2018 THOUGHT LEADERSHIP

CCS POLICY INDICATOR (CCS-PI)

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2018 REVIEW

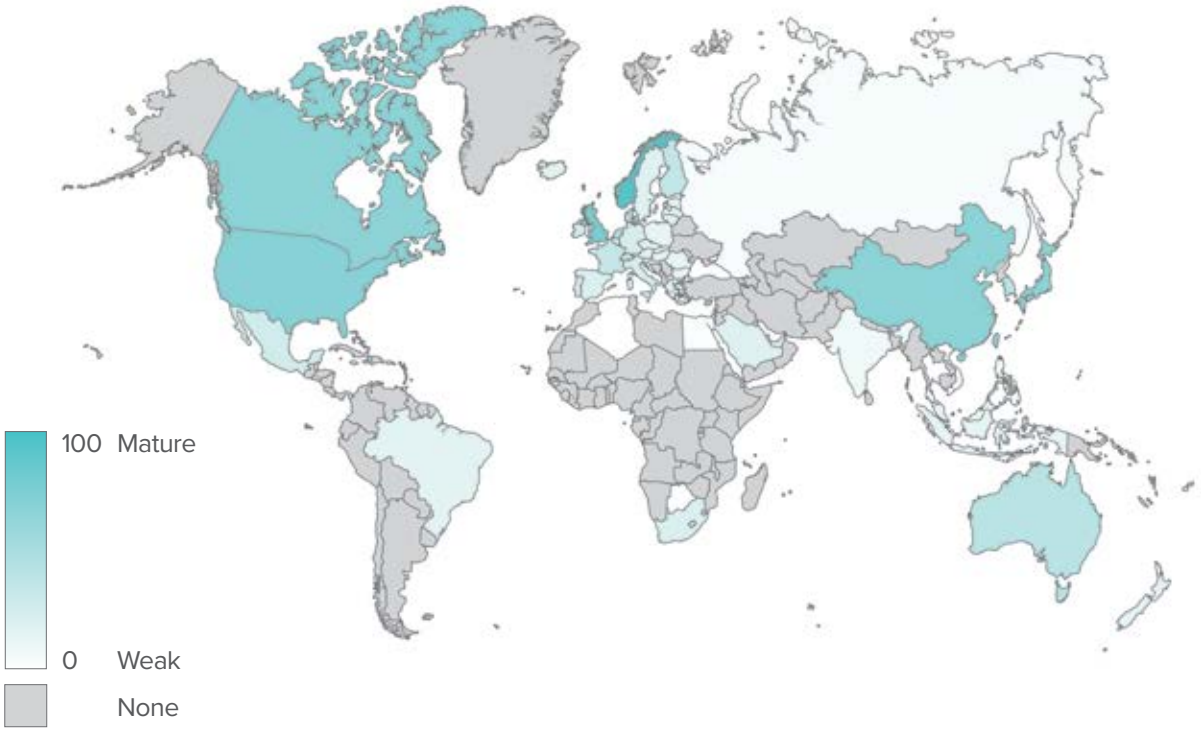
The Global CCS Institute's (the Institute) Global Policy Indicator (CCS-PI) tracks the development of government policy to accelerate the deployment of carbon capture and storage (CCS) as an essential climate mitigation technology in over 100 countries. The CCS-PI considers policy across nine measures. The CCS-PI applies a quantitative methodology to derive a single score, normalised to 100, for each country. The final score representing the extent to which policy settings support a business case for investment in CCS. Higher scores indicate more developed policy environments (Figure 1).

The 2018 assessment shows that progress has been made since 2015 with nations including Norway, Japan, China, France and Mexico achieving a significant increase in their CCS-PI score. The United Kingdom and United States of America saw a reduction in their CCS-PI scores compared to 2015, but both have taken significant and positive steps in 2017/2018. The highest CCS-PI score achieved was 56/100 (Norway).

The CCS-PI methodology was slightly modified for the 2018 assessment to more closely align it with the drivers of investment decisions. Figure 2 plots CCS-PI against the Global CCS Institute's CCS Inherent Interest indicator (CCS-CI). The CCS-CI uses a range of data on fossil fuel production and demand to determine a relative measure of a nation's economic dependence upon fossil fuels. Countries that produce and/or consume the largest quantities of fossil fuels such as Australia, Canada, China, Germany, India, Indonesia, Russia and the United States have the highest reliance on fossil fuels and the highest CCS-CI scores. CCS is most critical for these nations to protect their economies from the potential deleterious impacts of pursuing deep emission reductions.

The policy confidence required to drive rapid deployment of CCS consistent with closing the gap between the cumulative impact of all Nationally Determined Contributions and ambitious climate targets agreed in Paris has not yet developed in any nation.

