

Climate-Related Financial Risk and the Oil and Gas Sector

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Climate-Related Financial Risk and the Oil and Gas Sector

I. Executive summary

This IHS Markit report seeks to contribute to the dialogue resulting from the draft recommendations from the Financial Stability Board's (FSB) Task Force on Climate-related Financial Disclosures (TCFD or "Task Force"). As a leading independent provider of information and analysis on the energy industry, including the oil and gas sector, IHS Markit is concerned that requirements for inappropriate disclosures could cause mispricing of risk and distort markets.

Context

In December 2015 during the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris, the FSB announced the establishment of a Task Force to develop voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to lenders, insurers, investors, and other stakeholders.¹ In its December 2016 draft report, the Task Force defined its remit as "to promote more effective climate-related disclosures that (1) will support informed investment, credit, and insurance underwriting decisions ... and (2) will enable a variety of stakeholders to understand the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risk."²

The Task Force recommends a common framework for voluntary, climate-related risk disclosures in mainstream (or public) financial filings by all entities with public debt or equity.³ The framework centers on governance, strategy, risk management, and metrics and targets.

The FSB is expected to present the final TCFD recommendations to the G20 summit in Hamburg in July 2017.

IHS Markit key findings

IHS Markit believes that the TCFD recommendations would undermine the FSB's goal of improving capital allocation decisions and market functioning. The aspects of the TCFD recommendations that IHS Markit finds most problematic are related to the disclosure of metrics and targets and the use of scenarios. The linkages between climate-related indicators and financial impacts are complex and uncertain, and users could not consistently deduce the scale, timing, or even direction of climate-related financial risk from this information.

Climate-related risk is just one of many types of risks that affect the future strategies and performance of oil and gas companies. These risks should be assessed and managed in combination, subject to a consistent set of governance, risk management, and materiality considerations. Singling out climate-related risks for separate treatment would represent a radical departure from established concepts of materiality. It would also prevent financial markets from accurately assessing, comparing, and pricing risks and opportunities.

The most ambitious goal of the Task Force—understanding the concentrations of carbon-related assets and analyzing data at the systemic level to understand the financial system's exposure to climate-related risks—cannot be achieved with the available information, metrics, and methodologies.

1. The FSB reports to the G20 and coordinates with member institutions on regulatory, supervisory, and other financial sector policies, with the aim of strengthening financial systems and the stability of international financial markets. The members of the G20 are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States, and the European Union.

2. TCFD, *Phase I Report of the Task Force on Climate-Related Financial Disclosures*, 31 March 2016, p. 3., retrieved 11 April 2017.

3. The Task Force uses "mainstream financial filings" to denote reports filed in accordance with financial regulatory requirements.

IHS Markit analysis and recommendations

The TCFD framework advances an important dialogue on company reporting in relation to climate risk. In the end, investors and financial institutions will need to make their own assessments of the financial implications of climate-related risks based on a combination of company-specific information; public information about trends in the policy, economic, social, and business environment; and their own investment theses and risk appetites. To facilitate those assessments

- Companies should disclose *material information* about climate-related financial risk in their public financial filings, just as they disclose other material risks. These disclosures will be mostly qualitative and will exclude competitively sensitive information.
- Companies should consider communicating supplemental climate-related information through other channels, such as strategy presentations, sustainability reports, and independent reporting programs.

The TCFD framework has a number of shortcomings that risk undermining its intended purpose of promoting more informed decisions by investors, lending institutions, and insurers. IHS Markit offers six specific recommendations on the TCFD draft report:

Departure from established concept of materiality

Specifying that companies must disclose information on climate-related risks as part of their financial filings using a standard framework is inconsistent with the established principle that company boards and management make their own determination of materiality. The potential financial impact of climate-related risks should be treated in public financial reporting in the same way as the impact of other uncertainties. To do otherwise would upend the norms of corporate reporting upon which investors rely for making decisions and evaluating risks.

Recommendation. *Material* climate-related information should continue to be shared via public financial filings. For climate-related information that does not meet the established principles of materiality, companies should determine what is most appropriate to communicate through other channels, such as strategy presentations, sustainability reports, and independent reporting programs.

Metrics that are not correlated with financial risk and opportunity

Investors do not expect companies to quantify the financial implications of all the risks they face. While some of the indicative metrics and targets suggested in the TCFD report may be interesting to some stakeholders, they do not correlate directly with financial risk and cannot be used to value securities. For instance, there is no certainty that companies that invest in climate-related opportunities such as low-emission products will deliver better financial results for investors than companies that do not make such investments.

Recommendation. Many of the long-term trends associated with climate-related risks are public information. Investors should make their own assessments of the financial implications based on a combination of company-specific information; trends in the policy, economic, social, and business environment; and their own investment theses and risk appetites.

Misuse of scenarios

Companies use a variety of planning tools, including long-term scenario analysis, to manage risks and create value in an uncertain world. Companies share their strategic thinking in qualitative terms as part of the normal process of building investor confidence. The TCFD report suggests that companies quantify the financial implications of climate-related risks under a series of scenarios, including a 2 degree Celsius (2°C) scenario. This recommendation conflates scenarios, which are used to challenge long-term strategic thinking, with robust, detailed forecasts. Planning scenarios do not reflect the strategic changes that companies will

make over time, and any quantified financial implications of scenario analysis are contingent on multiple assumptions.

Recommendation. Financial regulators and investors should not ask for quantified financial implications of long-term scenario analysis. Such information does not provide substantive, objective information that can be used to assess financial risk.

Disclosure of confidential business information

Competitive considerations and uncertainties about long-term, forward-looking information limit the detail that companies can share about their costs, strategies, and scenario assumptions. Disclosing some of the suggested metrics would be competitively damaging and harm existing shareholders.

Recommendation. Companies should not be asked to disclose what they view as competitively sensitive information that could damage existing shareholder value.

Inappropriate scope

Some of the recommended disclosures extend beyond what could be used for investment decision making into the realm of climate policy. Designing and implementing climate policy is the role of government agencies with the requisite mandates and expertise, not financial regulators.

Recommendation. Financial disclosure should not be used to drive policy goals that are beyond the remit of financial regulators. Climate policy should be designed and implemented by government agencies with the requisite mandates and expertise.

Lack of agreement on defining carbon-related assets and measures of risk

The FSB's charge is to assess systemic risk and improve the accuracy of asset and risk valuation. It is premature and incomplete to propose a definition of "carbon-related assets" that excludes many carbon-intensive sectors such as transport, agriculture, and materials and buildings.

Recommendation. Since the Task Force believes that "further work is needed on defining [carbon-related assets] and their potential financial impacts," it should not limit which sectors banks consider to be "carbon-related" for the purpose of reporting credit exposure.

II. The Financial Stability Board’s Task Force and climate-related financial risk

The FSB is an international body that “promotes global financial stability by coordinating the development of regulatory, supervisory and other financial sector policies.”⁴ In April 2015, a meeting of G20 finance ministers and central bank governors asked the FSB “to convene public- and private-sector participants to review how the financial sector can take account of climate-related issues.”⁵ The FSB responded at the time of the Paris Agreement by establishing a Task Force to “develop voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to lenders, insurers, investors and other stakeholders” (see the box “The Paris Agreement”).⁶

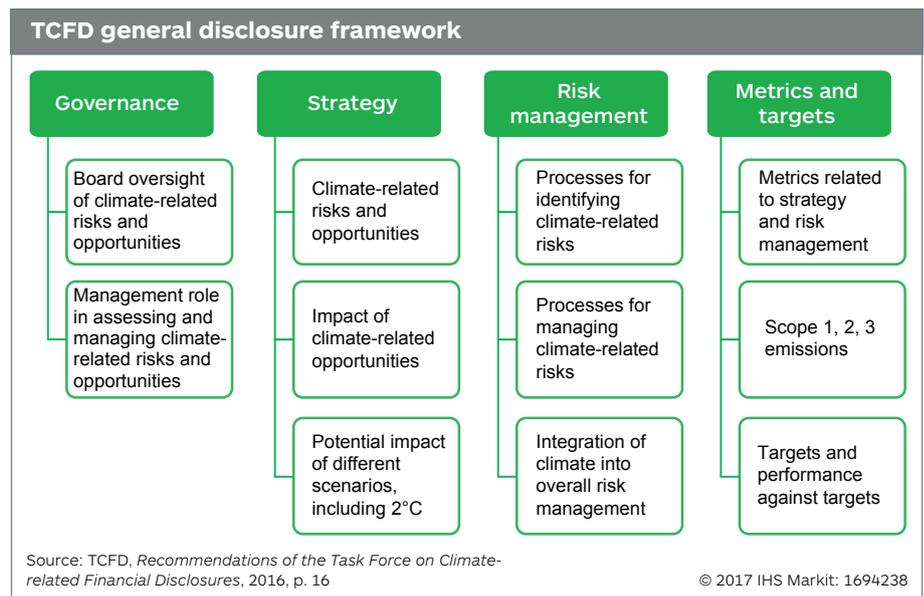
In its Phase I and draft recommendations reports, the Task Force summarized its remit as to develop recommendations for more efficient and effective climate-related disclosures that could promote more informed investment, credit, and insurance underwriting decisions that would, in turn, enable stakeholders to better understand the concentrations of carbon-related assets in the financial sector and the financial system’s exposures to climate-related risks.⁷

Other more ambitious and expansive goals have been suggested for the Task Force’s work, including reallocating capital to speed the transition to a low-carbon economy (see the box “Climate-related risk, financial stability, and other goals”).

