# FREQUENTLY ASKED QUESTIONS (FAQ)
## GREENHOUSE GAS (GHG) EMISSIONS MEASUREMENT AND REPORTING (M&R) REQUIREMENTS

**Table of Contents**


1. Threshold and Scope ..... 2
2. General Measurement and Reporting (M&R) Requirements ..... 3
3. Key concepts, measurement and methods ..... 7
3.1 Emissions quantification methods ..... 7
3.2 Alternative approach ..... 8
3.3 Uncertainty ..... 10
4. Quality Management Framework (QMF) ..... 10
5. Monitoring Plan Template ..... 12

## 1. Threshold and Scope

### Q1 What is the threshold for the M&R requirements?

Any single business activity (or 'facility') will be subject to the M&R requirements when its total direct GHG emissions (Scope 1 emissions) are equal to or exceed 25,000 tonnes of carbon dioxide equivalent ($CO_2e$) in any calendar year.

### Q2 What is the first base year to determine whether my facility has exceeded the threshold for the M&R requirements?

The earliest base year is 2016. For existing ECA facilities, if the facility's emissions for 2016 (based on Jun 2017 ECA submission) exceed 25,000 tonnes of carbon dioxide equivalent ($tCO_2e$), the facility will be required to register for the GHG M&R requirements and submit a Monitoring Plan by 30 June 2018. For all other cases, the facility will submit a Monitoring Plan by 31 Dec of the year, following the year during which the GHG emissions exceeded the threshold.

*Please also refer to Figures 2 and 3 in the M&R Guidelines Part I.*

### Q3 What are the greenhouse gases (GHG) covered under the M&R requirements?

The GHGs covered by the M&R requirements are:

i) Carbon dioxide ($CO_2$),
ii) Methane ($CH_4$),
iii) Nitrous oxide ($N_2O$),
iv) Sulphur hexafluoride ($SF_6$),
v) Nitrogen trifluoride ($NF_3$),
vi) Hydrofluorocarbons (HFCs), and
vii) Perfluorocarbons (PFCs).

*Please also refer to Table 2: Emissions covered under the M&R requirements in the M&R Guidelines Part I. Please note that (i)* $NF_3$ *emissions and (ii)* $CO_2$ *from biogenic sources do not count towards the threshold but must be reported.*

### Q4 Do the M&R requirements cover indirect emissions?

No. The GHG M&R requirements cover only direct (Scope 1) emissions. For example, emissions attributed to electricity purchased or consumed need not be reported by the facility

### Q5 Why do we have to report all the minor emission sources in our facility even if they are negligible?

Under the current ECA reporting requirements, all emission sources would need to be reported, regardless of its quantity. This remains unchanged under the M&R requirements. As the data collected will be used to compile Singapore's national GHG inventory, which will be reported to the United Nations Framework Convention on Climate Change (UNFCCC) as part of Singapore's reporting obligations, there is a need for all emission sources to be reported to ensure completeness.

For the quantification of minor emission sources, NEA has defined a Tier 1: Engineering Estimate, where the facility could adopt less rigorous estimation approaches.

**Q6 Do I need to report emissions from sources controlled by contractors but occurring within my facility? For example, my facility engages contractor to provide diesel compressors.**

No, emissions not under the facility's operational control (i.e. sources that are owned or provided by contractor) are not under the scope of the M&R requirements and therefore they are not reportable.

The facility is considered to have 'operational control' if it has the authority to introduce and implement all or any of the following for the activity (that results in GHG emissions):

- Operating policies;
- Health and safety policies;
- Environmental policies.

Companies should confirm such emission sources with NEA when in doubt.

**Q7 My facility purchases GHGs which are incorporated into our products sold. Do I report these GHG as negative emissions?**

The GHG M&R requirements are only concerned with direct emissions from (i) fuel combustion and (ii) industrial processes and product use (IPPU). If the GHGs are used as raw materials which get incorporated into the product, and no GHG is emitted to the atmosphere in the process, there is no need to report it under the M&R requirements.

## 2. General Measurement and Reporting (M&R) Requirements

**Q8 How are the M&R requirements different from what corporations are currently reporting under the Energy Conservation Act (ECA) today?**

Under the ECA, corporations are already submitting energy/fuel-use and non-energy use data (at system or process level) related to GHG emissions.

Under the M&R requirements, corporations will also be required to (i) quantify GHG emissions for both fuel combustion and industrial process and product use (IPPU) activities, (ii) implement quality control/quality assurance (QC/QA) procedures, and (iii) submit documentation and/or justification on the GHG emissions quantification and QC/QA procedures.

