Assessing the impacts of potential new businesses and industries resulting from the implementation of response measures

Draft Technical Paper

Agenda item 3b

7th Meeting of KCI

2 – 3 Nov 2022

Outline of the draft technical paper

- Introduction
- Methodological Approaches
- Social, economic, and environmental impacts
- Conclusions and Recommendations

Definitions

- This paper defines new/emerging industries and businesses are those productive entities (materials, goods and services) which
  - do not have fully matured operating ecosystem due to early stage of development and
  - that have the potential to significantly contribute to global deep decarbonization effort by changing the current state of global greenhouse gas emissions trajectory towards a net zero emissions.

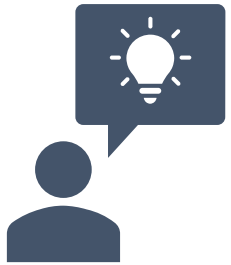
Research Methods

- Desktop reviews
- Systematic literature search
- Shortlisting
- Qualitative assessment of impacts

Desktop review

Reviewing

Party submissions to UNFCCC on new/emerging industries and businesses,
Works by constituted on technology development and transfer, and
Grey publications



To understand and synthesize the findings inform the criteria and justification for the shortlisting.

Scope

The concept of combinatorial effect is duly considered

Hard business and industries

Tangible components such as equipment, tools, computers, and software

Soft business and industries

Cover skills (e.g. specialised skills for mobilizing finance through crowd funding and green bonds); and

know-how

Systematic literature search

Constraint by

Years of Publication – Twenty-two years (2000 to 2022)

Search strings/key words

Produced

long list of sixty-six new/emerging industries and businesses for the subsequent shortlisting

Shortlisting of new and emerging industres

Evaluation against 12 criteria

Produced three industries

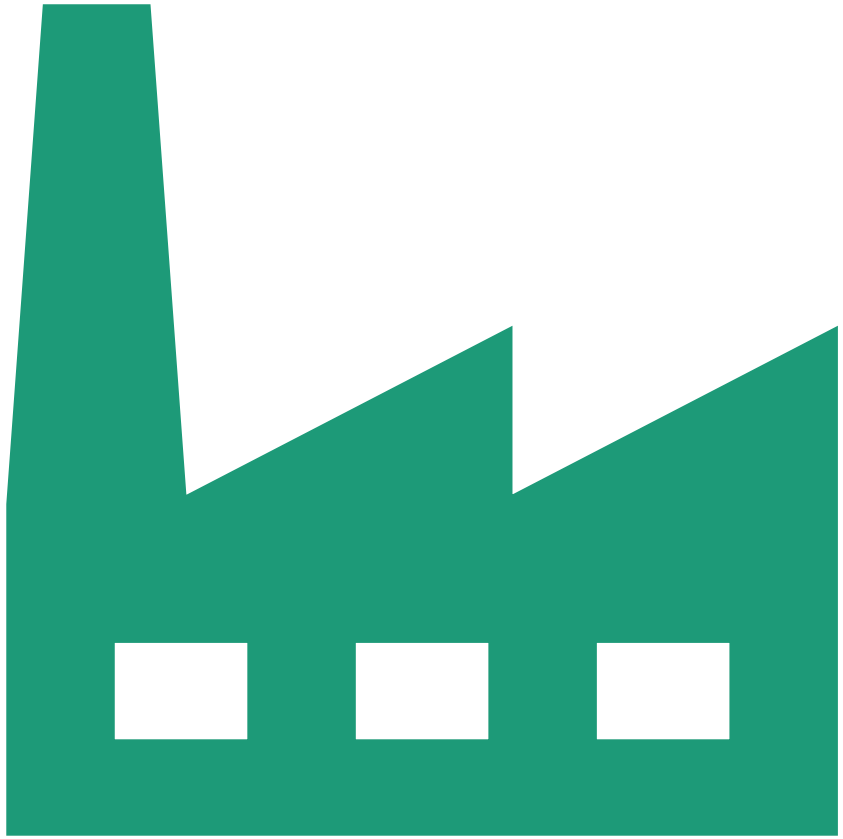
Carbon capture utilization and storage
Hydrogen production