Figure 1: 2018 Policy Indicator Heat Map



Six nations are clear leaders

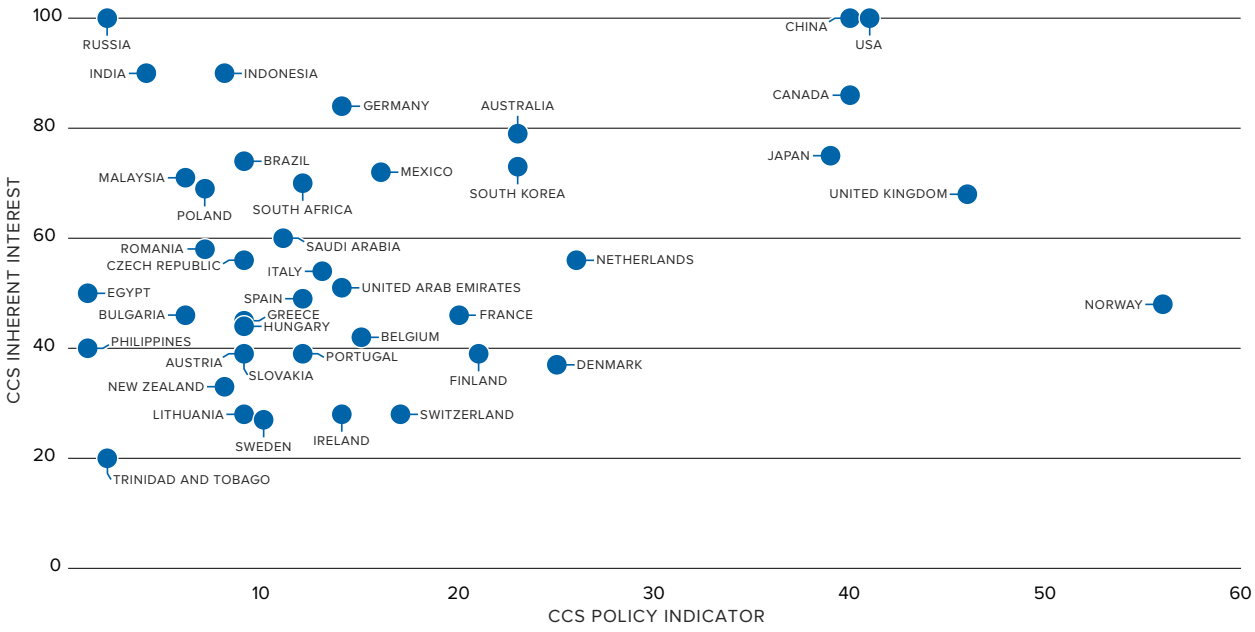
Whilst no nation has yet implemented policies to deploy CCS consistent with achieving climate targets agreed in Paris, six have established themselves as clear leaders and fall into Band A on the CCS-PI scale. These nations are Norway, the United Kingdom, United States of America (USA), China, Canada and Japan. All of these countries have experience in constructing and/or operating large-scale CCS facilities or smaller scale pilot project activities.

The United Kingdom currently has no CCS facilities under construction or in operation but has established strong institutional frameworks and broader supporting policies that are stimulating significant activity and building confidence that a business case for investment in CCS will emerge in the foreseeable future.

Four nations have a sound foundation for policy development

The Netherlands, Denmark, Australia and South Korea have all implemented significant policy initiatives designed to facilitate CCS however their portfolio of policies is less comprehensive than the six leading nations. These nations make up Band B of the the Institute's CCS-PI with scores between 23 and 26/100. These nations have all supported notable CCS demonstration and research activities and their governments have adopted a favorable stance towards CCS. Of these nations, only Australia has a large-scale CCS facility in construction which was a mandatory condition of approval for a liquified natural gas production operation. A business case for investment in large scale facilities in Band B nations is generally less well developed than in the leading six nations.

Figure 2: Comparing 2018 CCS Policy Indicator results and the 2018 Inherent CCS Interest Scores for key countries.



Most nations' policies are very immature

The policy response of nations outside of the top ten identified in the previous sections are very immature, with little or no effective policy to incentivize emissions reduction through CCS. It is notable, however, that three nations within Band C of the CCS-PI have operating large-scale CCS facilities. These nations are Saudi Arabia and the United Arab Emirates (UAE) in Band C, and Brazil in Band D (see section 2.2 for a discussion).

Within Band C and Band D are three sub-groups worth mentioning. The first sub-group includes Russia, India, Indonesia and Germany. These nations have the highest CCS-CI scores indicating the greatest need for CCS to decarbonise their economies, whilst having very poorly developed policies to deploy CCS. The development of progressive policies is most urgent in these countries.

The second sub-group is European nations that have benefited from European Commission directives but have very little domestic policy to incentivise investment in CCS. These nations, with developed economies, generally have low rates of annual growth in emissions from fossil fuels in their energy mix and industries. The other sub-group consists of the rapidly growing emerging economies of South East Asia with high rates of growth in emissions. To illustrate, coal utilisation in members of the Association of South East Asian Nations (ASEAN) is projected to more than triple between 2013 by 2035. Urgency will increase most rapidly in ASEAN nations as their economies become increasingly dependent upon fossil fuels to power their energy systems and as inputs to their industries.

1.0 INTRODUCTION

Similar to many other environmental outcomes, stabilisation of the global climate requires government intervention to alter the behavior of sectors, companies, public institutions and individuals. Government policy given effect through law and the allocation of public resources is critical to achieving climate targets. CCS requires investment in long-lived capital-intensive assets.

A single CCS facility may deliver millions of tonnes of CO_2 emissions abatement per year, require an initial investment of hundreds of millions to billions of dollars, and operate for decades. Investors must be confident that their investment will deliver their required rate of return over its life. Government policy plays a material role in determining the return on investment for any climate mitigation technology making confidence in government policy a pre-requisite of investment. The CCS-PI considers policy across nine policy measures and applies a quantitative methodology to derive a single score, normalized to 100, for each country representing the extent to which policy settings support a business case for investment in CCS. Higher scores indicate more developed policy environments. The policy measures considered by the CCS-PI are:

1. Policy Leadership
2. Government Commitment
3. Fiscal Incentives
4. Information Sharing and Adoption
5. Regulations
6. Public Finance
7. International Collaboration
8. Market Mechanisms
9. Institutional Strengthening

By consolidating nine policy measures into a single number, the CCS-PI is effectively a measure of policy confidence in the context of investment in CCS. It is notable that the leading nations with similar but still relatively low CCS-PI scores (i.e. circa 50/100) have quite dissimilar policy environments indicating that they are on different pathways in the early deployment of CCS, each addressing some of the dimensions of policy confidence, but none addressing all. Clearly, to achieve higher CCS-PI scores required to accelerate CCS deployment, Governments will need to converge on a set of policy measures that address all dimensions of policy confidence. The detailed policy design will vary from nation to nation, but they will likely draw on most if not all of the policy tools summarised below:

- Economy-wide emission reduction targets;
- Sector-specific emission reduction targets;
- CCS deployment targets and programs
- Fiscal incentives such as capital and operational support for CCS deployment (e.g. capital grants, contracts for difference, feed in tariffs, CO_2 storage payments)
- Promulgation of CCS-specific legal and regulatory regimes which address all aspects of the project lifecycle and the establishment of capacity within institutions to apply them
- Removal of legal barriers to CCS such as the failure to ratify amendments to the London Protocol
- Introduction of a robust value on carbon
- Sustained research and development support
- Public education and international collaboration.

