



QUANTUM
CAPITAL
GROUP

25th
ANNIVERSARY

Investing in a Brighter Future

2023 Environmental, Social & Governance Report



Contents

3

Introduction

CEO Letter	3
Quantum's Purpose, Vision & Values	4
ESG Progress	5
About Quantum Capital Group	6
Spotlight: Unlocking Value in Quantum & Across Our Portfolio Through Digital	10



11

Global Energy Perspective

Understanding the Dual Energy & Climate Challenge	12
Energy Drives the Modern World and Human Prosperity	13
Energy Poverty Results from a Lack of Energy Access	14
Climate Change is Real and Needs to be Addressed	15
Energy Has Many Different Forms with Unique Attributes	16
Energy Security Matters	17
Any Meaningful Energy Transition Takes Decades	18
Renewables and Electrification are Meaningful but not a Panacea	19
Traditional Energy Can and Will Continue to be Part of the Solution	22
Traditional Energy Can Decarbonize and Contribute to Solving the Dual Challenge	23
The World Has One Atmosphere and Must Work Together	24
Solving the Dual Challenge is Expected to Require Multi-Dimensional Solutions	25
How Quantum Addresses the Dual Energy Challenge	26

27

Integrated ESG Program

ESG Governance	28
Our ESG Strategy	29
ESG Factors	30
Spotlight: EQT Highlights Tug Hill Acquisition as "ESG Accretive"	31
Spotlight: Tanos' ESG Performance Added Value to Diversified Energy Purchase	32
Deal Sourcing, Due Diligence & Decision Making	33
Ownership & Responsibility	34
Portfolio Monitoring, Evaluation & Reporting	35
Spotlight: Partnering with Portfolio Company FigBytes to Enhance ESG Data Management	35



36

Portfolio Company ESG Performance

2022 Portfolio Company Highlights, At A Glance	37
Climate Risks & GHG Emissions	38
Spotlight: Partnering with Portfolio Companies to Reduce Regulatory Requirements	40
Water	44
Spotlight: Creating Tools to Improve Water Conservation While Reducing Costs	44
Human Capital Management	45
Spotlight: Trident Energy's Focus on Process Safety & Asset Integrity	46
Cybersecurity	48

49

Portfolio Company Case Studies

KODA Resources	50
Rockcliff	51
BeZero Carbon	52
Project Canary	53
Risilience	55
Carbon Direct	56

58

Corporate Disclosures

Portfolio Company Performance Table	59
-------------------------------------	----

60

Disclaimer

Disclaimer	61
------------	----



Letter to Stakeholders

Dear Stakeholders,

As we commemorate our 25th anniversary, we reflect on a legacy of transformative growth. Our steadfast commitment to adapt and grow in response to the dynamic needs of the energy sector, and the world at large, has been a constant throughout our journey. This commitment has enabled us to maintain a consistent track record of delivering attractive risk-adjusted returns for our investors, a testament to our rigorous investment approach and dedication to excellence.

Our progression over the years is notable, from a firm focused solely on oil and gas to a diverse enterprise managing four different funds and investing across the entire energy value chain. Our evolution is embodied in our new name – Quantum Capital Group – and underscores our continued commitment to the responsibly sourced production, energy transition, and decarbonization sectors – what we call the Sustainable Energy Ecosystem.

As stewards of capital to the energy industry, we understand that we can play a significant role in promoting positive change through our principal efforts to drive and protect the value of our investments, to the benefit of our investors and society. With an unwavering commitment to data science and digital automation, technical and operational excellence, and environmental, social, and governance (ESG) principles, we continue to responsibly manage our investors' capital and deliver differentiated returns while being the financial partner of choice for many of the energy industry's leading companies and top management teams.

Balancing Progress and Sustainability

Since the dawn of the industrial revolution, the world has been in a constant state of energy transition – or “energy addition” as we like to call it – continuing to add new forms of energy to meet the world's growing energy demand. As a civilization, we now find ourselves at a critical juncture, grappling with the dual challenge of curbing humanity's impact on the environment while concurrently meeting the ever-growing demand for affordable and reliable energy.

This increasing demand is driven by a multitude of interconnected factors. Our world population is projected to grow by more than 2 billion people by 2050. Additionally, as billions of people climb the economic ladder, their energy requirements increase as their living standards improve. Concurrently, we are grappling with the contrasting reality of energy poverty, with billions of people around the world living without access to affordable, reliable energy, detrimentally impacting their health, wellbeing, and quality of life.

This challenge is further complicated by the fact that most of the impending population growth will originate from the same areas already experiencing energy poverty. Our societal task is to ensure these burgeoning populations have access to the essential benefits and services that many of us take for granted, such as quality healthcare, proper nutrition, and a good education. The delivery of these services is inextricably linked to an affordable and reliable energy supply, reinforcing the pivotal role of energy in fostering human progress and facilitating socio-economic development.

There is no clear consensus on how to solve the dual challenge we face and the debate around the energy transition is varied, with some suggesting that we can and should transition away from traditional forms of energy in the coming years. At Quantum Capital Group, we firmly believe that movement away from fossil fuels, which currently supply about 77 percent of the world's energy, will not only take decades and meaningfully increase the cost of energy, but also may not be necessary given that we can integrate carbon capture and storage technology with natural gas and coal generation to turn these perceived-to-be less desirable energy sources into clean, baseload energy.

What we are really pursuing is an emissions transition from high greenhouse gas emissions energy to no or low emissions energy, while adding large amounts of wind and solar to the overall energy supply mix, alongside carbon capture and storage initiatives. In any case, we believe that tackling the dual challenge will require a globally coordinated approach that will include all forms of energy, including fossil fuels, renewable energy, and nuclear energy, as well as the continued development and adoption of innovative technologies that will help us develop and use energy more efficiently.

Our Mission and Commitments

We are proud to help deliver the energy that propels the world by investing capital across the Sustainable Energy Ecosystem. Our unique approach transcends the traditional role of a capital provider. We are holistic energy investors who form deep and strategic partnerships with our portfolio companies. We differentiate ourselves with exceptional execution capabilities, innovative technical and digital proficiencies and a meticulous method to identify, analyze, price, and manage risk. Our data-driven approach involves collecting and leveraging data across our entire energy portfolio, granting us what we believe to be a durable competitive advantage in a rapidly evolving sector.

At Quantum, our mission is unequivocally clear – to generate the best risk-adjusted returns for our investors. Appropriately including ESG in our investment framework is not saying we have a double bottom line, rather it is improving the bottom line.

Most people tend to only focus on the “environment” part of ESG, which we think is very important, but we also think there are a few more “E’s” worth considering, such as employees, economics, and exits. *Employees* – success in our investments is all about having the best people on the team and we have found that a properly constructed and aligned ESG program improves recruiting and retention and enhances employee morale and performance. *Economics* – ESG initiatives can help portfolio companies reduce costs and create additional revenue opportunities. *Exits* – public buyers are increasingly placing a focus on ESG and will prioritize assets which meet or enhance their ESG objectives.

Looking Ahead

As we continue to navigate and adapt to the ever-evolving energy landscape, our core values serve as our compass. We are excited to carry forward the legacy we have built over 25 years into the next chapter of our journey – a journey marked by evolution, not just in our name but in our approach, mindset, and impact.

We understand and respect the profound responsibility we carry as stewards of our investors' capital and our dedication to doing it responsibly and to making enduring contributions to the global energy system remains a powerful catalyst for our continued success. Our commitment to the Sustainable Energy Ecosystem is unwavering and our dedication to effecting positive change within the energy industry remains absolute.

To the Quantum team, our portfolio companies, and our partners who have accompanied us on this incredible journey – your dedication, innovation, and belief in what we do continues to inspire us. As we continue to work toward responsibly advancing today's energy for tomorrow's low-carbon world, we invite your ideas, perspectives, and engagement. We are deeply grateful for your continued support and trust.

Sincerely,



Wil VanLoh
Founder and CEO



Quantum's Purpose, Vision & Values

At Quantum, our purpose, vision and values are the guiding principles that define our commitment to success and sustainable growth. We believe that by aligning our investments with our core principles, we can create long-term value for our stakeholders, and achieve strong financial performance.



Values

Integrity

We do the right thing, remaining true to ourselves and our word even when the choice is not easy.



Excellence

We are a high-energy organization that is committed to being the best in whatever we do, always striving for exceptional performance results.



Purpose

Quantum's purpose is to advance today's energy ecosystem for tomorrow's sustainable world while delivering superior risk adjusted returns to our investors.



Humility

We understand our place in the world, respecting others and appreciating the value that diversity brings. We willingly acknowledge our mistakes and limitations.

Discipline

We are thorough and thoughtful in our work and decisions, remaining intensely focused on achieving our firm's goals and strategies.



Entrepreneurial

We are creative, competitive, flexible and nimble; willing to risk failure in order to pursue innovative solutions that have exceptional results.



Vision

Use our capital, expertise and influence to lead the world in addressing energy security and climate change to improve the lives of current and future generations.



Ownership

We are accountable for our individual results as well as those of our team. We take the initiative to make positive things happen, not waiting for others to act.

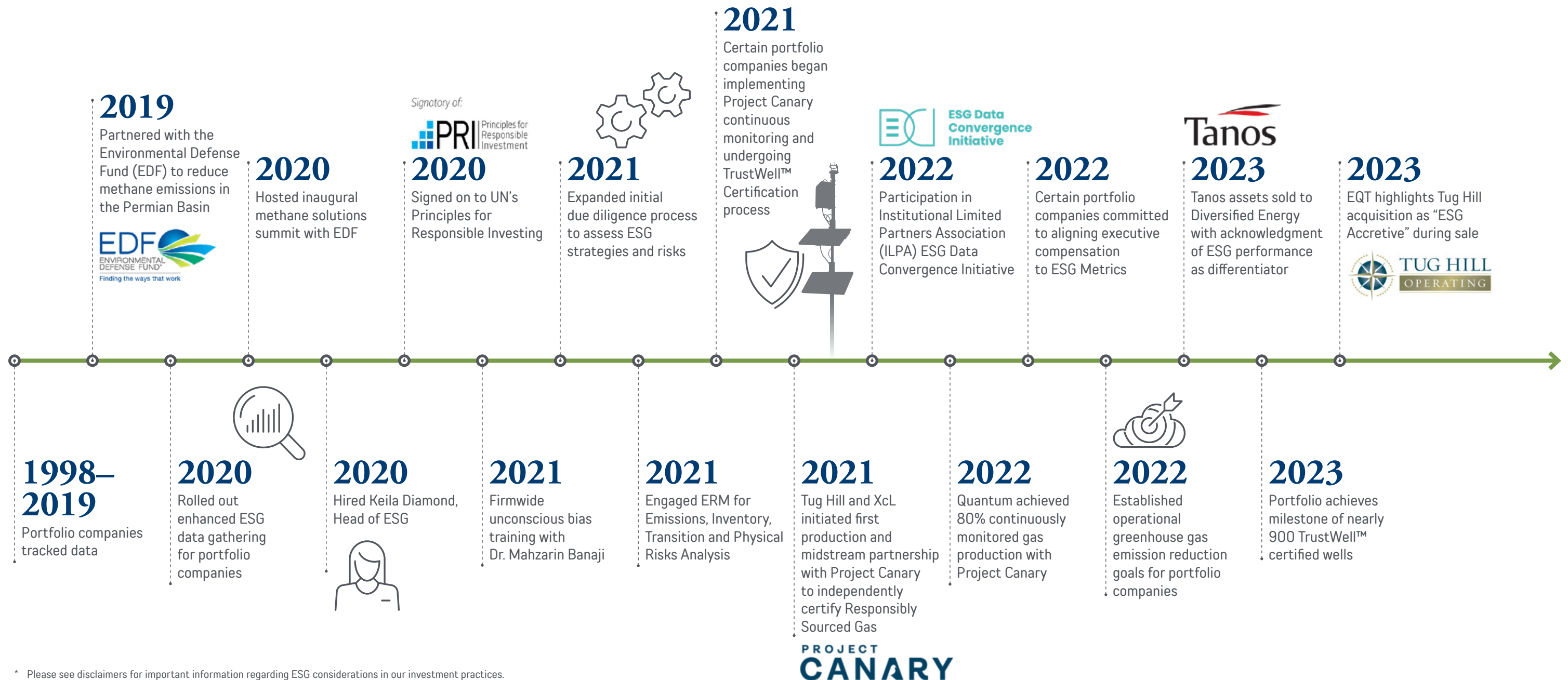
Collaborative

We effectively work together as a team, delivering outcomes that incorporate the best from everyone. We seek solutions that address the needs of all stakeholders.



ESG Progress*

As part of our commitment to ESG, we have made significant strides in integrating ESG considerations into our investment practices. We believe this has allowed us to mitigate risks and capitalize on emerging business opportunities. Our ESG progress is evident through the milestones we have achieved along our journey, demonstrating our commitment to ESG and our belief that it has a positive impact on Quantum’s long-term financial performance and the value we deliver to our limited partners.



* Please see disclaimers for important information regarding ESG considerations in our investment practices.

About Quantum Capital Group

Founded in 1998, Quantum Capital Group is a leading global provider of private capital to the responsibly sourced production, energy transition, and decarbonization sectors, what we call the Sustainable Energy Ecosystem.¹

Quantum has developed a platform of investment strategies to provide bespoke capital solutions to our partner companies. Our knowledge of the entire energy value chain and our ability to invest across the capital structure provides us with differentiated advantages. Through our investment vehicles, Quantum seeks to attract leading energy and sustainability entrepreneurs as partners.

Quantum also provides more than just capital to its portfolio companies. We pride ourselves on being value-add, hands-on partners. To facilitate this, we have built exceptional in-house capabilities. Our in-house Strategic Shared Services team works to propel our partner companies to a higher level with technical, digital, ESG, procurement, and marketing and hedging support.

\$23Bn

Commitments under stewardship since inception²

8

Flagship funds raised since 1998

130+

Portfolio companies formed since inception

45

Active investment platforms

116

Full-time employees and 11 senior advisors/operating partners

>1,700

Wells drilled across Quantum upstream portfolio companies over the past five years

>\$3.0Bn

Average annual capital expenditures over the past three years

>500,000BOE/D³

Current operated oil and gas production across all Quantum portfolio companies

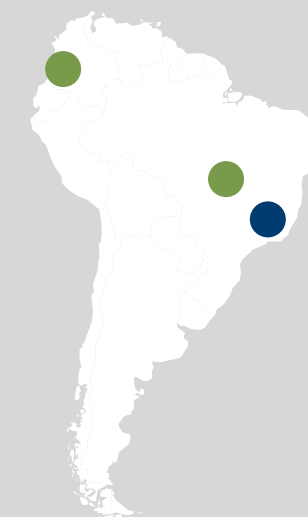
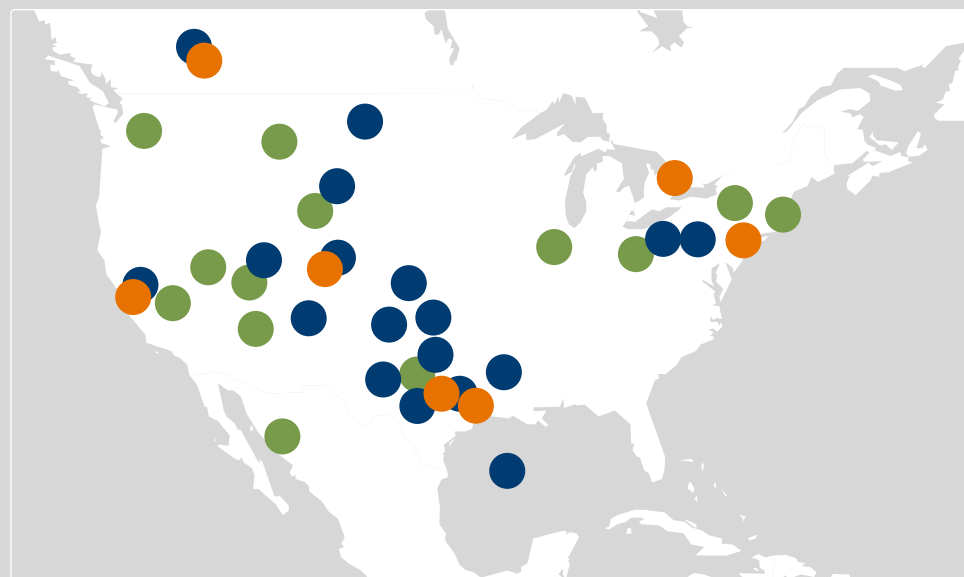
>35GW⁴

Operating and development portfolio gigawatts of solar, wind, and battery storage

2

Offices (Houston and New York City)

Our Geographic Footprint



● Oil & Gas ● Energy Technology ● Energy Transitions and Decarbonization²

¹ There is no guarantee that what Quantum refers to as the Sustainable Energy Ecosystem reflects the beliefs or values of any particular investor or third party. There are significant differences in interpretations of what "sustainable" means, and these interpretations are rapidly evolving.

² Represents committed capital from partners since inception through Quantum Energy Partners I–VIII, affiliated co-investment funds, select direct co-investment, Quantum Credit Solutions (QCS) and affiliated co-investment fund and Quantum Resources.

³ Includes Quantum portfolio companies and companies where Quantum Funds have a material ownership interest.

⁴ Includes pipeline of ConnectGen, a U.S. renewable energy platform which was sold to Repsol for \$768 million in September 2023.

About Quantum Capital Group *continued*

Quantum has developed a platform of investment strategies to take advantage of the wide variety of opportunities within the Sustainable Energy Ecosystem. Our knowledge of the energy value chain and our capability to invest across the capital structure provide us with differentiated competitive advantages.

Quantum Energy Partners

Private Equity Control equity capital

Quantum’s private equity strategy seeks to generate competitive risk-adjusted returns across the Sustainable Energy Ecosystem. Our selective approach is key, allowing us to devote more time and attention to our portfolio. Through our ability to react quickly, industry knowledge, technical expertise, and business skills, we believe we help entrepreneurs break through and rapidly advance their vision and businesses.

Select Portfolio Companies



Quantum Capital Solutions

Quantum Capital Solutions and Credit Opportunities Structured capital and debt

Through its credit and structured capital complex, Quantum seeks to provide tailored financing solutions that enable companies in the Sustainable Energy Ecosystem to fund growth projects, build cashflow, and generate shareholder value. Within Quantum Capital Solutions, we focus primarily on investing in public companies via asset-level financings, preferred equity, and structured debt. Within Quantum Credit Opportunities, we focus primarily on making secured credit investments in private companies. We believe our deep technical and operational expertise, structuring experience, and industry relationships make us the partner of choice for companies seeking to optimize their business plans.

Select Portfolio Companies



Quantum Innovation Fund

Climate Tech Venture Capital Growth equity capital in energy and sustainability technologies

Quantum Innovation Fund seeks to invest in transformative technology-based businesses focused on the energy and sustainability sectors. Quantum can provide early-stage companies with differentiated strategic insights and access. Quantum has significant experience coaching and mentoring founders to “cross the chasm” and build businesses of significant scale. Each venture investment Quantum makes gets the same hands-on support that Quantum has brought to all of its investments since our founding.

Select Portfolio Companies



About Quantum Capital Group *continued*

Quantum's Differentiated Team

Every member of our team is passionate about the Sustainable Energy Ecosystem and working with the entrepreneurs that drive its progress. We believe that it takes a true partnership mentality to build great companies and we live that belief every day. At the end of July of 2023, Quantum had:

116

total employees

11

senior advisors and
operating partners

12

member investment
committee for
Quantum Energy Partners fund

Partners

Wil VanLoh
Founder & CEO

Charles Baillie
Co-President

Ajay Khurana
Co-President

David Altshuler
Partner – Client Solutions

Jim Baird
Partner & General Counsel

Roman Bejger
Partner & General Counsel

Matt Chuchla
Partner

Chuck Davidson
Partner

Mike Denham
Partner – Chief Financial Officer

Tom Field
Partner

Michael MacDougall
Partner

Bill Montgomery
Partner

Jonathan Regan
Partner

William Riddle
Partner – Client Solutions

Garry Tanner
Partner

Blake Webster
Partner

Heriberto Diarte
Partner – Quantum Innovation Fund

Jeffrey Harris
Partner

Transaction Team

Rob Anderson
Managing Director

Alex Jackson
Managing Director

Rob Meister
Managing Director

Scott McGregor
Director

Sewell Strifler
Director

Fazul Lakhani
Director

& 6 Vice Presidents, 2 Senior Associates and 10 Associates

Involved in all aspects of origination, diligence, structuring, portfolio monitoring and exits

Technical Team

Basak Kurtoglu
Managing Director

Nathan Andrews
Managing Director

Jeff Jones
Director

Lane Neal
Director

Michael Shultz
Director

Shea Robin
Vice President

Adam Smith
Senior Geologist

& 7 Senior Technical Analysts and 1 Analyst

Leverages extensive industry experience to provide differentiated insights to Quantum's portfolio companies

Strategic Shared Services

Keila Diamond
Managing Director & Head of ESG

Sebastian Gass
Chief Technology Officer

Bill McKenzie
Chief Digital Architect

Arvind Battula
Head of Data Science

Sam Johnson
Head of IT Operations

Dennis Woods
Director of IT

& 5 supporting team members and 1 Associate

Focused on digital, ESG, procurement, and marketing and hedging

Fund Administration & Client Solutions

Lance Schuler
General Counsel – Private Equity

Tommy Ho
Chief Talent Officer

Sharmin Beacco
Chief Compliance Officer

Michael Dalton
Managing Director – Client Solutions

Tamara Beck
Managing Director – Client Solutions

Neil Horn
Managing Director – Client Solutions

Chris Gorgone
Managing Director – Client Solutions

Chris Jolivette
Controller

& 41 supporting team members

Works with other business groups to ensure compliance, human capital management, and timely reporting to Quantum's limited partners

About Quantum Capital Group *continued*

Driving Excellence with a Diverse Team

Our unwavering commitment to excellence is exemplified by our rigorous selection of top-tier candidates. We also believe that embracing and empowering a diverse workforce gives us a strategic advantage, bringing together a wide range of perspectives, experiences, and talents, which we believe fuels innovation, enables quick adaptation to changing market dynamics, and enhances sound decision making. In 2022, 33% of Quantum’s existing employees and 47% of Quantum’s new hires identified as ethnically diverse.

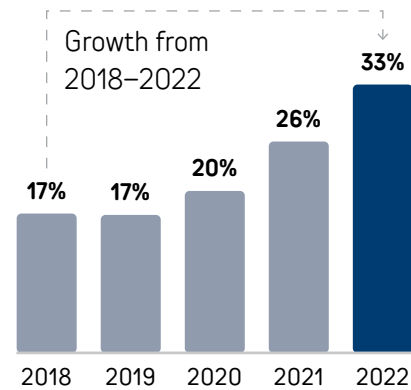
33%

Quantum employees who identified as ethnically diverse

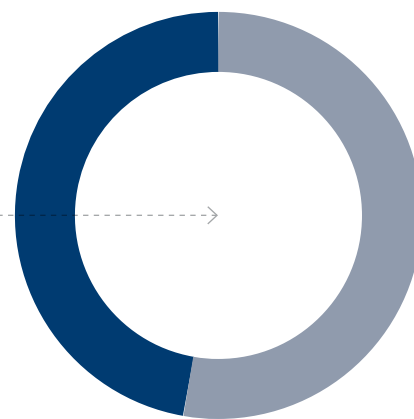
47%

Quantum new hires who identified as ethnically diverse

QUANTUM’S DIVERSITY IS GROWING



2022 QUANTUM NEW HIRES



■ 53% Caucasian
■ 47% Ethnically Diverse

Our commitment is further exemplified through ongoing training and resources provided to all employees, including workshops on inclusive recruitment led by experts like Dr. Elizabeth Haines. Additionally, we offer comprehensive development and learning opportunities in diversity, equity and inclusion (DE&I) through our Human Resources platform. By investing in our employees and creating an inclusive environment, we harness the power of diverse perspectives to propel our success and seek to drive positive change in the investment industry.



We are also dedicated to fostering the growth and empowerment of women within our organization. In 2023, we organized a successful Women in Energy event in Houston, providing a platform for networking and collaboration with industry peers. Additionally, our female employees made impactful contributions by presenting on private equity and energy investing to the Rice University in Finance and Investing Group. We take pride in the recognition of Keila Diamond, Quantum’s Head of ESG, as one of Hart Energy’s 25 Influential Women in Energy, and of Basak Kurtoglu who was named as one of Hart Energy’s 2023 Oil and Gas Investors Forty under 40. We are pleased to report that women comprised 46% of our promotions in 2022.

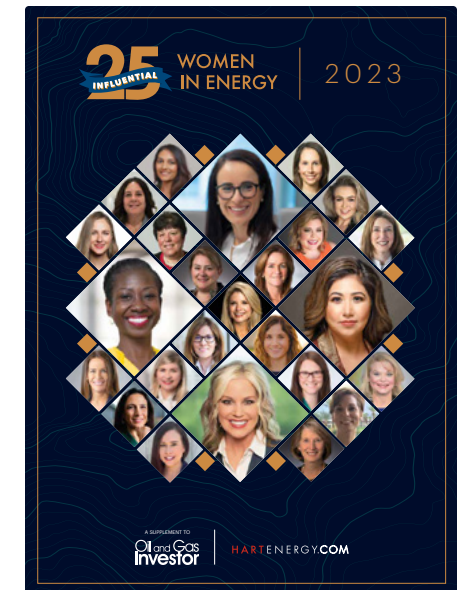
46%

Of promotions in 2022 were for women

2022 QUANTUM PROMOTIONS



■ 54% Male
■ 46% Female



SPOTLIGHT

Unlocking Value in Quantum & Across Our Portfolio Through Digital

Quantum is fully committed to embracing the digital era and is making substantial investments in driving a comprehensive digital transformation across our entire business. We recognize that in today's world of abundant data and reduced technology costs, digital capabilities have become a critical core competency and a powerful competitive advantage. We are already witnessing the significant benefits of these collective efforts, with potential savings and value creation in the hundreds of millions of dollars per annum.

To date, we have introduced the Quantum Energy Cloud (QEC), a purpose-built data architecture that seamlessly connects our entire organization, including Quantum and our portfolio companies. Our dedication to cybersecurity best practices has earned us National Institute of Standards and Technology (NIST) attestation. We have also harnessed advanced data science while developing or acquiring applications that leverage this data to enhance our decision-making processes, delivering tangible value. These initial steps set the stage for a future where we continue to leverage our digital capabilities to thrive in an era defined by data abundance and technological efficiency.

The QEC harnesses the power of the Microsoft Azure cloud while incorporating robust cybersecurity best practices and policies. At its core, QEC's common data foundation is designed to be a singular, reliable source of data for analysis and accessible for use by Quantum and its diverse portfolio of companies. The QEC's advanced automation and integration capabilities efficiently manage increased operational complexities, and its unified cloud architecture inherently applies a strong cybersecurity framework and machine learning across all solutions.

The QEC provides integrated solution playbooks tailored to specific asset classes. The private equity playbook is designed to seamlessly integrate key systems across Quantum's front, middle and back offices. Moreover, Quantum's portfolio companies are equipped with playbooks that offer straightforward access to a modern, purpose-built technology stack. We believe this simplified onboarding and offboarding process delivers a significant value proposition to our portfolio companies that is typically only available to much larger public companies.

Quantum's digital transformation efforts encompass our entire business, enhancing key areas such as investor relations, business development, investment stewardship, fund administration, portfolio company digital transformation, and IT operations. These initiatives share common themes of automating key processes, the utilization of enhanced data for better decision-making, and improved organizational connectivity.

Within each focus area, we have identified core workflows and are systematically enhancing them through our proprietary systems, algorithms, and streamlined processes. We believe these enhancements are yielding substantial benefits not only within Quantum but also across our portfolio of companies. By leveraging our collective efforts, we believe our portfolio companies are experiencing significant efficiency gains and cost reductions, far surpassing what they could achieve through individual endeavors.

Our Digital Focus Areas

Investor Relations

We utilize a premiere relationship intelligence platform to gain insights into investor preferences and trends and leverage digital marketing and offer self-service to our limited partner base.

Business Development

We apply a standardized evaluation process with rigorous petro-technical/engineering and artificial intelligence analysis to streamline deal risk and value quantification.

Investment Stewardship

We automate our deal management to streamline deal execution and monitoring and integrate portfolio monitoring, including ESG analytics and digital reporting.

Fund Administration & Operations

We have automated and integrated our back-office operations across all Quantum products.

Portfolio Company Digital Transformation

Our centralized QEC serves Quantum and our portfolio companies with the goal to drive high maturity in the areas of cybersecurity, cloud adoption and data science.

IT Ops & IT Foundation

Our IT foundation is focused on a high-quality data foundation with strong cybersecurity controls based on NIST.

Quantum Energy Cloud

Playbooks

Private Equity

Natural
Resources

Non-Operated

Energy,
Transition &
Decarbonization

Machine Learning Platform

Data exploration, feature engineering, model training

Services (orchestration, subscription) / Data Models Master Data Management



Cloud Foundation Infrastructure

Azure: QED Architecture System – Data Lake /
Quantum Virtual Cloud (CI/CD)

Global Energy Perspective

Understanding the Dual Energy & Climate Challenge	12
Energy Drives the Modern World and Human Prosperity	13
Energy Poverty Results from a Lack of Energy Access	14
Climate Change is Real and Needs to be Addressed	15
Energy Has Many Different Forms with Unique Attributes	16
Energy Security Matters	17
Any Meaningful Energy Transition Takes Decades	18
Renewables and Electrification are Meaningful but not a Panacea	19
Traditional Energy Can and Will Continue to be Part of the Solution	22
Traditional Energy Can Decarbonize and Contribute to Solving the Dual Challenge	23
The World Has One Atmosphere and Must Work Together	24
Solving the Dual Challenge is Expected to Require Multi-Dimensional Solutions	25
How Quantum Addresses the Dual Energy Challenge	26

Understanding the Dual Energy & Climate Challenge

Meeting the demand for ever-increasing amounts of reliable and affordable energy while simultaneously reducing GHG emissions and mitigating climate change constitutes the dual energy and climate challenge (dual challenge).

Energy is the lifeblood of the modern world; its accessibility drives the economy, prosperity, and human progress. As the global population and economic development expand, the world's insatiable appetite for energy is expected to continue to increase. Currently, the Energy Information Administration (EIA) estimates that energy demand will increase approximately 50% over the next 30 years. This demand for additional energy holds particularly true for the billions of people who currently lack access to energy, which negatively impacts their quality of life and life expectancy, a situation referred to as "energy poverty." As these people move up the economic ladder, their desire and need for energy increases dramatically. Notably, a large majority of these individuals reside in the same countries that are experiencing the most significant population growth.

Unfortunately, the energy that powers almost 80% of the world today creates greenhouse gas emissions, which are a major contributing factor to global warming and climate change. To minimize the adverse impacts of climate change, the world must significantly reduce emissions over the next few decades.

This is a global problem of enormous scale and complexity. We believe addressing it will require an approach that is open, thoughtful, collaborative, and fact-based, with the goal of identifying and implementing pragmatic and actionable plans that balance competing priorities and have a meaningful impact. Solutions are complex, as reducing emissions in one area may increase emissions in another area and/or limit global energy availability. In addition, the Russian invasion of Ukraine has further elevated concerns about energy security and affordability, which we believe will impact the energy solutions sought by countries and regions around the world.

We believe this challenge can be addressed with a multi-faceted approach that includes the expanded adoption of renewable energy and emerging technologies, responsibly sourced fossil fuels that decarbonize hydrocarbons, and non-partisan, cross-sectoral collaboration across governments, markets, and geographies.

There can be no assurance that any historical trends will continue or projections will materialize.

Sources:

¹ Our World in Data, Global primary energy consumption by source; Energy Institute Statistical Review of World Energy (2023).

² EIA International Energy Outlook (2021).

³ Bill Gates' *How to Avoid a Climate Disaster* (2021).

