United Nations Framework Convention on Climate Change

Agenda item 4.(c)ii.

Mapping existing initiatives for transformative industry to identify areas where the TEC could add value

TEC/2023/27/12

Technology Executive Committee, 27th meeting and TEC-CTCN Joint session

19-21 September 2023, Bonn, Germany

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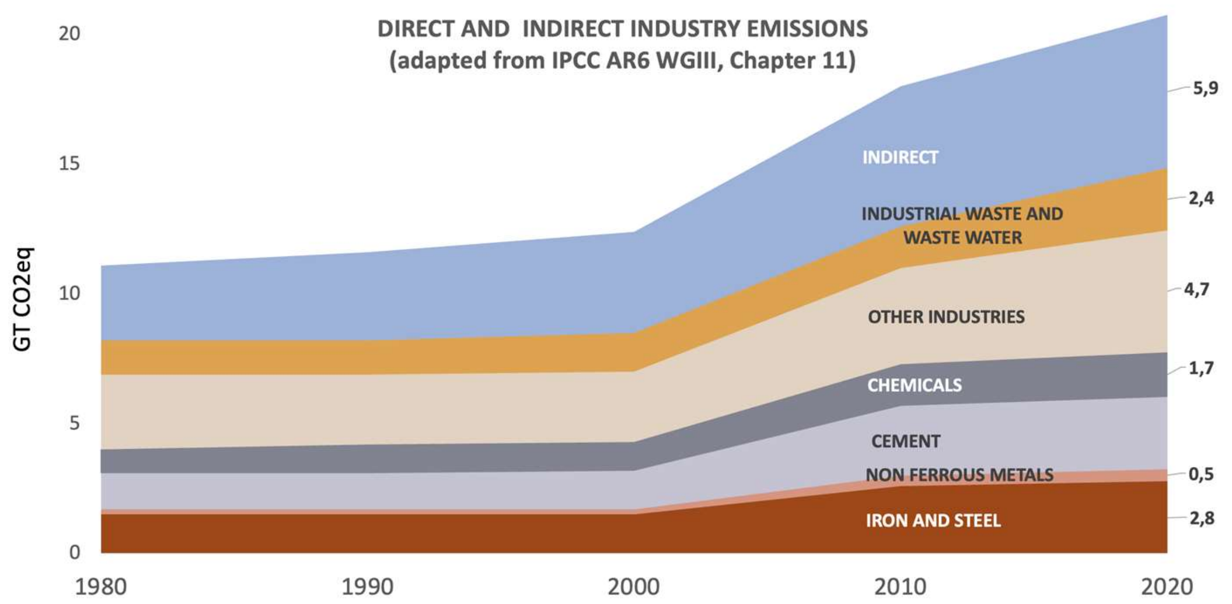
BACKGROUND

- Industry leading driver of global emissions with a total of **34% or 20 $GtCO_2eq$ (2019)** of total emissions (24% direct and 10% indirect emission)
- **Steel, cement, chemicals** with ~ 60% of energy and 70% of industry GHG emissions
- Industrial sector as **significant economic factor with** 21.8% of the Global GDP (2021)
- **Hard to abate industries (HAI)** with high reliance on fossil fuels, long facility lifetimes of 20-50 years creating transition risks, need to fully commercialize, rapidly scale up and deploy near zero fossil fuel free carbon alternatives with high capex;



Scope of mapping

- Assessment and mapping of **emission reporting** (IRENA, IEA, AAI, GCCA etc.)
- Climate technology, priority of **implementation**, policy on HAI
- **UNFCCC tools** (NDCs, BRs, BURs, TNAs, LT LEDS)
- **Country analysis** (MCA, current situation of HAI, policies, gaps)