The Task Force published its draft recommendations in December 2016. The draft recommends that

all financial and nonfinancial organizations with public debt or equity include disclosures on climate-related financial risk “in their mainstream (i.e., public) financial filings.”⁸ It proposes a standard framework for these disclosures that covers four thematic areas: governance, strategy, risk management, and metrics and targets (see Figure 1).⁹ A supplementary document, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures* offers more detailed guidance for the financial sector and industries, including energy, with the most potential to be affected by climate-related risk.¹⁰ A summary

Figure 1



4. FSB member institutions include national central banks, finance ministries, and financial regulation authorities, as well as international standard-setting bodies such as the Basel Committee on Banking Supervision or the International Accounting Standards Board.

5. Communiqué, 17 April 2015, <http://www.g20.utoronto.ca/2015/150417-finance.html>, retrieved 6 April 2017.

6. “FSB to establish Task Force on Climate-related Financial Disclosures,” FSB press release, 4 December 2015.

7. TCFD, *Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, p. 3., retrieved 11 April 2017.

8. *Ibid.*, p. 14.

9. *Ibid.*, p. 15.

10. TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, retrieved 11 April 2017.

of the specific recommendations as they relate to the energy sector and oil and gas companies is provided in the Appendix.

IHS Markit submitted commentary on the TCFD draft recommendations during the public comment period that ended in February 2017. The Task Force is currently finalizing its report, which the FSB is expected to present to the G20 summit of heads of government and representatives of international organizations in Hamburg, Germany, in July 2017.

Climate-related risk, financial stability, and other goals

The FSB established the Task Force at a time when several financial bodies around the world were being asked to investigate the potential implications of climate-related risks for the financial system.^a Such questioning has extended beyond the objective goal of seeking accurate information to the notion that financial regulations based on sustainability and materiality concerns could be used to redirect capital toward low-carbon opportunities by raising the cost of capital to the fossil fuel industry.^b In 2014, UNEP established the Inquiry into the Design of a Sustainable Financial System “to advance policy options to improve the financial system’s effectiveness in mobilizing capital towards a green and inclusive economy.” The Inquiry describes “an emerging toolbox of measures that can support capital reallocation, better risk pricing and market governance” and cites the FSB Task Force as an example of increasing momentum.^c

The Task Force calls its recommendations the first step in an evolving process, and some language in its reports points to ambitions that are broader than merely promoting voluntary disclosures.

- The Task Force quotes the FSB as noting that disclosures would foster an early assessment of climate-related risks, facilitate market discipline, and provide a source of data that can be analyzed at a systemic level to facilitate authorities’ assessments of the materiality of any risks posed by climate change to the financial sector and the channels through which this is most likely to be transmitted.^d
- The Task Force’s five-year illustrative implementation path leads to “Broad understanding of the concentration of carbon-related assets in the financial system and the financial system’s exposure to climate-related risks.”^e
- The chairman’s cover letter to the draft recommendations states, “Widespread adoption of the recommendations...will...speed the transition to a low-carbon economy.”^f
- FSB chair Mark Carney, in his speech proposing creation of the Task Force, says that “A ‘market’ in the transition to a 2 degree world can be built. It has the potential to pull forward adjustment [to a low-carbon economy] – but only if information is available...”^g

^aFor instance, the General Board of the European Systemic Risk Board discussed “possible systemic risks arising from the transition to a low-carbon economy under adverse conditions” and noted that “the disclosure of the carbon-intensity of non-financial firms and of other pieces of information useful for the assessment of climate risks should be enhanced.” The Swedish government asked its financial supervisory authority to examine “how environmental and climate change may affect financial stability in the long run, and which measures may be needed to dampen the negative effects on the financial system.”

^bSee, for instance, UNEP, *The Financial System We Need*, 2015 and 2016; 2 Degrees Investing Initiative, *Shifting Private Capital Towards Climate-Friendly Investments: The Role of Financial Regulatory Regimes*, 2013; Jeffrey D. Sachs and Lisa Sachs, “[The Responsible Investor’s Guide to Climate Change](#),” Project Syndicate, retrieved 8 April 2017.

^cUNEP, *The Financial System We Need*, 2015 and 2016.

^dTCFD, *Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, p. 3., retrieved 11 April 2017.

^eIbid., p. 42.

^fIbid., p. i.

^gMark Carney, “[Breaking the tragedy of the horizon - climate change and financial stability](#),” speech given at Lloyd’s, London, 29 September 2015, retrieved 11 April 2017.

The next section of this report reviews specific elements of the TCFD recommendations that risk misleading rather than informing financial markets. Given the context in which the Task Force was formed, any analysis must consider the effects they would have if applied more expansively and rigidly than in the voluntary and flexible fashion described in the December 2016 report. In section IV we provide context on oil and gas company risk management and strategy. In section V we discuss oil and gas company valuation and climate-related risk, including our analysis of the flawed concept of the “carbon bubble.” Our conclusions and recommendations follow in section VI.

The Paris Agreement

In December 2015, 194 countries signed the Paris Agreement, marking an unparalleled level of international commitment to address climate change. The overarching goal of the agreement is to “strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.”^a This goal aligns with conclusions reached by the Intergovernmental Panel on Climate Change (IPCC) that limiting atmospheric greenhouse gas (GHG) concentration levels to 450 parts per million carbon dioxide equivalent (CO₂e) by 2100 is consistent with at least a 50% chance of limiting the average global temperature rise to 2°C above preindustrial levels and will significantly reduce the risks and impacts of climate change, such as rising sea levels and severe weather events.^b In October 2016, the agreement entered into force following ratification by the required threshold of signatories.

^ahttp://unfccc.int/paris_agreement/items/9485.php, retrieved 5 April 2017.

^bIPCC, 2014: *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II, and III to the *Fifth Assessment Report* of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland. The IPCC was established by the World Meteorological Organization and United Nations Environment Programme (UNEP) in 1988 to assess the scientific basis of climate change and provide policymakers with assessments on its impacts and future risks as well as adaptation and mitigation options.

III. IHS Markit analysis

Some elements of the TCFD framework, such as climate-related governance, strategy, and risk management, can help investors understand how companies comprehend and manage potential risks relating to climate change.

But the recommendations for standard disclosures of climate-related financial risks in financial filings and the TCFD focus on metrics and scenarios could undermine the FSB's goal of improving capital allocation decisions and market functioning. Adopting them would obscure material information and create a false sense of certainty around the financial implications of long-term scenario exercises. This, as well as disclosure of metrics not correlated to financial risk, could lead investors to misunderstand opportunities and risks, misprice assets, and forgo future returns.

This section analyzes specific practical and conceptual issues arising from the TCFD draft recommendations.

Departure from established concept of materiality

The Task Force “cautions organizations against prematurely concluding that climate-related risks and opportunities are not material based on perceptions of the longer-term nature of some climate-related risks.”¹¹ It continues, “climate-related risks are material risks for many organizations, and this framework should be useful to organizations in complying more effectively with existing disclosure obligations.”¹² The draft report recommends that all organizations with public debt or equity include climate-related disclosures in their public financial filings.

This is a radical departure from the established concept of materiality, which requires company boards and management to make their own determination of what is material. Asking companies to disclose climate-related risks using a standard global framework as part of their financial filings is inconsistent with this concept (see the box “Disclosure in public financial filings”).

Companies have unique combinations of assets, activities, opportunities, and risks and operate in different jurisdictions. Company boards and management weigh their knowledge of the company and decide what information is sufficiently material to be shared in public financial filings. Regulators and legal advisors resist overdisclosure that obscures important information and excessively broad risk disclosures that aim to create a safe harbor for every eventuality.

The TCFD recommendation in effect “promotes” a standard list of climate-related topics to materiality status and alters the well-established principle of materiality. This undermines the goal of enabling better-informed decisions.