Artificial intelligence

Criteria

- Decarbonization potential
- The potential for allied new businesses and/or industries springing from the parent technology (downstream or upstream)
- Broad application across numerous sectors (applicability)
- Ease of geographical applications that meet diverse national/regional natural resource endowments.
- Potential for replication
- Technological maturity
- Availability of methodologies and tools for the assessment of associated impacts
- Positive societal impacts
- The relative cost of technology
- Easy management of associated risks
- Potential for amplification of combinatorial effects (ease of combining or coupling multiple new/emerging industries and businesses to achieve multiplicative impacts)
- Availability of knowledge, skills, and literature

Carbon Capture Utilisation and Storage



Social, economic and environmental impacts of CCUS

Social impacts

Creation and sustenance of jobs

Indirect jobs in the supply chain

Increase of skills and knowledge

Stranded assets and workers- there will be winners and losers

Stability

Economic impacts

Boost clean economic growth

Substantial flow-on effects

Source of high-value spillovers that can stimulate innovation-led growth

Extension of existing infrastructure’s

Economy-wide pathways to net zero emissions

Economic barriers exist to the adoption of CCUS

Wide range of abatement costs

Social, economic and environmental impacts of CCUS

Positive environmental impacts

avoid CO_2 emissions at point

decrease the stock of CO_2 emissions already in the atmosphere through Carbon Dioxide Removal (CDR) technologies.

improve air quality when used for hydrogen production/ when fitted with a thermal plant without a pollution control system.

Negative environmental impacts

water stresses due to additional water requirements for chemical and physical processes

require more water for cooling the plant (as result of decreased efficiency)

Groundwater contamination (due to CO_2 leakage during geologic sequestration)

Global climate effect due to low-level CO_2 leaked back into the atmosphere

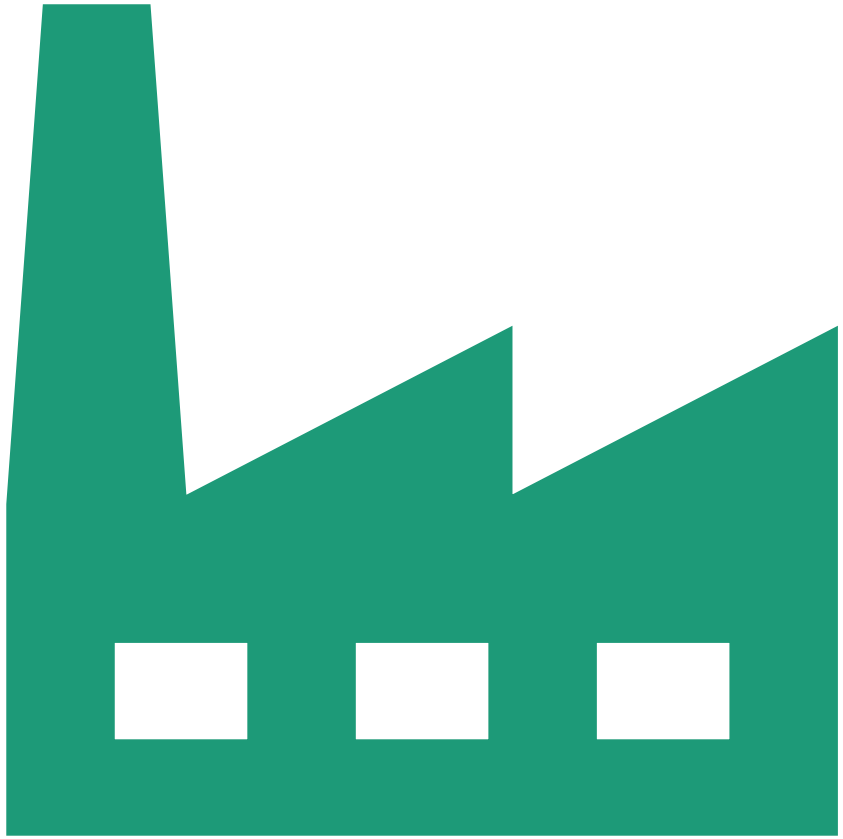
Social, economic and environmental impacts of CCUS

