



Strategic Analysis of the Global Status of Carbon Capture and Storage

Report 3: Country Studies
India

Final Report



This page left intentionally blank



Strategic Analysis of the Global Status of Carbon Capture and Storage

Report 3: Country Studies
India

Disclaimer

This report has been prepared by Baker and McKenzie on behalf of WorleyParsons Services Pty Ltd (WorleyParsons) for the exclusive use of The Global CCS Institute. It is subject to and issued in accordance with the agreement between The Global CCS Institute and WorleyParsons. Neither WorleyParsons nor Baker & McKenzie accept liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

Copying this report without the permission of The Global CCS Institute or WorleyParsons is not permitted.

Qualifications

This report:

- 1. states the law current as at 31 March 2009*
- 2. should not be relied upon as a substitute for specific legal advice*
- 3. has links and references throughout that were current as at 31 March 2009*
- 4. represents the views of Baker & McKenzie only and not of any person or agency that may have contributed to or reviewed any aspect of the report*

Contents

1.	Executive summary	1
2.	Glossary.....	2
3.	CO₂ pricing	3
3.1	Introduction	3
4.	Existing CCS initiatives.....	4
4.1	Introduction	4
4.2	Acreage releases.....	4
4.3	Government funding	4
4.4	Taxation incentives	5
4.5	Liability for failure to capture.....	5
4.6	Evaluation	5
5.	Capture of CO₂	7
5.1	Introduction	7
5.2	General policy and legislation with applicability to CO ₂ capture.....	7
5.3	Liability for failure to capture.....	8
5.4	Taxation of CO ₂ capture	8
5.5	Evaluation	8
6.	Transport of CO₂.....	9
6.1	Introduction	9
6.2	General policy and legislation specific to transport of CO ₂	9
6.3	Taxation of CO ₂ transport.....	12
7.	Exploration of potential CO₂ storage sites.....	13
7.1	Introduction	13
7.2	General policy and legislation with application to exploration of potential CO ₂ sequestration sites.....	13
7.3	Taxation of CO ₂ sequestration exploration activities.....	15
7.4	Evaluation	15
8.	Injection and pre-closure of CO₂ storage formations	16
9.	Post-closure and long-term storage of CO₂.....	17
10.	Summary.....	18
11.	References.....	19

11.1	Legislation and regulation and International materials	19
11.2	Other sources	20

1. Executive summary

India does not currently have any integrated policies or legislation dedicated to encouraging the development of CCS technologies or regulating the conduct of CCS projects in India. The National Clean Development Mechanism Authority of the Ministry of Environment and Forestry, Government of India has initiated executive moves to investigate the potential of CCS. To date, however, no CCS-specific legislation has been implemented. The Government of India is in the process of creating public awareness and undertaking research and development for CCS technology and activities. Workshops and discussions are taking place throughout the country to investigate the potential for CCS in India.

It is foreseeable that the mandate for CCS would come under a broad legislative framework that would aim to limit India's GHG emissions. Analysts are of the view that linking CCS with the CDM is necessary before India can support the inclusion of CCS under the CDM umbrella.

Existing environmental, mining and petroleum-sector legislation may be applicable to particular CCS activities. This legislation can also provide insight into how India might incorporate the regulation of CCS activities within existing regulatory regimes or create new CCS specific legislation in the future.

2. Glossary

APP	Asia-Pacific Partnership on Clean Development
BSCSP	Big Sky Carbon Sequestration Partnership
CCS	Carbon capture and storage
CDM	Clean Development Mechanism
CO ₂ GSP	CO ₂ Geological Storage Project
CSLF	Carbon Sequestration Leadership Forum
Federal Government	Government of India
GHG	Greenhouse gas
Hazardous Waste Rules	Hazardous Waste (Management, Handling and Transboundary Movement) Rules 1989
IRADe	Integrated Research and Action for Development
LNG	liquefied natural gas
Mineral Rules	The Mineral Concession Rules 1960
ONGC	Oil and Natural Gas Corporation Limited

3. CO₂ pricing

3.1 Introduction

Although India ratified the Kyoto Protocol to the *United Nations Framework Convention on Climate Change* in August 2002, as a non Annex 1 country, it does not currently have binding GHG emissions reduction targets under international law. India has, however, indicated that it is committed to GHG emission cuts post 2012. To date, the Government of India has not introduced any policies or legislation dedicated to encouraging the development of CCS technologies or regulating the CCS project cycle.