*Please also refer to Table 1: Key changes in Measurement and Reporting requirements under the Greenhouse Gas Measurement and Reporting Regulations VS. Energy Management Practices Regulations in the M&R Guidelines Part I.*

**Q9 What new documents do my facility need to submit under the M&R requirements?**

Under the M&R requirements, the corporation is required to submit two new documents for each facility that exceeds the threshold: (i) a Monitoring Plan and (ii) an annual GHG Emissions Report.

i. Monitoring Plan: The Monitoring Plan identifies and describes the facility's GHG emission sources and streams, emissions quantification methods, quality management procedures and uncertainty. It serves as the blueprint for emissions reporting.
ii. Emissions Report: The Emissions Report contains information on the facility's activity data, computation for each direct GHG emissions, and the total direct GHG emissions from fuel combustion and industrial processes and product use (IPPU) activities. The Emissions Report has to be prepared annually based on the approved Monitoring Plan.

*Please also refer to Section 2.3 Submission of the Monitoring Plan and Emissions Report in the M&R Guidelines Part I.*

**Q10 When is the first submission of the Monitoring Plan and Emissions Report?**

For existing ECA corporations, the GHG Manager will be required to submit the Monitoring Plan by June 2018 if its facility's emissions exceed the threshold in 2016 (based on Jun 2017 ECA submission). The Monitoring Plan will be approved by end-2018, to be ready for the first reporting period in 2019. The corporation will be required to submit the first verified Emissions Report (for emissions in 2019) by 30 June 2020.

For new companies, you will need to register under M&R (i) by 30 Jun and (ii) submit your Monitoring Plan by 31 Dec, in the year immediately following the year where emissions exceeded the threshold.

*Please also refer to Q2.*

**Q11 Is third-party verification required for the Monitoring Plan?**

The Monitoring Plan submission is not required to undergo third-party verification. NEA will validate and approve the Monitoring Plan submission. However, for certain circumstances where specialised technical knowledge is required to assess the processes, the Director General may direct the company to have the Monitoring Plan assessed by an independent third party.

*Please also refer to the Energy Management (Greenhouse Gas Measurement and Reporting) Regulations 2017 [Section 9] for more information.*

Corporations will be required to get their Emissions Report third-party verified before submitting to NEA.

**Q12 How often will the Monitoring Plan Template be revised? Do I have to fill in the Monitoring Plan again, from scratch, each time the template is revised?**

Corporations are able to download the latest version of the MP Template from the Emissions Data Monitoring and Analysis (EDMA) portal. Whenever there are changes to the MP Template, NEA will inform corporations when the revised versions are available for download from the EDMA portal. Corporations will then download the revised version of the MP Template and fill in accordingly.

**Q13 How detailed should the Monitoring Plan be?**

The general rule is that the facility should consider the following principles when preparing the Monitoring Plan: accuracy, completeness, consistency, relevance and transparency. The facility must ensure that all emission streams are documented in the completed MP Template, and all supporting documents are submitted together with the completed MP Template. The MP submission must also demonstrate to NEA that the emissions quantification approaches described are robust and appropriate.

*Please also refer to Section 2.2 Approval of the Monitoring Plan in the M&R Guidelines Part II.*

**Q14 If an emission stream is intermittent (i.e. might not result in emissions every year), should I still include the emission stream in the Monitoring Plan?**

Facilities are encouraged to record intermittent emission streams upfront in the MP Template. For the years whereby there are no emissions, facilities can key in nil emissions for that emission stream in the Emissions Report. As adding an emission stream is a significant change, by recording all emission streams upfront, it lessens the administrative burden of having to update and resubmit the Monitoring Plan when there are emissions from that emission stream.

**Q15 What is the difference between a significant change and minor change, and why is there a need to differentiate between significant and minor changes?**

Any change to a facility's processes that results in any change to the (i) emission sources or emission streams; or (ii) the measurement and reporting processes will require the facility to update the Monitoring Plan, and resubmit the Monitoring Plan with the relevant updated supporting documents to NEA for approval:

i. For significant change, the updated Monitoring Plan must be resubmitted within 30 days after the implementation of the change.
ii. For minor change, the updated Monitoring Plan must be resubmitted by 31 January of the year following the reporting period.

