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# Exposure Draft

IFRS<sup>®</sup> Sustainability Disclosure Standard

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## **[Draft] IFRS S2 Climate-related Disclosures Appendix B Industry-based disclosure requirements**

Volume B11—Oil & Gas—Exploration & Production

Comments to be received by 29 July 2022



This industry from Appendix B Industry-based disclosure requirements accompanies the Exposure Draft ED/2022/S2 *Climate-related Disclosures* (published March 2022; see separate booklet). It is published by the International Sustainability Standards Board (ISSB) for comment only. Comments need to be received by 29 July 2022 and should be submitted by email to [commentletters@ifrs.org](mailto:commentletters@ifrs.org) or online at <https://www.ifrs.org/projects/open-for-comment/>.

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## Introduction

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*This volume is part of Appendix B of [draft] IFRS S2 Climate-related Disclosures and is an integral part of that [draft] Standard. It has the same authority as the other parts of that [draft] Standard.*

This volume sets out the requirements for identifying, measuring and disclosing information related to an entity's significant climate-related risks and opportunities that are associated with specific business models, economic activities and other common features that characterise participation in this industry.

The industry-based disclosure requirements are derived from SASB Standards (see paragraphs B10–B12 of [Draft] IFRS S2 *Climate-related Disclosures*). Amendments to the SASB Standards, described in paragraph B11, are marked up for ease of reference. New text is underlined and deleted text is struck through. The metric codes used in SASB Standards have also been included, where applicable, for ease of reference. For additional context regarding the industry-based disclosure requirements contained in this volume, including structure and terminology, application and illustrative examples, refer to Appendix B paragraphs B3–B17.

## Oil & Gas – Exploration & Production

### Industry Description

Oil & Gas - Exploration & Production (E&P) companies explore for, extract, or produce energy products such as crude oil and natural gas, which comprise the upstream operations of the oil and gas value chain. Companies in the industry develop conventional and unconventional oil and gas reserves; these include, but are not limited to, shale oil and/or gas reserves, oil sands, and gas hydrates. Activities covered by this standard include the development of both on-shore and off-shore reserves. The E&P industry creates contracts with the Oil and Gas Services industry to conduct several E&P activities and to obtain equipment and oilfield services.

Note: The Standards discussed below are for “pure-play” E&P activities, or independent E&P companies. Integrated oil and gas companies conduct upstream operations but are also involved in the distribution and/or refining or marketing of products. SASB has separate standards for the Oil and Gas Midstream (EM-MD) and Refining & Marketing industries (EM-RM). As such, integrated companies should also consider the disclosure topics and metrics from these standards. SASB also has separate standards for Oil and Gas Services (EM-SV).

### Sustainability Disclosure Topics & Metrics

**Table 1. Sustainability Disclosure Topics & Metrics**

TOPIC	METRIC	CATEGORY	UNIT OF MEASURE	CODE
Greenhouse Gas Emissions	Gross global Scope 1 emissions, percentage methane, percentage covered under emissions-limiting regulations	Quantitative	Metric tons CO <sub>2</sub> -e (t), Percentage (%)	EM-EP-110a.1
	Amount of gross global Scope 1 emissions from: (1) flared hydrocarbons, (2) other combustion, (3) process emissions, (4) other vented emissions, and (5) fugitive emissions	Quantitative	Metric tons CO <sub>2</sub> -e	EM-EP-110a.2
	Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	Discussion and Analysis	n/a	EM-EP-110a.3

*continued...*

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TOPIC	METRIC	CATEGORY	UNIT OF MEASURE	CODE
Water Management	(1) Total fresh water withdrawn, (2) total fresh water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%)	EM-EP-140a.1
	Volume of produced water and flowback generated; percentage (1) discharged, (2) injected, (3) recycled; hydrocarbon content in discharged water	Quantitative	Thousand cubic meters (m <sup>3</sup> ), Percentage (%), Metric tons (t)	EM-EP-140a.2
	Percentage of hydraulically fractured wells for which there is public disclosure of all fracturing fluid chemicals used	Quantitative	Percentage (%)	EM-EP-140a.3
	Percentage of hydraulic fracturing sites where ground or surface water quality deteriorated compared to a baseline <sup>13</sup>	Quantitative	Percentage (%)	EM-EP-140a.4
Reserves Valuation & Capital Expenditures	Sensitivity of hydrocarbon reserve levels to future price projection scenarios that account for a price on carbon emissions	Quantitative	Million barrels (MMbbls), Million standard cubic feet (MMscf), Million barrels (MMbbls), Mega standard cubic meters (MSm <sup>3</sup> )	EM-EP-420a.1
	Estimated carbon dioxide emissions embedded in proved hydrocarbon reserves	Quantitative	Metric tons (t) CO <sub>2</sub> -e	EM-EP-420a.2
	Amount invested in renewable energy, revenue generated by renewable energy sales	Quantitative	Reporting currency	EM-EP-420a.3
	Discussion of how price and demand for hydrocarbons and/or climate regulation influence the capital expenditure strategy for exploration, acquisition, and development of assets	Discussion and Analysis	n/a	EM-EP-420a.4

<sup>13</sup> Note to EM-EP-140a.4 – The entity shall disclose its policies and practices related to ground and surface water quality management.

