G8-IEA-CSLF

RESULTS FROM THE CALGARY WORKSHOP
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3RD WORKSHOP

NEAR-TERM OPPORTUNITIES FOR CARBON CAPTURE & STORAGE

Recommendations on Near-term Opportunities for Carbon Dioxide Capture and Storage to the G8 Summit Hokkaido, Japan, July 2008

Introduction

In 2005, the G8 leaders issued the Gleneagles Plan of Action on Climate Change and Sustainable Development, which included the following statement on carbon dioxide capture and storage:

We will work to accelerate the deployment and commercialization of Carbon Capture and Storage technology by:
. . . inviting the International Energy Agency to work with the Carbon Sequestration Leadership Forum to hold a workshop on short term opportunities for carbon capture and storage, including from Enhanced Oil Recovery and removal of CO_2 from natural gas production.

To this end, the International Energy Agency (IEA) and the Carbon Sequestration Leadership Forum (CSLF) initiated three workshops: to identify the issues (San Francisco, August 2006); to assess those issues (Oslo, June 2007); and to provide recommendations on near-term opportunities (Calgary, November 2007). Participants at the workshops were comprised of international experts in the field of carbon dioxide capture and storage (CCS). These experts were drawn from industry, financial institutions, governments, NGOs and academia.

These recommendations will be forwarded to the IEA for incorporation into its report to the G8 Leaders Summit in Hokkaido, Japan in July 2008.

This report has been organized in three parts:

- a context for the scope of CCS;
- high-level recommendations for the G8 leaders; and
- detailed recommendations for policy makers.

Context

It has become clear, through studies conducted by the IEA and others, that there is no single mitigation strategy that will provide the requisite emissions reductions to stabilize atmospheric concentrations of greenhouse gases at an acceptable level. Renewables, energy efficiency and nuclear power will each have a role, as will CCS.

The IEA, in its most recent projections,[1] concludes that dependency on fossil fuels will continue for several decades, and that energy demand and greenhouse gas (GHG) emissions will increase by over 55 percent, by 2030, if no new climate change mitigation policies are introduced. The IEA report also states that, along with other GHG reduction technologies, CCS is one of the most promising mitigation technologies. Moreover, the IPCC[2] stated: *To continue to extract and combust the world's rich endowment of oil, coal, peat, and natural gas at current or increasing rates, and so release more of the stored carbon into the atmosphere, is no longer environmentally sustainable, unless*

1 World Energy Outlook 2007; the International Energy Agency, November 2007
2 Working Group III, Intergovernmental Panel on Climate Change, July 2007

carbon dioxide capture and storage (CCS) technologies currently being developed can be widely deployed (high agreement, much evidence).

To understand the mitigation potential of CCS, the IEA estimates that 6 Gt[3] of CO_2 could be captured and stored annually by 2050. For comparison, StatoilHydro's Sleipner project has been safely storing 1 Mt[4] of CO_2 per year for over a decade. The prospect of replicating 6,000 projects such as Sleipner with CCS is daunting. However, if CCS is to reach its potential, clear political commitment, leading to concrete action, is required now.

All elements of CCS technology (CO_2 capture from anthropogenic sources, transportation, storage and monitoring) exist today and have been commercially deployed in various industries, specifically oil and gas production such as Sleipner, Weyburn-Midale and In Salah. However, these technology elements have not been integrated into large-scale CCS projects such as coal-fired power plants and similar low-purity streams. Some technology risks may arise from that integration process; however, the most significant risks are commercial and policy related. At this time, CCS is not commercially viable, due to the high cost of CCS and the currently weak carbon price signals. Moreover, there is no legal/regulatory regime in place that would allow potential developers and investors to adequately assess and manage their risks and liabilities in respect of CO_2 sequestration.

There are two distinguishable phases of CCS deployment:

The near-term first phase is dominated by low-cost forms of CCS, which tend to have high purity CO_2 (in excess of 95 percent). It encompasses commercial processes that either already capture CO_2, or have little, or no additional capture cost associated with the implementation of CCS - typically natural gas processing, ammonia and hydrogen plants (including oil sands upgrading), and liquids production from coal gasification. The construction of CCS infrastructure will also play a role in this phase.

The IEA Greenhouse Gas R&D Programme estimates that world-wide there is currently about 300 Mt per year of high concentration CO_2 already being captured, before being vented to atmosphere, since its markets are limited.

