S&P Global
Market Intelligence

Climate Linked Credit Analytics for Upstream Oil & Gas Companies

A Global Tool to Assess the Credit Risk of Climate-Related Carbon Policy Scenarios

Authors

Luka Vidovic, PhD, FRM
Senior Analyst,
Analytic Development Group

Giorgio Baldassarri, PhD
Global Head,
Analytic Development Group

Overview

Climate change is prompting investors to consider plausible climate-related scenarios and evaluate the impact on their portfolios. This increased after the 2015 Paris Agreement, which formalized the commitments to facilitate the transition to a low-carbon economy by enacting a variety of policies to reduce greenhouse gases (GHGs).[1] This has resulted in regulatory changes and industry-led initiatives that have further advanced the efforts to better understand and manage economic risks related to climate change.

The Financial Stability Board established the Task Force on Climate-related Financial Disclosures (TCFD) to address issues related to assessment, pricing, and management of climate-related risks. The TCFD recommends that organizations adopt a *forward-looking* scenario analysis to assess the potential paths to a low-carbon economy and evaluate transition risks. Correspondingly, regulators' perception of climate change has also pivoted from looking at reputational risk to financial risk, with major implications from a credit risk perspective.[2, 3,]

One of the main policy tools considered to facilitate the transition to a low-carbon economy is the introduction of a carbon tax that penalizes GHG emissions. Under such a policy, companies in high-emitting sectors[4] will be faced with increased operational costs. This is expected to prompt changes in their operations and encourage a shift towards alternative, greener technologies and products. To that end, scenario analysis can be used to better understand risks and opportunities related to climate change.

S&P Global Market Intelligence, in consultation with Oliver Wyman,[5] developed the Climate Linked Credit Analytics tool that enables investors and risk managers at banks and non-financial corporations to estimate the impact of the carbon tax on companies operating in an upstream Oil & Gas sector.

The tool projects the impact of a carbon tax on a company's financial statements and evaluates the company's credit score. This fundamentals-based analysis is particularly suitable for companies operating in highly CO_2-intensive sectors.

[1] United Nations: "Chapter XXVII – Environment – 7.d Paris Agreement", December 2015.
[2] Bank of England: "The Bank of England's response to climate change", Quarterly Bulletin, Q2 2017.
[3] Prudential Regulation Authority: "The impact of climate change on the UK insurance sector", September 2015.
[4] For example: The Energy (Coal, Oil & Gas), Airline, and Steel Manufacturing sectors.
[5] Oliver Wyman is a global management consulting firm and is not an affiliate of S&P Global, or any of its divisions.

This tool can also be employed to support TCFD recommendations (that will become mandatory in 2020 for signatories of the Principles for Responsible Investment (PRI)) on forward-looking scenario analysis of potential paths to a low-carbon economy and disclosure of related transition risks.

Entity Coverage and Model Features

The Climate Linked Credit Analytics tool adopts a fundamentals-driven view, providing a company-specific credit score assessment for 1,200+ public and private upstream Oil & Gas companies on the Capital IQ platform. In addition to this tool, S&P Global Market Intelligence developed a complementary module based on a market-driven view that covers all public companies on the Capital IQ platform. This tool provides an estimate of future market capitalization and a credit score, conditioned on user-defined carbon-tax scenarios. Further information is available in a separate document.[6]

CO_2 Emissions and Fuel Production Costs

The amount of CO_2 emissions depends on the type and amount of fuel produced (e.g., oil or gas), while production costs depend on the region and technique employed. For example, the United States Energy Information Administration (EIA) reports that, on average, 0.43 tCO_2 gets emitted for each barrel of oil (0.36 for gas) produced. Oil production techniques based on oil sands or shale (most common in North America) bear higher production costs, while production of gas tends to be most costly in Latin America and Asia Pacific regions.[7]

The Climate Linked Credit Analytics tool employs EIA data on average CO_2 emissions by fuel type, as well as granular information on company-specific fuel production by geography (or country) extracted from company reports, when available. For companies with limited disclosure, we have developed a mechanism to create proxies based on comparative peer analysis. The granularity of this information is expected to improve over the next few years, as disclosure standards become enhanced and more stringent.