**Table 2. Activity Metrics**

ACTIVITY METRIC	CATEGORY	UNIT OF MEASURE	CODE
Production of: (1) oil, (2) natural gas, (3) synthetic oil, and (4) synthetic gas	Quantitative	Thousand barrels per day (Mbb/d); Million standard cubic feet per day (MMscf/d)	EM-EP-000.A
Number of offshore sites	Quantitative	Number	EM-EP-000.B
Number of terrestrial sites	Quantitative	Number	EM-EP-000.C

## Greenhouse Gas Emissions

### Topic Summary

Exploration & Production (E&P) activities generate significant direct greenhouse gas (GHG) emissions from a variety of sources. Emissions can be combusted, including those arising from flaring or power generation equipment, as well as uncombusted, including those emissions arising from gas processing equipment, venting, flaring, and fugitive methane. Regulatory efforts to reduce GHG emissions in response to the risks posed by climate change may result in additional regulatory compliance costs and risks for E&P companies. With natural gas production from shale resources expanding, the management of the emission of methane, a highly potent GHG, from oil and gas E&P systems has emerged as a major operational, reputational, and regulatory risk for companies. Furthermore, the development of unconventional hydrocarbon resources may be more or less GHG-intensive than conventional oil and gas, with associated impacts to regulatory risk. Energy efficiency, use of less carbon-intensive fuels, or process improvements to reduce fugitive emissions, venting, and flaring, can provide benefits to E&P companies in the form of climate risk mitigation, lower costs, or increased revenues.

### Metrics

#### *EM-EP-110a.1. Gross global Scope 1 emissions, percentage methane, percentage covered under emissions-limiting regulations*

- 1 The entity shall disclose its gross global Scope 1 greenhouse gas (GHG) emissions to the atmosphere of the seven GHGs covered under the Kyoto Protocol—carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF<sub>6</sub>), and nitrogen trifluoride (NF<sub>3</sub>).
  - 1.1 Emissions of all GHGs shall be consolidated and disclosed in metric tons of carbon dioxide equivalent (CO<sub>2</sub>-e), and calculated in accordance with published 100-year time horizon global warming potential (GWP) values. To date, the preferred source for GWP values is the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2014).
  - 1.2 Gross emissions are GHGs emitted into the atmosphere before accounting for offsets, credits, or other similar mechanisms that have reduced or compensated for emissions.
- 2 Scope 1 emissions are defined and shall be calculated according to the methodology contained in *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (GHG Protocol), Revised Edition, March 2004, published by the World Resources Institute and the World Business Council on Sustainable Development (WRI/WBCSD).
  - 2.1 These emissions include direct emissions of GHGs from stationary or mobile sources; these sources include but are not limited to: equipment at well sites, production facilities, refineries, chemical plants, terminals, fixed site drilling rigs, office buildings, marine vessels transporting products, tank truck fleets, mobile drilling rigs, and moveable equipment at drilling and production facilities.

- 2.2 Acceptable calculation methodologies include those that conform with the GHG Protocol as the base reference, but provide additional guidance, such as industry- or region-specific guidance. Examples include but are not limited to:
  - 2.2.1 *GHG Reporting Guidance for the Aerospace Industry* published by International Aerospace Environmental Group (IAEG)
  - 2.2.2 *Greenhouse Gas Inventory Guidance: Direct Emissions from Stationary Combustion Sources* published by the U.S. Environmental Protection Agency (EPA)
  - 2.2.3 India GHG Inventory Program
  - 2.2.4 ISO 14064-1
  - 2.2.5 *Petroleum Industry Guidelines for reporting GHG emissions*, 2nd edition, 2011, published by IPIECA
  - 2.2.6 *Protocol for the quantification of greenhouse gas emissions from waste management activities* published by Entreprises pour l'Environnement (EpE)
- 2.3 GHG emission data shall be consolidated according to the approach with which the entity consolidates its financial reporting data, which is generally aligned with the “financial control” approach defined by the GHG Protocol as well as:
  - 2.3.1 The financial approach detailed in Chapter 3 of the IPIECA/API/OGP *Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions*, Second Edition, 2011 (hereafter, the “IPIECA GHG Guidelines”)
  - 2.3.2 The approach provided by the Climate Disclosure Standards Board (CDSB) that is described in REQ-07, “Organisational boundary,” of the *CDSB Framework for reporting environmental information, natural capital and associated business impacts* (April 2018)
- 3 The entity shall disclose the percentage of gross global Scope 1 emissions from methane emissions.
  - 3.1 The percentage of gross global Scope 1 GHG emissions from methane emissions shall be calculated as the methane emissions in metric tons of carbon dioxide equivalents (CO<sub>2</sub>-e) divided by the gross global Scope 1 GHG emissions in metric tons of carbon dioxide equivalents (CO<sub>2</sub>-e).
- 4 The entity shall disclose the percentage of its emissions that are covered under an emissions-limiting regulation or that is intended to directly limit or reduce emissions, such as cap-and-trade schemes, carbon tax/fee systems, and other emissions control (e.g., command-and-control approach) and permit-based mechanisms.
  - 4.1 Examples of emissions-limiting regulations include, but are not limited to:
    - 4.1.1 California Cap-and-Trade (California Global Warming Solutions Act)