This phase also includes forms of CCS where costs are offset by revenue from enhanced oil recovery, principally in on-shore oil fields, or from avoided emissions taxes, as is the case in Norway. Additionally, there will be a limited number of large power generation projects with CCS, such as ZeroGen, that will be developed in the early stages. The scale of deployment in the near-term, for this phase of CCS, could be of the order of 200 Mt per year.

The longer-term second phase is characterised by widespread deployment of CCS for power generation, facilitated by the successful reduction of capture costs to a level that takes CCS costs below the values generally attributed to emissions reduction (in the range of $25 to $50 per tonne of CO_2). Other sources could include heavy industries, such as steel and cement. These sources tend to be characterized by large volumes with relatively low (less than 40 percent) concentrations of CO_2, which would have to be separated from the gas stream. As the storage opportunities associated with enhanced oil recovery decline, storage in depleted oil and gas fields, followed by deep saline formations, will likely dominate the second generation of CCS deployment.

3 Energy Technology Perspectives Scenarios and Strategies, IEA, June 2006

4 1 Mt = 1 Megatonne = 1 million tonnes; 1 Gt = 1 Gigatonne = 1 billion tonnes or 1000 Mt

The scale of deployment in the second phase is expected to be significantly higher than that of the first phase, from 200 Mt per year until 2025 to about 6,000 Mt per year by 2050, assuming the IEA's estimate of potential. This will necessitate the development of infrastructure and operational capabilities on the scale of today's natural gas industry.

Before the second phase can be effectively implemented, the key issues governing the deployment of CCS will need to be resolved in the first phase. These include:

- the identification and characterisation of storage resources;
- the development and implementation of regulatory and incentive regimes;
- deployment on a sufficient scale to gain community confidence and support; and
- the development of low-cost capture technologies.

High Level Recommendations

The G8 Heads of Government are urged to recognize the critical role of CCS in tackling global climate change and demonstrate the political leadership necessary to act now to initiate widespread deployment of this technology. CCS can achieve substantial reductions in CO_2 in a world faced with increased demand for fossil fuels. With CCS, fossil fuels will become part of the solution, not part of the problem. The IEA has estimated that, in addition to other mitigation options needed to combat climate change, CCS must be installed on the equivalent of over 600 coal-fired power plants by 2030. Expeditious deployment of CCS requires the following immediate actions:

Demonstrating CO_2 Capture and Storage

The G8 must act now to commit by 2010, to a diverse portfolio of at least 20 fully integrated industrial-scale demonstration projects (larger than 1 Mt per year), with the expectation of supporting technology learning and cost reduction, for the broad deployment of CCS by 2020.

Taking Concerted International Action

G8 Governments and international financial institutions should foster international action, to partner, financially support, build capacity and share information for large-scale integrated CCS demonstration projects and near term opportunities to accelerate wider deployment of CCS in developed and developing countries. An early priority should be to include CCS in the CDM (Clean Development Mechanism) in December 2008.

Addressing the Financial Gap

Governments should address, together with the private sector, the financial gap and risks facing early CCS projects in order to accelerate the commercial deployment of CCS, recognizing that market mechanisms alone will not be sufficient for the early deployment of CCS.

Establishing Legal and Regulatory Frameworks

By 2010, it is essential that governments have established the appropriate legal and regulatory frameworks that are needed for safe, large-scale geological storage of CO2.

Raising Public Education & Awareness

Public education and support are critical to CCS deployment. The link between CCS, continued global economic development, and environmental protection must be emphasized. Governments and stakeholders must dedicate resources to advance this message.

Recommendations for Policy Makers

The recommendations have been grouped along the principal themes identified in the first workshop: Technical, Legal, Commercial, Public Awareness and International Mechanisms. The recommendations meet the following criteria:

- They describe an action that governments can undertake; and
- Their implementation would accelerate the realization of near-term opportunities for CCS.

1. Technical

a. Demonstration and Field Test : Priority - 2010

Multiple, large-scale test and demonstration projects are vital to the future development and deployment of CCS. Much can be learned from these projects that will encourage the widespread deployment of industrial-scale CCS projects. Partnerships among countries to develop and financially support such projects would reduce costs, facilitate rapid demonstration of promising technologies and maximize information sharing among countries. This will improve the likelihood of effective world-wide deployment of these advanced technologies.

