Preparation and Compliance – Measurement, Reporting and Verification (MRV) system

Facility-level MRV for GHG Emissions - Training Workshop

09/04/2025

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Environment Agency - ABU DHABI

Today's agenda

1 | Introduction to and overview of the Monitoring, Reporting & Verification ("MRV") scheme

2 | Introduction to capacity building in the MRV scheme

3 | Monitoring & reporting training

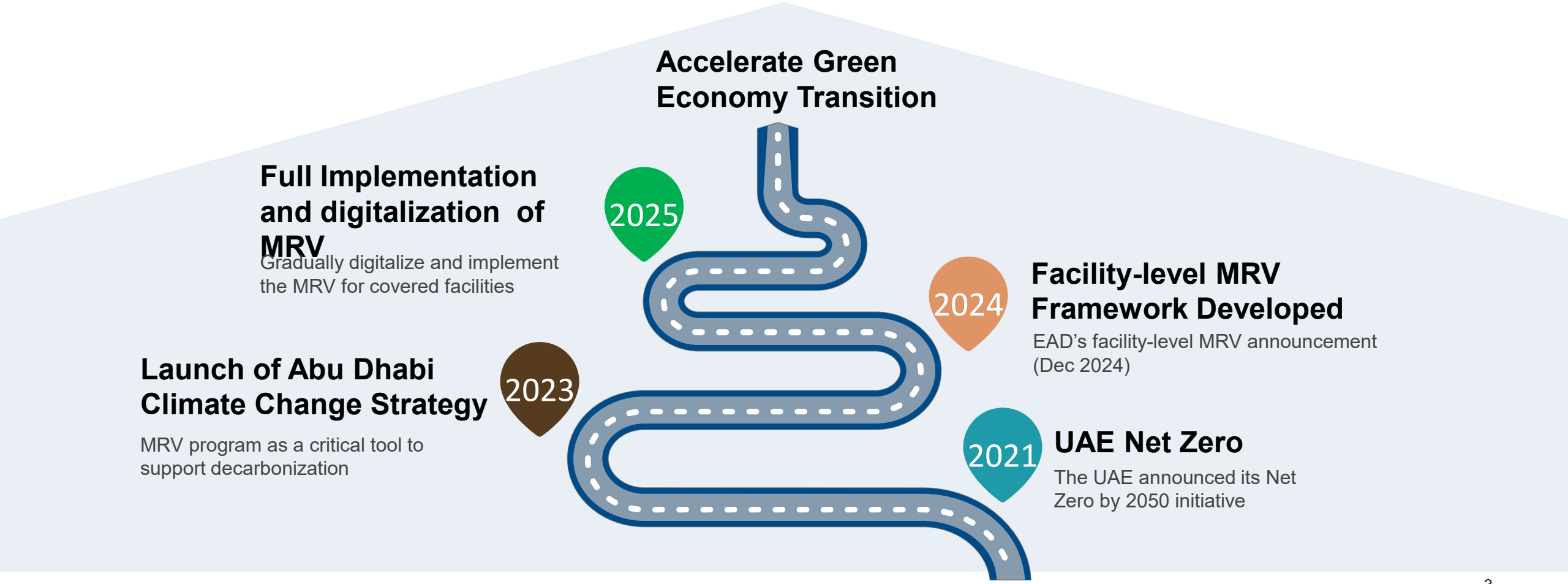
3i | Overview of process and required preparation

3ii | Reporting template – live demonstration

4 | Q&A session

Abu Dhabi is developing mechanisms to decrease carbon emissions in line with national- and emirate-level climate commitments and plans

Delivering on Abu Dhabi's Climate Change Strategy Goals



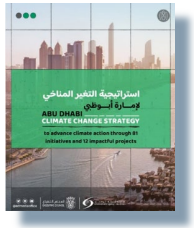
The MRV system is aligned to federal and national initiatives and will support with their success

Participation in the MRV will support the UAE's climate commitments and allow Abu Dhabi to lead GHG reductions to 2050's Net Zero ambition

Initial commitments - Paris 2015

2016-2022: UNFCCC and Nationally Determined Contributions (NDCs)

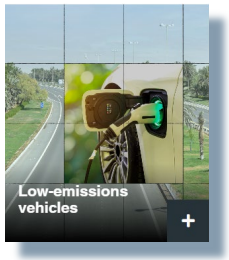
2023: Led to a National strategy 2024 onwards: a Federal approach

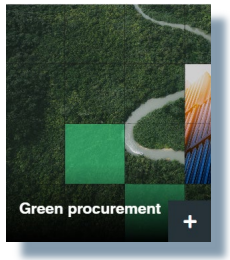


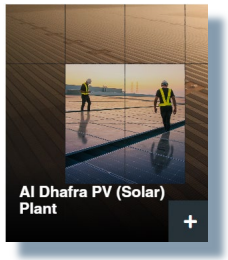
The MRV will facilitate many Abu Dhabi climate plans

Abu Dhabi Measurement, Reporting & Verification (MRV) scheme - will inform many GHG reduction initiatives

- Provides **core independent GHG information-gathering infrastructure**, supports wider GHG initiatives for Abu Dhabi, whilst supporting a template for the wider UAE and driving external investor (FDI) confidence – **Future proofing the region for trade, industry and climate ambition**







Abu Dhabi climate initiatives that could benefit from an MRV:

- ESCO Regulator, Self-Reporting Scheme and Carbon registry
- Future schemes could likely include an ETS *Cap & Trade* or Carbon Taxation legislation

These schemes will fundamentally need an MRV to function effectively

Establishing the Foundations for High-Quality Emissions Data and Future Climate Action

Development of an MRV System

Design a standardized system to monitor, report, and verify GHG emissions across key sectors and facilities in Abu Dhabi.

Analysis of coverage and historical emissions

Map and analyze emission sources and trends to support data-driven climate policy and sector-specific interventions.

Ensuring Data Quality and Readiness

Assess data availability, quality, and consistency to support effective tracking and future climate-related decision-making.

Exploring Future Policy and Incentive Options

Lay the groundwork for future market-based or regulatory approaches aligned with Abu Dhabi's sustainability goals.

Supporting Facilities with Tools, Digital Access, and Training for MRV Compliance

HOW ARE WE DOING IT?

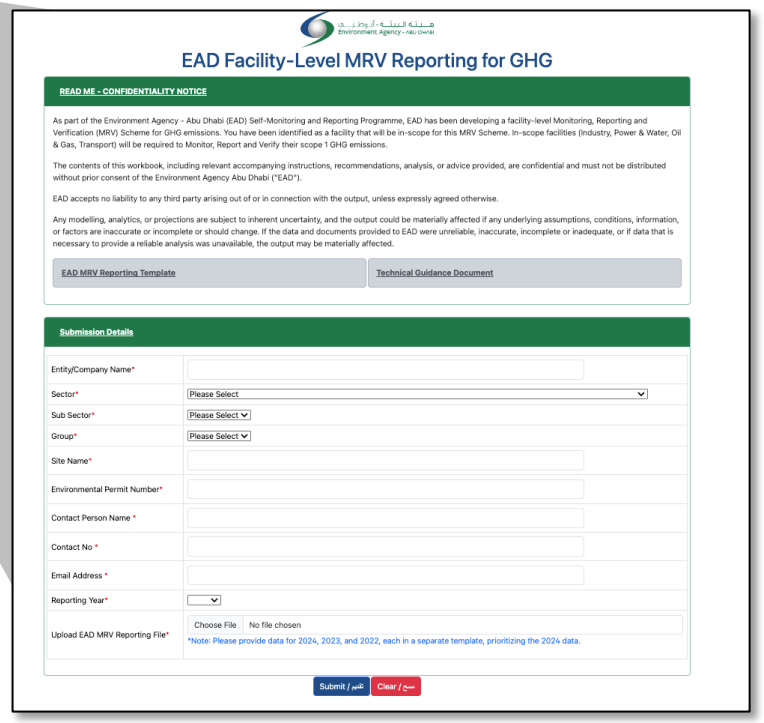
MRV REPORTING TOOLKIT
Reporting Guidance and Template for facilities

MRV PLATFORM
Modern MRV digital platform

CAPACITY BUILDING
Roll out a Capacity Building program for facilities

COMPLETE | ON-GOING

The MRV Reporting Toolkit Technical Guidance and Template are available to all facilities on [https://facilitymrv.ead.ae] accessible to all



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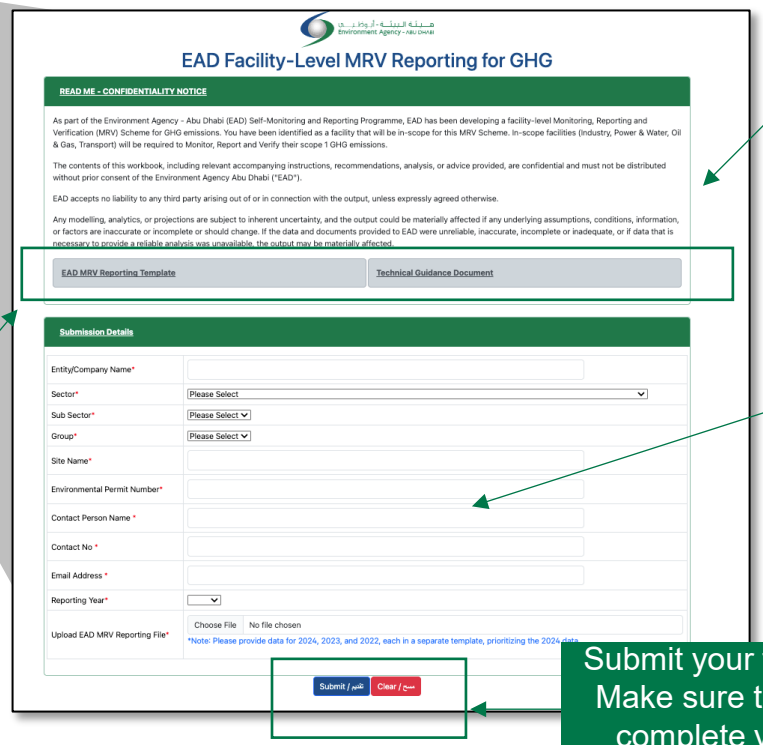

Provides Overview, purpose and who is in scope for reporting

Submission Form Facilities must enter their basic info

Two key resources to help facilities complete and understand the submission process:

1. EAD MRV Reporting Template – the Excel file
2. Technical Guidance Document – explains how to fill the template, what data is required, and the rules to follow.

Submit your facility data Make sure to upload a complete year **data priority 2024, and for previous years if you can compile for** 2022, 2023

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The scope of Abu Dhabi's facility-level MRV scheme

Key parameters of the MRV

Key highlights				
Point of Regulation	**Reporting Periodicity**	**Emissions Threshold**	**Sector Coverage**	**Emissions Coverage**
Facility level	Annual	25,000 tonnes CO_{2e}	**Power** (electricity & water) **Industry** (oil & gas, petrochemicals, iron & steel, aluminium, cement, manufacturing, in addition to other similar emission intensive sectors) **Transport**	CO_2 CH_4

✓ Today's session will provide participating facilities with guidance on the expectations and guidance for reporting their emissions as part of the MRV scheme

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EAD's reporting template is designed to capture scope 1 GHG emissions arising from carbon dioxide (CO_2) and methane (CH_4)

Scope 1
Emissions are direct GHG emissions from operations that are owned or controlled by the organisation.

Scope 2
Emissions are indirect emissions from the generation of purchased energy consumed by the organisation.

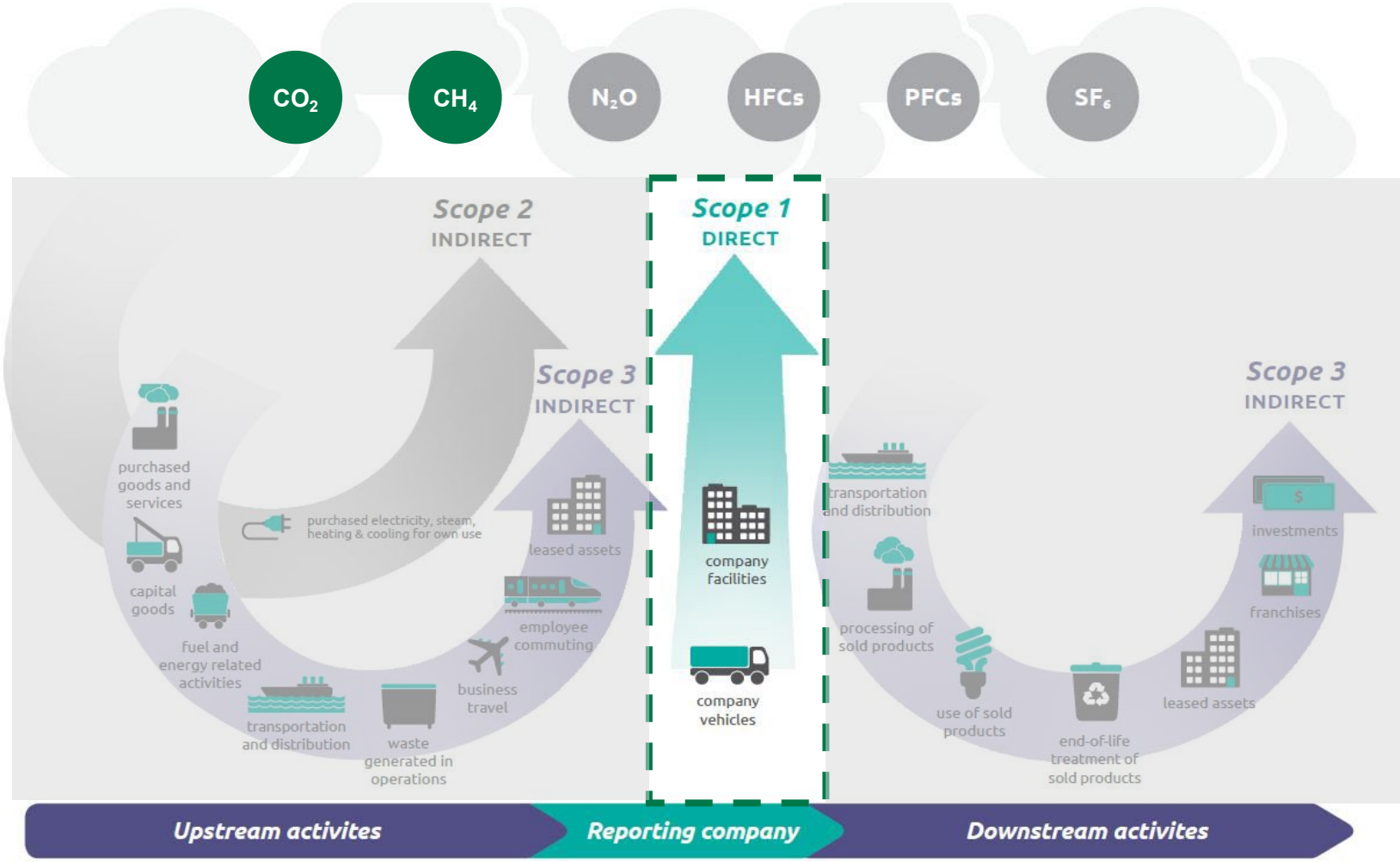


Image from GHG Protocol Corporate Standard

Scope 3
Emissions are all other indirect emissions (not included in Scope 2) that occur in the value chain of the organisation.