1.1 Changes since 2015

The methodology used to calculate the CCS-PI has been slightly modified to better align it with the drivers of investment. The 2015 CCS-PI scores have been re-calculated using the updated methodology and are presented with the 2018 scores in Appendix. The policies of 38 additional countries have been assessed under the CCS-since 2015.

The most significant driver of change in global climate policy has been the Paris Agreement. This agreement had only been announced at the time of publication of the 2015 indicator and it had not yet flowed into the implementation of any material changes in policy. Today thirteen countries plus the European Union mention CCS in their Nationally Determined Contributions under the Paris Agreement.. Those countries are Bahrain, China, Egypt, Iran, Iraq, Japan, Malawi, Mexico, Montenegro, Norway, Saudi Arabia, South Africa, and the United Arab Emirates.

There is evidence that the need for CCS to meet emission reduction targets and the ultimate objective of the Paris Agreement (i.e. limiting global average temperature increases to significantly less than two degrees Celsius) has started to be recognized by some governments, resulting in positive changes to policy in 2017 and 2018. The best examples are Norway and Japan. Norway has a long history of government policies designed to support CCS. In addition, in 2018 the Norwegian Government announced that it is funding Front End Engineering and Design studies for two large scale CCS facilities, increasing its CCS-PI score from 40 in 2015 to 56 in 2018. Japan has increased its support for a portfolio of demonstration projects, increasing its score from 27 to 39 and moving it from Band B up to Band A. Other countries that have announced support or advanced progressive policies that have significantly increased their CCS-PI scores (increase of three points or more) since 2015 include Australia, China, France and Mexico.

A number of countries have achieved significantly lower CCS-PI scores (decrease of three points or more) in 2018 compared to 2015. These countries include the United Kingdom, United States of America, South Africa and Malaysia. Although the United Kingdom's CCS-PI score reduced from 58 to 46 between 2015 and 2018 due to the cancellation of its one billion pound grant program for large-scale CCS facilities, more recent activities have confirmed the UK's long-term commitment to CCS. In October 2017 the United Kingdom Government released its Clean Growth Strategy confirming the role of CCS in decarbonizing its economy, and subsequently established a CCUS Cost Challenge Taskforce. The United States of America has announced an intention to withdraw from the Paris agreement contributing to a reduction in its CCS-PI score from 49 to 41, however it has also increased and extended the tax credit for CO_2 used for enhanced oil recovery (EOR) or injected for permanent storage. The tax credit will ramp up to USD35 per tonne and USD50 per tonne by 2026 for enhanced oil recovery and dedicated storage respectively. These tax credits are some of the most progressive values on carbon in the world.

Of the remaining countries assessed under the CCS-PI methodology, 12 have not had any significant movement in CCS-PI score since 2015, and 38 countries have been assessed for the first time in 2018.

Overall, the global policy environment as measured by the most important indicator, the number of large scale CCS facilities in operation, indicates slow but positive progress. Since 2015, four new large-scale CCS facilities have commenced operating (and one facility has closed). Today there are 18 large-scale CCS facilities in operation and an additional five under construction. This progress is most welcome, but clearly more needs to be done if ambitious climate targets are to be met.

2.0 DETAILED REGIONAL REVIEW

2.1 Global overview

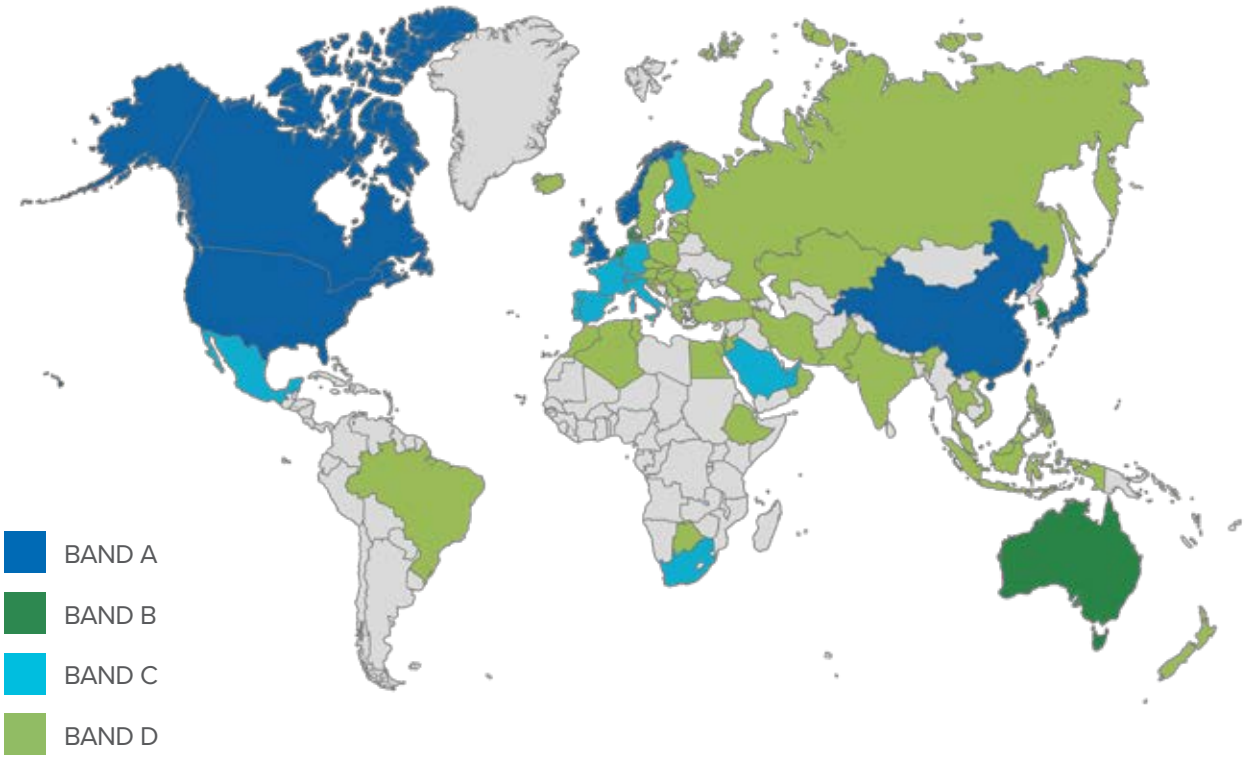
Norway, the United Kingdom, United States of America, China, Canada and Japan are in Band A with the highest CCS-PI scores. These nation's policies are the most supportive of CCS. All have experience in constructing and/or operating large-scale CCS facilities or smaller scale pilot project activities. The United Kingdom currently has no large-scale CCS facilities under construction or in operation but has established strong institutional frameworks and broader supporting policies that are stimulating significant activity and building confidence that a business case for investment in CCS will emerge in the foreseeable future.

