Leading a Responsible Energy Future

2020 CLIMATE-RELATED RISK ANALYSIS

CHESAPEAKE ENERGY

The Future is Natural Gas

Energy is one of the most fundamental drivers of modern society. Yet in 2019, 770 million people worldwide had no access to electricity, according to the International Energy Agency.

To adequately power our planet in the years ahead, we'll need to significantly increase energy supply, while also responding to the growing risks of climate change. Concerns about GHG emissions and abiding by the framework of the Paris Agreement — which seeks to keep the increase in global temperatures below 2 degrees Celsius above pre-industrial levels — will continue to encourage global energy change.

Chesapeake supports the ambitions of the Paris Agreement, recognizing that we have an important role to play in addressing climate change risks, while providing affordable, reliable energy to all.

Natural gas' readiness to meet global energy needs and its record as the cleanest-burning fossil fuel make it a key part of the solution for projected energy growth in a lower carbon future. Also, the U.S. natural gas industry's environmental performance continues to improve — primarily due to voluntary emissions reductions programs, a strict regulatory environment and active stakeholder involvement — further promoting the global adoption of this fuel.

In the last 30 years in the U.S.[1]

96%
Increase in natural gas production

17%
Decrease in U.S. methane emissions

Replacing coal with natural gas for power generation has been a significant driver in this success, leading to a 30% decrease of GHG emissions since 2005.[2]

Shifting from coal to natural gas resulted in the U.S. reaching its 2025 emissions reduction target (the EPA's response to the Paris Agreement under the Obama administration) eight years faster than projected.[3]

The U.S. is a catalyst for this type of success. Although global demand for natural gas declined in 2020 by 1.9% from 2019 levels, a rebound is expected due to fast-growing liquified natural gas (LNG) markets in Asia and other European countries. U.S.-produced natural gas is expected to help meet demand because of its lower cash costs, availability and transportation infrastructure.[4]

With a production mix weighted toward natural gas, Chesapeake is proud to be a leader in meeting global demand and addressing energy poverty, while helping to reduce global GHG emissions.

"We firmly embrace a lower carbon future and believe our portfolio is uniquely positioned to help responsibly supply the energy that is needed across the globe today." – CEO Nick Dell'Osso

(1) Jacobs, Nicole. "EPA: Oil and Natural Gas Methane Emissions Fall Despite Record Production." *Energy In Depth*, April 19, 2021.
(2) "U.S. Power Sector Sees Impressive Carbon Emission Reductions Amid Natural Gas Growth." *Energy In Depth*, accessed September 23, 2021.
(3) "Power Sector Carbon Index." *Carnegie Mellon University*, accessed September 23, 2021.
(4) "Global Energy Review 2021: Natural Gas." *IEA*, accessed September 23, 2021.

Dedicated Leadership, Strong Governance

Our comprehensive climate governance includes accountability and ownership at every level, from our Board of Directors to the employees that impact our operations every day.

Board of Directors Oversight

Chesapeake's Board of Directors has ultimate oversight of our strategy, planning and engagement around climate change and its related impacts.

Our Board's Environmental and Social Governance (ESG) Committee takes active ownership in engaging with our executive team and organizational leaders to manage and mitigate climate risks. This committee meets at least quarterly to discuss climate risks and opportunities, among other ESG topics. Relevant findings, progress and issues are raised to the Board-at-large or shared with other Board committees as needed.

Board-level Climate Discussions

- Climate-risk management and mitigation
- Emissions reduction practices
- Business continuity
- Climate change regulatory positions and trade association alignment
- Goal-setting and progress made
- Executive compensation tied to climate-related goals
- Market sensitivity analysis

Although the Board's ESG Committee takes the lead on climate oversight, each of our Board committees has climate performance as part of its responsibilities.

Audit Committee

Reviews climate-related risk as part of the enterprise risk management (ERM) process

Compensation Committee

Incorporates climate-related goals as part of our executive and employee compensation programs

Nominating and Corporate Governance Committee

Considers climate and other ESG-related experience when considering new Board directors

ESG Committee

Has complete oversight of our climate performance, from managing and mitigating climate risk to confirming progress toward our ESG goals

In 2021, our Board-at-large approved ambitious ESG goals, ultimately directing our company to reach net zero direct (Scope 1) GHG emissions by 2035.

Executive Management and Employee Leadership

Our CEO and executive leadership team (ELT) lead our climate performance, providing strategic direction and accountability to our business units. They also direct our climate-related planning process to address climate risks and opportunities.

Although our CEO and ELT work together to champion our climate-related efforts, their individual responsibilities help to ensure comprehensive coverage and planning related to this important issue.

CEO	ELT
Reviews forecasting and market sensitivity analysis	Oversees the ERM process assessing climate-related risk and mitigation plans
Directs long-term, strategic planning and ensures climate is factored when considering acquisition and divestiture opportunities	Confirms compliance related to emissions-reduction efforts and reporting
Confirms progress toward ESG goals	Advises on public policy engagement and trade association membership/advocacy
Manages the Environmental team; the Vice President of HSER reports directly to the CEO	Manages Internal Controls and Internal Audit teams, as well as the Director of Government & Regulatory Affairs
Reviews and approves our annual sustainability report, including our TCFD disclosures	Reviews and approves our annual sustainability report, including our TCFD disclosures

Pay-for-Performance

Emissions reduction goals and other ESG targets are central to our executive compensation program. In fact, we limit payout if critical ESG metrics, including GHG intensity reductions, are not met.

We include climate-related targets as part of our employee incentive plan as well. New for 2021, the company must meet certain ESG metrics before employees are eligible for “above” target bonus payouts, regardless of performance in other areas of the business.

Beyond our ELT, Chesapeake employees care deeply about improving our climate performance. At our business unit level, we have several departments with dedicated climate-related job responsibilities, including our Environmental, Government & Regulatory Affairs, and Compliance teams.

