

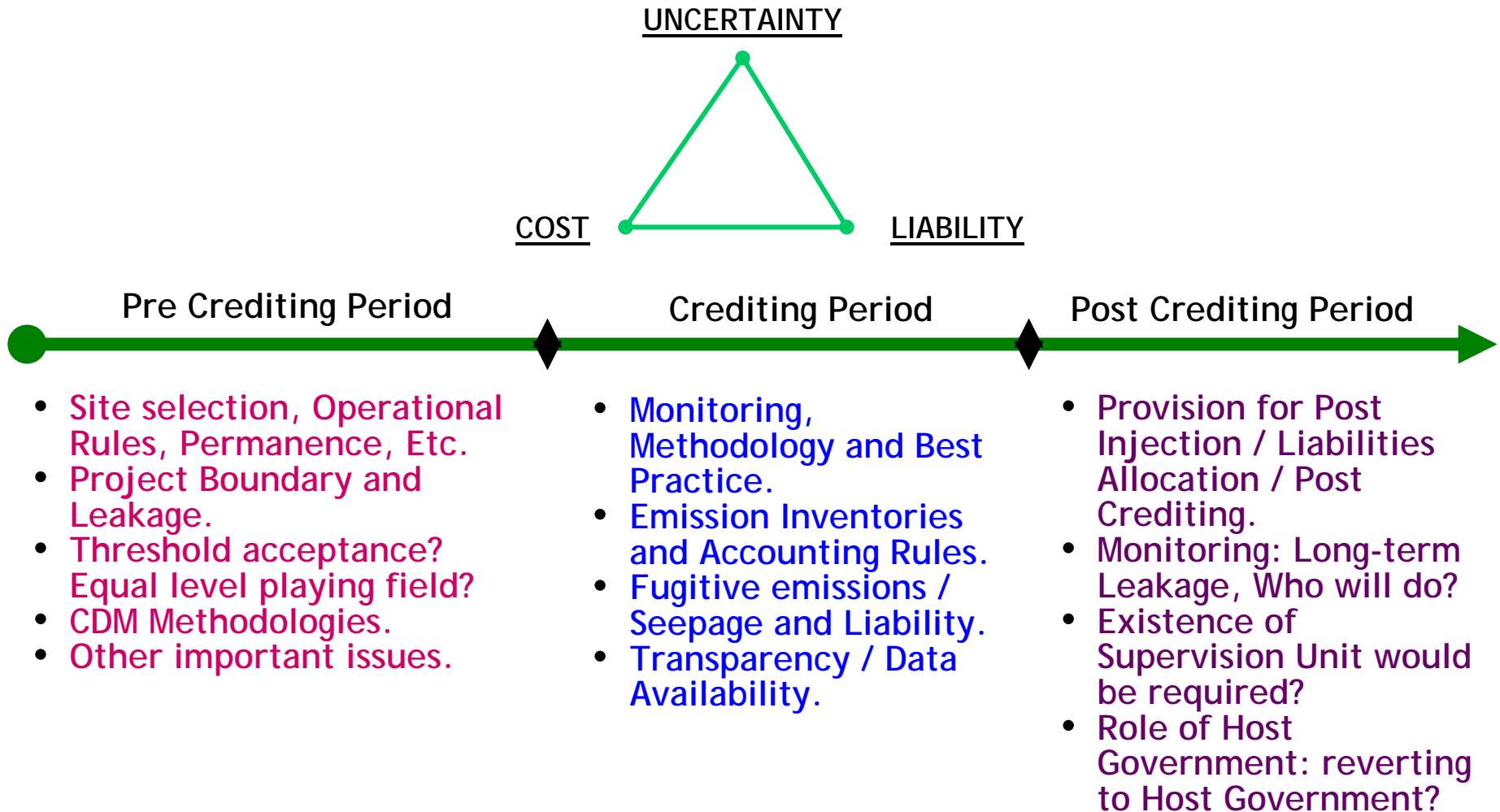
CARBON CAPTURE AND STORAGE

SALIENT ISSUES & REQUIRED ACTIONS

Recognizing the importance of the CCS as an potential option in mitigating climate change and also pertaining to whether CCS projects can be considered as CDM projects activities. Hence some salient issues and required actions have been identified under 3 recognized time frame: i) Pre-crediting period, ii) Crediting period, and iii) Post-crediting period.