These nations have quite dissimilar policy environments indicating that they are on different pathways in the early deployment of CCS, each addressing some of the dimensions of policy confidence, but none addressing all. Clearly, to achieve higher CCS-PI scores required to accelerate CCS deployment, Governments will need to converge on a set of policy measures that address all dimensions of policy confidence.

There are four countries in Band B.

- The Netherlands
- Denmark
- Australia
- South Korea.

Figure 3: CCS Policy Indicator country ranking

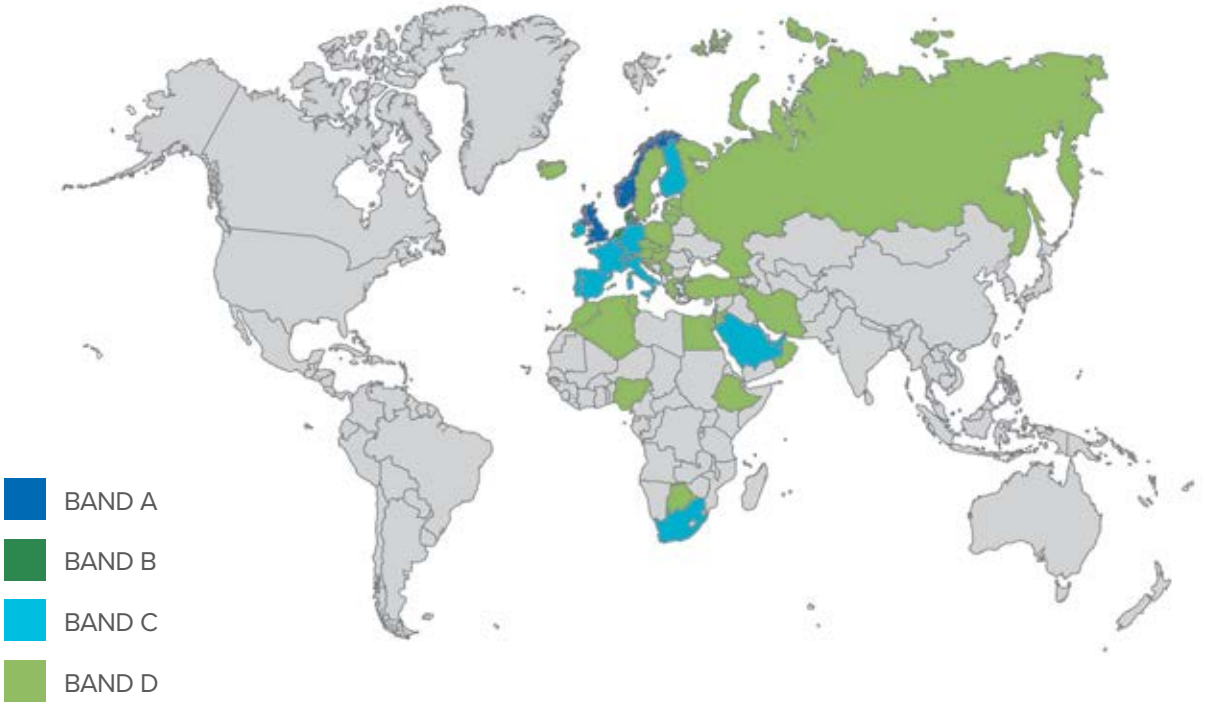


These nations have implemented significant policy initiatives designed to facilitate CCS however their portfolio of policies is generally less comprehensive than the six leading nations. All have supported notable CCS demonstration and research activities and their governments have adopted a favorable stance towards CCS. Of these nations, only Australia has a large-scale CCS facility in construction which is a mandatory condition of approval for a natural gas production operation. A business case for investment in large-scale facilities in Band B nations is generally less well developed than in the leading six nations.

The remaining countries are in Band C or Band D with CCS-PI scores of 21/100 or lower. These nations have very immature policies supporting CCS deployment. Notwithstanding an immature policy environment, two nations in Band C (Saudi Arabia and the United Arab Emirates) and one in Band D (Brazil) have large scale CCS facilities in operation. In all three cases, the CCS facility is operated by a State-Owned Enterprise for the purpose of enhanced oil recovery (CO_2EOR) and the prime driver of the positive investment decision was commercial. These projects required little or no policy support to incentivize the investment in CCS demonstrating a significant opportunity to leverage CO_2EOR to deliver emissions abatement. However, to achieve climate targets, thousands of CCS facilities must be constructed around the world and the overwhelming majority of those will not be able to achieve financial close without policies to incentivize the investment.

2.2 Europe, Middle East and Africa

Figure 4: CCS Rank Map – Policy Indicator – Europe, Middle East and Africa



EUROPE

All members of the European Commission benefit from directives, the development of the Emissions Trading Scheme (ETS), associated technology funding programmes and broad but consistent statements identifying the potential role of CCS. As part of the revision of the Emissions Trading Scheme (ETS), the European Commission has established the Innovation Fund which will set aside 450 million European Union Allowances to support renewable and CCUS energy demonstration projects, energy storage and low carbon innovation in energy intensive industry. At least 400 million allowances will be reserved from 2021 and a further 50 million unallocated allowances from the 2013-2020 New Entrant Reserve Fund (NER300) will be available. At the current EUA price of over €20, this fund is worth over nine billion Euros. The details of the Fund are currently being drafted.

