Horizons

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Energy

A roadmap to a carbon-differentiated market

To protect trade and mobilize capital to lower carbon commodities and solutions, market participants need to be able to trade commodities based on their GHG intensity, similar to how sulfur levels in fuels, ash in grains or silica in iron ore affected commodity value and incentivized investments in improving product quality. This special report outlines the current state of affairs, identifies gaps in the system, and proposes a roadmap to a carbon-differentiated economy.
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Credits

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Key implications

A carbon differentiated market is a world where buyers and sellers can compare, trust, and assign value to the GHG emissions associated with commodities and products. A carbon differentiated market aligns environmental goals, with product level competition between companies as well as capital and global trade. Such a market does not exist today.

The ability to distinguish and trust GHG emissions data is a pre-requisite for buyers and sellers to incorporate them into deals. To date, however, there remains a divergence in accounting methods across governments and industries. This is particularly important for products and corporate reporting where stated emissions are often inconsistent and incomparable. Compliance markets are expanding, but inconsistencies are adding confusion, increasing compliance cost, sidelining capital, and weakening the market signal.

The roadmap to a carbon differentiated market has three components: 1) an emissions accounting framework; 2) registry infrastructure, to record and report emissions performance; 3) and an organization and governance structure to administer and maintain the accounting framework. The emissions accounting framework specifically would require the creation of sector specific standards on emissions quantification, reporting, quality measures, and third-party verification and audit protocols.

The roadmap would create a market where governments, buyers and sellers can differentiate emissions performance among supply sources, reward better performers, and incentivize investment in emission reductions in commodity supply chains.

Why compete on carbon?

Although there is widespread trading of carbon and carbon credits as a commodity, to date there have been only a few dozen trades of commodities that included emissions claims. This matters because trading drives demand, which in turn impacts price. Pricing emissions in commodities aligns incentives to improving emissions performance. The impact could be significant; for example, a 1 kilogram reduction in the carbon intensity of a barrel of oil equates to over 30 million metric tons of emissions annually.

In oil markets, the past few decades saw increased transparency on sulfur levels in fuels leading to clear and consistent regulations, which in turn drove price differentials for those fuels. That provided the incentive for investment in upstream and midstream assets that reduced sulfur content.

Somewhat similarly, the 'value-in-use' mechanism in iron ore markets provides transparency on ore composition, and the impact on the value. In grains markets, the levels of ash and moisture are key determinants of the quality and ultimately price of the commodities. These type of product differentiators drives practices throughout the supply chain to improve quality, and enhance product value.

The same type of outcomes can follow in global emissions in commodity supply chains.

A standardized emissions accounting and reporting system would bring transparency and credibility to emissions claims, enabling buyers and sellers to differentiate on carbon in transactions. The current landscape of emissions accounting, however, is characterized by inconsistency.

Comparisons cannot be made, performance cannot be tracked and consumers cannot differentiate or assign value. A unified approach is needed to ensure transparency, accountability, reliability and comparability. Transparency would reward lower carbon commodities and bring new lower carbon commodities to market.

What has happened so far?

To date, companies have been taking voluntary actions that typically, but not exclusively, sit on the lower cost portion of their marginal abatement curve. As they move up that curve, they will inevitably struggle to invest larger sums without some sort of incentive or subsidy. Some jurisdictions have implemented compliance measures to regulate emissions, but these often also suffer from inconsistencies and a lack of interconnectedness. The resulting patchwork of regulations are difficult to navigate, contributing to market inefficiencies, and raising the cost of compliance and trade.

There has been work on creating frameworks for corporate emissions reporting across a supply chain . While these efforts are critical for creating an understanding of corporate emissions balances and flows, they also need product level emissions consistency, specifically for traded commodities so the information presented is comparable, reliable, and decision useful.

[1] S&P Global Energy Annual Strategy Workbook estimates global consumption of crude and condensate will top 83 million barrels per day or 30.4 billion barrels in 2025 (liquids would be higher over 100 million boe).
[2] Examples include GHG Protocol product level standard, and E-liability's method for assigning liability as well as the work of Stefan Reichelstein (Corporate carbon accounting: balance sheets and flow statements | Review of Accounting Studies)

Efforts to improve product level emissions accounting are emerging. One internationally coordinated framework led by the United States and European Union, comprises 20 nations, collaborating on a harmonized greenhouse gas measuring, monitoring, reporting and verification framework for gas and LNG3. This has the potential to drive positive change, but a broader, more cohesive outcome is needed to maximize its effectiveness and to expand into other commodities.