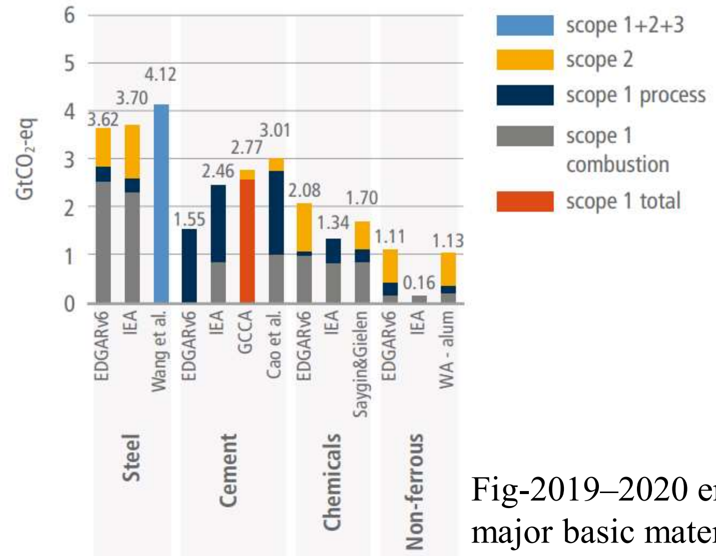


Fig-2019–2020 emissions by major basic materials production (IEA)

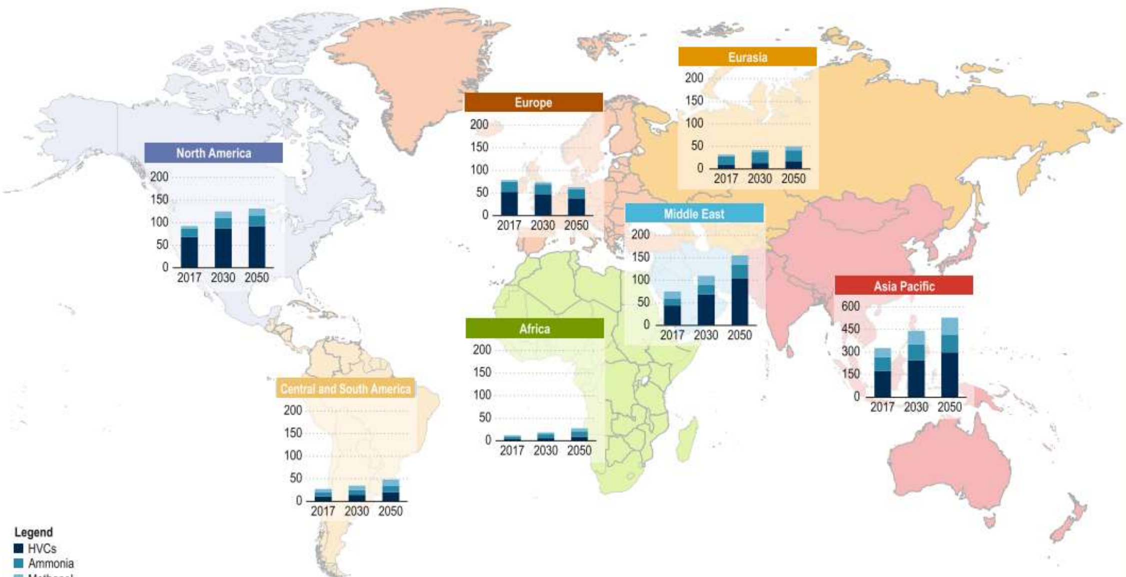


Fig-Industrial sector direct GHGs emissions. (IEA)