They are a consequence of the activities of the organisation, but occur from up and downstream sources not owned or controlled by the organisation.

The reporting template is designed to systematically gather and record data relevant to greenhouse gas (GHG) emissions at a facility's installation-level

The template's design is informed by reporting best-practices and simplifies existing processes for operators. Four overarching principles should be considered when preparing for reporting:

1 Outline process

- Can I describe what is happening in and at my installation?

2 Describe emissions-estimation approach

- Can I describe the approaches I use to estimate emissions at my installation?

3 Identify inputs

- Can I identify the inputs that I use and gather within my installation on which reporting is based?

4 Describe verification processes

- Can I describe the verification and quality assurance processes that are in place to ensure the data I report is valid?

How the template links to the MRV submission

Monitoring Plan

- Reporting Template without variable data populated

Emissions Report

- Fully completed Reporting Template with variable emissions populated
- For example, monitoring report with variable data of inputs for calculations for the year. Alternatively, the continuous measurements of carbon dioxide released from activities

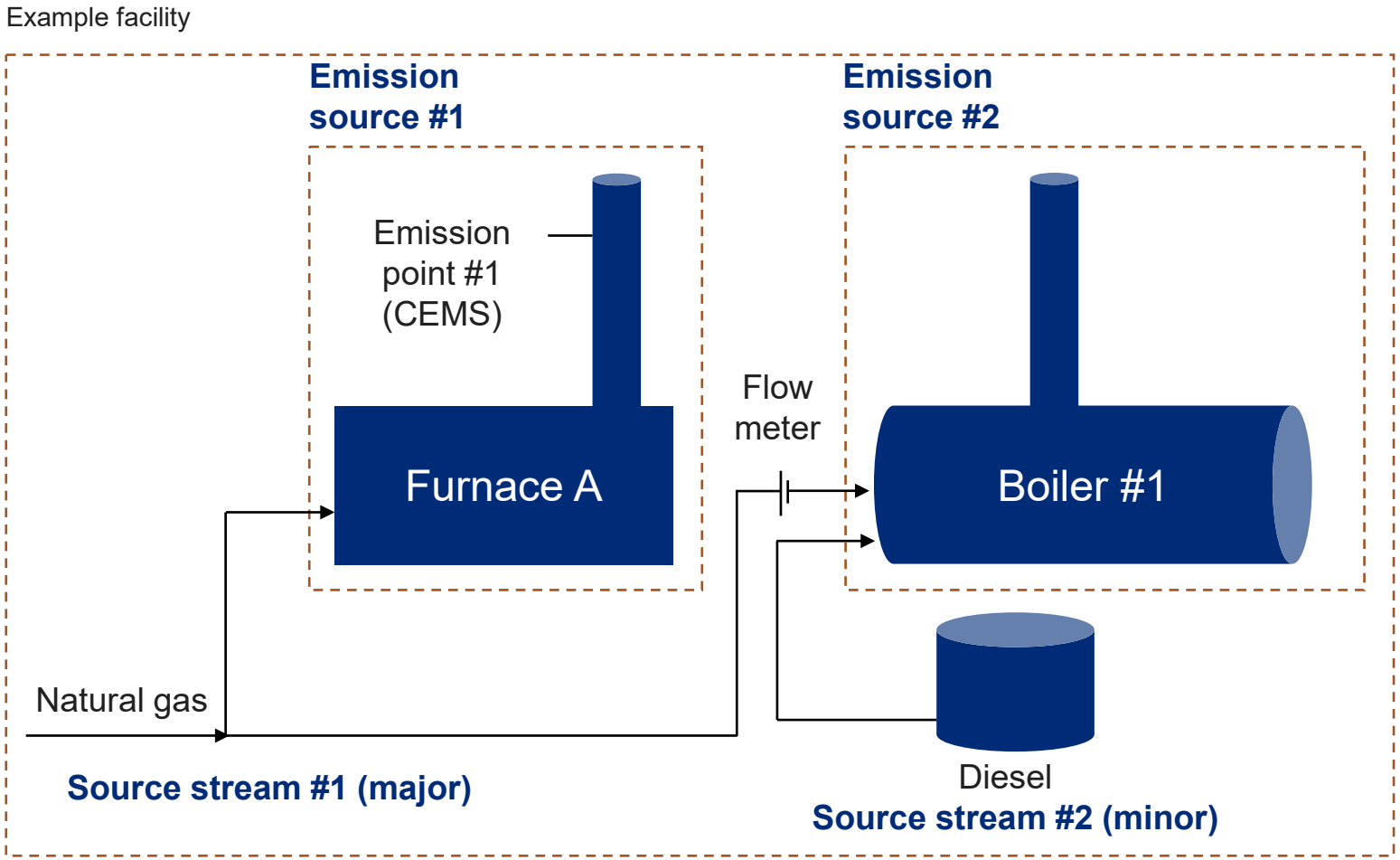
Verification

- Documented evidence that the facility submitting the report provide to validate the emissions reporting they are doing

Beyond this completion of template, no further annual submissions will be required complete the monitoring plan and emissions report

Outline process: A typical site schematic would show major emission sources and their fueling links

Example visualization of a site's mapped activities*



A facility may have multiple streams existing on site but in practice not all are material contributions to emissions and less stringent standards may be applied in order to reduce monitoring requirements.

Operators may review the relative contribution of individual source streams to the total of all monitored emissions and classify the smallest as 'de-minimis' or 'minor':

De-minimis: source streams that are jointly <1 kT CO2e or <2% total, up to a limit of 20 kT CO2e, whichever is higher

Minor: source streams that are jointly <5 kT CO2e or <10% total, up to a limit of 100 kT CO2e, whichever is higher

Major: all other source streams.

Examples would be:

Stand-by power generation sources that are activated at a low frequency for maintenance and testing.

Equipment at infrequently used locations

* For more information, please refer to *Step 3: Description of the installation and its activities* of the Technical Guidance Document
Source: MMC SME insights

Primary emissions-estimation approaches

Facilities have a choice of using a calculation-based methodology, a measurement-based methodology, or a fallback approach if compliance with the measurement-based and calculation-based approach is not possible

3 core methods of GHG quantification

Combustion emissions approach

$$\text{Emissions} = \text{Activity Data X Emission Factor X Oxidation Factor}$$

Mass balance approach

$$\text{Emissions} = \text{molar mass C conversion X } (\sum \text{Carbon}_{\text{input}} - \sum \text{Carbon}_{\text{output}})$$

Measurement based approach

$$\text{Emissions} = \text{GHG conc X Vol flow rate}$$

- These GHG assessment methodologies and slight variants are accepted. These should be recorded and agreed by the competent authority in a Monitoring Plan. Facilities will need to propose their preferred/justified methodology.
- The methods should be tiered and allotted by sector processes to aid measurement accuracy. The largest emissions need to be monitored most accurately; less stringent methods can be applied to smaller emissions
- Once defined and agreed with the authority, facilities will be required to adhere with this approach unless formally adjusted. The level of measurement uncertainty standard may decrease over time (increased standard), as such this may dictate a change of method and trigger a formal approach request for variation of measurement

Alternative emissions-estimation approach

‘Fallback’ emissions-estimation approaches are permitted, were neither the predominant calculation or measurement-based approaches are used, if justified and acceptable to a competent authority

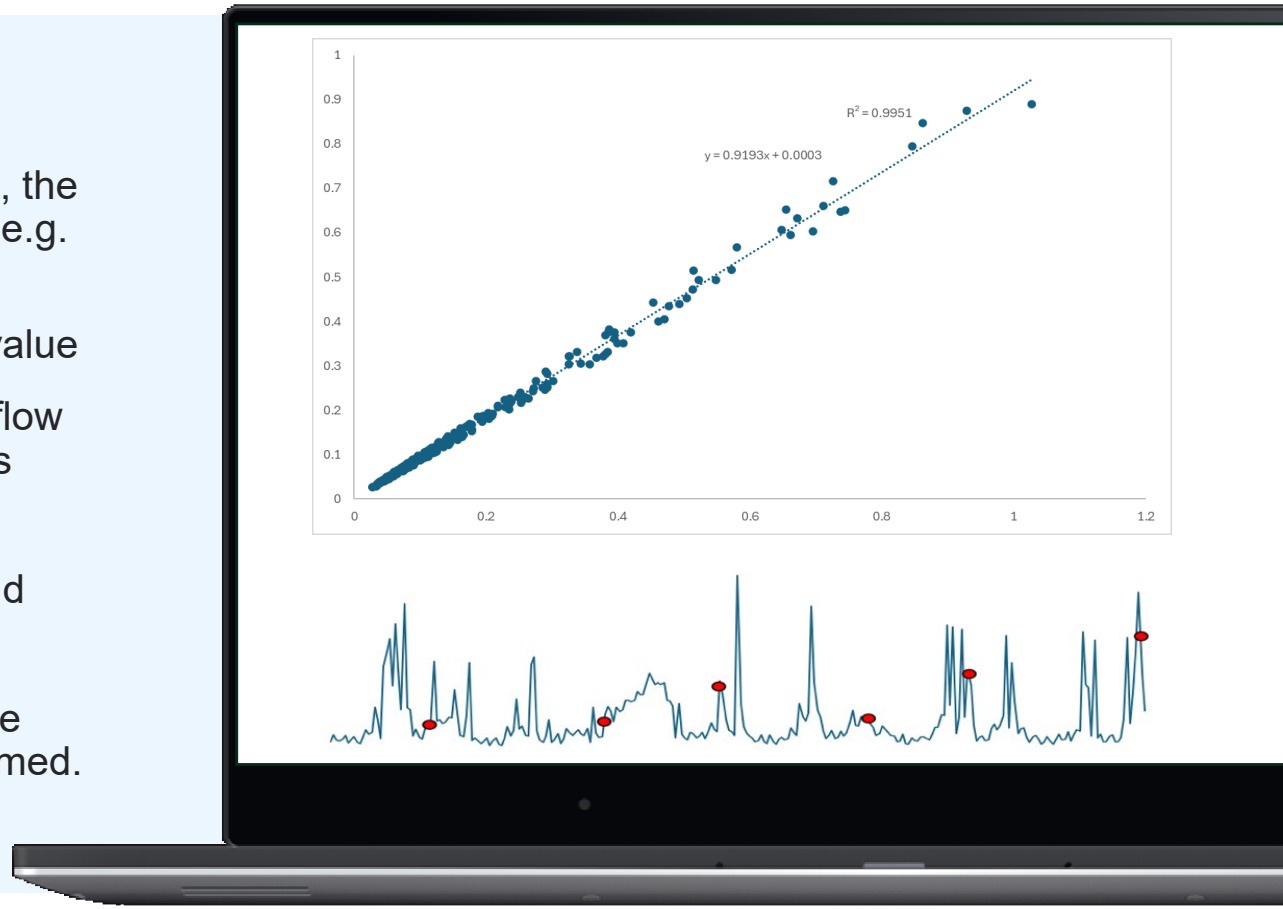
Fallback approach:

If a facility can demonstrate a **correlation** between variables, the competent authority may approve alternative methodologies e.g.

- For source streams that are made up of a mixture of hydrocarbons, density will strongly correlate with calorific value
- The installation of an SG analyser combined with existing flow meter may be sufficient to calculate the activity data for this stream, to the appropriate tier of uncertainty.

Entities will have to demonstrate that correlations remain valid through periodic sampling.

The competent authority will require sample frequencies to be determined and agreed, along with the analysis being performed.