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- 4.1.2 European Union Emissions Trading Scheme (EU ETS)
- 4.1.3 Quebec Cap-and-Trade (Draft Bill 42 of 2009)
- 4.2 The percentage shall be calculated as the total amount of gross global Scope 1 GHG emissions (CO<sub>2</sub>-e) that are covered under emissions-limiting regulations divided by the total amount of gross global Scope 1 GHG emissions (CO<sub>2</sub>-e).
  - 4.2.1 For emissions that are subject to multiple emissions-limiting regulations, the entity shall not account for those emissions more than once.
- 4.3 The scope of emissions-limiting regulations excludes emissions covered under voluntary emissions-limiting regulations (e.g., voluntary trading systems) as well as disclosure-based regulations [e.g., the U.S. Environmental Protection Agency (EPA) GHG Reporting Program].
- 5 The entity may discuss any change in its emissions from the previous reporting period, including whether the change was due to emissions reductions, divestment, acquisition, mergers, changes in output, and/or changes in calculation methodology.
- 6 In the case that current reporting of GHG emissions to the CDP or other entity (e.g., a national regulatory disclosure program) differs in terms of the scope and consolidation approach used, the entity may disclose those emissions. However, primary disclosure shall be according to the guidelines described above.
- 7 The entity may discuss the calculation methodology for its emissions disclosure, such as if data are from continuous emissions monitoring systems (CEMS), engineering calculations, or mass balance calculations.

*EM-EP-110a.2. Amount of gross global Scope 1 emissions from: (1) flared hydrocarbons, (2) other combustion, (3) process emissions, (4) other vented emissions, and (5) fugitive emissions*

- 1 The entity shall disclose the amount of direct greenhouse gas (GHG) emissions in CO<sub>2</sub>-e from the following sources (1) flared hydrocarbons, (2) other combustion, (3) process emissions, (4) other vented emissions, and (5) fugitive emissions from operations.
  - ~~1.1~~ Sources shall generally correspond to the definitions provided in the *API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry (2009)*.
  - ~~1.2~~ 1.1 Flared hydrocarbons shall include all emissions emitted from flares and which are associated with the management and disposal of unrecoverable natural gas via combustion of hydrocarbon products from routine operations, upsets, or emergencies.
  - ~~1.3~~ 1.2 Other combusted emissions shall include, but are not limited to:
    - ~~1.3.1~~ 1.2.1 Emissions from stationary devices, including, but not limited to boilers, heaters, furnaces, reciprocating internal combustion engines and turbines, incinerators, and thermal/catalytic oxidizers

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- ~~1.2.2~~ 1.2.2 Emissions from mobile sources, including, but not limited to  
~~1.3.2~~ barges, ships, railcars, and trucks for material transport; planes/  
helicopters and other company vehicles for personnel transport;  
forklifts, all terrain vehicles, construction equipment, and other  
off-road mobile equipment
- ~~1.3~~ 1.3 Other combusted emissions shall exclude those emissions disclosed as  
~~1.4~~ flared hydrocarbons.
- ~~1.4~~ 1.4 Process emissions shall include those emissions that are not combusted  
~~1.5~~ and are intentional or designed into the process or technology to occur  
during normal operations and are a result of some form of chemical  
transformation or processing step. Such emissions include but are not  
limited to: emissions from hydrogen plants, amine units, glycol  
dehydrators, fluid catalytic cracking unit and reformer generation, and  
flexi-coker coke burn.
- ~~1.5~~ 1.5 Vented emissions shall include those emissions that are not combusted  
~~1.6~~ and are intentional or designed into the process or technology to occur  
during normal operations, and which include, but are not limited to:

  - ~~1.5.1~~ 1.5.1 Venting from crude oil, condensate, or natural gas product storage  
~~1.6.1~~ tanks, gas-driven pneumatic devices, gas samplers, chemical  
injection pumps, exploratory drilling, loading/ballasting/transit,  
and loading racks
  - ~~1.5.2~~ 1.5.2 Venting resulting from maintenance/turn-arounds, including, but  
~~1.6.2~~ not limited to decoking of furnace tubes, well unloading, vessel  
and gas compressor depressurizing, compressor starts, gas  
sampling, and pipeline blowdowns
  - ~~1.5.3~~ 1.5.3 Venting from non-routine activities, including but not limited to  
~~1.6.3~~ pressure relief valves, pressure control valves, fuel supply  
unloading valves, and emergency shut-down devices
- ~~1.6~~ 1.6 Vented emissions shall exclude those emissions disclosed as process  
~~1.7~~ emissions.
- ~~1.7~~ 1.7 Fugitive emissions shall include those emissions that can be individually  
~~1.8~~ found and fixed to reduce emissions rates to near zero and which include,  
but are not limited to, emissions from valves, flanges, connectors, pumps,  
compressor seal leaks, catadyne heaters, and wastewater treatment and  
surface impoundments.

*EM-EP-110a.3. Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets*

- 1 The entity shall discuss its long-term and short-term strategy or plan to manage its Scope 1 greenhouse gas (GHG) emissions.

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- 1.1 Scope 1 emissions are defined according to *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (GHG Protocol), Revised Edition, March 2004, published by the World Resources Institute and the World Business Council on Sustainable Development (WRI/WBCSD).
- 1.2 The scope of GHG emissions includes the seven GHGs covered under the Kyoto Protocol—carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF<sub>6</sub>), and nitrogen trifluoride (NF<sub>3</sub>).
- 2 The entity shall discuss its emission reduction target(s) and analyze its performance against the target(s), including the following, where relevant:
  - 2.1 The scope of the emission reduction target (e.g., the percentage of total emissions to which the target is applicable);
  - 2.2 Whether the target is absolute- or intensity-based, and the metric denominator, if it is an intensity-based target;
  - 2.3 The percentage reduction against the base year, with the base year representing the first year against which emissions are evaluated towards the achievement of the target;
  - 2.4 The timelines for the reduction activity, including the start year, the target year, and the base year;
  - 2.5 The mechanism(s) for achieving the target; and
  - 2.6 Any circumstances in which the target or base year emissions have been, or may be, recalculated retrospectively or the target or base year has been reset which may include, but are not limited to energy efficiency efforts, energy source diversification, carbon capture and storage, or the implementation of leak detection and repair processes.
- 3 The entity shall discuss activities and investments required to achieve the plans and/or targets, and any risks or limiting factors that might affect achievement of the plans and/or targets.
- 4 The entity shall discuss the scope of its strategies, plans, and/or reduction targets, such as whether they pertain differently to different business units, geographies, or emissions sources.
  - 4.1 ~~Categories of emissions sources generally correspond to those defined in the API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry (2009), and may include:~~
    - 4.1.1 Flared hydrocarbons, including all emissions emitted from flares and which are associated with the management and disposal of unrecoverable natural gas via combustion of hydrocarbon products from routine operations, upsets, or emergencies
    - 4.1.2 Other combusted emissions, including, but not limited to: (1) emissions from stationary devices, including, but not limited to boilers, heaters, furnaces, reciprocating internal combustion engines and turbines, incinerators, and thermal/catalytic oxidizers,

- (2) emissions from mobile sources, including, but not limited to barges, ships, railcars, and trucks for material transport; planes/helicopters and other company vehicles for personnel transport; forklifts, all terrain vehicles, construction equipment, and other off-road mobile equipment, and (3) other combusted emissions shall exclude those emissions disclosed as flared hydrocarbons
- 4.1.3 Process emissions, including, but not limited to those emissions that are not combusted and are intentional or designed into the process or technology to occur during normal operations and are a result of some form of chemical transformation or processing step. Such emissions include, but are not limited to those from hydrogen plants, amine units, glycol dehydrators, fluid catalytic cracking unit and reformer generation, and flexi-coker coke burn
- 4.1.4 Vented emissions, including those emissions that are not combusted and are intentional or designed into the process or technology to occur during normal operations, and which include, but are not limited to: (1) venting from crude oil, condensate, or natural gas product storage tanks, gas-driven pneumatic devices, gas samplers, chemical injection pumps, exploratory drilling, loading/ballasting/transit, and loading racks, (2) venting resulting from maintenance/turn-arounds, including, but not limited to decoking of furnace tubes, well unloading, vessel and gas compressor depressurizing, compressor starts, gas sampling, and pipeline blowdowns, and (3) venting from non-routine activities, including but not limited to pressure relief valves, pressure control valves, fuel supply unloading valves, and emergency shut-down devices
- 4.1.5 Fugitive emissions, including, but not limited to those emissions which can be individually found and “fixed” to make emissions “near zero” and which include, but are not limited to emissions from valves, flanges, connectors, pumps, compressor seal leaks, catalytic heaters, and wastewater treatment and surface impoundments
- 5 The entity shall discuss whether its strategies, plans, and/or reduction targets are related to, or associated with, emissions limiting and/or emissions reporting-based programs or regulations (e.g., the EU Emissions Trading Scheme, Quebec Cap-and-Trade System, California Cap-and-Trade Program), including regional, national, international or sectoral programs.
- 6 Disclosure of strategies, plans, and/or reduction targets shall be limited to activities that were ongoing (active) or reached completion during the reporting period.