DUAL CHALLENGE

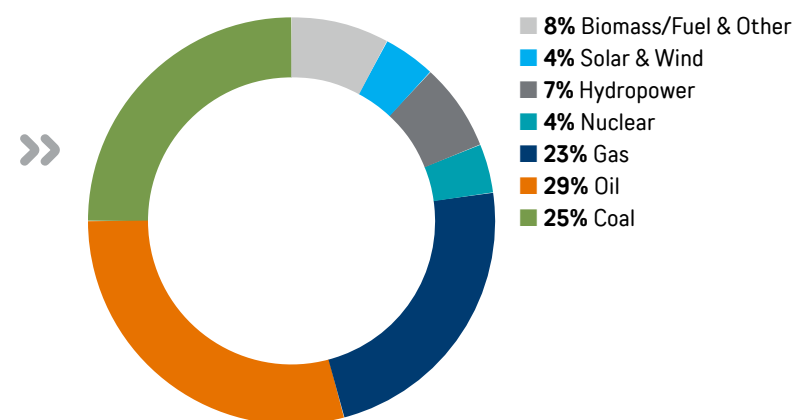
Energy Challenge



Energy challenge – the need for an ever-growing amount of affordable, abundant, reliable and clean energy

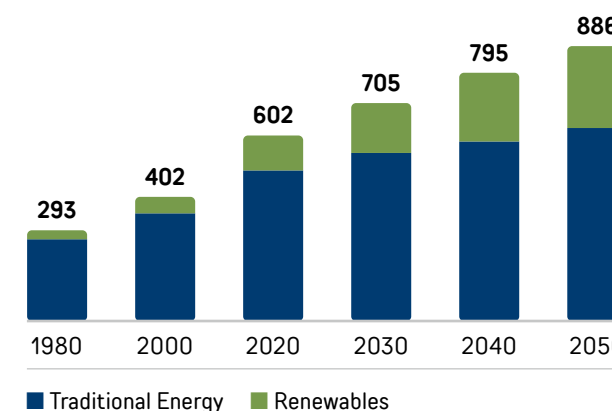
Current Situation

Sources of ~602 QBtu of global energy¹



Growing Future Challenge

Global energy needs are expected to rise with the population and GDP growth² (QBtu)



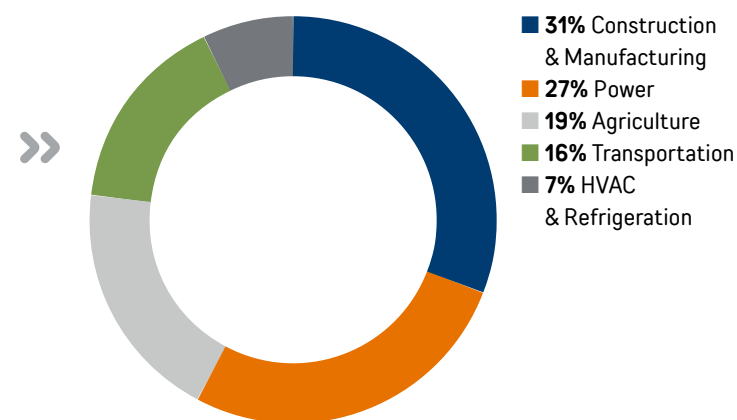
Climate Challenge



Climate challenge – the need to dramatically reduce CO₂ emissions to limit climate change and negative externalities

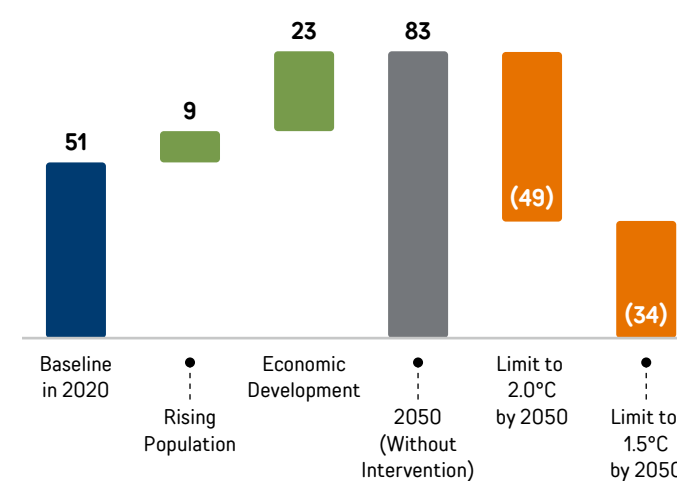
Current Situation

Sources of ~51 gigatons of global CO₂e emissions³



Growing Future Challenge

Without interventions, global CO₂ emissions are expected to rise³ (Billion tons of CO₂e)



Energy Drives the Modern World and Human Prosperity

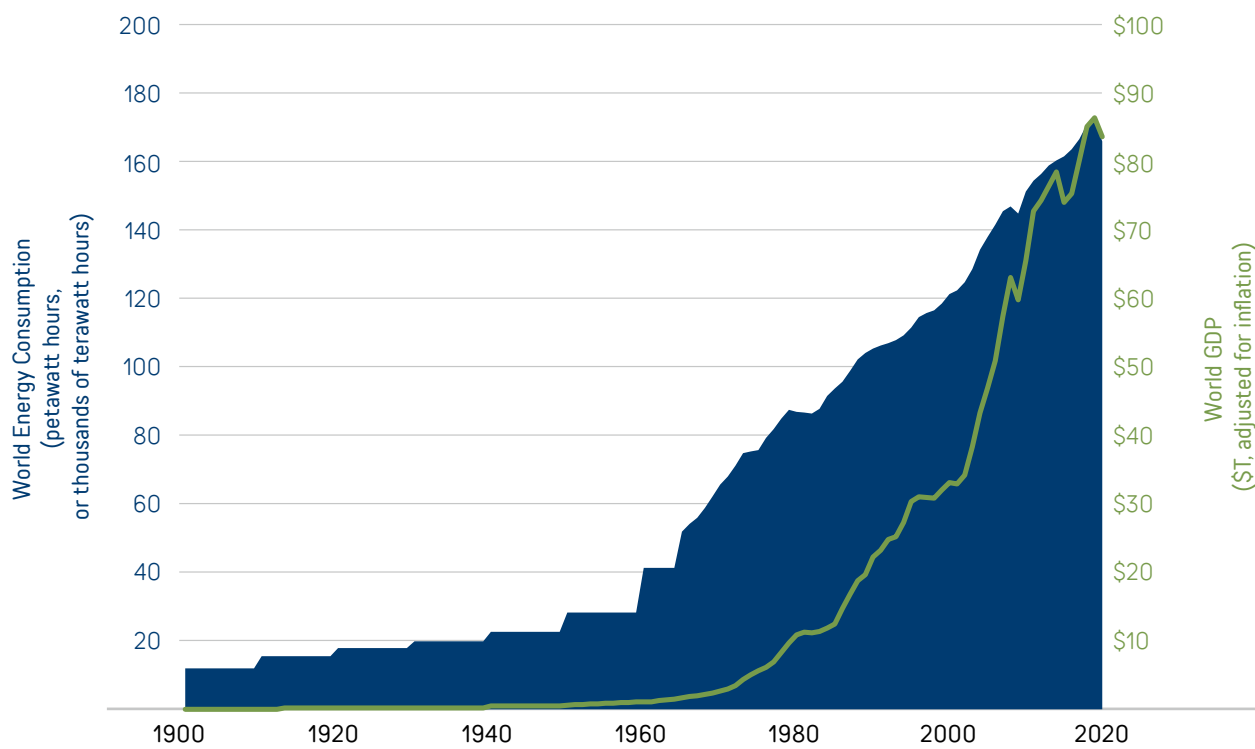
Energy is the essential ingredient that fuels our modern world. Our homes, buildings, fertilizers, food, hospitals, machinery, industry, lights, air conditioning, heating, and transportation – everything depends on energy. There is a measurable link between energy use, life expectancy, and human development, as access to energy has ushered in a golden era of human progress and prosperity.

Since the development of fossil fuels in the 19th century, the global population has increased more than fourfold, global life expectancy has more than doubled and the global economy has expanded significantly. These trends are expected to continue as the population and economic development increases across the globe.

The United Nations Human Development Index (HDI) is a proxy for the human condition. It combines life expectancy at birth, years of education received, and per capita gross national product. There is a strong correlation between energy consumption and HDI scores. Countries in the developed world have high HDI scores and high energy use, while those in the developing world tend to have lower HDI scores and lower energy usage.

The United Nations has projected that the global population will grow from 7.7 billion in 2019 to nearly 10 billion in 2050, significantly increasing demand for energy. We believe economic growth will further drive energy demand, especially as billions of people currently with limited energy access improve their living standards and secure access to abundant and reliable energy.

World Energy Consumption vs World GDP¹

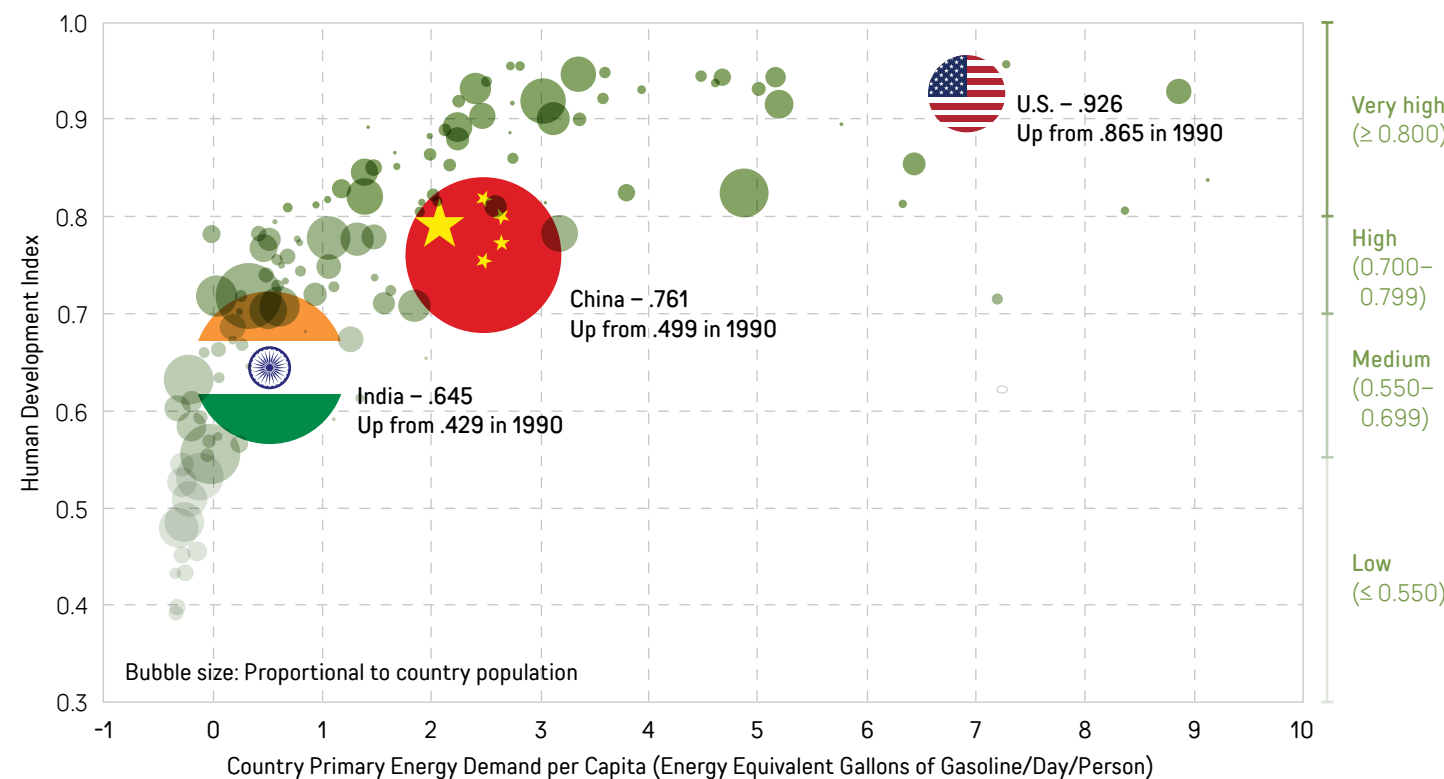


Population (billion)	1.6	1.9	2.3	3.0	4.4	6.1	7.8
Life Expectancy (years)	32.0	34.5	42.0	50.1	61.2	66.3	72.6

There can be no assurance that any historical trends will continue.

Sources:
¹ Our World in Data based on World Bank and Maddison (2017); Our World in Data, Life expectancy; United Nations, Department of Economic and Social Affairs, Population Division (2022). World Population Prospects 2022, Online Edition.
² EIA International Energy Outlook (2021).

Access to Affordable Energy is Essential for HDI Improvement²



Energy Poverty Results from a Lack of Energy Access

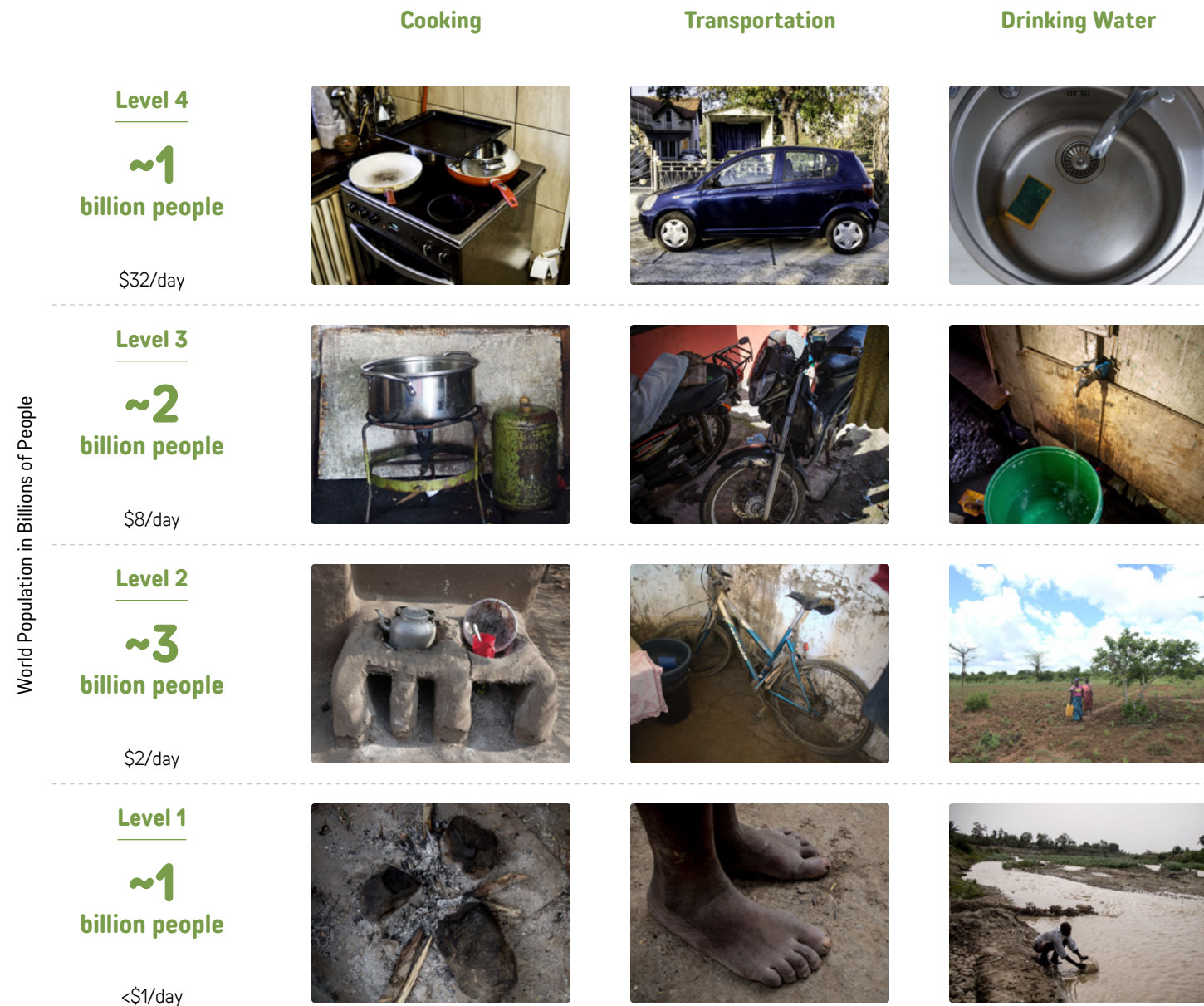
Energy poverty is the lack of access to affordable and reliable energy. Without access to energy, quality of life and life expectancy decreases. Energy poverty is a critical problem today, impacting billions of people around the world.

To illustrate energy poverty, the table to the right highlights living conditions for the human population across a range of everyday activities. These depictions are based on work by the Swedish public health doctor, Hans Rosling in his book, *Factfulness*. Only a fraction of the global population, roughly one billion people, experience the living standards that many in advanced economies often take for granted. As of 2020, approximately 750 million people did not have access to electricity and 2.4 billion still cooked their daily meals and heated their homes with traditional fuels – typically wood, dung, agricultural waste, or charcoal – which results in significant indoor air quality issues and a wide range of damaging health impacts.

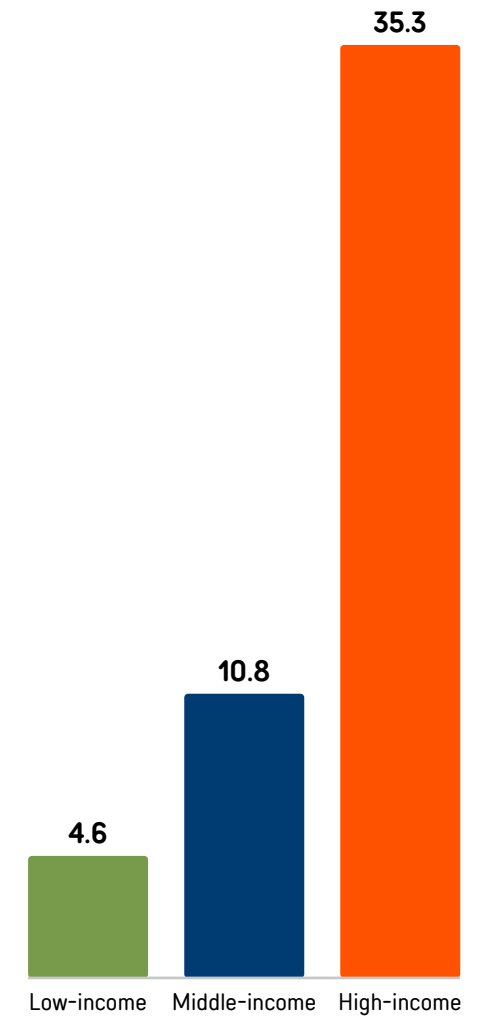
The World Health Organization (WHO) estimates that over three million premature deaths occur each year from indoor use of traditional biomass fuels. Energy scarcity also hinders socio-economic development, deepens inequality, and restricts basic human rights like access to clean water, education, and healthcare. Combined, energy scarcity issues account for over 10 million premature deaths worldwide each year. While the world's richest one billion people enjoy modern access to energy, most of the world is trying to access more energy.

As economies transition from low-income to high-income economies, energy use per capita increases from 4.6 to 35.3 barrels of oil equivalent per annum. Efforts by Organization for Economic Co-operation and Development (OECD) countries to restrict energy development in a bid to combat climate change could inadvertently cause more harm than good. Such measures can increase energy costs, limit access and reliability, and perpetuate energy poverty – with significant repercussions for human life and development. Therefore, any strategies aimed at limiting emissions should also consider their potential impact on global energy poverty.

The Range of Living Conditions Among the World's Population¹



Energy Use per Annum² (barrels of oil equivalent)



Sources:

¹ Hans Rosling, *Factfulness*; Photos from www.gapminder.com.

² The World Bank DataBank, Population Estimates and Projections. Note: Low income, Middle income and High income designations based on World Bank country classifications as of December 2022.

Climate Change is Real and Needs to be Addressed

Climate change caused by the increasing concentrations of greenhouse gases in the atmosphere, including CO₂, is undeniably real. The extensive use of energy – particularly derived from fossil fuels such as coal, oil, and natural gas – contributes significantly to global emissions, climate change, and the adverse effects of climate change. These adverse effects manifest in ecosystems, water scarcity, food production, public health, extreme weather, and human displacement.

The concentration of greenhouse gases in the atmosphere influences climate via the greenhouse effect. The primary greenhouse gases by volume are CO₂ (74%), methane (17%), nitrous oxide (6%), and fluorinated gases (2%). Despite their lower concentrations, these gases other than CO₂, have a stronger greenhouse effect than CO₂ itself due to their ability to hold heat. For example, the global warming potential (GWP) of methane is 25–80 times larger than that of CO₂.

Since the industrial revolution, a rapid increase in global emissions has accelerated global warming and climate change. Since 1900, approximately 2000 gigatons of CO₂ have been released into the atmosphere, primarily by developed countries, with the U.S. and Europe accounting for 46%. This surge in emissions has contributed significantly to the average global temperature increase of 1.2 degrees Celsius above pre-industrial levels. Currently, emissions are increasing worldwide, primarily in developing regions. In 2021, China was responsible for 29% of global emissions, whereas the U.S. was responsible for 12% of global emissions. Without cooperation from all countries, we believe developing countries will not be able to lower global emissions on their own.

Based on the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report, the current implemented climate policies will limit global warming to 2.5 to 3.5 degrees Celsius by 2050, and entail a modest year-over-year increase in annual emissions. To limit global warming to the IPCC recommended increase of 1.5 to 2.0 degrees, significant annual emission reductions will be required. Without these reductions, we will likely experience some or all of the detrimental effects of climate change, including changes in the ecosystem structure, negative effects on land and water-based animal species, human water scarcity, disruptions in food production, negative impacts on human health and wellbeing, and increased human displacement.²

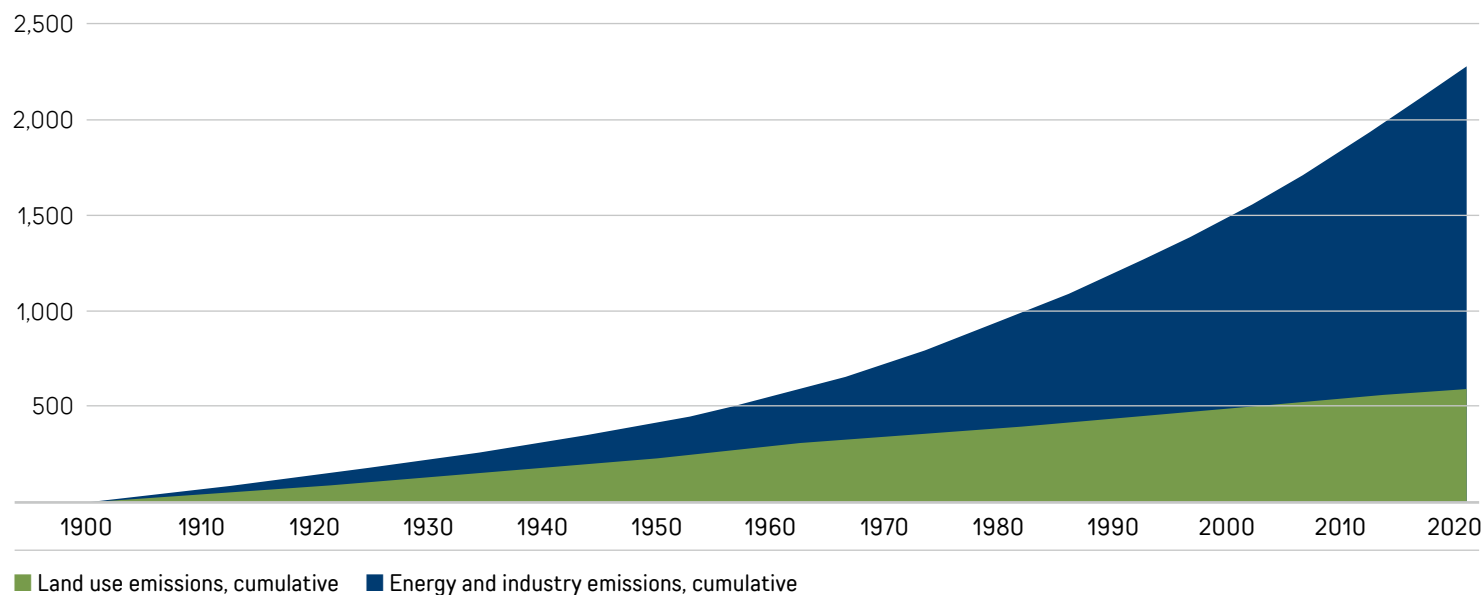
There can be no assurance that any historical trends will continue.

Source:

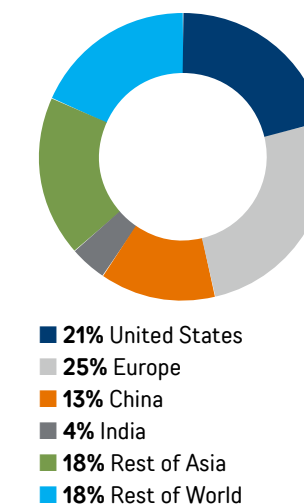
¹ Our World in Data, Cumulative CO₂ emissions including land use change; Global Carbon Budget (2022).

² IPCC, Sixth Assessment Report.

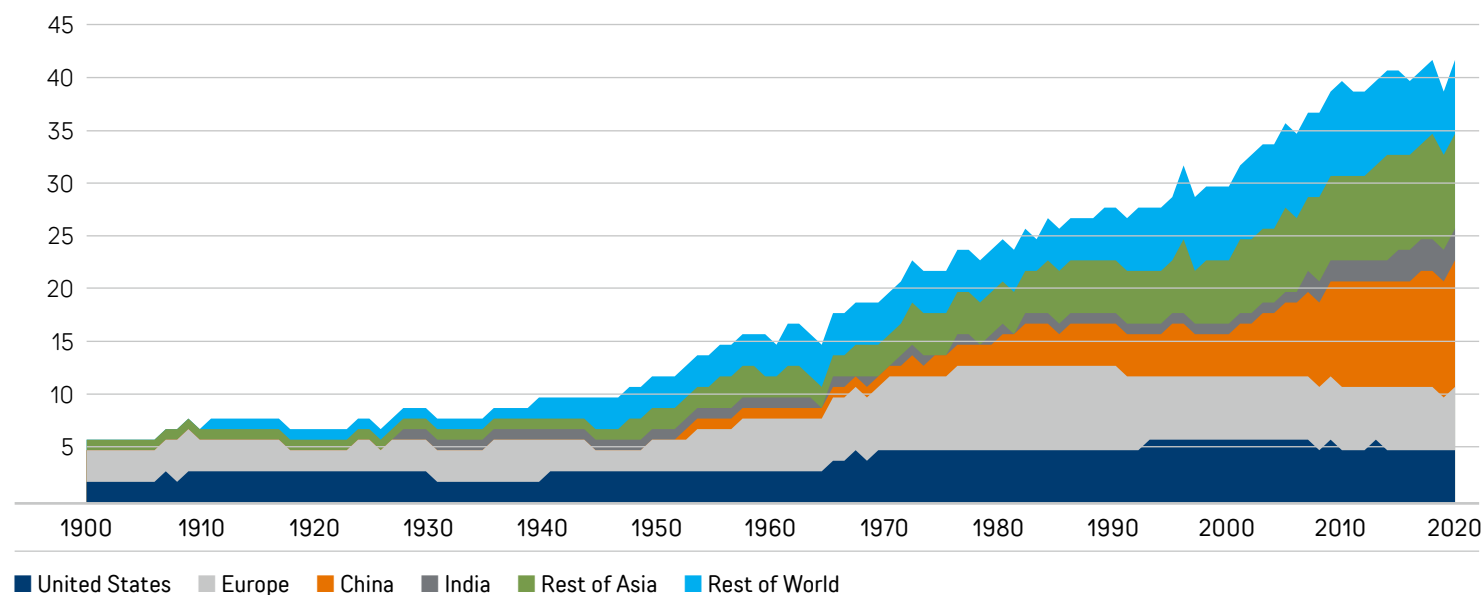
Cumulative Global CO₂e Emissions from Energy and Land Use Change¹ (Billion tons of CO₂e)



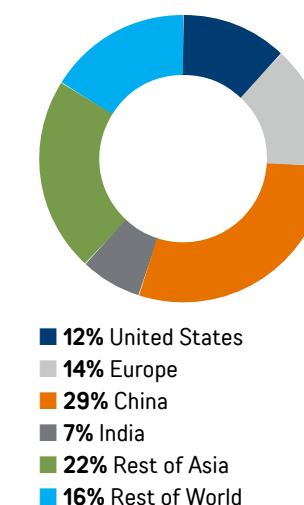
Share of Cumulative Emissions, 1900–2021¹



Annual CO₂e Emissions by Region¹ (Billion tons of CO₂e)



Share of 2021 Annual Emissions¹



Energy Has Many Different Forms with Unique Attributes

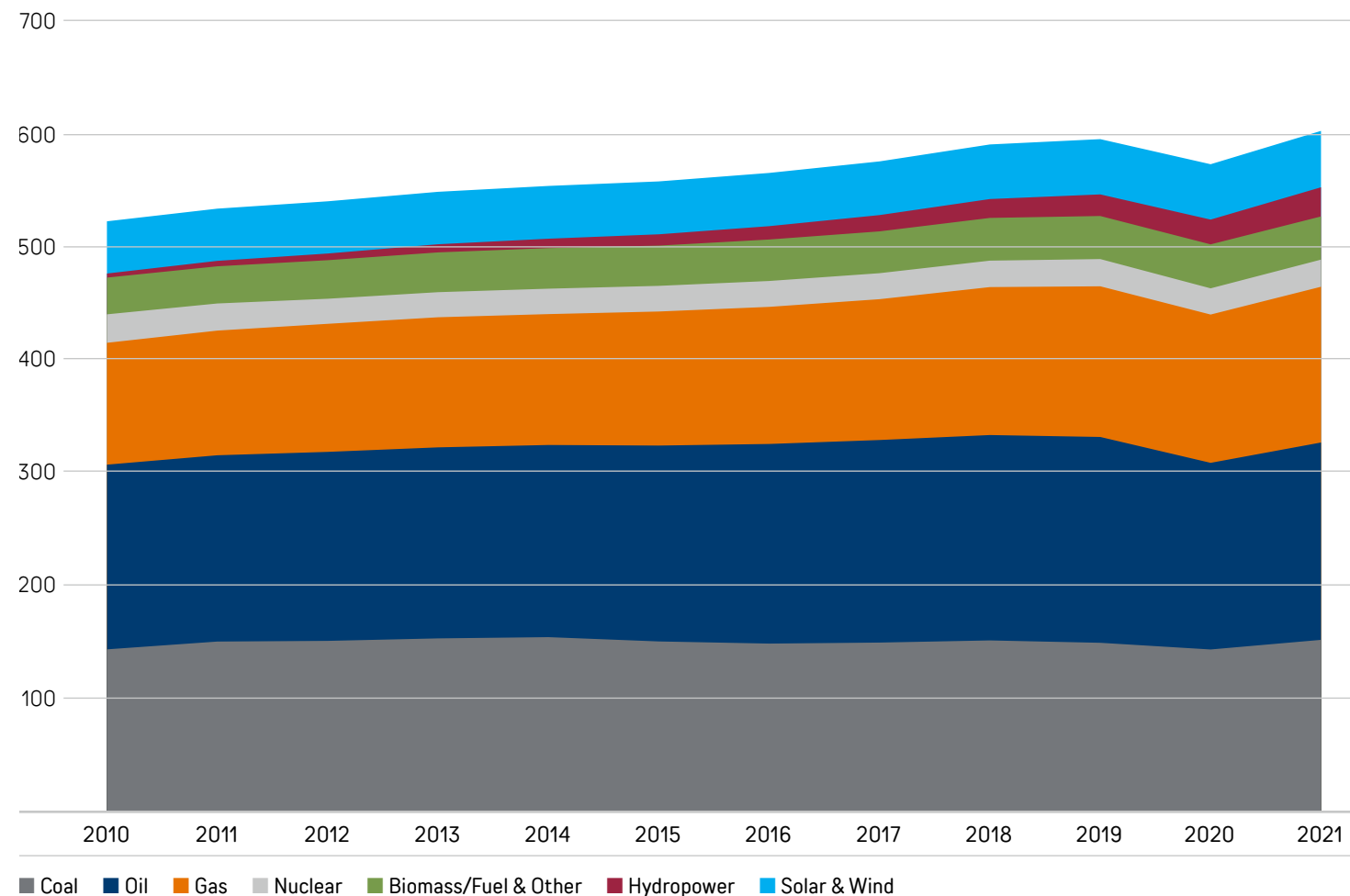
Energy exists in various forms, each possessing distinct attributes that render them more or less suitable for specific tasks. Factors such as cost-effectiveness, accessibility, energy security, and acceptance within a particular customer base come into play. Each form of energy must undergo an assessment based on individual merit and appropriateness for the intended purpose.

Key attributes for a given energy source include renewability, abundance, affordability, reliability, energy density, transportability, social acceptance, and emission intensity. Each of these factors drives local decisions regarding which energy source to develop and utilize. These decisions may vary across different markets. Today, much of

the developing world is prioritizing fossil fuels (coal, oil, and natural gas) to meet their ever-growing energy demands. They are discounting the emission attributes of these fuels because they are more available, affordable, and reliable.

Energy selection and the various regional perspectives must be considered when working to solve the dual energy and climate challenge. This approach ensures the entire world collaborates effectively towards a comprehensive solution.

Global Energy Demand by Type¹ (QBtu)



There can be no assurance that any historical trends will continue.

Source:

¹ IEA.

² Quantum internal analysis.

Energy Source Attributes²

Source	Renewable	Abundance	Affordable	Reliable	Energy Density	Transportability	Social Acceptance	Emission Intensity
Solar/Wind	Yes	High	High	No	Low	Low	High	Low
Hydropower	Yes	Low	Medium	Yes	Medium	Low	High	Low
Biomass	Yes	Low	Low	Yes	Low	Low	High	High
Nuclear	No	High	Medium	Yes	High	Medium	Low	Low
Gas	No	High	High	Yes	High	High	Medium	Medium
Oil	No	High	High	Yes	High	High	Low	High
Coal	No	High	High	Yes	High	High	Low	High

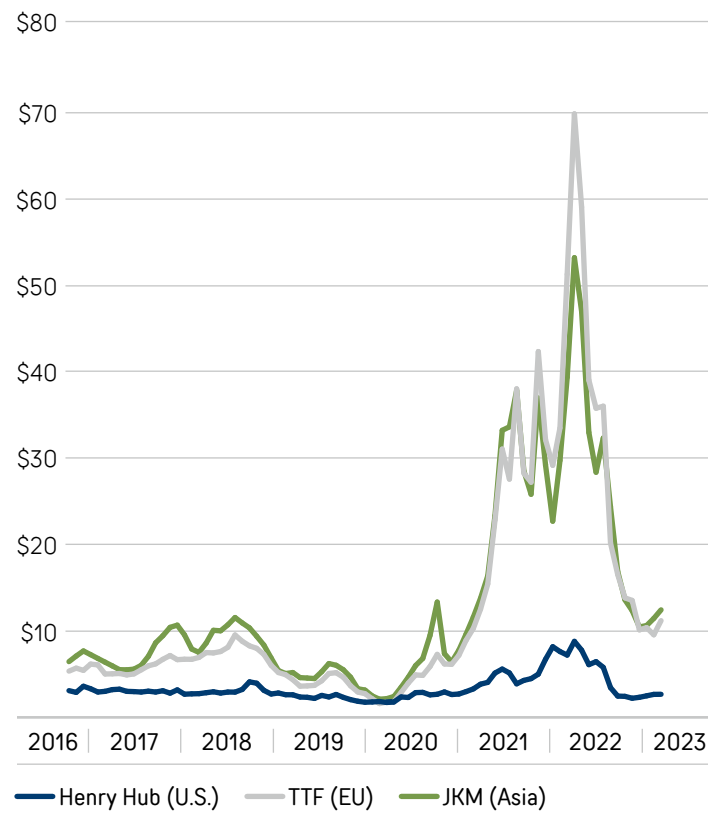
Energy Security Matters

Energy security is a country’s ability to control its own energy resources, which are vital to national security and economic prosperity. It is a multifaceted concept that is crucial both at the global level, where it involves resource availability, geopolitics, and sustainability, and at the individual country level, where it relates to diversification, infrastructure resilience, economic stability, and environmental considerations. Achieving energy security requires a combination of international cooperation, sound domestic policies, and investments in energy infrastructure.