Core to our culture of collaboration, we also have two internal committees focused on ESG strategy and improving our climate performance.

ESG Advisory Board

Made up of cross-disciplinary senior leaders and chaired by our Vice President of HSER, the ESG Advisory Board provides management-level leadership and oversight of the company's ESG performance.

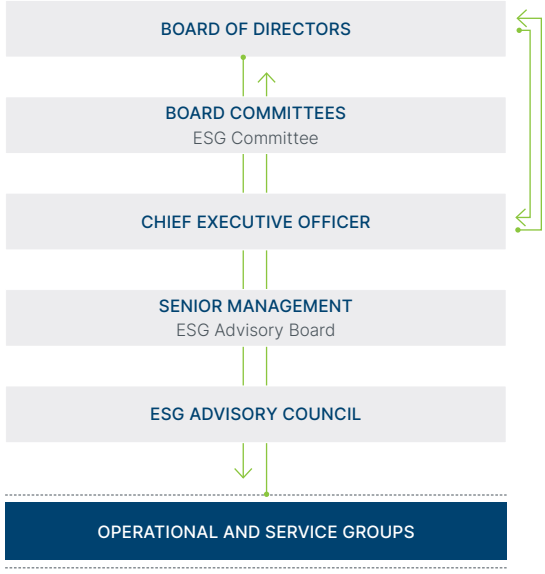
Specific to climate, this board establishes and implements climate policy strategy, aids in decision-making regarding emissions management and adopting energy efficiency solutions, approves emission reduction projects and helps to communicate with stakeholders.

The group meets regularly to ensure ongoing attention to monitoring, managing and reporting major ESG issues and validates the company's ESG disclosures.

ESG Advisory Council

Subject matter experts from multiple disciplines make up our ESG Council. Many of these experts are on the front lines of our ESG efforts, putting into practice the company's strategy and championing ESG initiatives and programs, including our emissions reduction efforts. The council meets weekly for consistent accountability and company integration.

Accountability at All Levels



Managing Climate-Related Risk

Guided by our long-standing ERM program, Chesapeake takes a methodical approach to identifying, assessing and managing ESG risks, including climate-related risks. Risk identification is the responsibility of all Chesapeake team members according to our Three Lines of Defense model, with several teams specifically tasked with recognizing and managing risks related to climate change.

Three Lines of Defense Model Business Plans and Strategy		
1st Line of Defense *Operational and service groups* Identify and control risk at the front lines of the organization	**2nd Line of Defense** *Internal Controls team* Provides impartial enterprise risk and compliance analyses	**3rd Line of Defense** *Internal Audit team* Uses a standardized, objective process to identify risk-based audits of department and business unit controls and processes; reports directly to the Board's Audit Committee

Understanding ERM

Through ERM, internal risk owners identify, review and assess the company's risks. These risks are then linked to core ESG categories and regularly reviewed at the executive level to ensure strategy alignment and responsive risk mitigation.

The Board's Audit Committee also reviews pertinent risks and mitigation plans at least quarterly through our ERM process. This reporting allows the Board to analyze the company's material risks and direct business strategies accordingly.

Assessing Emerging Risks

On an annual basis, all leaders within the organization participate in risk surveys to review current risk drivers and identify any emerging risks. The ERM team also performs subject matter expert interviews across the organization to ensure a comprehensive process for risk identification.

When identifying enterprise-wide risks, we measure severity based on four characteristics. This process helps to ensure company-wide alignment on risk priority.

If a risk requires mitigation, we develop and execute specific plans to reduce the risk to an acceptable level.

Risk Measurement Characteristics

Impact	Likelihood	Velocity	Response Maturity
Expected effects	Potential for risk to occur	Speed of impact	Evaluation of controls and response plan in place to mitigate risk

Identifying Climate Risks

As part of our ERM process, Chesapeake has identified several climate-related risks that could impact our business. They include:

- **Transition risks:** Transition risks relate to the shift to a lower carbon energy supply.
- **Reputation risks:** Poor ESG performance could damage our corporate reputation among consumers, investors and other stakeholders.
- **Market risks:** Demand for oil and natural gas could be negatively impacted by market incentives to use alternative energy sources.
- **Physical risks:** These risks physically impact our operations, such as extreme weather conditions.

For the purposes of this report, we categorize climate-related risks according to the timelines below.

Defining Risk Horizons

12	1 – 3	5+
Less than 12 months	Years	5 or more years
Short-term	Medium-term	Long-term

Following our ERM process, once we identify a risk, we evaluate it against our risk-measurement characteristics. These characteristics closely mimic recommended TCFD disclosures.

Risk	Impact	Potential Timing	Mitigation Strategies
Transition *Regulatory and legislative*	Increased operating costs due to stricter controls, taxes or carbon pricing	Short- to Medium-term	Policy engagement, emissions reduction practices, new technology adoption
Reputation *Inadequate ESG standards and processes*	Negative corporate reputation perception, loss of access to capital and increased stakeholder activism	Short- to Medium-term	Emissions reduction practices, stakeholder engagement and reporting transparency, new technology adoption
Market *Lower demand*	Depressed prices affecting our financial performance	Medium- to Long-term	Market sensitivity analysis, diversified portfolio, RSG as market differentiator, hedging activity
Physical *Extreme weather*	Damage to facilities, disruption of operations and/or safety incidents	Short-term and ongoing	Business continuity and disaster recovery planning, facility design, emergency preparedness

Transition Risk

As the global economy shifts to a lower carbon future, legislative and regulatory proposals could restrict or tax GHG emissions and increase our operating costs relative to obtaining permits, operating our equipment and facilities, and adopting new technology.

At the federal level, the EPA has issued regulations that require us to establish and report a prescribed inventory of greenhouse gas emissions. These regulations, including any new potential controls on methane or carbon dioxide emissions, could expand because of goals set forth in the Paris Agreement. States may also pursue the issue directly or indirectly, enacting localized regulations governing or restricting greenhouse gas emissions.