## Water Management

### Topic Summary

Depending on the extraction technique, exploration and production operations may consume significant quantities of water, which may expose companies to the risk of reduced water availability, regulations limiting usage, or related cost increases, particularly in water-stressed regions. Contamination of local water resources can result from incidents involving produced water, flowback water, hydraulic fracturing fluids, and other well fluids. Historically, there has been concern regarding the impacts of hydraulic fracturing operations on the contamination of groundwater supplies. ~~In the U.S., concerns about chemicals used in hydraulic fracturing fluids have led to increased disclosure by companies through a voluntary industry registry, FracFocus. There have also been related state regulations, as well as legislative proposals to repeal federal exemptions for hydraulic fracturing operations.~~ Reducing water use and contamination through recycling, other water management strategies, and use of non-toxic fracturing fluids could create operational efficiency for companies and lower their operating costs. Such strategies could also minimize the impacts that regulations, water supply shortages, and community-related disruptions have on operations.

### Metrics

*EM-EP-140a.1. (1) Total fresh water withdrawn, (2) total fresh water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress*

- 1 The entity shall disclose the amount of water, in thousands of cubic meters, that was withdrawn from freshwater sources:
  - 1.1 Fresh water may be defined according to the local statutes and regulations where the entity operates. Where there is no regulatory definition, fresh water shall be considered to be water that has less than 1000 parts per million of dissolved solids ~~per the U.S. Geological Survey.~~
  - 1.2 Water obtained from a water utility in compliance with ~~U.S. National Primary Drinking Water Regulations~~ jurisdictional drinking water regulations can be assumed to meet the definition of fresh water.
- 2 The entity shall disclose the amount of fresh water, in thousands of cubic meters, that was consumed in its operations.
  - 2.1 Water consumption is defined as:
    - 2.1.1 Water that evaporates during withdrawal, usage, and discharge;
    - 2.1.2 Water that is directly or indirectly incorporated into the entity's product or service;
    - 2.1.3 Water that does not otherwise return to the same catchment area from which it was withdrawn, such as water returned to another catchment area or the sea.
- 3 The entity shall analyze all of its operations for water risks and identify activities that withdraw and consume water in locations with High (40–80%) or Extremely High (>80%) Baseline Water Stress as classified by the World Resources Institute's (WRI) Water Risk Atlas tool, Aqueduct.

- 4 The entity shall disclose its water withdrawn in locations with High or Extremely High Baseline Water Stress as a percentage of the total water withdrawn.
- 5 The entity shall disclose its water consumed in locations with High or Extremely High Baseline Water Stress as a percentage of the total water consumed.

*EM-EP-140a.2. Volume of produced water and flowback generated; percentage (1) discharged, (2) injected, (3) recycled; hydrocarbon content in discharged water*

- 1 The entity shall disclose the volume, in thousands of cubic meters, of produced water and flowback fluid generated during its activities.
- 2 Produced water is defined ~~according to the U.S. Environmental Protection Agency (EPA) according to 40 CFR 435.41~~ as water (brine) obtained from the hydrocarbon bearing formation strata during the extraction of oil and gas. This can include formation water, injection water, and any chemicals added downhole or during the oil/water separation process.
- 3 Flowback is defined as the recovered hydraulic fracturing fluid that returns to the surface during a hydraulic fracturing operation that may often be mixed with produced water.
- 4 The entity shall calculate the percentage of produced water and flowback fluid that was:
  - 4.1 Discharged directly to the environment or indirectly discharged through a third party, such as a local wastewater treatment plant;
  - 4.2 Injected, ~~such as into a Class II injection well under the EPA's Underground Injection Control (UIC) program, or equivalent;~~
  - 4.3 Recycled for use in other wells in fracturing fluids or in other drilling and production processes.
- 5 The entity shall disclose the amount, in metric tons, of hydrocarbons water that was discharged to the environment.
  - 5.1 The scope of disclosure includes produced water, flowback, process water, storm water, or other water that was discharged to the environment.
  - 5.2 Measurements of hydrocarbon content should be made using test methods required or approved by local regulatory authorities (or equivalent applicable standards).