Norway

Norway has the highest CCS-PI score of all countries, which increased from 40 in 2015 to 56 in 2018. In 2018, the Norwegian government allocated 280 million NOK to advance CCS deployment including funding to support Front End Engineering and Design (FEED) studies for two full chain CCS projects. Each of these projects will capture 400,000 million tonnes per annum of CO_2 for storage below the North Sea seabed. Norway has a long history of government policies designed to support CCS. In addition to the support mentioned above, Norway has had a carbon tax since the 1990's. The Norwegian government has established Gassnova, a state-owned research organization focused on CCS, and the Technology Centre Mongstad, a CO_2 capture technology testing facility.

United Kingdom

The United Kingdom has the second highest CCS-PI score of all countries, which decreased from 58 in 2015 to 46 in 2018. The decrease arose from the UK Government's cancellation of its one billion pound CCS grant program for large scale CCS deployment, but more recent action confirms the UKs long term commitment to CCS. The UK government released its Clean Growth Strategy in October 2017 stating that the government's ambition was to have the option to deploy CCUS at scale during the 2030s subject to costs coming down sufficiently. Subsequently, The Rt Hon Claire Perry MP, UK Minister of State for Energy and Clean Growth, established the CCUS Cost Challenge Taskforce which delivered its report Delivering Clean Growth in July 2018. The Taskforce report acknowledged that CCS and CCUS are pivotal to decarbonising major industry – steel, cement, fertiliser, petrochemicals, and flexible natural gas – and identified the need for stable long term supportive policy. The report lays the foundation for the UK to move to a new energy economy with decarbonised heavy industry and hydrogen fuels that complement renewable deployment. The UK's high-ranking position is also due to strong institutional frameworks and a range of supporting policies including emission performance standards, a carbon price floor and CCS research funding.

The Netherlands

The Netherlands is at the top of Band B with a CCS-PI score of 26 (from 29 in 2015). The ROAD project, which would have captured one million tonnes of CO_2 per year from a coal-fired power station for storage in a depleted gas field in the North Sea, was cancelled in 2017. This setback was offset by the announcement of ambitious new climate targets and an increased role for CCS in reducing emissions by the Dutch Government in October 2017. The new plan calls for a 49 per cent reduction in CO_2 emissions by 2030 with CCS delivering at least 20 million tonnes of abatement per year by 2030. These targets are Europe's most ambitious for CCS.

Denmark

Denmark is a new entrant to the CCS-PI indicator with a score of 25; just behind the Netherlands and eighth overall. Denmark has legislated a target to transform the Danish economy into a low emission society by 2050 and has had a carbon tax of approximately USD25 per tonne since 1992. Denmark was a participant in the NORDICCCS project which completed a roadmap for CCS in Nordic countries in 2016.

Other Europe

The ranking of other European countries generally reflects EU-wide policy, including ongoing reforms of the Emissions Trading Scheme (ETS), associated technology funding programmes and broad but consistent statements identifying the potential role of CCS.

MIDDLE EAST

The Middle East region has enormous potential for CCS due to demand for CO_2EOR, a concentration of expertise in managing fluids in the subsurface and very well characterised basins as a consequence of many decades of oil exploration and production. There is also a recognition of the role of CCS in reducing emissions from industry such as steel and cement production. Saudi Arabia and the UAE are the most advanced. Other Middle East nations have less developed policy environments.

Saudi Arabia and the United Arab Emirates

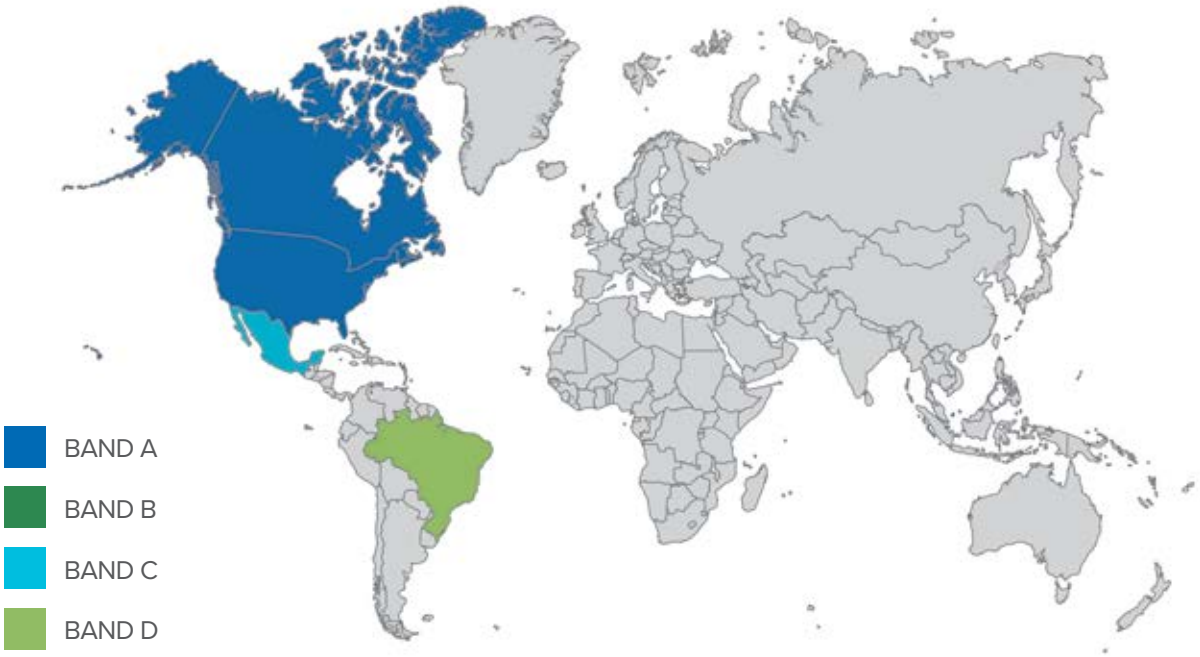
The relatively low CCS-PI scores for Saudi Arabia (11) and the UAE (14) are counter-intuitive as both nations have operating large-scale CCS facilities. In both cases, demand for CO_2 for enhanced oil recovery allowed State Owned Enterprises to invest in CCS. In effect, the governments of Saudi Arabia and the UAE have adopted a strategy of state ownership of CCS facilities to supply CO_2 for enhanced oil production, at least in the early stages of deployment, rather than establishing policy environments to encourage private sector investment. This, together with the nature of their governance arrangements has enabled Saudi Arabia and the UAE to advance CCS deployment without the broad range of policy measures that are generally required in other jurisdictions, resulting in a relatively low CCS-PI score.