4. Existing CCS initiatives

4.1 Introduction

The opportunities and potential of CCS technology are being explored and debated amongst the Indian economic, political and technical sectors. The Indian Government has actively participated in various forums and projects relating to CCS.

India became a member of the CSLF which is a ministerial-level international climate change initiative, focused on the development of improved cost-effective technologies for the separation and capture of CO₂, for its transport and long-term safe storage. The CSLF also promotes awareness and champions legal, regulatory, financial, and institutional environments conducive to such technologies. India joined the CSLF in 2003 with the Ministry of Power as the lead ministry. The objective of Indian participation was to develop cost-effective technologies by organizing collaborative research and development. Collaborative research on basalt rock studies under the CSLF project have been initiated with the United States, as the results of mineral trapping studies are projected to be useful for other countries which have similar formations (Goel, 2006).

4.2 Acreage releases

No areas have been released specifically for CCS exploration or storage activities.

4.3 Government funding

4.3.1 Research, development and commercialisation

India signed an agreement with the United States in April 2006 to partner in the FutureGen–275 MW zero emission power plant. FutureGen is a public-private partnership to build a “first-of-its-kind coal-fuelled, near-zero emissions power plant” (see the United States country study).

India is an institutional partner in the Big Sky Carbon Sequestration Partnership (BSCSP). BSCSP is one of the United State’s National Energy Technology Laboratory’s seven regional CO₂ sequestration partnerships. The partnerships engage key stakeholders in creating a nationwide network that will help determine the best approaches for capturing and permanently storing GHGs that contribute to climate change. As a member country India commits to foster and contribute its unique expertise and funding.

India is also a member of the APP and has agreed to work with the other members to meet goals for energy security, national air pollution reduction and climate change in ways that promote sustainable economic growth and poverty reduction. The APP is a voluntary partnership among six major Asia-Pacific nations to accelerate the development and deployment of cleaner, more efficient technologies including CCS. The Government of India also hosted the 2007 ministerial meeting of the APP.

The Integrated Research and Action for Development (IRADe) undertakes research and development projects relating to energy, environment and climate change with cross cutting issues of policy reforms, poverty and technology and has conducted analysis into the role of CCS technology in India.

The Institute of Reservoir Studies, Ahmedabad, is also involved in extensive research in the process of CCS, with special reference to sequestration procedures. The primary aim of the Institutes'

research is testing towards designing and operationalizing enhanced oil recovery processes for more efficient and cost effective extraction of oil.

The National Geo-physical Research Institute of India will be a participant in the CO₂ Geological Storage Project (CO₂GSP) which aims to develop necessary technological design and demonstration of deep bed injection of CO₂ and monitoring of CO₂ movement in the sedimentary rocks underlying basalt formations. The CO₂GSP will involve selection of a basalt covered area with minimum trap thickness 600 meters underlain sedimentary rocks, injection of approximately 2,000 tons of CO₂ followed by monitoring and modelling. The project will involve intensive monitoring of the behaviour of the injected CO₂ using broad range of geo-physical and geo-chemical technique, the development of numerical models and leakage risk assessment. The demonstration project will provide necessary technological know-how to store a large volume of CO₂ in a similar geologic environment in India. The project will be carried through participation of the National Geo-physical Research Institute, India, and the Pacific Northwest National Laboratory, USA

The Federal Government Department of Science and Technology under its Inter-Sectoral Science & Technology Advisory Committee has initiated a National Program on Carbon Dioxide Sequestration Research jointly with other Ministries of the Government of India. Various possibilities for CO₂ sequestration are being considered, such as storage in empty gas and oil fields, coal beds, oceans and water containing sub-surface aquifers, mineral sequestration, afforestation and agriculture.

4.3.2 Technology demonstration and early deployment incentives

As of 4 June 2009, India is considering the potential of the Badarpur power plant in south Delhi for the application of CCS technology. However, this has ignited debate within India over the safety aspects of CCS technology.

On 6 February 2008, Oil and Natural Gas Corporation Limited (ONGC), a public sector undertaking, signed a memorandum of understanding with the Norwegian oil and gas major, StatoilHydro ASA, to develop CO₂ management projects. ONGC has recently initiated a CCS project, where the CO₂ generated during the processing of sour gas at its Hazira plant in Gujarat is to be captured and transported to the nearby Ankleshwar asset and into the depleted reservoir there for enhanced oil recovery (Subramanian, 2008).