It is expected that at least 20 fully integrated CCS projects in different regions and geological media are required to adequately demonstrate the feasibility of this technology for reducing GHG emissions. These projects should include different pre and post combustion and oxy-fuel capture options, as well as an infrastructure demonstration, such as a CO_2 trunk line system and a variety of geological storage media. There are several near-term opportunities to demonstrate technologies such as the Zero Emission Fossil Fuel Power Plants, in the Flagship Programme of the European Technology Platform, and the China/UK Near Zero Emissions Coal project. Also, there are projects that have been announced, but are facing cancellation due to lack of a supporting regulatory framework, commercial incentives and/or financial support. Various types of projects should be used as models to demonstrate CCS, and it will be important to ensure that a system for sharing non-proprietary information on such projects is developed to fully evaluate the costs, reliability, environmental impacts, and to gain industry and public acceptance of such plants. In addition, the anticipated decrease in cost, as experience is gained, will be facilitated by such partnering and information sharing.

1. *Governments are encouraged to cooperate internationally to partner, financially support, and share information on large-scale integrated carbon dioxide capture and storage demonstration projects.*

b. Cost of Capture : Priority - 2012

There is need for well-resourced RD&D to drive capture costs down to the levels needed for widespread deployment in the power sector. The principal application of large scale CCS will most likely be in the coal-fired electric power generation sector. A main impediment to the deployment of CCS, in the power sector, is the high cost of capture and the loss of system efficiency.

2. *Governments and the private sector are encouraged to undertake and fund Research Development & Demonstration of carbon dioxide capture technologies with the objective of reducing costs and improving overall system efficiencies.*

c. National Storage Capacity Estimates : Priority - 2010

Both the IPCC Special Report on CO_2 Capture and Storage and the CSLF have addressed the inconsistencies between and within countries, as well as among agencies and individuals, in addressing geological storage capacity estimates. National assessments for storage capacity can be instrumental in determining the suitability and location for CCS opportunities. Some countries, such as the European Union, Australia and Canada, have made progress in this area.

These assessments fall into two parts: 1) Primary mapping of prospective geological storage sites, and 2) Detailed data compilation and acquisition for volumetric estimates. An inherent component of such assessments is matching CO_2 emission sources to storage opportunities.

3. *Governments should urgently establish primary assessment of prospective sedimentary basins, using an appropriate CO_2 Storage Capacity Estimation methodology, including source-sink matching.*

4. *Governments are encouraged to provide technical assistance, either individually or via appropriate international bodies to assist developing countries to produce mapping and capacity estimates.*

d. Capture Ready and Storage Ready : Priority - 2010

Implicit in the notion of capture ready is the requirement that a facility be "storage ready." There is no sense in capturing CO_2 unless there are suitable means to transport it to storage locations, where the technical, legal and regulatory issues associated with geological storage of CO_2 have been addressed. In recent years, there has been increasing discussion and controversy regarding the notion of "capture ready" facilities. For reference, the capture ready definition from the IEA Greenhouse Gas R&D Programme is provided in Annex I. Some parties support the notion of requiring "capture ready" facilities as a means of ensuring that retro-fits are possible under future regulation and to avoid "technology lock" in facilities built in advance of such regulation. Some argue that building a capture ready plant is more an issue of adequate design and planning, rather than one of additional investment. Others argue that such a requirement does not make economic or technical sense unless capture equipment is added soon after the facilities are built.

However, this issue may be viewed in a different light for developing countries that are in the process of rapidly expanding their power sectors where a significant "carbon lock" could result.

5. *Further work is required to understand and define the concept of "capture and storage ready" plants and its value as a viable mitigation strategy.*

2. Legal/Regulatory

There are numerable proposed capture-equipped projects potentially available for low-cost CCS demonstration or deployment as soon as viable regulatory and incentive regimes are in-place. Governments should work with industry to ensure that these regulatory and incentive pre-requisites are established as soon as possible.

The development of legal frameworks for CCS is at an early stage in many countries. Presently, regulatory compliance requirements, as well as the potential risks of environmental damage and

liability for CCS are not well articulated; this leads to a considerable business uncertainty that constrains investment. The very nature of long-term liability is a large disincentive to investment. Commercial developers will not invest in projects that would expose them to unlimited and undefined long-term liabilities, especially when future revenue streams are uncertain.