If distinct principles and frameworks are created for climate-related information, climate-related financial risk cannot be assessed consistently with other information that is provided based on standard materiality principles. This could result in such unintended consequences as

- Downgrading in the minds of investors other risks that may be comparable in importance but are not subject to specific disclosure frameworks. For instance, changes in future commodity prices will have a significant impact on company value, yet there is no special framework for disclosing future commodity prices and their implications.
- Creating an illusion of certainty and predictability about uncertain information and hypothetical modeled scenarios. This could lead reasonable investors to misprice assets and make suboptimal decisions.

11. TCFD, *Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, p. 35., retrieved 11 April 2017.

12. *Ibid.*, p. iii.

Many other channels exist for companies to report climate-related information that does not meet the established principles of materiality. Those channels include strategy presentations, sustainability reports, and independent reporting programs. See the box “Many climate-related reporting programs” for more information about other reporting programs.

Disclosure in public financial filings

Public financial markets and regulators require participants with traded equity or debt to disclose all material information that is relevant to their business. Companies are also required to discuss the risks associated with their businesses to warn investors and potential investors of issues that could affect the company’s future performance.

The OECD defines material information as information that a reasonable investor would consider important in making an investment or voting decision—or, put another way, information whose omission or misstatement could damage economic decisions taken by users of information.^a Different regulatory bodies across the world have their own definitions of materiality but share the concept that materiality is not strictly defined and is the responsibility of disclosing parties to interpret.

The US Securities and Exchange Commission (SEC) warns of the danger of overdisclosure: “There is also a possibility that high levels of immaterial disclosure can obscure important information.”^b The US Supreme Court found that “Some information is of such dubious significance that insistence on its disclosure may accomplish more harm than good” and, if the standard for materiality were lowered, “not only may the corporation and its management be subjected to liability for insignificant omissions or misstatements, but also management’s fear of exposing itself to substantial liability may cause it to bury the shareholders in an avalanche of trivial information – a result that is hardly conducive to informed decision-making.”^c

^aOECD, *G20/OECD Principles of Corporate Governance*, OECD Publishing, Paris, 2015, p. 37, retrieved 10 February 2017.

^bSEC, “*Business and Financial Disclosure Required by Regulations S-K*,” 2016, retrieved 11 April 2017.

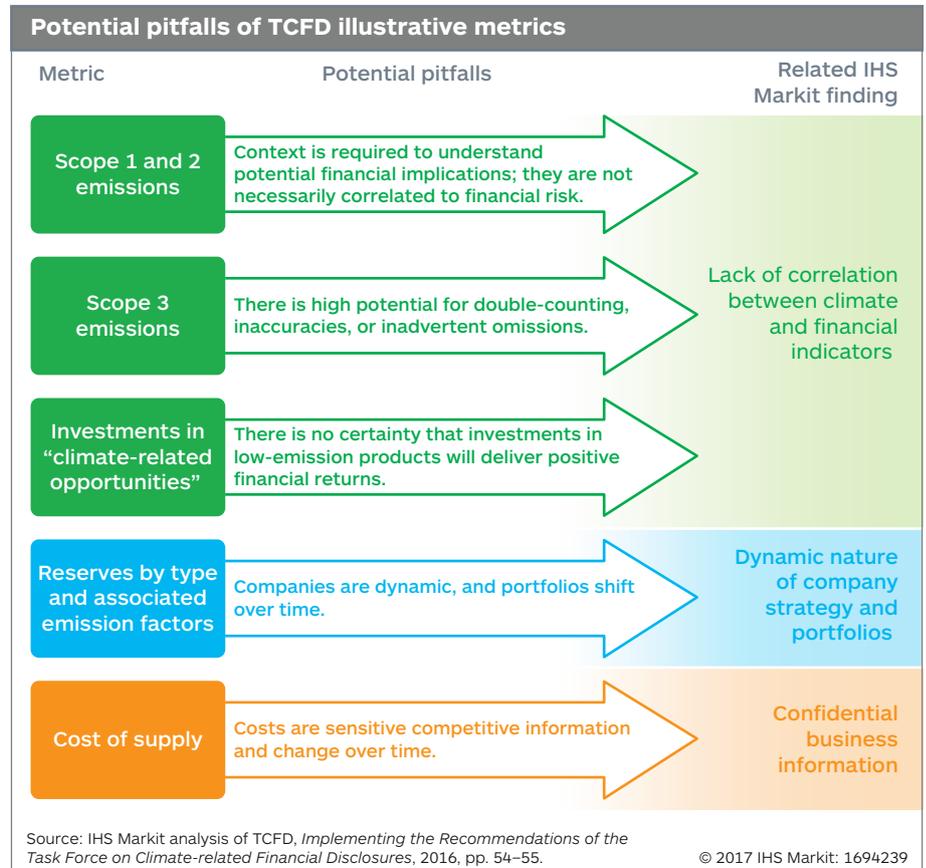
^cUS Supreme Court, *TSC Industries, Inc. v. Northway Inc.*, 1976.

Metrics that are not correlated with financial risk and opportunity

At the launch of the TCFD recommendations, Mark Carney, chair of the FSB and governor of the Bank of England, said, “The expectation is that qualitative and narrative disclosures will be complemented with quantitative ones as is the case for other disclosures made in financial statements.”¹³

The specific metrics in the TCFD draft recommendations vary in their correlation with climate-related financial risk. Climate-related factors are more complex and multidimensional than typical financial drivers like commodity prices, making their financial implications less amenable to quantitative analysis. The illustrative metrics provided by the Task Force may be informative to some stakeholders, but there is no evidence that they can be used to determine climate-related financial risk. Furthermore, contextual understanding is required to make them meaningful and comparable. Figure 2 shows some potential pitfalls of the TCFD illustrative metrics as related to the oil and gas sector.

Figure 2



Many climate-related reporting programs

Investors should use whatever targets, metrics, and screens they choose in building their portfolios. Some investors have taken decisions to “decarbonize” their portfolios or apply screens based on climate-related factors. Many companies choose to assist them by providing supplemental information through independent reporting programs. The FSB estimates that there are already almost 400 reporting programs relating to climate or sustainability.^a Oil and gas companies participate in and work with many of these programs, including CDP (formerly the Carbon Disclosure Project) and the Global Reporting Initiative (GRI). In the area of climate, these programs tend to focus on gathering metrics on carbon footprints, qualitative reporting of company actions to limit carbon emissions, and descriptions of how companies address climate issues in strategy, planning, and management.

^aFSB, “Proposal for a disclosure task force on climate-related risks,” 2015, p. 2.

13. Mark Carney, “Remarks on the launch of the *Recommendations of the Task Force on Climate-related Financial Disclosures*,” speech delivered at the Tate Modern, 14 December 2016.

Emissions disclosures

The Task Force recommends within its general framework that companies in all sectors disclose Scope 1, 2, and 3 GHG emissions as defined by the Greenhouse Gas Protocol.¹⁴

Emissions are better defined than some metrics, and many companies already report them. But the BlackRock Investment Institute warns, “Carbon footprinting for now is as much an art as a science. We should expect it to evolve.”¹⁵ Moreover, emissions do not correlate with climate-related financial risk in a straightforward manner. The TCFD rationale states that Scope 3 emissions from the combustion of a company’s products inform “vulnerability to a significant decrease in future earning capacity.”¹⁶

In fact, the link between Scope 3 emissions and future earning capacity will depend on the countries and sectors where the company’s products are used, the pace of adoption of climate-related policies in those countries and sectors, the deployment of carbon mitigation technologies, and other factors.

Operational emissions (i.e., Scope 1 emissions) can be understood only in context. A company’s emissions might be declining owing to improved emission management, portfolio shifts, changes in the degree of vertical integration, declining production, or other factors. A business change such as declining production could have a greater financial impact than climate-related risk factors. Metrics taken out of context do not allow proper comparisons and could lead to inefficient investor choices.

One TCFD goal was to enable stakeholders to understand concentrations of carbon-related assets in the financial sector. But the Task Force does not explain how financial entities with portfolios that combine many different companies and sectors can consolidate Scope 1, 2, and 3 emissions from those entities. One company’s Scope 1 emissions may be another company’s Scope 3 emissions, as when an airline purchases fuel from a refiner. For a portfolio containing investments in both the airline and the refiner, there is no systematic methodology to calculate GHG emissions that guards against double-counting, inadvertent omissions, or inaccuracies.

While this field is still evolving, financial players and regulators should encourage research, experimentation, consultation, analysis, and testing before rushing to disclose and use metrics. Hasty adoption of ill-defined metrics could result in the mispricing of risk and misallocation of capital that the FSB seeks to avoid.