Mitigation: We manage our regulatory risk through policy collaboration, supporting science-based research and adopting innovative technologies to reduce our footprint.

Policy Engagement	Research	Innovation
Through our policy engagement, we collaborate with stakeholders to develop policies that meet mutually beneficial environmental goals. We define sound policy as regulations that are based on scientific research and remain effective and equitable across regulated industries. Regulations should also recognize the expected growth and need for modern, affordable energy, as well as the continued technological and innovative advancements of our industry.	We continue to partner with universities and other institutions to support scientific research that enhances our understanding of GHG emissions and climate change. Our most recent partnerships have focused on the study of methane detection and reduction.	To meet regulatory requirements and voluntarily reduce emissions, we've adopted a number of innovative technologies to better detect emissions and prevent leaks or loss. Some of these technologies include continuous methane emission sensors, pneumatic retrofits, a comprehensive leak detection and repair (LDAR) program with FLIR cameras and our WellTender mobile app.

Opportunity: We view policy engagement as an opportunity to influence lasting and effective change. Chesapeake supports thoughtful, constructive federal regulations related to both GHG and methane emissions that encourage performance-based criteria to allow companies flexibility in determining the most efficient approach to achieving a determined metric. We also encourage complementing existing regulatory frameworks as opposed to creating duplicative systems.

Our focus is collaborative, which is why we work with trade associations and other organizations to partner with government in developing regulations. We endorse both API and AXPC's Climate Policy and Principles as a guide for our climate advocacy efforts, and support policy that facilitates meaningful GHG emissions reductions; balances economic, environmental and energy security needs; and promotes innovation.

In addition to policy engagement, we'll continue to voluntarily reduce our emissions through technology adoption and continuous improvement programs such as pursuing responsibly sourced gas (RSG) certification. Our pledges to end routine flaring across our operations and reduce our methane intensity and GHG emissions are also significant steps to reducing our climate-related impact.

Reputation Risk

Market and social pressures related to the transition to lower carbon energy may result in increased reputational risks for our industry and decreased access to capital. In particular, poor ESG performance may lead to subpar ratings from organizations that track ESG-related performance, impacting investment recommendations and actions by key investors, analysts and stakeholders. Negative ESG publicity may also affect public sentiment and, in turn, a company's social license to operate.

Mitigation: We're committed to transparent stakeholder engagement and forward-looking programs that promote ESG excellence.

Stakeholder Engagement

Through regular engagement, complemented by active listening, we respond to stakeholder concerns and continue to improve our operations.

Reporting Transparency

Each year we evolve and enhance our sustainability reporting to drive greater transparency. For our 2020 data, we consulted with an independent, third-party organization to review and verify our GHG intensity, methane intensity, TRIR and spills metrics. This added layer of accountability provides assurance for our highest-profile ESG performance metrics.

Proactive ESG-focused Programs

To meet our climate-related pledges, we continue to build upon our emissions reduction practices and adopt new ESG programs. One example is commitment to pursue RSG certification of production in our two natural gas basins. This independent certification verifies that our gas was produced to the highest ESG standards, meeting strict emissions requirements, among a number of additional factors. RSG also provides additional data assurance as part of the certification process.

Opportunity: We were the first company to announce a commitment to pursue RSG certification across two major shale basins, with a goal of completion by the end of 2Q 2022. We'll deliver on this commitment while also continuing to enhance our sustainability reporting. We're participating in industry efforts to standardize ESG reporting, particularly related to emissions, and increasing our communications to key stakeholders about our reporting. We commit to reporting our ESG performance at least annually, providing progress on our climate-related pledges to reach net zero direct GHG emissions by 2035.

Market Risk

The demand for oil and natural gas could be negatively impacted by regulatory or market incentives to conserve energy or use alternative energy sources in combating climate change. Lower demand for our products could temporarily or permanently reduce pricing should a significant share of energy reliance shift to other sources.

Mitigation: Thoughtful, long-range planning and strategic financial analysis, coupled with our diverse portfolio, allow us to reduce market volatility risk.

Market Analysis

At least quarterly we conduct market sensitivity analysis during which we evaluate our operational strategy and business portfolio against a number of market factors that could impact company performance based on product demand and pricing effects. Should a scenario show an enhanced risk, we develop a targeted mitigation plan.

Hedging

We strategically protect our capital program by using hedging to offset downside risk. By locking in future market prices, we protect our capital program and affiliated revenue should there be a dip in demand or a significant negative shift in oil and natural gas pricing.

Diversified Portfolio

Our diverse portfolio allows us to shift to the most profitable asset based on changes in market demand. By having both oil and natural gas assets in basins across the U.S., we can better react to market volatility.

Opportunity: We expect to be a significant producer of RSG, a differentiated product that we believe will increase in demand as our market adapts to a lower carbon future. Not only will we have significant volumes of certified RSG in our portfolio, but this production is strategically positioned near LNG terminals to meet the growing global interest in responsibly produced fuel. We also plan to apply the innovative technology used to fulfill our RSG certification to our mixed (oil and natural gas) assets to further improve our overall environmental performance.

Physical Risk

Climate change may produce global physical effects, such as higher sea levels, increased frequency and severity of storms, droughts, floods and other extreme weather events. If any of these effects occur in our operating areas, we could experience an incident at our sites, including safety or environmental concerns, downtime or damaged equipment. Our operational resources could also become limited or disrupted, affecting our production and financial performance.

Mitigation: Through the adoption of advanced technology, stringent processes to promote operational resilience and emergency preparedness, we protect our sites against physical risks.

