: Create differentiated markets for near zero emissions material production.
- Joint Action: Develop policies, ideally within the next three to four years and taking into account the timeline for technological innovation, that create demand for near zero emission materials production; guaranteed long-term support may be important for establishing the first handful of commercial plants, such as through carbon contracts for difference or advance market commitments; develop policies to support subsequent plants, such as sustainable or “green” public procurement policies or regulations requiring a growing minimum market share of near zero emissions materials production.
- Note: Clear and widely accepted definitions (see Part B) could be used to differentiate eligible material production under such policies, with higher and longer-term support for near zero emission production, and time-limited support for interim measures that deliver improvements in emissions intensity.

#### **5. Advance International Industry Decarbonisation Collaborations**

- Objective: Pursue avenues to strengthen ambition on the industry transition globally and move towards an increasingly level playing field.
- Joint Action: Continue the dialogue on ways to enhance international collaboration in support of the industry transition, including but not limited to exploring options such as forming an industry alliance or climate club, sectoral agreements, and enhanced participation and ambition within existing initiatives such as the Clean Energy Ministerial’s Industrial Deep Decarbonization Initiative, the First Movers Coalition, the Leadership Group for Industry Transition and the Mission Innovation Net-Zero Industries.
- Note: Many industrial products are globally traded and the industry transition is a global challenge. Increased ambition across the globe can help level the playing field for near zero emission production. Enhanced international collaboration will be key to accelerate the global transition.

## Policy Toolbox for the Industry Transition towards Near Zero Emission Material Production

Governments can help enable the industry sector transition to net-zero through a robust and comprehensive set of policies. A strong policy framework will require a multi-faceted response with measures that address multiple complex elements. Here is a non-exhaustive list of the various options in the policy toolbox to be considered adopting or expanding, as a complement to measures already in place.

### I. Framework fundamentals

#### Establishing plans and policy for long-term CO<sub>2</sub> emission reductions

- Roadmaps and plans for industry and accelerated deployment of clean energy technologies, including at the national and international level
- Sectoral CO<sub>2</sub> emission reduction targets
- Carbon pricing, including emissions trading systems and carbon taxes
- Tradable emissions standards, including tradable CO<sub>2</sub> performance credits
- Engagement with voluntary private-sector initiatives
- Just transition planning and support mechanisms, including targeted financial support and investment in skills redevelopment and training

#### Mobilising finance and investment

- Direct public funding, such as grants
- Public financing mechanisms to mobilise private investment, such as low-interest and concessional loans, blended finance
- International finance supporting the transition in emerging market and developing economies, including development aid and multilaterally-pooled finance (e.g. Multilateral Development Banks), derisking first-of-a-kind facilities
- Sustainable investment schemes and taxonomies, including for transition finance and taxonomies

### II. Targeted action for specific sectors and strategies

#### Managing existing assets and near-term investment

- Requirements and tax credits for new builds and refurbishment to be “ready” for future retrofit to near zero emission technologies
- Energy efficiency schemes, with compliance certificates that are tradable among plants
- Differentiated energy efficiency and emission requirements for new builds and plants close to retirement
- Sunset clauses and incentives for early retirement for high-emitting technologies
- Reducing excess capacity

#### Creating markets to support deployment of near zero emission materials production

- Carbon contracts for difference
- Sustainable public procurement

- Promoting and incentivising private procurement, such as coordinating a buying pool
- Regulations that require a minimum market share of near zero emission material production and/or content in products
- Definitions for near zero emission materials production
- Certification and product stewardship initiatives

#### Developing technologies

- R&D and demonstration funding including funding targeting large-scale demonstration
- Public-private partnerships
- Programs and networks for innovation knowledge sharing and co-ordination, including between public and private sector actors

#### Accelerating material efficiency

- Coordination and support for improved scrap collection networks and sorting, to increase circularity of material flows
- Modified product and construction design regulations to optimise life-cycle emissions, including performance rather than prescriptive requirements
- Incentives for extended end-use lifetimes, including demolition fees and building refurbishment incentives

### **III. Enabling conditions**

#### International co-operation and creating a level playing field

- International carbon markets
- Sectoral agreements
- Carbon border adjustments
- Climate clubs and alliances
- Consumption-based emissions policy
- International technology co-development and capacity building
- International best practice sharing
- International advance market commitments