The scope of these highlights mainly focus on geological storage of CO₂ with respect to CDM projects activities. As the following, we propose the salient issues and required actions that need to be addressed and accomplished prior to the acceptance of CCS projects to be considered as CDM project activities.

SALIENT ISSUES



SALIENT ISSUES & REQUIRED ACTIONS

PRE CREDITING PERIOD

SALIENT ISSUE	REQUIRED ACTIONS
Site selection, Operational Rules, Permanence, Etc.	<ul style="list-style-type: none">• Appropriate site selection tasks to confirm geological storage / reservoir integrity is crucial for project based CCS (i.e. geological storage) and should be carried on. Geology of storage site has to be evaluated and local and regional hydrogeology and leakage pathways must be identified. Confirming the potential leakage through site characterization and realistic models that predict movements of CO2 over time and locations where emissions might occur need to be done. These required actions need to have an international best practice including environmental criteria for site characterization.• Establish operational rules, and determine whether there will be uniform standards for the salient features of operation or flexible in accordance with the reservoir characteristics need to be addressed and defined. if uniform standards are preferred then its appropriate level need to be determined.
Project Boundary And Leakage	<ul style="list-style-type: none">• Minimum Project Boundary definition needs to be formulated which is derived from complete project structure description (the physical delineation).• Potential leakages need be defined as emissions due to the project which occurs outside the project boundary (CO2 sources can be in or out of boundary depending on the nature of the project).• Consistent methodologies for different CCS projects based on common principle need to be developed, and consolidated to the extent possible to establish a common methodology.

SALIENT ISSUES & REQUIRED ACTIONS

PRE CREDITING PERIOD

SALIENT ISSUE	REQUIRED ACTIONS
Threshold acceptance? Equal level playing field?	<ul style="list-style-type: none">• Many discussions on CDM methodological issues in regard to CCS had introduced threshold on the basis of the IPCC special report that the fraction of CO₂ retained in appropriately selected geological reservoir is very likely to exceed 99% over 100 years, and is likely to exceed 99% over 1000 years. On CDM requirement side, lower value is preferred (conservativeness). However at technical possibility side, it depends on the tool uses and the site. Threshold acceptance and determination of its appropriate level which can accommodate equal level playing field need to be concluded.
CDM Methodologies	<ul style="list-style-type: none">• Specific methods may be required for the net capture and storage of CO₂, physical leakage, fugitive emissions and negative emissions associated with biomass application of CCS systems.• Two important items need to be addressed and accounted for: (i) CO₂ might be captured in one country and stored in another country with different commitments, and (ii) Possible physical leakage from a storage site in the future.

SALIENT ISSUES & REQUIRED ACTIONS

PRE CREDITING PERIOD

SALIENT ISSUE	REQUIRED ACTIONS
Other important Issues	<ul style="list-style-type: none">• Address health, safety and environment risks in further detail.• Risk assessment due to leakage from storage of CO2 in geological reservoir and environmental impacts have to be carried on.• Develop common cost-effective remediation techniques.

SALIENT ISSUES & REQUIRED ACTIONS

CREDITING PERIOD

SALIENT ISSUE	REQUIRED ACTIONS
Monitoring, Methodology, and Best Practice	<ul style="list-style-type: none">• Monitoring is a basic requirement for CCS project, as an important part of the whole risk management strategy. Standard procedures / best practice monitoring guidelines or protocols need to be developed further for various types of formations, including operational rules such as: well injection pressure, injection rate, temperature, etc. will be measured regularly.• Methodology should highlight applicable techniques and must be flexible to allow for new techniques.• A monitoring system must be technically feasible, able to detect physical leakage (during project operation & long-term leakage) including fugitive emissions above a certain level (i.e. above the threshold, assuming that a threshold is introduced and accepted), and cannot be prohibitively costly.
Emission Inventories and Accounting Rules	<ul style="list-style-type: none">• The IPCC documents now in use do not specifically include CCS options. Standard methodologies for emission inventories and accounting rules need to be developed (if CCS is considered as emission reduction not removal), i.e. accounting for long-term leakage would be established (treatment of liability).• This is crucial for CCS project. A concrete proposal is required.