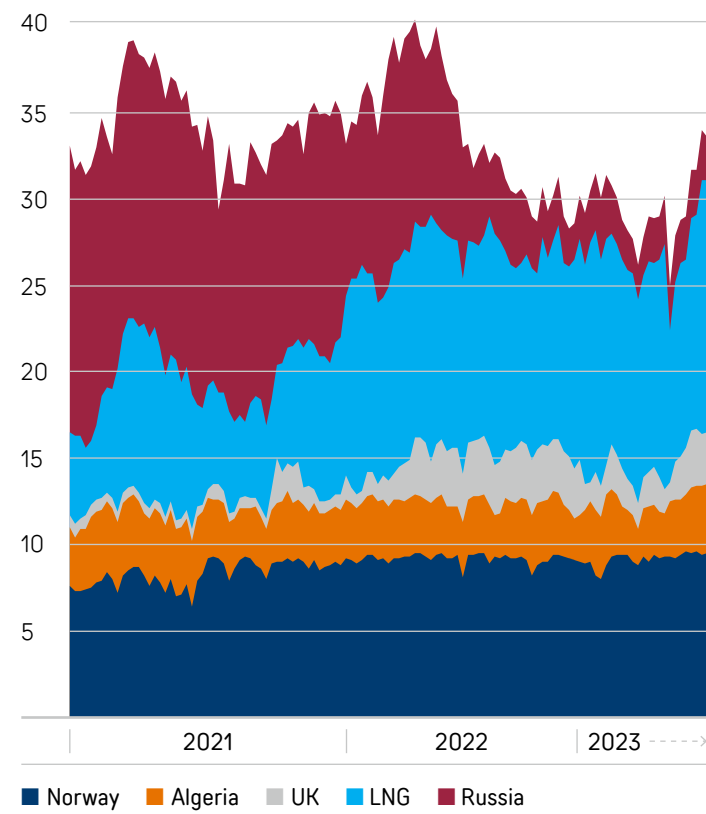
This issue was underscored during the Russian invasion of Ukraine and the subsequent embargo of Russian natural gas that caused prices to skyrocket and created significant disruptions across Europe. These events heightened concerns about energy security and drove national diversification efforts. As a result, there was an increased focus on developing alternative gas supply routes, including expanding liquefied natural gas (LNG) terminals, increasing interconnections between European countries, strengthening cooperation with supportive countries, and accelerating the transition towards renewable energy. This crisis highlighted the importance of energy security across the globe.

Today, each country’s energy mix varies widely depending on its natural resources, historical relationships, existing infrastructure, and societal norms regarding trading partners and preferred energy attributes. The world map highlights the relative energy use and variation in energy sources across the globe. Given its domestic reserves, China and India rely heavily on coal, despite the pollution and environmental benefits natural gas offers. Emerging countries often lean towards traditional energy sources due to their high energy density, ease of transportation, and affordability. The U.S. and Europe are focused on natural gas and renewables to limit emissions. Going forward, we believe any dual challenge solution will need to consider local and regional perspectives on energy security.

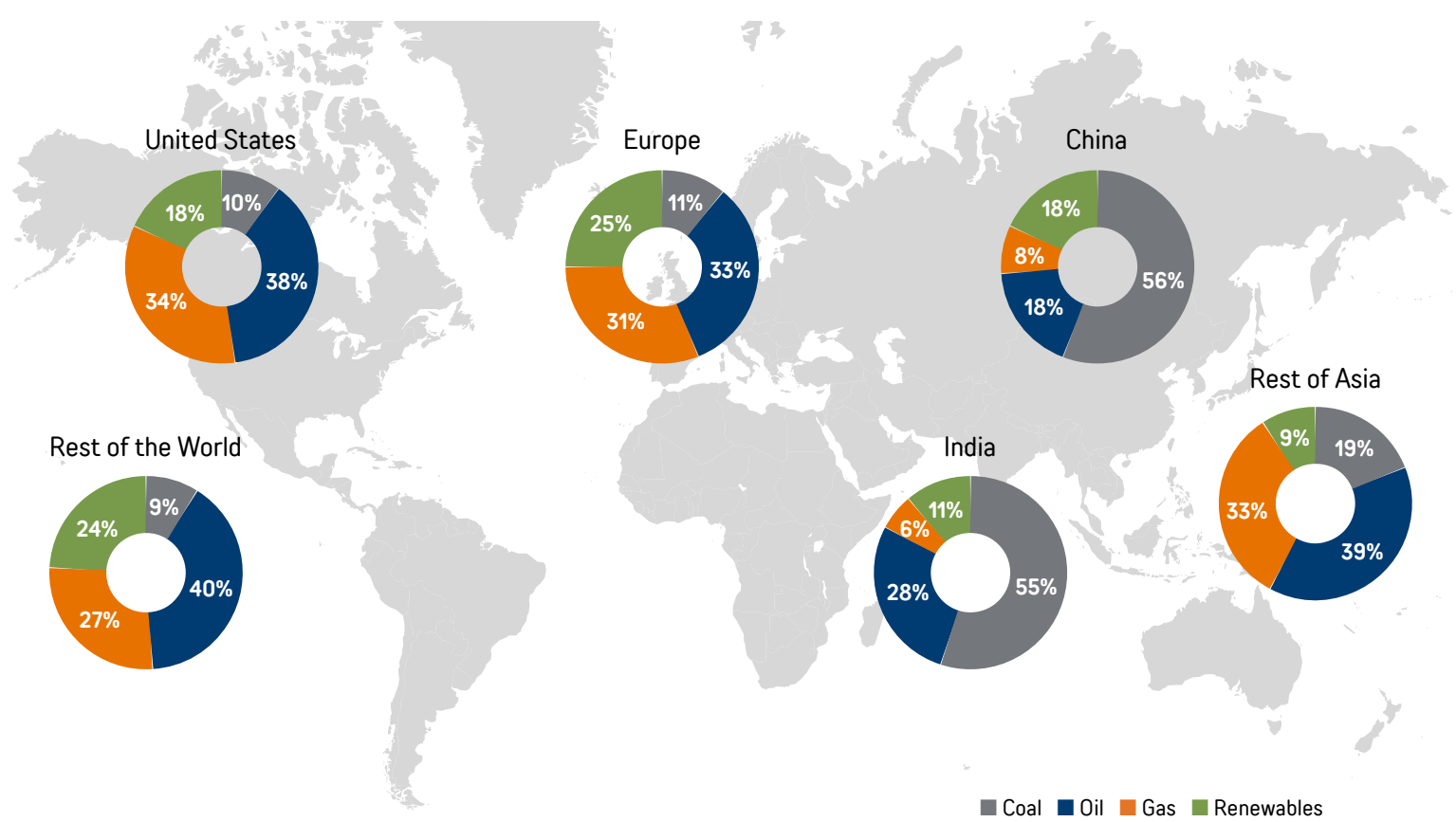
Historic Global LNG Prices Spike in 2022¹
(\$/MMBtu)



European Natural Gas Imports by Source²
(Bcf/d)



Percent of 2022 Energy Consumption by Source³



There can be no assurance that any historical trends or projections will continue or materialize.

Sources:

¹ Bloomberg.
² Bruegel European Natural Gas Imports (October 2023).
³ Our World in Data, Primary energy consumption by source (2022); Energy Institute Statistical Review of World Energy (2023).

Any Meaningful Energy Transition Takes Decades

Since the beginning of the industrial revolution, the world has undergone a continual process of energy transition, or energy addition, as we like to call it. However, these transitions take a long time, and historically, new forms of energy have never replaced existing ones. While projections for future energy demand differ, no current scenario suggests that traditional energy sources can be eliminated while simultaneously meeting future energy demand.

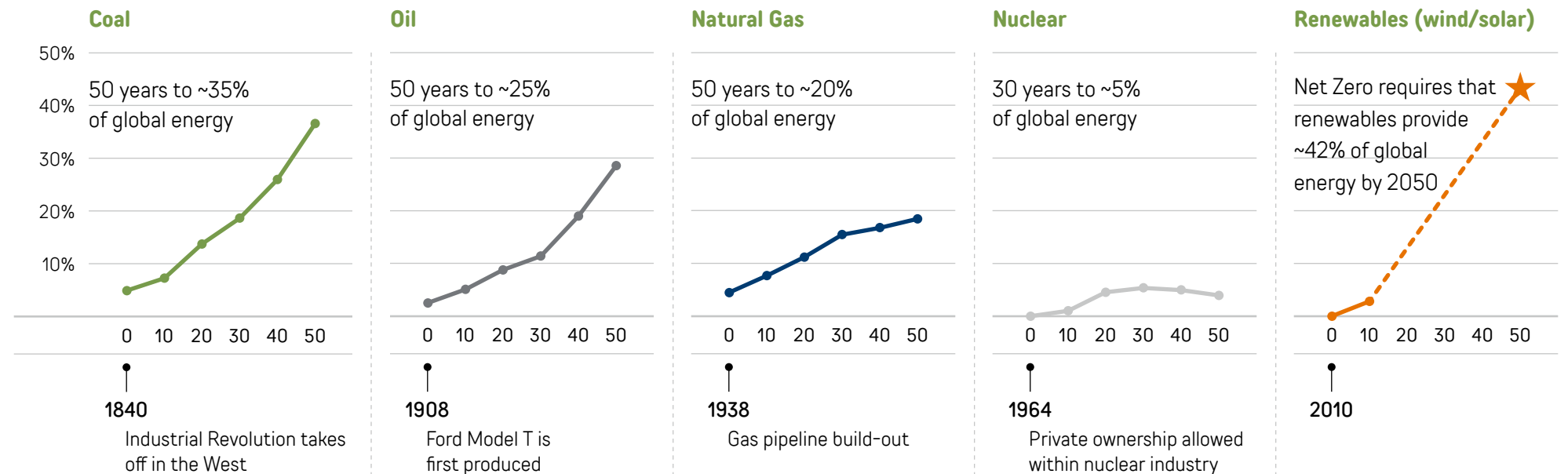
Since the dawn of humanity, energy has continually evolved, with people constantly seeking innovative and efficient energy sources to enhance their quality of life. Coal powered the industrial revolution in the mid-1800's. The mass adoption of automobiles for transportation at the turn of the 20th century propelled oil usage. Natural gas emerged in the 1930's and transitioned from a waste product to a significant part of the energy mix worldwide. It continued to grow with the advent of LNG and the development of a worldwide gas market. Nuclear emerged in the 1960's but never achieved market share penetration due to a few specific negative events.

Each of these transitions spanned decades, with the market share of each emerging energy source growing at different rates. Even as new energy forms gained more market share, the absolute consumption of all energy types continued to rise due to the growing overall demand. Today, we burn more coal than ever despite a loss in overall market share.

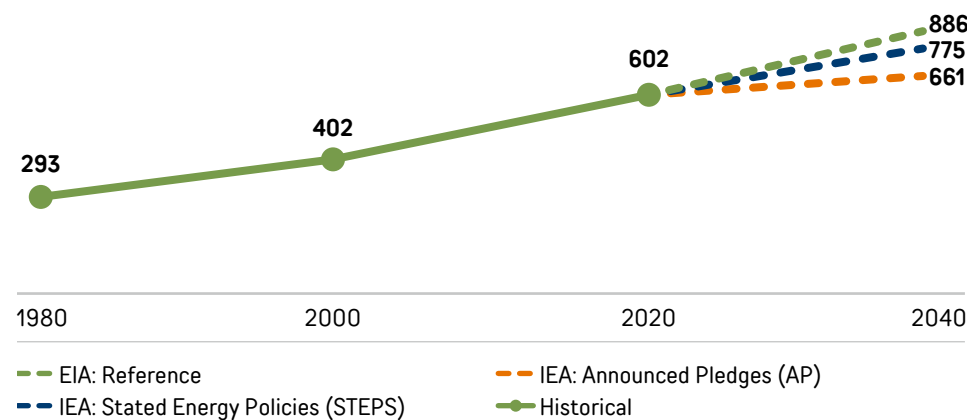
Wind and solar are the latest meaningful new energy sources, and after more than 10 years of significant investment, they currently account for only 4% of global energy supply, with fossil fuels still dominating with 77% market share. In the EIA reference case, renewables would have to grow to 42% of the global energy mix by 2050, which would be the greatest market penetration of any energy source in history.

We believe traditional energy sources will continue to play a meaningful role. Even in the International Energy Agency (IEA) Stated Policy and Announced Pledge Scenarios, which may be challenging to achieve as energy demand growth would have to moderate meaningfully from historical trends, fossil fuel use is still significant in 2050. The call to end fossil fuel use over time, especially over the next decade as some suggest, appears unrealistic when considering previous energy transitions and historical energy demand trends.

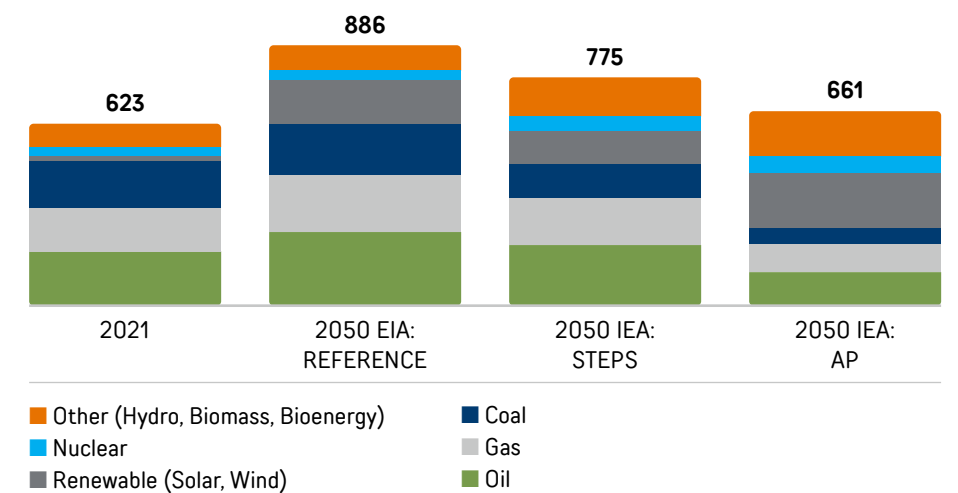
Share of Global Energy Supply by Energy Source Since Initial Adoption (percent)¹



Global Energy Consumption Forecast² (QBtu)



Global Energy Consumption Mix Forecast² (QBtu)



Information contained herein regarding market characterization has been determined by Quantum based on internal research and data. Although Quantum believes such determinations are reasonable, they are inherently subjective in nature. Other market participants may make different determinations relating to market characterization based on the same underlying data. There can be no assurance that any historical trends will continue.

Sources:

¹ Vaclav Smil, Energy Transitions: History, Requirements, Prospects.

² EIA International Energy Outlook 2021, IEA 2022 Stated Policies Scenario (STEPS), IEA 2022 Announced Pledges Scenario (AP), Resources For the Future.

Renewables and Electrification are Meaningful but not a Panacea

Is there enough capital for the energy transition?

We believe renewable energy is a significant force in today’s energy landscape and will be instrumental in solving the dual challenge. However, several obstacles exist that may limit the potential impact of renewables on the global energy mix. Capital availability is one of the key challenges. Achieving the desired growth in renewables over a relatively condensed timeframe requires substantial investment, which can be a barrier to its rapid deployment.

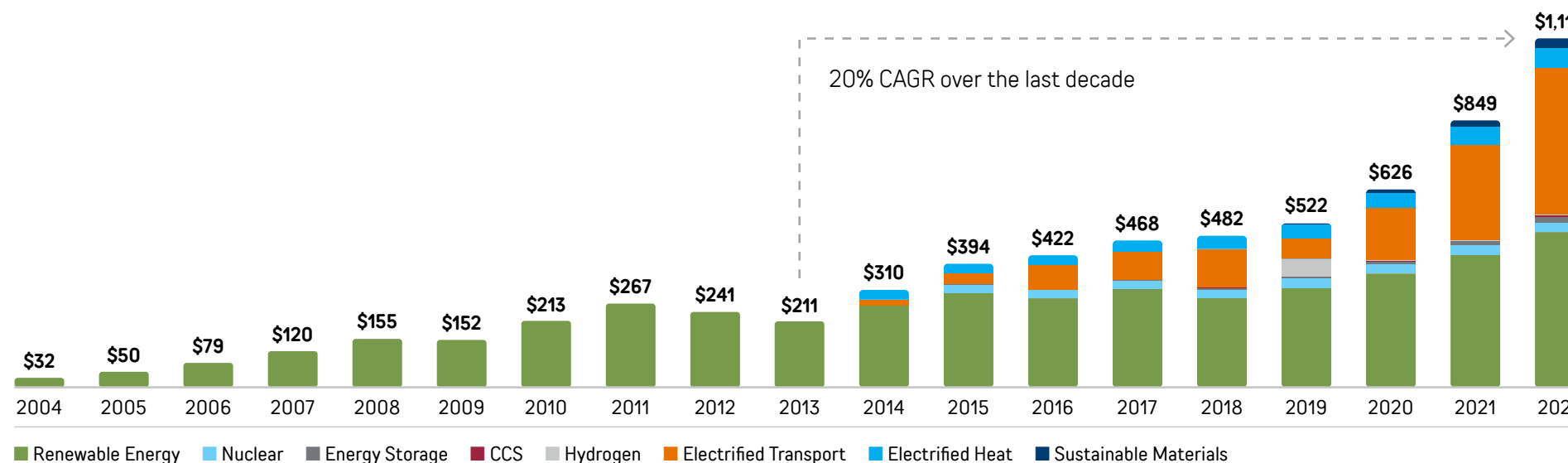
Global investments in the energy transition have surged from nearly negligible levels in 2004 to \$1.1 trillion worldwide in 2022. Estimates suggest that an annual investment ranging from \$3 trillion to \$5 trillion will be needed worldwide for the next 30 years, totaling approximately \$120 trillion by 2050, to achieve net zero carbon reduction targets and limit global warming to 1.5 degrees Celsius. This funding level surpasses that of traditional oil and gas, which has been closer to \$400 billion per year worldwide over the last eight years, even before the implementation of new energy legislation in North America and Europe. While the bulk of renewable energy investments target wind, solar, and electrified transportation, they also include nuclear energy, energy storage, carbon capture and sequestration (CCS), and alternative fuels like green hydrogen, green ammonia, and biofuels, in addition to electrified heat and sustainable materials.

Public and governmental support for a renewable energy transition provides a strong tailwind for investment. The landmark Inflation Reduction Act (IRA) in the U.S. is one of several important examples of government support aimed at accelerating the energy transition around the world. The IRA provides a stabilized investment environment and significant investment incentives for key decarbonization technologies, such as renewables, CCS, hydrogen, electrification, and domestic clean energy manufacturing. The Princeton REPEAT project estimates that \$4.1 trillion will be invested in U.S. energy infrastructure over the next decade because of the IRA, which is more than double the spending previously expected in the U.S.

While government support is strong in the U.S. and most other developed countries, we believe it alone will not provide the amount of capital needed. Public investors have meaningfully contributed to the overall capital replacement. However, there has been a recent pullback in this capital, as demonstrated by the approximately 25% decrease in the Global Clean Energy ETF in the past year. This may pose challenges to securing the necessary public investment needed to support the targeted growth of renewables.

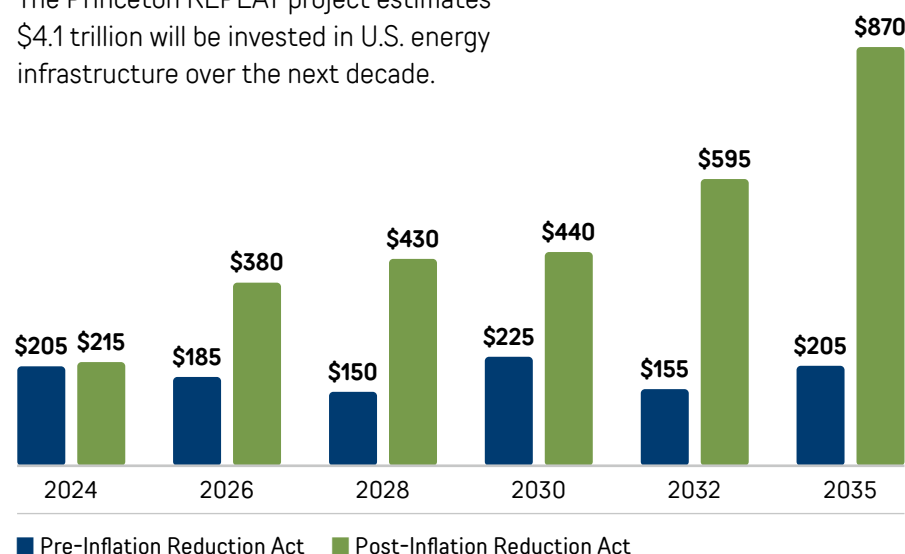
Global investments in the energy transition eclipsed \$1.1 trillion in 2022, but that amount is still far short of the \$3 trillion+ per year needed to reach Net Zero by 2050.

Global Investments in the Energy Transition by Sector¹ (\$Bn)

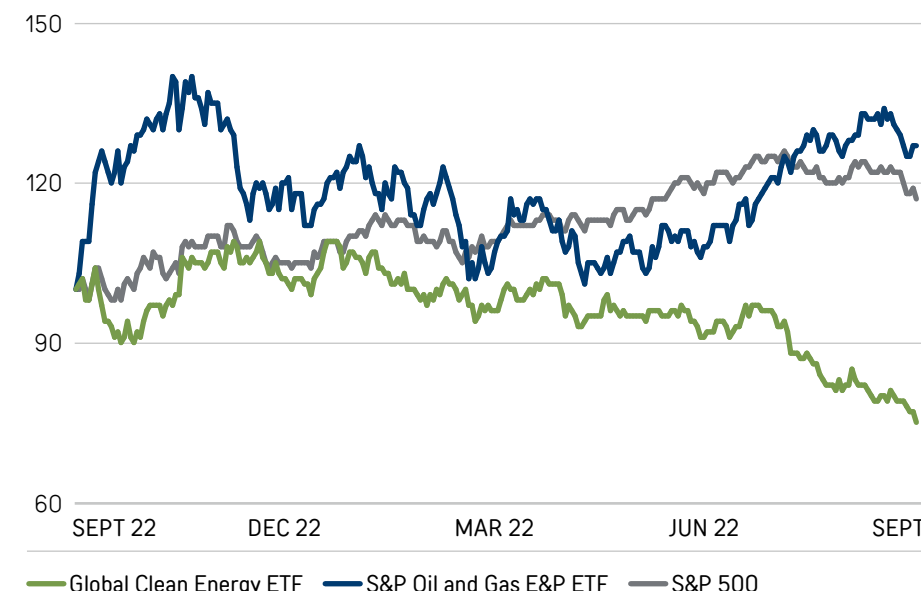


Annual Investment in U.S. Energy Infrastructure² (\$Bn)

The Princeton REPEAT project estimates \$4.1 trillion will be invested in U.S. energy infrastructure over the next decade.



Indexed Price Performance (Indexed to 100 – as of 9/26/23)



There can be no assurance that any historical trends will continue or projections will materialize.

Sources:

¹ Bloomberg New Energy Finance.

² The Princeton REPEAT Project.

Renewables and Electrification are Meaningful but not a Panacea *continued*

Will there be enough minerals for the energy transition?

Green technologies are expected to grow by an order of magnitude over the next decade and they consume approximately 5 to 6 times more minerals and metals per kilowatt (kg/kw) than traditional fossil fuels. When considering the intermittency of renewable energy sources, this ratio could escalate to between 12 and 18 times more minerals and metals for the same energy output. We believe this substantial increase will necessitate a significant incremental supply of minerals and metals, which could pose serious impediments to the expected growth in renewables.

According to research by McKinsey, the growth in various renewable technologies will be significant over the next decade. Mature technologies like wind and solar are expected to see growth in annual deployment ranging from 6 to 14 times, respectively. Meanwhile, emerging technologies such as electric batteries, green hydrogen, and CCS could experience growth anywhere from 14 to 200 times. We believe such expansive growth will necessitate a massive increase in the raw materials required to meet these growth projections.

According to estimates from the IEA World Energy Outlook, in the Sustainable Development Scenario, the world will need approximately double the amount of copper, 17 times the amount of graphite, 11 times the amount of nickel, and 18 times the amount of lithium to meet the rising demand for clean energy from 2020 to 2030. Notably, no extractive industry has ever increased global supply by 100% in a decade, much less the 1,000% to 1,700% that would be needed to meet the projected clean energy demand under the Sustainable Development Scenario.

We believe the extraction of these additional raw materials will require a significant increase in mining around the world. Currently, it takes an average of 17 years for a new mine to transition from discovery to commercial operations. This duration exceeds the timeline provided for the growth projection depicted here. How will these raw materials be brought to market?

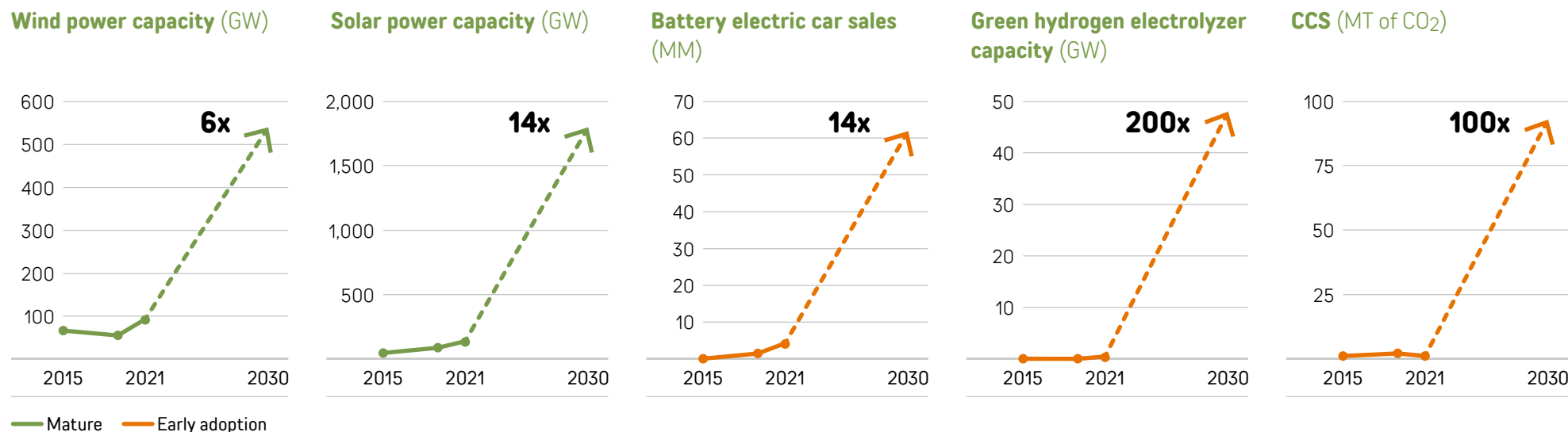
There can be no assurance that any historical trends will continue or projections will materialize.

¹ Based on the McKinsey 1.5°C achieved commitments scenario, which represents existing commitments from companies and policies from countries. To conduct this analysis, McKinsey estimated the current trajectory of supply of key climate technologies (based on historic and current activity), factored in current emissions-reductions commitments from countries and governments and assessed the supply of these technologies that would be required by 2030 to stay on track for a 1.5°C pathway.

Sources:

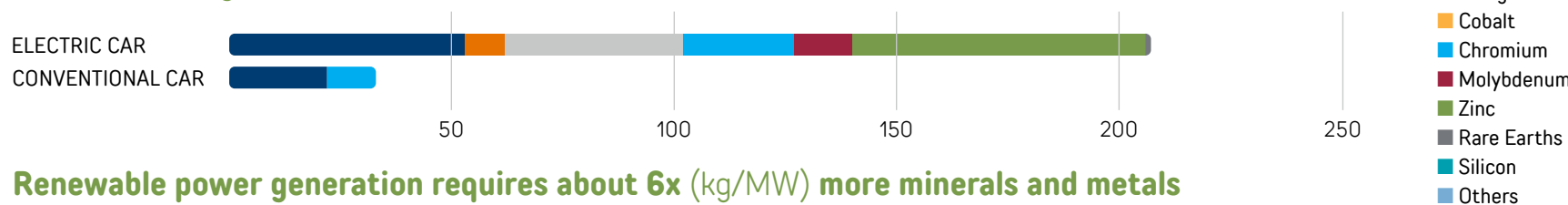
² EV-Volumes, IEA, International Renewable Energy Agency, McKinsey.
³ IEA, The Role of Critical Minerals in Clean Energy Transitions (2021).

Annual Deployment Globally of Climate Technologies Needed (multiples of current supply)¹²

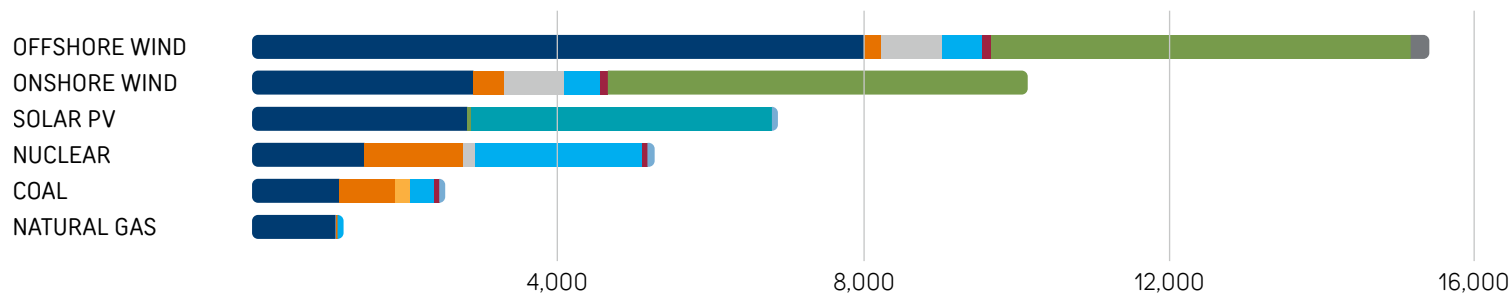


To scale exponentially, we believe green climate technologies will require massive quantities of minerals and metals, which will require the world to significantly increase mining, refining and processing, and manufacturing capabilities to a scale and at a speed never achieved before.

Electric vehicles require about 5x (kg/vehicle) more minerals and metals than internal combustion engine vehicles³



Renewable power generation requires about 6x (kg/MW) more minerals and metals than hydrocarbon power generation³



Due to the intermittent nature of solar and wind power, we believe generating the same amount of energy over the same period of time as hydrocarbons will require 2–3x the generation capacity, and thus 2–3x the minerals and metals, as shown here.

Renewables and Electrification are Meaningful but not a Panacea *continued*

Can we access the minerals and permits needed for the energy transition?

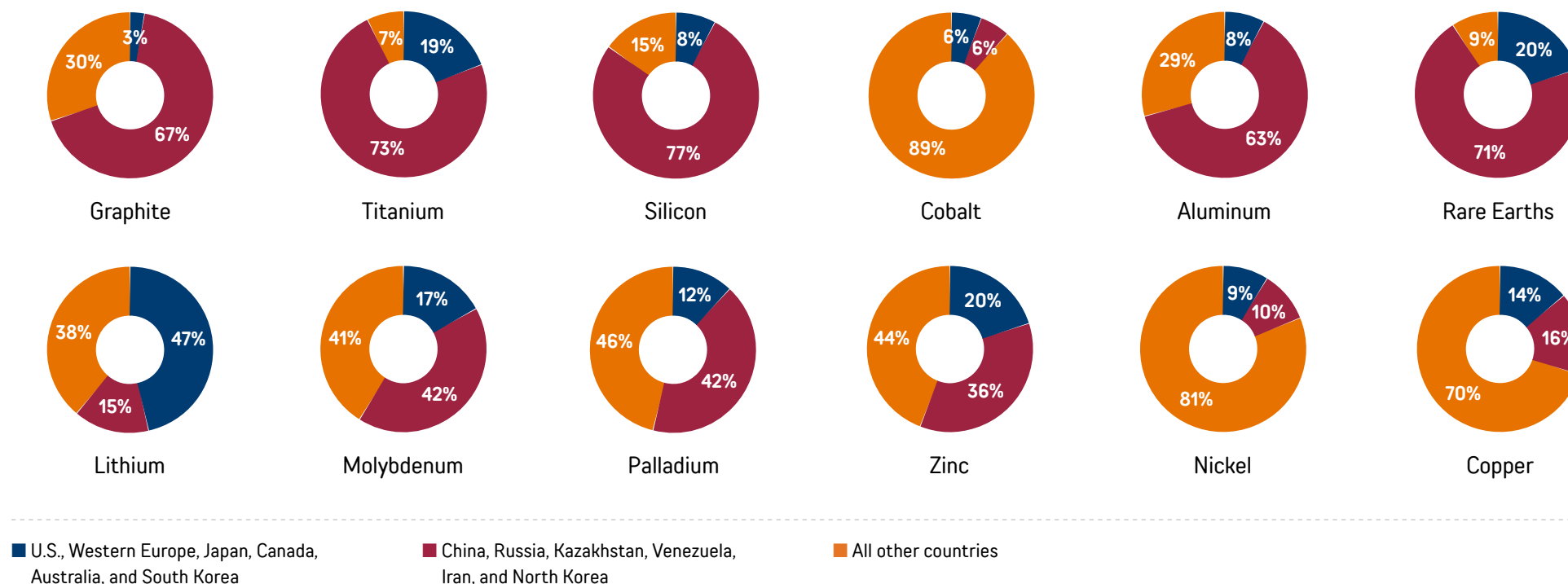
We expect energy security concerns to increasingly influence decisions regarding renewable energy. In addition to industry-wide structural issues, many of these key minerals and metals are mined, refined, processed, and manufactured in countries that may not align with Western democracies and capitalist principles. The China-Russian bloc controls a substantial portion of these key minerals and plays a dominant role in refining and processing them. Additionally, given the land requirements and typical placement of wind and solar projects away from concentrated energy demand centers, transmission lines are a critical component for renewable growth, and they require rights-of-way and permits that are not readily available.