Carbon Price Risk Premium Scenarios

Scenario analysis is a common approach employed by risk managers to assess the potential impact of possible future events. However, several challenges outlined below need to be tackled to analyze climate-transition risks. In addition, the long-term nature of the risks involved, and the characteristics of climate scenario analysis, contribute to additional complexity.

- ***Countless potential scenarios***: As of February 2019, carbon pricing (in the form of a genuine carbon tax or carbon emission trading scheme) already existed in 28 countries, ranging from <0.1$/$tCO_2e$ (Poland) up to circa 130$/$tCO_2e$ (Sweden), and covering approximately 6% of annual global GHGs.[8] It is estimated that in order to limit global warming to two degrees Celsius above pre-industrial

[6] S&P Global Market Intelligence: "Climate Scenario Analyzer for public companies", September 2019.
[7] BP: Statistical Review of World Energy, 2018.
[8] Source: The World Bank: Carbon Pricing Dashboard, https://carbonpricingdashboard.worldbank.org/map_data, (accessed on May 3, 2019).

levels a seven-fold increase in the current average price of carbon will be necessary by 2030 in Organization for Economic Co-operation and Development (OECD) countries.[9] However, carbon pricing policy may follow a different path in each national jurisdiction, both in terms of the final level and the overall timeframe over which it will be introduced.

- ***Long time horizons***: The 2015 Paris Agreement requires a multi-year concerted effort among all nations, with the goal of limiting global warming to approximately 2.7 degrees Celsius by 2100. This timeframe is much longer than the typical time horizons used in current stress testing exercises run by banks and, thus, inherently bears substantial uncertainties.

The Climate Linked Credit Analytics tool enables a user to select between: 1) a user-defined scenario, where the carbon price risk premium is applied globally, and the severity of the overall tax increase from current levels is assumed to be independent of the industry sector and geography, or 2) an integrated REMIND scenario.

- ***The global carbon tax scenario*** acts as an event-based, disorderly transition, where the carbon tax premium is applied globally over a three-year time horizon and companies have limited opportunities to adapt. These scenarios can be employed as a genuine stress-testing analysis of the introduction of a carbon tax.

- ***The REMIND scenario*** is a climate-economic scenario developed by the Potsdam Institute for Climate Impact Research (PIK).[10] This holistic scenario is based on a global general equilibrium approach that incorporates the economy, the climate system, and a detailed representation of the energy sector. The scenario assumes gradual increases of carbon price over decades that result in a transition to a low-carbon economy. The scenario captures both risks and opportunities of climate transition via primary and secondary effects, and accounts for economic and energy investment in different regions, as well as international trade in goods, energy, and emissions allowances. The scenario is often used for policy purposes to describe an orderly transition scenario, and is based on long-term modeling and transition assumptions.

Model Primary Outputs

The model's primary outputs include projected complete financial statements for the next three years (and the specified scenario), as well as the corresponding credit score obtained via S&P Global Market Intelligence's CreditModel™.

Additionally, the model enables the user to perform a detailed analysis of the sensitivity and contribution of a specific financial factor to the credit score. This enables users to determine the impact of the climate scenario on creditworthiness via the model drivers and impacted financial ratios.

[9] Source: Trucost: "Talking Points: Internal carbon pricing stress testing for climate risk", July 2017, https://www.trucost.com/publication/talking-points-internal-carbon-pricing-stress-testing-business-for-climate-change-risk/ (accessed on May 3, 2019).
[10] Potsdam Institute for Climate Impact Research: "REMIND", https://www.pik-potsdam.de/research/transformation-pathways/models/remind (accessed on May 3 2019).

Global Coverage

The coverage includes upstream Oil & Gas companies located both in developed and developing countries. For details please refer to Appendix A (page 9).

A Fundamentals-based Framework for Climate-Related Transition Risk Assessment

The TCFD provides high-level guidance to assess the climate-related transition effect.[11] However, the development and implementation of the most suitable method has been left to market participants. To that end, our Climate Linked Credit Analytics tool offers a comprehensive approach for scenario analysis of the impact of climate-related scenarios on the credit risk of upstream Oil & Gas companies.

Linking Climate Change and Credit Risk

We identify four major drivers of the financial performance for upstream Oil & Gas companies that capture the impact of the climate-related scenarios: volume, price, unit cost, and capital expenditures. In the first step, we translate the impact of a climate scenario on these four drivers at an individual company level. Next, we derive the scenario-adjusted financials for each company and derive credit risk metrics to evaluate the change in credit quality. This approach enables granular and comprehensive analysis of company-specific climate impacts.