AFRICA

African nations have emerging economies, are focused on near term development objectives and have very few significant policies related to mitigating climate change and fewer still related to enabling CCS. South Africa has the highest CCS-PI score (12) of the seven African countries with a score above zero. The South African Government, through the South African National Energy Development Institute and the South African Centre for CCS, supports knowledge sharing, capacity building and research activities related to CCS. This includes the Pilot Carbon Dioxide Storage Project (PCDSP) which will demonstrate the injection, storage and monitoring of between 10,000 and 50,000 tonnes of CO_2. Sites for the PCDSP are currently under investigation. South Africa has also been an active participant in international initiatives to advance CCS including the Carbon Sequestration Leadership Forum.

2.3 Americas

Figure 5: CCS Rank Map – Policy Indicator – Americas



UNITED STATES OF AMERICA

The USA has the third highest CCS-PI score of all countries, which decreased from 49 in 2015 to 41 in 2018. The reduction was caused by the new Administration rejecting the Clean Power Plan, abandoning various agreements with China, Mexico and Canada on technology collaboration and announcing its intent to withdraw from the Paris Agreement.

Whilst the rhetoric of the current Administration places no priority on emission reduction, the USA has established one of the world's most progressive values on carbon that is captured and geologically stored. In February 2018, the US Congress extended and increased the tax credits for the geological storage of CO_2. The CCUS tax credit was originally created in 2008 and was worth USD10 per tonne of CO_2 used for enhanced oil recovery and USD20 per tonne of CO_2 stored in saline formations. The original program was capped at 75 million tonnes of CO_2, after which it would no longer be available. The 2018 amendments:

- Increase the current tax credit for CO_2 that is captured and used for Enhanced Oil Recovery or natural gas recovery to USD35 per tonne in 2026
- Increase the current tax credit for CO_2 that is captured and stored in saline formations to USD50 per tonne in 2026
- Ramp up the tax credits from the original values to the new values in 2026 after which they will be indexed by inflation.
- Remove the 75 million tonne cap on the program.

New build and retrofit CCS projects that commence construction before 1 January 2024 are eligible to claim the credits for 12 years starting from the date the equipment was first placed into service subject to the following annual CO_2 capture thresholds:

- 500,000 tonnes for power facilities
- 100,000 tonnes for industrial facilities
- 25,000 tonnes for industrial pilot facilities.

These amendments bolster the business case for investment in CCS and provide the policy confidence that investors require. A value of up to USD50 per tonne of CO2 is likely to incentivise a new wave of new CCS facilities in the USA over the next five years.

The USA already has the most large-scale CCS facilities in operation (nine) with two new facilities commencing operation since 2015. The USA funds significant research and development activities on CCS as well as having provided capital grants to support large scale CCS facilities.

CANADA

Canada has the fourth highest CCS-PI score of 40 (38 in 2015) and has three large scale CCS facilities in operation, demonstrating longstanding and significant supporting policy. These policies include

- Capital grants from the Federal and provincial governments
- An Emission Performance Standard of 420kg CO_2 per MWh for new coal fired plant and plant that have reached the end of their life.
- Significant Federal and Provincial government support for research and development
- Development of CCS-specific legislation.

Canada is also moving towards national carbon pricing. Under Canada's Clean Growth and Climate Action Plan, a Federal initiative, each Canadian province and territory is required provide the federal government with a description of their first annual plan to price carbon. The price must start at CAN$10 per tonne of CO_2 (or greater) and rise to CAN$50 per tonne by 2022. A federal carbon pricing system will come into effect on 1 January 2019, as a backstop in any province that does not put its own carbon pricing system in place that meets the federal standard. All direct revenue from carbon pricing will go back to the jurisdiction of origin.

A few provinces have already adopted a price on carbon, however a new provincial government in Ontario cancelled its cap and trade program in early 2018 and Saskatchewan has challenged the federal carbon tax.

MEXICO

Mexico is the highest ranked developing country outside of China with a CCS-PI score of 16, up from 11 in 2015. It is a leader amongst developing countries on climate change, and also leads many developed nations. Mexico has identified CCS as an important component of its suite of measures to reduce greenhouse gas emissions, attracting funding support for capacity building projects and techno-economic assessments of potential demonstration projects from the World Bank.

In December 2017 the Mexican Ministry of Energy (SENER) launched the Mexican CCUS Centre to advance carbon capture, utilization and storage in Mexico. The CCUS Center will support the development and completion of two carbon capture pilot plants in Mexico: the Carbon Capture Pilot Project on a natural gas combined cycle power plant operated by the Federal Electricity Commission, and a CO_2EOR Storage Project operated by PEMEX.

Mexico has established ambitious emission reduction targets, which require relying on clean energy, including fossil fuels with CCS, for 50 per cent of power generation by 2050, and introduced a carbon tax of approximately USD3.50 per tonne on fossil fuels in 2014. In September 2018, the Mexican government announced a pilot carbon market commencing in 2019 that will run for three years and then transition into an Emissions Trading Scheme in 2022.

2.4 Asia-Pacific

Figure 6: CCS Rank Map – Policy Indicator – Asia Pacific

AUSTRALIA

Australia is in Band B with a CCS-PI score of 23, up from 19 in 2015. Australia has been a strong supporter of CCS for over a decade. The Australian federal and state governments have provided grants for pilot CCS projects, undertaken geological storage assessments, funded CCS research and development, promulgated laws for the regulation of geological storage of CO_2, developed CCS roadmaps and infrastructure plans, and mandated CCS on the Gorgon Liquified Natural Gas project. Gorgon will be the world's largest dedicated CO_2 storage project when it commences operation in 2019.

Further progress in advancing effective policy to mitigate climate change or to deploy CCS has stalled in recent years in response to rising concerns about the rising price of electricity.