Countries like China, Russia, Iran, and North Korea dominate the production of key minerals critical to renewable development. Together, these countries account for over 50% of world production of graphite, titanium, silicon, aluminum, and rare earth metals. They also produce a meaningful amount of molybdenum, palladium, and zinc. In addition, China refines and processes 66% of cobalt, 44% of copper, 62% of lithium, 49% of nickel, and 87% of rare earth minerals. A supply disruption or embargo of these minerals could be devastating to an economy that is heavily dependent on renewable energy.

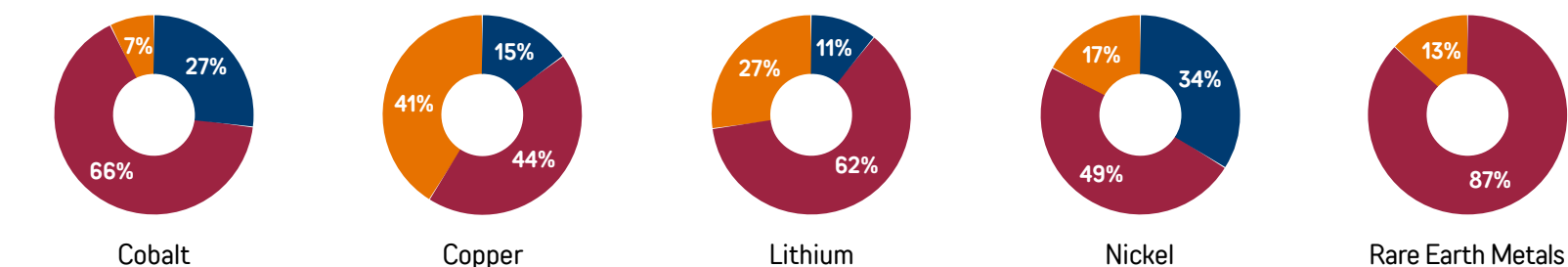
In addition, the prevalence of NIMBYism (Not-In-My-Backyard) in the U.S. makes it very difficult to obtain federal and state permits for long-haul transmission lines, which are necessary for the expected growth in renewables. The recent approval of the Mountain Valley pipeline required Congressional and Supreme Court approval to move ahead after years of delays.

Permit reform is a subject of debate in many state and federal legislatures and the current permit approval time and recent examples highlight the concerns with the current processes. We believe these impediments could cause meaningful delays in the expansion of renewables.

Percent Production by Region²



Refining and Processing Capability³



China alone controls refining capacity for 66% of cobalt, 39% of copper, 62% of lithium, 49% of nickel, and 87% of rare earth minerals.¹

¹ Lithium and nickel includes currently in production or under construction refineries. Copper includes currently in production refineries only.

Source:

² U.S. Geological Survey, Mineral Commodity Summaries (January 2023).

³ U.S. Geological Survey, Mineral Commodity Summaries (January 2023); Bloomberg New Energy Finance, Metal refinery assets map.

Traditional Energy Can and Will Continue to be Part of the Solution

Traditional energy represents about 77% of the energy mix in today's world. Given the rising global energy demand and anticipated obstacles with expanding renewables, these sources are expected to remain a dominant part of the global energy mix for decades to come. Nonetheless, to address the dual challenge, it is essential – and indeed possible – for the traditional energy sector to evolve and decarbonize fossil fuels over time.

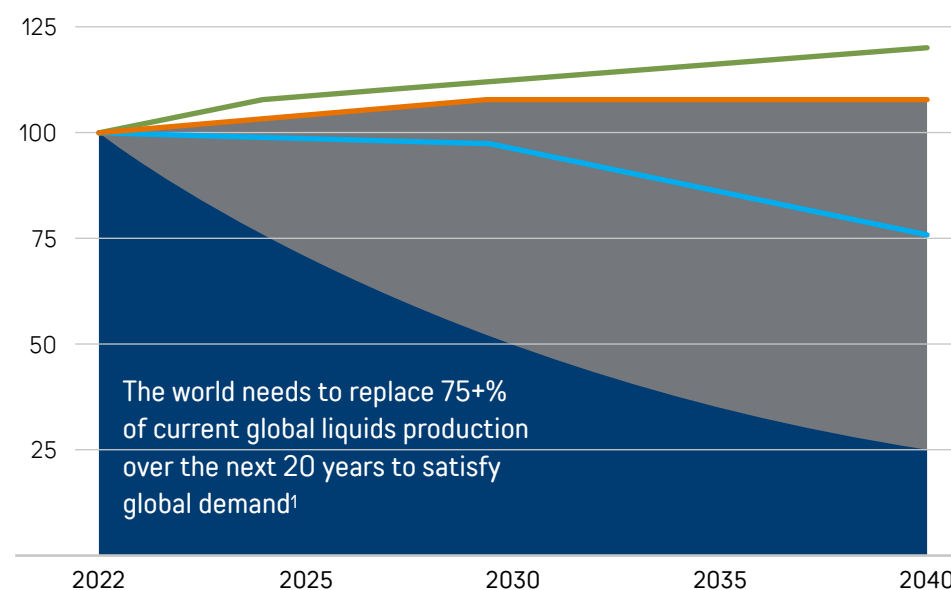
Today, traditional energy (coal, oil, and natural gas) represents ~77% of the current global energy mix. In addition, based on climate scenarios published by various authoritative sources, traditional fossil fuels will continue to play a significant role in meeting the world's energy demand for decades to come. However, there exists a perception among many people that the energy transition will occur swiftly, with renewables rapidly replacing traditional energy sources. This perception has created substantial negative pressure on the traditional energy sectors, resulting in limited investment. This limited investment, in turn, tends to increase commodity prices by constraining the supply and replacement of reserves, which are essential due to the depleting nature of oil, natural gas, and coal resources.

To meet relatively stable demand projections, the oil and gas industry would need to replace 75% of current production within the next 20 years. This equates to approximately \$12 trillion, or \$600 billion per year, which is 50% higher than the average annual expenditure over the past eight years. In the 2010s, reserve replacement declined from an average of 148% over the prior 50 years to under 30%, reaching a negative reserve replacement of 12% in 2021. Underinvestment tends to create shortages, heighten volatility, and increase commodity prices to temper demand. These elevated prices often function as a regressive tax on the less affluent and hinder development in emerging economies.

If we expect traditional energy to continue to play a meaningful role in meeting the world's energy demand, it stands to reason that we should produce the energy sources with the lowest carbon footprint and in the most socially responsible countries in the world. When examining the carbon intensity of worldwide production as reported by EIA and IEA in 2021, and Freedom House's Global Freedom Score Ranking as of May 2023, it is evident that North America should be the preferred location for oil and natural gas production. By restricting production in North America, given the same energy demands, global emissions could rise, and social justice could decline if we export production to other locations around the world.

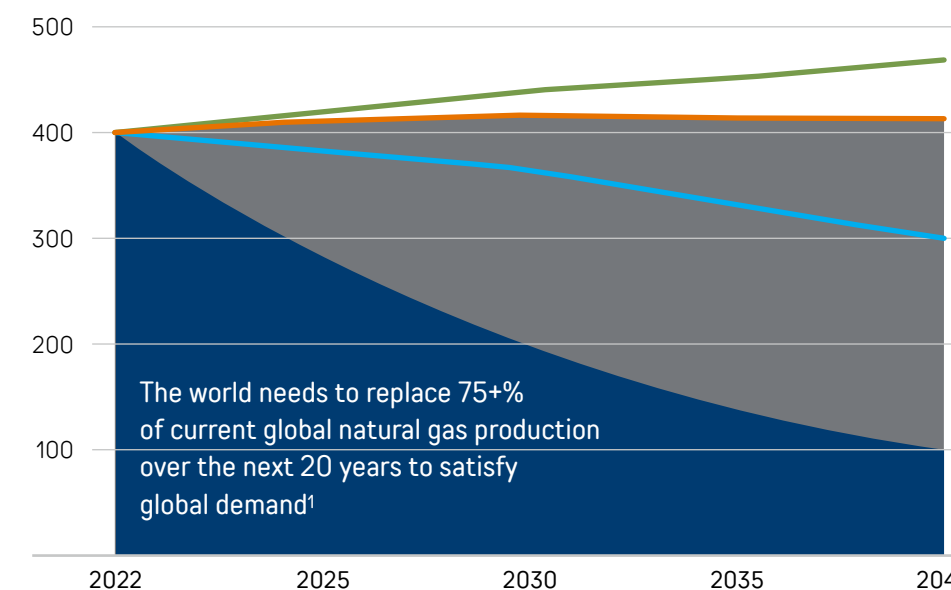
This is a key insight in solving the dual challenge: local solutions without a global perspective have the potential to exacerbate the problem due to the unintended consequences of relocating manufacturing/production and their corresponding emissions to overseas locations.

Global Liquids (Oil and NGLs) Supply and Demand² (MMBbl/d)



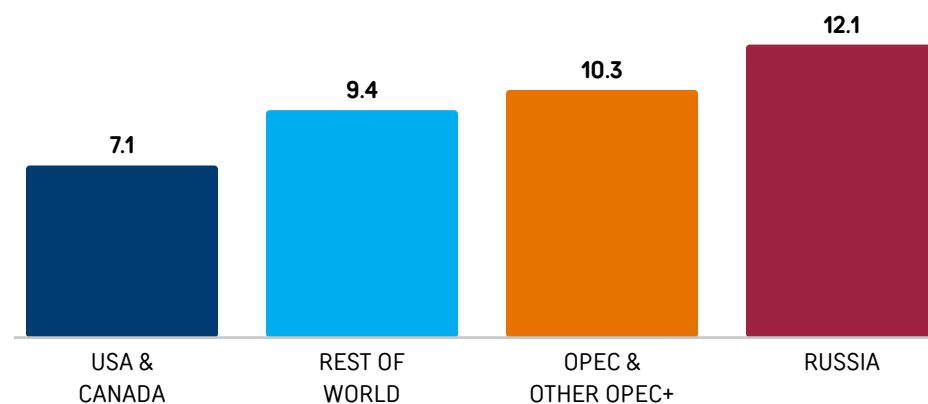
■ Current production ■ New production — EIA Reference demand forecast — IEA STEPS demand forecast — IEA AP demand forecast

Global Natural Gas Supply and Demand² (Bcf/d)

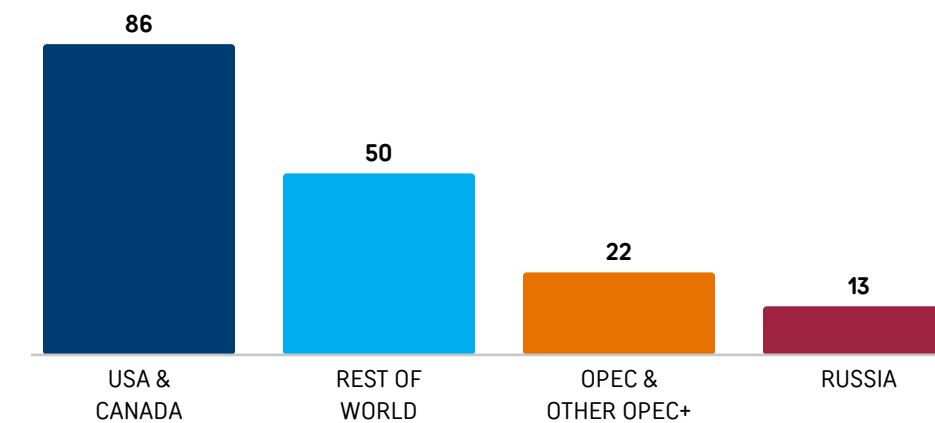


U.S. coal to natural gas switch and renewables helped the U.S. meaningfully reduce emissions.

Methane Intensity of Oil & Natural Gas (tCH₄/ktoe) – the “E” in ESG³



Freedom House's Global Freedom Score Ranking – the “S” in ESG⁴



We believe traditional energy can decarbonize and contribute to solving the dual energy and climate challenge.

There can be no assurance that any historical trends will continue or projections will materialize.

¹ Projected percentages of current production to be replaced references the IEA STEPS scenario demand forecast

Sources:

² IEA World Energy Outlook 2022 – STEPS and Announced Pledges scenarios, EIA International Energy Outlook 2021, BMO Capital Markets, Jefferies, ExxonMobil, Quantum estimates.

³ IEA, Greenhouse gas emissions from energy, 2021; EIA International Energy Outlook, 2021.

⁴ Freedom House's Global Freedom Scores.

Traditional Energy Can Decarbonize and Contribute to Solving the Dual Challenge

Responsibly-sourced natural gas and oil can be a meaningful part of the dual challenge. This is evident from the significant emission reductions in the U.S. from 2005–2019 due to the switch from coal to gas and renewables growth. By displacing coal with LNG worldwide, and other mitigating technologies and processes, we could drastically reduce global emissions from fossil fuels.

The U.S. significantly reduced emissions between 2005 to 2019, largely due to the growth in natural gas production from the shale boom that led to a decline in coal usage and the increased adoption of renewables. Switching from coal to gas accounted for 61% of these reductions, making it a more significant driver than the growth in renewables. Since then, oil and gas producers continue to enhance operations and reduce emissions through methane leak detection and mitigation, flaring reduction measures, better fuel efficiencies, and using lower carbon fuels in the production process.

Further, the industry is investing in the necessary infrastructure and expertise to decrease the carbon footprint of traditional energy through CCS, which involves gathering emissions at the source where they are most concentrated and transporting them to centralized sequestration sites where they can be stored, monitored and maintained indefinitely. This is a major focus for the industry with a pipeline of over 1,200 million tons per annum (MTPA) of capture and storage capacity announced or under development, of which over 75% aims to be operational by 2030.²

We believe reducing emissions is not only the right thing to do, it is good business. Lower emissions production reduces waste, typically commands a modest premium market price, and can enhance the value of asset sales, while also avoiding emission charges today and in the future. We believe updated regulations will also continue to incentivize emission reductions in the upcoming years. Pending EPA regulations, like Subpart OOOOb, may mandate lower emission thresholds, increased equipment maintenance and enhanced leak detection utilizing new technologies to decarbonize the oil and gas sector.

¹ Based on 2021 U.S. energy-related CO₂ emissions which excludes the impact of net agricultural emissions.

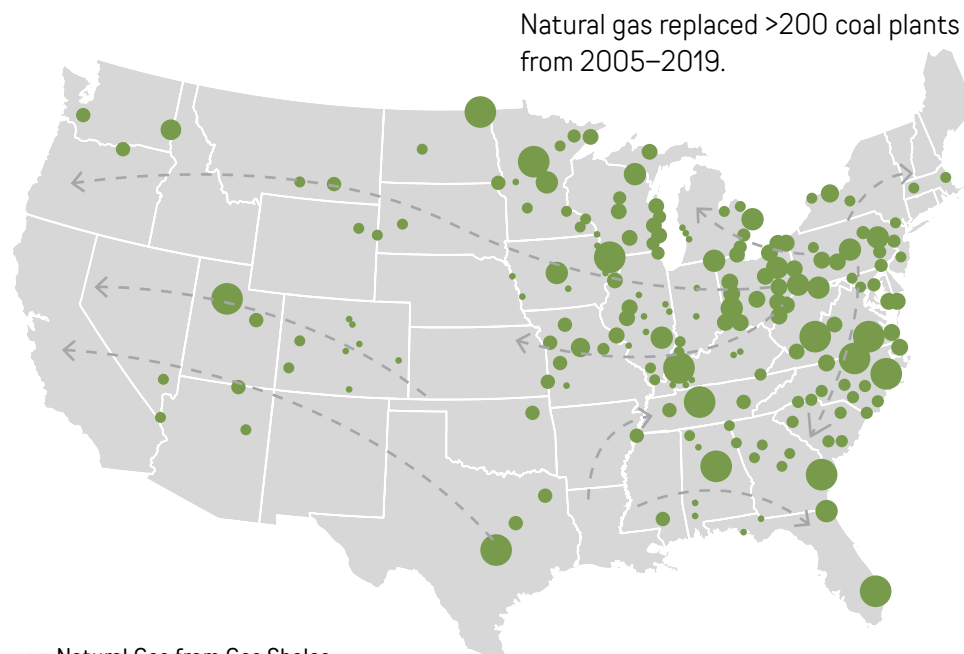
Sources:

² Wood Mackenzie, "Carbon capture, utilization and storage market update Q2 2023" (July 2023).

³ EQT's "Unleashing U.S. LNG" (2022), EIA, IEA.

⁴ Great Plains Institute (2021).

The switch in the U.S. from coal to natural gas and renewables helped the U.S. meaningfully reduce emissions.³



--- Natural Gas from Gas Shales
● Retired Coal Plant due to Natural Gas Switching

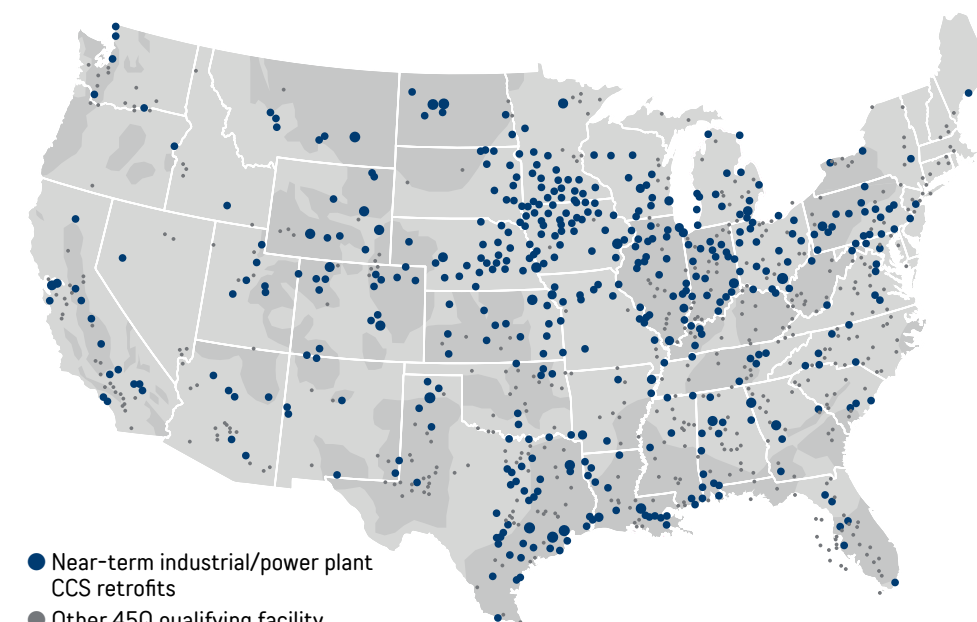
2005–2019 annualized CO₂ reductions³

COUNTRY	CO ₂ REDUCTION Million metric tons of CO ₂
United States	-959
United Kingdom	-188
Italy	-147
Germany	-144
Japan	-122
Ukraine	-120
Spain	-104
France	-77
Venezuela	-51
Greece	-39

Coal-to-gas switching was responsible for 61% of U.S. emission reductions (more than the next 3 countries combined).

By displacing coal with LNG more broadly, we believe we can meaningfully reduce global emissions.

Carbon Sequestration and other process can reduce fossil fuel emissions.⁴



● Near-term industrial/power plant CCS retrofits
● Other 45Q qualifying facility
■ Geological sequestration

Other fossil fuel improvements in addition to CCS which can reduce emissions:

- Methane leak detection and mitigation
- Reduced flaring
- Improved fuel efficiencies
- Use of lower carbon fuels in operations

We believe CCS on existing infrastructure could accelerate decarbonization meaningfully (>1 billion tons per annum, or ~20% of U.S. emissions').

The World Has One Atmosphere and Must Work Together

Our planet shares a single atmosphere, and while climate solutions are often locally driven and commendable, they run the risk of being ineffective without a global perspective. In fact, they may even inadvertently create more harm than good. Additionally, as the U.S. and Europe work to reduce emissions, it is important to recognize that 70% of current emissions originate from China and other non-OECD countries. We do not believe we will solve the dual challenge without the engagement of all meaningful emitters.

Since 1990, the U.S. and EU have reduced emissions, while other OECD countries have increased emissions modestly. Collectively they have reduced emissions about 0.7 gigatons per year. Meanwhile, China, India, and other non-OECD countries have increased emissions by 16.1 gigatons per year over the same timeframe. As such, we believe emission reduction targets worldwide will not be achieved without greater engagement by China, India, and other non-OECD countries.

Furthermore, a significant portion of forecasted global population growth and economic growth is concentrated in these non-OECD countries. We believe these factors will drive increased energy demand and most likely further increase emissions without a major policy change in these regions.

When we look at projections for emissions growth, we see major reductions are needed to achieve the stated climate goals of 1.5 to 2.0 degrees Celsius. Given the trends seen over the last decades and current implemented government policies, we believe achieving these trajectories will be extremely challenging without a broader and more creative, collaborative, and global approach. Additionally, some of our actions in the U.S. and Europe could result in limited or negative impacts if we export our emissions-intensive activities to regions with less stringent ESG standards.

There can be no assurance that any historical trends will continue or projections will materialize.

¹ Includes emissions from biogenic sources

² Low income, middle income, and high income designations based on World Bank country classifications as of December 2022.

Source:

³ Our World in Data, Cumulative CO₂ emissions including land use change; Global Carbon Budget (2022).

⁴ The World Bank DataBank, Population Estimates and Projections.

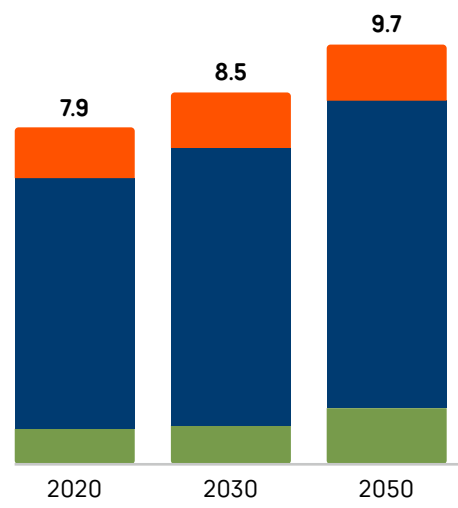
⁵ IPCC, Sixth Assessment Report.

Share of Global Emissions³

Emissions include those from fossil fuels and industry land use

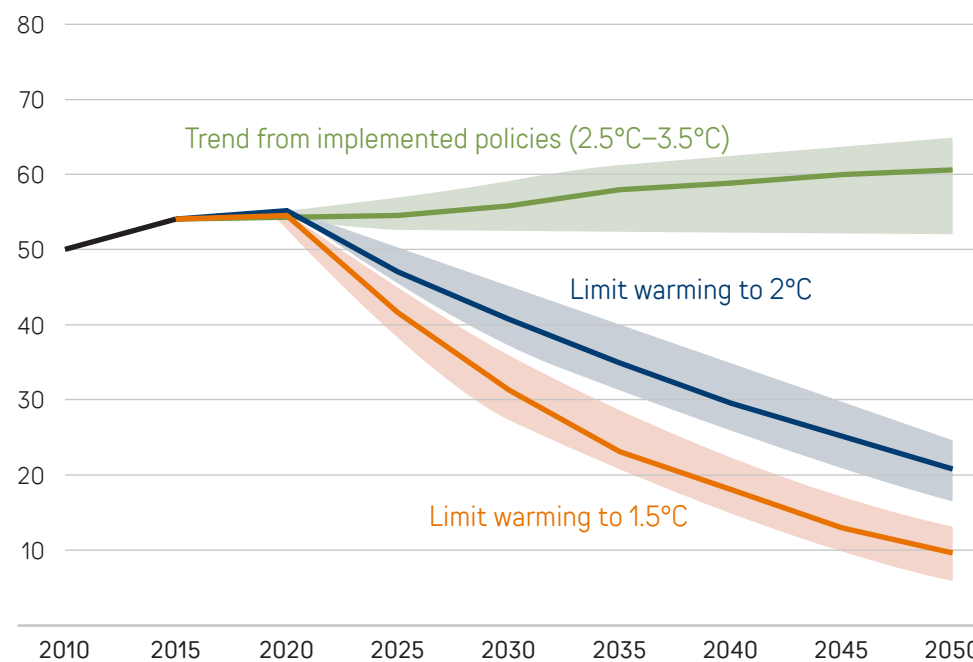
	1990		2021		Share of 1990–2021 growth
	Emissions	Percent of total	Emissions	Percent of total	
United States	5.4	20%	5.1	12%	(2%)
European Union (27)	3.7	13%	2.6	6%	(8%)
Other OECD	4.0	14%	4.7	11%	5%
Total OECD	13.1	47%	12.4	30%	(5%)
China	3.8	14%	11.8	29%	60%
India	0.8	3%	2.8	7%	15%
Other non-OECD	10.0	36%	14.0	34%	30%
Total non-OECD	14.5	53%	28.6	70%	105%
World	27.6	100%	41.1	100%	100%

Projected Population Growth^{2,4} (World population – billions)



■ High-income
■ Middle-income
■ Low-income

Total Global Annual Greenhouse Gas Emissions^{1,5} (gigatons of CO₂-equivalent)



Solving the Dual Challenge Will Require Multi-Dimensional Solutions

To address the dual challenge effectively, we need a comprehensive framework that can navigate the complexities and encompass the full spectrum of issues involved in assessing solutions. We believe this framework should be global in scope, addressing both energy and emission issues concurrently. It should consider technical maturity and the full life cycle cost of energy sources accounting for reliability, local and regional preference, energy security issues, and realistic timeframes for execution.

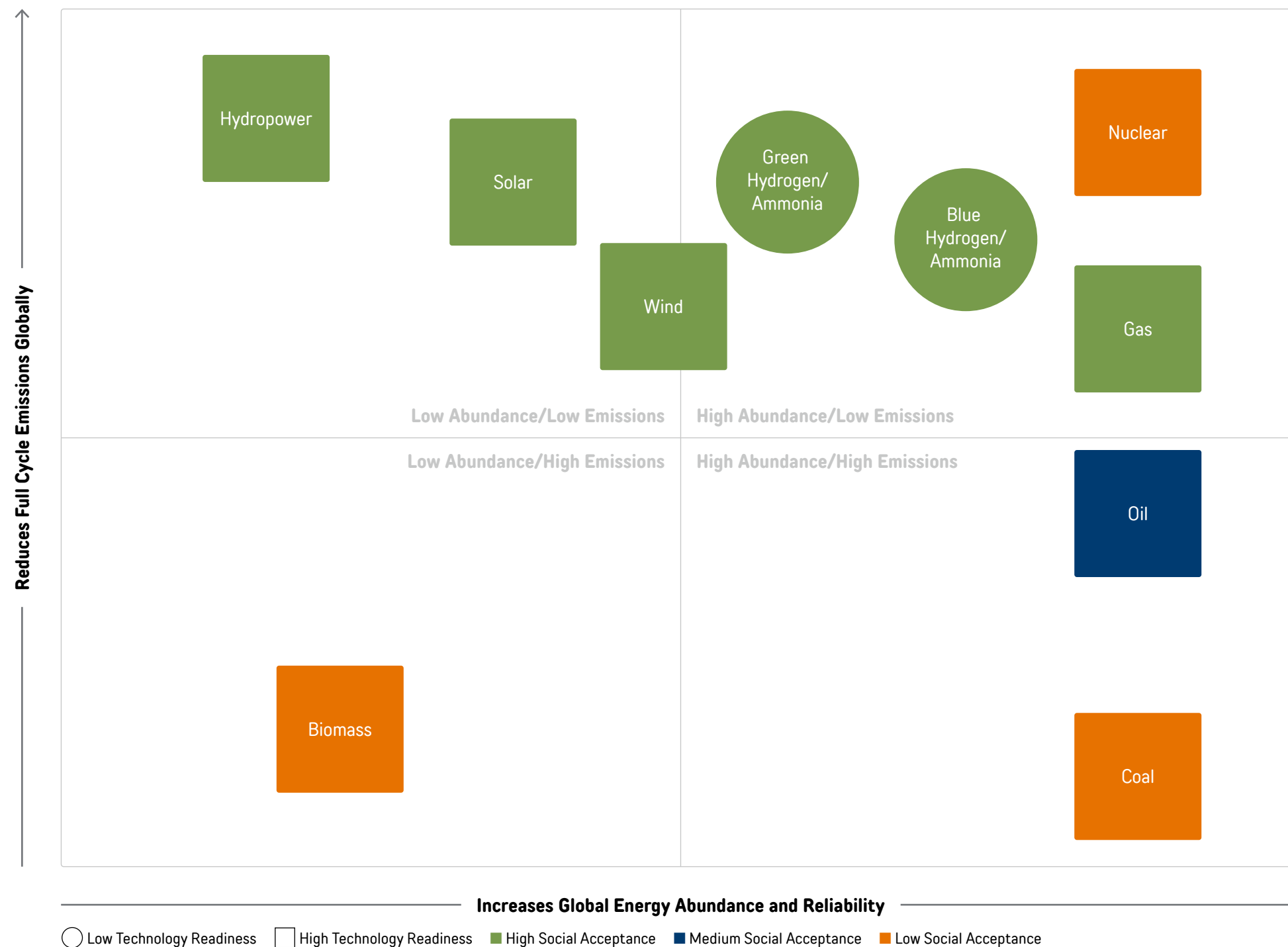
To date, there is no consistent framework or agreed upon methodology for assessing potential solutions to the dual energy and climate challenge. This challenge involves multiple stakeholders spread across various regions and countries. Many solutions address either energy supply or emissions, depending on the specific stakeholder involved. When attempting to optimize for both energy and emissions the complexity of the issue increases significantly.

The dual challenge solution involves a fundamental restructuring of one of the world's largest industries – energy – and mobilizing one of the most substantial capital pools ever contemplated for a single issue. Moreover, we believe each country will need to tailor its solutions according to its own available resources, capabilities, and energy security priorities. These solutions must balance technical and economic feasibility with societal, systemic, and environmental acceptance and viability, and consider the existence and economic practicality of proposed solutions and their level of support among the populace and government. These facets are often misaligned, either within a specific region or across diverse geopolitical landscapes. Furthermore, we believe unprecedented cooperation across regions will be required for any solution to be successful.

Today, accurately evaluating potential solutions based on these four major drivers is challenging, given the complexity of full cycle impacts, global ramifications, local variations and other factors that are difficult to quantify. Agreeing on an acceptable framework is a crucial next step. Once in place, sanctioned work can be initiated to complete the difficult task of quantifying the assessment of these agreed-upon factors across the range of available solutions.

At Quantum, we are focused on targeted solutions that we believe have significant potential to contribute, particularly in the areas of responsibly sourced production (RSP) and energy transition and decarbonization (ET&D) – what we call the Sustainable Energy Ecosystem. In addition, we are committed to actively providing energy education and supporting a balanced view regarding solutions to the dual challenge.

Dual Challenge Solution Framework*



Note: Information contained herein has been determined by Quantum based on internal research and data. Although Quantum believes such determinations are reasonable, they are inherently subjective in nature. Other market participants may make different determinations based on the same underlying data. There can be no assurance that any historical trends will continue.

Source:

* Quantum analysis.

How Quantum Addresses the Dual Energy Challenge

At Quantum, we are proud to support advancements in today’s energy ecosystem for tomorrow’s sustainable world while seeking to generate superior risk-adjusted returns for our investors. Our energy investments in the Sustainable Energy Ecosystem seek to help solve the dual challenge of providing low cost, reliable energy while reducing greenhouse gas emissions and mitigating climate impacts.

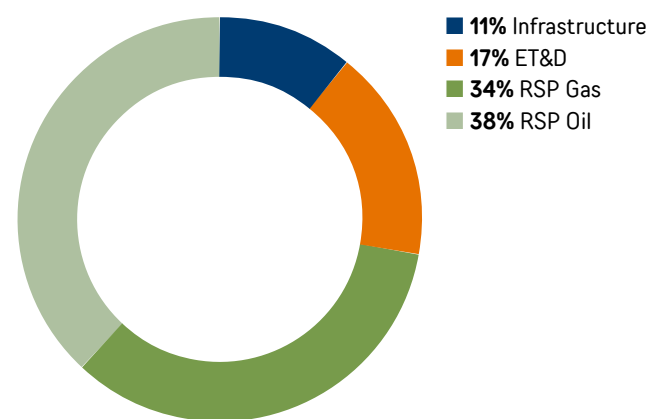
For 25 years, Quantum’s approach to energy investing has been centered around partnerships with leading execution-centric teams. Quantum has consistently followed a results-oriented investment strategy that has embedded ESG practices throughout the investment life cycle, which we believe has enabled us to achieve differentiated operational, environmental, and financial results.¹ These efforts span RSP, energy infrastructure, and ET&D, and include equity, structured capital, and venture capital.