Company Creditworthiness

We apply CreditModel, our statistical credit scoring model, to evaluate the creditworthiness of companies based on projected scenario financials. CreditModel employs an advanced generalization of the logistic regressions and is designed to evaluate long-term creditworthiness. The model methodology utilizes a set of financial ratios and historical distribution of S&P Global Ratings credit ratings to assess the credit risk a specific company.

CreditModel generates a quantitative credit score that statistically matches a credit rating by S&P Global Ratings.[12] Using this statistical approach enables the user to efficiently assess the credit risk for multiple companies under various climate scenarios. Additionally, the model lets the user perform a detailed analysis of the sensitivity and contribution of a specific financial factor to the credit score. This enables us to determine the impact of the climate scenario on creditworthiness via the model drivers and impacted financial ratios.

[11] Financial Stability Board: "The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities" Technical Supplement, June 2017.
[12] S&P Global Ratings does not contribute to or participate in the creation of credit scores generated by S&P Global Market Intelligence. Lowercase nomenclature is used to differentiate S&P Global Market Intelligence PD credit model scores from the credit ratings issued by S&P Global Ratings.

Model drivers

Price:
The outputs of the REMIND scenario already specify the carbon price, market prices, and demand for Oil & Gas in a specific year. We treat these values as a given input for the the Climate Linked Credit Analytics tool calculations.

In a carbon tax scenario, we first translate the assumed carbon price (in USD/tCO2) into a dollar equivalent carbon tax per barrel of oil and per million Btus of gas. We assume a carbon tax is levied fully to the producers of oil and gas, resulting in a shift of the supply curve. We assume a linear supply and demand model and apply long-term elasticities to iteratively construct a new equilibrium for oil and gas markets.

The output of both scenarios represents the average market price for oil and gas. To obtain a company-specific realized price, we proportionally adjust a company's last reported realized price.

Volume:
We use simplified company-level cost curves to derive oil and gas volumes produced by each company. In this approach, companies with operations in high-cost regions would see their volume reduced first before low-cost production is affected. This approach enables the calculation of company-level production estimates and captures the differences by geography and segment of production. The production volumes are used in conjunction with company-specific realized oil and gas prices to estimate a firm's revenues and expenses.

Unit cost:
We adjust the company-specific unit costs based on the scenario's carbon price and the change in the cost of oil field services. We increase the baseline unit cost to account for the price of carbon emissions generated during the production process and the cost of emissions that will be released when oil and gas products are used.[13] Additionally, the cost of oil field services is adjusted in proportion to the change in volume produced.[14] The derived company-specific unit costs are used to estimate volume-linked expenses.

Capital Expenditure:
We scale capital expenditures based on the change in the price of oil and gas. Based on historical experience, we decrease capital expenditure by 80% of the percentage decrease in oil prices. This approach enables us to link a company's investments to the market prices. The derived capital expenditures are used to estimate changes in cash flows, depreciation, and investments.

[13] Does not apply to integrated scenario, where tax is levied on consumers.
[14] Based on the analysis of historical industry data, we assume oil field services represent ~30% of operating expenses and that the decrease in the cost of oil field services equals 40% of the percentage decrease in oil prices (Source: FRED, U.S. Energy Information Administration).

Financial Statement Impact

We leverage a company's latest reported financial statements and construct climate scenario-based financial statements (income statement, cash flow statement, and balance sheet). Each financial line item is adjusted based on the four model drivers: volume, price, unit cost, and capital expenditures. For example, revenue- and volume-linked expenses (i.e., cost of goods sold, drilling, and exploration costs) are adjusted based on scenario-projected prices and volumes. Depreciation expenses are determined based on capital expenditures, while inventory and accounts payable are scaled proportionally to volume-linked expenses. Other items, like dividends, are held constant. An extended list of assumptions and financial statement drivers is available in Appendix B (page 15).