Climate-related opportunities

The Task Force encourages the disclosure of “climate-related opportunities” in terms that imply that all such opportunities will generate positive financial outcomes. In this vein, the Task Force suggests that oil and gas companies disclose metrics for “investments in low-carbon alternatives.”¹⁷ In fact, transitions can create pain and risk for new entrants and new technologies, many of which fail. As the BlackRock Investment Institute has written, “Not all incumbents will be losers, and not all renewables will be winners ... Many ... new players are too speculative to be investable yet or need a catalyst such as carbon pricing.”¹⁸

An investment strategy focused on financial returns must consider the balance of return and risk for clean energy and other “climate-related opportunities,” just as for investments in oil and gas. Using “climate-related opportunities” such as “low-emission products” as a financial risk metric could lead reasonable investors to misprice assets.

14. According to the Greenhouse Gas Protocol, “Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.”

15. BlackRock Investment Institute, *The Price of Climate Change: Global Warming’s Impact on Portfolios*, October 2015, p. 9, retrieved 11 April 2017.

16. TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, retrieved 11 April 2017, p. 54.

17. TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, p. 54, retrieved 11 April 2017.

18. BlackRock Investment Institute, *Adapting portfolios to climate change: Implications and strategies for all investors*, 2016, p. 6., retrieved 11 April 2017.

Misuse of scenarios

The Task Force recommends the use of scenario analysis to assess the financial implications of a lower-carbon future and provides a technical supplement called *The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities*. IHS Markit disagrees that “quantitative scenario analysis can assess a range of potential financial or other measurable impacts” for products, markets, or companies.¹⁹

IHS Markit develops and applies scenarios, and it endorses the use of scenarios to challenge conventional thinking and test the robustness of company strategies in an uncertain world. Scenario analysis logically and consistently explores the implications of current and potential new trends. By requiring imaginative thinking about the future and incorporating key uncertainties, scenario analysis guards against groupthink and concentration on a single projected outcome (see the box “Uncertain transition pathway”). However, it does not—and is not intended to—serve as a forecast or generate financial projections.

Disclosures based on scenario analysis could mislead investors in several ways:

- Scenarios are not forecasts of what is expected to occur at a company level. Long-term scenarios are used at a point in time to examine alternate futures against which to test strategies. The scenarios themselves do not reflect a company’s strategic responses, which will evolve over time (see section IV, “Oil and gas company risk management and strategy”).
- Any financial implications companies disclose based on scenario analysis will be contingent upon a large number of assumptions about markets, technologies, prices, costs, and even the performance of assets and technologies that are not yet in their portfolios.
- Scenarios from different companies will use different assumptions and will vary depending on focus, approach, and internal and external resources. The disclosed financial implications from scenarios created under different conditions cannot provide comparable information for pricing financial assets and risks.
- Some companies may have cost or technology advantages in a carbon-constrained world that they prefer to keep confidential. Others might disclose optimistic financial implications that are largely theoretical but could wrongly be viewed as demonstrating more limited exposure to climate-related financial risks.
- Entities that discuss future challenges associated with climate change could be seen as more at risk, whether merited or not.

Including financial implications of long-term scenario analysis in public financial filings could mislead investors about the certainty of those outcomes. This could result in inaccurately priced investments and foregone future returns, which would distort markets, not enhance them.

19. TCFD, *Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, p. 27., retrieved 11 April 2017.

Uncertain transition pathway

While the Paris Agreement represents global consensus to take action on climate change, multiple uncertainties surround the long-term transition to a lower-carbon economy. Therefore, its financial implications for companies, the energy sector, and the financial system are also uncertain. Many factors contribute to the uncertainty:

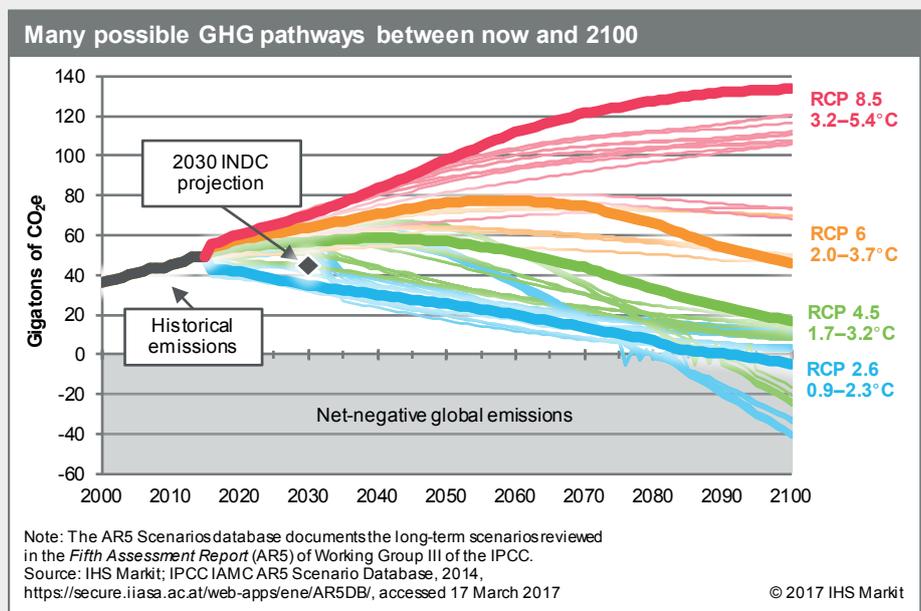
- The burden of reducing emissions has not been allocated across countries, sectors, or firms.
- The agreement is based on an incremental process in which countries reassess their policies and targets every five years.
- There are myriad possible pathways to reach the “well below 2°C” goal.
- The relationship between GHG emissions and fossil fuel consumption will depend on the deployment of carbon capture.

In place of binding, long-term, national targets, the Paris Agreement employs a bottom-up, incremental approach. In advance of signing the agreement, countries pledged intended nationally determined contributions (INDCs) toward mitigating and adapting to climate change. Currently, the sum of INDCs is estimated to fall substantially short of the reductions needed for a 2°C pathway. Going forward, countries will regularly report progress toward meeting their pledges and are expected to ratchet their ambition over time so that, as a group, they eventually reach the global goal.

The timing and details of these evolving pledges will determine how climate-related risks manifest themselves. For instance, if countries take stronger policy actions to achieve earlier reductions in GHG emissions, companies could face higher policy risk but lower physical risks. If policy actions are delayed, transition effects would unfold more slowly, but physical risks could be greater. The impact on companies will also depend on which sectors are targeted by policies that different jurisdictions adopt to achieve their national pledges. For instance, one country might limit policies to the electricity sector, while another might focus on transport.

When the IPCC reviewed more than 1,000 modeled climate scenarios from academic and nongovernmental organization sources, it found that 116 of them were consistent with a less than 2°C pathway (see Figure 3, which shows about 10% of those pathways and four Representative Concentration Pathways selected by the IPCC).

Figure 3



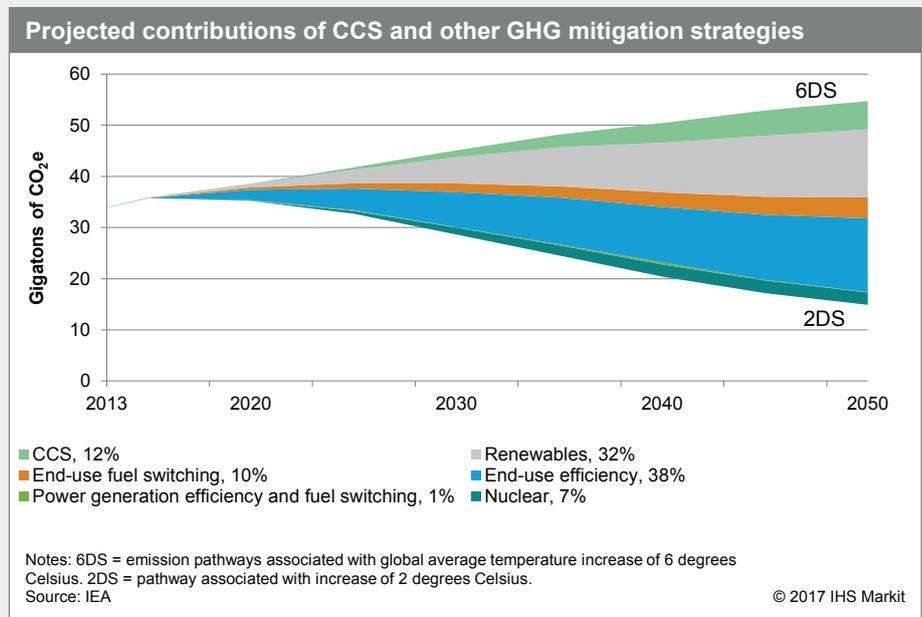
Uncertain transition pathway (continued)

Each of the scenarios makes different assumptions about technologies, policies, and socioeconomic factors, which in turn would have different implications for energy demand and prices.^a

The IPCC found that many models could not achieve the less than 2°C goal without the use of carbon capture and storage (CCS), bioenergy, or a combination of these.^b Such scenarios often used “negative emissions” in the second half of the century to offset emissions that exceeded the cumulative emission target in the first half of the century. These negative emissions are produced by a combination of bioenergy (which is assumed to be carbon-neutral) and CCS, which removes carbon from the atmosphere.