In Fund VII, we invested 11% in infrastructure, 17% in ET&D, and 72% in RSP, roughly evenly split between natural gas and oil-oriented investments. We expect this approach to continue. In our current Fund VIII, we anticipate investing approximately 10–15% in infrastructure, 10–20% in ET&D, and 70–80% in RSP, including both natural gas and oil oriented investments.²

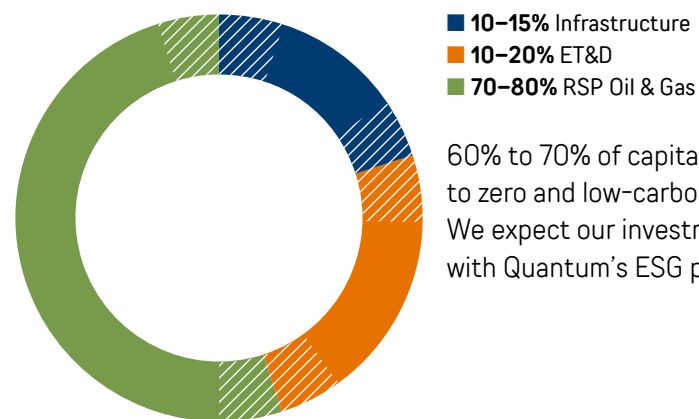
Where We Seek To Invest.

- RSP: These are investments in upstream oil and gas assets developed and operated with a strong focus on ESG performance. They include our core U.S. shale plays, non-core shale plays, deep water Gulf of Mexico, Canada and international production, and non-operational and royalty production.
- ET&D: These are investments in renewable energy (wind and solar), ET&D-related businesses, energy and sustainability technologies, and support for the circular economy.
- Infrastructure: These are investments in large scale infrastructure projects that support both RSP and ET&D. In the RSP space this includes midstream, processing facilities, and major pipelines. In the ET&D space, this includes transmission lines, mining, and ports. It also includes LNG facilities and CCS which lie at the crossroads of RSP and ET&D.

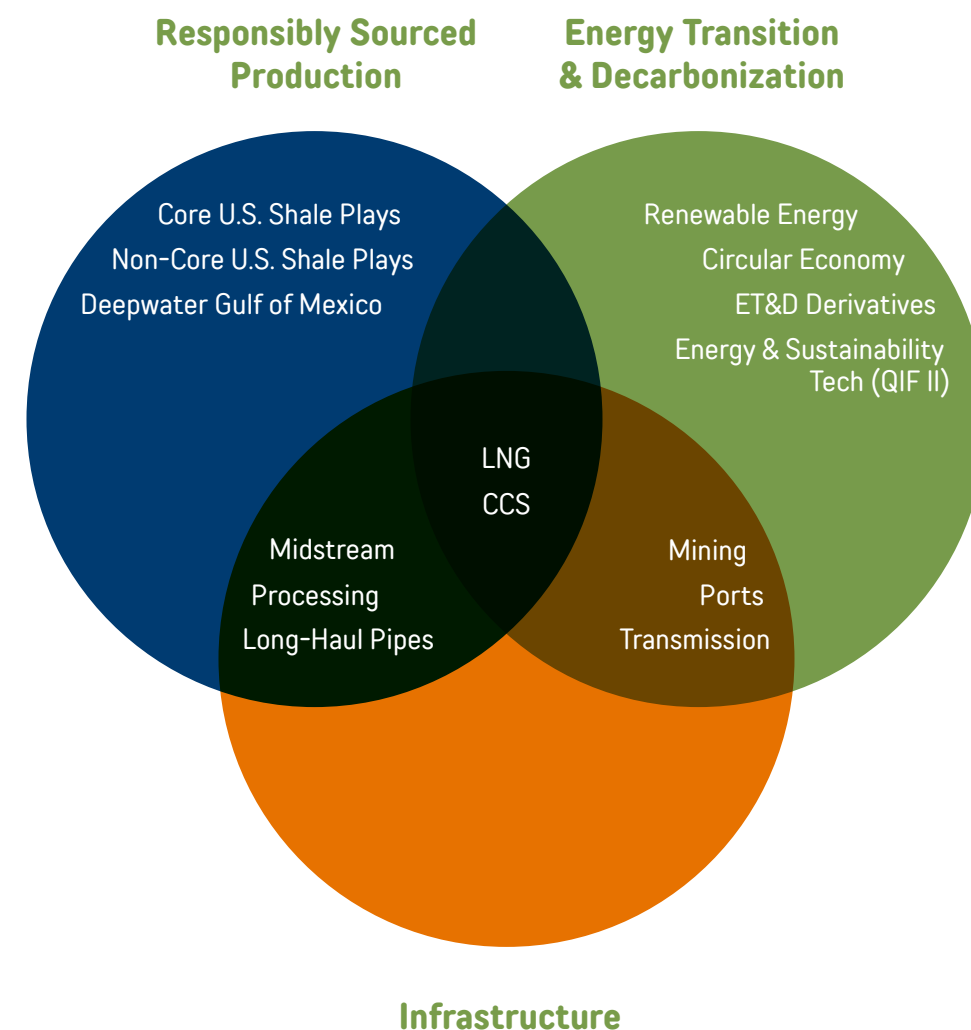
Quantum VII Investment Mix (Actual)



Potential Quantum VIII Investment Mix



60% to 70% of capital allocated to zero and low-carbon investments. We expect our investments will align with Quantum’s ESG principles.



¹ Please see disclaimers for important information regarding ESG considerations in our investment practices.

² Fund VII portfolio allocation and anticipated portfolio allocation for Fund VIII are provided for illustrative purposes to demonstrate the portfolio allocation Fund VIII seeks to achieve. There can be no assurance that such allocation metrics will be met, and actual portfolio construct may vary materially.

Integrated ESG Program

ESG Governance	28
Our ESG Strategy	29
ESG Factors	30
Spotlight: EQT Highlights Tug Hill Acquisition as “ESG Accretive”	31
Spotlight: Tanos’ ESG Performance Added Value to Diversified Energy Purchase	32
Deal Sourcing, Due Diligence & Decision Making	33
Ownership & Responsibility	34
Portfolio Monitoring, Evaluation & Reporting	35
Spotlight: Partnering with Portfolio Company FigBytes to Enhance ESG Data Management	35

ESG Governance*

To establish a robust ESG program, the Quantum Executive Team has developed a comprehensive governing structure that aligns with our core values and that we believe enables us to allocate the necessary resources to effectively address our ESG objectives. As engaged investors and owners, we also actively collaborate with our portfolio companies to promote and help them implement comprehensive governing structures and processes. These measures are aimed at fostering regulatory compliance, driving growth opportunities, managing risks, and creating value for our investors.



Our commitment to ESG integration supports our goal of maximizing returns to our investors, creating value for our portfolio companies and communities, actively managing risks, and driving business resilience and growth.”



Keila Diamond

Managing Director and Head of ESG,
Quantum Capital Group

Executive Team

Program Sponsorship

- Responsible for our strategic commitment to integrate ESG throughout the organization

ESG Steering Committee

Oversight & Strategic Guidance

- Provides oversight of ESG strategies and program management
- Comprised of eight senior leadership members and spearheaded by Quantum’s head of ESG

ESG Team

Strategy Development & Implementation

- Responsible for developing the strategy and implementation plans to meet Quantum’s ESG objectives
- Comprised of subject matter experts
- Responsible for creating processes to monitor and report on progress
- Responsible for promoting compliance with regulations and supporting ESG priorities set forth by Quantum

Quantum Representatives on the Boards of Directors at Portfolio Companies

Representation & Oversight

- Responsible for motivating management teams to pursue continued improvement
- Responsible for supporting companies’ ESG progress and performance reporting
- Responsible for supporting compliance with regulations and Quantum’s ESG priorities

ESG Team, Transaction Team, Technical Team, Client Relations Team, and Digital Team

Integration & Implementation Throughout the Investment Lifecycle

Portfolio Companies

Implementation

- Supported in managing material ESG factors with the goal of minimizing risks, complying with regulations, and increasing long-term value for stakeholders

* Please see disclaimers for important information regarding ESG considerations in our investment practices.

Our ESG Strategy

We adopt a comprehensive approach to integrating ESG throughout the entire investment lifecycle, where applicable. By using an integrated approach focused on continuous improvement, we aim to reduce risks and deliver robust financial results, which we believe demonstrates that ESG integration and profits are not mutually exclusive. We strive to align our investments with sustainable practices and capitalize on opportunities that promote competitive risk-adjusted financial returns driven by strong ESG performance.

We believe the ESG performance of our portfolio companies is increasingly becoming a differentiator in securing attractive exits, as seen with the recent acquisitions of Tug Hill and Tanos (see pages 31 and 32 for additional details).



We believe ESG belongs at the core of Quantum’s investment process. It transcends individual products, strategies, companies, or funds, becoming an intrinsic part of how we operate. By integrating ESG factors across our investment process, where applicable, we believe we gain a unique lens that unlocks significant opportunities for our portfolio companies to drive revenue growth, optimize costs, secure more efficient financing, and fortify their competitive positions. Embracing ESG not only sharpens our investment edge in a rapidly changing world but also reinforces our role as dedicated stewards of capital, helping to ensure a sustainable and responsible approach to investment.”

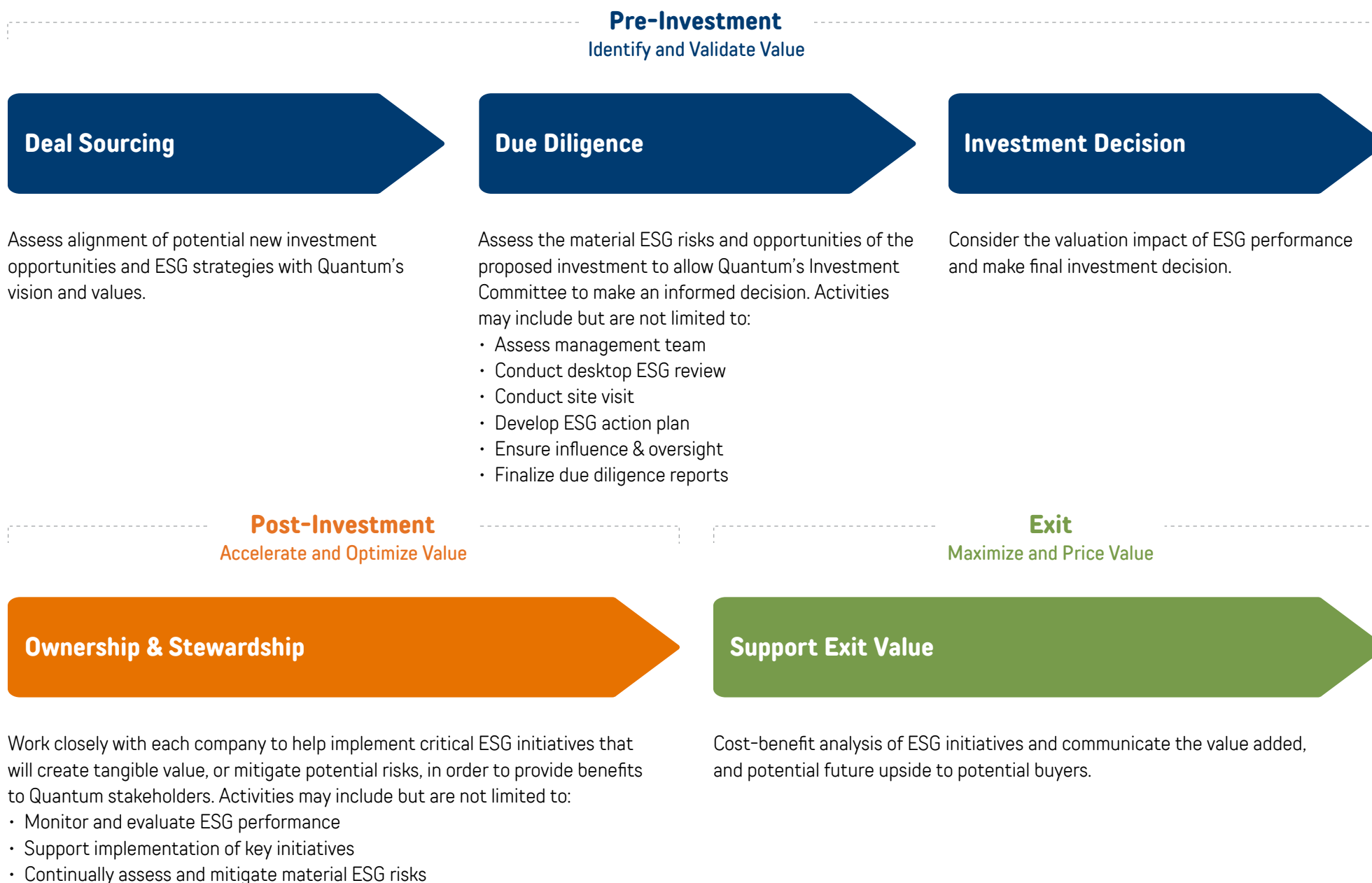


Charles Baillie
Co-President, Quantum Capital Group

Please see disclaimers for important information regarding ESG considerations in our investment practices. Although Quantum considers our ESG strategy to be an opportunity to improve performance and avoid risk for our investments, Quantum cannot guarantee that our strategy will positively impact financial or climate performance of any individual portfolio company.

* As Quantum deems feasible and appropriate, Quantum’s investment professionals will integrate material ESG factors into the investment process by implementing some or all of the following example processes.

ESG INTEGRATION IN THE INVESTMENT LIFECYCLE*



Potential Benefits of Integrating ESG Across the Investment Lifecycle



ESG Factors

Our strategy is based on a set of material ESG factors that serve as a lens through which we seek to identify material risks and opportunities for Quantum and prospective portfolio companies as appropriate. We selected these ESG factors following a rigorous analysis that included a benchmark assessment of material factors identified by leading international organizations and input from a range of stakeholders.

We seek to proactively integrate these ESG factors into our investment process, where material, and actively encourage our business partners to do the same. Furthermore, by providing clear expectations, comprehensive guidelines, and dedicated resources, we seek to empower our portfolio companies to embed and actively manage these ESG factors, where material, within their operations. We believe this strategy helps enhance our portfolio’s success and resilience and better positions us and our portfolio companies to navigate the evolving regulatory, environmental, and social landscape.

Our Material ESG Factors*



Environmental

Climate Change

GHG (Scopes 1 & 2)
Methane
Flaring
Combustion

GHG (Scope 3)

Climate Resilience

Natural Resources & Releases

Biodiversity & habitat

Air emissions

Water consumption

Wastewater

Waste

Spill prevention

Well closure & site decommissioning



Social

Human Capital

Health & safety

Labor standards & human rights

Asset integrity & process safety

Diversity, equity & inclusion (DE&I)

Community Relations

Community engagement

Indigenous People & First Nation rights

Land acquisition, use & resettlement



Governance

Corporate Governance and Ethics

ESG performance monitoring, evaluation & reporting

Stakeholder engagement

Business ethics and code of conduct

Cybersecurity

Executive incentives tied to ESG performance

* There can be no assurance that the list of ESG topics is exhaustive, and additional topics may be identified as material on an investment-by-investment basis. There is no guarantee that any of the steps taken by Quantum and/or third parties to mitigate, prevent, or otherwise address material ESG topics will be successful in preventing or mitigating impacts on returns, completed as expected or at all, or will apply to or continue to be implemented in the future. Please see disclaimers for important information regarding ESG considerations in our investment practices.

SPOTLIGHT: ESG AS A VALUE ADDED IN EXIT TRANSACTION

EQT Highlights Tug Hill Acquisition as “ESG Accretive”

In September of 2022, EQT Corporation announced a purchase agreement with two Quantum portfolio companies: THQ Appalachia I, LLC (Tug Hill) and THQ-XcL Holdings I, LLC (XcL Midstream). Tug Hill is an oil and gas exploration company in the Appalachian Basin focused on producing clean-burning natural gas. XcL is a greenfield natural gas gathering and processing system in Southwest Appalachia that was formed as a complement to Tug Hill. We believe the companies’ unwavering commitment to value-enhancing ESG initiatives played a pivotal role in the valuation and acquisition by EQT.

Throughout its history, Tug Hill has built a strong reputation for operational excellence. The company’s decision-making process is rooted in comprehensive technical and financial evaluations, reflecting a commitment to doing things right from the outset. Tug Hill’s effectiveness in executing its operations is complemented by a dedicated and impactful ESG program, which is the culmination of years of meticulous project planning, intentional execution, and an unwavering focus on enhanced monitoring and transparent reporting.

We believe EQT recognized the immense value of Tug Hill’s and XcL’s robust ESG foundations as strategic assets, aligning seamlessly with EQT’s own objectives. Tug Hill’s proactive ESG practices and robust risk management measures validated the company’s adeptness in navigating evolving regulatory requirements, yielded substantial operational efficiencies and associated costs savings, and fostered market differentiation.

“Tug Hill’s strong environmental performance is fully aligned with EQT’s net zero and other emissions target. Tug Hill’s methane intensity in 2021 was just 0.004, which is below EQT at 0.039%, and brings our pro forma business even closer to our 2025 methane intensity target of 0.02%.”

Toby Rice
CEO, EQT

The select investment is provided for illustrative purposes only to demonstrate Quantum’s investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future. There can be no assurance that any historical trends will continue or projections will materialize.

¹ EQT Methane emissions intensity target is calculated in accordance with the ONE Future Coalition’s methodology for calculating Production segment methane emissions intensity, and therefore includes all Production segment Scope 1 emissions attributable to EQT, including emissions and production from the Alta Assets. EQT GHG emissions intensity targets include only assets owned by EQT on June 30, 2021, and therefore exclude emissions and production from the Alta Assets.

Sources:
² EQT and Tug Hill GHG reports.
³ ERM 2022 Oil & Gas Benchmarking Report.

Tug Hill & XcL Environmental Highlights

» Tug Hill ranked #1 in lowest methane emissions intensity of Top 100 U.S. Producers³



» ~100% of Tug Hill production is assessed by TrustWell™ as Responsibly Sourced Gas (RSG), with the majority awarded TrustWell™ Platinum



» XcL received RSG certification and is the first midstream company to deploy Project Canary’s continuous site monitors



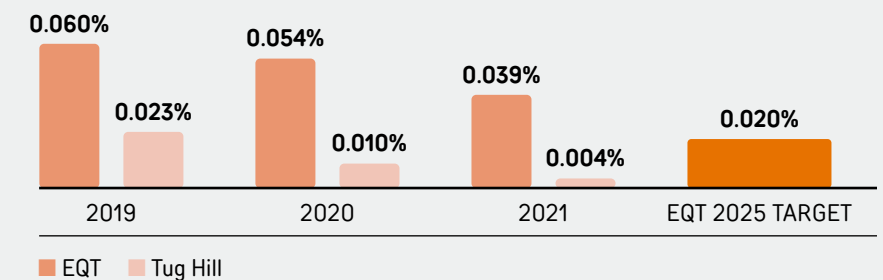
» ~100% of Tug Hill produced water is recycled in operations



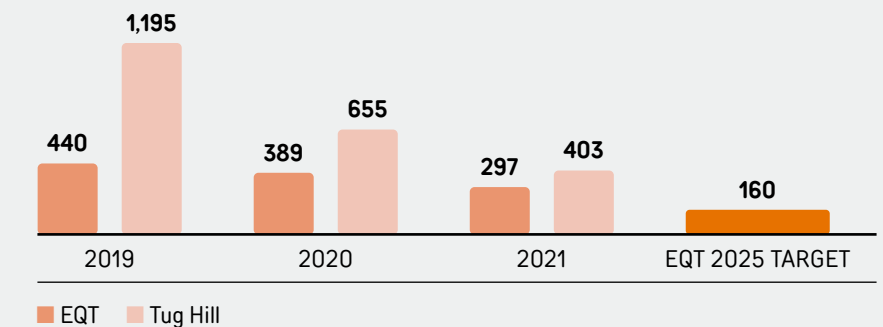
» Tug Hill’s significant methane emissions reductions largely driven by:

- Pneumatic device replacements
- Grid power utilization on >70% of pad sites
- Closed loop facility designs on all new pads

PRODUCTION SEGMENT SCOPE 1 METHANE EMISSIONS INTENSITY^{1,2}
MT CH₄ Emitted/Gross Annual Production * Methane Content (MT CH₄)



PRODUCTION SEGMENT SCOPE 1 GHG EMISSIONS INTENSITY^{1,2}
MT CO₂e Emitted/Gross Annual Production (Bcfe)



SPOTLIGHT: DIVERSIFIED'S ACQUISITION OF TANOS ENERGY HIGHLIGHTS ESG VALUE

Tanos' ESG Performance Added Value to Diversified Energy Purchase

In 2021, Diversified Energy Company PLC, in collaboration with funds managed by Oaktree Capital Management, L.P., successfully acquired Cotton Valley and Haynesville upstream assets in Louisiana and Texas from Tanos Energy Holdings III LLC (Tanos), a Quantum portfolio company. We believe Tanos' robust ESG program added substantial value to Diversified, aligning with their own ESG goals and supporting the acquisition.

Project Canary's renowned Low Methane Verified Attribute and TrustWell™ environmental risk assessment system awarded Tanos a prestigious "Gold" rating for its East Texas producing assets, serving as a testament to Tanos' commitment to operational excellence and environmental performance, and affirming the company's dedication to responsible practices.

The comprehensive environmental risk assessment evaluated 600 quantitative and qualitative data points related to well construction, emergency management, emissions, and water use per well. Tanos' exceptional performance earned them a "Gold" rating by TrustWell™, indicating they are in the top 25% of operators for their health, safety, and environmental practices.

Moreover, Tanos' proactive approach to methane intensity management earned them the "Low Methane Verified Attribute" designation from Project Canary. With methane intensity below 0.2% and continuous leak monitoring, Tanos demonstrated its dedication to minimizing methane emissions.

The outstanding ratings from Project Canary's verification system not only reinforced Tanos' strong operational standing but also opened access to responsible sourced gas (RSG) markets. We believe Diversified Energy's acquisition of Tanos underscored the significance of environmentally conscious practices in today's energy landscape and highlighted the growing importance of ESG considerations that we observed in third-party investment decisions.



The select investment is provided for illustrative purposes only to demonstrate Quantum's investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future.

“

We built our business on the premise of being responsible stewards of existing natural gas and oil assets, so we value the Project Canary recognition. The 'Gold' designation complements our already strong ESG actions, including the OGMP 2.0 Gold Standard, further highlighting our commitment to transparency and validating the important work we're doing to responsibly produce natural gas.”

Rusty Hutson, Jr.
CEO, Diversified Energy

Deal Sourcing, Due Diligence & Decision Making

As we work to continuously enhance our investment underwriting process, we remain dedicated to expanding our pre-investment due diligence workstreams around ESG priorities.

Our due diligence efforts seek to incorporate material ESG considerations into decision-making from the beginning. However, the extent of Quantum’s influence and control over its invested companies is contingent upon the investment structure and terms. Particularly in instances where Quantum identifies limited capacity to conduct due diligence or limited influence and control regarding ESG issues in connection with an investment, the application of ESG considerations is limited to what is deemed practicable.¹

When Quantum has operational control and has access to management and ESG data, we seek to review and consider material ESG risks and opportunities from the beginning of the investment process, as deemed feasible and appropriate, and we work with portfolio companies to promote ESG practices that are aligned with value creation and protection as well as operational excellence. To that end, we are creating a streamlined risk evaluation tool to help us prioritize and analyze ESG matters efficiently across all investment focus areas. This enhanced due diligence process reinforces our commitment to robust risk management and proactive ESG integration, aligning our investment strategy with the goal of achieving sustainable growth and maximizing returns.²



Unlike many others in the industry, we carefully and deliberately consider investing in assets even when they carry ESG risks if we can identify opportunities to mitigate those risks and create value post investment by actively driving meaningful ESG enhancements. We believe this differentiated skillset gives us a competitive advantage in the market.”



Jonathan Regan
Partner, Quantum Capital Group

Due Diligence ESG-Related Goals



Understand portfolio company culture and management’s commitment to our ESG strategies



Assess material ESG factors to seek to reduce risk/create value for each investment



Execute on material ESG opportunities post-investment through our portfolio stewardship and ownership framework



Develop a roadmap to address financial impacts and opportunities

We are creating a risk evaluation tool to prioritize and analyze ESG matters consistently. Our enhanced due diligence process, which can be applied to companies across all investment focus areas, includes creating a robust report of material ESG risks and opportunities for investment committee review.

The select investment is provided for illustrative purposes only to demonstrate Quantum’s investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future.

¹ Examples of such cases may include portfolio companies that do not have operating assets, portfolio companies where Quantum is a minority investor or lender, or certain portfolio companies where Quantum has no operational control and little access to management or non-public ESG information.

² For more information regarding our deal sourcing, due diligence, and decision making process, see page 22 of our 2022 ESG Report.

SPOTLIGHT

Triple Crown’s ESG-Linked Credit Due Diligence

Quantum Capital Solutions takes a highly customized approach to credit and structured capital solutions, tailoring the process for each company based on the transaction type, while seeking to conduct comprehensive due diligence that helps mitigate material risks while optimizing long-term financial value.

In December 2021, Quantum partnered with Triple Crown Resources (Triple Crown), a private upstream company with assets in the southern Midland Basin, to refinance their existing indebtedness through an innovative sustainability-linked first lien term loan. This unique arrangement offers pricing incentives tied to Triple Crown’s achievement of GHG emissions targets. As a committed partner, Quantum also provides Triple Crown with operational expertise and support and plays an active role in Triple Crown’s operations through Board representation and involvement in key discussions, including development plans, reporting, and ESG matters.

During Quantum’s investment due diligence process for Triple Crown, the team completed a comprehensive review of ESG information, including information related to GHG emissions, methane emissions, water consumption, and employee safety. After receiving the necessary data, the investment team conducted an analysis of historical performance, considering both absolute figures and trends over time. To help ensure data accuracy and reliability, Quantum engaged third-party assistance in reviewing and validating the information. Additionally, the team benchmarked Triple Crown’s ESG performance against comparably sized companies within the same industry segment and geographical location.

Based on the findings, Quantum identified and recommended the most appropriate key performance indicators (KPIs), collaborating closely with Triple Crown’s management team to establish targets and a proposed time-frame for achievement, all of which were documented in the loan agreement. Throughout the term loan’s duration, Quantum requires regular performance reporting to monitor progress towards reaching the GHG emissions targets, reaffirming its commitment to fostering positive ESG outcomes.

The Triple Crown loan represents a strategic alignment with Quantum’s broader goal of creating long-term value for its portfolio companies and investors. With a forward-looking vision, Quantum intends to replicate this sustainability-linked approach in its recently activated direct lending fund, which will focus on investment opportunities in the upstream and midstream sectors.

Ownership & Stewardship

During the investment period, we prioritize portfolio stewardship, leveraging active risk management strategies in an effort to minimize risks, capitalize on ESG opportunities, and drive strong returns. By identifying areas for improvement and developing a comprehensive implementation roadmap, we aim to help portfolio companies enhance their ESG performance and drive value creation.

Through active engagement and close relationships with our portfolio companies during the investment period, we encourage companies to embrace ESG initiatives quickly. By understanding the distinct needs of each company, we tailor our approach and provide resources and expertise, which we believe helps companies implement innovative solutions, unlock financial and reputational benefits, manage risks, drive value creation, and enhance their long-term resilience and competitiveness in the market.



Identify Priorities

Revisit ESG due diligence findings with portfolio companies and prioritize ESG factors



Develop Action Plan

Work with portfolio companies to develop a customized ESG roadmap



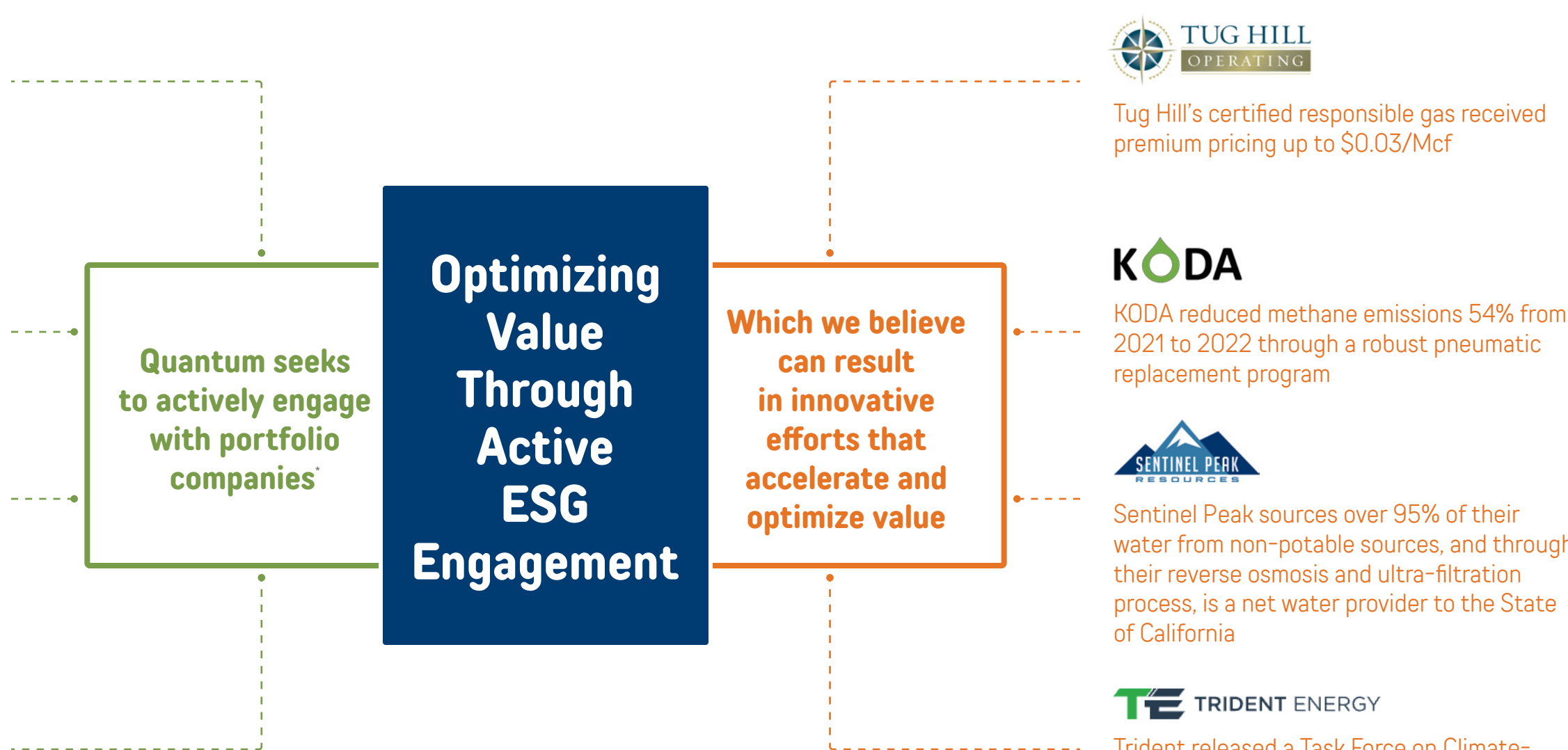
Provide Resources

Offer resources, including third party experts when needed, to help implement action plans, where required



Regularly Monitor and Engage

Engage with portfolio companies regularly, including through monthly check-ins and Board level engagement to review updates on various initiatives. Conduct periodic assessments of ESG performance and complete site visits when needed.



Tug Hill's certified responsible gas received premium pricing up to \$0.03/Mcf



KODA reduced methane emissions 54% from 2021 to 2022 through a robust pneumatic replacement program



Sentinel Peak sources over 95% of their water from non-potable sources, and through their reverse osmosis and ultra-filtration process, is a net water provider to the State of California



Trident released a Task Force on Climate-Related Financial Disclosures (TCFD)-aligned Sustainability Report in April 2023

The select investments are provided for illustrative purposes only to demonstrate Quantum's investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future. Please see disclaimers for important information regarding ESG considerations in our investment practices.

These are illustrative examples of engagement activities. Actual engagement may vary from investment to investment. Please see disclaimers for important information regarding ESG considerations in our investment practices.

Portfolio Monitoring, Evaluation & Reporting

We have made significant strides in monitoring and reporting ESG performance across our portfolio companies in recent years. By doing so, we believe we are enhancing transparency and accountability and fostering a culture of continuous improvement and responsible business practices.

2022 Portfolio Company ESG Reporting (As of December 2022)

5,700+

Data points collected

34

Reporting companies

Portfolio Company Reporting Process*

Quarterly Surveys

By evaluating and analyzing quarterly performance reports, we work with portfolio company management teams to identify important trends, develop plans to address issues, drive continuous improvement, and ensure alignment with Quantum’s ESG policies and procedures.

Annual Surveys

Portfolio companies are asked to submit detailed annual surveys to us, covering operational, human capital, and emission statistics for each company.

Quarterly Board Reports

Utilizing a Quantum-provided template, portfolio companies are encouraged to submit quarterly reports to their Boards, allowing executive teams to provide longer-term oversight of trends and action plan implementation.

Unplanned Event Reports

Portfolio companies are asked to inform our team immediately of any unplanned events, and we work closely with them to understand the circumstances and develop mitigation plans.

From January to December 2022, we collected a comprehensive set of KPIs that spanned multiple categories, providing us with a holistic view of our portfolio ESG performance and progress. High-quality data underpins effective analysis, ESG integration, and portfolio management. We believe our comprehensive monitoring and reporting program allows us to identify trends and potential risk factors and opportunities across all our operating, majority owned investments. The data we collect is available to our portfolio companies and is used to extract insights regarding common trends, drivers, and challenges, and to better assess risks and opportunities for new investment opportunities.

CATEGORY	TYPES OF METRICS MONITORED
Energy Consumption	Electricity consumption / Fuel consumption
GHG Emissions	Scope 1 / Scope 2 / Gas flaring
Methane	Methane intensity and LDAR / Methane reduction
Air Emissions	Number of Title V facilities / Criteria pollutants
Water	Total fresh / Non-freshwater sourced / Recycled water
Spills	Oil spills / Water spills / Chemical spills
Safety, Contractor, Vehicle	Work hours / TRIR / LTIR / PVIR / Lost time incidents
Regulatory Compliance	#NOVs and associated fines
Anonymous Reporting	Presence of systems in place
Community Relations	Number and type of complaints
DE&I	Employee turnover and demographics

The select investment is provided for illustrative purposes only to demonstrate Quantum’s investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future. Please see disclaimers for important information regarding ESG considerations in our investment practices.