What are the biggest gaps to compete on carbon?

There is significant misalignment among governments, industries, and existing emissions accounting protocols, resulting in inefficiencies and redundancies. Addressing this requires collaboration and harmonization of standards and protocols across governments and industry.

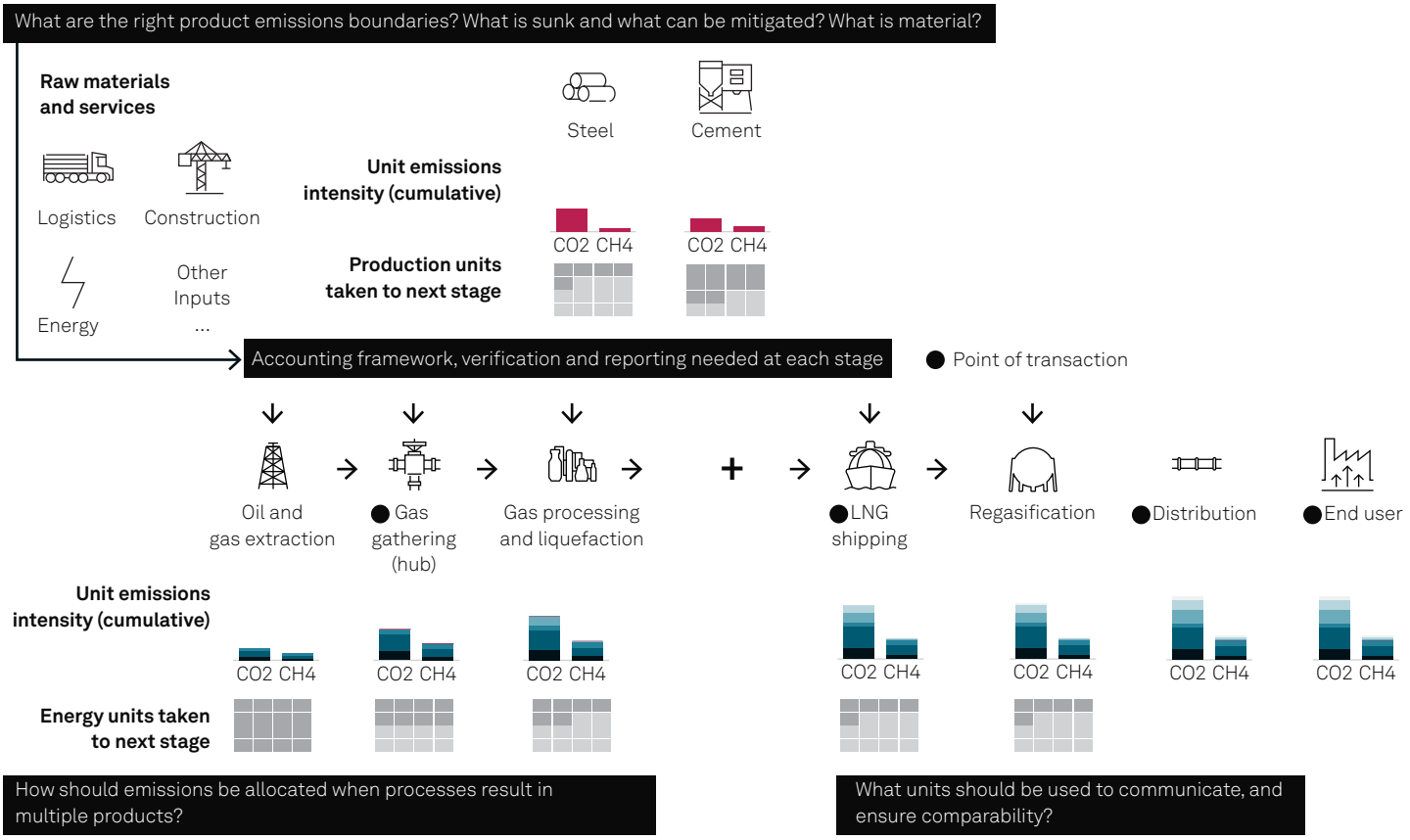
Competing on carbon continues to be held back by the divergence in emissions accounting frameworks. What is needed is a set of commonlyagreed principles coupled with tighter more prescriptive sector-specific standards, coupled with assurance requirements. Establishing consistent emissions quantification and reporting is essential to creating a transparent and effective emissions accounting system.

A lack of trust is another hindrance. Governments, industries, and the public question the reliability of emission estimates. Agreement on the attributes of a product or good is a prerequisite for a deal. Building trust through a transparent accounting framework would foster competition and further incentivize decarbonization.