*EM-EP-140a.3. Percentage of hydraulically fractured wells for which there is public disclosure of all fracturing fluid chemicals used*

- 1 The entity shall disclose the percentage of hydraulically fractured wells for which there is public disclosure of all fracturing fluid chemicals used.
  - 1.1 The percentage shall be calculated as the number of hydraulically fractured wells for which it provides public disclosure of all of the chemical content of fracturing fluid, divided by the total number of hydraulically fractured wells.

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- 1.2 The entity shall include in the percentage only those wells for which all fluid chemicals are publicly disclosed, including the chemicals that meet the definition of a trade secret, ~~according to Appendix E to 29 CFR Part §1910.1200 and may be exempt from disclosure on a material safety data sheet (MSDS).~~
- 2 Public disclosure includes, but is not limited to, posting to a publicly accessible corporate website ~~or the FracFocus Chemical Disclosure Registry.~~

*EM-EP-140a.4. Percentage of hydraulic fracturing sites where ground or surface water quality deteriorated compared to a baseline*

- 1 The entity shall calculate the percentage as: the total number of hydraulic fracturing well sites for which it detected a deterioration in the ground or surface water surrounding the well site as compared to a baseline measurement, divided by the total number of hydraulic fracturing well sites.
- 2 Deterioration in water quality is, at a minimum, defined as occurring when testing indicates:
  - 2.1 Presence of thermogenic gas or a mixture of thermogenic and biogenic gas that was not present in baseline testing.
  - 2.2 An increase in methane concentration by more than 5.0 mg/l between sampling periods.
  - 2.3 Benzene, toluene, ethylbenzene, or xylenes (BTEX compounds) or total petroleum hydrocarbons (TPH) are present in higher concentrations as compared to the baseline.
- 3 The entity shall determine whether water quality deteriorated against a baseline through monitoring of ground and surface water surrounding hydraulically fractured well sites.
  - 3.1 Determinations shall be consistent with Chapter 3 of the Wyoming Oil and Gas Conservation Commission (WOGCC) Rules and Regulations ~~and/or, the Colorado Oil and Gas Conservation Commission's (COGCC) Rule 609 — Statewide Groundwater Baseline Sampling and Monitoring, or a jurisdictional equivalent.~~
  - 3.2 The entity shall disclose the jurisdictional standard, guideline, or regulation used for its calculation.
- 4 The initial baseline sample shall occur:
  - 4.1 Prior to drilling or before installation of a surface oil and gas facility on a location
  - 4.2 Prior to re-stimulation of a well, if more than 12 months have passed since the initial pre-drilling sampling event or the most recent re-stimulation sampling event
- 5 Ongoing monitoring shall occur with at least the following frequency:
  - 5.1 One subsequent sampling between 12 and 18 months after well completion or facility installation

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- 5.2 A second subsequent sampling between 60 and 78 months after the previous sampling event. Dry holes are exempt from this requirement
- 6 The entity shall collect initial baseline samples and subsequent monitoring samples from all available water sources within a one-half mile radius of a proposed well, multi-well site, or dedicated injection well.
- 6.1 The entity shall follow sampling guidance from the WOGCC and COGCC or jurisdictional equivalent for the collection of samples, including for instances when few or no sampling sites exist or are accessible.
- 7 If the entity does not conduct baseline water quality assessments and ongoing monitoring for any of its well sites, then it shall disclose the percentage of wells for which there is no baseline and/or ongoing monitoring.
- 8 The entity may disclose whether results of baseline groundwater quality tests and ongoing monitoring are communicated to local regulatory authorities (where not required by local law) and/or residents and business owners in proximity to hydraulic fracturing sites.

Note to **EM-EP-140a.4**

- 1 The entity shall describe its policies and practices related to its management of ground and surface water quality.
- 2 Applicable policies and practices may include, but are not limited to:
- 2.1 Well design and well integrity management
- 2.2 Hydraulic fracturing procedures
- 2.3 Surface facility design, including the use of backflow preventers, storage tank design, and impoundment design
- 2.4 Surface and groundwater quality and testing
- 2.5 Chemicals management
- 2.6 Water reuse, processing, and disposal

## Reserves Valuation & Capital Expenditures

### Topic Summary

Estimates suggest that exploration and production (E&P) companies may be unable to extract a significant proportion of their proved and probable oil and gas reserves if greenhouse gas (GHG) emissions are to be controlled to limit global temperature increases to two degrees Celsius as per the Paris Agreement. Companies with more carbon-intensive reserves and production and higher capital costs are likely to face greater risks. Regulatory limits on GHG emissions, together with improved competitiveness of alternative energy technologies, could lower or reduce the growth in global demand, and therefore reduce prices for oil and gas products. Extraction costs could increase with regulations that put a price on GHG emissions. These factors could affect the economic viability to extract oil and gas reserves. Regulatory actions that are more abrupt than anticipated, or those focusing on industries with high emissions, could impair asset values over a short period of time. Stewardship of capital resources and production decisions that take into account near- and long-term trends related to climate change mitigation actions can help prevent current asset impairment and maintain profitability and creditworthiness.