Please refer to *Step 5: Categorise your source stream and emission sources* Technical Guidance Document for more information

After mapping sites and defining an emissions-estimation methodology, the facility must assess where and how emission inputs can be derived

Example visualization of a site's mapped activities

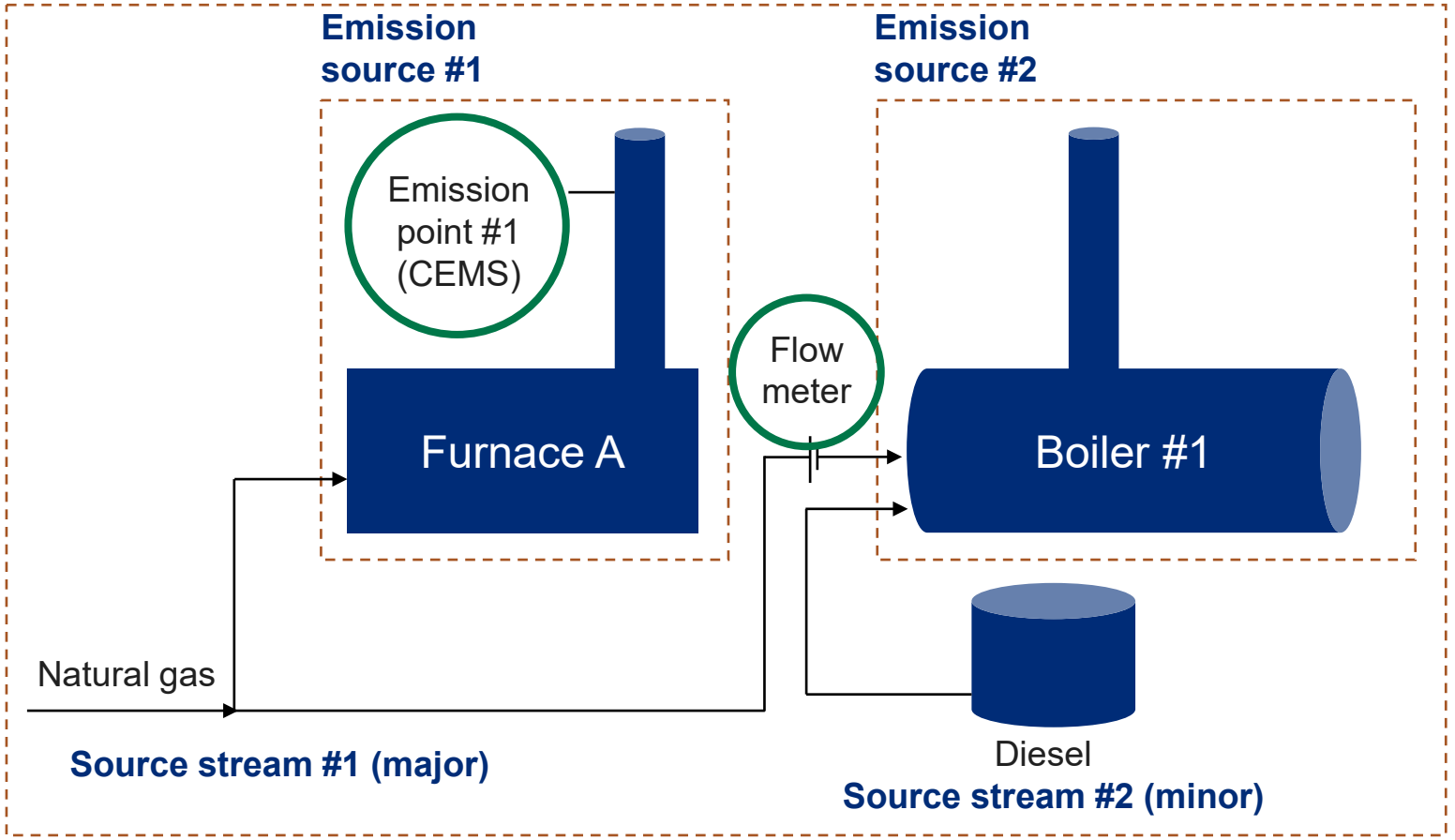
Key inputs

Documentation around the source of all inputs:

- Invoices for fuel purchases
- Gauges
- Emissions factors

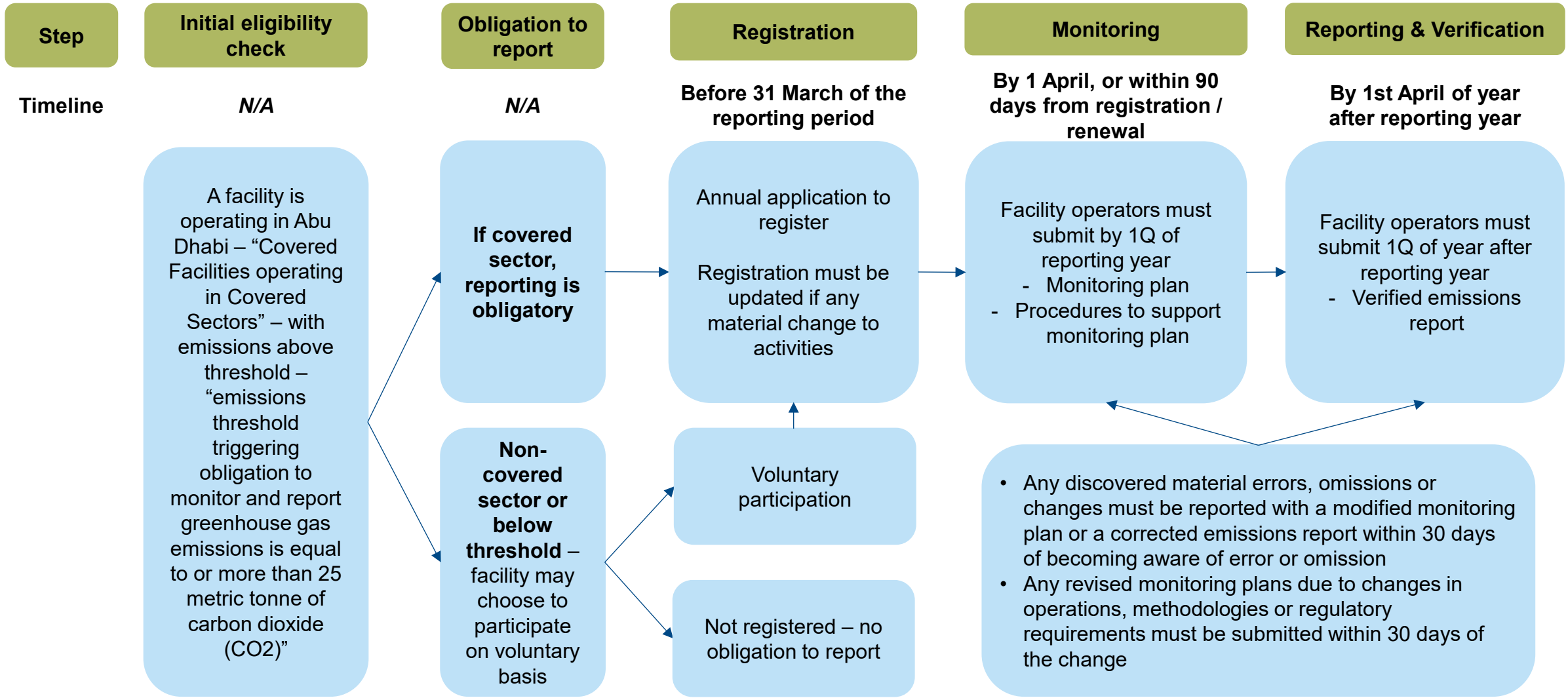
Input parameters in calculations linked to points on the flow-diagrams

Example facility



Source: MMC SME insights

An Abu Dhabi Facility's Decision Process for MRV reporting



- *Source: 20250204_MRV Draft Legislation_Revised Version 2.1*

Guidelines for emission calculation methodology have been proposed for implementing the 'in theory' approach

Monitoring of activity data and calculation factors necessary for accurate quantification of emissions

For each source stream we want to understand the uncertainty in the measurement which ties to the measuring instruments and methodology

For this exercise we define four Tiers* of uncertainty for Activity Data**:

- The maximum uncertainty of less than the following to qualify for each Tier
  - Tier 1: +/- 7.5%
  - Tier 2: +/- 5.0%
  - Tier 3: +/- 2.5%
  - Tier 4: +/- 1.5%
- Uncertainty refers to all sources of uncertainty, including uncertainty of instruments, of calibration, environmental impacts

Larger sources of emissions must be monitored to higher tiers of uncertainty over a reporting period

- Uncertainty assessments must be carried out to demonstrate compliance with the correct Tiers
- Major sources of emissions should comply at least with Tier 2
- Minor sources of emissions can comply with Tier 1
- De minimis sources of emissions can be excluded

Objectives

- For this exercise we want to understand your current levels of uncertainty
- We anticipate that over time requirements to measure emissions to higher Tiers maybe required

*Please see *Step 6: Data quality – tiers by approach, calculation factor, fuel and/or material quantity* for further guidance
**These four Tiers are in-line with the Tier Classification defined within the EU ETS (Section 6)*

Self-verification and managing data gaps

The verification step provides assurance that an internal quality control process has taken place, and should not be confused with the external 'verification' step of the whole MRV scheme that is completed by an accredited verifier

Understanding existing self-verification

Report should describe calibration and maintenance activities that support measurement devices and methodologies

This is additional information on how reported data has been gathered is used to:

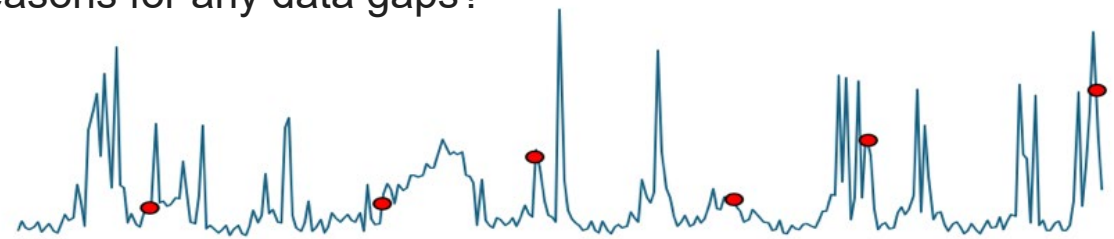
- Ensure comprehensive information has been supplied in the report to the competent authority
- Enable independent verification activities

Independent verification (aka, 'audit') of a facility's emissions report is a mandatory requirement for facilities participating in the MRV scheme.

Expectations of self-verification

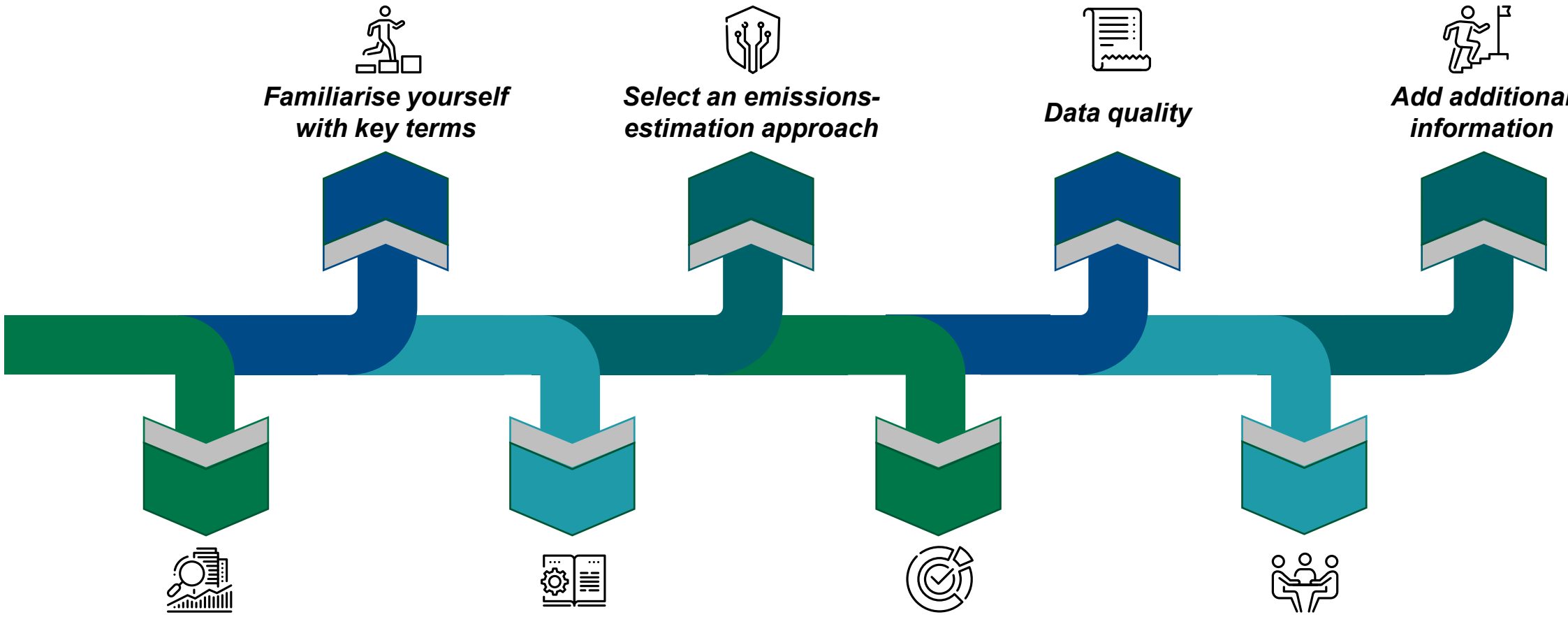
Facilities should be able to provide a detailed description of the verification methodology applied for all source streams and/or emission sources. For example:

- Does management information demonstrate the operating model of the site?
- What is your maintenance regime?
- What gauges are used?
- For each widget used, what practices are in place to ensure readings are valid?
- Are any points ambiguous, and are you able to describe the reasons for any data gaps?