Facility Design

Our facility-design standards require several elements to protect our operational equipment from extreme weather-related events. Some of these elements include the installation of catenary protection systems to reduce the risks of lightning strikes; cables anchoring tanks to concrete bases for protection during flooding; operational weatherization measures to protect against freezing temperatures; elevated berms for secondary containment if a spill occurs; and solar panels to power remote monitoring and shutdown capabilities if other power is lost.

Emergency Response Planning

Should extreme weather cause an emergency at one of our sites, our Emergency Response Plan (ERP) provides employees with the framework and action steps critical for responding to incidents in a safe, effective and efficient manner.

Business Continuity

While it's our goal to continue operations during an emergency, sometimes we must temporarily shut down a site or facility. If an emergency requires a prolonged closure, we utilize our business continuity and disaster recovery process to maintain critical operations. Our recovery team assesses the business impacts of certain risks, including extreme weather, and develops enterprise response and recovery plans to reduce potential associated impacts. These plans can include arranging alternate workspace, providing a secondary power source, or engaging with employees outside of our standard communication channels.

Opportunity: With a geographically diverse portfolio and nimble operating structure, we can efficiently shift resources should a weather emergency significantly impact one of our basins. Although we believe our mitigation plans would not require the shut-in of wells or production, should this need occur, we're well-equipped to make the operating changes necessary to continue to meet market demand through another Chesapeake asset.

Portfolio Resilience:
Using Scenarios to Understand Risks, Opportunities

Along with the COVID-19 pandemic and a steady push to adopt new policies encouraging a lower carbon future, climate-related uncertainties continue to impact the domestic oil and natural gas sector. To best mitigate these uncertainties, we conduct a robust scenario analysis to assist in quantifying climate-related risks and opportunities and provide additional perspective on how a lower carbon future may impact the company's long-range business plans and portfolio optimization.

For our long-term planning, Chesapeake considers a variety of energy and policy forecasts and analyses from public and private institutions. However, for purposes of this climate-related report, we used scenarios from the International Energy Agency's (IEA) 2020 World Energy Outlook (WEO) to test our portfolio resiliency. Recommended by the Task Force on Climate-related Financial Disclosures (TCFD), this outlook includes climate change policies that align with the goals of the Paris Agreement.

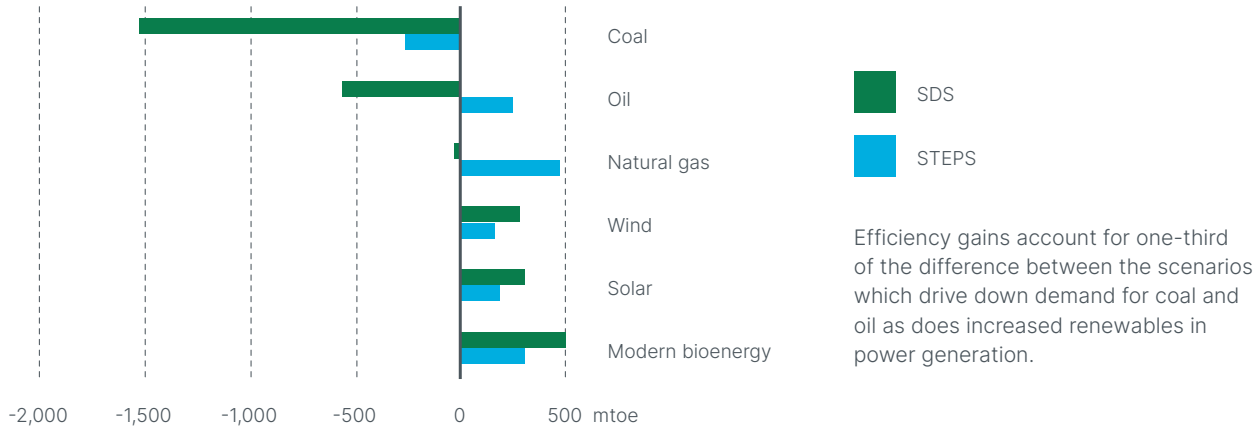
While the 2020 WEO presents four unique scenario assessments, we based our analysis on the two scenarios we believe are pre-eminent benchmarks for projecting oil and natural gas demand and offer the most realistic view of future outlooks. The two referenced WEO scenarios include predicted fluctuations of product price and energy demand through 2040. Emissions impact is also analyzed, including measuring each scenario's ability to meet Paris Agreement objectives.

- The **Stated Policies Scenario (STEPS)**, which reflects current policy intentions and targets, includes the Nationally Determined Contributions Under the Paris Agreement, and assumes that the pandemic's impact to public health and the economy is gradually under control in 2021.

- The **Sustainable Development Scenario (SDS)** considers a surge in clean energy policies and investment that places the energy system on track to achieve sustainable energy objectives in full, including the Paris Agreement, while maintaining the same public health assumptions as the STEPS scenario.

Under the 2020 WEO modeling scenarios, oil and natural gas will remain a significant source of the energy makeup through 2040. With this, the STEPS scenario depicts world supply, demand and commensurate pricing for both oil and natural gas to realize a moderate uptick through 2040. However, the SDS scenario depicts a moderate decline in both world oil and natural gas supply and demand through 2040.

Change in Total Primary Energy in the Stated Policies and Sustainable Development Scenarios, 2019 – 2030[1]



Efficiency gains account for one-third of the difference between the scenarios which drive down demand for coal and oil as does increased renewables in power generation.

Although these scenarios provide studied constructs of the future, they're not forecasts. They represent a potential future, identifying possible trends or factors that could influence business models should a scenario's key assumptions occur.