4.4 Taxation incentives

There are no CCS specific taxation incentives in India.

4.5 Liability for failure to capture

There is no CCS specific legislation or policy relating to a liability for failure to capture CO₂.

4.6 Evaluation

In order to build incentives for CCS technology, CCS legislation development and application in India, the Federal Government could consider expanding its cooperation with foreign partners to encompass CCS activities. It could also consider releasing acreage for CCS exploration activities.

The recent consideration of the potential of the Badarpur power plant in south Delhi for the application of CCS technology has resulted in much debate surrounding the safety aspects of CCS technology in India. The Federal Government could consider extending its current investment in public awareness

in order to settle this debate and provide a conducive environment for the development and commercialisation of CCS technologies.

5. Capture of CO₂

5.1 Introduction

The current regime in India is based around existing legislation. There is no integrated regime and CCS projects must adhere to existing environmental legislation (particularly the Environment (Protection) Act 1986 and associated rules) and mining and petroleum-sector legislation. This legislation provides an insight into how India might deal with CCS activities.

5.2 General policy and legislation with applicability to CO₂ capture

5.2.1 Retrofitting

There is no specific legislation or policy governing retrofitting of CO₂ capture capability to existing facilities but under the Environment Impact Assessment Notification S.O.60(E), any person who seeks to undertake an expansion or modernisation of an existing petroleum refinery must submit an application to the Secretary of the Ministry of Environment and Forests, New Delhi to obtain environmental clearance.

Further, the Federal Government, through the Ministry of Environment and Forests, pursuant to the powers granted under the Environment (Protection) Act (See the Environment Impact Assessment Notification dated 14 September 2006), has directed that on and from the date of the notification the construction of new projects or activities or the expansion or modernisation of existing projects or activities listed in the Schedule to the said notification entailing capacity addition with change in process and or technology shall only be undertaken after the prior environmental clearance from the Federal Government or as the case may be, by the State Level Environment Impact Assessment Authority, duly constituted by the Federal Government under the provisions of the Environment (Protection) Act 1986, in accordance with the procedure specified in the said notification.

5.2.2 Relevant pollution laws and policies

General pollution laws that may be relevant to CO₂ capture are contained in the Environment (Protection) Act 1986, the Air (Prevention and Control of Pollution) Act 1981, the Water (Prevention and Control of Pollution) Act 1974 and associated rules.

Concentrated forms of CO₂ would fall within the definition of both an environmental pollutant and a hazardous substance as defined in the Environment (Protection) Act 1986. Under the Act it is an offence to discharge or emit environmental pollutants in excess of the standards prescribed. Pollution standards are determined by the Central Pollution Control Board or the relevant State Pollution Control Board.

The Hazardous Waste (Management, Handling and Transboundary Movement) Rules 1989 (Hazardous Waste Rules) may be relevant to CO₂ capture activities. The Rules do not expressly list CO₂ as a hazardous waste, however, concentrated forms of CO₂ may nevertheless fall within the broad, general definition of hazardous waste. An authorisation must be obtained from the State Pollution Control Board to collect and store hazardous waste. The Hazardous Waste Rules further provide that an operator of a hazardous waste collection facility is liable for all damages caused to the

environment of a third party due to the improper handling of hazardous waste. The Hazardous Waste Rules also contain financial penalties payable to the relevant Pollution Control Board for a violation of the Rules.

Concentrated CO₂ would be considered an air pollutant under the Air (Prevention and Control of Pollution) Act 1981. Under the Act it is an offence to discharge or cause or permit to be discharged the emission of any air pollutant in any air pollution control area, in excess of the standards laid down by the Central Pollution Control Board or the relevant State Pollution Control Board.

Discharge of concentrated forms of CO₂ would also be considered pollution for the purposes of the Water (Prevention and Control of Pollution) Act 1974. Offences may arise from violations of the pollution standards determined by the Central Pollution Control Board or the relevant State Pollution Control Board.

The Central Pollution Control Board currently has no pollution standard directly applicable to the capture, discharge or storage of CO₂. State Pollution Control Board standards may be more stringent.

5.3 Liability for failure to capture

There are no CCS specific laws relating to liability for failure to capture CO₂. Some liability may arise under the general pollution laws discussed in Section 5.2.2, however this is not clear.