Case Study

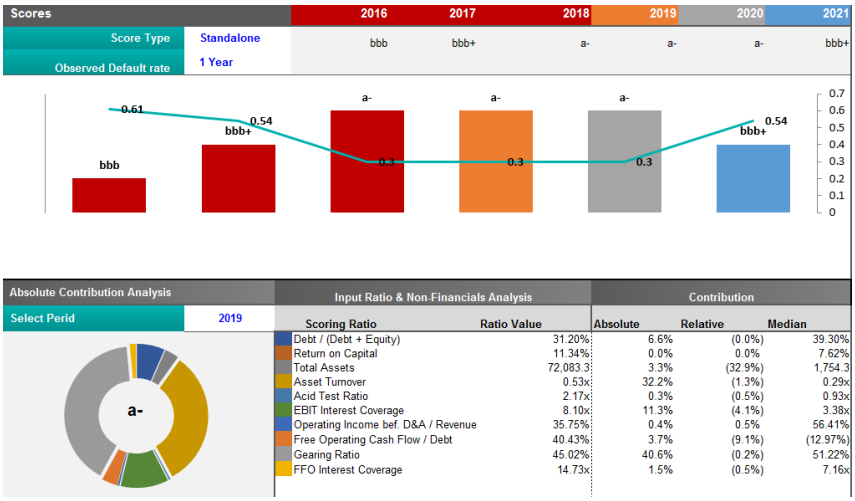
ConocoPhillips is headquartered in Houston, Texas. It explores for, produces, transports, and markets crude oil, bitumen, natural gas, liquefied natural gas (LNG), and natural gas liquids, worldwide. The company primarily engages in the tight oil reservoirs, LNG, oil sands, and other production operations. Its portfolio includes unconventional plays in North America; conventional assets in North America, Europe, Asia, and Australia; various LNG developments; and oil sands assets in Canada.

Figure 1 shows an example of a climate-scenario analysis for ConocoPhillips. As a baseline, we leveraged financial statement data and market data as of the end of 2018 when ConocoPhillips's estimated credit score equaled 'a-'. We applied the Climate Linked Credit Analytics tool to calculate the projected scenario-based financials and associated credit score for a three-year horizon. We assumed the global carbon tax was introduced in 2019 and increases linearly to 50 USD/tCO2 by 2021.

The impact of a carbon tax on ConocoPhillips is limited in the initial years, and the projected credit score remains stable throughout 2020. This could be attributed to ConocoPhillips's leading position as one of the largest oil and gas producers by revenue and its global diversification, making it relatively less sensitive to a carbon tax increase. However, we observe the deterioration of ConocoPhillips' credit score to 'bbb+' in 2021, when $50 USD/tCO2 carbon tax is applied, indicating a susceptibility level of ConocoPhillips creditworthiness to a carbon tax.

In addition to assessing the overall impact of carbon tax on the credit score of a company, CreditModel enables users to analyze which financial ratios will be most affected by the introduction of a carbon tax and be the main drivers of a credit score deterioration. For example, the Gearing ratio, Asset turnover, and EBIT interest coverage ratio are the largest contributors to the credit score for ConocoPhillips in 2019, as denoted by the absolute contributions analysis. Such insight lets a user perform a detailed analysis of the sensitivity and drivers of a credit score for a chosen climate-transition scenario.

Figure 1: *Creditworthiness for ConocoPhillips and a three-year projection of the impact of a* $50 USD/tCO2 *carbon tax scenario*



Source: S&P Global Market Intelligence, Oliver Wyman. As of July 1, 2019. For illustrative purposes only.

Conclusion

One of the primary policy tools contemplated by governments to combat climate change is the introduction (or increase where already available) of a carbon tax. This policy would penalize firms' GHG emissions and, thus, potentially impact their financial performance.

S&P Global Market Intelligence has developed a Climate Linked Credit Analytics tool which enables a comprehensive bottom-up scenario analysis of the impact of climate-related scenarios on the credit risk of upstream Oil & Gas companies. The tool combines company and industry level data to derive the financial impact at a company level. To evaluate and analyze the change in companies' long-term credit risk, we leverage S&P Global Market Intelligence's CreditModel. The tool is automated, and enables the assessment of 1,200+ public and private upstream Oil & Gas companies, globally. Users can perform a scenario analysis based on predefined scenarios or customize their own.

The Climate Linked Credit Analytics tool can be used by corporate sustainability teams to support TCFD recommendations/disclosures, as well as by financial regulators and credit risk managers to perform scenario analysis addressing both risks and opportunities, or stress testing exercises focusing on downside risks.

References

United Nations: “Chapter XXVII – Environment – 7.d Paris Agreement”, (12 December 2015).