Oil Demand and Pricing

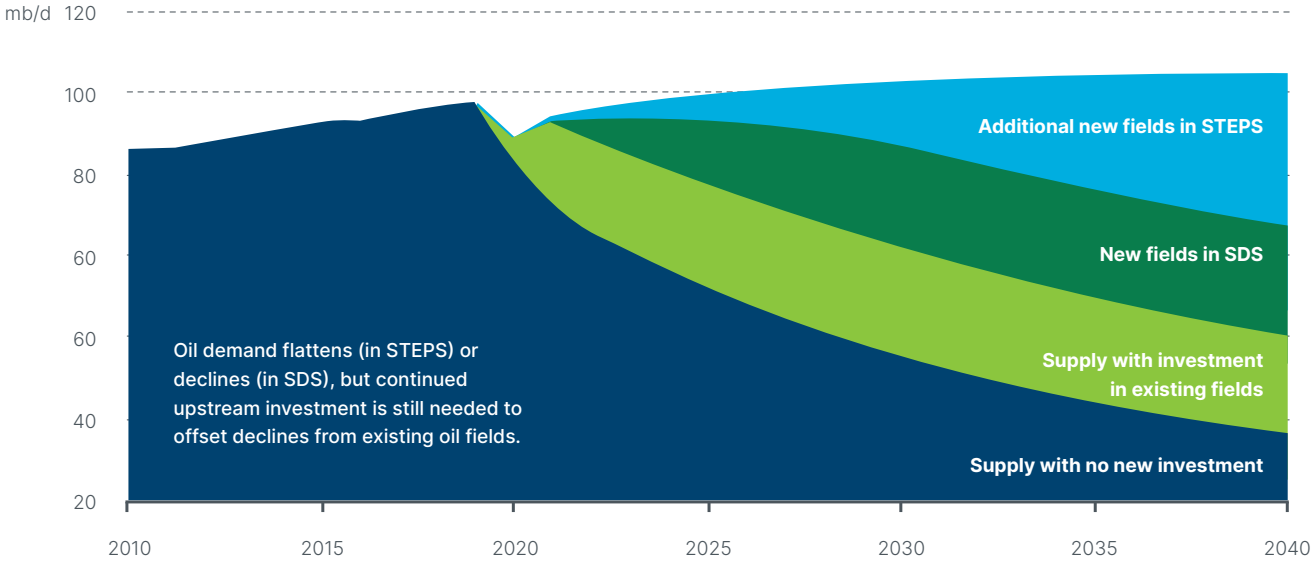
While global oil demand has increased for decades, impacts due to the COVID-19 pandemic and public policies supporting a lower carbon future have begun to stall growth. However, even with the carbon reductions identified in IEA's 2020 SDS scenario, oil continues to supply 23% of the world's primary energy demand in 2040, as opposed to the 31% makeup in 2019. In fact, while the SDS scenario projects lower oil demand in the 2040 timeframe, the IEA states that "decline in production from existing fields creates a need for new upstream projects, even in rapid energy transition."

Oil and Total Liquids Demand and Supply by Scenario (mb/d)[1]

	STEPS		SDS	
	2025	2040	2025	2040
World oil demand	99.9	104.1	92.5	66.2
World liquids demand	102.8	109.2	96.9	73.6
World oil production	97.5	101.3	90.2	64.4
World oil supply	99.9	104.1	92.5	66.2

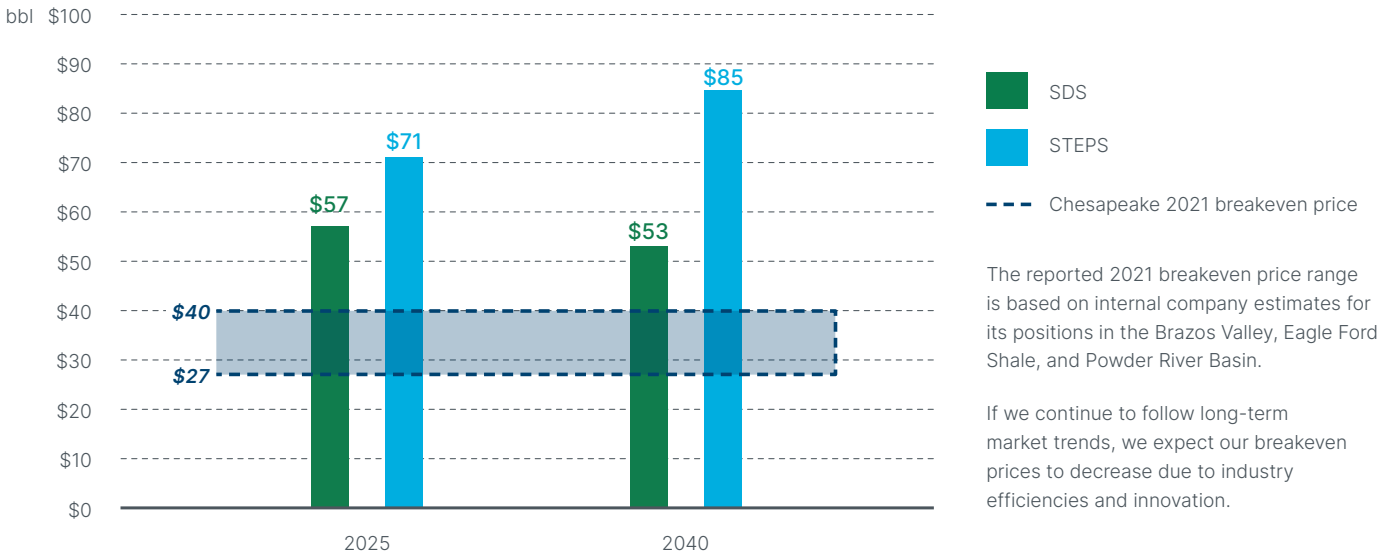
IEA anticipates a continued increase in oil demand under the STEPS scenario, with demand rising to pre-pandemic levels around 2023. After this time, demand is projected to rise by 0.7 mb/d each year on average through 2030, where it then reaches a plateau with annual growth tapering off to 0.1 mb/d per year.

