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Methodology for project activities involving the capture, transport, and geological storage of carbon dioxide – GCCM006 V 1.1

Contents

Pictorial view of the Methodology and Guidance

Efforts in this Methodology

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- 2.5 yrs of work into development of methodology
- Review by governance committee (4 Rounds)
- Peer review by industry experts (10 independent entities from Academia, technology provider, sub surface experts, financial institution & Legal firms)
- Global stakeholder consultation for period of 45 days.

Timelines of methodology development and rigor

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- Engaged services of CARBON COUNTS
- Comparative study of all other methodologies and guidance documents on CCS related to CDM / ACR / Alberta / IPCC
- Draft report on outcome of study and identification of key issues. Study of existing GCC documentation / templates (PSF form / Methodology template / Project standard / verification standard / other documents) wrt. CCS
- Identification of key issues –**crediting period, permanence, liability & Legal requirements**
- Draft version of methodology submitted to CCS Experts for inputs and incorporated into draft methodology
- Global Stakeholder Consultation (GSC) for 45 days

Uniqueness of the methodology

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- First Global methodology in voluntary market for point source emissions
- Separate Guidance document on aspects related to site selection, assessment of environmental and social Impacts, monitoring requirement etc.
- Unique mechanism to ensure conservative estimation of emission reduction/removals
- Provides guidance for projects undertaken in geographies which do not have CCS related regulations
- Contributes toward "Coal Phase down" regulations by way of allowing retrofit projects in energy sector only in geographies with such regulations

Treatment of fossil fuel systems and conservative estimates

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- Introduction of adjustment factor to account for renewable energy penetration rate in the connected grid and *ex-post* annual moderation of the grid emission factor with the adjustment factor
- For projects where the capture plant affects the performance of the source plant (e.g. energy penalty in energy generation systems) the historical average emissions prior to project is used to cap the amount of credits claimed from these projects
- For new built the benchmark performance of top 20% plants in the region used to cap the amounts of credits claimed from these projects
- In all scenarios the actual amount of Co2 injected into sub-surface is compared with the baseline calculations and lower of the two is claimable in the project.
- Several safeguards incorporated to avoid excess claims by way of changing feedstock or process resulting in more emissions
- Crediting period limited to remaining technical lifetime of the source plant or 30 years which ever is lower.

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Methodological Component	Global Carbon Council
Definitions	**A comprehensive list of definitions in including:** • Geological storage site • History-matching • Net reversal of storage • Significant deviation • Storage complex (similar to Area of Review applied in U.S. legislation)
Project Boundary	**Above-ground components, including, where applicable:** (a) The facility (Part of the Source plant) where the CO2 is captured; (b) The CO2 capture equipment; (c) Any CO2 treatment facilities; (d) Transportation equipment, including pipelines and booster stations along a pipeline, or offloading facilities in the case of transportation by rail, road, or ship tanker; (e) Any reception facilities or holding tanks at the injection site; (f) The CO2 injection facility. *NOTE: embodied CO2 and upstream emissions are excluded from the boundary/scope.* Subsurface components within the storage complex, including the geological storage site, connected infrastructure (e.g., wells injection, observation, production, abandoned wells, etc.), any pressure front associated with displaced brines, and all potential sources of seepage

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Applicability Conditions	Covers the following. **CO2 capture from:** • Industrial process sources (dilute or high-purity) • fossil point point sources (boilers, turbines etc) • biogenic point sources ("BECCS") • mixed bio and fossil sources (e.g. waste incineration with CCS) • direct from air (DAC) CO2 transportation: • Pipelines, rail, or road tanker **CO2 storage:** • Saline aquifers • Depleted hydrocarbon reservoirs • Enhanced oil recovery is excluded **Site permitting:** • In jurisdictions where the requirements for storage are entirely fulfilled by local regulations, the local regulations shall prevail. • In jurisdictions where any of the requirements for storage are not specified in local regulations, project owners must follow the GGCS. A permit to store CO2 from a national authority must also be provided