CHINA

China's CCS-PI score has increased from 34 in 2015 to 40 in 2018 establishing it as a member of the global leadership group (Band A) and the highest scoring Asian nation. CCS appears in China's previous and current Five Year Plans. The 12th Five Year Plan (2010 to 2015) included the goal of developing CCS technology for application in the coal-to-chemicals, cement, and steel sectors, as well as deploying fully integrated demonstration projects. In 2015, the Asian Development Bank and the Chinese Government announced a Roadmap for CCS Demonstration and Deployment, which outlined the strategy for the advancement of CCS and its role in the 13th Five Year Plan.

China has consistently shown support through a range of state-sponsored activities on CCS including the provision of comprehensive research and development funding. The state-owned China National Petroleum Company commenced operating China's first large scale CCS facility in 2018. Sinopec and Yanchang Petroleum, two other state owned enterprises, have each commenced construction of a large scale CCS facility. These two additional facilities are expected to commence operation in 2019 and 2020.

China is pursuing broad actions towards climate change mitigation including a carbon emissions trading system, which is expected to be fully implemented in 2020.

Currently China has the highest number of CCS pilot and demonstration plants in operation and in construction, as well as the largest number of large-scale CCS facilities in planning.

JAPAN

Japan's CCS-PI score increased from 27 in 2015 to 39 in 2018 taking it into the Band A leadership group. Japan has a comprehensive and strategic program to accelerate the deployment of CCS with the stated aim of achieving the practical use of CCS by the 2020s. Led by the Ministry of the Environment and the Ministry of Economy Trade and Industry, the Japanese government supports a wide range of studies on the investigation of potential CO_2 storage sites, CCS feasibility studies, the assessment of legal and regulatory structures necessary for the management of long-term liability for stored CO_2, and the environmental, economic and social impacts of CCS.
The Japanese government provides funding for CCS demonstration facilities including the Hydrogen Energy Supply Chain Project announced in 2018, which will demonstrate Japanese gasification technology on Australian brown coal to produce hydrogen, and test hydrogen transport logistics between Victoria (in Australia) and Japan.

Other CCS pilot projects supported by the Japanese Government are the Mikawa Post Combustion Capture Demonstration Plant, the Osaki CoolGen Project (both in construction) and the Tomakomai CCS Demonstration Project and the Saga City Waste Incineration Plant (both operating).

Japan has implemented a broad range of initiatives to drive emission reduction across its economy including requiring new coal fired plants to be equipped with CCS by 2030, regional emissions trading schemes and a national carbon tax on fossil fuels of JPY289 per tonne of CO_2.

REPUBLIC OF KOREA

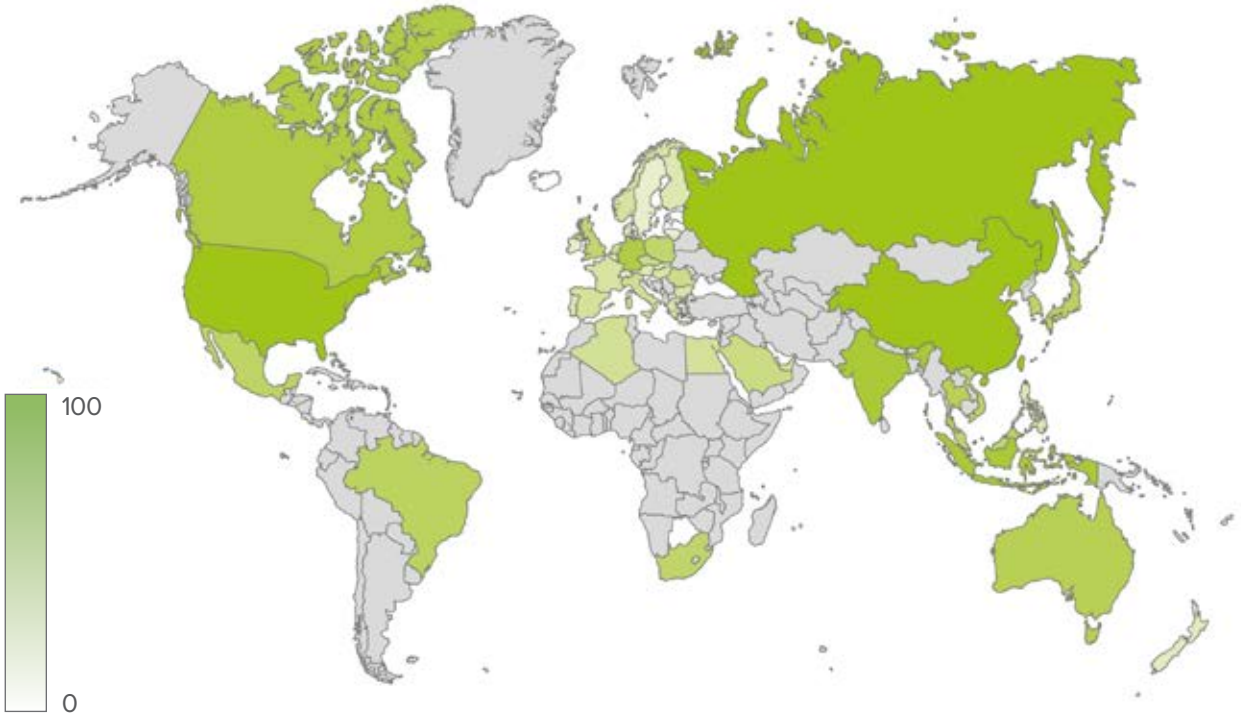
The Republic of Korea is in Band B with a CCS-PI score of 23. The Republic of Korea launched the Korean Emissions Trading Scheme in January 2015 with the aim of reducing the nation's emissions by 30 per cent below business as usual by 2030. CCS has been identified by the Government of the Republic of Korea as one of the core technologies for the reduction of greenhouse emissions. The government has supported the establishment of the Korean CCS Research and Development Center to develop and demonstrate CCS technologies, promote their commercialisation and build international links. Two pilot capture facilities on power stations successfully completed testing in 2017. Two large scale CCS facilities are in early development.

OTHER ASIA PACIFIC

Many Asian nations have rapidly growing economies, energy demand and emissions. Similar to Africa, most are developing nations with over-riding near-term economic development priorities. Longer term challenges such as climate change attract significantly less resource. Whist they recognise the long-term need for CCS, they are generally focussed on building capacity such that they can move towards deployment at some point in the future. This policy position is well represented amongst the ten member states of the Association of South East Asian Nations (ASEAN).

