

## Greenhouse Gas Services

### ***Climate Change***

Global warming and the anthropogenic climate change due to emission of greenhouse gases is one of the most serious environmental, social and economic issues that require immediate worldwide attention. Therefore governments, business and industries as well as the private sector have to play their part in the challenge for climate protection and the promotion of renewable energies and energy efficient technologies.



### ***Kyoto Protocol***

The Kyoto Protocol is a legally binding agreement for industrialized countries with the objective of collective emission reductions of greenhouse gases which contribute to climate change. The aim of the Kyoto Protocol is not just to set targets to the industrialized countries but to reduce greenhouse gases globally. To achieve this ambitious goal the Kyoto Protocol implies market-based instruments such as the Clean Development Mechanism (CDM), Joint Implementation (JI) and Emission trading. These so called flexible mechanisms enable parties to access cost-effective opportunities by promoting projects in other countries.

### ***Clean Development Mechanism (CDM)***

The CDM allows countries from Annex I countries (industrialized countries) to buy emission credits or to set up emission reduction projects in non-Annex I countries (developing countries). GLC has filed an application to become a Designated Operational Entity (DOE) for validation and verification/certification under the CDM.

### ***Joint Implementation (JI)***

The JI allows countries from Annex I countries (industrialized countries) to buy emission credits or to set up emission reduction projects in other Annex I countries. GLC has filed an application to become an Accredited Independent Entity (AIE) for determination and verification/certification under the JI.

### ***Voluntary Emission Reductions (VERs)***

Voluntary or Verified Emission Reductions refer to project-based emission reductions outside the Kyoto Protocol. The range of VER-activities covers voluntary projects following an approach as described in ISO 14064 and ISO 14065, pre-registration CDM projects, projects where technologies/methodologies are not applicable under the CDM/JI or certain small-scale projects for which the considerably requirements of the Kyoto Protocol are not appropriate.

In other words: the VERs are units of greenhouse gas emission reductions that has been verified by an independent auditor without going through the procedures of the UNFCCC regime, however, many of this schemes accept only validation/verification by UNFCCC approved third parties.

### ***European Union Greenhouse Gas Emission Trading Scheme (EU ETS)***

The EU ETS is an integral part of the EU climate policy and based on Directive 2003/87/EC. The EU scheme is largely modelled on the mechanism in the Marrakech Accords of the Kyoto Protocol and is the world's largest company-level 'cap-and-trade' system for trading in emissions of CO<sup>2</sup>.

### **6 fundamental principles of the EU ETS:**

- Cap-and-trade system
- Focus on CO<sub>2</sub> from big industrial emitters
- Phases with periodic reviews and opportunities for expansion to other gases and sectors
- Allocation plans for emission allowances are decided periodically
- Strong compliance framework
- EU-wide market but global emission reduction opportunities through the use of CDM and JI

***GLC's greenhouse gas services***

Since 1867 Germanischer Lloyd (GL) provides a broad range of first class testing and certification services. As part of the GL Group, GLC benefits from this profound knowledge and together with our own global network of environmental assessors and experts provides validation and verification services of greenhouse gas mitigation projects such as CDM (Clean Development Mechanism), JI (Joint Implementation) and VER (Voluntary or Verified Emission Reductions).

***GLC has applied for the following sectoral CDM and JI scopes:***

- Energy industries (renewable - / non-renewable sources)
- Energy distribution
- Energy demand
- Transport
- Fugitive emissions from fuels (solid, oil and gas)
- Waste handling and disposal