In the International Energy Agency (IEA) Energy Technology Perspectives 2°C Scenario, carbon capture delivers approximately 12% of cumulative emission reductions needed through 2050. Figure 4 shows how different mitigation strategies, including CCS, contribute to reducing GHG in that scenario through 2050.^c The extent to which fossil fuels can be consumed in any transition pathway will depend on deployment levels for CCS.

Figure 4



^aIPCC, 2014: *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II, and III to the *Fifth Assessment Report* of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland.

^bIbid., p. 24.

^cIEA, *20 Years of Carbon Capture and Storage: Accelerating Future Deployment*, 2016, p. 52., retrieved 11 April 2017.

Disclosure of confidential business information

A company shares its thinking about evolving trends and strategic responses to communicate its value proposition to investors. Discussing the implications of climate change is part of this process. But these discussions must avoid the disclosure of competitive information.

For instance, a company might usefully communicate in general terms that it is responding to risks associated with a low-carbon energy transition by focusing on short-lived projects, developing gas assets that will benefit from faster demand growth, minimizing costs to keep its portfolio competitive, and investing selectively in lower-carbon technologies in which it believes it can sustain a competitive advantage. But detailed disclosure of operating parameters and portfolio plans would damage its strategic prospects and harm the interests of existing shareholders.

The illustrative metrics that the Task Force provides for oil and gas companies include “Indicative costs of supply for current and committed future projects.”²⁰ Disclosure of this information could be counterproductive in several ways:

- Information about future project plans would reveal development priorities and impair leverage with host governments, project partners, and service sector companies.
- Cost information soon becomes inaccurate as the relative costs of developing different oil and gas resources shift in response to market and technology changes. For instance, at CERAWEEK 2017 by IHS Markit, a Statoil executive stated that the company had reduced its average break-even price for sanctioned projects from US\$70/bbl in 2015 to US\$27/bbl in 2017. Over a similar period, IHS Markit estimates that the average oil price at which new onshore wells in the United States break even has been reduced from US\$75/bbl to US\$43/bbl.²¹
- Given the complex ownership and contractual structures of oil and gas company portfolios, reasonable investors would not be able to translate project-level costs into an assessment of climate-related financial risk in a company’s entire portfolio.
- Companies seeking to protect competitively sensitive information may provide wide ranges that cannot be converted into decision-useful information.
- Companies could face litigation if future costs do not align with disclosed projected costs.

The Task Force has also recommended that companies disclose their underlying assumptions associated with climate-related scenario analysis. The assumptions embedded in internally developed scenarios comprise sensitive information, including proprietary thinking about markets, technologies, strengths and weaknesses, strategic drivers, key uncertainties, threats, opportunities, and competitive tactics. For instance, details of a company’s 2°C scenario could indirectly reveal information about relative costs of supply. Disclosure of this kind of information can be more useful to competitors and customers than to investors.

To use an example from another business sector, one presumes that Apple Inc.’s product portfolio will be substantially different 15 years from now and that there are technology-related financial risks associated with the company’s business. But the company’s annual report merely states, “Global markets for the Company’s products and services are highly competitive and subject to rapid technological change” and “The Company’s ability to compete successfully depends heavily on its ability to ensure a continuing and timely introduction of innovative new products and technologies to the marketplace.”²² Apple does not disclose details about its research and development (R&D) focus, costs, or the life cycles of its products. Even if it did, it is not clear how investors would convert this kind of granular detail into an assessment of technology-related financial risk at the company level. Similarly, oil and gas companies should not be asked to disclose competitive information such as costs of supply, capital payback periods, R&D spending on low-carbon alternatives, and scenario assumptions.

Inappropriate scope

The role of financial regulators is to ensure that companies share complete, accurate, and material information so investors can make well-informed decisions and to avoid asymmetry among the information available to different investors.

20. TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, p. 52, retrieved 20 April 2017.

21. The price includes a 10% return on capital.

22. Apple Inc., *Annual Report*, 2016, retrieved 6 April 2017.

Setting climate policy in line with the ambitions of the Paris Agreement is a different charge. In each jurisdiction, government entities with the necessary mandate, authority, and expertise will set climate policies and rules that are relevant to the local realities of economic growth, energy needs, and financial capacity. The results will be specific to national or regional conditions, rather than following a single formulation across national boundaries. Such policymaking should be done by authorities that have the mandate and expertise, not through the financial regulatory system.

Some TCFD draft recommendations extend into the realm of climate policy. It is unlikely that investors and lenders can translate such climate-related disclosures into clear and reliable information to guide investment decisions.

Lack of agreement on defining carbon-related assets and measures of risk

Part of the Task Force's remit from the FSB was to enable understanding of the concentration of "carbon-related assets" in the financial sector. Carbon-related assets are the element in financial institutions' portfolios considered to have the most exposure to climate-related risk. However, the Task Force was unable to define "carbon-related assets" and concluded, "further work is needed on defining carbon-related assets and their potential financial impacts."²³ See the box "Role of the energy sector in a lower-carbon future" for more information about energy transition.

Despite this lack of definition, the Task Force suggests that for the purpose of disclosing concentrations of credit exposure, banks define carbon-related assets as those tied to the energy sector and utilities except for renewable and independent power producers and water utilities.²⁴ It is arbitrary and incomplete to attribute elevated climate-related credit risk only to the energy sector and a subset of utilities while ignoring the carbon dependence of sectors such as transport, agriculture, and materials and buildings that have also been identified by the Task Force as having the most potential to be affected by climate-related risk. For the purpose of reporting bank credit exposure, it is premature for the Task Force to limit the sectors that are considered "carbon related."

23. TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 2016, p. 20, footnote 8, retrieved 11 April 2017.

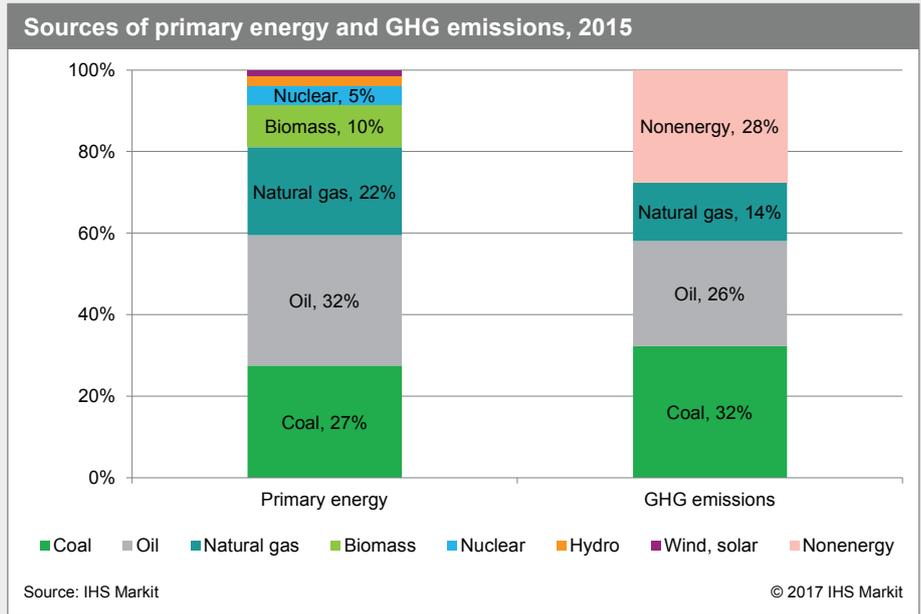
24. The text reads, "Recognizing that the term carbon-related assets is not well defined, the Task Force encourages banks to use a consistent definition to support comparability. For purposes of disclosing information on significant concentrations of credit exposure to carbon-related assets under this framework, the Task Force suggests banks define carbon-related assets as those assets tied to the energy and utilities sectors under the Global Industry Classification Standard, excluding water utilities and independent power and renewable electricity producer industries. The Task Force believes further work is needed on defining carbon-related assets and their potential financial impacts." TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 2016.

