

# Singapore's Measurement, Reporting & Verification Framework

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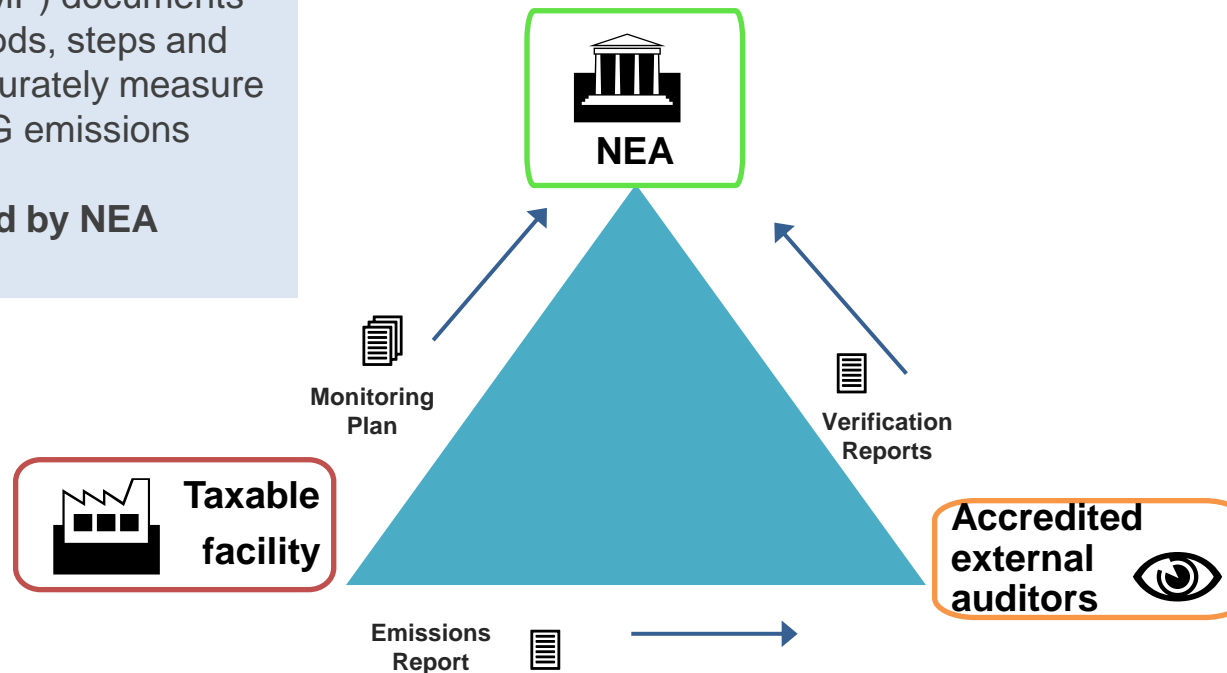
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# MRV Framework

- Monitoring Plan (MP) documents the facility's methods, steps and procedures to accurately measure and report all GHG emissions
- **MPs are validated by NEA**



- Third-party verification of Emissions Report (ER) ensures independent assurance that the GHG emissions measured & reported are accurate
- Accredited external auditors submit: (1) Notice of verification (2) Verification plan summary and (3) Verification report to NEA
- Accreditation of external auditors conducted by an inter-agency Accreditation Working Committee (AWC) led by NEA
- **Surveillance of accredited external auditors' performance done by NEA**

- **The accredited external auditor verifies the Emissions Report (ER) to a reasonable level of assurance based on MP**
- The verified emissions form the basis for the assessment of the taxable facility's carbon tax liability

# M&R Requirements – Submission Documents for Taxable Facilities

Monitoring Plan	Emissions Report
<ul style="list-style-type: none"><li>• Frequency: <u>dynamic</u>, whenever there are changes to processes or GHG computation methodologies, facility to update MP and seek NEA's approval.</li><li>• Documents the methods, steps and procedures to accurately measure and report GHG emissions<ul style="list-style-type: none"><li>• Emission sources and streams</li><li>• Emissions quantification methodology</li><li>• QC / QA procedures</li></ul></li><li>• Serves as the blueprint for emissions monitoring and third-party verification</li><li>• Macros-enabled Microsoft Excel Template</li><li>• Validation (including site visit) by NEA. Validation checklist comprises ~100 questions for admin checks and ~ 60 for technical checks</li></ul>	<ul style="list-style-type: none"><li>• Frequency: <u>annual</u></li><li>• Contains actual emissions data<ul style="list-style-type: none"><li>• Activity data</li><li>• Conversion factors (e.g. NCV, CO<sub>2</sub> EF)</li></ul></li><li>• Web-based form in EDMA, exportable to facilitate verification</li><li>• Auto-population of fuel combustion data with ECA EUR</li><li>• Verified by an external auditor to a reasonable level of assurance*<ul style="list-style-type: none"><li>• List of accredited verifiers is published on NEA website</li></ul></li></ul>

## Notes

\* Both reckonable & non-reckonable emissions to be reported, but only reckonable emissions to be verified by the third-party verifier.