* Reporting processes apply to select companies with relevant data available.

As part of our commitment to transparency and accountability, to date, we have proactively disclosed our ESG performance through various formats in a manner informed by globally recognized reporting frameworks such as ILPA, Sustainability Accounting Standards Board (SASB), Principles for Responsible Investment (PRI), and TCFD. These frameworks provide a standardized approach to reporting and enable stakeholders to assess our performance in a meaningful and comparable manner. Additionally, we engage in regular dialogue with investors and other stakeholders to gather feedback and ensure that our disclosures meet their information needs and expectations.

SPOTLIGHT

Partnering with Portfolio Company FigBytes to Enhance ESG Data Management

In line with our commitment to maximizing the value of our expanding ESG database, we have formed a strategic partnership with FigBytes, one of our portfolio companies, to enhance our ESG data management system and reporting capabilities. Through the FigBytes SaaS platform, we aim to quantify and embed ESG considerations into our operations and strategic efforts, facilitating seamless reporting, analytics, and goal setting across our organization. This collaboration strengthens our commitment to transparency, accountability, and continuous improvement in tracking, measuring, managing, and reporting on our portfolio company ESG performance with precision and efficiency.



Portfolio Company ESG Performance

2022 Portfolio Company Highlights, At A Glance	37
Climate Risks & GHG Emissions	38
Spotlight: Partnering with Portfolio Companies to Reduce Regulatory Requirements	40
Water	44
Spotlight: Creating Tools to Improve Water Conservation While Reducing Costs	44
Human Capital Management	45
Spotlight: Trident Energy's Focus on Process Safety & Asset Integrity	46
Cybersecurity	48

2022 Portfolio Company Highlights, At A Glance



Our Reporting Process

Over **5,700 data points** collected from **34 reporting companies** across all funds and investment strategies in our annual data collection

Increased data collection frequency to **quarterly reporting** for select companies

Embraced the digital transformation and enhanced ESG data management by partnering with Quantum Innovation Fund company, FigBytes



Our Climate Update

Achieved a methane intensity of 0.08%, surpassing our standard of 0.2% for the third consecutive year

>80% of Quantum gas production was monitored directly with continuous monitoring from Project Canary

Over 500,000 Quantum components were surveyed with optical gas imaging (OGI) cameras

As of May 2023, **nearly 900 Quantum wells** across 7 oil and gas operators have been TrustWell™ Certified



ESG in Our Operations

73% of the water used in Quantum operations is **non-fresh or recycled water**

Quantum companies **recycled 229 million barrels of water**

Quantum companies achieved an average **oil spill rate of 0.02 bbl/Mbbl**



Our Employees

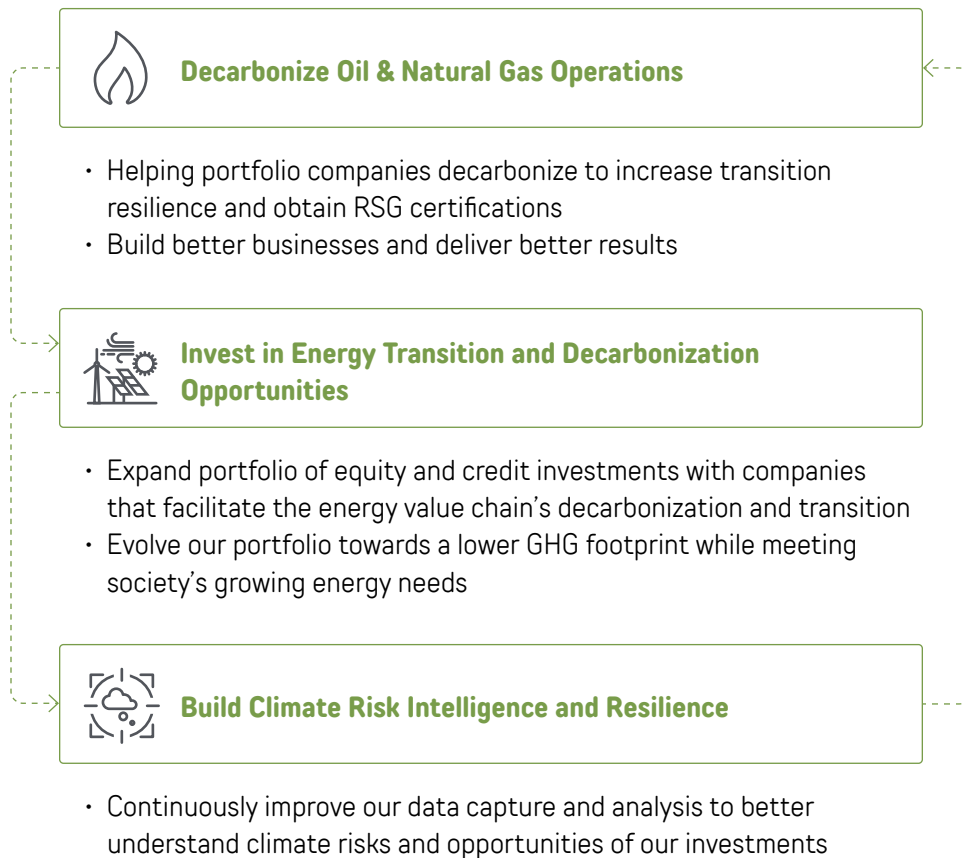
Expanded data gathering for social performance metrics, and **collected data representative of 2,644 employees**

Among Quantum portfolio companies, **24% of employees are women and 29% identified as ethnically diverse**

Climate Risks & GHG Emissions

We believe recognizing and addressing material climate risks and GHG emissions is a strategic necessity that helps us mitigate investment risk exposure, enhance the value of our portfolio companies, and meet increasingly stringent regulatory requirements, all of which are integral to our ongoing competitiveness and profitability in a rapidly evolving energy sector.

Our Climate Strategy



Our climate strategy implementation steps include:

Calculate carbon footprint

Quantum does not directly generate significant operational GHG emissions at the firm level as compared to emissions associated with its investments (or, financed emissions). However, we have developed a process to calculate certain financed emissions, including Scope 1, 2, and 3 (Category 15) associated with our oil and gas operations.

Assess risks

We have identified representative transitional risks and opportunities using two climate scenarios and evaluated the physical risks of three portfolio companies that we believe are geographically representative of future investments.¹

Disclose Results

We seek to align our climate and emissions disclosures with the recommendations of the TCFD.²

Create operational targets

We developed goals for oil and gas operators that we believe align with industry best practices to reduce GHG emissions. To learn more, see page 39.

In alignment with the recommendations of the TCFD, we have evaluated the material climate-related transition risks and opportunities for our investments under the IEA's U.S. Sustainable Development Scenario (SDS) assumptions. The risks and opportunities were analyzed through the lens of three main influences, including market and technology, regulatory and legal, and reputational.¹ For information about emissions-related performance, including our financed emissions and the operational emissions from our portfolio companies, see below and page 40.

GHG Emissions

As responsible investors, we recognize the importance of diligently monitoring and tracking the emissions of our portfolio companies. By doing so, we can gain a comprehensive understanding of our indirect environmental impact and leverage that information to align with market and regulatory requirements. This commitment reflects our dedication to responsible stewardship with the goal of delivering the highest possible risk-adjusted returns for our investors, while continuing to work to lower our financed emissions.

While Quantum does not directly generate significant operational emissions at the firm level, we have developed a process to calculate certain of our financed emissions (Quantum's Scope 3, Category 15), which incorporated certain Scope 1, 2 and 3 associated with our oil and gas operations.

2022 Calculated Financed Emissions³

	Scope 1 Operational emissions from traditional oil and gas upstream and midstream gathering	2,787,727 MT (3.3%)
	Scope 2 Emissions associated with electricity usage including office consumption and electrified operational equipment	191,168 MT (0.2%)
	Scope 3 End product sold to the market	81,547,637 MT (96.5%)
Total		84,526,532 MT (100%)

Please see disclaimers for important information regarding ESG considerations in our investment practices.

¹ For more information, see page 15 of our 2022 ESG Report.

² For more information, see page 50 of our 2022 ESG Report.

³ Data boundaries and scope: our emissions analysis includes GHG emissions from majority-owned portfolio companies associated with oil and gas operations as of December 31, 2022. Companies with minimal production were not included. All data has been provided directly by portfolio companies and has not been verified by Quantum or any third party.

Climate Risks & GHG Emissions *continued*

We have developed aspirational operational goals for our portfolio companies to help manage and reduce their Scopes 1 and 2 GHG emissions. With these goals serving as a roadmap, our portfolio companies can improve operational efficiency, increase revenue by capturing and monetizing more gas, and proactively prepare for possible future regulatory requirements in furtherance of our objective to enhance their value.

Operational Emissions Goals¹



Methane Emissions

Quantum recommends the below methane intensity caps to our portfolio companies:

Aim to achieve or maintain a methane intensity below 0.20% for the upstream segment²

Aim to achieve or maintain a methane intensity below 0.024% for the midstream segment²



Direct Measurement

Direct detection of methane leaks results in more accurate methane emissions data and allows operators to quickly identify problems and implement leak reduction strategies. Hence, Quantum recommends that portfolio companies:

Implement direct detection and measurement of methane emissions using on-the-ground direct measurement and continuous monitoring sensors



Flaring

In line with the World Bank Zero Routine Flaring Initiative adopted by many leading oil and gas companies, Quantum recommends that portfolio companies:

End routine flaring by 2030

Aim to keep flaring intensity below 1%³



CO₂ Emissions from Fuel Consumption

Quantum recommends that portfolio companies:

Strive to reduce CO₂ emissions from fuel combustion in operations by 50% by 2030⁴



Scope 2 Emissions

To reduce Scope 2 emissions from electricity used in drilling, completion, and production, where possible, Quantum recommends that portfolio companies:

Strive to procure 100% renewable electricity by 2030

Where renewable electricity is not available, use Renewable Energy Credits (RECs), in alignment with GHG Protocol offsetting guidance

Scope 1

Scope 2

Please see disclaimers for important information regarding ESG considerations in our investment practices.

¹ Targets are non-binding, subject to change, and no assurance can be given that targets will be achieved by portfolio companies.

² Methane intensity is calculated as methane emissions allocated to the natural gas value chain divided by methane throughput, following the approach established by the Natural Gas Sustainability Initiative (NGSI) Methane Intensity Protocol.

³ Flaring intensity is calculated as the percent of produced gas that is flared.

⁴ Reductions made compared to company calculated baseline.

Climate Risks & GHG Emissions *continued*

While our portfolio GHG emissions (Scope 3, Category 15) increased in 2022 in part because of fuel combustion in newly acquired assets, our portfolio methane emissions decreased due to the divestment of certain assets and the implementation of operational improvements across the portfolio. We have developed a plan to address the GHG emissions from fuel combustion in our newly acquired assets and we remain dedicated to identifying additional opportunities to reduce our portfolio emissions effectively and efficiently, with the goal of mitigating material risks and improving the value of our investments.

2022 Portfolio Emissions by GHG^{1,2}



Carbon Dioxide (CO₂)

Emissions from combustion operations related to drilling, completions, and compression, and emissions from flaring

**2,326,766
MT CO₂e**



Methane (CH₄)

Emissions from venting or leaking natural gas

**451,287
MT CO₂e**

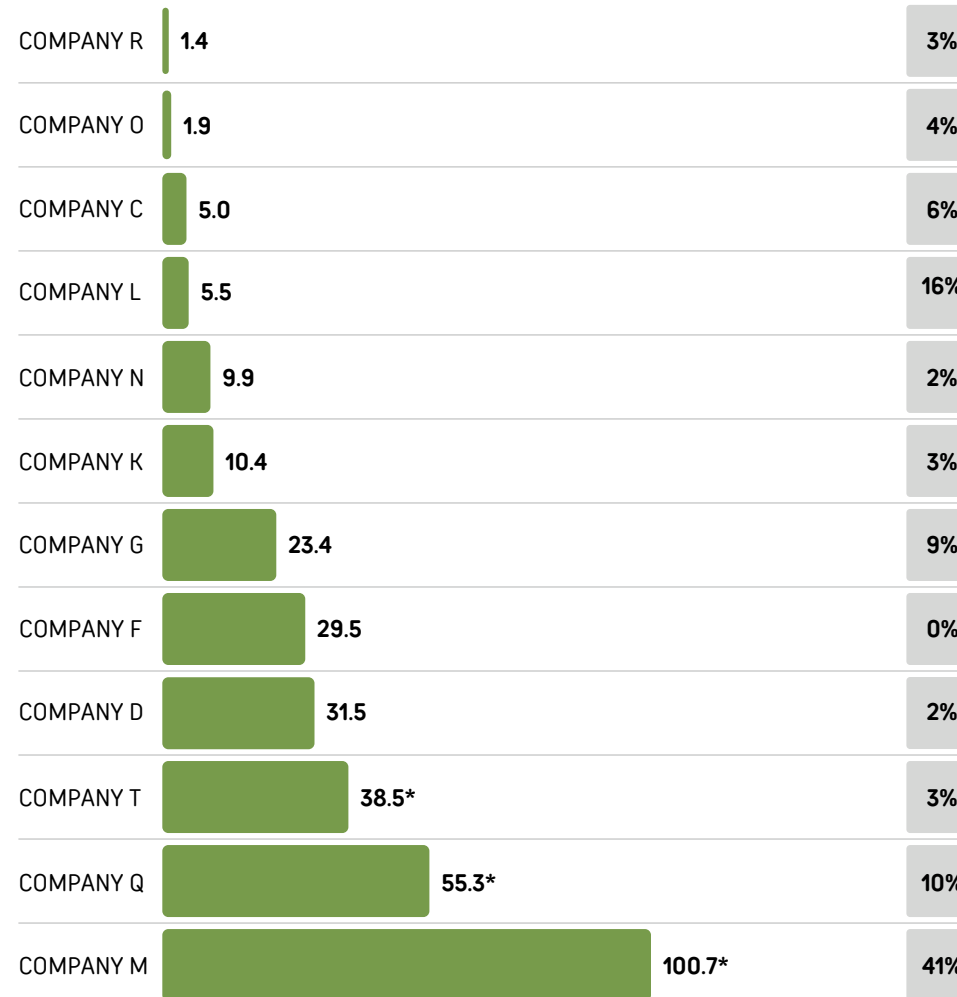


Scope 1

Operational emissions from upstream and midstream companies, including vehicle emissions

**2,787,727
MT CO₂e**

2022 SCOPE 1 GHG EMISSIONS INTENSITY** MT CO₂e/Mboe



■ GHG Intensity (MT CO₂e/Mboe) ■ GHG Emissions (MT/% of Portfolio)

* Indicates new portfolio company or newly-acquired asset

** Companies not listed here are not within the scope of reporting for this metric

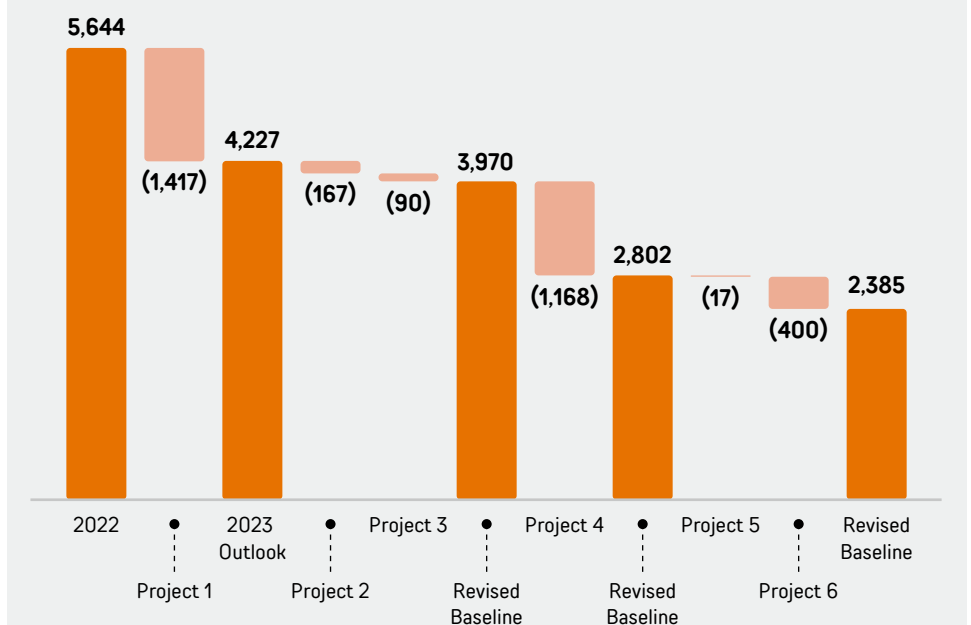
SPOTLIGHT

Partnering with Portfolio Companies to Reduce Methane Emissions

We seek to actively engage and form strategic partnerships with our portfolio companies, providing them with valuable support and tools to drive their ESG initiatives, improve their operational efficiency, manage risks, meet regulatory requirements, and create market differentiation and value.

With this objective in mind, we collaborated with one of our portfolio companies to develop a comprehensive emissions reduction roadmap for the portfolio company (see the figure below) to proactively identify reduction opportunities and address impending regulatory requirements. Through the initiative, we are assisting with an operational review and completing a field assessment. We hope this will help us identify operational efficiencies that we believe will result in the greatest reduction of GHG emissions at the lowest cost per ton. After completing the projects identified in this pilot, the company has the potential to reduce its methane emissions by 75% and avoid over \$14 million in costs by 2026.

Methane Emissions Reductions Plan (mt CH₄ per year)



The select investment is provided for illustrative purposes only to demonstrate Quantum's investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future. Please see disclaimers for important information regarding ESG considerations in our investment practices. There can be no assurance that any historical trends will continue or projections will materialize.

¹ A small portion of Quantum portfolio company emissions come from Nitrous Oxide (N₂O) and emissions from vehicle fleets. These are included in the Performance Table on p. 59.

² Data boundaries and scope: our emissions analysis includes GHG emissions from majority-owned portfolio companies associated with oil and gas operations as of December 31, 2022. Companies with minimal production were not included. All data has been provided directly by portfolio companies and has not been verified by Quantum or any third party.

Climate Risks & GHG Emissions *continued*

Progress on Reducing Methane

Methane is the core component of natural gas. As such, managing it directly contributes to the financial performance of our oil and gas portfolio companies by helping to ensure the efficient and profitable transport of natural gas via pipelines. In addition, methane has a global warming potential (GWP) that is 25–30 times higher than carbon dioxide over 100 years,¹ making it a priority for regulators with potential financial implications for our portfolio companies. By placing a high priority on methane management, we not only uphold good business practices but can also proactively position ourselves ahead of regulatory requirements.

Our approach to supporting methane management centers around deploying advanced direct detection methods to effectively identify and minimize methane leaks, with the goal of minimizing portfolio methane intensity to below 0.2%. Our target is aligned with industry peers and non-governmental organizations (NGOs) like the Oil and Gas Methane Partnership (OGMP 2.0). It is also consistent with the prescribed methane fee outlined in the IRA.

In 2022, methane comprised 16% of operational emissions from our oil and gas portfolio companies and we outperformed our 0.2% methane intensity goal. While there may be fluctuations in our portfolio-wide methane intensity as companies enter or exit our portfolio or make operational adjustments, our firm commitment to reducing methane intensity is a testament to our focus on driving operational excellence and financial performance.

Our portfolio companies are encouraged to diligently assess their methane emissions and proactively address each identified source. Consistent with previous years, leaks and pneumatics remain the primary contributors. The companies in our portfolio are actively working to reduce leaks by employing a range of technologies, including continuous monitoring through Quantum portfolio company Project Canary. Currently, Project Canary sensors continuously monitor over 80% of the gas produced in Quantum’s portfolio.

Please see disclaimers for important information regarding ESG considerations in our investment practices. There can be no assurance that any historical trends will continue.

Quantum’s total [portfolio] methane intensity is estimated using aggregated data provided by portfolio companies. Portfolio company data has not been verified by Quantum or any third party.

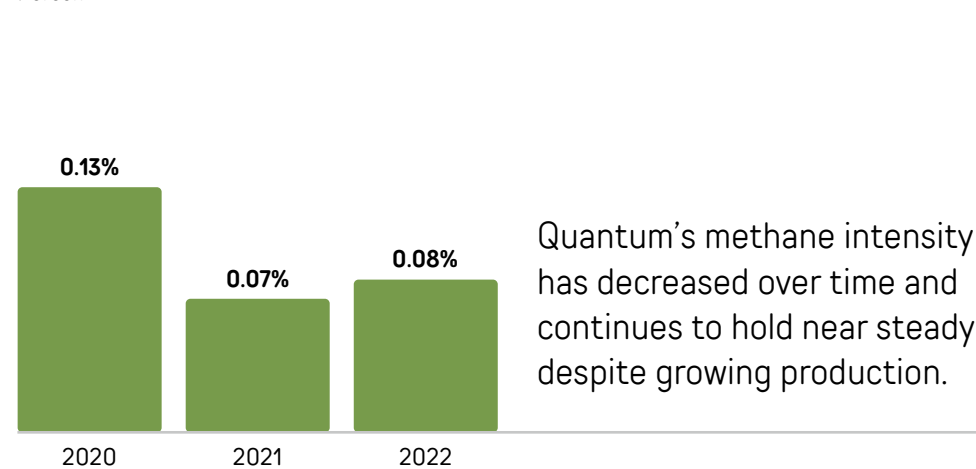
¹ IPCC, Sixth Assessment Report.

² Quantum calculates methane intensity in accordance with the Natural Gas Sustainability Initiative (NGSI) protocol.

³ Company Q’s intensity was not calculated by Quantum but disclosed by the company.

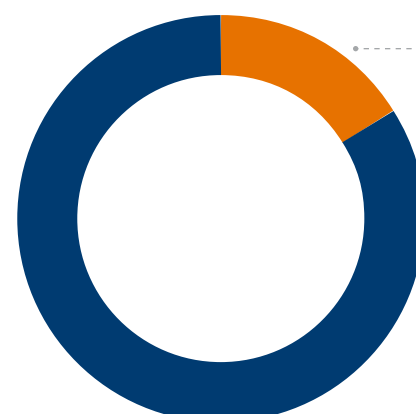
YEAR-OVER-YEAR METHANE INTENSITY

Percent



2022 SCOPE 1 OPERATIONAL EMISSIONS

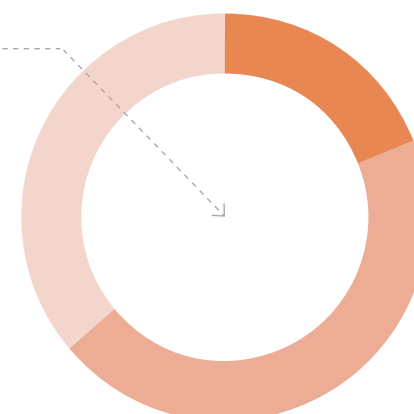
Percent



■ 16% Methane
■ 84% Carbon Dioxide

2022 PERCENT METHANE BY EMISSION SOURCE

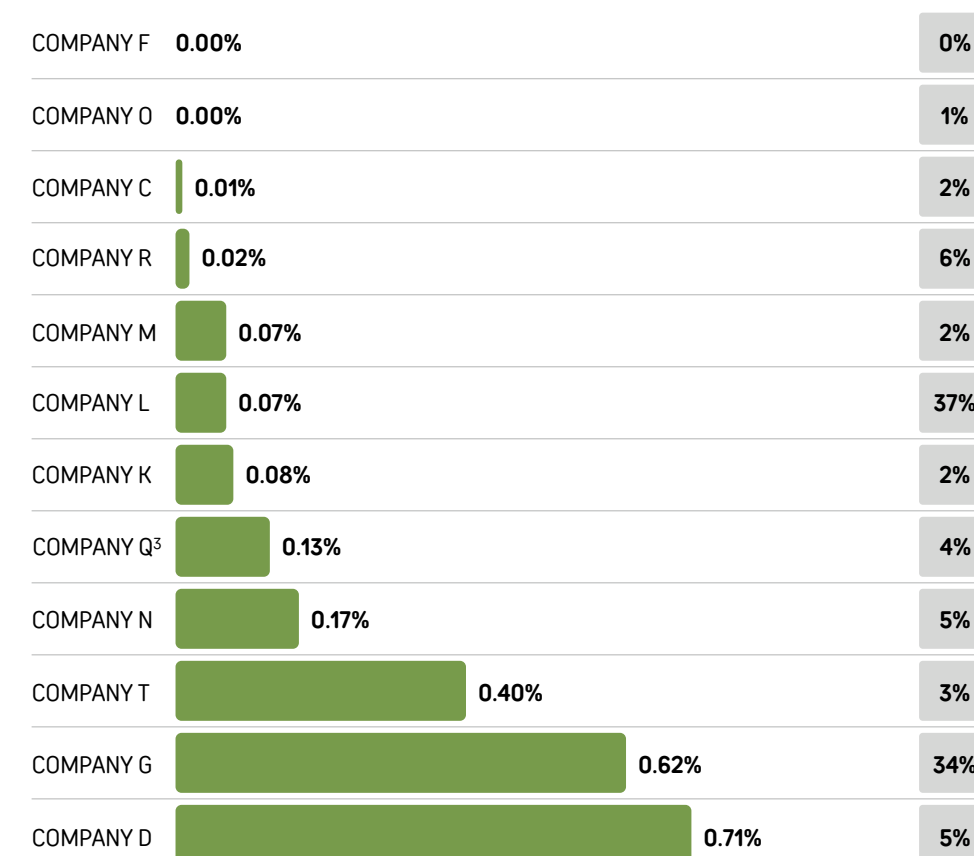
Percent



■ 19% Leaks
■ 45% Pneumatic devices
■ 36% Other sources

2022 NGSI² METHANE INTENSITY


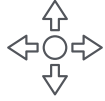

Percent



■ Methane Intensity (%) ■ CH₄ Emissions (MT/% of Portfolio)

Climate Risks & GHG Emissions *continued*

In addition to considering or deploying continuous methane monitoring, our portfolio companies are exploring options to utilize piloted aircraft and drones to complement their continuous monitoring and OGI efforts. In 2022, over 500,000 components were surveyed with OGI throughout the portfolio.

TECHNOLOGY TYPE	BENEFITS	TRADE-OFF	OPERATORS
Piloted Aircraft 	<ul style="list-style-type: none"> • Low cost • Ability to scan hundreds of sites per day • Rapidly finds super-emitters 	<ul style="list-style-type: none"> • Only sees large leaks 	Quantum portfolio companies are exploring options to utilize piloted aircrafts and drones for a “top-down” approach to complement the detailed “bottom-up” methods below
Mobile Monitoring (Vehicle or Drone) 	<ul style="list-style-type: none"> • Low cost • Can scan tens of sites per day • Finds smaller leaks than aircraft flyovers 	<ul style="list-style-type: none"> • Requires supporting groundwork to find specific leaks 	
Facility-Wide Continuous Monitoring 	<ul style="list-style-type: none"> • 24/7 live emissions notification and quantification • Highly-sensitive receptors • Embedded data management system available to trend leaks 	<ul style="list-style-type: none"> • Upfront costs • Supply chain constraints 	Over 80% of Quantum gas production monitored continuously with Project Canary
OGI Camera 	<ul style="list-style-type: none"> • Ability to pinpoint emission sources • Easy to use • Regulatory standard 	<ul style="list-style-type: none"> • Manual surveying requires significant time commitment • Less effective with large footprint 	Over 500,000 Quantum components surveyed with OGI in 2022



Climate Risks & GHG Emissions *continued*



About Flaring

- Flaring is when excess natural gas is burned as a waste stream because oil companies do not have access to natural gas take away, or for safety reasons.
- Certain operating regions, such as the Bakken, generally lack the appropriate midstream infrastructure for gas takeaway.

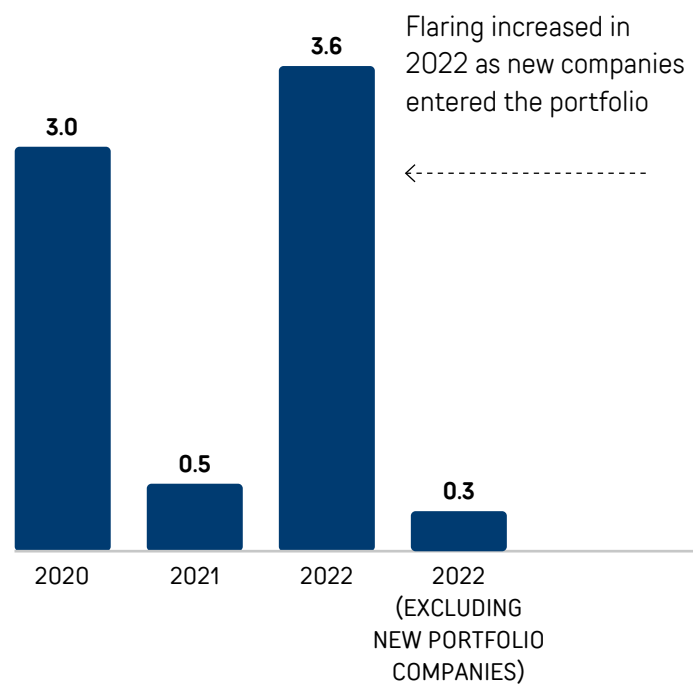
Progress on Flaring

Our objective is to help our portfolio companies eliminate routine flaring and establish short-term flaring intensity goals. Flaring, the burning of excess natural gas as a waste stream, is primarily attributed to challenges in natural gas takeaway infrastructure or operational safety considerations. By working closely with our portfolio companies, we aim to address these issues to minimize flaring and optimize the utilization of natural gas resources, which helps improve the profitability of our investments.

In 2022, we observed a notable increase in our firmwide flaring intensity, which we primarily attribute to the inclusion of a new company in our portfolio who operates international offshore oil production with limited gas takeaway infrastructure. The volume of gas flared by assets from new acquisitions constituted 68% of Quantum’s flare volume for the year. Recognizing the importance of minimizing flaring and aligning with industry best practices, Quantum is supporting the company in actively evaluating and implementing various initiatives to reduce flaring.

PERCENT GAS FLARED

Gas flared/Gas produced



Notably, flaring emissions account for approximately 13% of our portfolio’s total Scope 1 emissions, highlighting our ongoing commitment to managing and mitigating these emissions within our portfolio.

Please see disclaimers for important information regarding ESG considerations in our investment practices. There can be no assurance that any historical trends will continue.

Quantum’s total flaring intensity is estimated using aggregated data provided by portfolio companies. Portfolio company data has not been verified by Quantum or any third party.

Progress on Combustion Emissions

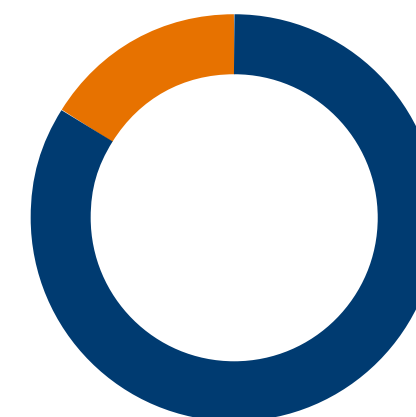
Combustion emissions primarily stem from combustion operations involving fuel-fired equipment, such as engines utilized in steam floods, drilling, completions, and compression for low-pressure wells. As combustion-related emissions contribute significantly to our portfolio’s Scope 1 emissions, addressing them is a key focus area.

In part due to increased activity and acquisitions during 2022, combustion emissions increased across our portfolio. In our experience, emissions from combustion are more challenging to reduce than methane emissions, and while various technologies can help minimize fuel consumption, certain situations may necessitate the implementation of CCS to fully eliminate combustion related emissions from specific sources.

However, our portfolio companies are actively implementing strategic measures to reduce their combustion emissions. For example, certain portfolio companies are utilizing bi-fuel engines, which use cleaner fuel sources, during drilling and completions operations. We are committed to exploring innovative solutions and collaborating with our portfolio companies to reduce emissions, with the goal of improving the long-term value of our investments.