Global Oil Demand by Scenario and Declines in Supply from 2019[1]



Even with oil demand peaking around 2023 according to the most stringent SDS scenario, the analysis suggests that companies developing high-value projects at streamlined costs will continue to remain competitive. In fact, upstream oil and natural gas investment is currently projected to average about $320 billion in 2021, approximately 20% lower than the past five-year period. Assuming there will be a significant capital push to drive a lower carbon future in the energy sector, IEA's SDS continues to call for approximately $400 billion per year in upstream oil and natural gas investment.

Oil Price by Scenario[1]
as compared to Chesapeake breakeven pricing



The reported 2021 breakeven price range is based on internal company estimates for its positions in the Brazos Valley, Eagle Ford Shale, and Powder River Basin.

If we continue to follow long-term market trends, we expect our breakeven prices to decrease due to industry efficiencies and innovation.

Based on the pricing data provided and using conservative planning assumptions, we believe Chesapeake will continue to offer efficient investment returns through even the most restrictive scenarios' end date of 2040. This demonstrates both the robust nature and allocation optionality that exists today with Chesapeake's current portfolio, as well as our proven history of flexibility to respond to new innovations and changes in the energy landscape.

Natural Gas Demand and Pricing

While natural gas supply and demand fare best among fossil fuels under the two 2020 WEO scenarios, different policy contexts produce strong variations for the fuel's outlook through 2040. These outlook impacts are largely dependent on a few key factors, including:

- A push to improve air quality and support growth in manufacturing, combined with the expansion of gas infrastructure and demand for fuel in emerging markets and developing economies.
- Broad variability in the supply of associated gas, given the pricing and supply/demand balance regarding oil.
- Achieving a smooth balance between liquified natural gas (LNG) supply and demand, based on infrastructure, financing and policy constraints.
- Reduced long-term opportunities for coal-to-gas switching in developed economies due to stimulus spending directed toward renewables and a push for greater transparency and enhanced methane emissions abatement throughout gas-supply chains.
- Opportunities for the natural gas industry to retool itself via demonstrable progress with developments such as low-carbon hydrogen and carbon capture, utilization and storage (CCUS).

Under the STEPS scenario, global natural gas demand increases through 2040; however, under the more restrictive SDS, natural gas demand initially rises through 2025, then stabilizes and experiences moderate demand declines.

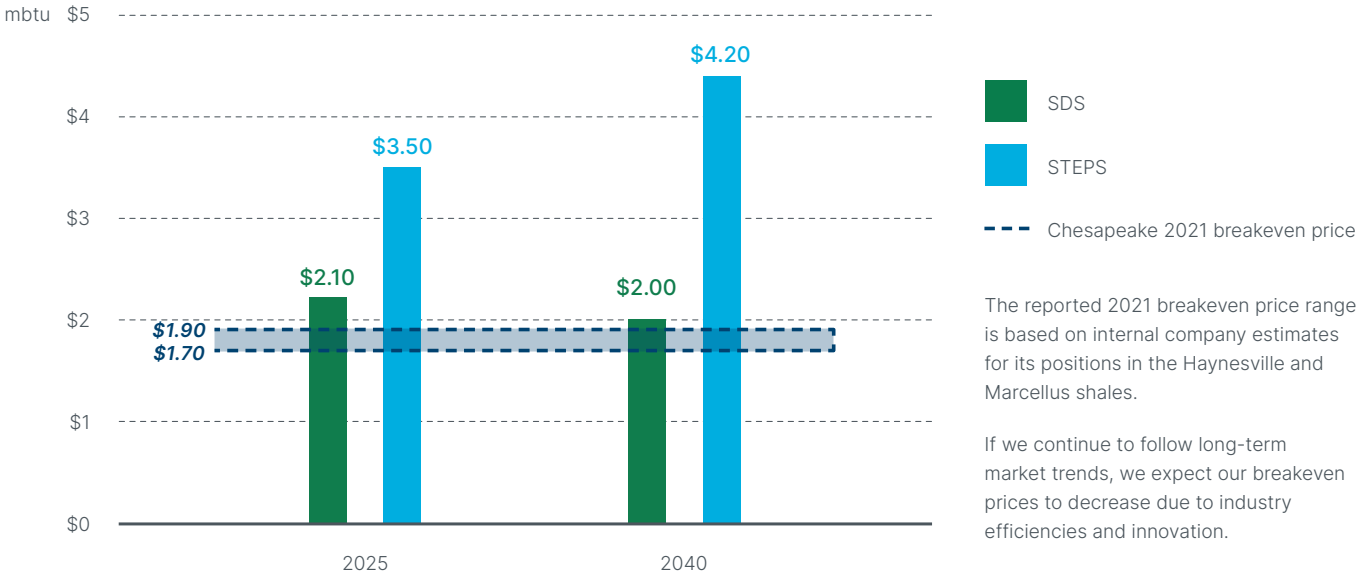
Natural Gas Demand and Supply by Scenario (bcm)[1]

	STEPS		SDS	
	2025	2040	2025	2040
World natural gas demand	4,358	5,221	4,166	3,554
World natural gas production	4,358	5,221	4,166	3,554

Natural gas fulfills 25% and 23%, respectively, of world energy demand in 2040 under the STEPS and SDS scenarios.

The STEPS scenario anticipates North America will remain the world's largest natural gas producer through 2040. The SDS scenario is largely the same, although natural gas production from Eurasia slightly eclipses North America in 2040.

Natural Gas Price by Scenario[1]
as compared to Chesapeake breakeven pricing



The reported 2021 breakeven price range is based on internal company estimates for its positions in the Haynesville and Marcellus shales.

If we continue to follow long-term market trends, we expect our breakeven prices to decrease due to industry efficiencies and innovation.

Similar to our oil price outlook, Chesapeake's cash-cost efficiency suggests a strong future for our natural gas projects. Chesapeake's current breakeven price reinforces the strength of our operational strategy and capital allocation flexibility as both demand and pricing evolve under these two scenarios.