United Nations Environment Programme (UNEP). “The Financial System We Need: Aligning the Financial System with Sustainable Development”, Inquiry Report, October 2015.

Financial Stability Board: “Recommendations of the Task Force on Climate-Related Financial Disclosures – TCFD”, Final Report. June 2017.

Bank of England: “The Bank of England’s response to climate change”, Quarterly Bulletin, Q2 2017.

Prudential Regulation Authority: “The impact of climate change on the UK insurance sector”, September 2015.

Prudential Regulation Authority: “Transition in thinking: the impact of climate change on the UK banking sector”, September 2018.

European Banking Authority: “Joint EBA & EBF Workshop on Sustainable Finance”, April 2019.

Rudebusch, D. Glenn: “Climate Change and the Federal Reserve”, FRBSF Economic Letter, March 2019.

BP: Statistical Review of World Energy, 2018.

The World Bank: Carbon Pricing Dashboard, https://carbonpricingdashboard.worldbank.org/map_data, (accessed on May 3 2019).

Trucost: “Talking Points: Internal carbon pricing stress testing for climate risk”, July 2017, https://www.trucost.com/publication/talking-points-internal-carbon-pricing-stress-testing-business-for-climate-change-risk/ (accessed on May 3 2019).

Potsdam Institute for Climate Impact Research: “REMIND”, https://www.pik-potsdam.de/research/transformation-pathways/models/remind (accessed on May 3 2019).

Financial Stability Board: “The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities” Technical Supplement, June 2017.

Trucost: “TCFD Scenario Analysis: Integrating future carbon price risk into portfolio analysis”, March 2019.

Oliver Wyman, UNEP Finance Initiative: “Extending Our Horizons”, 2018.

S&P Global Market Intelligence: "CreditModel™ Corporates 2.6", White Paper, October 2018.

EPA Greenhouse gases equivalencies calculator, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator (accessed on May 3 2019).

Office of Tax Analysis: "Methodology for Analyzing a Carbon Tax", Working Paper 115, January 2017.

Killan, L. & Murphy, P.: "The role of inventories and speculative trading in the global market for crude oil", J. Appl. Econ. 29 (454-478), 2013.

Chang, D. & Serletis, A.:" The demand for gasoline: evidence from household survey data", J. Appl. Econ. 29 (291-313), 2013.

Taghizadeh-Hesary, F. & Yoshino, N.:"Macroeconomic Effects of Oil Price Fluctuations on Emerging and Developed Economies in a Model Incorporating Monetary Variables", ADBI Working Paper Series 546, 2015.

Bernstein, R. & Madlener, R.:" Residential Natural Gas Demand Elasticities in OECD Countries: An ARDL Bounds Testing Approach", FCN Working Paper 15, 2011.

Krichene, N.:"World crude oil and natural gas: a demand and supply model" Energy Economics 24 (557-576), 2002.

Carnegie Endowment World Climate Index: http://oci.carnegieendowment.org/#total-emissions (accessed on May 3 2019).

World Bank Group: "State and Trends of Carbon Pricing 2017", November 2017.

U.S. Energy Information Administration: "Annual Energy Outlook 2017", 2017.

APPENDIX A

Climate Scenario Analyzer: Global Coverage (as of September 2019).

Country	Country ISO Code
Afghanistan	AFG
Åland Islands	ALA
Albania	ALB
Algeria	DZA
Andorra	AND
Angola	AGO
Anguilla	AIA
Antarctica (British Antarctic Territory)	ATA
Antigua and Barbuda	ATG
Argentina	ARG

Country	Country ISO Code
Armenia	ARM
Aruba	ABW
Australia	AUS
Austria	AUT
Azerbaijan	AZE
Bahamas	BHS
Bahrain	BHR
Bangladesh	BGD
Barbados	BRB
Belarus	BLR
Belgium	BEL
Belize	BLZ
Benin	BEN
Bermuda	BMU
Bhutan	BTN
Bolivia	BOL
Bonaire, Sint Eustatius & Saba	BES
Bosnia & Herzegovina	BIH
Botswana	BWA
Brazil	BRA
British Indian Ocean Territory	IOT
British Virgin Islands	VGB
Brunei Darussalam	BRN
Bulgaria	BGR
Burkina Faso	BFA
Burundi	BDI
Cambodia	KHM
Cameroon	CMR
Canada	CAN
Cape Verde	CPV
Cayman Islands	CYM
Central African Republic	CAF
Chad	TCD
Chile	CHL
China	CHN
Christmas Island	CXR
Cocos (Keeling) Islands	CCK
Colombia	COL
Comoros	COM
Congo Brazzaville	COG
Cook Islands	COK