Figure 1: Carbon Quantification and Reporting

Illustrative examples of alignment issues in carbon quantification and reporting

(kgCO2e/unit)



Note: Example of accounting framework applied to LNG. All numbers are illustrative. Emissions are portrayed as cumulative. In this illustration emissions between co products are allocated on an energy basis. Different color blocks represent different process phases.

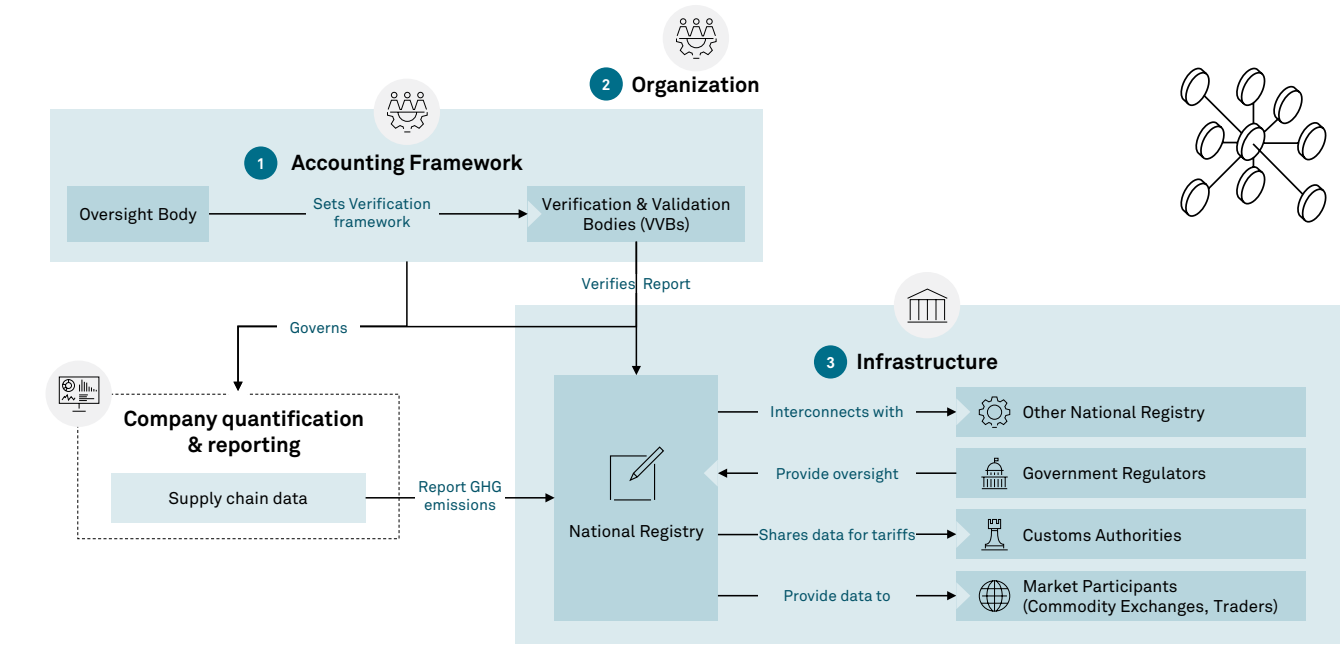
[3] For more information on the Greenhouse Gas Supply Chain Emissions Measurement, Monitoring, Reporting, and Verification (MMRV) Framework, see: https://www.energy.gov/fecm/greenhouse-gas-supply-chain-emissions-measurement-monitoring-reporting-verification-framework

Roadmap to a Carbon Differentiated Economy

The roadmap to achieving a carbon-differentiated market involves three key components: the accounting framework; the organization and the governance structure; and the infrastructure.

By implementing these components, an ecosystem could be created to enable commodity transaction that incorporates greenhouse gas emissions.

Figure 2: Roadmap to a Carbon Differentiated Economy



Note: In this organization, the accounting framework is defined by the over-arching body, third party verification is done against the framework, and recorded in the registry. The registry provides information to marketplaces such as exchanges, as well as providing tradeable information to market participants and auditable data to governments.

Source: S&P Global Energy

Accounting Framework

While there are some standards for emissions accounting, such as those from the International Organization for Standards (ISO) or the GHG Protocol, these were developed to be applicable across broad sectors before we had tools to track and trace GHG data though systems. A lot has evolved since then. While fundamental core definitions are necessary, the unique processes within sectors result in inconsistent accounting even in the same sector.