Countries selection and assessment

Selection criteria focused on-

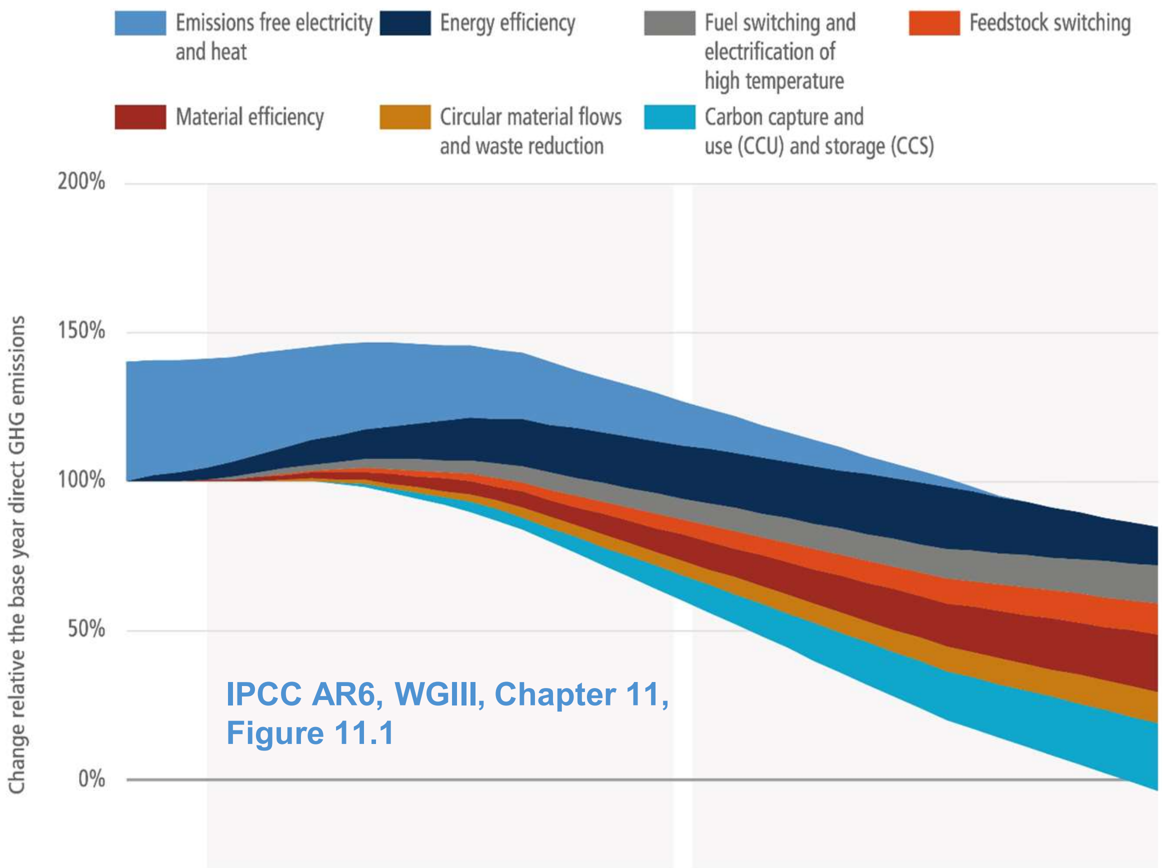
i. Geographical location
ii. Size of economy
iii. Technological advancement
iv. Contribution in the HAI sectors
v. Available policy documents

Assessment includes-

i. Country data analysis on HAI
ii. Technology gap assessment
iii. Sectoral success stories
iv. Sectoral challenges, trends and policies

Country Group	Countries Selected	Score (out of 100%)
G20 Countries (Total 6)	China	90%
	Indonesia	84%
	Türkiye*	75%
	Japan*	72%
	Germany*	51%
	Mexico*	49%
Developing Countries (Total 2)	Vietnam	69%
	Egypt	47%
Small Island Developing States (Total 1)	Belize	40%
Least Developed Countries (Total 1)	Mauritania	42%

Decarbonisation pathways towards zero emissions across industries



- Tansition to zero emissions possible
- Costs can be signficant but not usually low as share of final products
- Electrification as key mitigation option and demand for electricity will increase
- Hydrogen important for steel, chemicals and feedstock
- Circular economy important to reduce demand for primary resources and lower emissions
- Material efficiency to reduce emission along the lifecycle (LCA); transition aways from carbon intense infrastructures
- Strategic sequencing of options needed based on maturity to avoid lock-in; transparency on progress critical

Challenges of decarbonizing HAI sectors

Cement sector:
- Availability and supply of **clinker substitutes**
- Need to **electrify and capture process emissions**
- Technical challenges and **acceptance of alternatives & application**