Activities for completing the reporting template

Key activities for facilities reporting their emissions:



Please see *1.3. How do I fill out this template of the* Technical Guidance Document for further guidance

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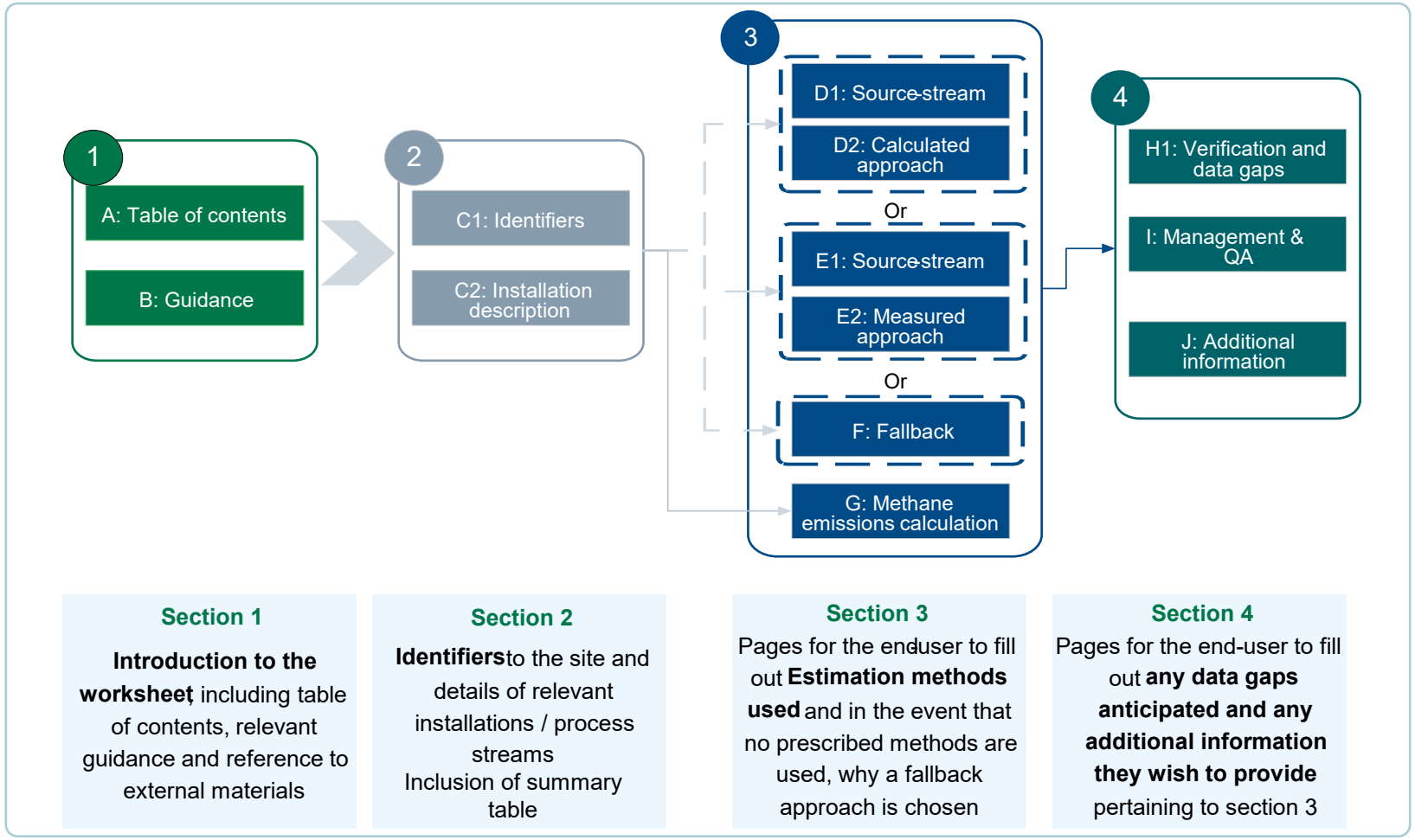
Overview of facility-level reporting template workflow

Workflow of report and monitoring plan template



- The template is separated into different sections (in the form of steps), with the intention of enhancing useability and ensuring data is captured in ways that prevent overlap / conflation of different categories
- The template includes separate source stream worksheet for each approach ensures source streams are not conflated / captured separately

Regulation and definitions

For a complete list of definitions, please refer to *Section 4. Terms and Definitions* of the Technical Guidance Document. Pertinent sections are included in green boxes throughout the technical guidance document

Emission source	• A separately identifiable part of an installation or a process within an installation, from which relevant greenhouse gases are emitted or, for aviation activities, an individual aircraft
Source stream	• (A) a specific fuel type, raw material or product giving rise to emissions of relevant greenhouse gases at one or more emission sources as a result of its consumption or production; • (b) a specific fuel type, raw material or product containing carbon and included in the calculation of greenhouse gas emissions using a mass-balance methodology.
Activity data	• Data on the amount of fuels or materials consumed or produced by a process relevant for the calculation-based emissions-estimation methodology, expressed in terajoules, mass in tonnes or (for gases) volume in normal cubic metres, as appropriate;
Calculation factors	• Means net calorific value, emission factor, preliminary emission factor, oxidation factor, conversion factor, carbon content, biomass fraction or unit conversion factor;
Tier	• A set requirement used for determining activity data, calculation factors, annual emission and annual average hourly emission, released fuel amount and scope factor

The reporting terminology closely follows the EU Monitoring and Reporting Regulation (MMR), with key terms found in Article 3, MMR: Definitions

Live demonstration of the MRV reporting template

Let’s walk through each sheet of the Excel template that has been shared with you to understand more about its useability and requirements

At this point in the training presentation, open up the Excel reporting template for a live demo, or play the recorded session (see section 4 of this report for more detail)

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Part 4: Q&A Session

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Frequently asked questions from the Mock Compliance Review [1/2]

Question	Answer
Where can I get further guidance?	For clarification on terms and methodology, you may refer to the Technical Guidance Document (TGD) that was developed by the Agency to support the Decision No.1 of 2024. When relevant legislation (including impending Abu Dhabi MRV legislation) are created, these should be consulted as priority. To align with best practices and other jurisdictions, operators may – at their own discretion and risk – consult EU Monitoring and Reporting Regulation ("MRR") as indicated in the data-gathering tool. Occasional references will also be made to Directive 2003/87/EC ("Directive"), which is the Directive that implements the Regulation. Further useful guidance, including a glossary of key defined terms, can be found in Article 3, MRR: Definitions, and Article 3 of Directive 2003/8. These should be used for clarification of terms and methodologies. It is important to note that the MRV system does not fully comply with the GHG Protocol, covering only one component under Scope 1. This distinction should be clearly understood by users to avoid confusion and the potential risk of being labelled as engaging in "greenwashing." These regulations are not binding in the jurisdiction of Abu Dhabi. Please note, it is your responsibility to ensure that you are using the latest version of the Regulation and Directive.
Do you have a preferred form / template for facilities submitting emissions reports?	EAD has prepared the standard format for reporting. The excel for reporting is available from EAD at the email address on the download page for this document.
What system is used for submitting the report?	Emissions reports must be submitted to the Agency according to the process and method of submission notified by the Agency to the operators. The submission process shall include steps for uploading the report, verification documents, and any additional required information. Evidence for verification may not rely on a meter but on documents such as invoices or calibration certificates. The current submissions process is via email. The Agency may in future establish a reporting platform in the form of digital system to facilitate the submission, management, and verification of greenhouse gas emissions data from operators.

Frequently asked questions from the Mock Compliance Review [2/2]

Question	Answer
What requirements do I need to follow in selecting an accredited verifier?	The accredited verifier should have an accreditation of International Organization for Standardization for the scope of verification including the activities, processes and methodologies for undertaking the verification as per ISO 14064 Standards, or any subsequent edition or update of that standard, or any other relevant ISO standard that may be introduced.
How do I check if someone is an Accredited Verifier and how do I apply to be a verifier?	The Agency shall annually issue a list of accredited verifiers authorised to perform verification activities and issue verification reports as required by this document. Verifiers shall be included on the list of accredited verifiers by applying to the Agency and providing satisfactory proof the required certifications.
How do I monitor and report my emissions?	Facilities must follow the Operational Control Approach, as this MRV system is designed to measure emissions from facilities over which operators have operational control. This is especially relevant given the complexity of corporate structures in the UAE Facilities must monitor emissions through either: • Calculation based methodology: determining emissions from source streams based on activity data (measured or default values) and recognized calculation factors. • Measurement based methodology: determining emissions through continuous measurement using instruments at the facility. If a facility relies on a single meter or gauge to monitor processes (e.g., for power generation or diesel usage in smaller entities like hospitals), the facility should highlight this reliance in its report. Where possible, facilities should reduce dependence on a single monitoring point to improve data accuracy.

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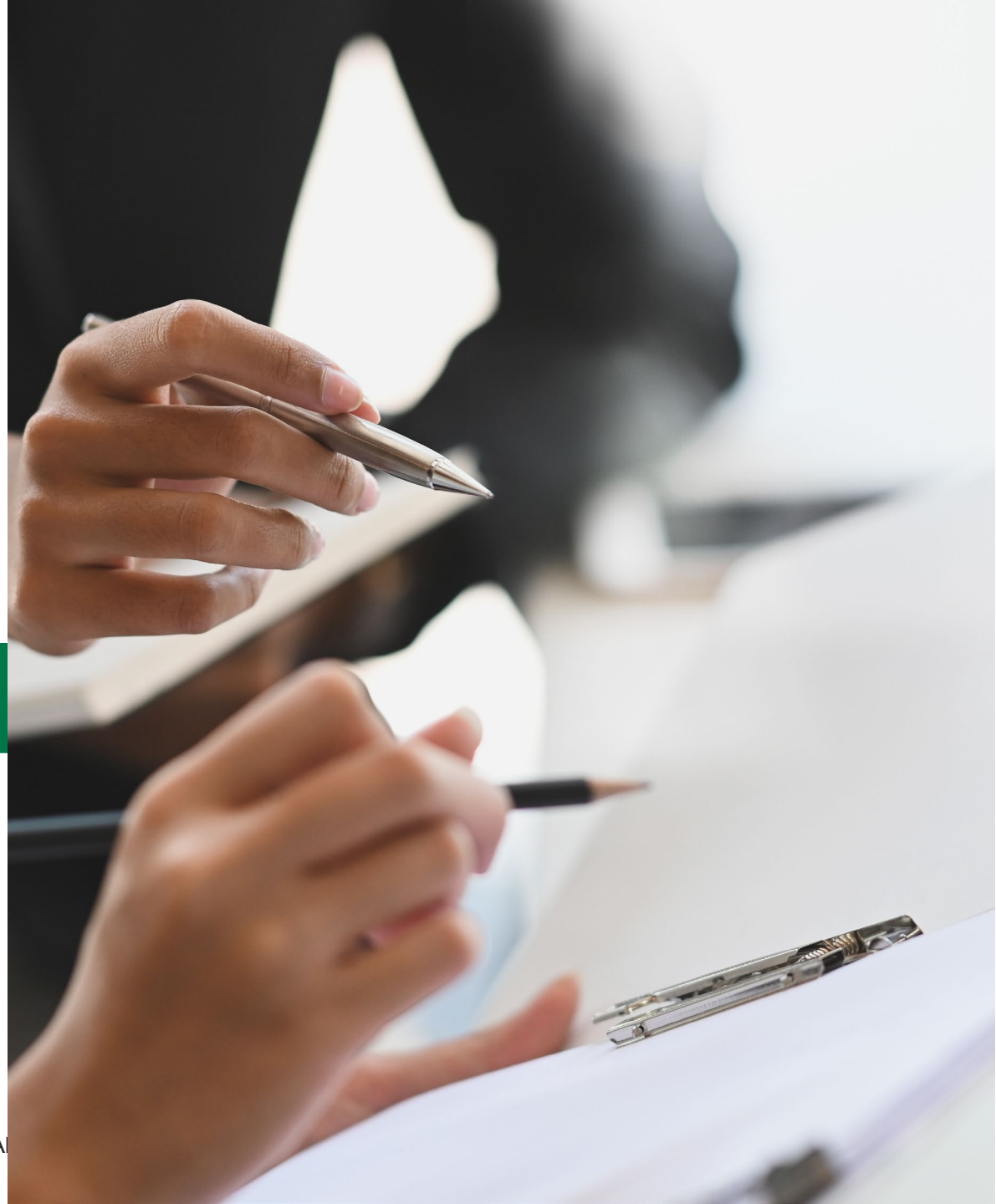

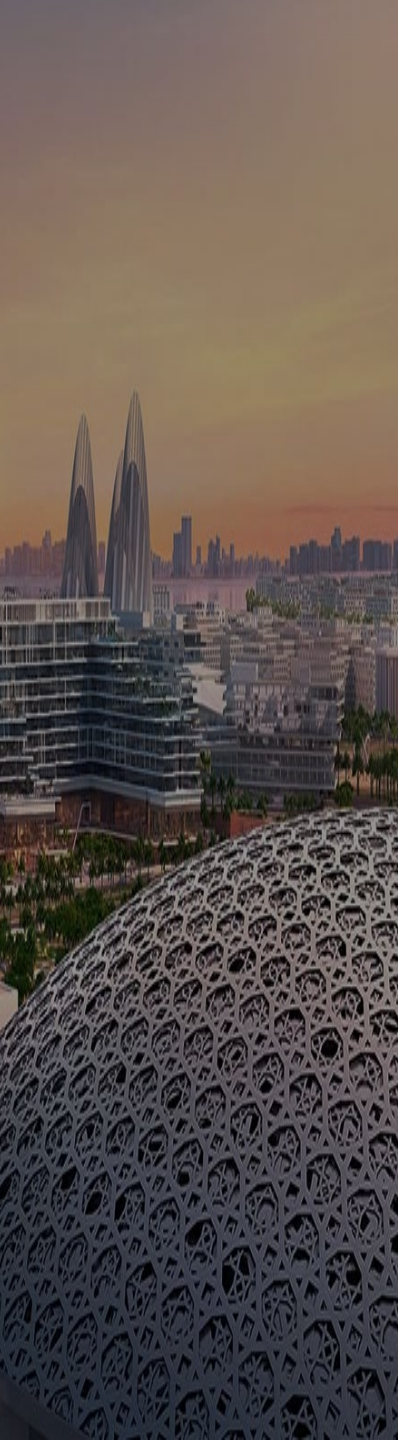

Section outline and overview

0

Project background & Phase 1 recap

- **0.1** Project context & objectives
- **0.2** Key learnings from Phase 1
- **0.3** Rationale for implementing MRV & potential ETS

1

Objectives of the capacity-building program

- **1.1** Objectives & audience for Deliverable F

2

Monitoring & reporting training materials

- **2.1** Introduction to & overview of the MRV scheme
- **2.2** Introduction to capacity building
- **2.3** Reporting training
- **2.4** Q&A / FAQs