Based on our 2020 scenario planning analysis, we're confident that our portfolio of assets will continue to deliver strong returns well into the future. It's also highly unlikely that we'll have any "stranded" assets as we align globally with the ambitions of the Paris Agreement.

(1) Based on IEA data from World Energy Outlook 2020 © OECD/IEA 2020, www.iea.org/statistics, all rights reserved, as modified by Chesapeake Energy Corporation

Climate Metrics:
Measuring Our Impact

We use performance metrics to measure our progress, recognize trends and identify opportunities for improvement. Our climate-related metrics help to inform the action steps needed for us to ultimately achieve our net zero direct GHG emissions goal.

Defining Our Metrics

- **Scope 1 emissions:** Direct GHG emissions that occur from Chesapeake's operations; most often these sources are from flared hydrocarbons, other combustion, process emissions, fugitive emissions and other vented emissions.
- **Scope 2 emissions:** Indirect GHG emissions associated with the purchase of electricity to support our operations.
- **Scope 3 emissions:** Indirect GHG emissions from the combustion and use of the oil and natural gas we produce.
- **Methane intensity:** The ratio of direct methane emissions to gross natural gas produced; it may be referred to as the "loss rate."
- **GHG intensity:** The ratio of direct GHG emissions released to gross annual production.
- **Routine flaring volume:** The amount of natural gas flared from the primary separator; flaring is the regulated and controlled combustion of natural gas.
- **Routine flaring intensity:** The percentage of natural gas flared from the primary separator.

Our Performance

All data is for calendar year 2020 unless otherwise stated. Certain performance data may have been impacted by the COVID-19 pandemic and the associated reduction in drilling and production activity.

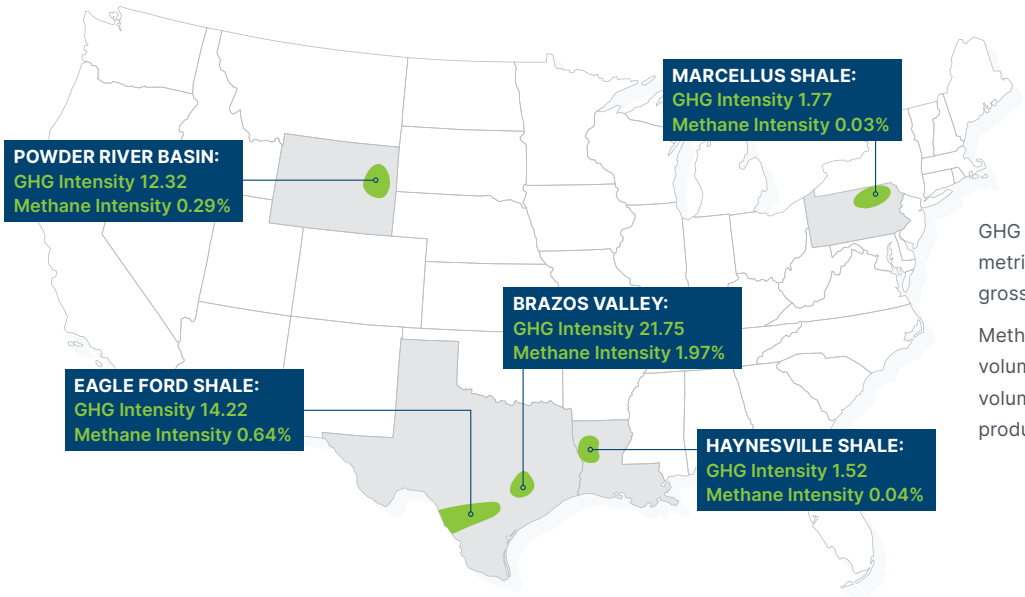
The EPA regulates all of our operations, including emissions, and we report Scope 1 emissions to the EPA's GHG Reporting Program as required by law. The reporting of certain other emissions, such as Scope 2 emissions, is not required, but we voluntarily report them in this analysis. For our 2020 data, we consulted with a third-party organization to review and verify our GHG emissions, GHG intensity and methane intensity to help ensure reporting accuracy.

Scope 1 GHG Emissions

As reported under the EPA's GHG Reporting Program

	2020	2019	2018	2017
Scope 1 GHG emissions (million metric tons CO_2e)	1.86	2.81	2.55	3.22
GHG intensity (metric tons CO_2e / gross mboe produced)	6.0	8.2	7.2	9.1
Methane intensity (volume methane emissions / volume gross natural gas produced)	0.13%	0.17%	0.16%	0.19%

2020 GHG and Methane Intensity by Operating Area



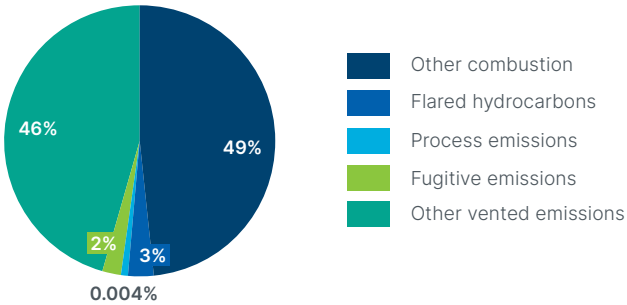
GHG Intensity: metric tons CO_2e / gross mboe produced

Methane Intensity: volume methane emissions / volume gross natural gas produced

Given the dynamic and complex nature of our business, it's understood that GHG emissions occur from several different sources. The Sustainability Accounting Standards Board, in its standard disclosures for our industry, identified five distinct pathways to the atmosphere that are newly incorporated into Chesapeake's corporate sustainability performance data.

In addition to providing added transparency to our stakeholders, disclosing source types helps us to identify the technologies and design solutions that best mitigate these.