A future framework should consider: the role and legislative and regulatory treatment of pilot projects; verification of CO_2 storage for accounting purposes; approaches for selecting, operating and monitoring CO_2 storage sites in the short and long term; approaches to long-term stewardship; and the requirements for closing and decommissioning a storage project. The risk and liability should be quantified, when possible, for governments, industry and the financing sector.

Some national and sub-national governments have made significant progress towards legal and regulatory frameworks for CCS and collaboration through the IEA Working Party on Fossil Fuels has started. Australia has been a leader in developing guiding principles for a carbon dioxide storage regulatory framework and, in the US, the Interstate Oil and Gas Compact Commission recently issued comprehensive guidelines for CCS. Japan has recently modified its law to regulate CCS under the seabed, in conjunction with the amendment of the London Protocol. The law covers site selection, environmental assessment, monitoring and mitigation, as well as criteria for the quality of CO_2 stream. Also, the European Commission has published its CCS Directive for Geological Storage of CO_2 that will facilitate deployment of CCS in the EU, especially in the area of long term liability.

a. Property Rights : Priority - 2010

The IEA publication "Legal Aspects of Storing CO_2" recognizes the legal regimes in different countries and discusses the issues of access, ownership and property rights associated with the storage of CO_2.

6. *Governments should develop clear and equitable systems regarding access rights to sites for the geological storage of CO_2. These systems should define parties' responsibility before, during and after injection, including surface rights, mineral or hydrocarbon rights, and issues with respect to the ownership of the pore space. Such property rights should ensure the ability to safely utilize and fairly allocate storage capacity.*

b. Long-term Liability : Priority - 2010

A framework addressing liability is required for the injection and post-injection phases of a storage project. This includes, but is not limited to, sub-surface property rights, joint liability where there are several operators injecting into the same formation, processes for assessing and resolving potential conflict between CO_2 injection and hydrocarbon production, transboundary movement of CO_2, and timeframes associated with liability.

7. *Governments should clearly define the liability regime for the operational, closure and post-closure phases of a storage project. The regime should also address:*
   - *Government assumption of long term liability.*
   - *The timing of the transfer of liability to Governments for the post-closure phase.*
   - *Implications for surface and sub-surface transboundary movement of carbon dioxide.*

8. *Governments should develop clear licensing and permitting systems for storage projects. Such regulations should address procedures and responsibilities to ensure safe closure and provisions for post-closure monitoring, and remediation, if necessary.*

9. *The IEA and CSLF should continue to develop the recommendations for future legal work on CO_2 storage by:*
   - *Collecting examples of regulatory streamlining and other incentives and practices which will facilitate critically needed near-term demonstration projects.*
   - *Using existing project data to develop internationally consistent guidance for CO_2 storage project site identification, monitoring and long-term verification.*
   - *Continuing to share regulatory models internationally.*

10. *For the demonstration projects, the appropriate level of government should use a framework which is formulated using best practices at the time of the project. That is, projects should not be delayed because the complete regulatory framework is not in-place. Based on experience from demonstration projects, frameworks for full commercial-scale projects can then be formulated.*

c. Classification of CO_2 : Priority - 2010

The main issue with the classification of CO_2 is the difference between it being a commodity or a waste. This is often an issue with laws and regulations that were promulgated before the concept of geological storage of CO_2 was developed.

Regulatory frameworks should reflect that CO_2 storage is not to be used as a means to dispose of other industrial waste (i.e., substances other than those associated with the capture and storage process should not be added to the stream that is to be disposed of). In some cases, underground injection of these substances may, in itself, be a proper disposal method for these substances.

11. *Governments should ensure that the way in which CO_2 is classified in the various laws and regulations that would govern its capture, transport and storage does not inhibit its safe use for that purpose. In particular, CO_2 should not be classified as a pollutant or waste such that it cannot be injected for permanent storage.*

12. *Laws and regulations governing the geologic storage of CO_2, for the purpose of GHG mitigation, should recognize that other substances may enter in the CO_2 stream incidental to its capture at the source, and that these are likely to be injected with the CO_2. Proposals to allow the injection of incidental substances, other than CO_2, should be based on a thorough understanding of the potential impacts of both injecting and not injecting these substances.*

d. Storage Integrity and Monitoring : Priority - 2010

Adoption and implementation of site selection criteria will be critical to establishing the integrity of a storage location. Additionally, an important aspect of storage integrity will be the establishment of Measurement, Monitoring and Verification (MMV) procedures. Several research projects have been undertaken in this area, notably the IEA GHG Weyburn-Midale Monitoring and Storage Project, SACS (Sleipner), CO2SINK and CO_2ReMoVe projects, which should be used to develop guidelines for MMV.