There is a need to differentiate between significant and minor changes because significant changes, e.g. addition of emission streams or the change of emission quantification methods, have a direct impact on the computation or determination of the final emission numbers. The Monitoring Plan would need to be updated promptly so that the facility can continue monitoring the emissions based on the updated and approved methods/procedures in the Monitoring Plan. Minor changes, e.g. removal of emission stream or change in personnel, on the other hand, have a less direct impact on the final emission numbers.

**Q16 Does my facility need to seek NEA's permission before implementing a significant or minor change?**

These changes arise from the facility's operating circumstances and therefore, any significant or minor change does not need to be pre-approved by NEA before the facility can implement the change.

*Please also refer to Section 2.3 Resubmission of the Monitoring Plan in the M&R Guidelines Part II.*

**Q17 If there is a significant change, the Monitoring Plan needs to be submitted within one month from the implementation of change. What is meant by "implementation of change"?**

Companies are given one month to revise their Monitoring Plan from the date that the change occurred. For example, if a new emission stream is introduced, the change is considered implemented e.g. when the new equipment or system (representing the new emission stream) commences operations, or when the new feedstock (representing the new emission stream) is used.

**Q18 How should I determine the deadline for submitting the Monitoring Plan if there is a series of significant changes taking place at my facility?**

As a rule of thumb, the facility is encouraged to submit the updated Monitoring Plan within one month after implementing the last significant change. Nevertheless, the GHG Manager should inform NEA if the facility anticipates a series of significant changes that are to take place, so as to allow NEA to better advise the submission deadline(s) of the updated MP submission. The facility can also update the MP in advance to reflect the significant changes, if the significant changes are planned and the GHG Manager is able to reflect the planned changes in advance in the updated MP.

**Q19 If the type of fuel or feedstock used in my facility is in fact a fuel blend of variable composition, is it considered a significant change each time the fuel composition and/or the proportion of the blend change?**

If the composition of the fuel blend is expected to vary, the GHG Manager is advised not to report the constituent fuel types of the blend separately in the Monitoring Plan, so as to avoid the need to update the Monitoring Plan submission each time the fuel or feedstock changes. The facility can key in a user-specific name for the fuel or feedstock indicating that the fuel or feedstock type is a fuel blend of variable composition. The GHG Manager can explain in the relevant Emission Streams tab, that (i) the user-specific fuel is in fact a blend of various fuels and the composition will change, and (ii) how the facility intends to measure the composition of the fuel or feedstock and derive the site-specific conversion factors (e.g. NCV and emission factor) in relation to the varying fuel/feedstock composition.

**Q20 Do I need to submit any supporting document related to the measurement instrument management procedures?**

No. However, it is necessary to state the name of the procedure in the MP Template which confirms the existence and implementation of such a procedure. NEA may request a copy of the management procedures during the validation of the MP and site visits.

**Q21 When re-submitting the Monitoring Plan, do I also have to re-submit all supporting documents into the Emissions Data Monitoring and Analysis (EDMA) portal?**

No, the GHG manager is only required to submit the supporting documents that are relevant to the updates made in the Monitoring Plan.

*Upon completion of the MP Template, refer to Tab L – Submission Checklist of the MP Template for the full list of supporting documents that are to be attached with the MP Template for submission in the EDMA portal.*

**Q22 Can the appointed GHG Manager be the same person as the current Energy Manager who is doing the reporting under the ECA?**

Yes, the Corporation shall appoint at least one GHG Manager to be responsible for preparing and submitting the Monitoring Plan and Emissions Report for each facility. It is possible to have the current Energy Manager as the GHG Manager.

*Please refer to Section 2.4 Responsibilities and required competencies of GHG Manager(s) in the M&R Guidelines Part I.*

# 3. Key concepts, measurement and methods

## 3.1 Emissions quantification methods

**Q23 Will NEA stipulate the method my facility quantify emissions?**

No, the facility has the flexibility to decide on the most appropriate emissions quantification methods and tiers to compute GHG emissions. The emissions quantification methods and tiers applied should ensure accurate and robust computation of the GHG emissions, and be based on technical or scientific considerations. The MP submission requires that the selected emissions quantification method, as well as the tiers applied for activity data and conversion factors, be explained and substantiated as part of the supporting documents that are submitted together with the MP Template.

*Please refer to Section 2.1.2 Supporting Documents in the GHG M&R Guidelines Part II.*

**Q24 What is a tier and why must we use tiers?**

Tiers represent a hierarchy of measurement approaches of increasing accuracy (or decreasing uncertainty), for an activity data or conversion factor. Tiers are used to help facilities describe and categorise the measurement approach that will be used to determine the activity data and conversion factor(s) of each emission stream. The selected tier will affect the uncertainty calculations of each emission stream in the MP Template.