3

Accreditation & verification (“A&V”) information pack

- **3.1** Introduction to & overview of the MRV scheme
- **3.2** Introduction to capacity building
- **3.3** Overview of MRV process to be verified
- **3.4** Required A&V standards for verifiers to meet
- **3.5** Example verification-activity workflow

4

Capacity-building program management & next steps

- **4.1** Program management approach
- **4.2** Approach-execution timeline
- **4.3** Plans to ‘Train the Trainer’
- **4.4** Supporting materials & next steps

Feasibility of cap-and-trade scheme
Phase 2: preparation and compliance – MRV system

MRV scheme: Accreditation & verification information pack

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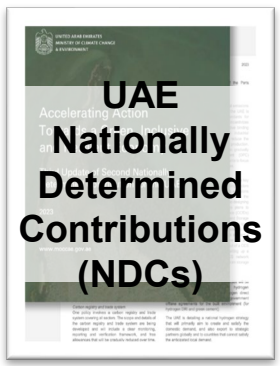
Abu Dhabi is developing mechanisms to decrease carbon emissions in line with national- and emirate-level climate commitments and plans

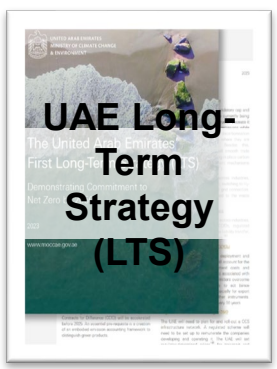
Climate commitments and related carbon-reduction mechanisms:

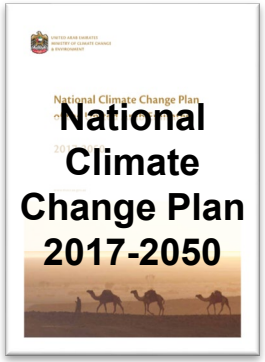
Climate Commitments and Plans

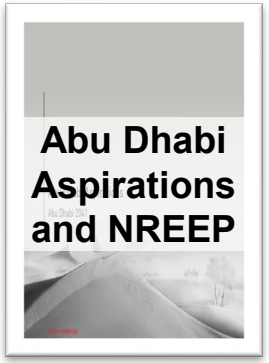
National level

Abu Dhabi level









Carbon Mechanisms

Emissions Trading System (ETS)

ETS cap-and-trade fundamentals developed in 2023

Monitoring, Reporting, and Verification (MRV) System

Focus of this initiative

Carbon Registry

Issued Cabinet Resolution no. 67 for 2024, to be linked with ETS

MRV use can extend beyond carbon pricing:

- Self-monitoring and reporting scheme
- GHG inventories
- National and sub-national MRV programs
- Environment permitting
- Etc.

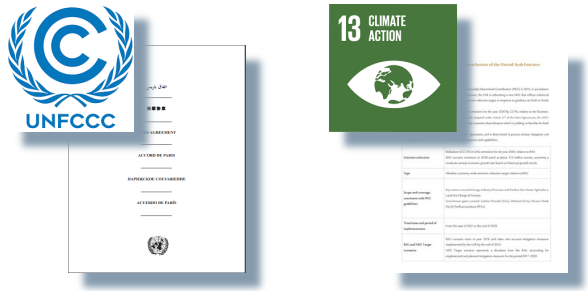
The MRV system is aligned to federal and national initiatives and will support with their success

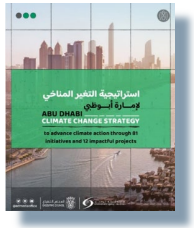
Participation in the MRV will support the UAE's climate commitments and allow Abu Dhabi to lead GHG reductions to 2050's Net Zero ambition

Initial commitments - Paris 2015

2016-2022: UNFCCC and Nationally Determined Contributions (NDCs)

2023: Led to a National strategy 2024 onwards: a Federal approach

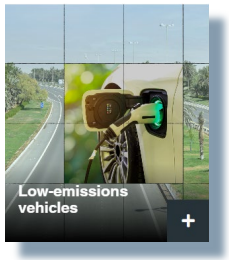


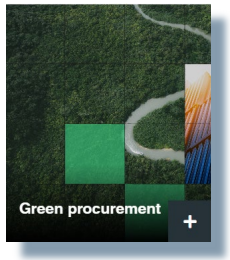


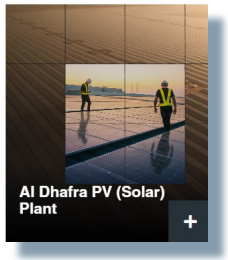
The MRV will facilitate many Abu Dhabi climate plans

Abu Dhabi Measurement, Reporting & Verification (MRV) scheme - will inform many GHG reduction initiatives

- Provides **core independent GHG information-gathering infrastructure**, supports wider GHG initiatives for Abu Dhabi, whilst supporting a template for the wider UAE and driving external investor (FDI) confidence – **Future proofing the region for trade, industry and climate ambition**







Abu Dhabi climate initiatives that could benefit from an MRV:

- ESCO Regulator, Self-Reporting Scheme and Carbon registry
- Future schemes could likely include an ETS *Cap & Trade* or Carbon Taxation legislation

These schemes will fundamentally need an MRV to function effectively

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EAD completed the design of a cap-and-trade ETS scheme and is currently in the preparation and compliance phases of the program

Key project objectives

- **Analysis of Coverage and Historical Emissions**
- **Analysis of Data and Assessment of Risk of Market Liquidity and Overallocation**
- **Analysis of the Jurisdiction for the Cap-and-trade Scheme**
- **Development of an MRV System**

We are here

Design C&T ETS → **Preparation (2024)** → **Compliance (2024-2025)** → **ETS Phase 1 (2026-2028)** → **ETS Phase 1 (2026-2028)**

Target completion by May 2025

Approach

May 2024 — **May 2025**

- Identifying stakeholders, data gathering and enrichment
- Quantification, reporting and verification of GHG emissions
- Capacity building — **We are here**
- Draft MRV legislation
- Market liquidity assessment and allowance allocations

The scope of Abu Dhabi's facility-level MRV scheme

Key parameters of the MRV

Key highlights				
Point of Regulation	**Reporting Periodicity**	**Emissions Threshold**	**Sector Coverage**	**Emissions Coverage**
Facility level	Annual	25,000 tonnes CO_{2e}	**Power** (electricity & water) **Industry** (oil & gas, petrochemicals, iron & steel, aluminium, cement, manufacturing) **Transport** (to be included after initial MRV phase)	CO_2 CH_4

✓ Today's session will provide participating facilities with guidance on the expectations and guidance for reporting their emissions as part of the MRV scheme

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The reporting template is designed to systematically gather and record data relevant to greenhouse gas (GHG) emissions at a facility's installation-level

The template's design is informed by reporting best-practices and simplifies existing processes for operators. Four overarching principles are considered when facilities are preparing for reporting:

1

Outline process

- Can the facility describe what is happening in and at my installation?

2

Describe emissions-estimation approach

- Can the facility describe the approaches they use to estimate emissions at their installation(s)?

3

Identify inputs

- Can the facility identify the inputs that they use and gather within their installation(s) on which reporting is based?

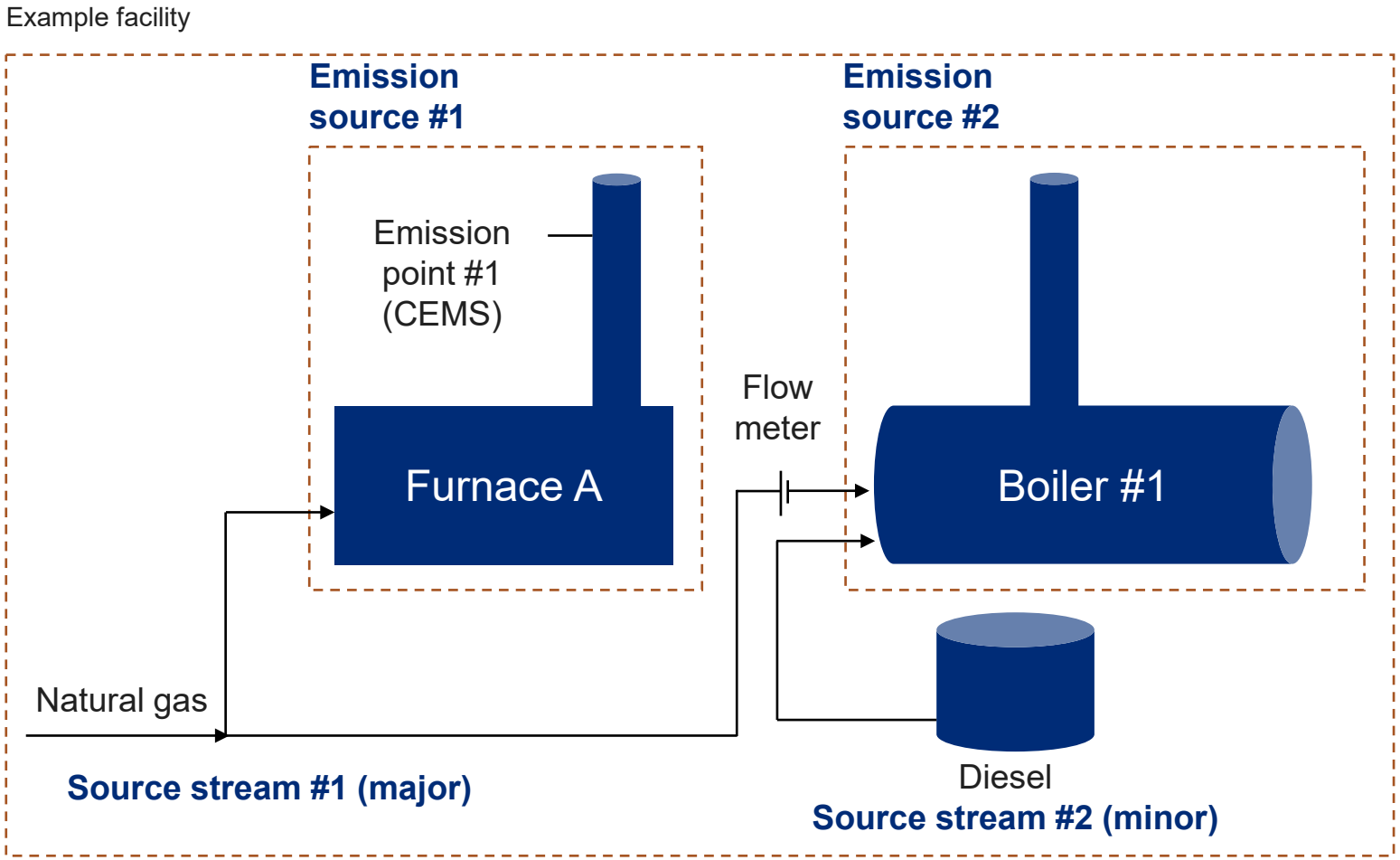
4

Describe verification processes

- Can the facility describe the verification and quality assurance processes that are in place to ensure the data reported is valid?

Outline process: A typical site schematic would show major emission sources and their fueling links

Example visualization of a site's mapped activities*



A facility may have multiple streams existing on site but in practice not all are material contributions to emissions and less stringent standards may be applied in order to reduce monitoring requirements.

Operators may review the relative contribution of individual source streams to the total of all monitored emissions and classify the smallest as 'de-minimis' or 'minor':

De-minimis: source streams that are jointly <1 kT CO2e or <2% total, up to a limit of 20 kT CO2e, whichever is higher

Minor: source streams that are jointly <5 kT CO2e or <10% total, up to a limit of 100 kT CO2e, whichever is higher

Major: all other source streams.

Examples would be:

Stand-by power generation sources that are activated at a low frequency for maintenance and testing.

Equipment at infrequently used locations

* For more information, please refer to *Step 3: Description of the installation and its activities* of the Technical Guidance Document
Source: MMC SME insights

Primary emissions-estimation approaches

Facilities have a choice of using a calculation-based methodology, a measurement-based methodology, or a fallback approach if compliance with the measurement-based and calculation-based approach is not possible

3 core methods of GHG quantification

Combustion emissions approach

$$\text{Emissions} = \text{Activity Data X Emission Factor X Oxidation Factor}$$

Mass balance approach

$$\text{Emissions} = \text{molar mass C conversion X } (\sum \text{Carbon}_{\text{input}} - \sum \text{Carbon}_{\text{output}})$$

Measurement based approach

$$\text{Emissions} = \text{GHG conc X Vol flow rate}$$

- These GHG assessment methodologies and slight variants are accepted. These should be recorded and agreed by the competent authority in a Monitoring Plan. Facilities will need to propose their preferred/justified methodology.
- The methods should be tiered and allotted by sector processes to aid measurement accuracy. The largest emissions need to be monitored most accurately; less stringent methods can be applied to smaller emissions
- Once defined and agreed with the authority, facilities will be required to adhere with this approach unless formally adjusted. The level of measurement uncertainty standard may decrease over time (increased standard), as such this may dictate a change of method and trigger a formal approach request for variation of measurement

Alternative emissions-estimation approach

Facilities are permitted to use ‘fallback’ emissions-estimation approaches, if justified and acceptable to a competent authority