Role of the energy sector in a lower-carbon future

The energy sector will play a key role in the transition to a lower-carbon economy. Today, oil, gas, and coal supply 81% of our global energy needs. Combustion of these fuels produced 72% of global GHG emissions. The remaining 28% originate primarily from forestry, agriculture, and industrial processes (see Figure 5).^a

The Paris Agreement acknowledges the need to ensure access to affordable, reliable, sustainable energy. OECD economies are close to achieving zero or negative energy growth as declines in energy intensity offset the effects of economic and population growth. But emerging economies are projected to have growing energy needs as they raise their per capita living standards. Between 1990 and 2015, energy use in non-OECD economies doubled, and those economies were responsible for 84% of the total growth in global energy demand. These countries will account for an even larger share of energy growth in future.

Figure 5



The transformation of the energy sector toward a lower-carbon economy is under way. Wind and solar power generation are becoming cheaper and gaining market share. But they cannot currently substitute for fossil fuels in all uses because they are intermittent and many activities are not fueled by electricity. A complete energy transition requires changing not only the sources of supply but also replacing energy-using equipment, technology, and infrastructure in every sector of the economy. During this transition, oil and gas will continue to supply much of the world’s reliable energy and raw materials.

To illustrate the extended term of the energy transition, consider how the growth of wind and solar power is unfolding. These technologies have made impressive technology and cost improvements in recent years. In 2015, a record 38% of new power generation additions globally were wind and solar. In that year, wind and solar made up 12% of total *installed* power generation capacity, delivered 7% of the world’s electric power supply, and accounted for 1.4% of global primary energy.^b

^aIHS Markit Global Energy Scenarios 2015 data.

^bIHS Markit Global Energy Scenarios 2015 data.

IV. Oil and gas company risk management and strategy

Oil and gas exploration and production is a high-risk, capital-intensive business with global scale. The oil and gas industry is experienced in managing many interconnected risks and dynamically evolving strategies to deliver shareholder returns over time.

Risk management

In addition to the usual business risks, some examples of risks that oil and gas companies manage are

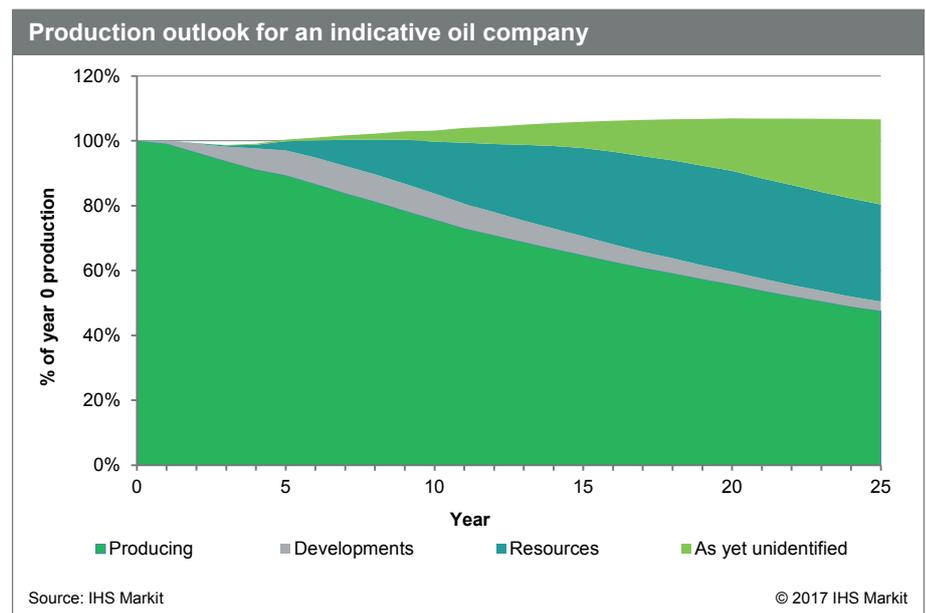
- **Depletion risks.** Oil and gas resources become depleting assets as soon as they go into production. Companies must continually find and develop new resources to offset natural declines.
- **Geological risks.** It is impossible to fully predict the behavior of hydrocarbon formations several miles below the surface of the earth, and there is a high rate of exploration failure.
- **Geopolitical and security risks.** Production may be interrupted, assets can be expropriated, host governments may change contractual terms for sharing revenues, and new laws and regulations can raise costs.
- **Commodity price risks.** Prices can change substantially in response to under- or oversupply. For example, the average Brent spot crude oil price in 2016 was 60% lower than in 2013 (US\$44/bbl versus US\$109/bbl).
- **Technology risks.** Companies must continually develop and apply new and more sophisticated technologies to tackle new challenges. New technologies have allowed companies to produce from offshore fields in deep water, extract oil and gas from shales, and recover additional resources from mature basins.
- **Climate-related risks.** Some oil and gas companies are shifting portfolios toward gas, investing in renewables, and increasing R&D for new technologies such as biofuels, batteries, and carbon capture.

Dynamic strategy in a world of change

Unlike companies in most industries, oil and gas companies know that each year their existing assets will produce less than they did in the prior year. Just to maintain production they must constantly replenish their portfolios and develop new resources. Figure 6 shows how within 15 years an indicative oil company has the opportunity to make new investment decisions to replace approximately one-third of its production. For certain asset types, such as tight oil, the decline rates, asset turnover, and reinvestment cycles are considerably faster.

Oil and gas companies therefore cannot be viewed as static entities with fixed portfolios that face a brand new type of challenge with

Figure 6



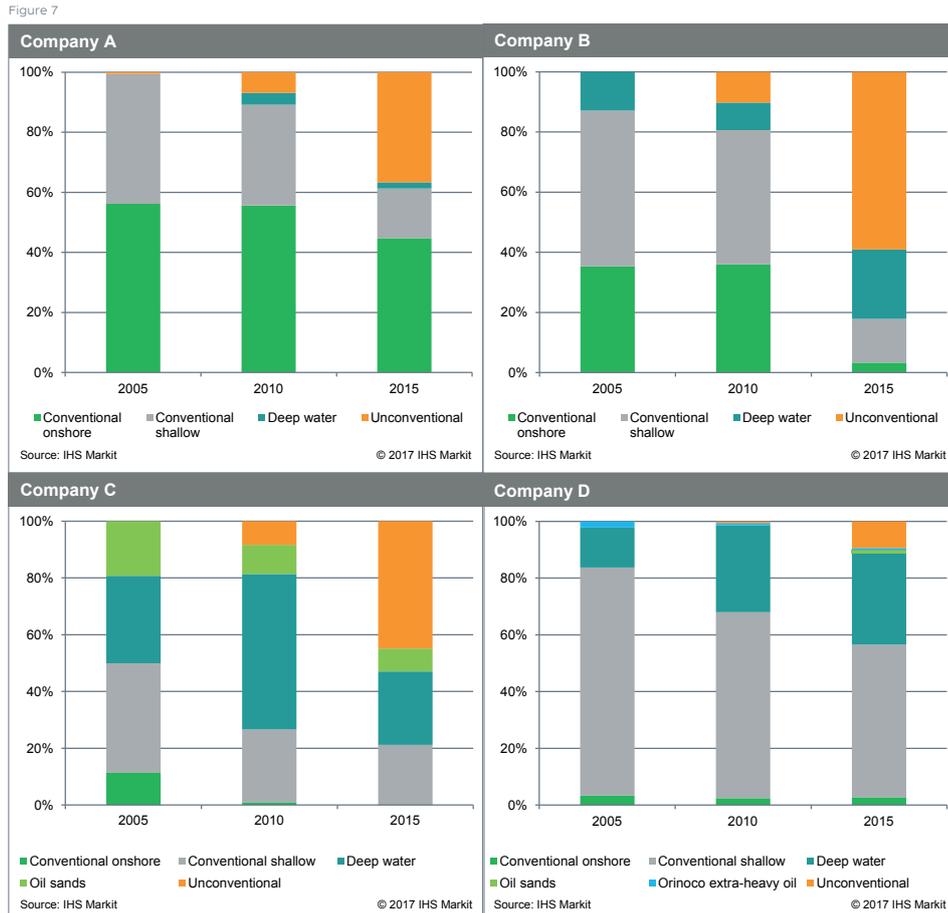
respect to climate-related risks. They are highly dynamic entities that manage climate-related trends and impacts along with many others.

The planning cycles of oil and gas companies and their asset lives are generally shorter than the extended gestation period for the global energy transition. This allows them to forecast and adapt to the changes that accompany the transition to a lower-carbon energy system in the context of their strategy and portfolio management processes.