Country	Country ISO Code
Costa Rica	CRI
Côte d´Ivoire	CIV
Croatia	HRV
Cuba	CUB
Curaçao	CUW
Cyprus	CYP
Czech Republic	CZE
Democratic Republic of Congo	COD
Denmark	DNK
Djibouti	DJI
Dominica	DMA
Dominican Republic	DOM
Ecuador	ECU
Egypt	EGY
El Salvador	SLV
Equatorial Guinea	GNQ
Eritrea	ERI
Estonia	EST
Ethiopia	ETH
Falkland Islands (Malvinas)	FLK
Faroe Islands	FRO
Fiji	FJI
Finland	FIN
France	FRA
French Guiana	GUF
French Polynesia	PYF
Gabon	GAB
Gambia	GMB
Georgia	GEO
Germany	DEU
Ghana	GHA
Gibraltar	GIB
Greece	GRC
Greenland	GRL
Grenada	GRD
Guadeloupe	GLP
Guatemala	GTM
Guernsey	GGY
Guinea	GIN
Guinea-Bissau	GNB
Guyana	GUY

Country	Country ISO Code
Haiti	HTI
Heard Island & Mc Donald Islands	HMD
Honduras	HND
Hong Kong	HKG
Hungary	HUN
Iceland	ISL
India	IND
Indonesia	IDN
Iran	IRN
Iraq	IRQ
Ireland	IRL
Isle of Man	IMN
Israel	ISR
Italy	ITA
Jamaica	JAM
Japan	JPN
Jersey	JEY
Jordan	JOR
Kazakhstan	KAZ
Kenya	KEN
Kiribati	KIR
Kuwait	KWT
Kyrgyzstan	KGZ
Laos	LAO
Latvia	LVA
Lebanon	LBN
Lesotho	LSO
Liberia	LBR
Libya	LBY
Liechtenstein	LIE
Lithuania	LTU
Luxembourg	LUX
Macau	MAC
Macedonia	MKD
Madagascar	MDG
Malawi	MWI
Malaysia	MYS
Maldives	MDV
Mali	MLI
Malta	MLT
Marshall Islands	MHL

Country	Country ISO Code
Martinique	MTQ
Mauritania	MRT
Mauritius	MUS
Mayotte	MYT
Mexico	MEX
Moldova	MDA
Monaco	MCO
Mongolia	MNG
Montenegro	MNE
Montserrat	MSR
Morocco	MAR
Mozambique	MOZ
Myanmar	MMR
Namibia	NAM
Nauru	NRU
Nepal	NPL
Netherlands	NLD
New Caledonia	NCL
New Zealand	NZL
Nicaragua	NIC
Niger	NER
Nigeria	NGA
Niue	NIU
Norfolk Island	NFK
North Korea	PRK
Norway	NOR
Occupied Palestinian Territory	PSE
Oman	OMN
Pakistan	PAK
Palau	PLW
Panama	PAN
Papua New Guinea	PNG
Paraguay	PRY
Peru	PER
Philippines	PHL
Pitcairn Islands	PCN
Poland	POL
Portugal	PRT
Qatar	QAT
Réunion	REU
Romania	ROU

Country	Country ISO Code
Russia	RUS
Rwanda	RWA
Saint Barthélemy	BLM
Saint Helena, Ascension & Tristan da Cunha	SHN
Saint Kitts and Nevis	KNA
Saint Lucia	LCA
Saint Martin	MAF
Saint Pierre & Miquelon	SPM
Saint Vincent and the Grenadines	VCT
Samoa	WSM
San Marino	SMR
Sao Tome and Principe	STP
Saudi Arabia	SAU
Senegal	SEN
Serbia	SRB
Seychelles	SYC
Sierra Leone	SLE
Singapore	SGP
Sint Maarten	SXM
Slovakia	SVK
Slovenia	SVN
Solomon Islands	SLB
Somalia	SOM
South Africa	ZAF
South Georgia & the South Sandwich Islands	SGS
South Korea	KOR
South Sudan	SSD
Spain	ESP
Sri Lanka	LKA
Sudan	SDN
Suriname	SUR
Svalbard & Jan Mayen	SJM
Swaziland	SWZ
Sweden	SWE
Switzerland	CHE
Syria	SYR
Taiwan	TWN
Tajikistan	TJK
Tanzania	TZA
Thailand	THA
Timor-Leste	TLS