5.4 Taxation of CO₂ capture

There are no specific laws relating to taxation of CO₂ capture.

5.5 Evaluation

There is scope for CO₂ capture activities to be regulated under the existing pollution laws. The laws currently in force could possibly be extended to specifically cover CO₂ capture activities, however the application of such laws to CO₂ capture is uncertain and untested. India could consider developing further regulation in this area.

6. Transport of CO₂

6.1 Introduction

There is no integrated regime governing the transport of CO₂ in India. CCS projects must adhere to existing environmental legislation (particularly the Environment (Protection) Act 1986 and associated rules) and mining and petroleum-sector legislation (particularly the Mines and Minerals (Development and Regulation) Act 1957, Petroleum and Minerals Pipelines (Acquisition of Right in User of Land) Act 1962 and associated rules) This existing legislation may also provide an insight into how India might deal with CCS. The regulatory system established for petroleum could also be used as a model or could possibly be adapted to cover CO₂ transport in the future. This regulatory system is contained in the Petroleum Rules 1976 and is discussed in this Section.

6.2 General policy and legislation specific to transport of CO₂

6.2.1 Licencing of transportation activities

PIPELINES

NEW PIPELINES

Part V of the Petroleum Rules 1976 contains the provisions relating to the transport of petroleum by pipelines. Under the provisions all the necessary land easements and rights for the construction of a pipeline must be acquired before construction. The approval of the route, design, construction and working of a pipeline must be obtained from the Chief Controller.

EXISTING PIPELINES

There is no specific legislation or policy governing the transport of CO₂ through existing pipelines, but under the Petroleum Rules 1976 the approval of the Chief Controller must be obtained before an alteration or addition to a pipeline is carried out. Further, under the Environmental Impact Assessment Notification S.O.60(E) any person who seeks to undertake an expansion or modernisation of an existing petroleum product pipeline must submit an application to the Secretary of the Ministry of Environment and Forests, to obtain environmental clearance.

The Ministry of Environment and Forests, pursuant to the powers granted under the Environment (Protection) Act 1986 (see the Environment Impact Assessment Notification dated 14 September 2006), has directed that on and from the date of the said notification the construction of new projects or activities or the expansion or modernisation of existing projects or activities listed in the Schedule to the said notification entailing capacity addition with change in process and or technology shall only be undertaken after the prior environmental clearance from the Federal Government or as the case may be, by the State Level Environment Impact Assessment Authority, in accordance with the procedure specified in the said notification.

The Schedule specifically provides for approval to be obtained from the Central Pollution Control Board for all projects involved in offshore and onshore oil and gas exploration, development and production. This requires the applicant to disclose whether the project shall involve new or diverted

pipelines. Further projects involving oil and gas transportation pipelines (crude and refinery/ petrochemical products), passing through national parks, sanctuaries, coral reefs, or ecologically sensitive areas, including liquefied natural gas (LNG) terminals, require prior approval of the Central Pollution Control Board.

ROAD AND RAIL TRANSPORT

Under the Petroleum Rules 1976 it is an offence to deliver or dispatch petroleum to anyone in India other than the holder of a storage licence or a port authority or railway administration authorised to store petroleum without a licence. The requirements and procedure for a licence are set out in Part V of the Rules. The Rules also contain various provisions regarding conditions for the transportation of petroleum on land by vehicles or rail and by water.

TRANSPORTATION BY SHIP

The Petroleum Rules 1976 discussed above in Section 6.2.1 contain various provisions regarding conditions for the transportation of petroleum by water.

6.2.2 Planning

PIPELINE LICENCING REGIMES – NEW PIPELINES

ONSHORE PIPELINES

The laying of pipelines is authorised under the Petroleum and Minerals Pipelines (Acquisition of Right in User of Land) Act 1962 where the right of user in land has vested in the Federal Government or in any State Government or with the corporation concerned.

OFFSHORE PIPELINES

The Petroleum & Natural Gas (Safety in Offshore Operations) Rules, 2008 regulates the safety in offshore oil and gas exploration, exploitation, production/drilling and matters connected therewith, under powers conferred by Sections 5-7 of the Oilfields (Regulation and Development) Act, 1948. These rules apply to all public sector undertakings, private or joint venture companies operating in the territorial waters, contiguous zone, continental shelf and exclusive economic zone of India in offshore upstream oil and gas sector. Further, projects involving oil and gas transportation pipeline (crude and refinery/petrochemical products), passing through national parks, sanctuaries, coral reefs, ecologically sensitive areas, including LNG terminals, require prior approval of the Central Pollution Control Board. Laying of pipelines on the sea bed of the continental shelf or exclusive economic zones have been prescribed under the Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act 1976.