To illustrate how oil and gas company strategies and portfolios respond to unexpected developments, consider some changes that companies have made:

- In response to opportunities in North American shale gas and tight oil, companies withdrew from international exploration, converted LNG importing terminals into LNG liquefaction plants for export, and shifted the US electric power generation mix away from coal.
- Geopolitical changes led international operators to exit Venezuela, bid for leases in Mexico that were once exclusively reserved for the government-owned oil company, and plan investments in Iran.
- The growth of unconventional resource plays has created opportunities for developments with much shorter cycle times. Companies can rapidly shift capital allocations in response to changes in the operating environment.

Figure 7 shows the production portfolios of four different oil and gas companies in 2005, 2010, and 2015, providing a vivid illustration of how dramatically companies have changed their portfolios in response to new strategic priorities and opportunities.



V. Oil and gas company valuation and climate-related risk

Some environmental groups and academics have claimed that oil and gas companies are in a family of “carbon-related assets” that are overvalued because the market has underpriced (or discounted) climate-related risks. They note that if a “carbon budget” were imposed in keeping with the maximum cumulative level of GHG emissions recommended by scientists to keep global average temperatures from rising more than 2°C, some of the world’s known hydrocarbon resources would become “unburnable.”

To the extent that company valuations are based on unburnable carbon, a “carbon bubble” could lead to devaluations and portfolio losses. Mark Carney, governor of the Bank of England and chairman of the FSB, raised the concern that such abrupt devaluations could destabilize financial markets.²⁵

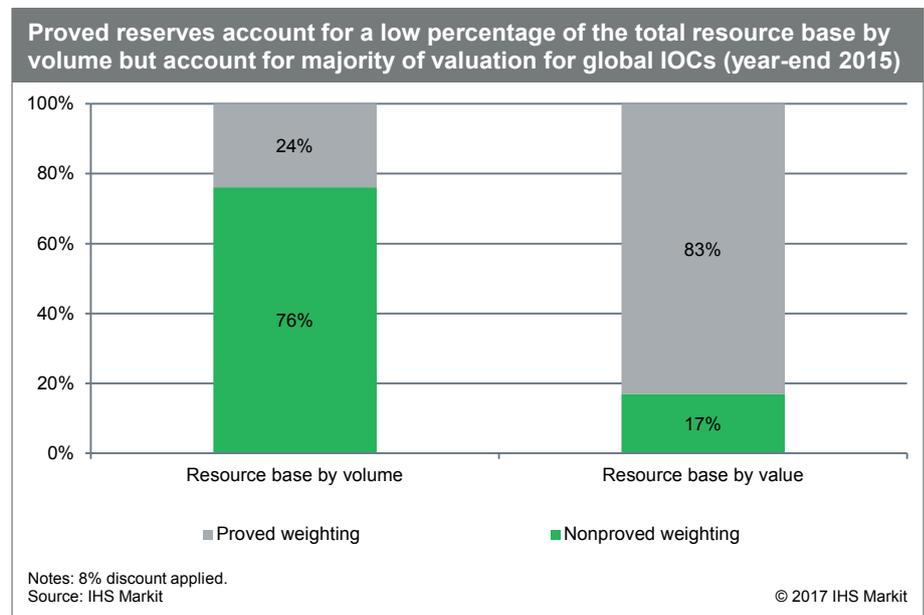
Deflating the carbon bubble

The carbon bubble theory is based on a misunderstanding of how fossil fuel reserves are valued and contribute to the market capitalization of oil and gas companies.²⁶ While companies have a wide discovered resource base, IHS Markit analysis of global integrated oil companies (IOCs) has shown that the main driver of the intrinsic value of their upstream operations is the oil and gas resources that are “proved reserves” according to the strict definition by the SEC. Such proved reserves must be economically viable and either in commercial production or close to production, because the company has committed capital and staff to develop them.²⁷

Proved reserves typically account for about 20% of a company’s oil and gas resource base by volume but 80% by value (see Figure 8). Resources that do not meet this strict definition factor into a company’s valuation to a much more limited degree.

Crucially, proved reserves are monetized over a relatively short-term horizon, usually 10–15 years—a time frame over which companies have visibility of market trends. Even in the unforeseeable event of sweeping regulation enacted at a global scale or discovery of a breakthrough technology, it would take many years for the impacts to transform the entire global system.

Figure 8



25. Mark Carney, “[Breaking the tragedy of the horizon - climate change and financial stability](#),” speech given at Lloyd’s, London, 29 September 2015, retrieved 23 March 2017.

26. See the IHS Markit Special Report [Deflating the “Carbon Bubble”: The reality of oil and gas company valuation](#).

27. The SEC defines proved reserves as resources that geological and engineering data indicate with reasonable certainty can be economically recovered under existing economic conditions, operating conditions, and government regulations. In most circumstances, the company has committed appropriate resources (capital and staff) to develop them, and a final investment decision has been made.

Oil price decline stress test

There is recent evidence of abrupt value declines in the oil and gas sector having only a limited impact on the global financial system. From June 2014 to January 2016, oil prices fell from a high of US\$112/bbl Brent to US\$31/bbl—a decline of nearly 75%—in effect, performing a severe real-life stress test. The oil price shock resulted not from climate-related factors but from an imbalance between global supply and demand and OPEC’s decision to cease attempts to manage the crude oil market.

During this period, oil and gas companies lost 42% of their total market value, or US\$1.4 trillion in market capitalization.²⁸ This sharp loss of value resulted in some insolvencies and stressed portfolios that were heavily weighted to the oil and gas sector but did not significantly impair the global financial system.²⁹

28. See the Comparative Peer Group Analysis *Peer Group Study: IHS Herold-covered companies suffer median market loss of 40% in 2015; share performance continues to favor companies with stronger balance sheets.*

29. See the IHS Markit Strategic Report *Do Investments in Oil and Gas Constitute “Systemic Risk”?*

VI. Conclusions and recommendations

Conclusions for oil and gas companies

IHS Markit considers three elements of the TCFD framework useful for assessing climate-related financial risks and opportunities and their potential impacts:

- **Governance around climate-related risks and opportunities.** Management and the board of directors should establish governance processes to assess and manage risks and opportunities resulting from the long-term global transition toward a lower-carbon energy system (“energy transition”) and the expected physical impacts of climate change.
- **Impact of climate-related issues on businesses, strategy, and financial planning.** Strategic planning processes should address the possible impacts of future energy transition pathways and physical risks relating to climate change along with other trends and uncertainties.
- **Risk management.** Companies should incorporate the identification, assessment, and management of climate-related risks, including both physical and transition risks, into their risk management processes.

To the extent that these processes produce information that meets a materiality threshold, companies should disclose that *material* information in their financial filings.

While companies will use quantitative methods in their planning and risk management processes, most information they disclose about climate-related financial risks and opportunities will be qualitative because

- Long-term scenario outputs and forecasts are uncertain and contingent on a large number of assumptions. Sharing detailed assumptions and implications would create a false sense of certainty and potentially expose companies to litigation.
- Many planning assumptions and scenario inputs are competitively sensitive, and to disclose them would damage the interests of the companies and their shareholders.

Companies should consider communicating supplemental climate-related information that does not meet the established principles of materiality through other channels.³⁰ There are several reasons why this may be desirable:

- To build investor confidence in their companies’ ability to create value and manage risks in an uncertain future
- To demonstrate their competitive advantages in the transition to a lower-carbon future
- To provide context for material climate-related disclosures, or their absence, in financial filings

Conclusions for investors, financial companies, and regulators

Financial regulators, whose primary goal is to assure financial stability, should

- Accept that company-level reporting and disclosures on climate-related issues cannot deliver on some of the more ambitious hopes that have been expressed for the Task Force. These hopes include providing a source of data that can be analyzed at a systemic level to assess the materiality of the risks that climate change might

30. Other channels include strategy presentations, fact books, sustainability reports, investor meetings, industry outlooks, and independent reporting programs.

pose to the financial sector or the channels through which it might be transmitted, and aggregating and analyzing information for financial stability purposes.³¹

- Avoid using financial market regulation to advance other policy goals, such as addressing climate-related externalities or promoting certain categories of investments.

Investors and financial companies should

- Understand how the uncertainties around physical climate impacts, climate policies, and transition pathways preclude the quantification of long-term financial impacts of climate-related risks at the company level.
- Not expect companies to disclose competitively sensitive information, which would damage the interests of existing shareholders.
- Recognize the lack of consensus on metrics and methodologies to translate climate-related risks into financial risks.
- Make their own assessments of the financial implications of climate-related risks based on a combination of company-specific information; public information about trends in the policy, economic, social, and business environment; and their own investment theses and risk appetites.

