

SAMPLE REPORT

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ESG
MIDSTREAM
UPSTREAM OIL & GAS

RESPONSIBLY SOURCED GAS (RSG)

License to Operate?

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What is the certification process for responsibly sourced gas (RSG)? How big is the market? Who are the first movers?

KEY POINTS

- Supply of producer-certified RSG is expected to grow from 8.7 Bcf/d in 2021 to about 20 Bcf/d by the end of 2022 based on announced projects, or about 18% of the North American market.
- Although cost data is sparse, Project Canary disclosed its TrustWell certification and continuous monitoring systems average \$ [redacted] per pad. Offtake agreements are also scarce, but anecdotal reports suggest price premiums of a [redacted] per Mcf.
- We see producers' RSG commitments principally driven by a desire to demonstrate environmental credibility, not an expectation of [redacted] gas in the near term.
- MiQ and Equitable Origin co-certify [redacted] % of RSG volumes, driven by large basin-wide partnerships spread across three producers. Project Canary is the most active with a [redacted] % market share across [redacted] partnerships and an additional seven announced pilot projects.
- [redacted] is the leading supplier with almost 13 Bcf/d of certified gas projected by year-end 2022, followed by [redacted] with over 4 Bcf/d. The totals respectively represent 39% and 34% of production in the two regions.
- [redacted] and [redacted] lead the pack with the highest estimated RSG volumes across the industry and combined will supply [redacted] % of estimated year-end 2022 volumes. [redacted] and [redacted] are the largest predominantly-gas operators with no RSG announcements to date.
- Based on our calculations, natural gas power plants are more emissions friendly than coal power plants for methane leakage rates below 5.1% when looking on a 20-year global warming potential timescale and 12.3% when looking on a 100-year timescale. These are both considerably higher than the Environmental Defense Fund's ~2.3% estimate and One Future's 1% target of well-to-end-user leakage rate across the U.S.

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GENERAL

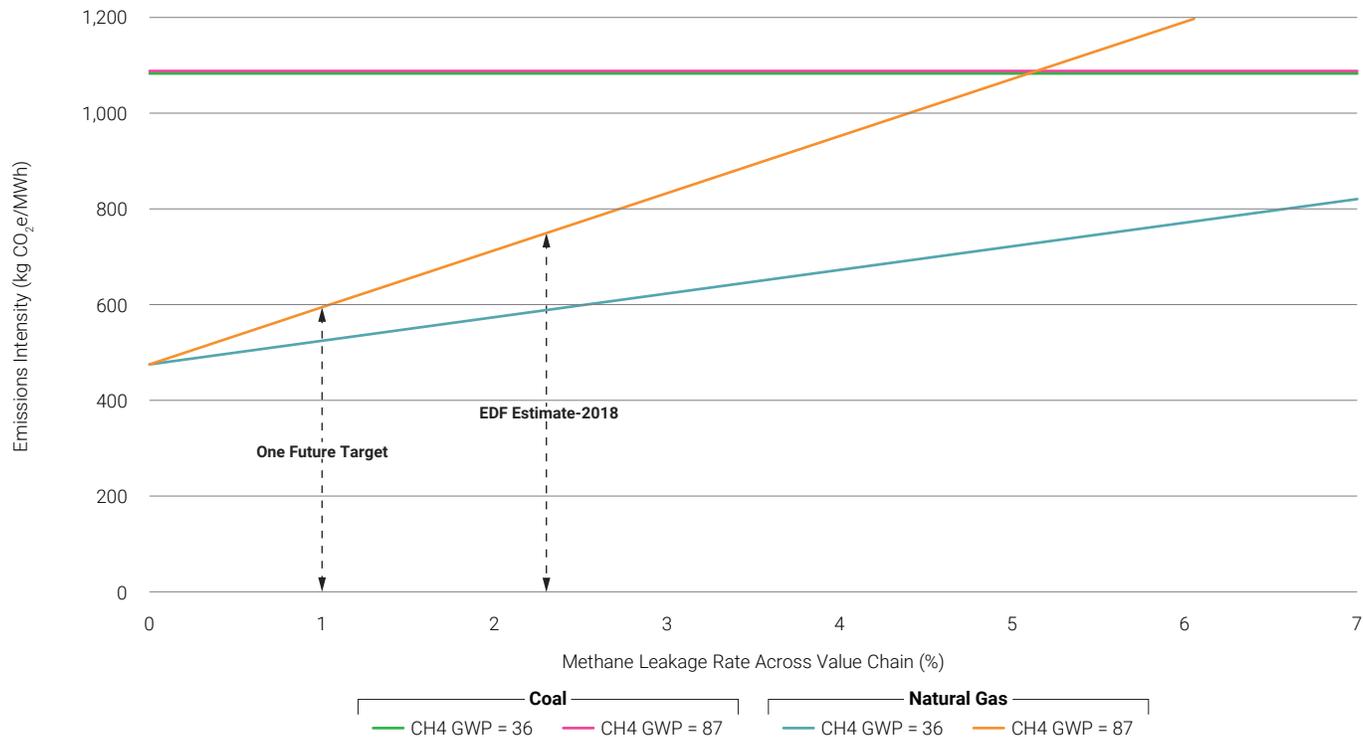
ESG pressures are pushing companies to analyze their supply chains, creating preferential markets for sustainable resource extraction. Responsible Steel, the Copper Alliance, the Concrete Sustainability Council and Responsibly Sourced Gas (RSG) are all examples of certification frameworks introduced by various commodity markets to differentiate production. RSG, is natural gas with third-party certification verifying that certain standards on key metrics such as methane leakage, water usage and community impact have been met. This report compares the three leading RSG certifiers – Project Canary, MiQ and Equitable Origin – and analyzes the state of the overall RSG market.