Major strides have been made regarding MMV, but there is still inadequate information on monitoring strategies and requirements, timeframes and frequency of monitoring, and the related costs. MMV will likely be most intense during the injection phase. However, the responsibilities for post-injection must be defined as well; in particular the duration of those responsibilities must be addressed by both the government and private sectors.

MMV methods and conventions should be the subject of international collaboration between project developers, regulators and researchers, but the requirements for individual projects must be shaped by the characteristics of the project and the suitability of the MMV technologies to those characteristics.

13. *Accelerate the deployment and acceptance of CCS by sharing of principles and experiences on site selection with the aim of improving practices and ensuring the integrity of storage sites, lowering costs and transferring knowledge through international organisations.*

14. *Governments working with stakeholders need to develop performance-based standards for storage site safety and integrity.*

e. Intellectual Property (IP) : Priority - 2012

Intellectual property is referenced in the IEA publication "Legal Aspects of Storing CO_2."

15. *Intellectual property used for CCS should be adequately protected while enabling it to be applied as widely as possible. To this end, the IEA should conduct case studies of successful instances of the treatment of similar intellectual property rights, which could potentially be used as models for CCS.*

16. *Publicly-funded CCS projects should be required to disseminate non-proprietary information to facilitate the development and deployment of this technology.*

3. Commercial/Finance

a. Public/Private Partnerships : Priority - 2010

The development and deployment of CCS technology will require a partnership between governments and the private sector. The role of governments in setting the policy frameworks, providing support, and sharing the risk that enables the private sector to make the large investments required is absolutely essential. It is the private sector that will develop, deliver and deploy the technology.

17. *Governments should address, together with the private sector, the financial gap and risks facing early CCS projects, and to accelerate the adoption of large-scale CCS. Public-private collaborations should not endanger the benefits of creating a competitive business environment for the products and services associated with CCS, but should clearly identify risk sharing arrangements. Government to government collaboration should stimulate and support these partnerships through appropriate policy and action.*

b. Insurance : Priority - 2010

Insurance-based products could be combined with other market-based financial methods to efficiently

allocate risks and manage liability. Overall, the management of risks and liabilities should be based on science-backed best practices for site selection, MMV, permitting and regulation.

18. *The insurance industry should be encouraged to work with governments and industry to develop insurance-based products to address the potential business liabilities associated with CCS through all its phases.*

c. Creating a Value for CO_2 : Priority - 2010

One of the principal deterrents to carbon dioxide capture and storage is that there is very low or no value for CO_2 in most regions. Indications to date are that carbon prices, which are a result of emissions trading (notably the EU system), will not be sufficient in the near-term to stimulate investments in CCS. Therefore other transitional mechanisms will be required, but this should not preclude the inclusion of CCS in tradable permit systems. The "Revised EU Emission Trading Directive" will allow for CCS within the European Trading System.

19. *Governments should provide long term policy certainty through the introduction of appropriate regional/national instruments to create a value for CO_2, such as emissions trading and/or tax treatment; and to ensure that emissions trading systems (ETS) recognize CCS for permanent storage.*

4. Public Education and Awareness

In general, public awareness of CCS is low. Some countries, such as Australia and Norway, have developed programs to communicate the national and local issues associated with CCS projects, but the current level of effort is inadequate. It is important that information on CCS comes from unbiased, independent, authoritative sources and that there is appropriate communication, particularly regarding safety.

The development of communication material has been largely uncoordinated and has received minimal funding. Additionally, CCS is often perceived as an alternative to other mitigation technologies, such as renewables and energy efficiency. It must be made clear that CCS can play a substantial role as part of a suite of technologies to reduce CO_2 emissions. There are various means to facilitate public understanding; some examples are:

- The need for further social research to better understand the public attitude to CCS issues.
- Coordination of effort and resources to develop materials that would improve public communications including websites, multimedia, museum displays, and school curricula.
- Appropriate outreach and communications campaigns to support media's ability to provide accurate and up-to-date information.
- Country-based CCS organizations, representing all stakeholders, can be established to serve as a forum on CCS issues, and to conduct open dialogues among governments, industry, environmental NGOs and the public.
- Governments, NGOs and academia, must join efforts to clearly inform local communities of the safety and security of CCS, as well as the entire portfolio of benefits of CCS, such as its emissions reduction potential, the creation of new jobs, growth of local economies and business opportunities related to CCS activities. Communication of all these aspects will greatly increase the interest and awareness of CCS, and will be a key factor for public acceptance.

a. Improving Public Awareness of CCS : Priority - 2010

20. *Governments, together with industry and other stakeholders, should commit resources to advance the understanding and education related to CCS. Communication strategies need to reflect different audiences, including the general public and project-level communities.*

21. *CCS should be communicated in the context of GHG mitigation options to demonstrate the role that CCS can play in reducing GHG emissions in a world of growing energy and resource demand.*

5. International Mechanisms

a. International Consistency in Policy Guidance : Priority - 2012

In order for CO_2 to be fungible across trading systems it is necessary to have internationally consistent approaches to the quantification and validation of emissions reductions, as well as the legal and regulatory frameworks. This does not mean that there is one system for all countries. The IEA/CSLF published a document in June 2007 "Legal Aspects of Storing CO_2;" the London Convention Scientific Group is preparing "Specific Guidelines for the Assessment of CO_2 Streams for Disposal into Sub-seabed Geological Formations;" and the Government of Australia has completed draft legislation for CCS (Amended Offshore Petroleum Act 2006). Moreover, the EU is proposing to revise the ETS to include CCS – "Revised EU Emission Trading Directive." Other governments and industry organizations have legislation/regulation in-place that may be used.

The development of international standards is a desirable goal. However, it may be impractical and potentially counter-productive if their development impedes the early deployment of CCS.

22. *Governments should collaborate to ensure that their respective CCS legislation and regulations are compatible with international fungibility of mitigation credits for CCS, as noted in Recommendation 19.*

23. *To accelerate policy and regulatory development globally, G8 governments should support the dissemination of best practices and existing legislation including:*
    - *Permitting requirements for site-selection and long-term monitoring, verification and remediation.*
    - *Accounting protocols used in trading systems that are verifiable and treat CCS on a consistent basis with other mitigation measures.*

b. Role of Multilateral Lending Institutions : Priority - 2012

The introduction of CCS into developing countries will be important to achieve the ultimate goal of widespread use of CCS.

24. *The World Bank and other multilateral lending institutions should be encouraged to work with developing countries to fund capacity building, such as training, mapping, identification of potential CO_2 storage reservoirs and estimation of large emission sources, in those countries.*

25. *Multilateral lending institutions should provide financial support to share the risk of appropriate*

demonstration projects, in developing countries.

c. CDM/JI : Priority - 2008

At this time, CCS is not eligible for CDM projects. Although efforts are underway in UNFCCC, this issue may take some time to resolve. In order for CCS to be accepted as CDM, the environmental and co-benefits of CCS should be emphasized at the next Conference of the Parties in December 2008 (COP14).

26. *Governments should actively encourage the CDM Executive Board to adopt CCS as an acceptable mitigation technology.*

Other : Priority - 2010

In order to ensure a continuity of effort in CCS, it will be important to provide updated reports to the G8 on the progress of these recommendations.

27. *The IEA/CSLF will assess the implementation of these recommendations on an ongoing basis, and will provide this assessment to the G8 Leaders in 2010. This assessment will include further actions that could be taken by the G8 to further accelerate the exploitation of near-term CCS opportunities.*

Annex I

Capture Ready Definition

The IEA Greenhouse Gas R&D Programme defines capture ready as:

> *A CO_2 capture ready power plant is a plant which can include CO_2 capture when the necessary regulatory or economic drivers are in place. The aim of building plants that are capture ready is to reduce the risk of stranded assets or "carbon lock-in."*
>
> *Developers of capture ready plants should take responsibility for ensuring that all known factors in their control that would prevent the installation and operation of CO_2 capture have been eliminated.*
>
> *This might include:*
>
> - *A study of options for CO_2 capture retrofit and potential pre-investments.*
> - *Inclusion of sufficient space and access for the additional facilities that would be required.*
> - *Identification of reasonable routes to storage of CO_2.*
> - *Competent authorities involved in permitting power plants should be provided with sufficient information to be able to judge whether the developer has met these criteria.*

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