
MiQ
MiQ Supply Chain Protocol

SETTING THE STANDARD FOR METHANE EMISSIONS

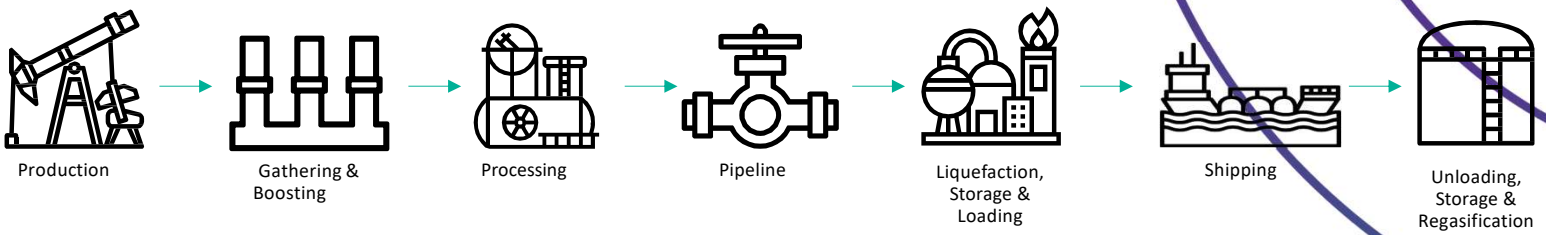
# MiQ next iteration: from single asset certified gas to full supply chain emissions

MiQ is the global market leader in gas certification

- 220bcm/year certified in the US, MI < 0.2% and majority < 0.05%
- **Asset/project** granularity level
- Compulsory 3rd party audit including site visit
- Compulsory data reconciliation, monitoring/measurement, 100% of the certified assets are OGMP 4/5 equivalent
- Pilots and audits for offshore, crude, LNG and Europe
- MiQ standard = MMRV + digital certificates for each MMBtu to track methane attributes (**g/MMBtu**), avoid double counting and demonstrate ownership

What about supply chain emissions with **multiple** assets, onshore & LNG?

- MiQ launched the MIQ Supply Chain Protocol



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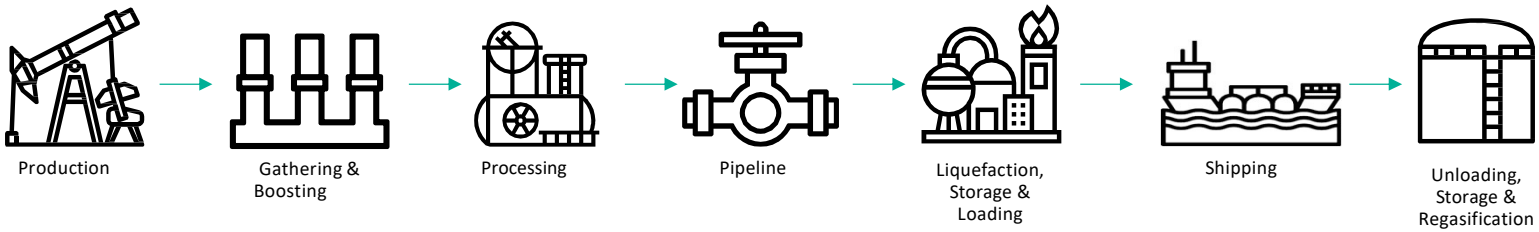
# Goals for MiQ Supply Chain protocol

Create an multi standard framework to:

- Create supply chain emissions determinations and **inform the marketplace TODAY**
- Utilize **heterogenous data** sources as we align towards standardized and highest quality data methodologies
- Utilize **accepted LCA and LCI principles, including ISO 14040 and ISO 14044**
- Align behind a **DQI system** that recognizes the importance of measurement-informed inventories and third-party verification
- Aligned with DOE MMRV stated framework, Japan/Korea CLEAN initiative, GIIGNL attestations, and a **solution for regulatory markets such as EU Methane Regulation**