**Q25 Tier 1: Engineering estimate for activity data is defined very broadly, and this might result in differences in application between facilities. How will NEA assess if a facility's engineering estimate is appropriate and justifiable?**

The facility has the discretion to apply engineering estimate, but would need to justify and substantiate that the use of the engineering estimate (i) is appropriate, (ii) enable the GHG emissions to be accurately computed, and (iii) is based on technical or scientific considerations. As an engineering estimate could be developed taking into account the facility's operating circumstances, NEA will assess the appropriateness of the engineering estimate on a case-by-case basis.

**Q26 What is the difference between Activity data Tier 2: Measured using typical industry approach and Tier 4: Measured using an instrument meeting a specific standard?**

Tier 4 activity data are obtained from the use of a measurement instrument that is well maintained and calibrated according to:

i) Manufacturer's recommended maintenance and calibration procedures/frequency;
ii) Legal standard required for commercial transactions; or
iii) Appropriate industry or international standard for the instrument type.

The facility is also required to provide supporting documents in the Monitoring Plan submission to justify how Tier 4 is achieved, including:

i) A statement of the measurement approach;
ii) Reference to any applicable manufacturer documents or standards applied; and
iii) Justification for the site-specific uncertainty (if any).

All other measurement instruments that do not meet Tier 4 requirements will be classified as Tier 2.

**Q27 If my facility has a monthly schedule for a conversion factor analysis that is also representative, which tier should my facility classify this conversion factor?**

If the facility is of the view that the monthly analysis schedule is a representative analysis, the facility should select Tier 4 and provide the justifications as well as the conversion factor formulation as part of the supporting documents. Tier 4 – representative analysis may be selected should any of the following scenarios apply:

i) Samples are taken in accordance with an internationally accepted frequency for sampling;
ii) Sampling based on each delivery batch/shipment of the material;
iii) Monthly using a composite of samples collected daily through the month; or
iv) Continuous online monitoring e.g. direct measurement using a continuous or periodic monitoring system (CEMS or PEMS).

## 3.2 Alternative approach

**Q28 What is the purpose of the alternative approach?**

The purpose of the alternative approach is to prevent data gaps and to enable the facility to provide an estimation of the GHG emissions if the main emissions quantification approach fails. Examples of such scenarios are a meter failure, process upset maintenance etc. In addition, as the alternative approach needs to be detailed in the supporting documents, NEA would have approved the alternative approach upfront so that it lessens the administrative burden of needing to update the Monitoring Plan whenever there is such an unexpected scenario.

*Please refer to Section 3.2.3 Alternative approaches of the GHG M&R Guidelines Part II.*

**Q29 What is the maximum time period an alternative approach can be used in a reporting period?**

The alternative approach may be used for up to 90 days in the whole reporting period, whether or not the days are consecutive. Should the alternative approach be used for more than 90 days during the reporting period, the facility must describe a new measurement approach within the Monitoring Plan and resubmit the Monitoring Plan to NEA within 30 days of identifying that the failure will or has exceeded cumulatively 90 days in the reporting period. The facility is expected to have in place appropriate quality control/quality assurance (QC/QA) procedures in order to take note of the date from which the alternative approach takes effect.

**Q30 I understand that the facility may use the alternative approach for up to 90 days in the whole reporting period. Is this 90-day limit pegged to the measurement instrument recorded at the instrument identifier level? If such a scenario is in fact a system of measurement instruments working in parallel, should the 90-day limit apply to each individual instrument or the entire instrument system?**

The facility may use the alternative approach for up to 90 days in the whole reporting period. The 90-day limit applies to each individual measurement instrument.

Hence, even if the facility chooses to key in one entry for a series of measurement instruments, the 90-day limit will still be pegged to each individual measurement instrument even if they are listed within one entry.

**Q31 Under supporting documents, what are the types of documentation required to describe the alternative approach?**

The alternative approach should be used when an event such as process upset shutdown, maintenance, failure and/or replacement of meters occur. The types of supporting documents required could include:

i) Calculation/estimation approach, including the formula, assumptions, details of each parameter and how each parameter is measured;
ii) Benchmarking based on historical data; and
iii) Alternative measurement instruments in the facility.

The description of the alternative approach should also include the alternative GHG quantification approach for the particular emission stream, should the primary approach becomes no longer applicable.