SALIENT ISSUES & REQUIRED ACTIONS

CREDITING PERIOD

SALIENT ISSUE	REQUIRED ACTIONS
Fugitive emissions / Seepage and Liability	<ul style="list-style-type: none">• International guidelines need to be established.• Seepage should be measured and subtracted from the project's GHG mitigation contribution. However, if the amount is small then it would be difficult to determine. A new approach is required on the basis of the IPCC special report that the fraction of CO₂ retained in appropriately selected geological reservoir is very likely to exceed 99% over 100 years, and is likely to exceed 99% over 1000 years.• Nonetheless, a mechanism is required to allocate liability for any seepage among parties.
Transparency / Data Availability	<ul style="list-style-type: none">• Recovery of anthropogenic CO₂ from large industrial GHG emission sources and its storage in an oil reservoir can be developed as part of EOR. However, availability of data from active production units may be an issue i.e. commercial confidentiality. Data availability must be addressed.

SALIENT ISSUES & REQUIRED ACTIONS

POST CREDITING PERIOD

SALIENT ISSUE	REQUIRED ACTIONS
Provisions for Post Injection / Liabilities Allocation / Post Crediting	<ul style="list-style-type: none">• Critical items to be addressed.• Best practice guidelines need to be developed that include development of options, allocation of risk and treatment of liability.
Monitoring: Long-term Leakage, Who will do?	<ul style="list-style-type: none">• Standardization of methodology required.• Necessary to determine who will conduct the monitoring, and who will bear the cost.
Existence of Supervision Unit would be required?	<ul style="list-style-type: none">• Must be considered.
Role of the Host Government: reverting to the Host Government?	<ul style="list-style-type: none">• Government liability is not acceptable under CDM.• Security package and financial schemes need to be established.

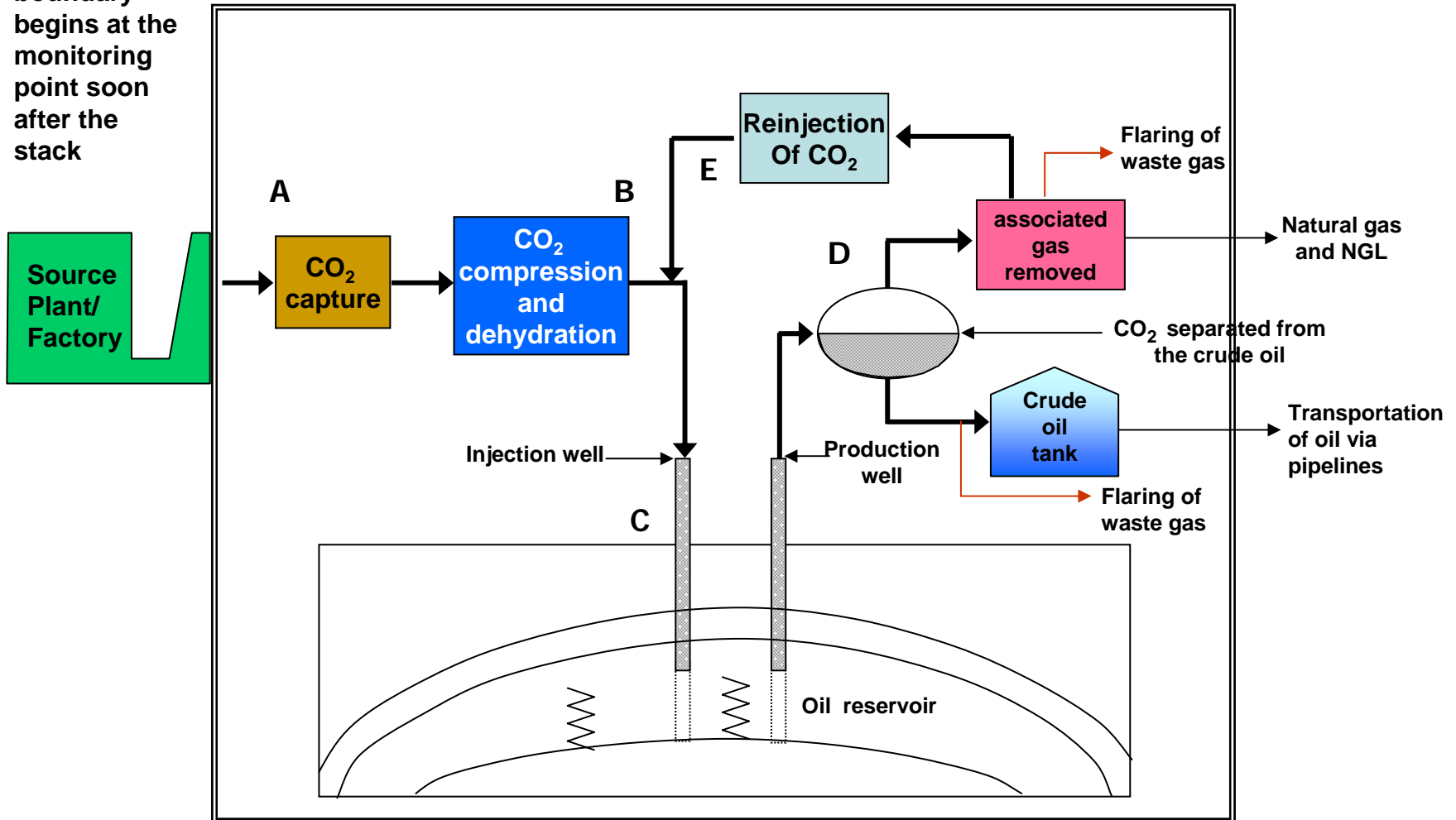
RECOVERY OF ANTHROPOGENIC CO₂ FROM LARGE INDUSTRIAL GHG EMISSION SOURCES AND ITS STORAGE IN AN OIL RESERVOIR