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# Data quality indicators (DQI) - how to score data for each stage in the LNG value chain

| DQIs | <-- Best Score | | Lowest Score --> |
|---|---|---|---|
| **Time-related representativeness** | 1. <3 yrs | 2. <6 yrs | 3. <10 yrs |
| **Geographical representativeness** | 1. Asset-level, asset that is being evaluated | 2. Sub-asset level or regional, same geographical region | 3. Country-level estimate, if multiple regions are possible |
| **Technological representativeness** | 1. Quantification includes site-specific information and temporally complete range of operating conditions within a unit process | 2. Quantification includes generic emission factors addressing all "technologies" or emission sources within unit process | 3. Quantification applies category level factors |
| **Completeness** | 1. A materiality of unit process flow is captured by quantification methods (i.e. through temporally complete and/or spatial top-down and bottom-up quantification methods) | 2. A materiality of unit process flow and emissions flow is captured through either top-down, or bottom-up quantification methods, or comparable representation through a moderate sampling set | 3. A small sampling size of unit process and emissions flow is used to represent larger asset |
| **Reproducibility See EPA DQIs: Process Review** | 1. Third party audit with reasonable assurance or peer-reviewed studies | 2. Third party audit with limited assurance or non-peer reviewed publication (i.e. white paper) | 3. Self-reporting or First party audit |

[1] Reproducibility category references the process review from EPA DQIs: EPA/600/R-16/096, June 2016, retrieved from: www.epa.gov/research. Protocols must be available to third party auditors.

| Data Source | Time-related Represent-ativness | Geographical Represent-ativeness | Technological Represent-ativeness | Completeness | Reproducibility | DQI |
|---|---|---|---|---|---|---|
| **Currently Available Data Sources** | | | | | | |
| MiQ , MiQ-EO | 1 | 1 | 1 | 1 | 1 | **1** |
| EO | 1 | 1 | 2 | 2 | 1 | **4** |
| Sherwin et al (2024), basin level | 1 | 2 | 2 | 1 | 1 | **4** |
| OGMP L4 single Asset, UN review | 1 | 1 | 1 | 2 | 3 | **6** |
| Next Gen Gas (assumes GHGRP 2024, LA) | 1 | 1 | 2 | 2 | 2 | **8** |
| OGMP L3 single Asset, UN review | 1 | 1 | 2 | 2 | 3 | **12** |
| MiQ LNG Shipping Model | 1 | 1 | 3 | 2 | 2 | **12** |
| 2023 GHGRP, self-reported | 1 | 1 | 2 | 3 | 3 | **18** |
| NETL Model (2019) | 2 | 3 | 2 | 2 | 1 | **24** |
| MiQ-HW Index (2023) | 2 | 3 | 2 | 1 | 2 | **24** |
| Rutherford et al (2021) | 2 | 3 | 2 | 2 | 1 | **24** |
| Alvarez et al (2018) | 2 | 3 | 2 | 2 | 1 | **24** |
| GREET, placeholder values | 2 | 3 | 2 | 2 | 2 | **48** |
| OCI+ Model | 1 | 2 | 3 | 2 | 3 | **36** |
| IEA GMT | 1 | 3 | 3 | 2 | 3 | **54** |
| **Examples of Potential Data Inputs** | | | | | | |
| OGMP L4/5 Asset w 3P RA Audit | 1 | 1 | 1 | 1 | 1 | **1** |
| GTI Veritas Asset w 3P RA Audit | 1 | 1 | 1 | 1 | 1 | **1** |
| GTI Veritas Asset, self-reported | 1 | 1 | 1 | 1 | 3 | **3** |
| OGMP L4/5 Asset, UN review | 1 | 1 | 1 | 1 | 3 | **3** |
| GHGRP (2024) Asset w 3P RA Audit | 1 | 1 | 2 | 2 | 1 | **4** |
| LMR - full asset | 1 | 1 | 2 | 2 | 2 | **8** |
| GHGRP(2024) Asset,  w 3P LA Audit | 1 | 1 | 2 | 2 | 2 | **8** |
| GHGRP(2024) Asset, self-reported | 1 | 1 | 2 | 2 | 3 | **12** |
| MIQ US LNG Index | 1 | 2 | 2 | 1 | 3 | **12** |
| OGMP L4/5 Company level, UN Review | 1 | N/A | 1 | 1 | 3 | **N/A** |