**Q32 What happens if there is no alternative approach for my measurement instrument or analysis?**

Under the M&R requirements, the facility is required to specify at least one alternative approach should the primary measurement approach become no longer suitable or unavailable. If there are no alternative instruments for metering and analysis, the facility may use engineering estimate as an alternative approach, with supporting documents stating the formulae and assumptions, and the primary source of data e.g. invoices or historical data.

## 3.3 Uncertainty

**Q33 If my facility's overall uncertainty is +/-10%, will there be an impact the final emissions number and the carbon tax to be paid?**

The uncertainty assessment will not affect the facility's total emissions nor the carbon tax liability. The purpose of assessing uncertainty is to provide both NEA and the facility an indication on the emission streams with the highest relative uncertainty. This is to also assist the facility if the facility would like to improve on the accuracy of its emissions numbers.

*Please refer to Section 3.3.2 Purpose of assessing uncertainty of the GHG M&R Guidelines Part II.*

**Q34 What type of supporting documents should my facility submit if my facility plans to cite a site-specific uncertainty value for our measurement instruments?**

For measurement instruments, the GHG Manager is required to provide an extract of the manual highlighting the relevant sections which state the make and model of the measurement instrument and the uncertainty value as provided by the original equipment manufacturer (OEM)/vendor.

# 4. Quality Management Framework (QMF)

**Q35 What is the purpose of the QMF?**

The main purpose of the QMF is to ensure data quality. Each facility is required to establish, document, implement and maintain an appropriate QMF for the collection, computation, and reporting of GHG emissions data.

*Please refer to Section 4.1 Purpose of the GHG M&R Guidelines Part II.*

**Q36 We already have general QC/QA activities implemented in our facility, can we just adapt these QA/QC activities for the QMF?**

NEA understands that many facilities will already have QC/QA activities in place, and facilities can adapt these QC/QA activities into the QMF for the purpose of GHG measurement and reporting. The QMF should also document additional QC/QA activities that the facility intends to implement in order to comply with the QMF requirements.

*Please refer to Section 4.3 Elements of a Quality Management Framework of the GHG M&R Guidelines Part II.*

**Q37 NEA requires facilities to develop and implement the QMF and its quality control (QC) activities, which will facilitate subsequent third-party verification of the Emissions Report. What is the level of documentation required/accepted by NEA at the MP submission stage? Are there some examples?**

Facilities are to describe the QMF and the relevance of its QC activities in relation to the QMF elements (listed in Section 4.3 of the Guidelines) in an outline. Companies are encouraged to document all relevant QC activities in relation to the QMF elements, and ensure all QMF elements are satisfied.

In addition, the QMF covers all stages of the GHG M&R, including inventory preparation and management as part of preparing the MP. Therefore, in addition to the QMF outline that is to be submitted as part of the supporting documents, a well-prepared MP that satisfies the five principles of accuracy, completeness, consistency, relevance and transparency, is an indicator that proper quality controls and checks are in place, and this can also facilitate the approval of the MP.

**Q38 What is meant by 'appropriateness' and what is needed to justify whether my emissions quantification method/site-specific factors is 'appropriate'?**

An appropriate emissions quantification method or site-specific conversion factor is one which is representative of the facility's processes and operations, and leads to the accurate computation of emissions. Appropriateness has to be demonstrated in the Monitoring Plan submission for approval by NEA. A good example of an appropriate emissions quantification method is one that is based on international or industry practices, which can be demonstrated with reference to publicly available data or industry/company-specific reports.

**Q39 Does the outline of the QMF to be submitted to NEA have to fulfil all the QMF elements?**

Yes, and this outline is part of the MP submission that is to be submitted before the start of the first reporting period. The facility should have considered all the QMF elements sufficiently to tick off the boxes in Tab K – Quality Management of the MP Template.

**Q40 What happens if my facility is unable to fully implement the QMF that my facility had submitted in the MP submission? Will my facility be penalised when the QMF is audited by NEA during the site inspection?**

The onus is on the facilities to inform NEA if they are unable implement the QMF elements, either in advance or during the site inspections/audits. NEA will review the explanations provided by the facility and will advise the facility accordingly. Should there be gaps in the QMF or if the QMF has not been adhered to, NEA may require companies to demonstrate how the company, in the absence of the QMF elements, ensures data quality and accuracy. This could take up more time and resources and companies are hence encouraged to develop and implement a comprehensive QMF.

The overall objective is to have a well-functioning and implemented QMF which helps ensure data quality and leads to an ER that is complete and accurate. The corporation will be liable for penalties if the ER is inaccurate and incomplete.