#### Infrastructure planning and development

- Co-ordinated planning of infrastructure for low emission electricity and hydrogen production and distribution, for CO<sub>2</sub> transport and storage, and for improved end-of-life material collection, sorting and recycling
- Public financing for infrastructure
- Streamlined and accessible permitting

#### Tracking progress and improving data

- Increased data collection and reporting
- Labelling, standards, certification and definitions for near zero-emission materials production
- Work towards common international methodologies

## Part B: Standards and Definitions for Near Zero Emission Materials Production

### 1. Measurement Standards for Material Production

- Objective: Consolidate existing work on measurement standards, ensure their fitness for purpose, and avoid the development of duplicate standards and protocols.
- Joint Action: Agree on common measurement standards and reporting frameworks to use for evaluating the emissions intensity of production for each material; address any gaps in these standards' coverage or completeness through refinement, without proposing new series of standards unless not standard already exists for a particular material.
- Note: International standards and accounting frameworks already exist or are under development for evaluating the emissions intensity of production of certain materials, both for production (e.g. ISO 14404 for steel production, ISO DIS19694-3 for cement production) and products (e.g. ISO 20915, Environmental Product Declarations). Product standards for single materials (e.g. steel rebar) and multi-material products (e.g. reinforced concrete) should use these harmonised material production standards as inputs.

### 2. Thresholds for Near Zero Emission Material Production

- Objective: Adopt stable, absolute and ambitious thresholds for near zero emissions material production that take account of sector-specific nuances.
- Joint Action: Recognise the definitions proposed in the IEA report as a robust starting point, and identify processes to develop, refine and extend them as needed.
- Note: The threshold values proposed in the IEA Report are for steel production 50-400 kg of CO<sub>2</sub> equivalent per tonne (kgCO<sub>2</sub>e/t) and 40-125 kgCO<sub>2</sub>e/t for cement production, with the precise values depending on the amount of scrap used and the clinker to cement ratio respectively. The thresholds for near zero emissions production outlined in the IEA report target levels of emissions intensity that are compatible with reaching net zero emissions from the global energy system by mid-century, as defined in the IEA's Net Zero by 2050 Roadmap. Several prominent companies have already made ambitious purchasing commitments for near zero emission steel through the First Movers Coalition, which set a technical threshold comparable to the IEA Report's proposal. The ResponsibleSteel Standard, currently under development, has indicated thresholds that are also comparable with the IEA's thresholds.

### **3. Thresholds for Interim Steps in the Transition Phase**

- Objective: Use of a complementary – but distinct – definition for valuing the interim steps taken to lower emissions intensity, without compromising the stringency of definitions for near zero emissions production.
- Joint Action: Recognise the continuous scale of evaluation of “low emissions production” proposed in the IEA Report, which stipulates that the quantity of low emission production is proportional to the reduction in emissions intensity achieved with the upper limit of the low emissions production threshold defined as a multiple of the near zero emissions threshold.
- Note: Unlike the near zero emissions production intensity thresholds, low emissions production takes account of incremental progress and contextual factors that vary over time. Each country may choose which multiple to use to set the threshold at various points in time, with the threshold likely declining over time in line with the country’s path to net zero.

### **4. Definitions for other production sectors, and products and projects**

- Objective: Extend the reach of work on definitions down existing supply chains, and into new ones.
- Joint Action: Undertake work to ensure continuity between definitions of near zero emission material production and near zero emission products, projects and portfolios; consolidate all work on the interoperability of thresholds, building on the work carried out in the IEA report.
- Note: The principles established in the IEA Report could potentially be applied to other bulk materials, e. g. ammonia, methanol and aluminium.

## Considerations for Definitions of Near Zero Emission Materials Production

Definitions of near zero emission materials production will be important for differentiated market creation, sustainable public procurement, tracking progress, and other targeted policy support. The definitions in the IEA Report do not imply a specific production pathway or exclude a specific methodology, denote a specific carbon content or entirely rule out any residual emissions. Here, a non-exhaustive list of the relevant considerations is provided.