### Metrics

#### *EM-EP-420a.1. Sensitivity of hydrocarbon reserve levels to future price projection scenarios that account for a price on carbon emissions*

- 1 The entity shall perform a sensitivity analysis of its reserves to determine how several future scenarios may affect its determination of whether the reserves are proved or probable.
- 2 The entity shall analyze the sensitivity of its current proven and probable reserves using the price trajectories published by the International Energy Agency (IEA) in its World Energy Outlook (WEO) publication, including:
  - 2.1 Current Policies Scenario, which assumes no changes in policies from the mid-point of the year of publication of the WEO.
  - 2.2 New Policies Scenario, which assumes that broad policy commitments and plans that have been announced by countries (including national pledges to reduce greenhouse gas emissions and plans to phase out fossil-energy subsidies), occur even if the measures to implement these commitments have yet to be identified or announced. This broadly serves as the IEA baseline scenario.
  - 2.3 Sustainable Development Scenario, which assumes that an energy pathway occurs that is consistent with the goal of limiting the global increase in temperature to ~~2°C~~ 1.5°C by limiting concentration of greenhouse gases in the atmosphere ~~to around 450 parts per million of CO<sub>2</sub>e.~~
- 2.4 ~~3~~ The entity shall consider the WEO scenarios as a normative reference, thus any updates to the WEO made year-on-year shall be considered updates to this guidance.

3.4 The entity shall follow the applicable jurisdictional guidance published by the U.S. Securities and Exchange Commission (SEC) in its Oil and Gas Reporting Modernization (Regulation S-X Section §210.4-10 and §229.1202 [Item 1202] Disclosure of Reserves) for the following:

3.1 4.1 Classifying of reserves as proved and probable.

4.2 Conducting a reserves sensitivity analysis

3.2 Conducting a reserves sensitivity analysis and disclosing, in the aggregate, an estimate of reserves for each product type based on different price and cost criteria, such as a range of prices and costs that may reasonably be achieved, including standardized futures prices or management's own forecasts.

3.2.1 The entity shall disclose the price and cost schedules and assumptions on which disclosed values are based.

3.3 4.3 Determining current Current (or base) case of reserve levels.

4.5 The entity may use the following table format to summarize its findings:

**Table 3. Sensitivity of Reserves to Prices by Principal Product Type and Price Scenario**

PRICE CASE (Scenario)	PROVED RESERVES			PROBABLE RESERVES		
	Oil (MMbbls)	Gas (MMsef) (MSm <sup>3</sup> )	Product:A (measure)	Oil (MMbbls)	Gas (MMsef) (MSm <sup>3</sup> )	Product:A (measure)
Current Policies Scenario (base)						
New Policies Scenario						
Sustainable Development Scenario						

5.6 The entity may disclose the sensitivity of its reserve levels in other price and demand scenarios in addition to those described above, particularly if these scenarios differ depending on the type of hydrocarbon reserves, regulatory environment in the countries or regions where exploration occurs, end-use of the entity's products, or other factors.

6.7 For additional sensitivity analyses, the entity should consider disclosing the following, per the Task Force on Climate-Related Financial Disclosures (TCFD) Recommendations Report Figure 8 as well as the Implementing the Recommendations of the TCFD Report, Section E:

6.1 7.1 The alternative scenarios used, including other 2°C or lower scenarios.

6.2 7.2 Critical input parameters, assumptions, and analytical choices for the climate-related scenarios used, particularly as they relate to key areas such as policy assumptions, energy deployment pathways, technology pathways, and related timing assumptions.

6.3 ~~7.3~~ Time frames used for scenarios, including short-, medium-, and long-term milestones (e.g., how organizations consider timing of potential future implications under the scenarios used).

*EM-EP-420a.2. Estimated carbon dioxide emissions embedded in proved hydrocarbon reserves*