3.0 INHERENT CCS INTEREST 2018

Figure 7 – Inherent CCS Interest Indicator 2018



The inherent interest indicator (CCS-CI) uses a range of data on fossil fuel production and demand to determine a relative measure of a nation's economic dependence upon fossil fuels. The CCS-PI and indeed all CCS indicators are compared to the CCS-CI. The hypothesis for this approach is that countries with a higher "inherent interest" should place a higher priority on CCS deployment and be more advanced in driving deployment. Countries that produce and/or consume the largest quantities of fossil fuels such as Australia, Canada, China, Germany, India, Indonesia, Russia and the United States have the highest reliance on fossil fuels and the highest CCS-PI scores. CCS is most critical for these nations to protect their economies from the potential deleterious impacts of pursuing deep emission reductions.

The development of progressive policies to incentivise CCS deployment is most urgent for nations whose economies have high levels of dependence on fossil fuels (i.e. high CCS-CI scores), but the least developed policy environments (low CCS-PI). These countries, which appear in the top left quadrant of the CCS-PI chart, are Russia, India, Indonesia and Germany. Collectively the source of approximately 16 per cent of global carbon dioxide emissions, CCS will be required to play a very significant role in decarbonizing their industries and energy systems.

4.0 METHODOLOGY

The Global CCS Institute's Global Policy Indicator (CCS-PI) tracks the development of government policy to accelerate the deployment of carbon capture and storage (CCS) in over 100 countries – only nations with scores above zero are presented in this report. The purpose of the indicator is to provide a relative measure of the state of development of a nation's policies with respect to their efficacy in deploying CCS for climate mitigation purposes.

The Policy Indicator is built up from 32 factors which combine to form nine policy measures. Each policy measure considers between two and six factors. The policy measures are then combined using appropriate weightings into three sub-indicators. Figure 8 below lists the policy measures and their weightings for each of the three sub-indicators (the factors are proprietary and are not shown).

Figure 8. Policy measure weighting factors for each of the three sub-indicators

Policy Measure	Policy Measure Weighting Factor for Leadership Sub-Indicator (%)	Policy Measure Weighting Factor for Demonstration Sub-Indicator (%)	Policy Measure Weighting Factor for Deployment Sub-Indicator (%)
Policy Leadership	100	0	0
Government Commitment	0	20	15
Fiscal Incentives	0	15	20
Information Sharing and Adoption	0	5	0
Regulation	0	5	10
Public Finance	0	30	20
International Collaboration	0	5	0
Market Mechanisms	0	15	20
Institutional Strengthening	0	5	15

The sub-indicators are then weighted to produce the overall policy indicator score. Figure 9 shows the weighting factors for each of the sub-indicators.

Figure 9. Sub-indicator weighting factors for the Policy Indicator

	Leadership Sub-Indicator	Demonstration Sub-Indicator	Deployment Sub-Indicator
Sub-indicator weighting factor for Policy Indicator (%)	5	25	70

The final score for each nation is then normalized to a score out of 100.

2018 CHANGES TO CCS-PI METHODOLOGY

The 2018 edition of the CCS-PI reflects some changes with respect to the calculation of earlier editions, these include:

1. Several policy factors have been added to reflect the rising prominence of governments and statutory bodies setting legislated long-term emission reduction targets and associated interim targets/carbon budgets, which has been spurred by the 2015 Paris Agreement.
2. Similarly, some factors have been merged or deleted, particularly those that overlapped with the Institute's CCS Legal and Regulatory Indicator.
3. These changes necessitated revisiting some of the weightings within the Policy Indicator.
4. The 2015 Index results have been recast against these new weightings and revised set of policy variables to ensure like-for-like comparisons.

5.0 APPENDICES

BAND A

COUNTRY	TOTAL SCORE Out of 100	MOVEMENT From 2015 assessment score
Norway	56	▲
United Kingdom	46	▼
USA	41	▼
Canada	40	▲
China	40	▲
Japan	39	▲

BAND B

COUNTRY	TOTAL SCORE Out of 100	MOVEMENT From 2015 assessment score
Netherlands	26	▼
Denmark	25	new entry
Australia	23	▲
South Korea	23	▲

BAND C

COUNTRY	TOTAL SCORE Out of 100	MOVEMENT From 2015 assessment score
Finland	21	new entry
France	20	▲
Switzerland	17	new entry
Mexico	16	▲
Belgium	15	new entry
Ireland	14	new entry
Germany	14	▲
United Arab Emirates	14	▼
Italy	13	▲
Spain	12	-
Portugal	12	new entry
South Africa	12	▼
Saudi Arabia	11	▲

BAND D

COUNTRY	TOTAL SCORE Out of 100	MOVEMENT From 2015 assessment score
Sweden	10	▲
Estonia	9	new entry
Latvia	9	new entry
Lithuania	9	new entry
Croatia	9	new entry
Czech	9	new entry
Greece	9	new entry
Hungary	9	new entry
Iceland	9	new entry
Luxembourg	9	new entry
Malta	9	new entry
Slovakia	9	new entry
Slovenia	9	new entry
Brazil	9	▼
Austria	9	new entry
Indonesia	8	▲
New Zealand	8	▲
Poland	7	-
Romania	7	▼
Bulgaria	6	▲
Malaysia	6	▼
India	4	▲
Russian Federation	2	-
Trinidad & Tobago	2	-
Kazakhstan	2	new entry
Philippines	1	new entry
Turkey	1	new entry
Egypt	1	-

BAND D

COUNTRY	TOTAL SCORE Out of 100	MOVEMENT From 2015 assessment score
Fiji	1	new entry
Ethiopia	1	new entry
Iran	1	new entry
Montenegro	1	new entry
Oman	0.2	new entry
Singapore	0.2	new entry
Thailand	0.1	new entry
Vietnam	0.1	new entry
Algeria	0.1	▲
Botswana	0.1	new entry
Israel	0.1	new entry
Jordan	0.1	new entry
Kosovo	0.1	new entry
Morocco	0.1	new entry
Pakistan	0.1	new entry
Serbia	0.1	new entry
Tunisia	0.1	new entry

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