What is needed is more detailed quantification guidance, standardized reporting guidelines, and the ability to differentiate on quality. Greater alignment around core quantification principles such as which emissions are included, known as system boundaries, how emissions are allocated to co-products, and whether single or multiple time horizons are included would support greater consistency.

Governments and market participants also need to align on how emissions are reported. GHG emissions data may be reported on different bases, such as commodity, asset, or corporation, or they may be reported using different units.

The focus, at least initially, should be on how nations trade, and companies compete, based on the emissions intensity of the commodities they buy, produce, and sell.

Industry needs sufficiently detailed sector-specific guidance to narrow the sources of inconsistency within sectors. These guidelines should define requirements for emissions accounting and reporting, ensuring all entities adhere to the same standards. By enforcing these guidelines, inconsistencies can be removed to create a level playing field for all participants.

Robust Monitoring, Measurement, Reporting, and Verification (MMRV) protocols should be implemented to verify reported data and ensure alignment with established standards. Trust-building criteria, such as the Data Quality Metric, should be mandatory to allow users to differentiate between more site-specific measurements and use of more generic default averages4.

We need to accept the quality of emissions reporting will vary, particularly in the early years of standardization. Users of these data will need to understand the relative reliability between GHG estimates to assess the quality of information. At the same time providers of these data need the tools to communicate quality as investments in improved reliability can come with a risk of upward revision to previously stated emission levels.

The framework should also require third-party verification bodies (VVBs). These bodies would ensure reported data matched performance and was in line with the overall agreed framework, as well as the provided data quality metrics.

Credibility is a critical aspect of the accounting framework. To achieve this, the framework should be endorsed and enforced by national governments with a stake in the major trade flows in a given commodity. Multilateral backing for the framework will allow the private sector to operationalize it consistently and globally.

Organization

The organizational component is key to support the implementation and enforcement of the accounting framework. A governance structure should be established to oversee and manage the framework and ensure its effective operation. This could be similar to how accounting standards in finance and commodity quality specifications are often managed (e.g. IASB for financial accounting, Crude Quality Committee in USA, Open Spec Naphtha in Asia et al.) This structure should include representatives from various stakeholders, including governments, industries, and non-governmental organizations, to ensure a balanced and inclusive approach. A regional administrator might be needed to ensure its proper implementation at various hubs.

Verification and audit guidance and protocols are essential components of the organizational structure. These protocols should include accreditation for Verification and Validation Bodies (VBs) to ensure the credibility and reliability of the verification process. Establishing robust verification and audit protocols helps put in place early rules critical to building trust. Guidance on the reconciliation of methane observation will also be key.

Providing clarity on the ecosystem is crucial for the effective functioning of the emissions accounting system. Clear guidelines should be established to define the roles and responsibilities of different stakeholders within the ecosystem. This clarity will facilitate coordination and collaboration among stakeholders, ensuring that the system operates smoothly and efficiently.

Infrastructure

The infrastructure required to support transactions in a carbon-differentiated market must be established. Registries should be set up to record and track emissions along individual supply chains, ensuring that the data is tracked, aggregated, and stored. These registries should be accessible to all stakeholders, providing a transparent record of emissions associated with specific cargoes or parcels.

A registry should be established for every nation involved in the international trade of a given commodity. In these, suppliers would register the emissions intensity at key points of trade in their supply chain, which would be verified by the accredited VVBs according to the overarching global framework. Supply of a specific unit of a commodity would then be issued in the system, and tracked along its physical journey, with emissions at each key stage further accounted as per the framework. The system would provide the necessary reporting and documentation, whether for regulatory, customs or transactional purposes.

Creating connections between different registries is essential for facilitating seamless data exchange. This includes wiring between country and sector registries, as well as connections to marketplaces, such as exchanges, and other relevant platforms.

The infrastructure must provide functional access. The system should be user-friendly, enabling stakeholders to access data with ease. Simplifying the infrastructure will reduce barriers to entry and encourage participation from a wide range of stakeholders.

The technology for these systems is well-established across environmental markets and is already deployed within regulated markets such as the US Renewable Identification Number market or the EU's Emissions Trading System.

National or regional deployment of registries will ensure strong governance, but it needs a clear framework and organizational structure at international level. This would provide the required consistency globally for commodities that move between regions and countries.

Lastly, the infrastructure should adhere to a consistent data and security structure so connections between national registries are seamless.

