CCS. VITAL TO ACHIEVE NET-ZERO

IN THE FIGHT AGAINST CLIMATE CHANGE, CARBON CAPTURE AND STORAGE (CCS) IS A GAME-CHANGER.

Its ability to avoid CO_2 emissions at their source and enable large-scale reduction of CO_2 already in the atmosphere via carbon dioxide removal technologies, make it an essential part of the solution.

To avoid the worst outcomes from climate change, the IPCC Special Report on Global Warming of 1.5 degrees Celsius highlighted the importance of reaching net-zero emissions by mid-century. It presents four pathways for limiting global temperature rise to 1.5 degrees Celsius – all require carbon dioxide removal and three involve major use of CCS. The pathway that does not utilise CCS requires the most radical changes in human behaviour.

ACHIEVING COST-EFFECTIVE NET-ZERO EMISSIONS WITH CCS

FOUR MAIN WAYS TO ACHIEVE COST-EFFECTIVE NET-ZERO EMISSIONS THROUGH CCS INVESTMENT

ACHIEVING DEEP DECARBONISATION IN HARD-TO-ABATE INDUSTRY

The cement, iron and steel, and chemical sectors emit carbon due to the nature of their industrial processes and have high-temperature heat requirements. They are among the hardest to decarbonise. Several reports[1] conclude that achieving net-zero emissions in industries like these may be impossible and, at best, more expensive without CCS. CCS is one of the most mature and cost-effective options for deep decarbonisation of hard-to-abate industry.

ENABLING THE PRODUCTION OF LOW-CARBON HYDROGEN AT SCALE

To decarbonise hard-to-abate sectors and reach net-zero emissions, global hydrogen production must grow significantly, from 70 million tonnes per annum today[2] to 425–650 million tonnes a year by mid-century. Coal or natural gas with CCS is currently the most cost-effective way to produce low-carbon hydrogen. It is likely to remain so in regions where large amounts of affordable renewable electricity for hydrogen production with electrolysis is not available, and fossil fuel prices are low.

DELIVERING NEGATIVE EMISSIONS

Residual emissions in hard-to-abate sectors need to be compensated for. CCS provides the foundation for technology-based carbon dioxide removal, including bioenergy with CCS (BECCS) and direct air capture (DAC). While carbon dioxide removal is not a silver bullet, every year that passes without significant reductions in CO_2 emissions, makes it more necessary.

PROVIDING LOW CARBON DISPATCHABLE POWER

Decarbonising power generation is crucial to achieving net-zero emissions. CCS equipped power plants supply dispatchable and low-carbon electricity, as well as grid-stabilising services, such as inertia, frequency control and voltage control. Therefore, CCS complements renewables, helping make the low-carbon grid of the future resilient and reliable.

1 Including from the Energy Transition Commission and International Energy Agency (IEA)
2 70 Mtpa of pure H_2 is currently produced. About 50Mtpa of H_2 mixed with CO in syngas is also produced

CCS. VITAL TO ACHIEVE NET-ZERO

SUPPORTIVE POLICY NEEDED TO INCENTIVISE CCS INVESTMENT

To achieve net-zero emissions, today's worldwide installed capacity of CCS must increase more than a hundredfold by 2050. Stronger policy to incentivise rapid CCS investment is overdue. The current fleet of commercial CCS facilities provides examples of the mix of policies and project characteristics that have facilitated investment.

Governments will choose a policy framework that best suits its circumstances, and so long as a viable business case can be made, the private sector will invest in CCS. Like all technologies, CCS follows a learning curve whereby the cost of developing a CCS project will come down with deployment. This in turn reduces the cost of development, allowing smaller emitters to participate in investments. At the same time, risks are reduced with deployment through learning by doing, and this will lead to increased participation from financiers, including institutional investors.

BENEFITS OF CCS

Vital for reducing CO_2 emissions, investment in CCS provides several economic and social benefits:

- CREATING AND SUSTAINING HIGH-VALUE JOBS
- SUPPORTING ECONOMIC GROWTH THROUGH NEW NET-ZERO INDUSTRIES AND INNOVATION
- ENABLING INFRASTRUCTURE RE-USE AND THE DEFERRAL OF SHUT-DOWN COSTS
- CRITICALLY, CCS ALSO FACILITATES A 'JUST TRANSITION'[3]

GLOBAL STATUS OF CCS (AS AT NOVEMBER 2020)

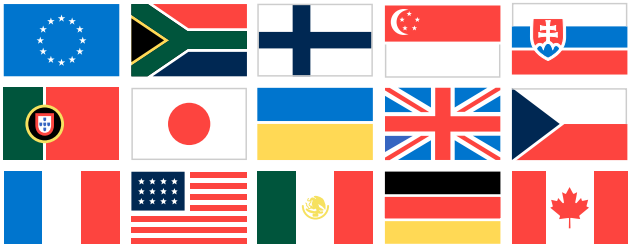
COMMERCIAL FACILITIES

65

- OPERATIONAL: 28
- IN CONSTRUCTION: 3
- IN VARIOUS STAGES OF DEVELOPMENT: 34

INTERNATIONAL CLIMATE POLICY

15 of the19 submitted long-term low-greenhouse-gas emission development strategies (LEDS) under the UNFCCC have included CCS[4].



European Union, South Africa, Finland, Singapore, Slovakia, Portugal, Japan, Ukraine, UK, Czechia, France, US, Mexico, Germany and Canada

CURRENT INSTALLED CAPACITY

Today's worldwide installed capacity of CCS exceeds 40 Mt per annum.

40Mt
CAPTURED & STORED

DELIVERING GLOBAL CLIMATE TARGETS

To achieve net-zero emissions, today's installed CCS capacity must increase more than a hundredfold by 2050.

2,000+
LARGE-SCALE FACILITIES REQUIRED BY 2050

3 Townsend et al., 2020
4 As at November 2020

GLOBAL CCS INSTITUTE