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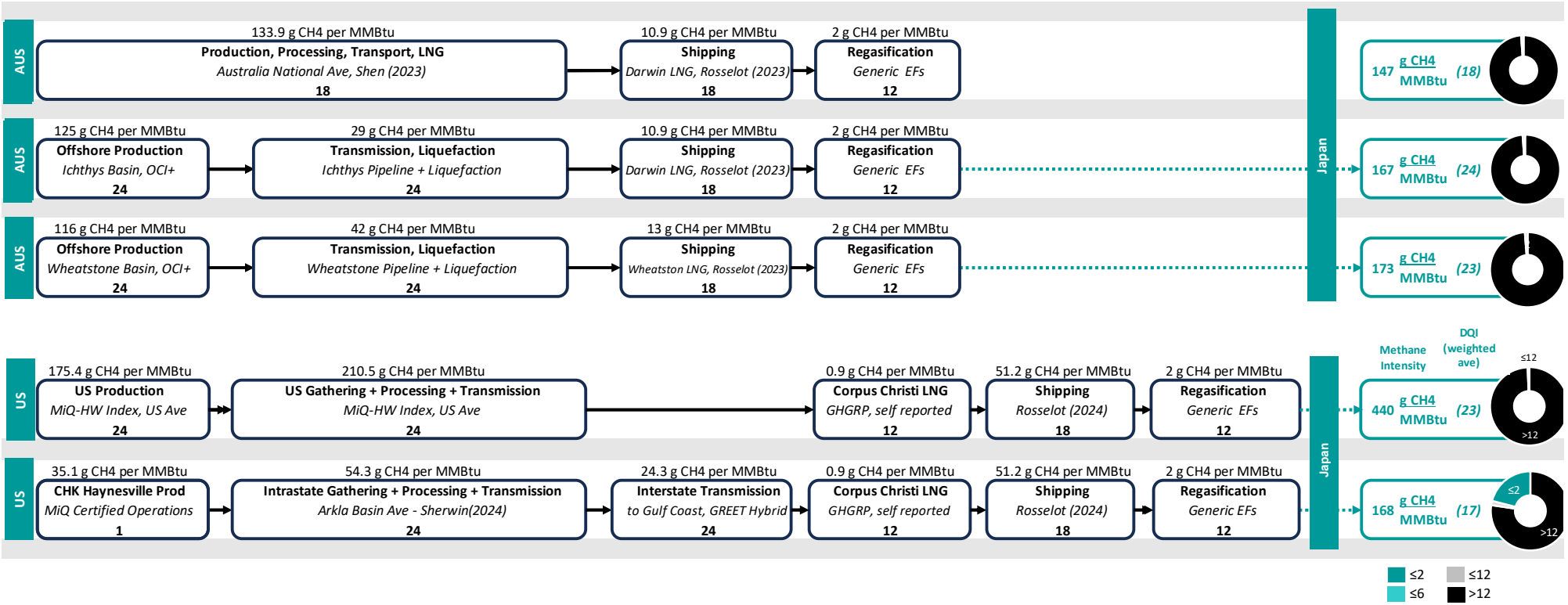
# Worked examples – Japan import