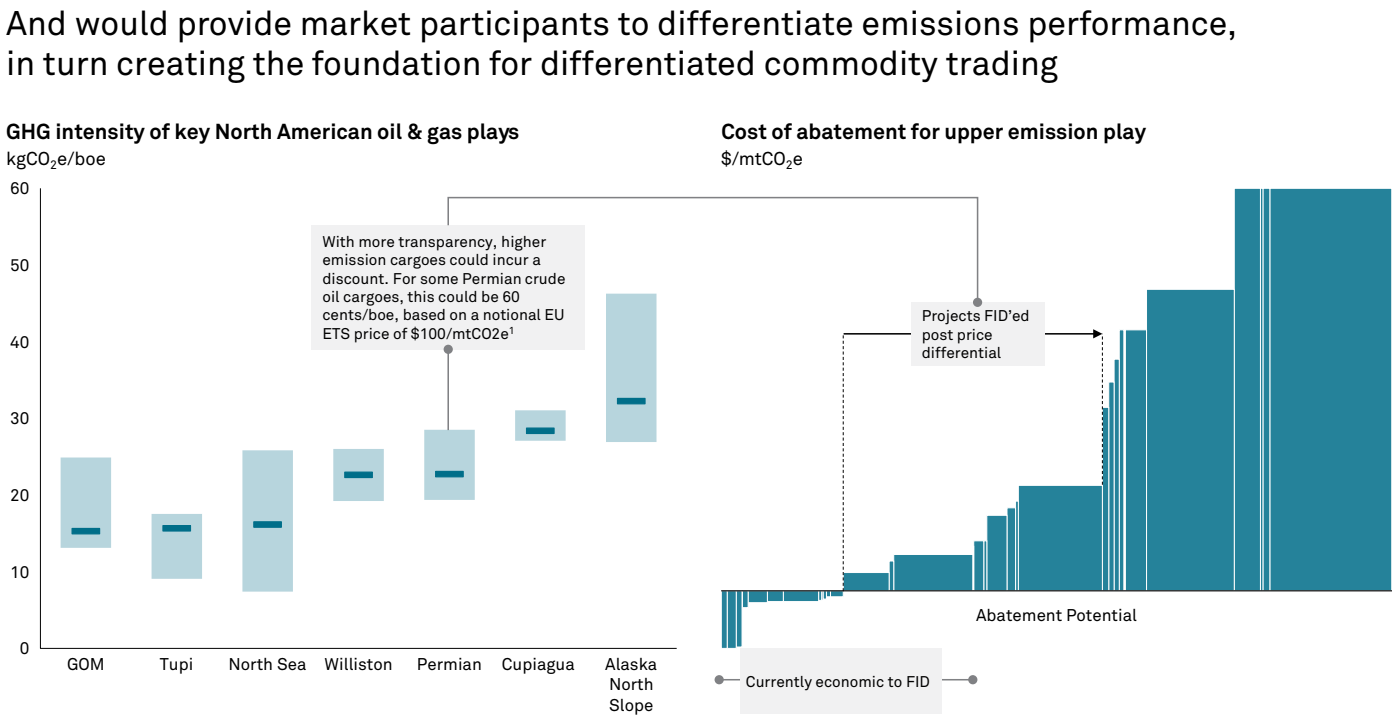
Market development

This roadmap provides a comprehensive approach to achieving a carbon-differentiated market. By addressing the gaps and building a robust framework, emissions accounting and reporting can be consistent, comparable, and sufficiently reliable to be trusted and transacted upon.

This enables market participants to differentiate emissions performance among alternative supply sources, in turn creating the foundation for differentiated commodity trading. The ultimate prize is for the market to place a value on performance which includes both the level of emissions, but also reliability of the information to reward better performers and incentivize investments in improving performance.

To return to the analogy with sulfur, clear and achievable sulfur regulations drove demand, and in turn market premia for low sulfur fuels, creating the economic incentive for investment in secondary units at refineries. We contend that a global, operational framework for emissions accounting would provide the market the ability to differentiate lower carbon commodities with confidence for the first time. A key difference is that sulfur is physically discoverable, whereas emissions require a transparent, verified system of record. This would impact market demand, and in turn premia for low carbon commodities, setting the stage for a carbon-differentiated market—a market where companies compete on carbon. This would also allow companies to accurately account and allocate their emissions, to credibly set up targets aligned with international agreements.

Figure 3: Impact of carbon differentiation on FIDs



Note: Price discount estimated for the upper value in the GHG intensity range (28.5 kgCO2e/boe) against the average (22.7 kgCO2e/boe) multiplied by the notional EU ETS price (US$100/tCO2e)

Source: S&P Global Energy

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