Carbon Markets, the GCC, and the Case for Digital MRV

Carbon markets have become one of the central instruments of global climate governance, yet for all their potential, they remain structurally constrained by a problem that has proven stubbornly difficult to solve: how do you verify, with credibility and at scale, that a tonne of carbon reduced or removed is exactly what it claims to be?

For the Gulf region specifically, the stakes around that question are particularly high and understanding why requires starting from first principles.

How carbon markets work

A carbon credit represents the avoidance or removal of one metric tonne of carbon dioxide equivalent (tCO_2e) from the atmosphere. Credits can be generated through a range of activities, such as reforestation, renewable energy development, methane capture, and improvements in industrial efficiency. (UNDP, 2025).

Two primary market structures govern how these credits are bought and sold.

Compliance markets are established by law. Governments or regulatory bodies set a cap on total emissions within a defined sector or economy; entities that emit below their allowance may sell surplus credits to those that exceed it. This cap-and-trade design creates a direct financial incentive to reduce emissions (World Bank, 2025).

Voluntary carbon markets (VCMs) operate outside mandatory frameworks. Companies, governments, and individuals purchase credits to meet self-imposed climate commitments or to offset residual emissions they cannot yet eliminate (UNDP, 2025). The VCM was valued at approximately $5 billion in 2024 and is projected to grow to $30 billion by 2030 (KPMG, 2024).

At the international level, Article 6 of the Paris Agreement establishes a framework for countries to trade emissions reductions across borders. Its Article 6.4 provision created the Paris Agreement Crediting Mechanism (PACM), a UN-supervised successor to the Kyoto Protocol's Clean Development Mechanism, which became operational in late 2024, deepening integration between national carbon systems and the global market (UNDP, 2025).

Carbon markets in the Gulf Region

The six Gulf Cooperation Council member states, Saudi Arabia, the UAE, Qatar, Kuwait, Bahrain, and Oman, occupy an unusual position in global carbon markets. As some of the world's largest per capita emitters and among the most carbon-intensive economies, they face significant pressure to decarbonize. At the same time, their economies remain deeply intertwined with hydrocarbon revenues, creating complex trade-offs for climate policy design.

As of 2025, none of the Gulf states have implemented a mandatory domestic carbon pricing mechanism or formal emissions trading scheme. However, all six have referenced international carbon markets in their Nationally Determined Contributions (NDCs) under the Paris Agreement, a signal of genuine strategic interest in carbon trading as a policy tool (Tandelberg et al., 2025).

However, progress remains uneven as institutional infrastructure is nascent, public and private emissions disclosure is limited, and the transition from voluntary interest to structured compliance markets has not yet materialised. The World Bank has called for accelerated capacity building across the Arab region to ensure these economies can meaningfully participate in and benefit from emerging global carbon market frameworks (World Bank, 2023).

Encouragingly, regional initiatives such as the Global Carbon Council (GCC), the region's leading carbon crediting standard, are building the institutional architecture required for credible carbon market participation. The convergence of NDC commitments, net-zero targets, and growing buyer demand for high-integrity credits is creating both pressure and opportunity for the Gulf states to move from intent to infrastructure.

The Integrity Problem

Despite growing momentum, carbon markets face a persistent structural challenge that limits their effectiveness and credibility, and one that is particularly pronounced in emerging and developing economies, including those in the Gulf: integrity.

A significant share of credits in voluntary markets has been found to deliver overestimated or unverifiable climate benefits. Studies of forest protection projects have raised questions about:

- Additionality: whether emissions reductions would have occurred without the project
- Permanence: whether stored carbon is secure over the long term
- Leakage: whether the displacement of emissions to adjacent areas undermines claimed reductions

These verification failures have eroded buyer confidence and contributed to a 25 percent decline in voluntary carbon market transactions in 2024 (Sylvera, 2024; Mongabay, 2024). At the root of many of these failures lies a process problem. Traditional MRV, Monitoring, Reporting, and Verification, was not designed for the scale, speed, or scrutiny that modern carbon markets require.

The problem with traditional MRV

In the conventional model, project proponents manually collect field data, compile monitoring reports over months, and submit them to Validation and Verification Bodies (VVBs) for independent audit. This process is paper-heavy, slow, and typically spans 18 to 24 months from project initiation to first credit issuance (SustainCert, 2023).