***Our range of services covers:***

- Pre-assessment of project idea / concept
- Validation of PDD
  - Completeness check of documentation
  - Submission of a proposed New Methodology (optional)
  - Publication of the PDD on the UNFCCC webpage
  - Project validation
  - On-site visit (optional)
  - Draft Validation Report
  - Final 'Validation Report and CER request
- Preliminary verification
- Initial verification / Periodically verification
  - Document completeness check
  - Publication of the Monitoring Report on the UNFCCC webpage
  - Document desk review
  - On-site visit
  - Draft Verification Report
  - Final Verification Report and CER request
- Methane emissions detection and auditing / methane measurement
  - Stack emissions measurements  
Combustion emissions analysis with the aim of improving process efficiency and reducing the environmental impact of operations. Consultancy work alongside operators and manufacturers to minimise emissions.
  - Site emissions measurements and survey  
Area emissions surveys, investigative measurements to locate and quantify emissions sources.
  - Fugitive natural gas emissions evaluations  
Measurement of ambient natural gas levels, area surveys, gas infrastructure fugitive leak measurement and modelling. Consultancy services to evaluate gas leakage at gas above ground installations to assist with meeting compliance and environmental impact issues.

## CDM – Clean Development Mechanism

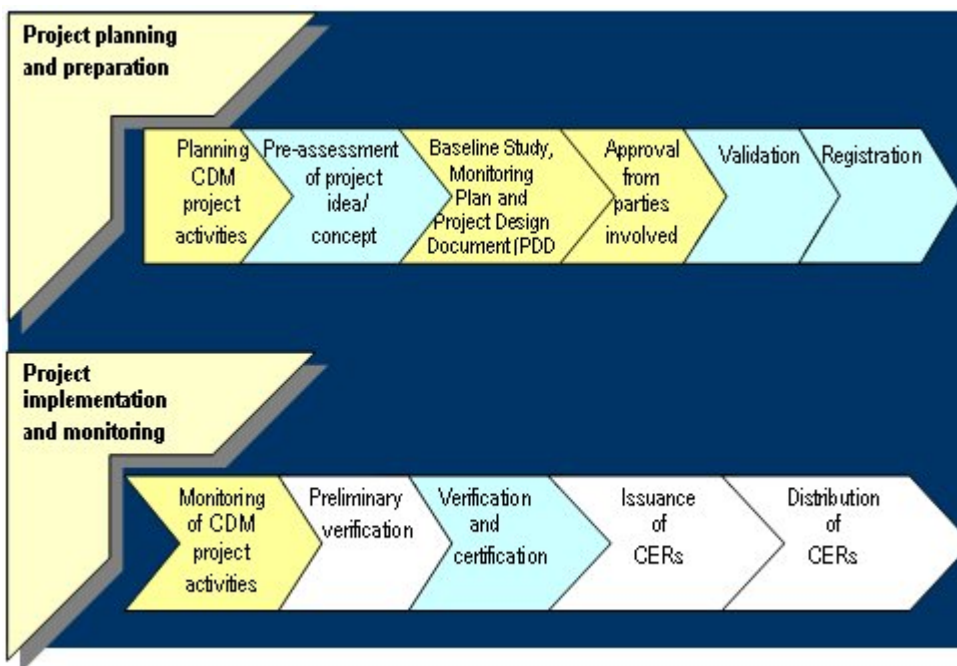
### CDM Project Overview

Projects under the Clean Development Mechanism (CDM), as defined in Article 12 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, generate emission reductions, Certified Emission Reductions (CERs).

Customer can benefit from implementation of a CDM project in different ways:

- Meeting of the home country emission reduction burden in a cost-effective way
- CERs (emission credits) can be traded
- Realization of projects which otherwise would be not financially attractive
- Implementation of sustainable and environmentally friendly technologies in developing countries

### CDM Project Cycle



### Validation

Prior to the implementation of a CDM project the project documents; mainly the [project design document \(PDD\)](#) has to be assessed by the DOE. Where changes to an approved methodology or a new methodology are required the project documentation has to be completed with the [respective form](#).

The assessment includes the check whether the requirements for CDM projects are met as well as investigations on the project design, baseline, monitoring plan and environmental impact assessment in particular.

During the validation process the PDD with its appendices has to be released on the UNFCCC and DOE's webpage for 30 days to enable interested parties or stakeholders to comment on the project documentation. For detailed procedures please visit the [UNFCCC](#).