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Baseline Emissions	**Baseline scenario**: a similar type of "Source Plant", with similar levels of output, that would occur in the absence of the financial incentive to capture (or remove) and store CO2 offered by project crediting under GCC. **Baseline emissions:** Distinguishes between (I) retrofit or (II) new-build. (I) retrofits tend towards using historical emissions (performance-based) (II) new-builds towards using a benchmark (standards-based) There cases presented with decision support matrix. • **Case 1**: Actual emissions measured in each project year • **Case 2**: Historical emissions (average of three years) • **Case 3**: Average emissions of similar "Source plants" undertaken in the previous five years, in similar circumstances, and whose performance is among the top 20 percent of their category [Various sub-types covered for different types of source plants] DACCS and BECCS have zero removal/emissions baseline.
Additionality	**Applies CDM "TOOL01:** Tool for the demonstration and assessment of additionality". • CCS and BECCS: supplemental guidance provided to guide assessment. • DACCS considered to all be additional unless mandatory.

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Project Emissions (including seepage)	**Project emissions include the following:** (a) CO2 emissions due to fossil fuel combustion from stationary sources (i.e., used to power CO2 capture, treatment, transportation by pipeline, reception, and injection of the CO2) and from mobile sources (e.g., in the transportation of CO2 by rail, road and/or ship tanker) within the project boundary; (b) CO2 emissions from electricity consumption relating to the capture, treatment, transportation by pipeline or rail (if applicable), reception and injection of the CO2; (c) CO2 emissions from bought-in heat consumption used for the capture of the CO2; (d) CO2 removals arising from the injection and geological storage of biogenic CO2 or direct air capture (accounted for as negative project emissions); (e) Fugitive (non-seepage) CO2 emissions occurring across the project activity due to losses (leaks) from pipelines, loading and unloading etc.; (f) Potential CO2 emissions from seepage of CO2 from the geological storage site, which can potentially occur at any time after injection commences. **Three key parameters included for the Geological Storage Complex:** 1. Conditions of use - operational safety margins and appropriate conditions of use to avoid activating pressure-driven processes in the injection formation. 2. CO2 migration analysis - history matching to confirm that there is an agreement between the numerical modelling of the CO2 plume distribution in the geological storage site and the monitored behavior of the CO2 plume. 3. Geological storage site architecture - monitoring of the geological storage site architecture (i.e., features), based on comparison with base-level survey data collected during site characterization. CO2 flux rate measurements must be applied where seepage is detected.

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Monitoring	**Methodology:** **Monitoring plan covers two types of parameters:** (a) Those that are determined ex-ante, and therefore not monitored during the crediting period, and (b) Those that are to be monitored during the crediting period. CCGS: Sets out detailed requirements for preparing a CO2 Storage Complex Monitoring Plan. Focus is on establishing techniques to fulfil the three-project emission elements described above (i.e. Conditions of Use; CO2 Migration; Storage Site Architecture)
Leakage	**Two variants covered:** 1. Electricity generating plant de-rating 2. Biomass use

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Permanence Liability for CO2 Reversal	**Operational phase:** Seepage from the CO2 Geological Storage Site should be treated as project emissions. Where reductions/removals exceeded in a monitoring period, net removal of storage applies. Net reversal of storage (i.e. seepage exceeds reductions/removals): Buffer pool. Where net reversal occurs, an equivalent number of ACCs shall be cancelled from the GCC pooled buffer account for geological carbon storage. **Post-injection monitoring, cessation of monitoring and transfer of stewardship:** • Project owner continues MRV to the GCC for a minimum of five years after the cessation of injection. • If evidence from MRV indicates that the risk of seepage is sufficiently low and that permanent storage is highly likely to be achieved, site closure can occur and monitoring can be discontinued • If evidence does not show permanent storage after five years post injection monitoring. MRV shall continue in two-year increments until such conditions are met. • After monitoring ceases, host country liable for undertaking any future monitoring as per paragraph 4(v) of Volume 2, Chapter, 5, Section 5.7.1, of the IPCC 2006 Guidelines

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Methodological Component	Global Carbon Council
Environmental and Social Impacts	**Methodology:** • Project owners must apply the GCC "Environment and Social Safeguards Standard – V3.0" CCGS: • Sets out detailed requirements for Environmental and Social Risk and Impact Assessment (for CO2 geological storage sites
Sustainability	**Methodology**: • Project owners required to follow the GCC Project Sustainability Standard – V3.1.