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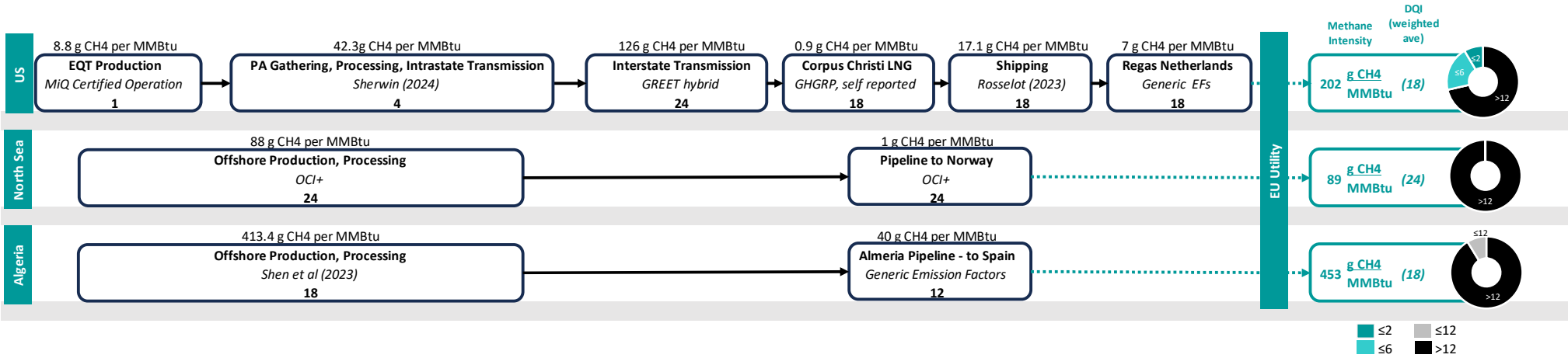
# Worked example: EU imports



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# Launching soon – MethaneScout digital platform for credible supply chain emissions

My Gas Supply Chains

MIQ CERTIFIED

Showing 1-6 of 6 | Add filters

| Facility or Benchmark | Segment | Country | Operator | Best Data Source | Methane Intensity *gCH4/MMBtu* | Methane Intensity % | DQI ranking |
|---|---|---|---|---|---|---|---|
| Chesapeake Haynesville Shale Operations | Production | US | Chesapeake Energy Corporation | MiQ , MiQ-EO100 | **35.1** | 0.20% | 1 |
| Arkla Basin (Midstream) | Midstream (B&G, Processing, Pipeline) | US | N/A | Basin-level data extrapolated from Sherwin et al (2024) | **54.3** | 0.31% | 24 |
| Transmission - Haynesville to Gulf Coast (258 miles) | Pipeline and Storage | US | N/A | GREET BU/TD Hybrid (2023) | **24.3** | 0.14% | 24 |
| Corpus Christi Liquefaction | LNG Liquefaction | US | Cheniere Energy Inc | GHGRP, Pre-RY2024, no 3P Audit (self-reported) | **0.9** | 0.01% | 18 |
| Corpus Christi to Tokyo (Cape of Good Hope), X-DF LNG ship | LNG Shipping | N/A (LNG ship) | N/A | Rosselot et al (2023) | **51.2** | 0.29% | 18 |
| SAMPLE - LNG Japan terminal | LNG Regasification | US | N/A | OGMP L3 Asset, UN review | **2.0** | 0.01% | 12 |
| | | | | **Total / Average** | **167.8** | **0.96%** | **17.2** |


**Summary for the full Supply Chain**

| Gas Volume | Methane Intensity | Methane Emissions |
|---|---|---|
| 3,000,000 MMBtu | 0.96% | 503 MT CH4 |
| 55,385 MT | 168 gCH4/MMBtu | 41,498 MT CO2e |
| | 13 gCO2e/MJ | |

*If you are interested in providing feedback on the beta version or participating, please contact lara.owens@miq.org or info@miq.org*

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# WHAT IS NEXT

- ✓ MiQ is finalizing the norms for Certified LNG
- ✓ MIQ is actively working with participants for a pilot from US to Europe to showcase “certified LNG”
- ✓ We are including CO2 in the next iteration
- ✓ MIQ is building an online platform MethaneScout to enable and visualize the protocol
- ✓ We are writing the attestations statements for onshore and LNG supply chains

- ✓ **Full supply chain emissions, asset per asset, are now possible in 2024**
- ✓ **Buyers or importers can buy low methane certified LNG in Asia and Europe**


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MiQ