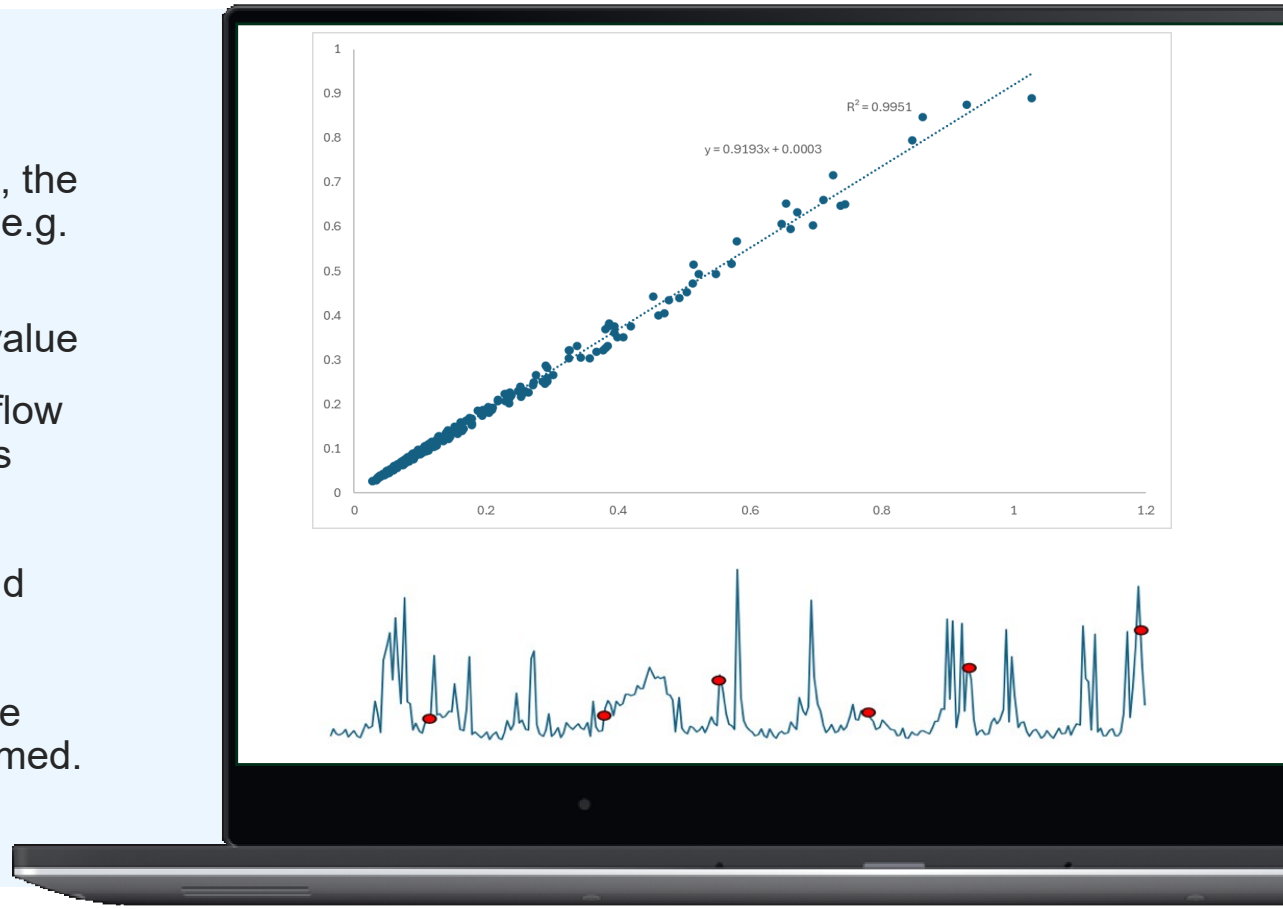
Fallback approach:

If a facility can demonstrate a **correlation** between variables, the competent authority may approve alternative methodologies e.g.

- For source streams that are made up of a mixture of hydrocarbons, density will strongly correlate with calorific value
- The installation of an SG analyser combined with existing flow meter may be sufficient to calculate the activity data for this stream, to the appropriate tier of uncertainty.

Entities will have to demonstrate that correlations remain valid through periodic sampling.

The competent authority will require sample frequencies to be determined and agreed, along with the analysis being performed.



Please refer to *Step 5: Categorise your source stream and emission sources* Technical Guidance Document for more information

After mapping sites and defining an emissions-estimation methodology, the facility must assess where and how emission inputs can be derived

How should inputs for emissions-estimation be gathered by the facility?

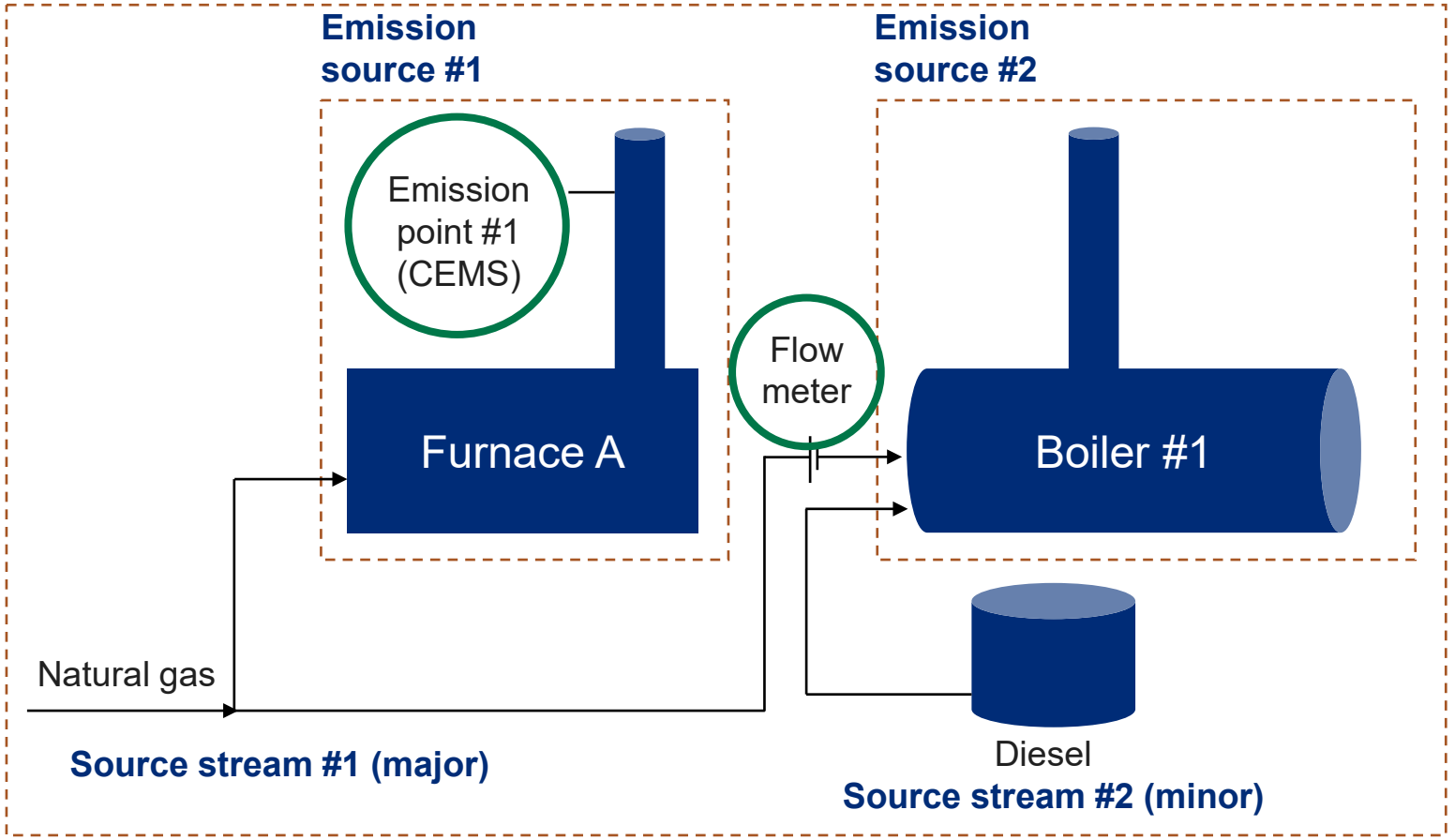
Key inputs

Documentation around the source of all inputs:

- Invoices for fuel purchases
- Gauges
- Emissions factors

Input parameters in calculations linked to points on the flow-diagrams

Example facility



Source: MMC SME insights

Guidelines for emission calculation methodology have been proposed for implementing the 'in theory' approach

Monitoring of activity data and calculation factors necessary for accurate quantification of emissions

For each source stream we want to understand the uncertainty in the measurement which ties to the measuring instruments and methodology

For this exercise we define four Tiers* of uncertainty for Activity Data**:

- The maximum uncertainty of less than the following to qualify for each Tier
  - Tier 1: +/- 7.5%
  - Tier 2: +/- 5.0%
  - Tier 3: +/- 2.5%
  - Tier 4: +/- 1.5%

Larger sources of emissions must be monitored to higher tiers of uncertainty over a reporting period

- Uncertainty assessments must be carried out to demonstrate compliance with the correct Tiers
- Major sources of emissions should comply at least with Tier 2
- Minor sources of emissions can comply with Tier 1
- De minimis sources of emissions can be excluded

Objectives

- For this exercise, the aim is to understand a facility's current levels of uncertainty
- It is anticipated that over time, requirements to measure emissions to higher Tiers may be required

*Please see *Step 6: Data quality – tiers by approach, calculation factor, fuel and/or material quantity* for further guidance
**These four Tiers are in-line with the Tier Classification defined within the EU ETS (Section 6)*

Self-verification and managing data gaps

The self-verification step undertaken by facilities provides assurance that an internal quality control process has taken place, and should not be confused with the external 'verification' step of the whole MRV scheme that is completed by an accredited verifier (further detail overleaf)

Understanding existing self-verification

Report should describe calibration and maintenance activities that support measurement devices and methodologies

This is additional information on how reported data has been gathered is used to:

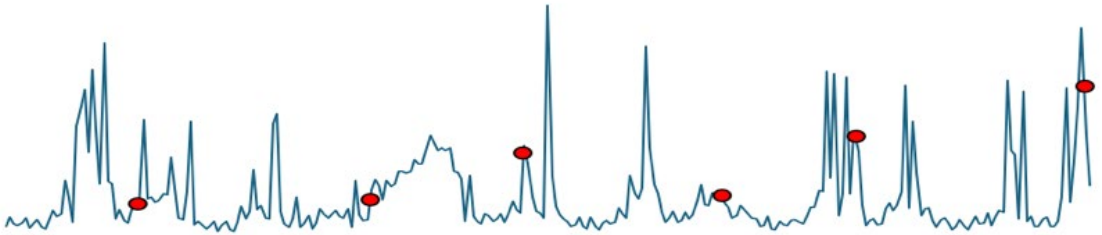
- Ensure comprehensive information has been supplied in the report to the competent authority
- Enable independent verification activities

Independent verification (aka, 'audit') of a facility's emissions report is a mandatory requirement for facilities participating in the MRV scheme.

Expectations of self-verification

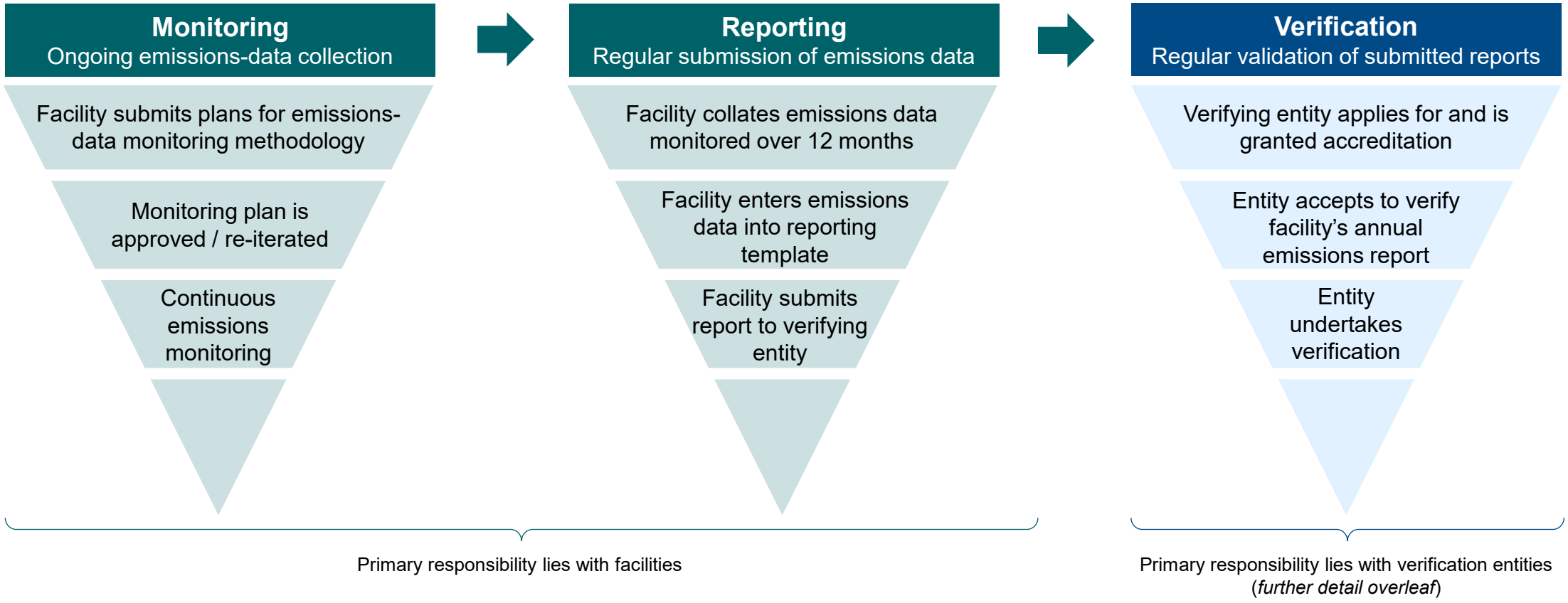
Facilities should be able to provide a detailed description of the verification methodology applied for all source streams and/or emission sources. For example:

- Does management information demonstrate the operating model of the site?
- What is the facility's maintenance regime?
- What gauges are used?
- For each data source used, what practices are in place to ensure readings are valid?
- Are any points ambiguous, and is the facility able to describe the reasons for any data gaps?