These delays compound the integrity problem. When monitoring is periodic rather than continuous, anomalies go undetected for months. When data collection is manual and fragmented, there are multiple points at which errors or manipulation can occur. When verification is snapshot based, it captures a moment rather than a trajectory.

The result is a system that is expensive, slow, and structurally prone to the kinds of verification failures that have damaged market confidence.

One solution: Digital MRV

Digital MRV (dMRV) is the systematic digitisation of the monitoring, reporting, and verification process. It refers to the use of technologies, satellite monitoring, geospatial mapping, automation, IoT sensors, and secure data infrastructure, to measure, report, and verify carbon emissions reductions and removals at scale.

Rather than relying on periodic, snapshot-based audits, dMRV enables continuous, data-driven monitoring that detects anomalies as they occur. This shift from reactive to proactive oversight is perhaps the most consequential change dMRV introduces.

Rather than a linear sequence of activities where each party waits for the previous step to conclude, dMRV enables parallel workflows, simultaneous data collection, validation, and verification, compressing timelines that were previously sequential by design. The result is a process that is not only faster but structurally more resilient, with fewer handover points where data can be lost, altered, or disputed.

Who benefits, and how

The value of dMRV extends across every stakeholder in the carbon credit lifecycle.

For project proponents, the efficiency gains are immediate: near-real-time credit issuance enables earlier and more consistent cash flows, reducing financial risk. This is a particularly significant advantage for smaller projects in emerging markets, which cannot afford to wait two years between issuance cycles.

For VVBs, dMRV fundamentally changes the nature of the verification task, from periodic, site-intensive audits to continuous, data-driven oversight. For many project types, an initial system-wide validation is required only once, with subsequent reviews focusing solely on flagged anomalies. This shifts the VVB's role from repetitive data gathering toward higher-value assurance work, enabling remote verification at a scale that in-person audits could never achieve.

For credit buyers and investors, the benefits are equally significant. Real-time monitoring insights enable better risk analysis, and the confidence that purchased credits represent genuine, auditable climate impact directly addresses the trust deficit that has suppressed demand growth.

dMRV in the Gulf Region: the Path is Already Open

For project proponents in the Gulf region, the pathway to adopting dMRV is already established. The GCC has formally integrated digital MRV into its framework and approved select solution providers to operate within its ecosystem, removing one of the most significant barriers to adoption: uncertainty over whether digital verification will be accepted by the relevant standards body.

As the first approved solution provider by the GCC, NGX offers project proponents not only advanced monitoring technology, but a verification pathway already embedded within the GCC's methodology and market infrastructure. Developers do not need to navigate standards' approval independently or risk investing in a system that may later face methodological challenges.

The GCC's framework is designed to serve projects of all sizes, not only large-scale developers with the resources to build bespoke systems. For the region's carbon market ambitions, the convergence of institutional readiness, global regulatory momentum, and an approved dMRV provider represents a genuinely pivotal moment.

The integrity problem that has held carbon markets back is not unsolvable. The tools to address it exist. In the Gulf region, the market infrastructure to deploy them credibly is now in place.

NGX's Trace platform provides digital MRV integrated with third-party verification bodies and carbon registries: from data collection to verified carbon credits.

References

KPMG (2024). How can we scale a trusted voluntary carbon market? https://assets.kpmg.com/content/dam/kpmg/sg/pdf/2024/01/how-can-we-scale-a-trusted-voluntary-carbon-market.pdf

Mongabay (2024). The State of Carbon Markets in 2024. https://news.mongabay.com/2024/12/the-state-of-carbon-markets-in-2024/

Sylvera (2024). The State of Carbon Credits 2024. https://www.sylvera.com/reports/state-of-carbon-credits-2024-report

Tandelberg et al. (2025). Lessons from Gulf Cooperation Council Countries' Participation in the Clean Development Mechanism. https://www.tandfonline.com/doi/full/10.1080/14693062.2025.2479816

UNDP (2025). What are carbon markets and how do they work? https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-how-do-they-work

World Bank (2023). Embracing Climate Opportunities for a Greener GCC. https://blogs.worldbank.org/en/arabvoices/embracing-climate-opportunities-greener-gcc

World Bank (2025). State and Trends of Carbon Pricing 2025. https://www.worldbank.org/en/publication/state-and-trends-of-carbon-pricing