Coal-to-gas switching across the U.S. helped reduce the country's power plant emissions by 38% since 2005, convincing many to tout natural gas as a bridge fuel for the energy transition. Pushback from certain stakeholders, however, often focuses on uncertain methane leakage rates across the supply chain from wellhead to end use. Methane is a more potent greenhouse gas than carbon dioxide but with a shorter lifetime, leading to a 25-36x equivalency factor on a 100-year time frame and 84-87x over 20 years.

Figure 1 shows the effect of methane leakage on the emissions benefit of coal-to-gas switching. Based on our calculations, natural gas power plants produce lower emissions per unit of electricity than coal plants when well-to-end-use methane leakage rates fall below 5.1% when looking on a 20-year timescale and 12.3% on a 100-year timescale. These are considerably higher than the Environmental Defense Fund's ~2.3% estimate and One Future's 1% target for current U.S. operations. Although we believe the environmental benefits of coal-to-gas switching are clear, RSG aims to provide stakeholders with even greater certainty and help solidify natural gas as a key component of the energy transition.



FIGURE 1 | Natural Gas Versus Coal at Various Methane Leakage Rates and Carbon Dioxide Equivalent Global Warming Potential Conversions



Source | Enverus, NETL, EDF, ACS, BP

CERTIFICATIONS

Project Canary, MiQ and Equitable Origin are the three main RSG certification providers in North America. Project Canary provides comprehensive coverage including methane calculations, qualitative ESG checks, verification and continuous monitoring. MiQ and Equitable Origin are commonly combined along with outside third-party verification and continuous methane emissions monitoring to provide full coverage. **Figure 2** gives a high-level overview of the certifying bodies.

Like the global Leadership in Energy and Environmental Design (LEED) building rating scale, all three providers use different certification levels based on operational performance, methane intensity and company practices, meaning not all RSG is created equally. The market is still developing standardized RSG methane intensity thresholds, but one value that is emerging is 0.2%, which is lower than the One Future upstream methane intensity goal of 0.28% and the U.S. 2020 average of 0.27%. The U.S. 2020 median methane intensity is 0.49%, which shows there are ample operations in the U.S. where RSG certification would be a significant differentiator.

FIGURE 2 | Comparison of the Primary RSG Certification Providers in North America

	MIQ	EQUITABLE ORIGIN	PROJECT CANARY
General Criteria	Methane intensity, company practices and monitoring technology deployment	Corporate governance, transparency and ethics; human rights, social impact and community development; Indigenous people's rights; fair labor and working conditions; climate change, biodiversity and environment	Air, water, land and community
Levels (Highest to Lowest)	A-F	PT3, PT2 or PT1	Platinum, gold or silver
Standards	MiQ Standard	EO100™ Standard for Responsible Energy	TrustWell
Granularity	Field level	Field level	Pad-level
Verification	Third party	Third party	Internal
Certificate Life	12 months	Three years with annual verification	12 months
Methane Intensity Calculation	Follows Natural Gas Sustainability Initiative (NGSI) protocol	Commonly paired with MiQ to include methane intensity certification	Follows One Future protocol

Source | Enverus, company disclosures

CONTINUOUS MONITORING TECHNOLOGY

Although RSG certification depends on meeting a wide array of requirements, mitigating methane leakage is a key component and, in our opinion, a major driver of its adoption. While none of the certification providers requires continuous monitoring to be utilized, using this technology gives operators granular direct-measured data to back up claims of responsible production while also unlocking higher level certification by having a leak detection and repair (LDAR) program beyond regulatory requirements.