Country	Country ISO Code
Togo	TGO
Tokelau	TKL
Tonga	TON
Trinidad and Tobago	TTO
Tunisia	TUN
Turkey	TUR
Turkmenistan	TKM
Turks & Caicos Islands	TCA
Tuvalu	TUV
Uganda	UGA
Ukraine	UKR
United Arab Emirates	ARE
United Kingdom	GBR
Uruguay	URY
Uzbekistan	UZB
Vanuatu	VUT
Vatican City	VAT
Venezuela	VEN
Vietnam	VNM
Wallis & Futuna	WLF
Western Sahara	ESH
Yemen	YEM
Zambia	ZMB
Zimbabwe	ZWE

Source: S&P Global Market Intelligence. As of July 1, 2019. For illustrative purposes only.

APPENDIX B

Climate Scenario Analyzer: Impact of the climate scenario on company financials

Income Statement (simplified)

Line item	Drivers
Revenue =	
Oil Revenue (Upstream)	Price, volume
+ Gas Revenue (Upstream)	Price, volume
-Intersegment Revenue	Price, volume
+ Other Revenue	Hold constant
Expenses =	
Volume Linked Expenses1	Unit costs., volume
+ Selling, General, & Administrative	Price, volume
+ Depreciation and Amortization	Capital exp.

+ Impairment of oil, gas, and mineral prop.	Price
+ Interest Expense	Capital exp.
+ Tax Expense	All
+ Other Expenses	Hold Constant
+ Unusual Expenses	Set to zero

Source: S&P Global Market Intelligence. As of July 1, 2019. For illustrative purposes only.

Balance Sheet (simplified)

Line item	Drivers
Assets =	
Cash and Cash Equivalents	All
+ Accounts Receivable	Price, volume
+ Inventory	Unit costs, volume
+ Property, Plant and Equipment	Capital exp.
+ Other Assets	Hold constant
Liabilities =	
Accounts Payable	Unit costs., volume
+ Current portion long term debt	Capital exp.
+ Long term debt	Capital exp.
+ Other Liabilities	Hold constant
Shareholder Equity =	
Common Equity	Hold constant
+ Retained Earnings	All
+ Other Equity	Hold constant

Source: S&P Global Market Intelligence. As of July 1, 2019. For illustrative purposes only.

Cash Flow Statement (simplified)

Line item	Drivers
Cash Flow from Operations (CFO) =	
Net Income	All
+ Change in working capital	Price, volume, unit costs
+ Depreciation and Amortization	Capital exp.
+ Impairment of oil, gas, & mineral prop.	Price
+ Other changes in CFO	Set to zero
Cash Flow from Investing (CFI) =	
-Capital Expenditure	Capital exp.
+ Other changes in CFI	Set to zero
Cash Flow from Financing (CFF) =	
+ Change in Debt	Capital exp.
-Dividends	Hold constant
+ Other changes in CFF	Set to zero

Source: S&P Global Market Intelligence, Oliver Wyman. As of July 1, 2019. For illustrative purposes only.

About S&P Global Market Intelligence

At S&P Global Market Intelligence, we know that not all information is important—some of it is vital. Accurate, deep and insightful. We integrate financial and industry data, research, and news into tools that help track performance, generate alpha, identify investment ideas, understand competitive and industry dynamics, perform valuation, and assess credit risk. Investment professionals, government agencies, corporations, and universities globally can gain the intelligence essential to making business and financial decisions with conviction.

S&P Global Market Intelligence is a division of S&P Global (NYSE: SPGI), which provides essential intelligence for individuals, companies and governments to make decisions with confidence. For more information, visit www.spglobal.com/marketintelligence.

Contact Us

Americas
+1 877 863 1306

Europe, Middle East and Africa
+44 (0)20 7176 1234

Asia Pacific
+852 2533 3565

credit_analytics
@spglobal.com

www.spglobal.com/marketintelligence