## 5. Monitoring Plan Template

### Q41 Where are the default conversion factors provided by NEA referenced from?

Default conversion factors provided by NEA are based on the 2006 IPCC Guidelines and API Compendium.

*Refer to the Appendix for more details.*

### Q42 Where are the default uncertainty values provided by NEA referenced from?

Default uncertainty values provided by NEA for conversion factors and measurement instruments used for metering and analysis are referenced from the 2006 IPCC Guidelines as well as third-party sources such as the Australian National Greenhouse and Energy Reporting (Measurement) Determination 2008, and other reputable industry sources.

Facilities may source and input site-specific uncertainty values in the MP template but this must be substantiated in the supporting documents.

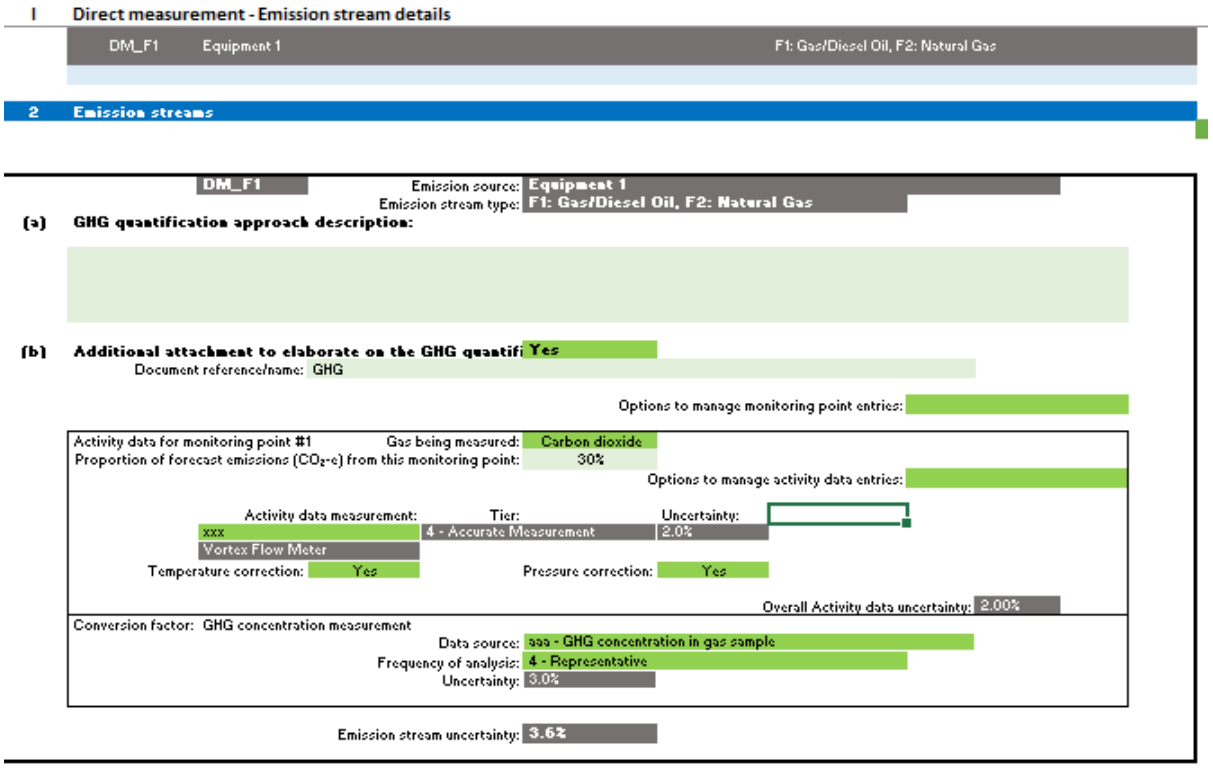
*Please refer to the Appendix for more details for the referenced default uncertainty values.*

### Q43 How should I indicate in the Monitoring Plan, the use of Direct Measurement for the fuel combustion of multiple fuels?

If a continuous or periodic emissions monitoring system (CEMS/PEMS) is used to directly measure $CO_2$ emissions, the type of fuel combusted should be selected under the 'emission stream type', while the direct measurement method should be selected under the 'emissions quantification method' in Tab C – Site Details. The MP Template will automatically create an emission stream form for $CO_2$ emissions in Tab I – Emissions Streams as well as another emission stream form for $CH_4$ and $N_2O$ emissions in Tab E – Emissions Streams using the Calculation Approach. This is because the MP Template assumes that $CH_4$ and $N_2O$ emissions would be quantified based on Calculation Approach and not Direct Measurement. Based on Calculation Approach, $CH_4$ and $N_2O$ emissions would be determined based on the default $CH_4$ and $N_2O$ emission factors which are fuel-specific, as well as quantity of the fuel in physical (e.g. tonne) or energy units (e.g. mmBTU).