− GCC Program Framework

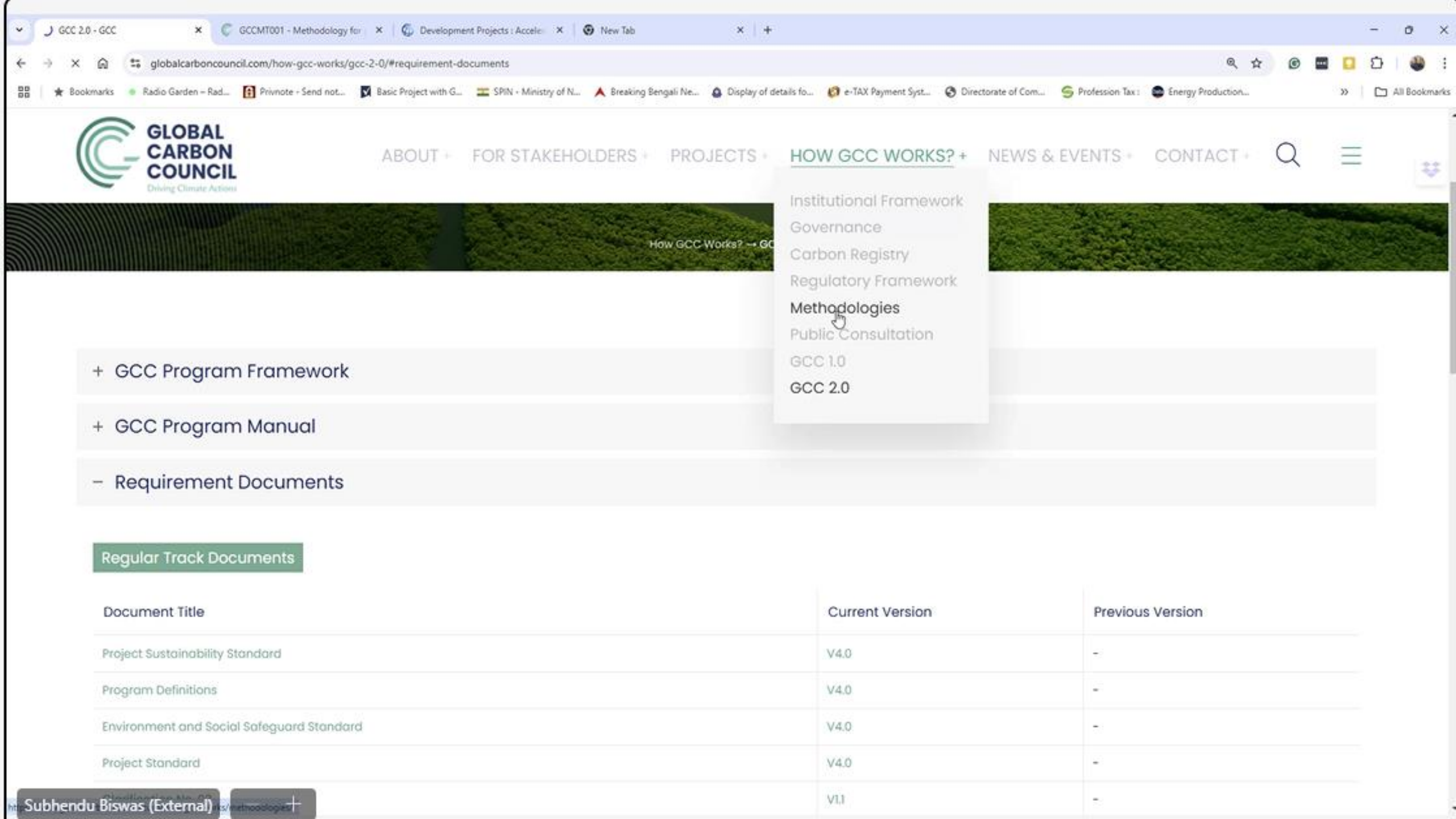
Document Title	Current Version	Previous Version
Program Framework	V4.0	-