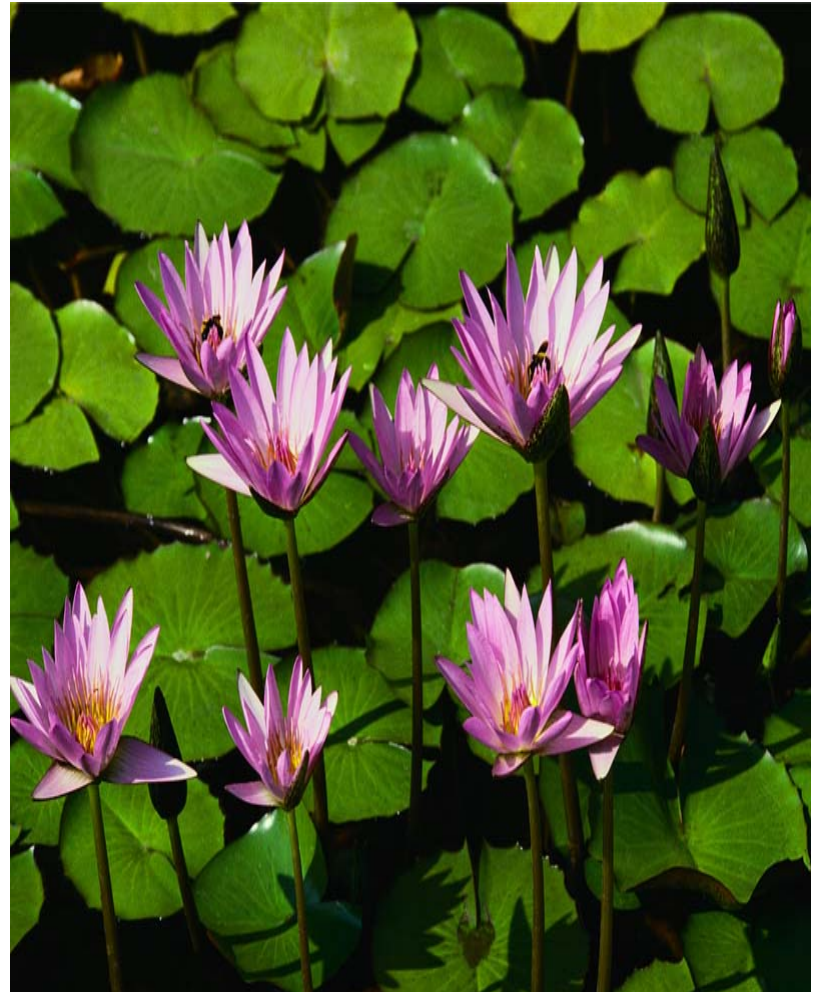
The methodology deals with projects for capture of anthropogenic CO₂ and its storage in an active or depleted oil reservoir