The focus for the definitions is on material production. This can serve as a base and provide guidance for other work streams, initiatives and frameworks that are focused on *products* and *projects*. A uniform and clear end-point in the process that facilitates comparability has been set: in the case of iron and steel, this is crude steel production, while in the case of cement and concrete, this is cement production.

### Definition method

#### *Near zero emission production definition*

Stable and absolute definitions based on a fixed emissions intensity are identified, as these are most straightforward. The objective here is to define what constitutes near zero emission materials production, not to specify an average emission intensity compatible at different points in time with a pathway to net zero.

For each material, the near zero emissions definitions can be applied with two different scope considerations: one encompassing only direct emissions and one encompassing both direct and indirect emissions, with the latter being the long-term goal. They are complementary in the incentives provided and governments can choose which to use for different purposes depending on their particular circumstances, or to use them in parallel. This provision enables the recognition of early efforts being undertaken to dramatically reduce direct emissions in advance of, say, a sufficiently decarbonised electricity grid. Clarity must be maintained by stipulating which scope the definition is being applied to in a given instance.

Direct emissions are defined according to internationally recognised frameworks for energy and emissions accounting, such as the IEA World Energy Balances and the IPCC's Guidelines for Greenhouse Gas Emissions Accounting. Indirect emissions included would be limited to those arising from clearly defined steps in the production process. Key steps of the production value chain are included whether they occur on the same or different sites (e. g. iron ore agglomeration in the case of steel, clinker production in the case of cement), thus the direct and indirect terminology is used rather than referring to "Scopes". Using the terminology of the Greenhouse Gas Protocol, so-called "Scope 3" emissions on one site could be "Scope 1" emissions on another site.

→ Example for primary crude steel production of the steps of the supply chain included (regardless of the ownership associated with each of the sources of emissions):

- Fossil fuel use in iron ore agglomeration (direct)
- Fossil fuel use in ironmaking (direct)
- Fossil fuel use in steelmaking (direct)
- Producing reduction agents, including on-site hydrogen production (direct)



- Production and use of lime fluxes (direct)
- Off-gases (direct and indirect)
- Imported electricity, heat and hydrogen (indirect)
- Emissions from fossil fuel supply (indirect)
- Emissions from raw material extraction and transport (indirect)

The thresholds for near zero steel and cement production take account of the share of scrap use in the case of steel, and the clinker ratio in the case of cement. Ambition is crucial – to be truly “near zero”, the emission intensity thresholds are set to allow only a limited amount of residual emissions, taking into account estimates of likely residual emissions from the various key production pathways that are compatible with an energy system that achieves net zero emissions (such as that described in the IEA’s Net Zero Emissions by 2050 Scenario, and other scenarios with comparable climate ambition).

#### *Low emissions production definition*

A definition for “low emissions production” can also be useful to provide time-limited and context-dependent recognition of interim measures that deliver substantial improvements in emissions intensity, in line with a trajectory to meet Paris Agreement goals, but which do not meet the near zero emissions definition. Recognition for interim measures can be evaluated on a continuous sliding scale, defined between the near zero threshold and a multiple thereof, with the tonnages of output calculated in proportion to the emissions intensity reduction achieved. Over time, the stringency of the low emissions production definition can be increased, using “band ranges” similar to the energy performance certificates used in the buildings sector.

#### Interaction with existing standards and other definitions

Existing measurement standards and those under development are available for evaluating the emissions intensity of steel (e.g. ISO 14404, ISO 20915, Worldsteel Benchmarking System) and cement (e. g. ISO 19694-3, GCCA Cement CO<sub>2</sub> and Energy Protocol) production. There is a need to consolidate existing work on measurement standards, ensure their fitness for purpose, and at the same time avoid the development of duplicate standards and protocols. At the national and regional level, the IPCC’s Guidelines on National Greenhouse Gas Inventories are the gold standard, and plant level accounting should be compatible with these overarching guidelines.

Consistency with other definitions is important. Other definitions and interactions to consider when developing definitions for near zero emissions steel and cement include the following:

- Low emissions electricity generation
- Low carbon and low emission hydrogen
- Compatibility and workability of definitions for other materials beyond steel and cement
- Equivalent principles adopted in other end-use sectors beyond industry, such as the transport and buildings sectors
- Other international regulations that set up standards for the same production processes