Verification practices play a crucial role in the tripartite MRV scheme

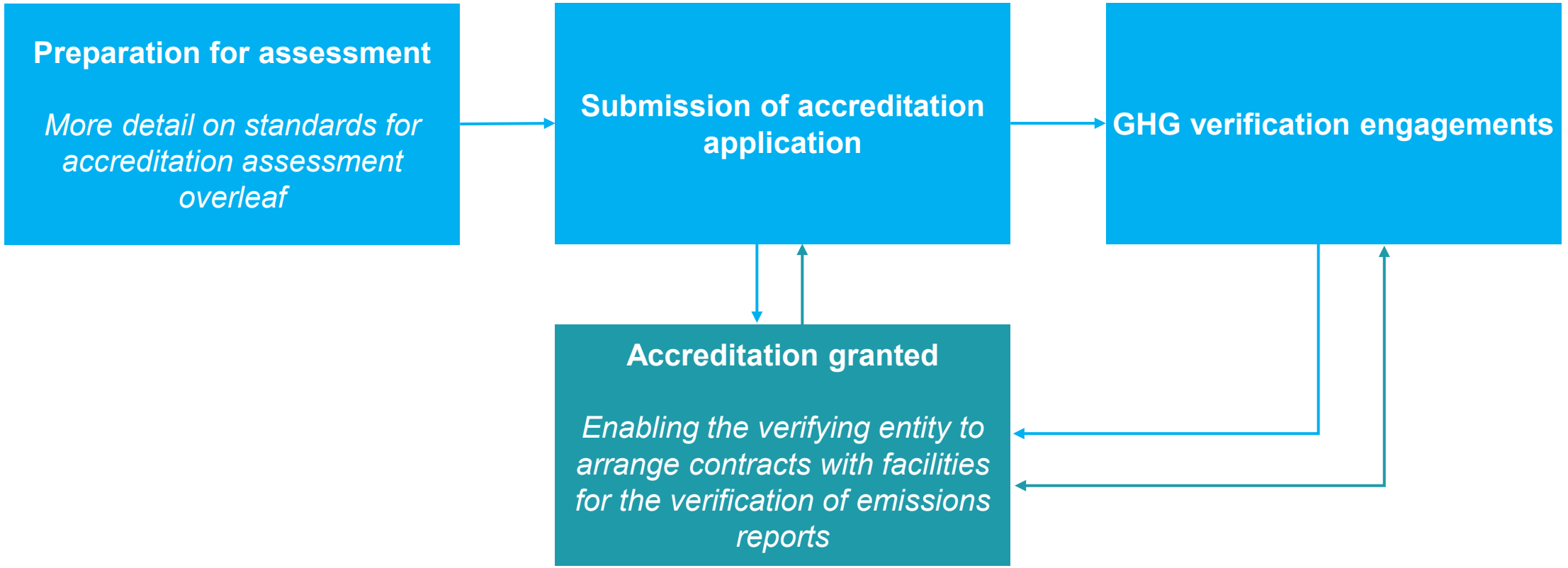
The role of verification in the MRV scheme



✓ Verification provides **quality assurance in the MRV system**, ensuring data **integrity**, **transparency** and **credibility** by validating that emissions are accurately measured and reported, **building trust between stakeholder groups** and ultimately, with the competent authority

How is an entity authorised to verify facility emissions reports?

The verification element of the MRV scheme entails two components – verifier accreditation and emissions-report verification. Overview of the verifier-accreditation element process flow:



Key: Responsibility / activity undertaken by:

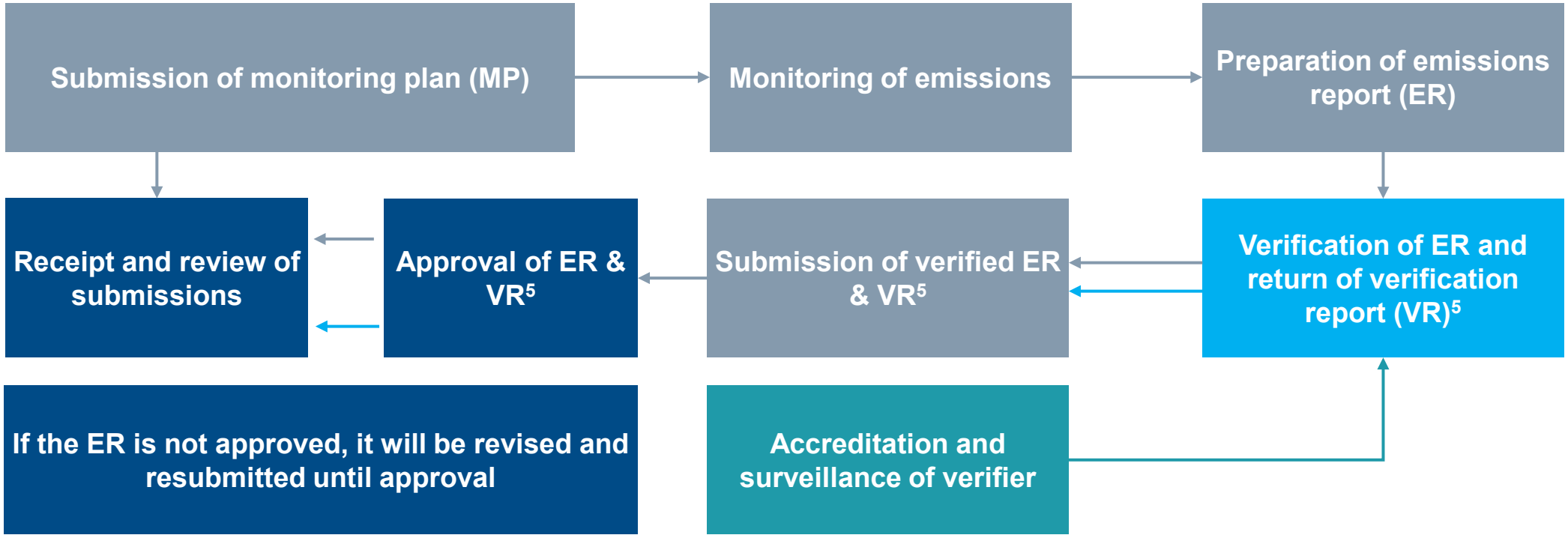
Verification entity[1] Accreditation body[2]

1) 3rd-party entity verifying the emissions report 2) Entity issuing accreditation to verifiers (guidance dictates this will be undertaken by EAD)

How is the verification of an emissions report interlinked with other components of the MRV scheme?

The verification element of the MRV scheme entails two components – verifier accreditation and emissions-report verification. Overview of the emissions report verification element process flow:

Typical emissions-report verification process flow



Key: Responsibility / activity undertaken by:

Verification entity[1] Accreditation body[2] Reporting facility[3] Authorising body[4]

1) 3rd-party entity verifying the emissions report 2) Entity issuing accreditation to verifiers (guidance dictates this will be undertaken by EAD) 3) In-scope facilities for reporting in the MRV 4) Entity receiving, reviewing and approving final verified emissions reports (guidance dictates this will also be undertaken by EAD) 5) Verification report is distinct from emissions report ("ER") and certifies the validity of the ER

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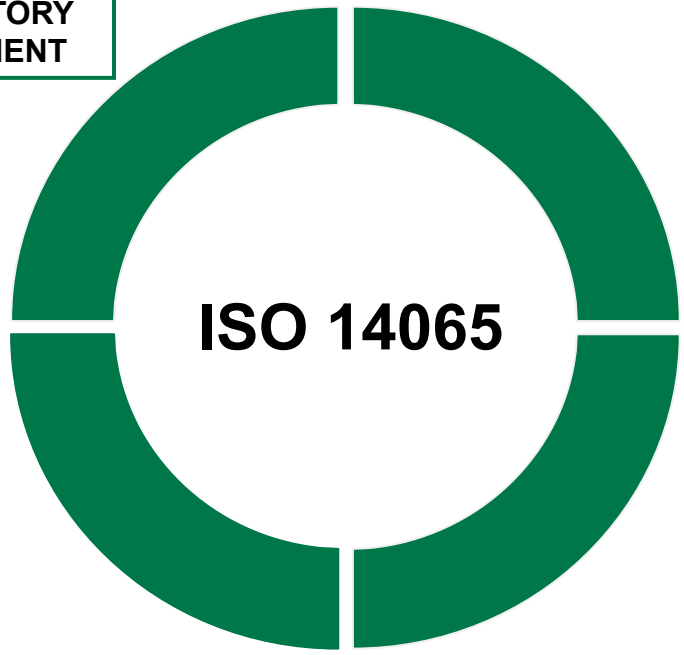
What standard must entities adhere to when preparing for accreditation?

Verifying entities participating in the MRV scheme will need to comply with ISO 14065 to meet the requirements for accreditation, before they can undertake the verification of a facility's emissions report

MANDATORY ALIGNMENT



- **Requirements for organizations that provide validation and verification services** for GHG emissions and removals.
- Focuses on ensuring that **bodies operate competently & impartially**
- Detailed **requirements for the processes used to validate and verify GHG assertions**, including planning, conducting, and reporting

High-level overview of ISO 14065 expectations for verifiers:

1 **Context**
- ISO 14065 is a framework to ensure that organizations conducting GHG validation and verification are competent, impartial, and effective
- Alignment with the ISO 14065 standard is **mandatory** for verification entities applying for accreditation

2 **Scope & Application**
- Requirements for organisations that verify or validate GHG emissions / removal
- Applies to bodies providing third party validation and verification services

3 **Personnel competence**
- Personnel must have the necessary education, training, skills, and experience

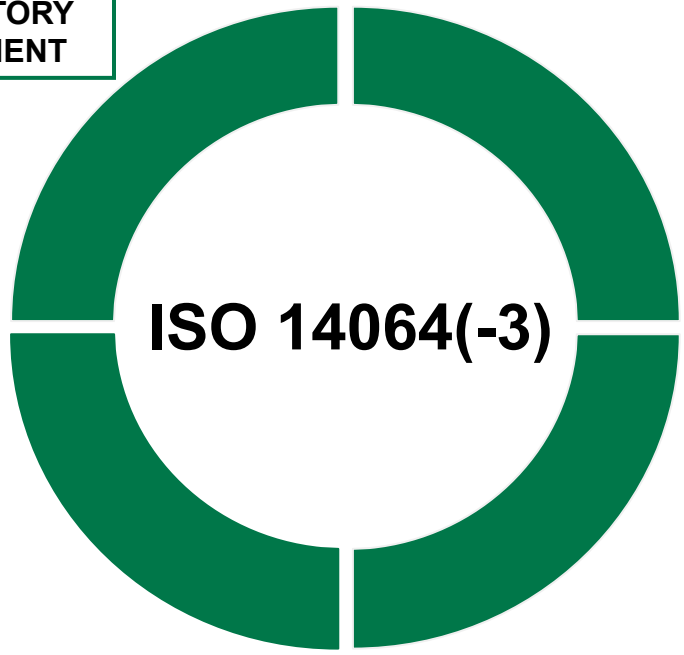
4 **Validation & Verification Processes**
- Detailed requirements for the processes used to validate and verify GHG assertions, including planning, conducting, and reporting

5 **Management System**
- The body must implement a quality management system to ensure the consistency and reliability of its validation and verification services

What standards must verifiers adhere to when undertaking emissions-report verification?

Once accreditation is granted, verification entities will need to undertake their activities in line with ISO 14064(-3), in order for the verification of an emissions report to be valid

MANDATORY ALIGNMENT



- **Guidance for the verifiers on how to perform the validation and verification** of GHG Assertions
- Focuses on the **process and methodologies involved in assessing the accuracy and reliability of GHG assertions** reported by organizations or projects

High-level overview of ISO 14064(-3) expectations for verifiers:

1 **Context**
- The ISO 14064(-3) framework is the standard for validation and verification processes for GHG assertion
- Alignment with ISO 14063(-3) is **mandatory** for accredited entities undertaking the verification of a facility's emissions report in the MRV scheme

2 **Scope & Application**
- Requirements and guidance for the validation and verification of GHG assertions, including those made by organizations and projects
- It applies to the activities of validation and verification for GHG assertions at both the organizational level and project level
- third party validation and verification services

3 **Personnel competence**
- Personnel must have the necessary qualifications and training

4 **Planning, implementation, Reporting**
- **Planning:** Developing a plan for validation or verification activities
- **Implementation:** Conducting the validation or verification activities, including the assessment of GHG assertions
- **Reporting:** Documenting and reporting the results of validation or verification activities

5 **Quality Management**
- Requirements for maintaining a quality management system to ensure the reliability of validation and verification services

Additional ISO standards for verification entities' awareness

Federal legislation also includes the following standards for verification entities to be aware of. Accredited verification entities should review these standards to evaluate the relevance for the facilities that they are verifying.