Cross cutting impact

need for technical regulation for CO_2 transport and geological storage

need for strengthening policy support to drive innovation and deployment

Hydrogen Production



Social impacts of hydrogen production

- Transformational changes in societal structure
- Health improvement
- Creation of quality and sustainable jobs (both upstream and downstream)
- **Leading to capacity and knowledge enhancement** because of reskilling and retooling of existing jobs
- **High potential for reducing inequality among nations** as countries become more and more energy independent
- **Promoting intergenerational equity,** including through improvement in ecosystem quality.
- **Addressing gender inequalities and empowerment –** due to decentralised production and use

Economic impact of hydrogen production

- More cost-effective energy transition by integrating with other low-carbon alternatives in energy, transport and industry
- Promotion of industries and revitalise regional economies through patents relating to hydrogen technology
- Possible use of existing gas infrastructure to transport hydrogen.
- Large-scale, efficient renewable electricity integration by taking away intermittent challenges of solar and wind
- Stimulation of new businesses: The technical and economic success of hydrogen-based distributed energy systems will stimulate new business ventures
- Serves as a feedstock for chemical industry
- boost global industrial competitiveness
- boost national economies by stimulating allied upstream and downstream industries and businesses.
- reduce resource dependency
- Promoting circular economy and industrial eco-symbiosis

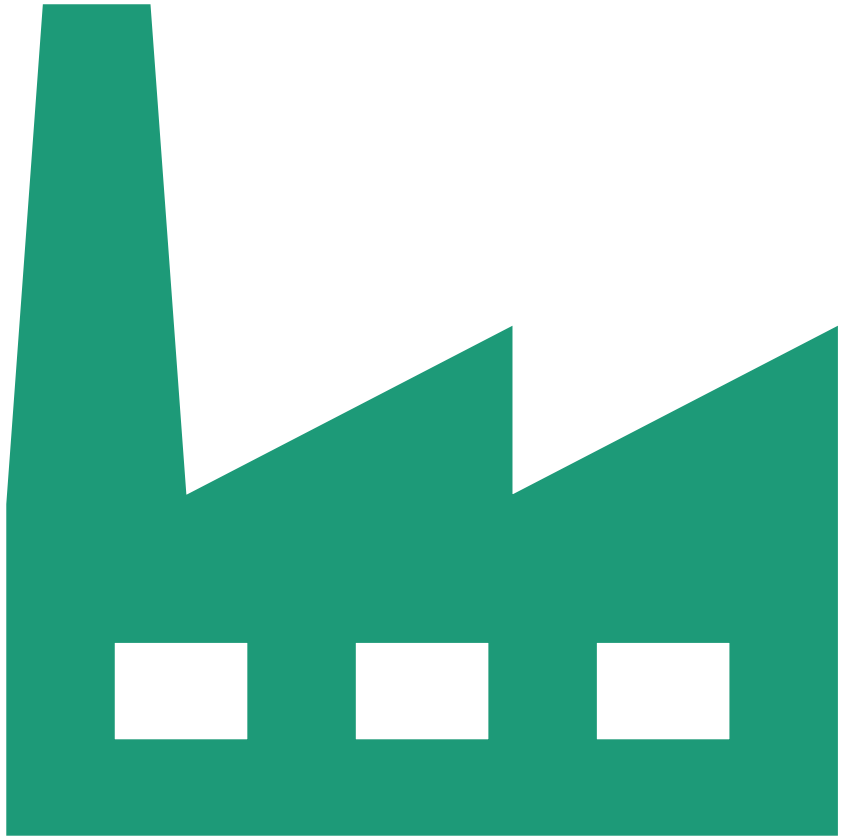
Environmental impacts of hydrogen production

- Long-term option for reducing CO_2 emissions.
- Ramp up efforts to achieving net zero targets pledged by governments and corporations in the wake of calls for climate action.
- Reduce environmental stress as when used to produce energy does not emit CO_2.
- Hydrogen warming impact - Climate consequences of hydrogen application relative to fossil fuel strongly depend on time horizon and leakage rate

Policy enablers for hydrogen production

- Mega funds for climate technologies is accessible developing countries to support hydrogen economy programs
- Collaboration on
  - adopting a uniform methodology for calculating life cycle greenhouse gas (GHG) emissions for hydrogen production
  - developing comprehensive and science-based terminology, as well as standards or best practices for deployment;
  - expand collaboration on sustainable hydrogen production across all regions
- Developing a tradeable Guarantee of Origin for hydrogen
- Development of relevant codes and standards to promote widespread adoption of the hydrogen economy.
- Putting in place the necessary systemic, legal and regulatory frameworks
- Promoting decentralized production and use of hydrogen in the energy, industry, and transport sectors

Artificial intelligence



Social and environmental impacts of AI

Social impacts

could deliver e-health services to 1.6 billion people across the developing and developed world.