Recommendations

- *Material* climate-related information should continue to be shared via public financial filings. For climate-related information that does not meet the established principles of materiality, companies should determine what is most appropriate to communicate through other channels, such as strategy presentations, sustainability reports, and independent reporting programs.
- Many of the long-term trends associated with climate-related risks are public information. Investors should make their own assessments of the financial implications based on a combination of company-specific information; trends in the policy, economic, social, and business environment; and their own investment theses and risk appetites.
- Financial regulators and investors should not ask for quantified financial implications of long-term scenario analysis. Such information does not provide substantive, objective information that can be used to assess financial risk.
- Companies should not be asked to disclose what they view as competitively sensitive information that could damage existing shareholder value.
- Financial disclosure should not be used to drive policy goals that are beyond the remit of financial regulators. Climate policy should be designed and implemented by government agencies with the requisite mandates and expertise.
- Since the Task Force believes that “further work is needed on defining [carbon-related assets] and their potential financial impacts,” it should not limit which sectors banks consider to be “carbon-related” for the purpose of reporting credit exposure.

31. Goals relating to systemic risk are stated in the following documents: TCFD, *Recommendations of the Task Force on Climate-related Financial Disclosures*, 2016, p. 3; FSB, Proposal for a disclosure task force on climate-related risks, November 2015, p. 5.

Appendix: TCFD draft supplemental guidance for energy companies

Energy is one of four nonfinancial sectors that the Task Force identified as “more likely to be financially impacted than others due to their material GHG emissions, energy, and/or water dependencies associated with their operations and/or products.”¹

The Task Force states that energy companies face potential financial impacts from both physical risks and transition risks relating to climate, in particular,

- Physical, policy, or technological changes affecting fossil fuel demand, energy production, and usage
- Emission constraints
- Water availability

In December 2016, the Task Force issued a draft consultation report for public comment. The recommendations include guidance for all sectors and supplemental guidance for specific sectors. The draft supplemental guidance for energy companies reproduced below is from the December 2016 consultation report. The TCFD is in the process of considering the comments received on the consultation report, including those received from IHS Markit, and is amending the draft report where appropriate. Areas of the draft energy guidance that are under review by the TCFD are noted below.

Supplemental guidance, from December 2016 consultation draft^a

Governance

Energy Group organizations should consider describing whether and how performance metrics for board and management, including links to remuneration policies, take into consideration climate-related risks and opportunities.

Strategy *[general]*

[Note: This portion of the guidance is under review by the Task Force and may change.]

Energy Group organizations should consider discussing how climate-related risks and opportunities are integrated into their strategy formulation and decision making as well as the key planning assumptions around:

Income Statement

- **Revenues** — Energy Group organizations should consider providing carbon-pricing assumptions, including any internal carbon price applied, and how it is determined, and an assessment of the potential impacts on future operational revenues.
- **Expenditures** — Energy Group organizations should consider describing the potential impacts of climate-related risks and opportunities on cost of supply and strategy for managing these impacts relative to market demand and competition. This may include discussions of research and development (R&D) expenditures, adoption of new technology, and costs of key inputs.

^aIHS Markit has been granted permission from the TCFD to reproduce the following excerpts of the draft guidance. Text additions from IHS Markit are italicized.

1. TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, p. 44.

Supplemental guidance, from December 2016 consultation draft (continued)

Balance Sheet

- **Assets/Liabilities** — Energy Group organizations should focus on existing and committed future activities, noting any, if applicable, expected changes to the balance sheet or reserves (e.g., additional investments, restructuring, write-downs, or impairment). Energy Group organizations should consider describing their critical planning assumptions around legacy assets, for example, strategies to lower carbon-, energy-, and/or water-intensive operations.
- **Capital** — Energy Group organizations should consider discussing whether applicable, and, if so, how GHG emissions, energy, and water issues are taken into account in capital planning and allocation. This could include a discussion of major acquisitions and divestments, joint-venture requirements, and investments in technology, innovation, and new business areas in light of changing climate-related risks and opportunities. Energy Group organizations should also consider providing an assessment of flexibility in positioning/repositioning capital to address emerging climate-related risks and opportunities.

Strategy [related to the application of scenarios]

[Note: This portion of the guidance is under review by the Task Force and may change.]

Energy Group organizations should consider describing:

- The range and diversity of climate-related scenarios used, including the 2°C scenario used (e.g., whether climate-related scenarios with major disruptions [positive and negative] from business-as-usual [breakthroughs, breakdowns] were considered).
- For the 2°C scenario used, any adjustments/differences from publicly available 2°C scenarios.
- Quantitatively and qualitatively the critical input parameters, assumptions, and analytical choices for the climate-related scenarios used.
- Time frames used for the climate-related scenarios, including near-, medium- and long-term milestones (e.g., how does the organization consider timing of potential future implications under the climate-related scenarios used).
- Qualitatively and quantitatively the key implications for the organization's performance under the various climate-related scenarios considered, including implications for the organization's value chain, capital-allocation decisions, R&D, and other financial implications.

Risk Management

With specific consideration of the income statement and balance sheet implications described earlier and any significant climate-related risks identified, Energy Group organizations should consider describing actions taken to prevent and mitigate any relevant climate-related risks or take advantage of opportunities (e.g., procurement of low-carbon substitutes as inputs, development of lower-carbon products and services, investment in low-emissions technologies, and other activities to reduce emissions and increase resilience to climate-related impacts).

Metrics and Targets [associated with strategy and risk management processes]

[Note: This portion of the guidance is under review by the Task Force and may change.]

For all relevant metrics, Energy Group organizations should consider providing historical trends and forward-looking projections (by relevant country and/or jurisdiction, business line, or asset type). Organizations should

also consider disclosing metrics that support their scenario analysis and strategic planning process and that are used to monitor the organization's business environment from a strategic and risk management perspective.

Supplemental guidance, from December 2016 consultation draft (continued)

Energy Group organizations should consider providing key metrics related to GHG emissions, energy, water, land use and, if relevant, low-carbon alternatives that address potential financial aspects of shifting demand, cost of supply, reserves, and capital allocation. This could include examples such as:

Revenues

- Investment in low-carbon alternatives (e.g., R&D, equipment, products, or services).

Expenditures

- Indicative costs of supply for current and committed future projects (e.g., through a cost curve or indicative price range). This could be broken down by product, asset, or geography.
- Current internal carbon price or range of prices used in financial planning and analysis.
- Measurement of water used/withdrawn in regions with high or extremely high baseline water stress.

Assets/Liabilities

- If relevant, a breakdown of reserves and/or long lived assets and an indication of associated emissions factors to provide insight into potential future emissions.

Capital

- Relevant metrics to indicate flexibility of capital deployment, portfolio allocation and capital payback. This could include measures such as:
 - proportion of capital allocation to long-lived assets versus short-term assets,
 - capital payback periods or return on capital deployed, and/or
 - investments in low-carbon alternatives (e.g., R&D, technology, products and/or services).

Metrics and Targets *[associated with GHG emissions]*

Energy Group organizations should consider providing the following information:

Revenue Changes

- Scope 3 emissions from significant sources, including where appropriate emissions from the use of the organization's products.

Expenditures

- Scope 1 and Scope 2 emissions and fugitive methane (where relevant) emissions by geography to indicate exposure to potential policy changes and any associated implications for expenditures (e.g., remediation, emission reduction, mitigation).

TCFD illustrative metrics: Oil and gas

The TCFD's *Implementing the Recommendations* report provides illustrative examples of specific metrics for three subsectors of the Energy Group: oil and gas, coal, and electric utilities, with cross reference to disclosures recommended by other publicly available frameworks.²

Illustrative metrics specific to oil and gas companies are indicated in Table 1.

Table 1

TCFD illustrative metrics

Oil and gas

Investment in low-carbon alternatives (R&D, equipment, products, or services)

Estimated Scope 3 emissions, including methodologies and emission factors used

Percent water withdrawn in regions with high or extremely high baseline water stress

Amount of gross global Scope 1 emissions from (1) combustion, (2) flared hydrocarbons, (3) process emissions, (4) directly vented releases, and (5) fugitive emissions/leaks

Indicative costs of supply for current and committed future projects, e.g., through a cost curve or indicative price range. This could be broken down by product, asset or geography.

Describe current carbon price or range of prices used

A breakdown of reserves by type and an indication of associated emissions factors to provide insight into potential future emissions

Assets committed in regions with high or extremely high baseline water stress

Proportion of capital allocation to long-lived versus short-lived assets

Capital payback periods or return on capital deployed

Source: TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 2016.

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2. TCFD, *Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures*, 14 December 2016, pp. 54–58.

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