Project Canary's certification is commonly paired with its Canary X monitoring system, while MiQ is provider-agnostic and does not provide monitoring in-house. In addition to the Canary X system, Baker Hughes' LUMEN Terrain and Scientific Aviation's SOOFIE systems are common choices for continuous monitoring. Cost data is sparse for continuous monitoring, but Project Canary disclosed its TrustWell certification and continuous monitoring costs \$ [REDACTED] /pad on average. Based on this disclosure, we estimate the average cost to certify gas with continuous monitoring is [REDACTED] per Mcf for gas operators with pad-level productivity greater than 1.5 MMcf/day and [REDACTED] per Mcf for gas operators with pad-level productivity less than 1.5 MMcf/day. Oil operators incur the highest estimated cost at [REDACTED] per Mcf.

Figure 3 shows the layout of a sample continuous monitoring setup where the orange zones are the potential emission sources and the green zones are the sensors. The sensors are equipped with a power source, a device to capture air samples, the laser-based sensor itself to quantify concentrations, an anemometer to determine the source of the sample and a system to transmit this information in real time. These systems vary by provider but the common feature is they run 24/7, allowing operators to catch, quantify and fix leaks within hours rather than months.

FIGURE 3 | Pad-Level Continuous Monitoring Setup



Source | Enverus, Project Canary, Google Earth, Maxar Technologies, U.S. Geological Service, USDA Farm Service Agency

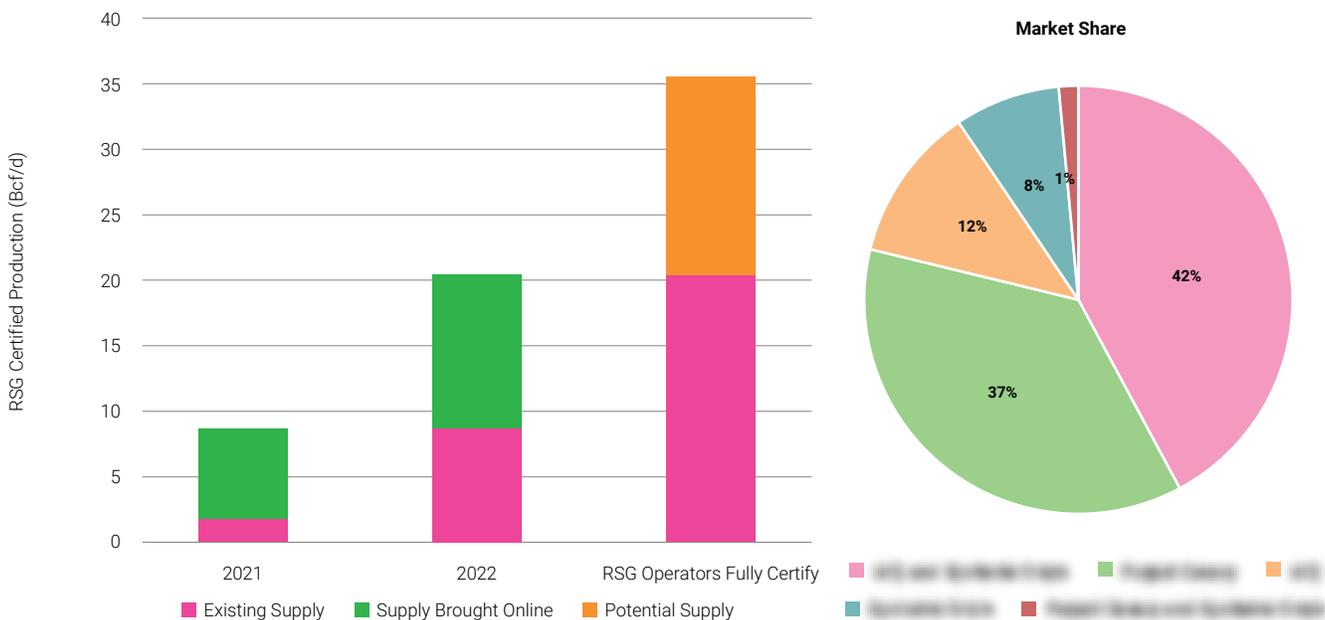
RSG SUPPLY ESTIMATES

Certified RSG supply grew to about 8.7 Bcf/d in 2021, and we expect this to more than double to 20.4 Bcf/d in 2022 based on announced projects (**Figure 4**). In a scenario where all operators piloting RSG programs or certifying only parts of their operations opt for 100% certification, daily RSG production could reach over 35 Bcf/d. These estimates represent 18% and 31%, respectively, of gas production in Canada and the Lower 48.

MiQ and Equitable Origin lead with a 42% market share, driven by large basin-wide certification deals spread across three operator partnerships: **Equitable Origin**, **MiQ** and **Equitable Origin**. Project Canary is the most active with a 38% market share across 13 partnerships and an additional seven announced pilot projects. The remaining RSG market is certified by MiQ or Equitable Origin individually.