Based on a successful validation of the project design the DOE submit the project documentation including the validation report to the CDM Executive Board (EB) and recommend a registration. The project registration is a prerequisite for the future generation of emission certifications. Registered projects including the validation report will be published on the UNFCCC webpage.

**Verification (periodically)**

Following the registration and project realization the DOE verifies the actual amount of emission reductions on the basis of the project emission monitoring report and reviews the findings against the validation and its conformity with the project documentation. In addition the data, data collection, measuring equipment, and the calculations are to be verified by the DOE.

The monitoring report will be published by the DOE for comments by stakeholders. The verified amount of emission reductions will be submitted to the EB with a request for respective certificates.

**JI – Joint Implementation**

**JI Project Overview**

Projects under the Joint Implementation (JI), as defined in Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, generate Emission Reduction Units (ERUs).

Customer can benefit from implementation of a JI project in different ways:

- Meeting of the home country emission reduction burden at lower cost than at home
- ERUs (emission certificates/credits) can be traded
- Realization of projects which otherwise would be not financially attractive

**Two-track JI system**

According to the Marrakech Records two JI procedures, referred to as Track 1 and Track 2, are in place. Track 1 is a simplified JI procedure and is subject to supervision of the host country. Track 2 follows the rules of independently verified projects and is subsequently supervised by the JI Supervisory Committee (JISC) and an independent body for approval, so called Accredited Independent Entity (AIE).

	<b>Track 1</b>	<b>Track 2</b>
Modalities	National guidelines	COP/MOP decisions, incl. JI guidelines
Requirements	National guidelines	Verification by AIE Review by JISC
Baseline and monitoring	National guidelines	AIE Review by JISC
Determination of PDD and monitoring reports	National guidelines	AIE Review by JISC
Transfer	Commitment Period Reserve (CPR) restricted	No Commitment Period Reserve (CPR) restriction

**JI Track 1 (simplified procedure for fully eligible countries)**

When an Annex I host party meets the [eligibility requirements](#), the host country is able to issue and transfer ERUs without approval of any international body. Verification of the project has to be conducted by

companies which are authorized by the government/ host country.

The process for Track 1 depends on the host country's own procedures. Consequently, the JI project cycle could differ from host country to host country.

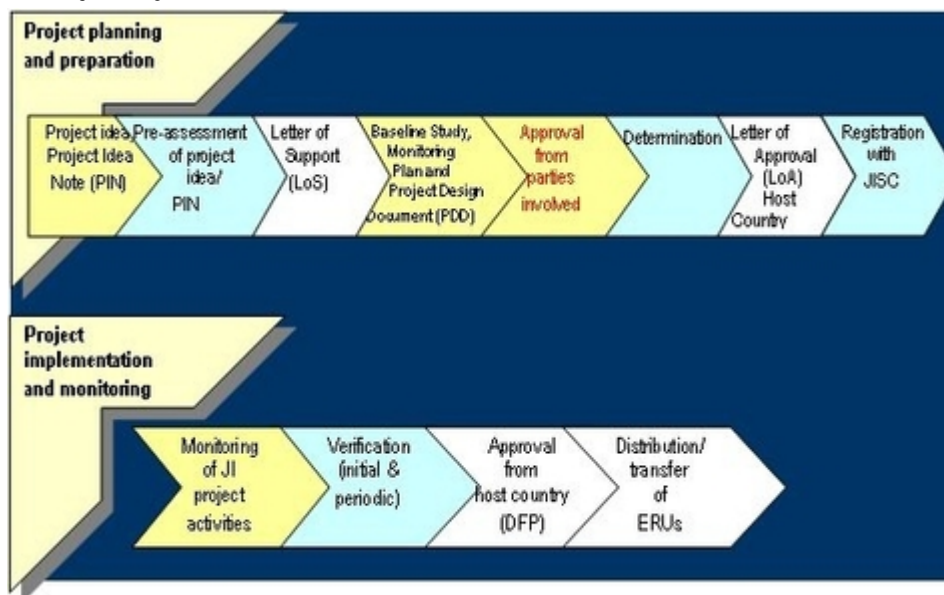
During the Track 1 process the parties could decide on using the JI Track 2 procedure.