Smart agriculture will boost yields by 30%, avoid 20% of food waste

Environmental impacts

Smart Agriculture can reduce water needs by 250 trillion litres and abate 2.0Gt CO_2e

Real-time traffic information, smart logistics, intelligent lighting and other ICT-enabled solutions could abate 3.6Gt CO_2e, including abatement from avoided travel

Smart manufacturing, including virtual manufacturing, customer-centric production, circular supply chains and smart services, could abate 2.7Gt CO_2e.

Economic impacts of AI

- AI is a tool that enables other tools and abatement methods to function optimally across all fields e.g.
  - In the energy sector, AI has the versatility to improve wind and solar generation forecasts and help the grid maximize; enable communications between electricity generators and consumers to better align use with resources
  - In transport sector, AI helps to improve EV charge scheduling, congestion management, vehicle-to-grid algorithms, and battery energy management, as well as by assisting in the research and development of EV batteries
  - AI improve climate modelling and predictions
- Economic returns are achieved through the employment creation, improve quality of life and enabling adoption of green technologies.

Policy recommendations

Cross cutting

- engagement of the private sector, including small and medium enterprises could facilitate maximizing positive social, economic and environmental impacts including to promote the creation of decent work and quality jobs in new/emerging business and industries

Policy recommendations - CCUS

- There is the need for the development regulatory framework at the national or global level. Such a framework will help ensure standardisation of the design and application of CCUS with high safety standard.
- Strengthening policy support for CCUS to drive innovation and deployment is central to the scaling up of CCUS. As the CCUS technology matures specific policy incentive are critical to expand the frontier of the market world-wide.

Policy recommendations- Hydrogen production

- Megafunds that have been ring-fenced for climate technologies, are accessible to developing countries to support hydrogen economy programs
- Collaboration is required
  - On adopting a uniform methodology for calculating life cycle greenhouse gas emissions for hydrogen, and
  - on developing comprehensive and science-based terminology, as well as standards or best practices for its deployment; and
  - expand collaboration on sustainable hydrogen production across all regions
  - the development of a sustainable hydrogen market by developing market stimulation programmes.
- Developing a tradeable Guarantee of Origin for Hydrogen to decouple physical from commercial flows and accelerate hydrogen deployment worldwide.
- Development of relevant codes and standards to promote widespread adoption of the hydrogen economy.
- Putting in place the necessary systemic, legal and regulatory frameworks.
- Development of bespoke institutional and capacity building and training packages to support the transition to the hydrogen economy.

Policy recommendations- Hydrogen production

- Establishment of state ministries to support hydrogen economy transition, infrastructure development and service delivery.
- Undertaking scientific assessments to pin down the national resource endowment potential for sustainable hydrogen production.
- Promoting decentralized production and use of hydrogen in the energy, industry, and transport sectors, with the view to achieving net-zero emissions growth.
- Developing systems for sustainable and transformational impacts monitoring, reporting and verification consistent with the enhanced transparency framework under the Paris Agreement.
- Supporting research and development as well as knowledge management infrastructure to promote peer-to-peer learning.
- Undertaking economic and financial analyses, including assessment of diversification of investments and business models for investment in the hydrogen economy.
- Promoting partnerships involving relevant national and international stakeholders from the public and the private sectors, as well as from civil society and the research and academia.

Policy recommendations - AI

- Promoting inter and intra-country learning, including by identifying relevant skills, optimization of existing knowledge and capabilities, and developing new skills through targeted training,
- Fostering collaboration among all stakeholders, undertaking joint pilot activities and programmes, and listening and sharing knowledge and data sets from governments (policymakers), business communities, research and academia, AI experts, and civil society groups.
- Consciously and systematically implementing and deploying AI tools to achieve the desired impacts.

Thanks