# Key M&R Elements

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Emission sources and emission streams

Emission quantification methods

1) Calculation approach 2) Material balance 3) Direct measurement

Tiers

*methods for estimating activity data and conversion factors of increasing complexity and accuracy*

- choice of default or site-specific factors through sampling/analysis, online metering
  - choice of sampling/analysis (and frequency), online metering
  - choice of engineering estimates, invoices, etc

Emissions quantification approach

- calculation formulae and data aggregation steps
- how activity data and conversion factors are determined
  - assumptions involved

Alternative approach

*treatment of missing data*

Uncertainty assessment

- parameter level, stream level, aggregated facility-level uncertainty

Quality Management Framework

*Quality control / quality assurance procedures to ensure data quality and emissions accuracy*

# Verification

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**Verification** is an independent & objective assessment of the:

- (i) Implementation of the validated Monitoring Plan (MP), including the Quality Management Framework (QMF); and
- (ii) Robustness / accuracy of data in the Emissions Report (ER).

The verification team is to assess the following to a **reasonable level of assurance** during verification

- (i) Only reckonable emissions need to be verified, while the non-reckonable emissions will be checked by NEA

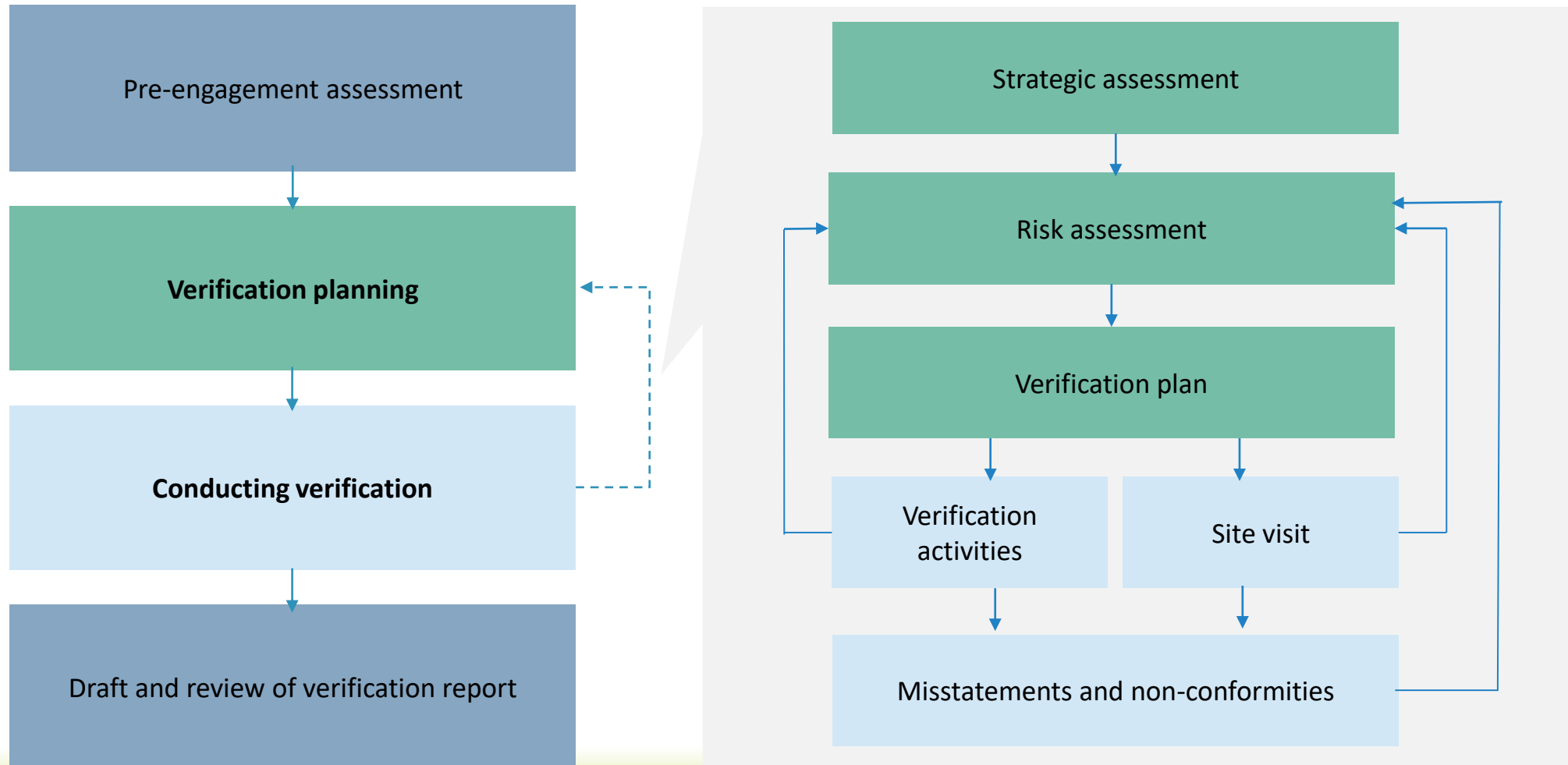
- Data reported in the ER were collected in compliance with the approved MP

- Data reported in the ER are complete, reliable, accurate and free from material misstatement(s)

- The ER complies with the M&R requirements

# Verification Process

Accredited auditors are required to conduct their verification by following the verification process.



# References

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- For further information on the implementation of Singapore's carbon tax, please visit our website:

- [GHG Measurement and Reporting requirements](#)



- [GHG Verification and Accreditation requirements](#)



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