Steel sector:
- Scrap supply availability and **challenges in recycling**
- Availability of **green hydrogen and fossil fuel free alternative technology solution**
- **Access and deployment of zero carbon solutions**

Chemical sector:
- **Transition to renewable feedstocks and technologies**
- Shift to **fossil fuel free heating**
- **Production and recycling of plastics**
- Employing 100% **green ammonia-** other source for urea fertilizer production

Trends and enabling policies for decarbonization of HAI sectors

- **Standards for low and zero emission materials and** products (e.g., steel, cement etc.) and reporting on the transition to low and zero emission products (LCA, EPD and PCR based)
- **Greening of the value chain**
  - **Upstream: Greening of value chain** (green electricity/hydrogen, CCS/CCUS etc.)
  - **Downstream:** More stringent standards & regulation for **waste & recycling**
  - **Green public and private procurement of low&zero carbon industrial products**
- **RDD Funding** for de-carbonization R&D and implementation
- **Climate financing and carbon pricing** for low & zero carbon industry products & projects (Carbon pricing, ETS, Contracts for difference, Carbon Border Tax Adjustments etc.)
- International and bilateral **collaboration** for accelerating RDD
- **Transition to more material efficiency & alternative materials**

HAI decarbonization initiatives: success stories

Cement

- The **EU and the US, China** set to invest billions in HAI
- Canada initiated **ENERGY STAR** certification
- **Technical assistance by CTCN** to Vietnam, Congo, South Africa, regional projects initiated
- **IDDI:** Green public procurement & low & near zero product standards

Steel

- The **UNDP-GEF** project in Brazil
- Vietnam **green growth strategy** in steel sector
- Indonesia's **TNA-** regenerative burner combustion system
- **IDDI:** Green public procurement & low & near zero product standards

Chemical

- The EU's **energy transition**, decarbonization and **material efficiency** in chemical sector
- In Brazil- abundant **biomass resources** i.e sugarcane

R&D Recommendations

- **Low and zero emission product standards**
- **Alignment of financing and incentives for RDD in HAI**

Cement

- Electrification of kilns
- Low carbon cementious materials (SCMs) to replace clinker, alternative building materials
- Waste-derived fuels, re-carbonation tech, CCS/CCUS and sustainable CCS/CCUS standards

Steel

- Hydrogen as fuel in DRI furnance for primary steel making; Molten oxy-fuel as possible future process;
- Renewable energy based electric arc furnaces for near zero emission secondary steel production
- Optimisation along the value chain

Chemicals

- Green hydrogen as feedstock, development of water and thermal plasma electrolysis
- Electrification of heat supply
- CCS/ CCUS & locations and related MRV
- Alternatives to F-gases

Enabling environment policy recommendations

- Consider HAI abatement targets in **enhanced NDCs & MRV**
- **Low GHG emission roadmaps and LT-LEDS integration** with supporting enabling environments
- Supportive financing and capacity building

Energy efficiency & electrification

- Issuing regulation(ISO50001), simplifying governmental procedure
- Energy audit, energy intensity and renewable targets, benchmarking system
- Green bonds, green loan with de-risking components

Circular economy

- Solid waste management, incentive policy, national building codes with circular economy elements for construction (embodied carbon standards) and recycling
- Increasingly ambitious recycling quotas and material standards
- Development of recycling trading platforms and waste specifications

Low-carbon products

- Low-carbon standards and policies, including ISO 21930 and EN 15804 for construction
- Green Public Procurement for steel, cement, and concrete.
- National and international reporting for transitioning to near-zero emission products, with streamlined procedures and climate financing and carbon pricing options

Recommendations for international collaboration

Promote cooperation **on HAI RDD programs with focus on technologies needed for net zero pathways**

Develop a **global study** on guidance to countries on transition towards low and near zero industries, enabling environments and inclusion in NDCs

Exchange experiences and foster collaboration between countries, initiatives and financing on the transition to zero emission HAI *(adoption and harmonization of standards and their integration into policies, regulations & financing; Strategic collaboration with major initiatives IEA, IDDI, WorldSteel and GCCA; contacts established by activity group)*

Thank you