+ GCC Program Manual

+ Requirement Documents

+ Procedural Documents

+ Templates and Forms


GCC 2.0 - GCC
GCCMT001 - Methodology for
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+ GCC Program Manual
– Requirement Documents
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Previous Version
Project Sustainability Standard
V4.0
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Program Definitions
V4.0
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Environment and Social Safeguard Standard
V4.0
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Project Standard
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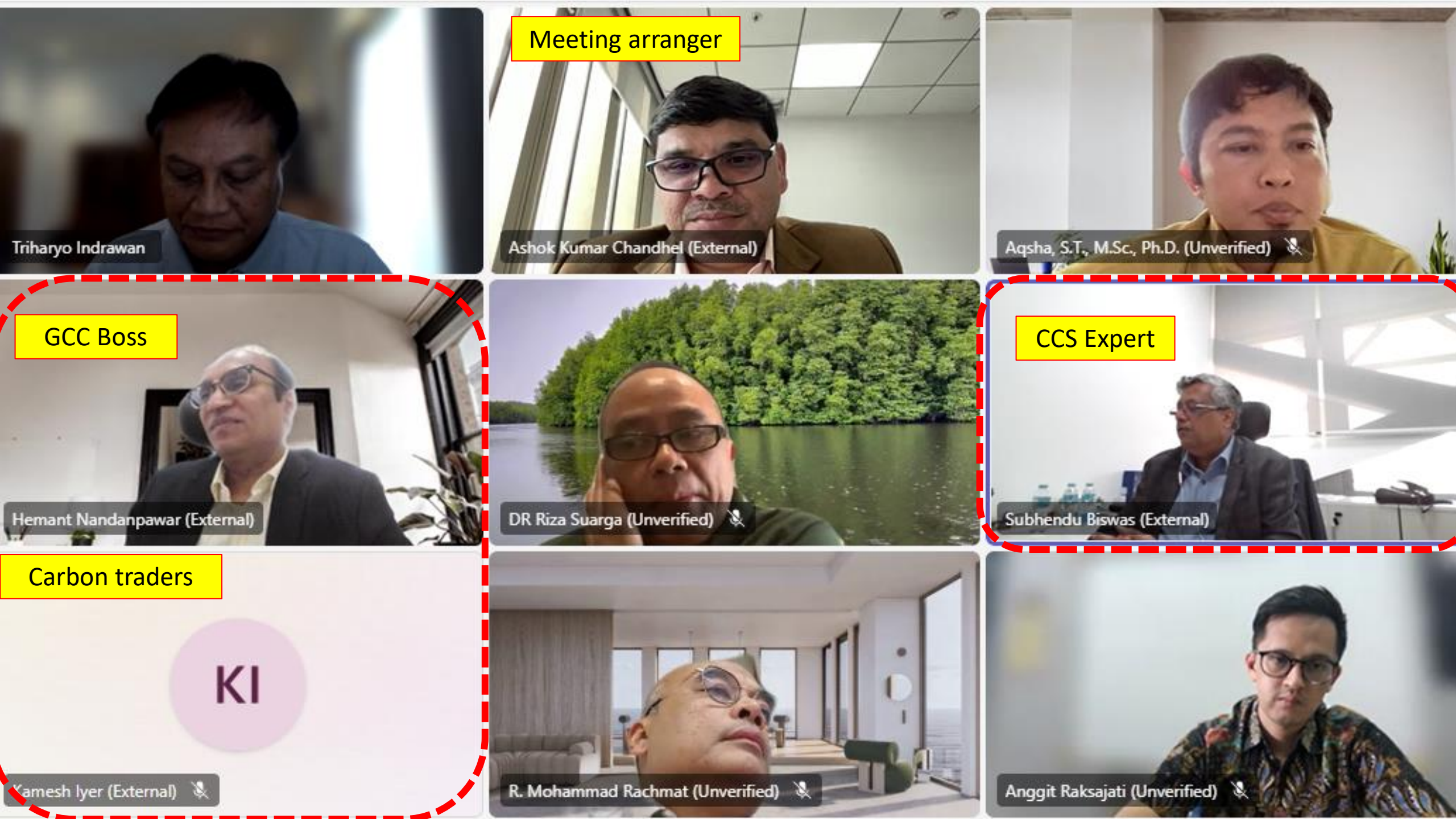
Subhendu Biswas (External)


Meeting arranger
Triharyo Indrawan
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