Equitable Origin is the leading supplier of RSG with almost 13 Bcf/d of certified gas projected by year-end 2022. **MiQ** follows with over 4 Bcf/d (**Figure 5**). Together they make up 83% of future certified production volumes with room to grow since only 39% of **Equitable Origin** production and 34% of **MiQ** production is estimated to be certified by year-end 2022.

FIGURE 4 | North American RSG Supply Estimates Through Time and Certification Provider Market Share



Note | Supply estimates do not include small, well-pad-level pilot projects.
Source | Enverus, company disclosures

FIGURE 5 | North American RSG by Region

REGION	ESTIMATED RSG PRODUCTION (Bcf/d)	PERCENTAGE OF REGIONAL PRODUCTION CERTIFIED
Alberta	12.7	39%
Lower 48	4.2	34%
Canada	1.3	99%
Other	0.9	5%
Other	0.8	74%
Other	0.3	2%
Other	0.2	7%

Source | Enverus, company disclosures

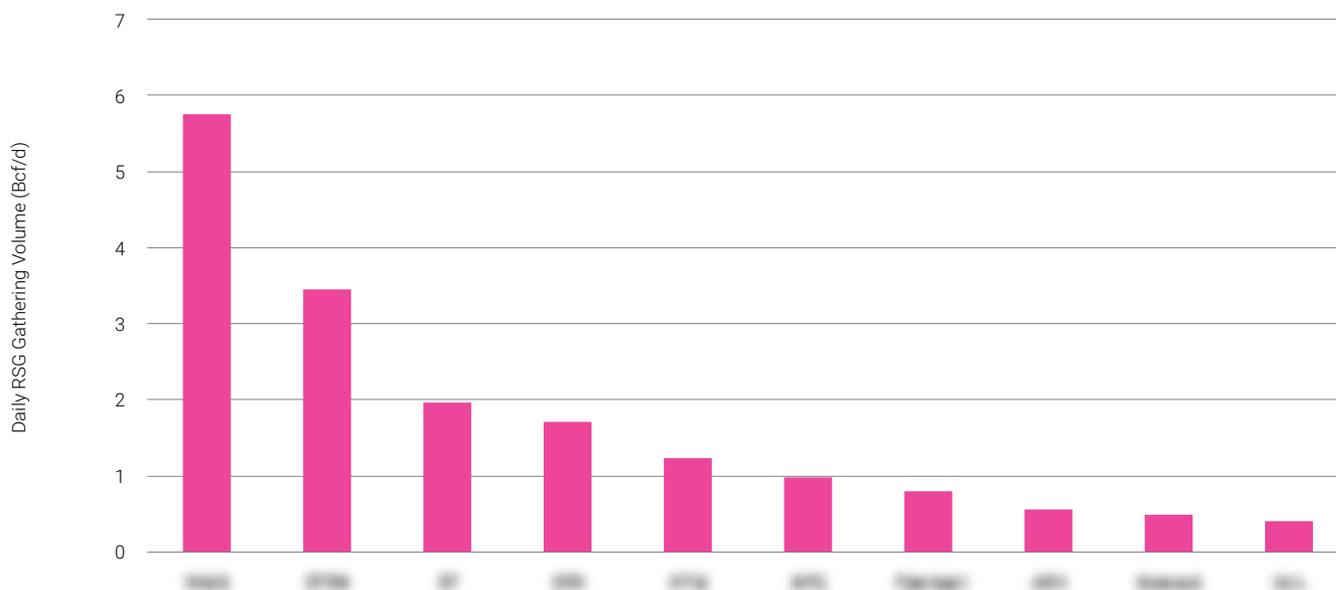


RSG GATHERERS

In December 2021, **Energy Services**, in partnership with **Energy Services Midstream** and **Energy Services Energy** with **Energy Services Midstream**, announced operation-wide certification from the wellhead to the receipt point, a first for the industry. Certifying the gathering stage is crucial to achieving RSG's goal of wellhead-to-burner certification, so we anticipate seeing more announcements in the future.

Figure 7 shows the daily gas gathering volumes of the top 10 gathering operators tagged to wells on our estimated RSG well list. These wells include current and future certifications, so the volumes are not all currently certified. We estimate **Energy Services** gathers more RSG than **Energy Services** and **Energy Services** combined, the second- and third-largest gatherers. Of the top 10 RSG gatherers, **Energy Services**, **Energy Services**, **Energy Services** and **Energy Services** have announced programs for midstream asset certification or carbon neutral gas transport.

FIGURE 7 | Top 10 Gas Gathering Operators From RSG Wells



Source | Enverus



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Additional sections and figures shown on full report:

Additional Sections

RSG Transmission
RSG Markets
RSG Marketing
Companies Listed In This Report

Additional Figures

FIGURE 8 | North American RSG Overview
APPENDIX A1 | RSG Transactions-to-Date
APPENDIX A2 | RSG Transactions-to-Date Continued



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