### **JI Track 2 (International verification of projects)**

Where a host party does not meet all of the [eligibility requirements](#), Track 2 procedure has to be applied.

Track 2 procedures are similar to the CDM project cycle. The projects have to be assessed by an Accredited Independent Entity (AIE) which is accredited by the [JI Supervisory Committee \(JISC\)](#).

### **JI Project Cycle**



### **Determination**

Prior to the implementation of a JI project the project documents; mainly the [project design document \(PDD\)](#) has to be assessed by the AIE. Approved methodologies for baselines and monitoring by the Executive Board of the Clean Development Mechanism could be used under JI as well, if appropriate. Where changes to an approved methodology or a new methodology are required the project documentation has to be completed with the [respective form](#). A non-approved methodology could be applied if it is proved and common practice (best practice) in the respective type of project.

The assessment includes the check whether the requirements for JI projects are met as well as investigations on the project design, baseline, monitoring plan and environmental impact assessment in particular.

During the determination process the PDD with its appendices has to be released on the UNFCCC and AIE's webpage for 30 days to enable interested parties or stakeholders to comment on the project documentation. For [detailed procedures](#) please visit the UNFCCC.

Based on a successful determination of the project design the AIE submit the project documentation including the determination report to the JI Supervisory Committee (JISC) and recommend a registration. The project registration is a prerequisite for the future generation of emission certifications. Registered projects including the determination report will be published on the UNFCCC webpage.

## **Verification (periodically)**

Following the registration and project realization the AIE verifies the actual amount of emission reductions on the basis of the project emission monitoring report and reviews the findings against the validation and its conformity with the project documentation. In addition the data, data collection, measuring equipment, and the calculations are to be verified by the AIE.

The monitoring report will be published by the AIE for comments by stakeholders. The verified amount of emission reductions will be submitted to the Designated Focal Point (DFP)/ host country with a request for respective certificates. [ERUs](#) will be issued by the host country.

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## Carbon capture and storage

Advantica's heritage in the gas and oil industry makes us an ideal choice for helping clients deal with carbon management. Our gas-chain technical know-how is already being used to address the often analogous range of issues which arise when the gas in question is carbon dioxide.

How pure does CO<sub>2</sub> need to be before it is transported?  
What are the issues, costs, processes needed to get it there?

- Advantica has in-depth expertise in understanding both costs and technical issues associated with turning effluent streams from combustion plant into CO<sub>2</sub> which can be captured.
- Our gas processing know-how has already been applied to developing detailed process schemes for carbon capture from a variety of processes.

Advantica's expertise in pipelines and fluid flow is being used around the world by the oil gas and water industries, This is now being applied to transmission of CO<sub>2</sub> in pipelines.

- We have expertise in simulation of fluid flow through pipelines which can be readily applied to CO<sub>2</sub> management. Our suite of software can allow a detailed hydraulic analysis of the issues of transporting CO<sub>2</sub>.
- What are the requirements for constructing a CO<sub>2</sub> pipeline? Is your existing pipeline suitable? What are the safety, legal, routing, environmental and technical requirements? What are the likely costs?
- We can apply our integrity analysis and hazard and risk expertise to understanding all the potential problems of moving CO<sub>2</sub> through a pipeline. CO<sub>2</sub> is often transported in a supercritical phase, leading to a whole raft of new physical and materials issues. We have already begun addressing these for major clients in the energy industry.
- What would happen if there was a fracture in a CO<sub>2</sub> pipeline, and a release of CO<sub>2</sub> was to occur? We can carry out quantitative risk analyses to ensure that your proposed CO<sub>2</sub> capture project is as free from risk as reasonably possible.

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