ADDITIONAL ISO STANDARDS TO EVALUATE

ISO 17029

- Establishes **general requirements for bodies performing validation and verification** as conformity-assessment activities
- Applicable to **all types** of validation and verification
- **Personnel:** Specifies the necessary competence & impartiality requirements for personnel involved in verification
- **Process:** Details the process for conducting verification, incl. planning, data collection & evaluation
- **Reporting:** Provides guidelines on how to report verification results
- **Verification:** Highlights the importance of independent verification to enhance credibility

ISO 17065

- Establishes **requirements for bodies performing validation and verification** activities, focusing on **products, processes and service** certification
- Applicable to **all types** of cross-sector certification schemes
- **Personnel:** Specifies the competence and impartiality requirements for personnel undertaking certification activities
- **Process:** Outlines the certification process, incl. application review, evaluation, decision-making and surveillance activities
- **Reporting:** Details guidelines on how to report certification results
- **Verification:** Emphasises the value of independent, 3rd-party certification to enhance credibility

ISO 14067

- Guidelines for quantifying and reporting the **carbon footprint of products**
- Helps organizations measure and communicate the carbon footprint of their products
- **Monitoring & quantification**: Provides a framework for calculating the carbon footprint in terms of CO_2-equivalent emissions
- **Reporting:** Specifies how to report the results transparently and accurately, including the use of a product carbon footprint (PCF) label
- **Verification:** Optional but it emphasises that independent verification adds significant value, and outlines requirements for third-party verification to ensure the credibility of the reported data

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Typical workflow for emissions-report verification activities

Example tripartite process that a verifier might follow to verify the CO_2 emissions for oil & gas facilities

Phase 1: Preliminary works

Description

- Identify riskiest emissions sources through desktop/remote work prior to site visits
- Assess regulatory compliance of monitoring plans & calculation procedures
- Create an accurate verification plan prior to site visit
- Ensure verifiers can rely on the control activities of the site
- Optimise verification works with accurate understanding of the site's issues

Phase 2: On-site verifications

Description

- Ensure monitoring plans (reviewed as part of Phase 1) are implemented on sites
- Verify reported data of sites and the way they have been calculated and sampled
- Conduct interviews with key personnels
- Verify findings identified during previous audits have been corrected
- Verify the correct implementation of regulatory requirements & reliability of reported data
- Verification will include recommendations for improvement regarding risks and controls, implementation of procedures, monitoring and reporting

Phase 3: Closing audit, final report & assurance statement

Description

- Verify data & ensure corrections are made where necessary
- Review data of facilities not subject to a site visit
- Finalise verification reports
- Issue opinion statement relying on actual findings of verification process
- Independent quality review - to challenge conclusions against findings and observations, quality control of work and carried out by a senior manager skilled to assess and challenge work performed

Prior to on-site visits (and after completion of remote review of documents in Phase 1), an information letter and verification plan may be sent to the facility giving the site notice, including: describing personnels to be interviewed and necessary source documents to be prepared / sent in advance to verifiers visiting the site

Within the example verification workflow, key sub-activities are undertaken, including documentation review and stakeholder interviews

Activities and deliverables at each phase of the recommended verification workflow:

Phases	Documentation review	Stakeholder interviewees	Deliverables
1) Preliminary works *Documents requested & reviewed remotely prior to site visits to identify riskiest emissions sources and perform regulatory compliance review*	• Monitoring plan and related procedures • Mail exchanges with authorities regarding CO_2 reporting • Previous verification reports • Calculation datasheets	• N/a	• N/a
2) On-site verifications *Meetings with key personnel, review of data sources and emissions consistency, review of management system, and first synthesis of verifications findings*	Documentation relating to: • Emissions factors – carbon content • Maintenance & equipment • Monitoring & reporting data, activity data, lab data, uncertainty data, management system data	• Environment manager / engineer • Fuel balance engineer • Fluid Catalytic Cracking (FCC) process engineer – if applicable • Laboratory manager • Maintenance supervisor • Accounting department • Operations supervisor	• Preliminary verification reports prepared following site visit, submitted to the site for stakeholders to review and if applicable, correct findings • If applicable, recommendations for improvements to risk & controls
3) Closing verification, final report & assurance statement	• N/a	• N/a	• Final verification report shared with site environmental management • Independent quality review of verification work • Assurance statement issued to fulfil regulatory deadlines • Consolidated report of main findings

Assessing the performance of accredited verifiers

Verifiers will need to comply with the following criteria to maintain accreditation

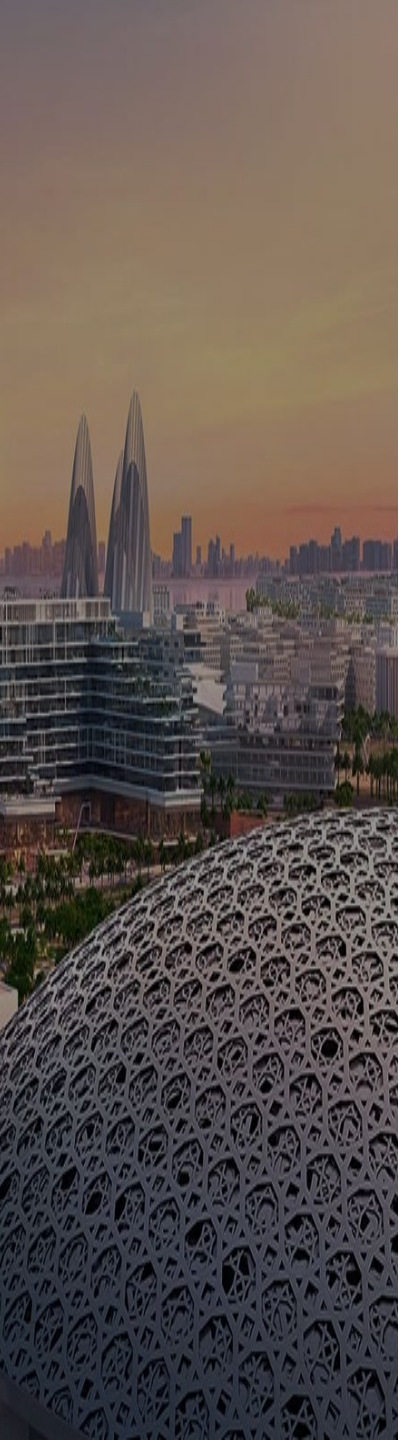
Verifier competence

- Entities must ensure they are ISO 14065 compliant, and then apply to EAD to be a listed accredited verifier for facilities taking part in the MRV
- Verifiers should then submit each year their ISO 14065 accreditation, allowing EAD to ensure auditors maintain documented competence
- Verifiers will need to present their verification processes and controls to obtain ISO 14065 certification, thus ensuring the audits done under the MRV will be of expected quality

Verification performance & timing

- As an accredited verifier, the responsibility is on the verifier to ensure their verification is accurate and follows the expected ISO standard
- The verifier performance assessment is will be in line with current federal legislation, based off timing by setting a KPI on all accredited verifiers that 100% of all audits conducted are completed within the required timescale, based off their contract with EAD

Table of Contents: Deliverable F



Section outline and overview

0

Project background & Phase 1 recap

- **0.1** Project context & objectives
- **0.2** Key learnings from Phase 1
- **0.3** Rationale for implementing MRV & potential ETS

1

Objectives of the capacity-building program

- **1.1** Objectives & audience for Deliverable F

2

Monitoring & reporting training materials

- **2.1** Introduction to & overview of the MRV scheme
- **2.2** Introduction to capacity building
- **2.3** Reporting training
- **2.4** Q&A / FAQs

3

Accreditation & verification (“A&V”) information pack

- **3.1** Introduction to & overview of the MRV scheme
- **3.2** Introduction to capacity building
- **3.3** Overview of MRV process to be verified
- **3.4** Required A&V standards for verifiers to meet
- **3.5** Example verification-activity workflow

4

Capacity-building program management & next steps

- **4.1** Program management approach
- **4.2** Approach-execution timeline
- **4.3** Plans to ‘Train the Trainer’
- **4.4** Supporting materials & next steps

A multi-dimensional approach has been designed to ensure the capacity-building program is continuously managed

Following the issuance of Deliverable F, the program will continue to be managed across 3 workstreams

1

Completion of ongoing stakeholder training

- 1x monthly training session to be delivered to stakeholders over the next 6 months
- Training to be supplemented with:
  - A recording of the Excel reporting template demo
  - Answers to FAQs

2

Management of a 'train-the-trainer' program

- We will work with EAD to transfer ownership of the stakeholder training over the course of the 6-month program
- We will also upskill the relevant EAD team on the reviewing the reporting template for approval of submissions from facilities

3

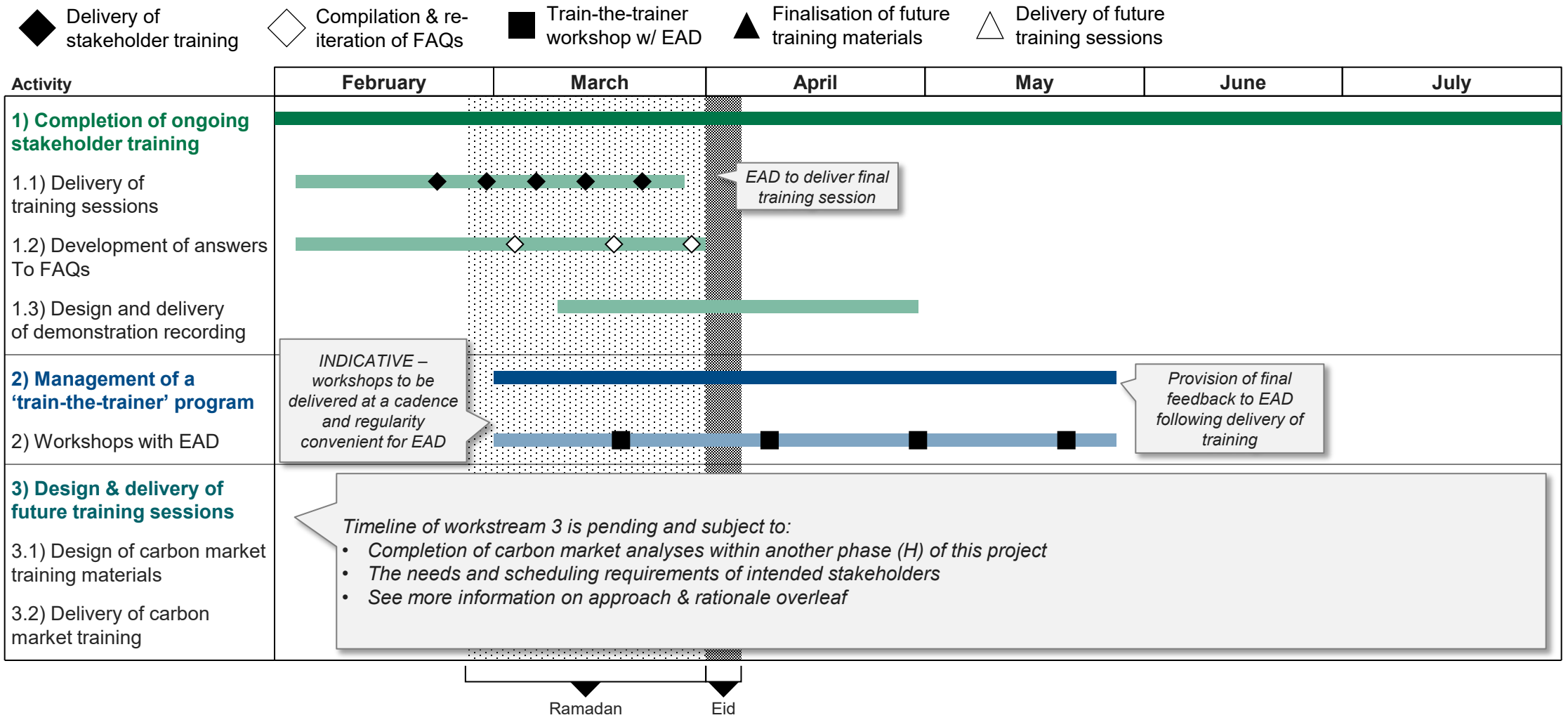
Design & delivery of future training sessions

- A key objective of Deliverable F is to design training sessions on carbon markets, to be delivered to MRV participants
- This training will be planned following the analysis of carbon markets in Phase H of this project

See overleaf for further details on timelines and structured approach

Workstreams 1 and 2 will complement each other, while workstream 3 is subject to completion of the carbon market analysis

Indicative timeline for continued capacity-building program management:



Over the course of the 6-month stakeholder training program, supporting materials will be designed and delivered

A recording of the live demonstration of the Excel template and answers to stakeholder's FAQs will complement the finalisation of Deliverable F

1

Completion of ongoing stakeholder training

- 1x monthly training session to be delivered to stakeholders over the next 6 months
- Training to be supplemented with:
  - A recording of the Excel reporting template demo
    - Towards the end of the 6-month training program, the content and delivery of information will be refined, enabling the delivery of a pre-recorded demonstration that can be shared with stakeholders as a standard tutorial
  - Answers to FAQs
    - Questions from each training session delivered over 6 months will be collated and consolidated, with final questions and answers thereto shared with EAD at the end of the 6-month program
- A session will also be conducted with accredited verifiers after the Technical Guidance has been distributed to field questions that agencies involved in the verification process may have

Approach to delivering a ‘train-the-trainer’ program

Our approach to workstream 2 and delivering the ‘train-the-trainer’ program will be guided by the ‘EDIP’ framework, primarily leveraging workshops with EAD to ensure the handover of program ownership is sustainable

2 Management of a ‘train-the-trainer’ program

Explanation	Demonstration	Imitation	Practice
Objectives: • Provide a clear understanding of training content to EAD	**Objectives:** • Showcase effective training techniques & methodologies	**Objectives:** • Enable EAD stakeholders to practice training techniques	**Objectives:** • Enable EAD to take ownership of the training program
Activities: • Set up schedule of regular workshops with EAD to present key concepts and objectives	**Activities:** • Live demonstration of MRV stakeholder training sessions (regularly delivered over the 6-month program)	**Activities:** • Live demonstration of MRV stakeholder training sessions (regularly delivered over the 6-month program)	**Activities:** • Gradual handover of training responsibilities • Ongoing support & feedback as EAD delivers training sessions

Benefits

- Empowers EAD to independently and effectively train their stakeholders on a continued basis
- Ensures sustainability of the 6-month stakeholder training program, and trainings thereafter
- Upskills and builds confidence & collaboration among EAD’s key stakeholders

Future training sessions on carbon markets will be subject to the completion of and conclusions from the project's Phase H economic analyses

In workstream 3, the design and delivery of carbon market training will be undertaken

3

Design & delivery of future training sessions

- A key objective of Deliverable F is to design training sessions on carbon markets, to be delivered to MRV participants
- This training will be planned following the analysis of carbon markets in Phase H of this project
    - It is proposed to delay this workstream until conclusions from Phase H have elucidated the exact form the program will take e.g., ETS / carbon pricing etc.

Feasibility of cap-and-trade scheme
Phase 2: preparation and compliance – MRV system

Design and Deliver a Capacity Building Program (Deliverable F)

October 2024

هـيـئـة الـبـيـئـة - أبـوظـبـي
Environment Agency - ABU DHABI