2020 Scope 1 Direct GHG Emissions Sources



2020 Routine Flaring Metrics

Metric	2020
Gross annual volume of flared gas (mcf)[1]	711,934
Flaring intensity – gross annual volume of flared gas (mcf) / gross annual production (mcf)	0.05%
Flaring intensity – gross annual volume of flared gas (mcf) / gross annual production (boe)	0.002

Scope 2 GHG Emissions

2021 is the first year Chesapeake reported Scope 2 indirect emissions. We're committed to continuing to report this metric moving forward.

Metric	2020
Scope 2 emissions (million metric tons CO_2e)	0.063

Scope 3 GHG Emissions

As an independent, upstream company, Chesapeake has limited control over the final use and consumption of our oil and natural gas production. For enhanced transparency, we've reported our estimated indirect Scope 3 emissions on an equity basis using Category 11 of the *Estimating petroleum industry value chain (Scope 3) greenhouse gas emissions* reporting guidance by IPIECA/API (2016). The calculation methodology applies the Environmental Protection Agency's emission factors for listed fuel types. The estimated emissions reported represent the indirect end use greenhouse gas emissions of the products created from our crude oil and natural gas, Chesapeake's most material Scope 3 emissions category.

Chesapeake recognizes that stakeholder demand for reporting Scope 3 indirect emissions is rapidly evolving; however, it's important to note that emissions-estimation methodologies are uncertain and subject to double counting along our value chain. Double counting may occur when emissions already captured by other entities are reported in their Scope 1 or Scope 2 emissions.

Metric	2020
Scope 3 emissions (million metric tons CO_2e)	57

Targets:
Driving Progress, Improving Performance

In 2021, we announced ambitious targets as a pathway to Chesapeake achieving net zero direct (Scope 1) GHG emissions by 2035. We committed to this ambitious goal to make meaningful change, reduce our corporate impact and contribute to the climate change solution.

We set high standards for our climate performance, recognizing the responsibility entrusted to us by our stakeholders as we work to lead a responsible energy future.

Pathway to Net Zero Direct GHG Emissions

0
Routine flaring on wells completed in 2021 and beyond, enterprise-wide by 2025

5.5
GHG intensity by 2025
(tCO_2e/gross mboe produced)

0.09%
Methane intensity by 2025
(volume methane emissions/volume gross gas produced)

Achieving Our ESG Goals

Through a layered toolkit of technologies and best-management practices, we'll better detect and mitigate emissions in support of our 2025 timeline. Our emissions-reduction approach is holistic, recognizing the opportunities for improvement across our operations and operational lifecycle.

Mitigation Category	Action Step	Impact
Research Analysis	Conduct a basin-by-basin analysis of both proven and emerging technologies	Identification and implementation of a targeted blend of technologies specific to each asset for greatest efficacy
Operational Emissions Reductions	Improve facility design for efficiency	Reduced venting and flaring
	Reduce or capture pneumatic device emissions and emissions from pressure regulators	Reduced venting
	Capture associated gas	Reduced venting and flaring
	Minimize compression emissions	Greater efficiency and reduced combustion emissions
	Reduce well venting from liquids unloading using enhanced work practices and technologies	Reduced venting and flaring
	Utilize electricity to power drilling and completions fleets	Reduced diesel fuel use and associated emissions
	Evaluate the use of geothermal or renewable microgrid technology powered by solar/wind to provide baseload power	Reduced Scope 2 emissions through carbon-neutral power sources (increased efficiency)
Sequestration	Explore sequestration opportunities including enhanced oil recovery (EOR), carbon capture and utilization (CCU) or carbon capture, utilization and storage (CCUS)	Reduced emissions with increased production
RSG	Deploy continuous methane emissions monitoring technology	Enhanced leak detection and repair; reduced venting
	Partner with a third-party to verify emissions data	Greater accuracy for trend analysis and operational study
Collaborative Partnerships	Partner with the Gas Technology Institute (GTI) and other academic institutions working to enhance methane detection technologies	Improved reporting and data quality through collective efforts; opportunity to develop, test and optimize emerging technologies through a shared capital risk

Partnering for Progress

We recognize that supporting these programs requires significant research and development capital, which involves a certain degree of risk. We're committed to spending capital to deliver improved performance in this area, and we're also exploring pooling resources with other companies for more efficient technology analysis and development. Part of our partnership strategy is centered on looking beyond Chesapeake's core upstream business and exploring opportunities with our midstream and downstream providers and the end users of our fuel.

Additionally, we're exploring opportunities to engage partners outside the traditional oil and natural gas value chain, including project-origination opportunities such as regenerative agriculture, which may ultimately achieve significant carbon-abatement potential at a low marginal cost. Our analyses focus on the effectiveness of each prospective technology from a technical, operational and economic standpoint.

TCFD Context Index

Our climate reporting follows the Task Force on Climate-related Financial Disclosures (TCFD) framework. By disclosing through this framework, we offer high-quality information that enhances our transparency on the impacts of climate change to our business. We respond to each of the four TCFD disclosure categories noting our climate-related risks and opportunities.

Disclosure Category	Description	Disclosure Location
Governance	a) Describe the Board's oversight of climate-related risks and opportunities. b) Describe management's role in assessing and managing climate-related risks and opportunities.	Climate Governance
Strategy Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy and financial planning where such information is material.	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium and long term. b) Describe the impact of climate-related risks and opportunities on the organization's business, strategy and financial planning. c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	Climate Strategy & Risk Management, Portfolio Resilience
Risk Management Disclose how the organization identifies, assesses and manages climate-related risks.	a) Describe the organization's processes for identifying and assessing climate-related risks. b) Describe the organization's processes for managing climate-related risks. c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management.	Climate Strategy & Risk Management, Air Quality, Managing Risk
Metrics and Targets Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk-management process. b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks. c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	Climate Metrics, Targets, Performance Metrics