2022 SCOPE 1 OPERATIONAL EMISSIONS

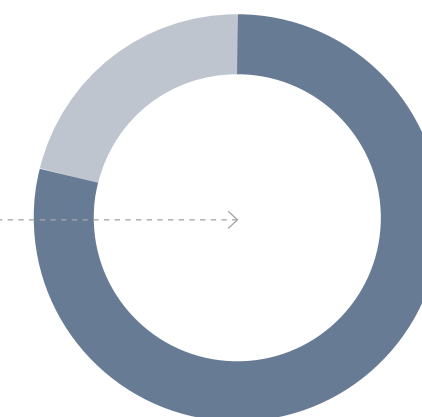
Percent



■ 84% Carbon Dioxide
■ 16% Methane

2022 CO₂ BY EMISSION SOURCE

Percent



■ 79% Drilling, completion and production fuel
■ 21% Flaring & other sources

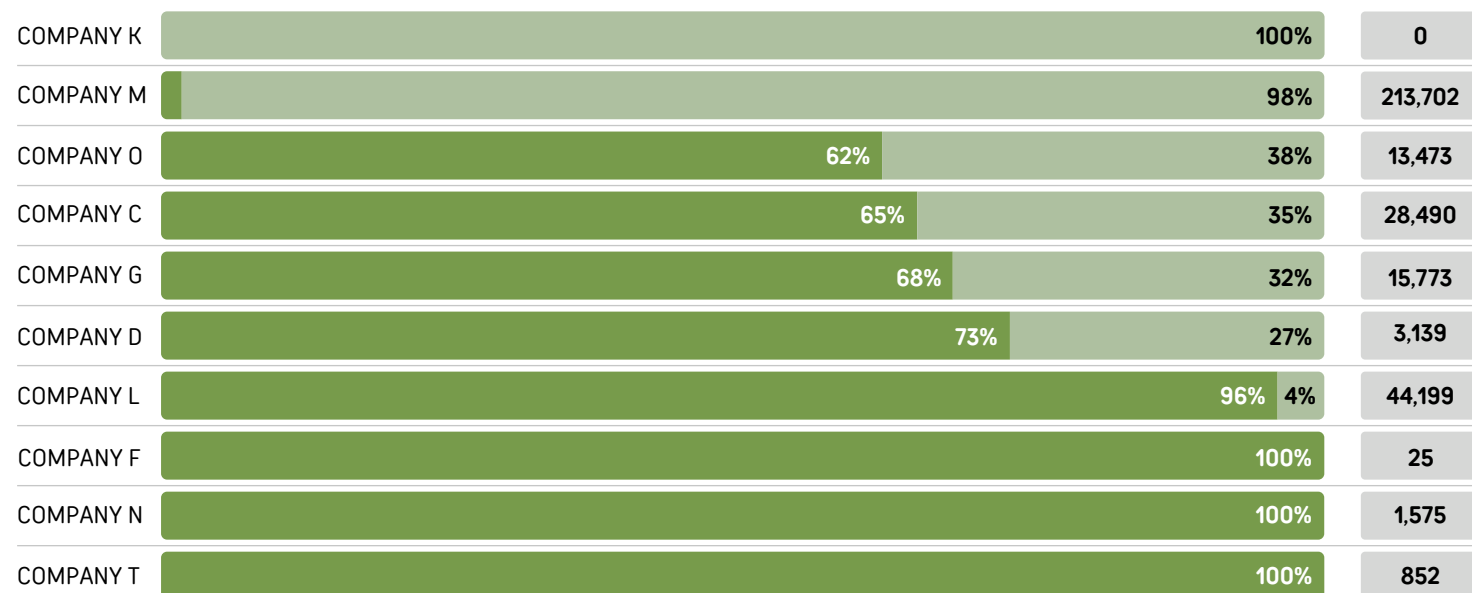
Water

We continue to focus on reducing freshwater consumption across our portfolio companies. We believe doing so can result in significant cost savings in water procurement and disposal, mitigate risks associated with water scarcity, and enhance a company’s social license to operate, thereby strengthening its competitive position in an increasingly resource-conscious market.

In 2022, we made significant progress in reducing water usage across our portfolio, with less than 30% of the total water consumed by our portfolio companies coming from freshwater sources. As part of our commitment to responsible water management, Quantum actively monitors water consumption across our portfolio and has assessed water scarcity in the regions where our companies operate. This mapping exercise has provided us with valuable insights, allowing us to work with our portfolio companies to prioritize and implement targeted conservation measures.

2022 TOTAL WATER CONSUMPTION

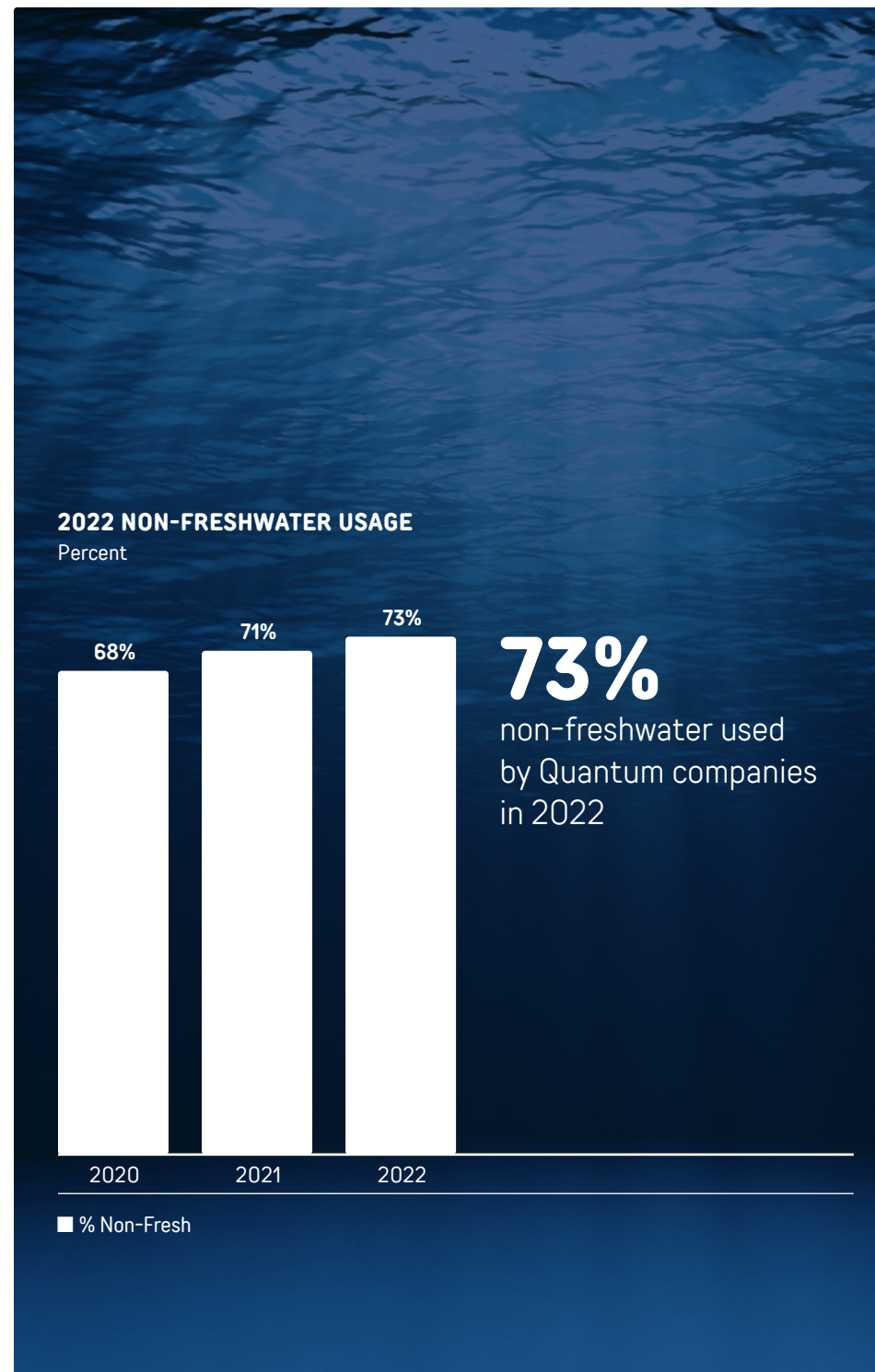
Percent



■ Freshwater Sourced ■ Non-Freshwater Sourced ■ Total Water Sourced (bbl)

The select investment is provided for illustrative purposes only to demonstrate Quantum’s investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future. Please see disclaimers for important information regarding ESG considerations in our investment practices.

Quantum’s total non-freshwater usage is calculated using aggregated data provided by portfolio companies. Portfolio company data has not been verified by Quantum or any third party.



SPOTLIGHT

Creating Tools to Improve Water Conservation While Reducing Costs

In 2022, we partnered with one of our portfolio companies to develop a pilot tool designed to evaluate freshwater consumption and associated costs in fracking operations. This initiative was undertaken in response to the substantial expenses tied to freshwater usage during fracking, with the objective of identifying opportunities for water conservation and cost reductions.

The pilot tool yielded promising results, indicating that the company could more than double its utilization of recycled produced water, resulting in substantial cost efficiencies and environmental improvements. The tool developed through this initiative can be leveraged by Quantum’s other oil and gas portfolio companies, potentially resulting in significantly more firmwide reductions in freshwater usage and cost reductions.

Human Capital Management

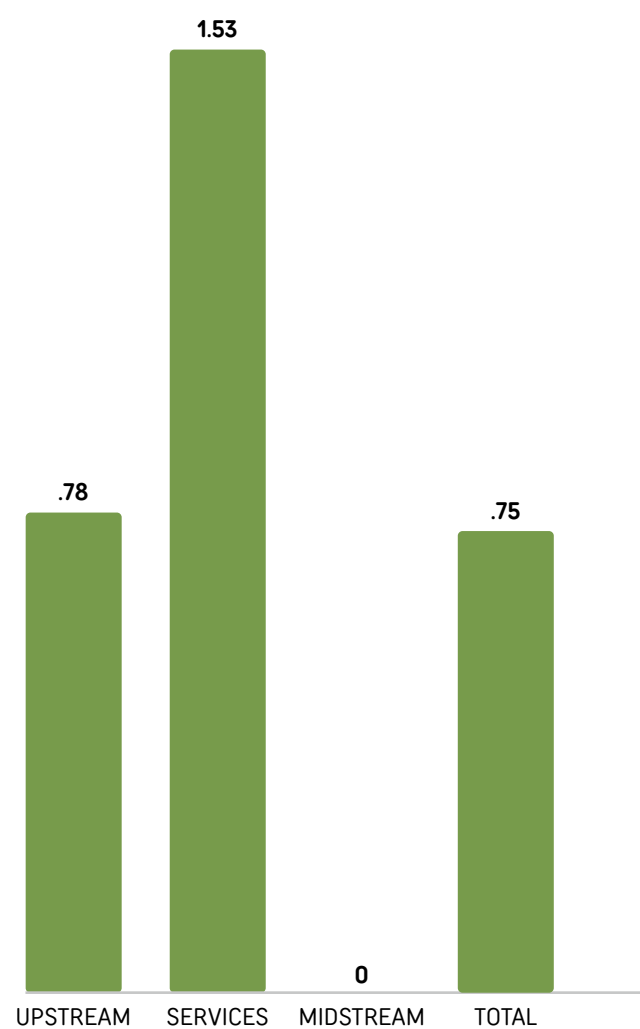
We are focused on fostering effective human capital management across our portfolio companies, as it helps create a more engaged, productive, and safe workforce and directly influences the overall operational efficiency, competitiveness, and long-term success of an organization.

Implementing Effective Safety Programs

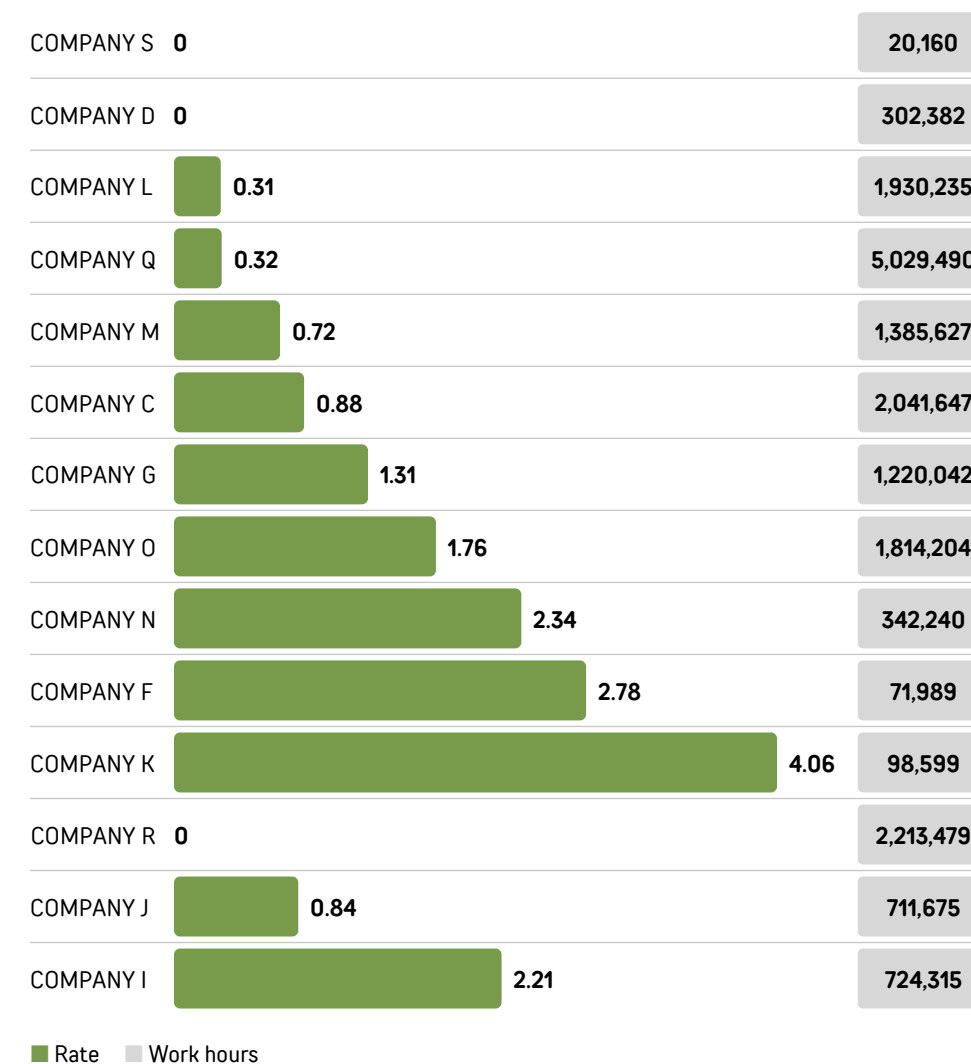
We work with our portfolio companies to implement an effective safety program and culture that focuses on every person returning home safely at the end of each day. Prioritizing safety helps to mitigate risks and associated costs from workplace accidents, including potential regulatory fines and increased insurance premiums. It also contributes to a more productive work environment by preserving the health and morale of employees.

Regrettably, our portfolio Total Recordable Incident Rate (TRIR) increased in 2022. This trend is not unique to our organization. In consultation with other industry professionals, we are finding that incident rates are rising among certain other businesses in the energy industry due in part to a shortage of experienced workers. As part of our commitment to safety, we recognize the importance of addressing this issue proactively. In the upcoming year, we intend to prioritize safety discussions during quarterly Working Group Meetings with our portfolio companies. Our goal is to engage with key stakeholders in constructive dialogue to identify effective strategies and initiatives that will yield improved safety results.

2022 TOTAL RECORDABLE INCIDENT RATE BY VERTICAL



2022 TOTAL RECORDABLE INCIDENT RATE



Portfolio company data as of December 31, 2022. Companies that had not yet commenced operations or have minimal production were not included. All data has been provided directly by portfolio companies and has not been verified by Quantum or any third party.

Human Capital Management *continued*

Asset Integrity and Process Safety

We work with our oil and gas portfolio companies to prioritize asset integrity and process safety to help ensure operational efficiency while mitigating environmental and safety risks. Asset integrity encompasses a comprehensive approach that includes the design, maintenance, and replacement of assets throughout their life cycle, while managing and balancing the associated costs. By proactively managing asset degradation, the goal is to keep people safe, mitigate environmental risks, and maintain uninterrupted business operations. We believe that asset integrity and process safety help form the foundation for achieving superior risk-adjusted returns for our investors.

The select investment is provided for illustrative purposes only to demonstrate Quantum's investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future. Please see disclaimers for important information regarding ESG considerations in our investment practices.

SPOTLIGHT: PROCESS SAFETY & INTEGRITY AS A BUSINESS ESSENTIAL

Trident Energy's Focus on Process Safety & Asset Integrity

Quantum portfolio company Trident Energy is an international exploration and production group currently operating offshore Brazil and Equatorial Guinea. They specialize in the operation of mid-life and aging assets, making process safety and asset integrity critical to their ability to effectively manage risks and achieve financial success.

Trident Energy's commitment to process safety and asset integrity has been a cornerstone of their operations. With a robust framework for process safety management, we believe Trident Energy maintains effective barriers to help prevent unplanned releases and major accidents. Their systemic approach to asset integrity helps ensure the protection of personnel, equipment, and the environment throughout the asset lifecycle.

Managing Process Safety Events

In 2022, Trident Energy reported one Tier 1 and eight Tier 2 process safety events across 4.6 million workhours, which were thoroughly investigated.

Trident's early objectives in Brazil to restore critical safety barriers is now allowing them to focus on executing preventive maintenance work orders for critical safety and environmentally critical elements relative to those for corrective maintenance. In addition, they continue to build on their leak detection and repair (LDAR) program and focus on a Corrosion Under Insulation campaign in Brazil and Equatorial Guinea to enhance asset integrity and inspection activities. To further enhance their integrity management programs, Trident Energy plans to progressively transition to risk-based inspections informed by enhanced data integrity, replacing traditional time-based inspection approaches.

From Adversity to Advantage

Trident Energy's focus on process safety and asset integrity was reinforced following a fire incident on their P-08 installation in Brazil in January 2022. This incident prompted a comprehensive review of their approach to asset integrity, resulting in investments, operational

changes, and an emphasis on safe and sustainable operations. Strengthening inspections, focusing on leak detection and repair, developing new diagnostic tools, restructuring teams, investing in critical safety systems, deploying advanced technologies, and incorporating artificial intelligence and specialized integrity management software are among the measures Trident Energy has implemented to improve asset integrity and enhance business performance.

Trident Energy's unwavering commitment to process safety and asset integrity has yielded significant benefits, including reduced risks, improved safety outcomes, increased reliability, and greater staff engagement. Through their proactive approach, Trident Energy works to maintain effective barriers to prevent unplanned releases, promptly addresses process safety events, and implements comprehensive asset protection measures.



Human Capital Management *continued*

Driving Value with a Diverse Team

We continue to work closely with our portfolio companies to adopt and implement DE&I company policies, with the goal of fostering innovation, driving better decision-making, enhancing employee engagement and retention, improving brand reputation, and ultimately contributing to sustainable long-term growth. By the end of 2022, 21 of our portfolio companies had adopted DE&I policies.

We have significantly expanded our DE&I data gathering efforts across multiple funds and sectors to comprehensively assess and analyze the DE&I programs across our portfolio. By doing so, we were able to identify areas of improvement and share best practices.

34

Reporting Company Count

2,644

Employee Count

21

Number of DE&I Policies

2022 TOTAL PERCENT FEMALE*

Percent



2022 TOTAL PERCENT ETHNIC MINORITIES*

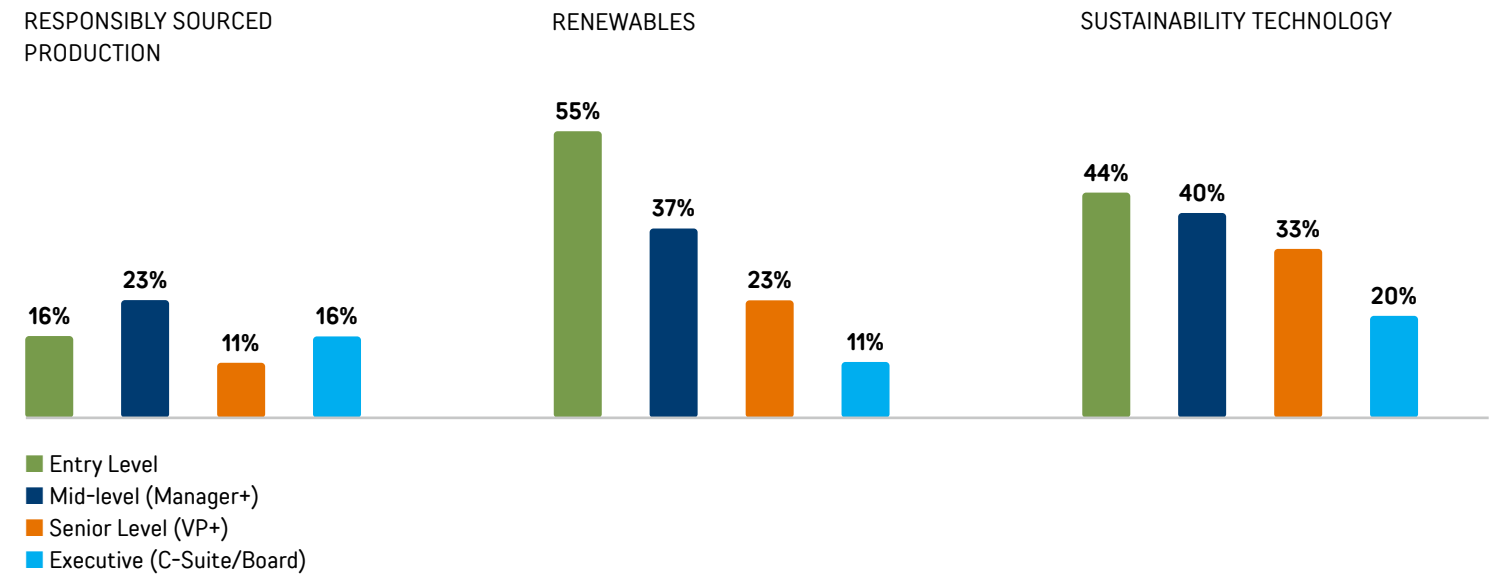
Percent



DE&I data does not include Quantum Capital Solutions or companies that did not track DE&I data. Company Q submitted totals for employee male and female counts, but did not track at the Entry, Mid, Senior, or Executive levels and is not included in this analysis.

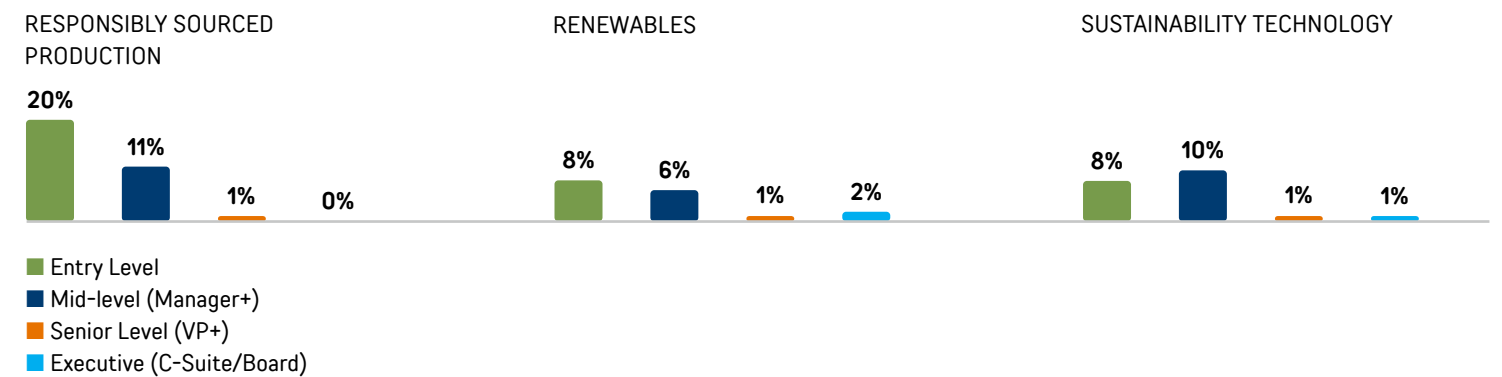
2022 PERCENT FEMALE BY POSITION

Percent



2022 PERCENT ETHNIC MINORITY BY POSITION

Percent



Cybersecurity

Acknowledging the growing complexity of cybersecurity, Quantum has implemented a robust cyber program that leverages modern technologies such as artificial intelligence and automation. To effectively manage risks and analyze the abundance of available information, we prioritize robust risk management and filtering. We seek to help provide comprehensive protection from threats by extending our umbrella cyber program to both Quantum and our portfolio companies.

Our cybersecurity recommendations are based on the NIST standards. All portfolio companies are encouraged to undergo training on and adhere to these recommendations. Moreover, we have implemented a comprehensive 5-star rating system to reinforce key cybersecurity measures across our portfolio companies.



Quantum Five-Star Rating System

- **Cyber education and training**
- **Multi-factor authentication for all access points**
- **IT policies including password policies**
- **Managed detection and response and regular vulnerability testing**
- **Disaster recovery and incident management**



Through our unwavering commitment and persistent efforts, we are proud to highlight the following cyber-related accomplishments in 2022:

- Achieved NIST 800-53 attestation through a third party audit
- Conducted quarterly Board level discussions on cyber security with all portfolio companies
- Conducted 5-star rating status reviews of our portfolio companies weekly
- Helped improve the star rating status across our portfolio companies by 2 points compared to 2021
- Implemented a master service agreement with a third party to conduct managed detection and response and a baseline assessment against Quantum's recommendations at all portfolio companies
- Integrated a cyber incident reporting system across Quantum and its portfolio
- Updated recommendations to address new threat vectors

Quantum Core Cybersecurity Recommendations for Portfolio Companies

Identify

- Document cybersecurity policies and critical inventory
- Designate a senior leader with accountability for the cyber program
- Ensure a corporate Governance & Risk and Controls (GRC) checklist exists and is executed annually
- Perform GRC and vulnerability assessments every 3 years

Protect

- Enforce safe password practices, publish a password policy, and use multi-factor authentication whenever possible
- Implement a mobile device management software; install anti-virus and anti-malware software
- Use a firewall and VPN to access company networks
- Maintain off-site backups of all critical data
- Uphold an active cyber education program
- Obtain appropriate cyber insurance

Detect

- Develop procedures to aggregate logs and events from various systems and synthesize these into alerts
- Regularly review critical alerts from all such systems

Respond

- Create documented response plan

Recover

- As part of the response plan, address recovery from potential breaches, including:
 - How key data can be restored from cloud and off-site backup
 - How workers get to critical functionality in case of no office network

Portfolio Company Case Studies

KODA Resources	50
Rockcliff	51
BeZero Carbon	52
Project Canary	53
Risilience	55
Carbon Direct	56

The select investments are provided for illustrative purposes only to demonstrate Quantum's investment approach generally, and not all applicable investments are shown. There is no guarantee that Quantum will be able to identify similar investments in the future. Please see disclaimers for important information regarding ESG considerations in our investment practices. There can be no assurance that any historical trends will continue or projections will materialize.

KODA Resources // QUANTUM ENERGY PARTNERS

Improving Emissions to Eliminate Wasteful Gas Releases


KODA takes immense pride in their commitment to deliver energy responsibly, backing their motivation to produce reliable, abundant energy with a strong sense of environmental stewardship. As an active operator of the Williston and Uinta basins in the Rocky Mountain region, KODA is well acquainted with the rigorous environmental standards prescribed by the states of Utah and North Dakota. KODA’s experience with compliance, combined with a focus on operational excellence have created a drive to implement cost-effective emissions solutions that increase efficiency – and keep them ahead of the curve in a changing regulatory landscape, including potential fees associated with methane waste under the IRA.

Leveraging technical expertise to improve efficiency

In May 2020, KODA Resources Development and Middle Fork Energy Partners were merged to increase scale, combine the complementary strengths of both organizations, and bring KODA’s technical and operating capabilities together to improve Middle Fork’s legacy assets. The KODA team has since implemented hundreds of equipment upgrades to optimize production and align with industry best practices. These upgrades, including enhanced leak detection and updated pneumatic devices, help eliminate wasteful gas releases at low-producing legacy wells.

Identifying and attacking emissions by source

KODA’s legacy assets present a large number of pneumatic devices and methane leaks from existing equipment. Pneumatic devices, which are designed to emit small amounts of methane as they actuate, are one of the major sources of methane emissions in the oil and gas industry. KODA has committed to swapping their pneumatic devices with low emissions alternatives. In 2022, the KODA team replaced 600 pneumatic devices, and plans to replace 300 more in 2023. Additionally, to combat emissions from leaks, KODA has installed Project Canary continuous monitoring to identify leaks in real-time – enabling fast action to fix problems as soon as they occur.



PRIMARY OFFICE
Denver, Colorado

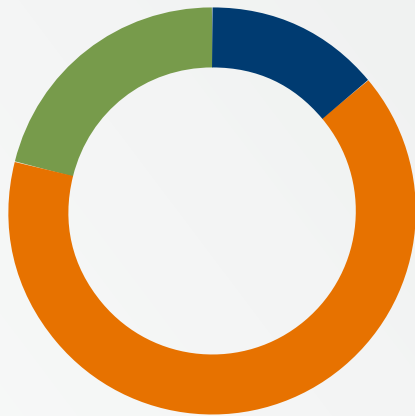
YEAR OF INVESTMENT
2018

KODA is a Denver-based company focused on the acquisition and development of oil and gas companies in the Rocky Mountain region.

[Visit Website ↗](#)

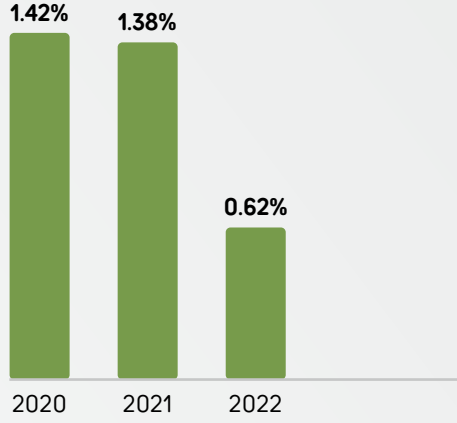
KODA has decreased absolute methane emissions while increasing production through various operational upgrades

2022 METHANE EMISSIONS BY SOURCE
Percent of total methane emissions by equipment



- 14% Leaks
- 65% Pneumatic devices
- 21% Other sources

METHANE EMISSIONS FROM NATURAL GAS/METHANE CONTENT OF NATURAL GAS THROUGHPUT
Percent



Year	Percent
2020	1.42%
2021	1.38%
2022	0.62%

55%

Reduction in methane intensity from 2021 to 2022

13%

Reduction in absolute methane emissions from 2021 to 2022

Implementing impactful solutions at every stage

While the bulk of KODA’s emissions come from pneumatic devices on legacy assets, the KODA production team found an opportunity to reduce greenhouse gas from flowback operations following the drill of a new well. The team developed a three-phase program – they first installed several low emissions equipment alternatives such as electric air compressors and vapor-tight storage tanks to reduce initial emissions. Next, they eliminated flaring by designing a pressure surge vessel to capture liquids at higher pressure to reduce gas breakout. Any remaining gas breakout is processed through a combustor that also feeds electric liquid pumps. These two phases greatly reduced emissions from the flowback process. The final step of the program involves selling breakout gas – the team plans to modify operations in order to sell remaining breakout gas, rather than burning it. KODA was recognized for this work by the Utah Petroleum Association and received the Environmental Leadership Award in 2023.

Teaming up with the experts for enhanced results

In 2023, Quantum sponsored KODA’s engagement with an emission solutions specialist to conduct an assessment of further opportunities to reduce emissions, costs, and regulatory exposure under the IRA. The output of this assessment is an abatement cost curve identifying projects to decrease emissions from each operational source, focused on the largest abatement for the lowest cost. Executing these projects is expected to achieve reductions that will mitigate risks under the IRA and aid in future regulatory compliance.

Rockcliff // QUANTUM ENERGY PARTNERS

Implementing Pilot Projects for Maximum Gas Capture and Emissions Efficiency

As a top-tier operator, and the largest dry gas producer in Texas, Rockcliff attributes its success to an integrated commitment to people, technology, safety, the environment, community enrichment, and disciplined capital allocation. As part of this culture of integration, in recent years, Rockcliff has implemented several pilot projects leveraging creative solutions to curb GHG emissions from multiple sources. Rockcliff's exceptional team is utilizing innovative technology to help improve their performance while reducing their environmental footprint.

Reducing CO₂ from drilling and completions

Due to the rapid growth of Rockcliff through a robust drilling and completions program, 63% of the company's emissions come from fuel used in drilling and completions operations. To curb these emissions, all contracted drilling rigs and frac fleets use dual-fuel engines, utilizing natural gas from Rockcliff's existing operations to supplement fuel. The dual-fuel engines help reduce consumption of higher emitting diesel fuel and directly reduce onsite emissions. This also directly reduces the environmental impact associated with the refining and transportation of diesel fuel used for Rockcliff's operations.

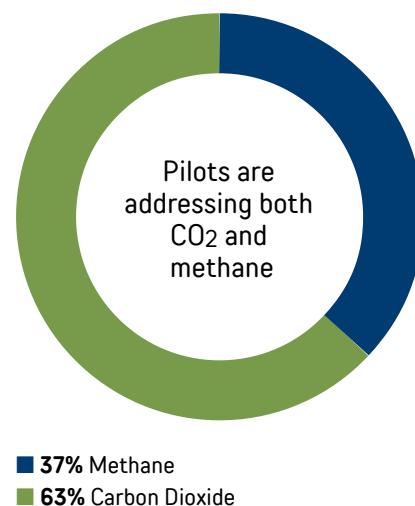
By displacing 6.1 million gallons of diesel with natural gas, Rockcliff avoided 10,350 metric tons of CO₂ from being released into the atmosphere in 2022.¹

¹ The emissions avoided were calculated using emission factors for diesel fuel.

² Emissions calculated using EPA Subpart W protocol.

³ Benchmarking Methane and Other GHG Emissions of the Oil and Natural Gas Production Sector in the United States / July 2022.

EMISSIONS BY POLLUTANT²



PRIMARY OFFICE
Houston, Texas

YEAR OF INVESTMENT
2015

Rockcliff is a premier natural gas company focused on developing the prolific East Texas Haynesville shale.

[Visit Website ↗](#)

Reducing Methane emissions throughout the field

Installing instrument air packages

Emissions from pneumatic devices, which have historically been designed to release small amounts of gas when they actuate, make up 32% of Rockcliff's total emissions profile. A problem not unique to Rockcliff, pneumatic devices comprised 62% of all methane emissions reported by oil and gas producers to the EPA in 2020.³ To combat these emissions, Rockcliff began installing instrument air packages to power pneumatics on existing facilities, helping to avoid the release of natural gas at this source. Going forward, it is expected that every new well pad will utilize these instrument air packages rather than traditional pneumatics.

In 2023, Rockcliff plans to implement instrument air packages at all new facilities

Eliminating production leaks with continuous monitoring from Project Canary

Rockcliff employs a comprehensive leak detection program, with an in-house leak detection specialist who uses forward-looking infrared (FLIR) OGI cameras to survey and inspect each company-operated facility as well as continuous monitoring from Project Canary. Over 95% of Rockcliff's production is covered by CanaryX sensors, enabling quick repairs field-wide. For more information on Rockcliff's work with Project Canary, visit the Project Canary Case Study on page 53.