THE PROJECT AND ITS BOUNDARY

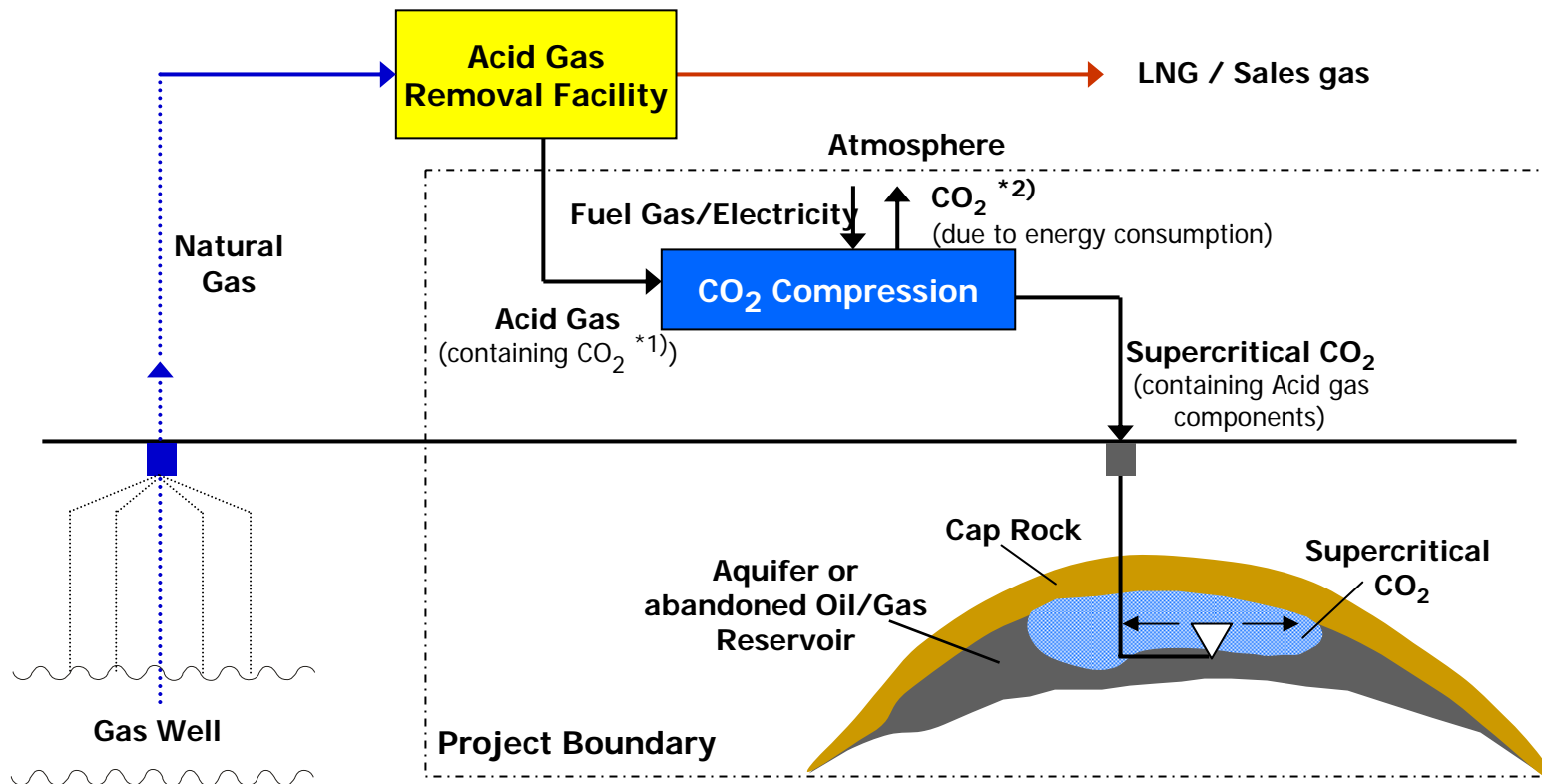
The project boundary begins at the monitoring point soon after the stack



THE CAPTURE OF
CO₂ FROM NATURAL
GAS PROCESSING
PLANTS AND LNG
PLANTS AND ITS
STORAGE IN
UNDERGROUND
AQUIFERS OR
ABANDONED
OIL/GAS RESERVOIRS



PROJECT BOUNDARY



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THANK YOU