PIPELINE LICENCING REGIMES – EXISTING PIPELINES

Pipeline licencing requirements are discussed above in Section 6.2.1.

ENVIRONMENTAL IMPACT ASSESSMENT

Under the EIA Notification, it is provided that a prior approval needs to be obtained from the Central Pollution Control Board for all projects involved in offshore and onshore oil and gas exploration,

development and production which requires the applicant to disclose whether or not the project shall involve new or diverted pipelines. Further projects involving oil and gas transportation pipelines (crude and refinery or petrochemical products), passing through national parks, sanctuaries, coral reefs, ecologically sensitive areas, including LNG terminals, require prior approval of the Central Pollution Control Board

6.2.3 Access / tenure

NATURE OF PROPERTY INTERESTS CONFERRED

The Petroleum and Minerals Pipelines (Acquisition of Right in User of Land) Act 1962 provides for the acquisition of right of user in the land for the laying of pipelines for the transport of petroleum and minerals and for other matters connected to such activities.

RIGHTS OF INDIGENOUS PEOPLES AND OTHER CUSTOMARY RIGHTS

Indigenous people are categorized as “Scheduled Tribes” and “Scheduled Castes” under the Constitution of India (via Articles 341 and 342 of the Constitution) which afford these groups certain rights and protections. Additionally, laws have also been formulated to safeguard the interest of these minority groups, such as the Untouchability Practices Act 1955, Scheduled Caste and Scheduled Tribe (Prevention of Atrocities) Act 1989, The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006. Separately various States in India have also regulated for the protection of tribal lands and areas.

COMPULSORY ACQUISITION AND COMPENSATION REGIMES

Under the Petroleum and Minerals Pipelines (Acquisition of Right in User of Land) Act 1962, whenever it appears to the Federal Government that it is necessary to acquire the right of user in any land for the purpose of laying pipelines for the transport of petroleum or minerals, it may declare its intention to acquire that right by notification in the Official Gazette. The Minerals Pipelines (Acquisition of Right in User of Land) Act 1962 provides the procedure for acquiring such a right. Where that right is acquired, the right of user in land vests absolutely in the Federal Government free from all encumbrances.

Authorisation to lay pipelines under the Petroleum and Minerals Pipelines (Acquisition of Right in User of Land) Act 1962 is subject to compensation provisions within the Act, where compensation is payable by a corporation for damage, loss or injury sustained by a person with an interest in the land.

6.2.4 Environmental and other risks

LEAKAGE OF TRANSPORTED CO₂

General pollution laws that may be relevant to CO₂ capture are contained in the Environment (Protection) Act, the Air (Prevention and Control of Pollution) Act 1981, the Water (Prevention and Control of Pollution) Act 1974 and associated rules (see also Section 5.2.2).

Specifically, hazardous waste must be transported in accordance with the provisions of the Hazardous Waste Rules. Further requirements exist where the waste is being transported from the State where it was generated to another State. For example, a “No Objection Certificate” must be obtained from the Pollution Control Board of each State concerned. Hazardous waste must not be stored for longer than

ninety days. Provision contained in the Rules regulate the import and export of hazardous waste to and from India.

Under the Hazardous Waste Rules, the transporter of hazardous waste is liable for all damages caused to the environment of a third party due to the improper handling of hazardous waste. The Rules also contain financial penalties payable to the relevant Pollution Control Board for a violation of the Rules.

POLLUTION – NOISE, AIR AND WATER

Air and water pollution regulation is discussed above in Section 5.2.2.

6.3 Taxation of CO₂ transport

There are no CCS specific taxation regimes in India which relate to transportation of CO₂.

7. Exploration of potential CO₂ storage sites

7.1 Introduction

There is currently no integrated Indian legislation that applies to the exploration of offshore reservoirs for permanent storage of CO₂, however, the Offshore Areas Minerals (Development and Regulation) Act 2002 could be used as an acceptable framework to regulate CCS related exploration in connection with petroleum activities. This Section therefore discusses certain relevant provisions of the Offshore Areas Minerals (Development and Regulation) Act 2002 to identify possible options for the regulation of exploration activities for CCS storage sites. It also discusses the prospecting licencing regime under the Mineral Concession Rules 1960 enacted pursuant to the provisions contained in the Mines and Minerals (Development and Regulation) Act 1957, in so far as it could be used as an indication of the Indian Government's approach to such licences for exploration and mining on land.