If a second type of fuel is combusted and $CO_2$ emissions is directly measured using CEMS/PEMS, the same steps are to be repeated. The second fuel type that is combusted should be selected under the 'emission stream type', while the direct measurement method should be selected under the 'emissions quantification method' in Tab C – Site Details. This is necessary in order to account for $CH_4$ and $N_2O$ emissions arising from the combustion of the second fuel(s). By adding the second fuel type in Tab C – Site Details, the MP Template will automatically create an emission stream from for $CH_4$ and $N_2O$ emissions in Tab E – Emissions Streams.

However, there will not be a second emission stream form for $CO_2$ emissions created in Tab I – Emissions Streams. For the direct measurement of $CO_2$ emissions from the combustion of multiple fuels (e.g. natural gas and diesel), there would be one emission stream form created in Tab I – Emission Streams in the MP Template. Please refer to the following screenshot.




The MP Template allows for up to four monitoring points to be created in the emission stream form, where there is a distinct GHG concentration measurement data source and activity data measurement entry for each monitoring point.

### Q44 How do I fill in the Monitoring Plan if I use different emissions quantification methods for different GHG emissions of the same emission source/stream?

When developing the MP Template, NEA has taken into account the different types of GHGs that could be quantified by different emissions quantification method for a particular emission source/stream.

For example, for fuel combustion where $CO_2$ emissions could be directly measured, the MP Template will automatically create an emission stream for $CH_4$ and $N_2O$ emissions using the Calculation Approach.

Method 2: Material Balance is used to determine $CO_2$ emissions based on the difference in the quantity of carbon measured entering and exiting a process. The emission stream form created in Tab G – Emission Streams for Method 2: Material Balance automatically assumes that the facility will compute secondary non-$CO_2$ emissions using the Calculation Approach i.e. based on the production value and the default $CH_4$ emission factor as per the 2006 IPCC Guidelines. Therefore, the facility is not required to create a separate emission source/stream in the MP Template for such secondary non-$CO_2$ emissions.

**Q45 Tab C: Fuel Combustion: If we are unable to find a suitable fuel type in the MP Template, how should I indicate the emission stream?**

On the default list of fuels in the MP Template, NEA has taken reference from the list of fuels and definitions as per the 2006 IPCC Guidelines. *Please refer to Section 1.4.1.1 in Chapter 1, Volume 2: Energy of the 2006 IPCC Guidelines for further information on fuel definitions.*

If the GHG Manager is unable to find a relevant or representative fuel type in the MP Template, the GHG Manager can type in the fuel type into the Emission stream type (by selecting the blank option within the drop-down list). However, for such user-specified fuels, the MP Template would not have a default conversion factor and uncertainty value.

**Q46 Tab C: IPPU: If we are unable to find a suitable emission source in the MP Template, how should I indicate the emission source?**

For such cases, the facility is required to select "Any other process or activities resulting in greenhouse gas emissions" under Section 3.2 Industrial Processes and Product Use (IPPU) in Tab C – Site Details of the MP Template.

**Q47 Tab C: Why does NEA require an emission source diagram showing the physical location of all the emission sources?**

The purpose of requiring an emission source diagram is for NEA to better understand the facility's profile and location of emission sources to facilitate NEA's validation of the MP. It will also be used as a reference during site inspections and enforcement. The emission source diagram would enable NEA to understand how various emission streams and sources are linked, as well as identify any that are missed out in the Monitoring Plan.

Should there be changes in the facility's processes, the GHG Manager will be required to update the emission source diagram in order to accurately reflect the ground situation, and submit it as part of the updated supporting documents along with the updated Monitoring Plan.

**Q48 Tab C: How should "diffused" emission sources such as fugitive equipment leaks be represented on the emission source diagram?**

For diffused emission sources such as fugitive leaks where it is not possible to pinpoint the exact physical location(s) on the diagram, the GHG Manager may indicate that the emission stream identifier is a diffused emission source in a table/box form on the diagram or as a list in an annex to the diagram.