- 1 The entity shall calculate and disclose an estimate of the carbon dioxide emissions embedded in its proved hydrocarbon reserves.
  - 1.1 Nota bene — this estimate applies a factor for potential CO<sub>2</sub> only and does not include an estimate for all potential greenhouse gas emissions, as these are dependent on downstream use (e.g., utility electricity generation, industrial heating and electricity generation, residential heating and cooling, transportation, or use in petrochemicals, agrochemicals, asphalt, and lubricants).
- 2 Estimated potential carbon dioxide emissions from proved hydrocarbon reserves shall be calculated according to the following formula, derived from Meinshausen et al.:
  - 2.1  $E = R \times V \times C$ , where:
    - 2.1.1 E are the potential emissions in kilograms of carbon dioxide (kg CO<sub>2</sub>);
    - 2.1.2 R are the proved reserves in gigagrams (Gg);
    - 2.1.3 V is the net calorific value in terajoules per gigagram (TJ/Gg); and
    - 2.1.4 C is the effective carbon dioxide emission factor in kilograms CO<sub>2</sub> per terajoule (kg/TJ).
- 3 In the absence of data specific to the entity's hydrocarbon reserves, carbon content shall be calculated using default data for each major hydrocarbon resource published by the Intergovernmental Panel on Climate Change (IPCC) in its 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
  - 3.1 The entity shall use default carbon content values per unit of energy that is listed in IPCC Table 1.3 Default Values of Carbon Content, Volume 2: Energy, Chapter 1.
  - 3.2 The entity shall use calorific values per weight of hydrocarbon contained in IPCC Table 1.2 Default Net Calorific Values (NCVs) and Lower and Upper Limit of the 95% Confidence Intervals, Volume 2: Energy, Chapter 1.
- 4 The entity shall use engineering estimates to determine the weight of its hydrocarbons reserves in gigagrams, ~~such as the type of hydrocarbon reserves and its API gravity as published by the American Petroleum Institute.~~
- 5 For other assumptions required to estimate the carbon content of hydrocarbon reserves, the entity shall rely on guidance from the IPCC, ~~the~~ Greenhouse Gas Protocol, ~~U.S. Energy Information Agency (EIA),~~ or the International Energy Agency (IEA).

*EM-EP-420a.3. Amount invested in renewable energy, revenue generated by renewable energy sales*

- 1 The entity shall disclose the total amount spent, including capital and research and development expenditures, on renewable or alternative energy sources.
  - 1.1 Such disclosure generally corresponds to the renewable energy technology areas per C-OG 9.6 of the CDP Climate Change Questionnaire.
- 2 The entity shall disclose the sales generated from renewable energy sources.
  - 2.1 Such disclosure generally corresponds to the renewable energy strategic development areas Section C4.5a of the CDP Climate Change Questionnaire
- 3 Renewable energy is defined as energy from sources that are capable of being replenished in a short time through ecological cycles, such as geothermal, wind, solar, hydro, and biomass.
  - 3.1 For the purposes of this disclosure, the scope of renewable energy from ~~hydro and biomass sources are~~ is limited to the following:
    - ~~3.1.1 Energy from hydro sources that are certified by the Low Impact Hydropower Institute or that are eligible for a state Renewable Portfolio Standard.~~
    - ~~3.1.2 Energy from biomass sources is limited to materials certified to a third-party standard (e.g., Forest Stewardship Council, Sustainable Forest Initiative, Programme for the Endorsement of Forest Certification, or American Tree Farm System), materials considered “eligible renewables” according to the Green-e Energy National Standard.~~
    - ~~3.1.3 Version 3.1 (2017), and materials that are eligible for a state Renewable Portfolio Standard.~~
    - 3.1.1 The entity shall consider the Green-e Energy National Standard as a normative reference, thus any updates to the Standard made year-on-year shall be considered updates to this guidance.
    - ~~3.1.4~~
- 4 The entity shall consider the CDP Climate Change Questionnaire a normative reference, thus any updates made year-on-year shall be considered updates to the guidance.

*EM-EP-420a.4. Discussion of how price and demand for hydrocarbons and/or climate regulation influence the capital expenditure strategy for exploration, acquisition, and development of assets*

- 1 The entity shall discuss how projections for price and demand for hydrocarbon products and the path of climate regulation influence the entity's capital expenditure (CAPEX) strategy.
  - 1.1 This discussion should include the entity's projections and assumptions about future hydrocarbon prices and the likelihood that certain price and demand scenarios occur.

APPENDIX B OF [DRAFT] IFRS S2 CLIMATE-RELATED DISCLOSURES

- 2 The entity shall discuss the implications of how price and demand scenario planning (i.e., EM-EP-420a.1) may affect decisions to explore, acquire, and develop new reserves.
- 3 The entity may discuss factors that materially influence its CAPEX decision making, including, but not limited to:
  - 3.1 How the scope of climate change regulation—such as which countries, regions, and/or industries are likely to be impacted—may influence the type of hydrocarbon on which the entity focuses its exploration and development
  - 3.2 Its view of the alignment between the time horizon over which price and demand for hydrocarbons may be affected by climate regulation and time horizons for returns on capital expenditures on reserves
  - 3.3 How the structure of climate regulation—i.e., a carbon tax versus cap-and-trade—may differently affect price and demand, and thus the entity's capital expenditure decision making
- 4 The entity may discuss how these trends affect decision-making in the context of different types of reserve expenditures, including development of assets, acquisition of properties with proved reserves, acquisition of properties with unproved reserves, and exploration activities.
  - 4.1 The entity shall discuss capital expenditures, regardless of the accounting method it uses (i.e., full cost or successful efforts).