7.2 General policy and legislation with application to exploration of potential CO₂ sequestration sites

The Offshore Areas Minerals (Development and Regulation) Act 2002 provides for development and regulation of mineral resources in the territorial waters, continental shelf, exclusive economic zone and other maritime zones of India. Under the Act the Federal Government may declare parts of offshore areas which are available for grant of an exploration licence. The Mineral Concession Rules 1960 (the Mineral Rules) enacted under the Mines and Minerals (Development and Regulation) Act 1957, provide for the granting of prospecting licence for minerals on land. However, it is important to recognise that neither of these two Acts deal specifically with CCS.

7.2.1 Exploration licencing

APPLICATION CRITERIA

It is an offence to undertake an exploration operation in an offshore area without an exploration licence granted under the Offshore Areas Minerals (Development and Regulation) Act 2002. The provisions of the Act set out the application criteria which includes the applicant possessing the requisite technical ability and financial resources to undertake exploration operation based on scientific parameters prescribed.

The application criteria for a prospecting licence under the Mineral Rules is dependant on whether the licence is in respect of land in which minerals vest in the Government or land in which minerals vest in a person other than the Federal Government. The application criteria and procedures for a prospecting licence in respect of land in which minerals vest in the Federal Government is set out in Chapter III of the Mineral Rules. The application criteria and procedures for a prospecting licence in respect of land in which minerals vest in a person other than the Federal Government is set out in Chapter V of the Mineral Rules. Where a prospecting licence is in respect of land that vests partly in the Government and partly with a private person the criteria and procedure of Part III applies. Prospecting operations under a prospecting licence must be carried out in accordance with a scheme of prospecting established under the Minerals Conservation and Development Rules 1988.

RIGHTS CONFERRED BY EXPLORATION LICENCE

The legislation and rules providing for the granting of an exploration licence do not provide production rights. The production rights are conferred separately under a production lease executed with the Government.

LICENCE TERM

An exploration licence granted under the Offshore Areas Minerals (Development and Regulation) Act 2002 is for a term of three years. The holder of an exploration licence must commence operations within one year of the granting of the licence.

7.2.2 Access / tenure

NATURE OF PROPERTY INTERESTS CONFERRED

The legislation and rules providing for the granting of an exploration licence do not explicitly define the nature of property interest conferred on the licensee.

ESTABLISHING PRIORITY BETWEEN EXPLORATION AND EXISTING USES AND RIGHTS

PETROLEUM AND RESOURCE EXPLORATION AND EXTRACTION

No applicable legislation or policy exists.

FAUNA AND FLORA, INCLUDING ENDANGERED SPECIES

The holder of a prospecting licence must take all possible precautions for the protection of environment and control of pollution while conducting prospecting in the area concerned.

MINING

The Mineral Rules contain some provisions regarding the priority of prospecting and mining licences and reconnaissance permits over the same piece of land. If the reconnaissance permit holder discovers availability of minerals covered under their permit within the area subsequently granted for prospecting or mining of minerals other than those covered under the reconnaissance permit, the permit holder shall have the right to get such areas vacated from the licensee or the lessee.

SUBSEQUENT USES

At the expiration of a prospecting lease under the Mineral Concession Rules 1960 the licensee must, within six months, plug all bores and fill up or fence all excavations in the land covered by the licence and restore, to the extent possible, flora destroyed by prospecting operations. Further, the holder of a prospecting licence must undertake the phased restoration, reclamation and rehabilitation of lands affected by prospecting operations.

RIGHTS OF INDIGENOUS PEOPLES AND OTHER CUSTOMARY RIGHTS

The rights of indigenous peoples are discussed above in Section 6.2.3.

COMPULSORY ACQUISITION AND COMPENSATION REGIMES

The Mineral Rules contain provisions for the payment of compensation by a prospecting licence holder to the occupier of surface of the land for damage to that land. These compensation provisions are contained in Chapter X of the Mineral Rules.

7.2.3 Planning and construction regulation applicable to CO₂ sequestration facilities

ZONING

No CCS specific legislation or policy exists.