**Q49 Tabs D, F, H: Do I have to key in each Tier 3 invoice and Tier 1 engineering estimate into the Metering & Analysis tabs of the MP Template?**

There is a default option to indicate the use of invoices under 'activity data measurement' for each activity data entry in Tabs E, G, I – Emission Streams, and the default uncertainty for invoices is 1.5%. Hence, there is no need to create an entry for 'invoices' in Tabs D, F, H – Metering & Analysis unless the facility wish to overwrite the default uncertainty value with a site-specific uncertainty value.

An entry for the use of engineering estimate needs to be created in Tabs D, F or H – Metering & Analysis.

**Q50 Tabs D, F, H: If my facility has multiple meters of the same type and calibrated based on the same procedures, do I need to key in an entry for each meter in the Metering & Analysis tabs in the MP Template?**

If the meters are of the same type and calibrated based on same procedures, facilities can key in one entry to represent the system of meters in Tabs D, F, H – Metering & Analysis. Companies are allowed to select the same meter identifier for different emission streams.

**Q51 Tabs D, F, H: I understand that if my facility operates several of the same meter, calibrated in the same manner, I can create one entry in the Metering & Analysis tab, to be referenced in the relevant Emission Stream tab. Does this affect the emission stream uncertainty calculations as compared to creating one entry per meter?**

Default uncertainty values are provided for the metering and analysis instruments provided in the drop-down selections in the Metering & Analysis tabs.

For measurement instruments measuring activity data, if one entry (i.e. 'internal identifier' in Metering & Analysis tabs, 'activity data measurement' in Emission Streams tabs) is created in the Metering & Analysis tab for a series of measurement instruments, the GHG Manager would have to provide a site-specific uncertainty. For example, if the default uncertainty of a particular measurement instrument provided in the MP Template is 3%, and two of such instruments are identified as a system of meters, the overall uncertainty of this system would be $\sqrt{3\%^2 + 3\%^2}$ or 4.2%. *(Please also refer to equation A in the M&R Guidelines Part I.)*

On the other hand, if the GHG Manager prefers to create an entry for each measurement instrument, in the relevant Emission Stream tab, the GHG Manager can add activity data entries to list the second instrument. The MP Template would calculate the uncertainty for the activity data measurements based on the relative proportion of the activity data being measured. (Note that the Monitoring Plan currently caters for up to four activity data entries for Direct Measurement and Material Balance methods, and up to eight activity data entries for Calculation Approach.)

For measurement instruments measuring conversion factors, there can only be one entry (i.e. 'internal identifier' in Metering & Analysis tabs) created for each conversion factor, as there is only one 'data source' available for selection for any conversion factor in the Emission Streams tabs. The GHG Manager would have to provide a site-specific uncertainty if a series of measurement instruments are used to determine a conversion factor.

**Q52 Tabs E, G, I: How should I indicate in the Monitoring Plan if there is more than one measurement instrument (i.e. data source) for a particular activity data?**

The Monitoring Plan currently caters for up to four activity data entries for Direct Measurement and Material Balance methods, and up to eight activity data entries for Calculation Approach.

The GHG Manager can create an aggregated metering system in Tabs D, F, H – Metering & Analysis, e.g. for cases where the number of measurement instruments used to determine a particular activity data exceeds the limits of the MP Template as described earlier.

Alternatively, the GHG Manager can create individual entries in Tabs D, F, H – Metering & Analysis, and then in Tabs E, G, I – Emission Streams, select 'Add new activity data entry' under "Option to manage activity data entries" to add additional activity data entries. (For information, the uncertainty calculation for multiple activity data entries assumes that the different entries are operating in parallel i.e. simultaneously.)

**Q53 Tabs E, G, I: What does the 'Site-specific' refer to under 'data source' for conversion factors in Tabs E, G, I – Emission Streams in the MP Template?**

It refers to the Tier 1 site-specific conversion factors that are proposed by the facility. These are alternative conversion factors as opposed to Tier 1 default conversion factors provided by NEA. These conversion factors may be sourced from reputable literature, industry guidelines, HQ's guidelines and reports, or based on historical analysis and measurements.

Upon selecting 'site-specific', the site-specific value and the document name/reference is to be specified in the MP Template. The document name/reference should contain the necessary basis or explanation for the use of the Tier 1 site-specific conversion factor, and be submitted as part of the supporting documents.

**Q54 Tab J: Why do we have to provide the forecast annual emissions in Tab J: Summary for each emission stream and what is it used for?**

The forecast annual emissions will provide the GHG Manager an indication on the relative uncertainties of each emission stream and how overall uncertainties will be affected based on the proportions of the emission streams. This is to provide the GHG Manager with an indication of which emission stream to focus on if the facility would like to improve the accuracy of its emission numbers.