ENVIRONMENTAL IMPACT ASSESSMENT

Accompanying the application of a mining lease under the Mineral Rules must be a mining plan which incorporates a plan of the area concerned, showing natural water courses, limits of reserves and other forest areas and density of trees, if any; assessment of impact of mining activity on forest, land surface and environment including air and water pollution; details of the scheme of restoration of the area by afforestation; land reclamation; use of pollution control devices; and such other measures as may be relevant. The application for a prospecting licence under the Mineral Rules does not contain similar provisions.

PIPELINE LICENCING REGIMES

Pipeline licencing requirements are discussed above in Section 6.2.1.

CONSTRUCTION AND BUILDING CODES

No CCS specific legislation or policy exists.

7.3 Taxation of CO₂ sequestration exploration activities

There are no CCS-specific taxation regimes in India which relate to exploration activities.

7.4 Evaluation

Existing exploration and prospecting licencing regimes could potentially be adapted to the regulation of CCS exploration.

8. Injection and pre-closure of CO₂ storage formations

There is currently no integrated CCS legislation in India that relates to injection and pre-closure of CO₂ sequestration sites. Existing legislation contains little that may be directly relevant or applicable to such activities. Indian jurisdictions may wish to legislate directly in this area.

The Environmental (Siting for Industrial Projects) Rules 1999 contains provisions that prohibit the establishment of a new unit of certain industries listed in the schedule to the Rules within particular areas defined in the Rules. While there are no CCS-specific provisions, the establishment of a site for CO₂ sequestration may be prohibited in the areas listed in the Rules.

9. Post-closure and long-term storage of CO₂

Current Indian legislation does not deal with long term monitoring and liabilities in connection with CCS projects. This would require new policy development.

10. Summary

Some Indian jurisdictions have been proactive in facilitating policies aimed at encouraging the development of CCS technologies. However, no CCS-specific legislation currently exists in India. This lack of regulation of the CCS project cycle is the single largest impediment to investment in CCS projects in India and Indian jurisdictions should consider addressing this by implementing either amendments to India's existing minerals, pollution and environmental regulations or dedicated legislation.

11. References

11.1 Legislation and regulation and International materials

11.1.1 International

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, as modified by the Protocol of 1996, opened for signature 29 December 1972, 1046 UNTS 138 (entered into force 30 August 1975).

Kyoto Protocol to the United Nations Framework Convention on Climate Change, opened for signature 11 September 1997 2303 UNTS 148 (entered into force 16 February 2005).

Protocol 1978 relating to the *International Convention for the prevention of pollution from ships*, opened for signature 17 February 1978, 1340 UNTS 62 (entered into force 2 October 1983).

United Nations Framework Convention on Climate Change, opened for signature 9 May 1992, 1771 UNTS 107 (entered into force 21 March 1994).

11.1.2 Legislation and regulation

Constitution of India

Environment (Protection) Act 1986.

Environmental (Siting for Industrial Projects) Rules 1999.

Environment Impact Assessment Notification S.O.60(E),

Environment Impact Assessment Notification S.O.1533.

Air (Prevention and Control of Pollution) Act 1981.

Water (Prevention and Control of Pollution) Act 1974.

Hazardous Waste (Management, Handling and Transboundary Movement) Rules 1989.

Mineral Concession Rules 1960.

Minerals Conservation and Development Rules 1988.

Mines and Minerals (Development and Regulation) Act 1957.

Offshore Areas Minerals (Development and Regulation) Act 2002.

Oilfields (Regulation and Development) Act, 1948.

Petroleum & Natural Gas (Safety in Offshore Operations) Rules 2008.

Petroleum and Minerals Pipelines (Acquisition of Right in User of Land) Act 1962.

Petroleum Rules 1976.

Scheduled Caste and Scheduled Tribe (Prevention of Atrocities) Act 1989.

Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act 1976.

Untouchability Practices Act 1955.

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006.

11.2 Other sources

Goel, Malti 2006, *Workshop on carbon capture and storage*, UNFCCC 24th session of SBSTA, 20 May 2006, available at: unfccc.int/files/meetings/sb24/in-session/application/pdf/un.ccs.mg.20.5.pdf.

Subramanian, T.S. 2008, 'Controlling carbon' *Frontline* Vol. 25 No. 05 14 March 2008, available at: <http://www.hinduonnet.com/fline/fl2505/stories/20080314250511000.htm>