>1 Bcf/day

of monitored produced gas

67

CanaryX monitored facilities

Waste gas recovery

The composition of dry natural gas in the Haynesville shale yields low emissions from the storage tanks on Rockcliff's production facilities relative to other onsite sources. Despite these already low emissions, the operations teams at Rockcliff saw an opportunity to eliminate methane-entrained vapors from tanks altogether with a creative solution. In 2023, Rockcliff implemented facility changes to recover waste gas off the Salt-Water Disposal degas vessel, re-routing the gas to be reutilized for generator fuel gas. To date – Rockcliff has executed these changes and eliminated tank emissions on 15 facilities.

Rockcliff has eliminated tank emissions on 15 facilities

BeZero Carbon // QUANTUM INNOVATION FUND

A Global Carbon Ratings Agency: Scaling Markets for Environmental Impact

Reaching Net Zero is an ambitious target. There is now a huge gap between the reductions needed and the amount of carbon that must be sequestered to limit warming to below 2 degrees. We believe carbon credits are an essential tool to plug this gap.

BeZero Carbon is the world's largest provider of ratings-based risk analysis for the voluntary carbon market. They give clients access to over 300 carbon credit project ratings across all sectors to find quality projects that match their needs, in-depth project-specific risk analytics to manage their risk exposure, and market-defining research and ratings insights.


What problem is BeZero trying to solve?

BeZero Carbon aims to address the lack of transparency and reliability in the voluntary carbon market. The company strives to solve the problem of uncertainty and inconsistency in carbon credit projects by providing tools and information that ensure carbon credits effectively achieve their intended purpose of removing or avoiding CO₂ emissions. By offering transparency and high-quality data, BeZero Carbon seeks to build trust and confidence in the market, ultimately driving meaningful climate action.

What has BeZero Carbon achieved?

We believe BeZero Carbon offers a realistic, workable, and effective model for every voluntary carbon market participant. Their team of scientists, business experts, and financial professionals collaborate to produce industry-leading ratings and risk products. Leveraging advanced technology, including remote sensing and comprehensive data, they deliver critical insights to support better net zero decisions.

Today, their platform is used by a growing number of global clients and leading climate platforms. Their ratings are also one of the most widely adopted across marketplaces and exchanges, with thousands of individuals and organizations accessing their free listings service, ratings explainer and technical methodology documents, and research reports.

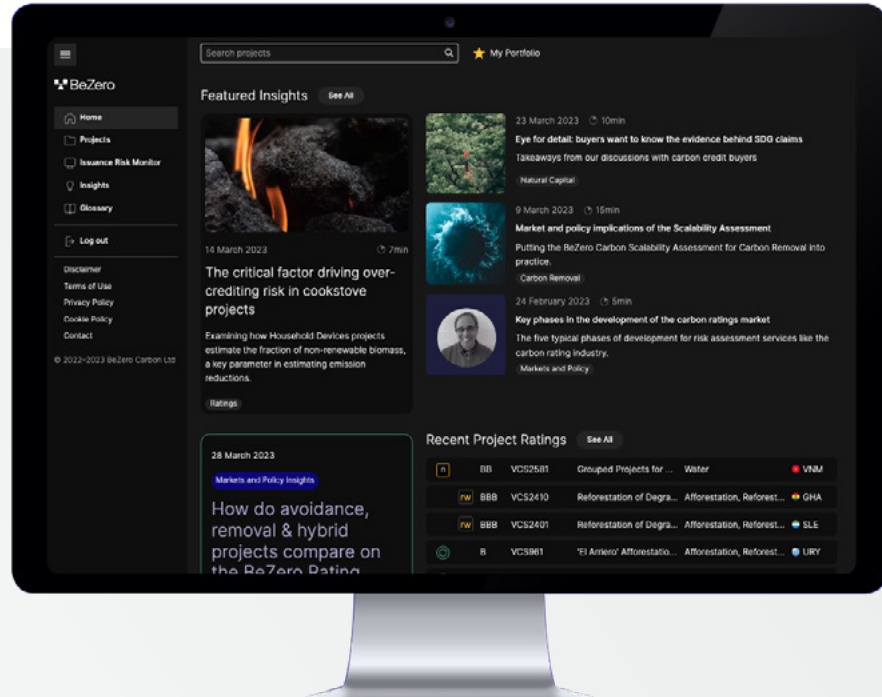


PRIMARY OFFICE
London, England

YEAR OF INVESTMENT
2022

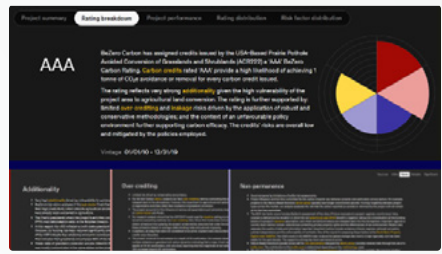
BeZero Carbon is the world's largest provider of ratings-based risk analysis for the voluntary carbon market.

[Visit Website](#)

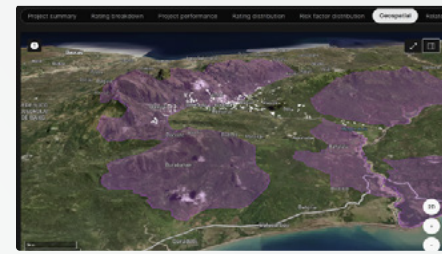


Actionable insights from carbon ratings, risk analytics and research

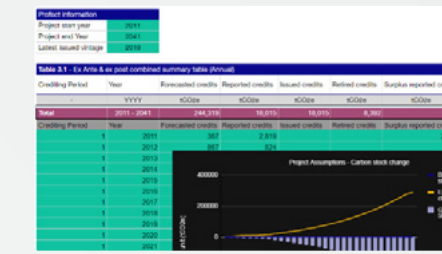
The BeZero Carbon Markets platform is a one-stop shop for critical carbon market analysis.




320+ Rating Analyses



Geospatial Data



Standardized Data



Research & Webinars

>20

Marketplaces & exchanges host the BeZero Carbon Rating

>400

Users of the BeZero Carbon risk analytics platform

>3K

Subscribers to BeZero Carbon's publicly available headline letter ratings

50+

BeZero Carbon ratings analysts, data scientists, and geospatial experts

10K+

Citations in peer-reviewed academic papers

8K+

Macro and bottom-up data sources

Project Canary // QUANTUM INNOVATION FUND

Real-Time Intelligence for Effective Emission Reduction Strategies

Businesses and stakeholders, particularly in the oil and gas industry, face challenges accurately measuring, monitoring, and verifying their emissions, leading to a lack of transparency and trust. In addition, without the ability to continuously monitor their emissions sources and access real-time emissions data, oil and gas companies are hindered in their ability to demonstrate quantifiable emissions reductions.

Project Canary's goal is to mitigate climate change risks by helping the oil and natural gas industry operate on a cleaner, more efficient, more sustainable basis. Their solutions help energy companies measure, understand, manage, operationalize, and benefit from real-time and granular environmental data in two key areas:

Emissions Management: Using Continuous Monitoring and Emissions Quantification Software

Project Canary's SENSE Platform leverages continuous monitoring technologies and an integrated real-time dashboard to offer companies swift detection and notification capabilities for unintentional releases. By promptly identifying and alerting operators to leaks, the SENSE Platform can significantly shorten leak durations, potentially resulting in a substantial reduction in emissions. This advanced system outperforms traditional inspection methods like OGI camera inspections, quarterly flyovers, and satellite monitoring, with the aim of delivering enhanced emissions reduction outcomes within the oil and gas sector.

Project Canary's technology uses machine learning and smart alerts to notify operators as soon as a leak threshold is reached, and which piece of equipment is likely responsible. This triggers further evaluation to determine the root cause of the leak and appropriate mitigation measures. Project Canary's high-fidelity sensors and data reconciliation solutions also allow operators to quantify their total site-level emissions, converting point sensor concentration levels to site-level mass values.

PROJECT CANARY

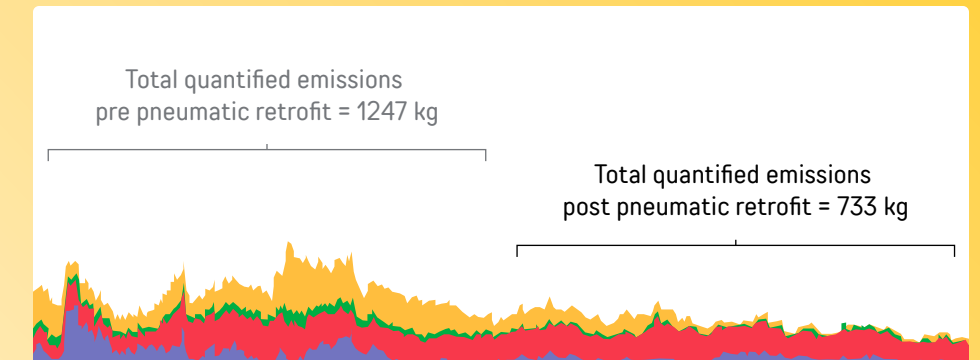
PRIMARY OFFICE
Denver, Colorado

YEAR OF INVESTMENT
2021

Project Canary combines continuous methane monitoring trusted data and the TrustWell™ assessment to offer a comprehensive environmental data platform for evidencing ESG performance and a proven responsibly sourced gas (RSG) solution based on best practices and high-quality objective data.

[Visit Website ↗](#)

Project Canary has partnered with many Quantum portfolio companies to capture methane leak insights, improve emissions performance, manage associated risks and deliver trusted methane emissions data.



“

Project Canary helped us focus on the emissions associated with our operations. The team has become increasingly reliant on Project Canary data to guide operational decision-making.”

Ted Wurfel

Rockcliff's Chief Sustainability Officer

Project Canary continued

The Project Canary process helps customers make the leap from continuous measurement to operational improvement in five key steps:

1

Measure/Quantify

State-of-the-art monitoring technology gives operators a minute-by-minute look at their emissions profile and the ability to accurately quantify site-level emissions

2

Alert/Leak Detection

Smart alerts coupled with operational data help customers understand how planned and unplanned events impact emissions

3

Annotate/Analyze

Dashboard technology provides operators with insight into the root cause of emissions events

4

Analyze/Understand

Operator feedback and annotations help pinpoint the root cause of emissions events and develop event profiles

5

Act/Report

Early detection and quantification combined with event annotation allows customers to identify and validate the benefits of real-time mitigation, report emissions profiles, and comply with OGMP 2.0, if desired

Environmental Assessments for Differentiated Operations and Responsibly Sourced Gas

Project Canary also provides comprehensive TrustWell™ environmental assessments, which provide rigorous facility- or well-level information, enabling producers to understand their performance relative to environmental best practices and effectively manage environmental risks. Project Canary's analysis covers 600 data points across 28 categories, encompassing air, water, land, and community environmental attributes. Utilizing this extensive data, each facility receives a score that reflects its environmental performance.

Moreover, Project Canary has introduced the Low Methane Rating (LMR) that specifically measures a company's methane intensity. This rating provides a detailed assessment of pad- and basin-level performance. Natural gas buyers can leverage Project Canary's environmental risk assessments and the LMR to differentiate gas molecules based on the producing company's environmental practices. This differentiated gas, often known as Responsibly Sourced Gas (RSG) or certified gas, allows buyers to make informed decisions that align with their sustainability objectives.

Canary, by the numbers

3,400+

IoT monitoring devices deployed on 800+ facilities – all with smart alerting enabled

2.9 GB

Environmental data points captured per month

9.8 Bcf/day

Gas monitored

60+

Energy-transition leading customers across upstream, midstream, and downstream

760M+

Emission measurements per month

150+

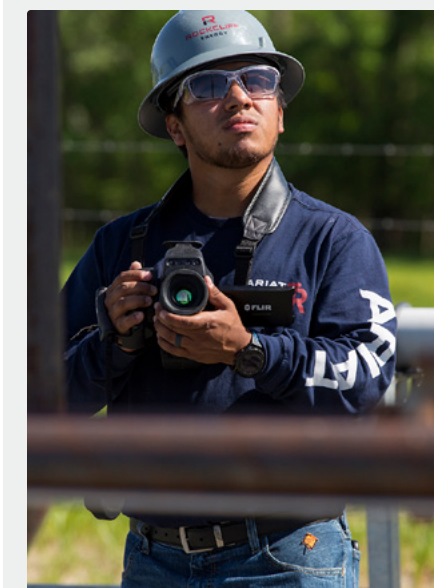
Facilities with full-site quantified emissions mass value

SPOTLIGHT

Project Canary and Rockcliff Energy

Rockcliff Energy, a Quantum portfolio company and Project Canary customer operating in the East Texas Haynesville Shale play, goes beyond utilizing Project Canary data solely for leak detection. In addition to decreasing the number of smart alerts they received by 25% during a period of 2022 compared to that same period in 2023, they have harnessed Project Canary data to facilitate comprehensive benchmarking activities and catalyze operational improvements. By integrating precise, real-time emissions data with operational insights, Rockcliff enhances their decision-making process, driving continuous improvement and optimizing their operations.

For example, Rockcliff used operational data and field-level conditions from Project Canary data to generate a methane leak analysis that can be utilized to improve emissions across various assets with similar conditions. As a result, operational improvements, process changes, and equipment upgrades can be implemented and tracked to test important emissions reduction hypotheses resulting in net environmental benefits. Moreover, the natural gas that is not being lost to the atmosphere because of their mitigation measures is being sold, generating more revenue.



“Now, between the FLIR camera and the Canaries continuously monitoring, we are able to identify recurring emissions events and proactively address them.”

John Turner
Environmental & Sustainability Manager,
Rockcliff

Risilience // QUANTUM INNOVATION FUND

Putting the Power of Climate-Risk Science in the Hands of Global Enterprises

The complex landscape of climate risks is challenging and constantly evolving. As such, many businesses face challenges related to understanding and navigating their climate risks, integrating climate risks into their business strategies, and quantifying the financial impact of climate risks.

Risilience is a climate-analytics company that supports enterprise organizations' efforts to transform their business for the low-carbon economy with its climate-intelligence SaaS platform. Risilience's technology is based on more than a decade of influential frameworks pioneered by the company's founders during their time at the Cambridge Centre for Risk Studies at the University of Cambridge Judge Business School. Through the platform, they aim to help businesses better understand their physical and transition climate risks, quantify the impact of those risks in financial terms, and successfully plan and manage a path to net zero.



In partnership with Risilience, we have developed a digital twin of our business, and used this to build and test scenarios for low carbon transition and physical risks across our value chain... This has highlighted bigger potential impacts from transitional changes, and the need to focus on mitigating them across the value chain."

Burberry Annual Report 2021/22

Risilience helps us make informed decisions and improves our understanding of the potential climate vulnerabilities in our operations and our value chain. This data and resulting analysis is shared throughout our business, supporting climate resilience across our planning and operations."

Coca Cola Europacific Partners Integrated Annual Report 2022



PRIMARY OFFICE
Cambridge, England

YEAR OF INVESTMENT
2022

Risilience's climate-analytics technology supports business transformation to a low-carbon economy with its award-winning, climate-intelligence SaaS platform.

[Visit Website ↗](#)

What clients does Risilience serve?

Risilience's current client base represents 422.9 million tons of carbon dioxide equivalent (CO₂e). Risilience serves enterprise clients across a range of high carbon sectors with complex supply chains.



How Does Risilience Help Organizations?

Risilience supports organizations across the entire sustainability journey, whether they are at the early stages looking to navigate a path through the complex landscape of disclosures or are further along and focused on delivering against their net-zero commitments. The Risilience platform helps businesses in the following ways:

1 Understand Enterprise Climate Risk

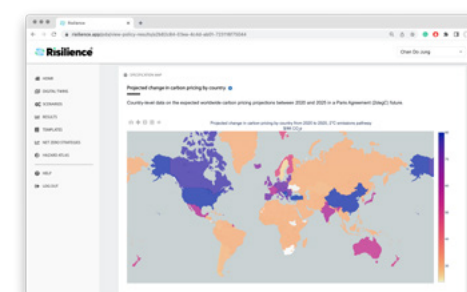
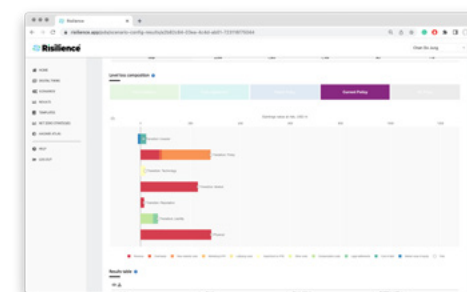
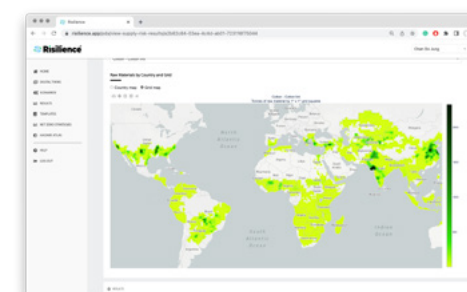
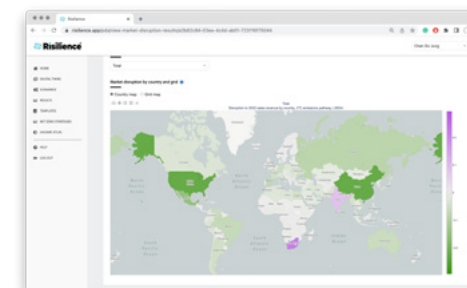
Risilience's platform helps businesses seeking to comprehend the complex landscape of climate risk. Through the integration of Risilience's digital-twin technology and world-class climate models, companies gain visibility into the full spectrum of their climate risks and future scenarios, yielding granular financial-impact insights. This analysis equips organizations with the knowledge and understanding necessary to navigate the interplay between climate dynamics and their business operations, enabling data-driven decisions and effectively mitigating risks.

2 Report Climate-Related Risks & Opportunities

Risilience helps businesses respond to the increasingly complex regulations and reporting requirements with reliable and credible data, demonstrating transparency and compliance. Risilience supports businesses across a range of disclosure standards.

3 Transform and Build Climate Resilience

Risilience helps businesses formulate commercially viable and scientifically grounded net-zero plans. Leveraging their quantitative analysis and scenario builder, businesses can make informed investment decisions aimed at reducing emissions while capitalizing on market opportunities, creating a value-driven, net-zero strategy. In addition, Risilience provides access to ongoing support from its experienced team, enabling businesses to navigate their sustainability journey with expertise and dedicated assistance.



Carbon Direct // QUANTUM INNOVATION FUND

Empowering Companies with Scientific Insights for Impactful Carbon Management

Companies worldwide face ongoing challenges when it comes to effectively addressing and managing carbon emissions. Understanding, quantifying, and mitigating a company's carbon footprint remains complex and demanding. Furthermore, the development of credible and science-based emissions reduction plans presents additional challenges. The intricacies involved in these processes make it essential for companies to find robust solutions that can navigate the complexities of carbon emissions, enabling them to make informed decisions and implement effective strategies.

Carbon Direct helps organizations go from climate goals to climate action. The company combines technology with deep expertise in climate science, policy, and carbon markets to deliver carbon emission footprints, actionable reduction strategies, and carbon dioxide removal credits that meet our quality criteria. Carbon Direct helps clients set and equitably deliver on their climate commitments, streamline compliance, and manage risks through transparency and scientific credibility.

How Does Carbon Direct Help Clients?

Carbon Direct was founded to bring the knowledge of the world's leading climate experts to companies at any stage of the climate journey. Their approach, from bespoke advisory services to SaaS-based carbon management, is grounded in science and scales from a footprint of less than 100 tons to 100,000+ tons. Carbon Direct helps clients on all aspects of carbon management, from developing a carbon footprint to creating decarbonization strategies. The company's experts review – and often contribute to – the latest research and insight into carbon markets, climate science and technologies, policy, and regulation. They use that knowledge to continuously evolve their solutions.



PRIMARY OFFICE
New York, New York

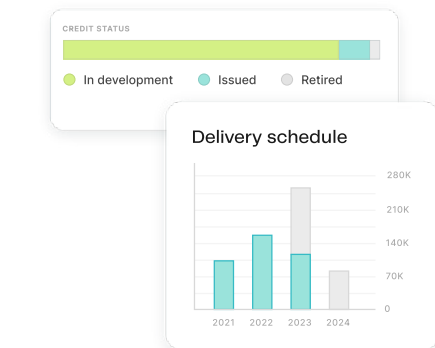
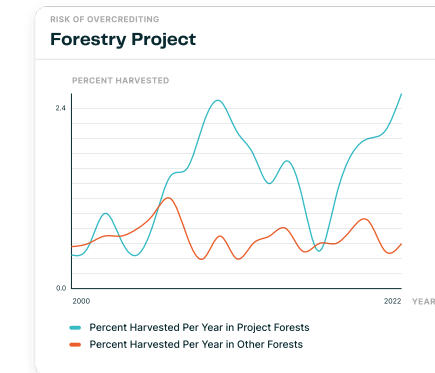
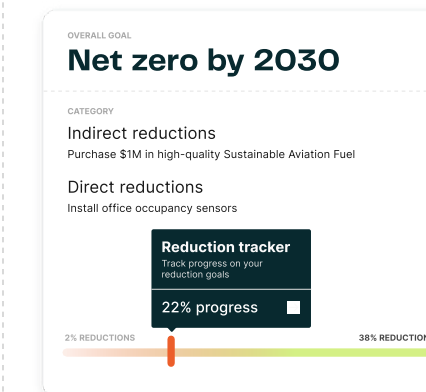
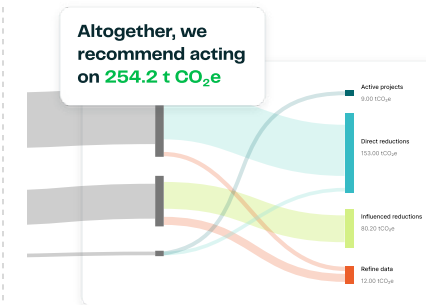
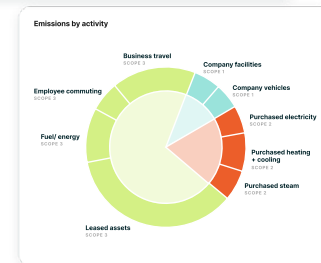
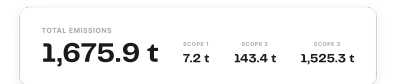
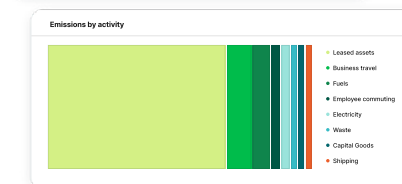
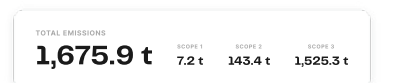
YEAR OF INVESTMENT
2022

Carbon Direct is focused on making meaningful and equitable climate action achievable for any organization at any stage in their climate journey with a scientifically-proven approach.

[Visit Website ↗](#)

“Carbon Direct’s emission report was exactly what we were looking for to help us achieve net zero by 2030.”

Kathleen Simpson
CEO, The Russell Family Foundation



Measure

Activate your climate strategy through carbon footprints.

Reduce

Create a strategy with actionable steps to reduce your footprint.

Remove

Purchase removal credits with real climate impact.

Carbon Direct has worked with numerous clients, including the world's largest buyers of carbon removal, to perform the scientific and technical diligence required to evaluate and procure carbon dioxide removal credits.

>15

RFIs completed

>600

Project applications assessed

>225

Diligence reviews performed

Carbon Direct continued

Our Expertise

The Carbon Direct team includes dozens of the world’s leading climate scientists with expertise in every aspect of carbon management, from carbon accounting, to nature-based, hybrid, and engineered carbon removal, to environmental and climate justice.

Quality Portfolio Development

Carbon Direct specializes in building portfolios of carbon dioxide removal, catering to quality-focused buyers in the market. The company applies rigorous scientific standards to every carbon removal project to help ensure that it delivers meaningful climate impact. Only projects that meet our quality criteria are included in Carbon Direct portfolios. Carbon Direct also works closely with suppliers to design projects aligned to the needs of buyers.

Scientific and Technical Insight

Carbon Direct delivers scientific and technical insight across every stage of carbon management, from the diligence they apply to carbon emissions footprinting, to providing science-backed decarbonization strategies tailored to each unique emission type, including portfolio-level decarbonization. Carbon Direct also provides expertise in environmental and climate justice, delivers policy and regulatory guidance, and regularly publishes custom research and analysis.

Climate and Environmental Justice

We believe effective climate change mitigation requires addressing unequal distribution of environmental benefits and burdens. Carbon Direct works with clients to evaluate the climate and environmental justice implications of their carbon management strategies with a focus on achieving equitable outcomes. Their approach includes community and stakeholder engagement, evaluation of potential harms and community benefits, and analysis of environmental risks and potential benefits.

Quality Carbon Removal

Carbon Direct evaluates every carbon removal project against rigorous criteria to help ensure quality and climate impact.

TIST Agroforestry
Kenya
AGROFORESTRY

ICICO Improved Forest Management
Mexico
IMPROVED FOREST MANAGEMENT

Pacific Biochar
United States
BIOCHAR

Climate Robotics Biochar
United States
BIOCHAR

The inclusion of any logos herein does not reflect an endorsement by the entity whose logo is so included, nor does it represent or imply any affiliation with such entity.

What industries does Carbon Direct serve?

Carbon Direct works with organizations across all verticals, with a focus on financial institutions and asset managers – including BlackRock, The Rockefeller Foundation, and The Russell Family Foundation. Other focus industries include technology, aviation, manufacturing, and logistics.



Expert Diligence in Action

- The Russell Family Foundation**
Case Study: The Russell Family Foundation catalyzes climate finance
- Microsoft**
Criteria for High-Quality Carbon Removal
- Apple**
Sustainable Aviation Fuels Primer: Production Pathways and Opportunities to Scale
- Bipartisan Policy Center**
Government Intervention in Support of High-Quality Carbon Credits
- Boulder County**
Carbon Removal for Local Ecosystems, Communities & Economies

ESG Performance Disclosures

[Performance Table](#)

59

Portfolio Company Performance Table

ENVIRONMENTAL PERFORMANCE METRICS ¹	
	2022
Scope 1 GHG Emissions (MT CO ₂ e)	2,787,727
Carbon Dioxide	2,326,766
Methane	451,275
Nitrous Oxide	2,104
Scope 2 Electricity Emissions ²	191,168
Scope 3 Emissions ^{2,3}	102,217,671
Scope 1 GHG Intensity (MT CO ₂ e/Mboe) ⁴	9.9
Methane Emissions Intensity (%) ⁵	0.08%
Methane Monitoring	
Number of Leaks Detected	1,752
Number of Components Surveyed	526,057
Flaring Intensity (% of Natural Gas Produced)	0.21%
Water Usage	
Freshwater Sourced (Mbb)l	89,513
% Freshwater Usage	27%
Water Recycled (Mbb)l	229,882
Spills above 1 bbl of Liquid Released to the Environment ⁶	
Water (bbl)	378
Oil (bbl)	24
Volume of Spills Released to the Environment	
Water (bbl)	6,355
Oil (bbl)	405

SAFETY PERFORMANCE METRICS ⁷	
	2022
Total Recordable Incident Rate (TRIR)	
Employee	1.41
Contractor ⁸	0.61
Workforce	0.75
Lost Time Incident Rate (LTIR)	
Employee	0.74
Contractor ⁸	0.19
Workforce	0.28
Preventable Vehicle Incident Rate (PVIR)	1.25

SOCIAL PERFORMANCE METRICS ⁹	
	2022
Total Workforce Headcount	2,464
Minorities as a Percentage of Workforce	29%
Women as a Percentage of Workforce	24%
Minorities as a Percentage of Leadership ¹⁰	18%
Women as a Percentage of Leadership ¹⁰	10%

Disclaimer: The information in this report is based on portfolio company data across all funds provided to Quantum Energy Partners for the 2022 calendar year. Reporting companies include majority owned operators unless otherwise noted.

- ¹ Scope 1 emissions include data from upstream and midstream portfolio companies for the Production and Gathering and Boosting segments of EPA's Subpart W. Certain companies with emissions below reporting thresholds, or companies that did not have assets for the majority of the reporting year did not disclose emissions to Quantum. Emissions from vehicle fleet, which make up a small portion of total emissions, are not included in this estimate.
- ² Scope 2 emissions are calculated using upstream and midstream portfolio company provided production data in conjunction with EPA fuel and electricity emissions factors. Not all portfolio companies provide this data.
- ³ Scope 3 emissions do not include production from Quantum-owned mineral companies.
- ⁴ Greenhouse Gas Intensity calculated as GHG emissions over total hydrocarbon production in barrel of oil equivalent; MT CO₂e/MBoe.
- ⁵ Methane Intensity calculated using Edison Electric Institute and American Gas Association Natural Gas Sustainability Initiative (NGSI) methodology.
- ⁶ Spill metric was updated in 2021 from reportable spills and associated volumes to spills > 1 bbl for comprehensive reporting.
- ⁷ Safety metrics include data from upstream, midstream, and service companies.
- ⁸ All companies reported contractor data beginning in 2021.
- ⁹ Social metrics include data from 26 majority-owned portfolio companies including minerals and alternative energy companies.
- ¹⁰ Leadership defined as senior level vice president to executive level management.

Disclaimer

Disclaimer

The data and information in this report (“Report”), which has been prepared by Quantum Energy Partners (together with its affiliates, “Quantum”), are presented for informational purposes only. This Report shall not constitute an offer to sell or the solicitation of any offer to buy any interest, security, or investment product and may not be used or relied upon in connection with any such offer or sale of securities. An offer or solicitation in respect of any fund will be made only through offering materials prepared for such fund and will be subject to the terms and conditions contained therein. The information in this Report is only as current as the date indicated, and may be superseded by subsequent market events or for other reasons, and Quantum assumes no obligation to update the information herein. Nothing contained herein constitutes investment, legal, tax or other advice nor is it to be relied on in making an investment or other decision. This Report should not be viewed as a current or past recommendation or a solicitation of an offer to buy or sell any securities or to adopt any investment strategy.

Certain information contained in this document constitutes “forward-looking statements” which can be identified by the use of forward-looking terminology such as “may,” “will,” “should,” “expect,” “anticipate,” “target,” “project,” “estimate,” “intend,” “continue,” “forecast,” or “believe” or the negatives thereof or other variations thereon or comparable terminology. The forward-looking statements contained in this presentation are based on assumptions believed to be reasonable in light of the information presently available. More broadly, statements that do not relate strictly to historical or current facts are based on current expectations, estimates, projections, opinions or beliefs of Quantum and its affiliates or its sources of information as of the date of this report. Actual events or results or actual performance may differ materially from those reflected or contemplated in such forward-looking statements due to various risks and uncertainties, many of which are beyond the control of Quantum. No assurance, representation or warranty is made by any person that any of such forward-looking statements will be achieved and no person should rely on such statements. Quantum has based these forward-looking statements on current expectations and assumptions about future events, taking into account all information currently known by Quantum. These expectations and assumptions are inherently subject to significant business, economic, competitive, regulatory and other risks and uncertainties; actual events are difficult to project and often depend upon factors that are beyond the control of the Quantum and its affiliates. Additional risks of which Quantum is not currently aware could cause actual results to differ. The risks and uncertainties that may affect the operations, performance and results of Quantum’s business and forward-looking statements include, but are not limited to, those set forth in this report and in the documents Quantum files from time to time with the Securities and Exchange Commission. None of Quantum, any of its affiliates or any of their respective directors, officers, employees, partners, shareholders, advisors or agents makes any assurance, representation or warranty as to the accuracy of any of such forward-looking statements. Recipients of this presentation should carefully review the assumptions underlying any such forward-looking statements. Any forward-looking statement speaks only as of the date on which such statement is made, and Quantum assumes no obligation to correct or update any forward-looking statement, whether as a result of new information, future events or otherwise, except as required by law.

Certain information contained herein relating to any environmental, social and governance (“ESG”) or other similar industry frameworks is subject to change, and no assurance can be given that Quantum will remain signatory, supporter, or member of such initiatives or other similar industry frameworks.

Certain information contained herein relating to any ESG-related goals, targets, intentions, or expectations, including with respect to any climate-related targets and related timelines, is subject to change and no assurance can be given that such goals targets, intentions or expectations will be met. Further, statistics and metrics relating to ESG matters are estimates and may be based on assumptions or developing standards (including Quantum’s internal standards and policies).

Similarly, there can be no assurance that Quantum’s ESG policies and procedures as described in this report will continue; such policies and procedures are subject to Quantum’s fiduciary duties and applicable legal, regulatory, and contractual requirements and could change, even materially. Quantum is permitted to determine in its discretion, taking into account any applicable contractual commitments or regulatory requirements, that it is not feasible or practical to implement or complete certain of its ESG initiatives based on cost, timing or other considerations. Statements about ESG initiatives or practices related to portfolio companies do not apply in every instance and depend on factors including, but not limited to, the relevance or implementation status of an ESG initiative to or within the portfolio company; the nature and/or extent of investment in, ownership of or, control or influence exercised by Quantum with respect to the portfolio company; and other factors as determined by investment teams, corporate groups, asset management teams, portfolio operations teams, companies, investments, and/or businesses on a case-by-case basis. ESG factors are only some of the many factors Quantum considers in making an investment, and there is no guarantee that Quantum will successfully implement its ESG policies and procedures or that consideration of ESG factors will enhance long-term value and financial returns for limited partners or increase the ESG performance of investments. There is no guarantee that any of the steps taken by Quantum and/or third parties to mitigate, prevent, or otherwise address material ESG topics will be successful in preventing or mitigating impacts on returns, completed as expected or at all, or will apply to or continue to be implemented in the future. Similarly, to the extent Quantum engages with portfolio companies on ESG-related practices and potential enhancements thereto, there is no guarantee that such engagements will improve the financial or ESG performance of the investment. In addition, the act of selecting and evaluating material ESG factors is subjective by nature, and there is no guarantee that the criteria utilized or judgment exercised by Quantum will reflect the beliefs or values, internal policies or preferred practices of investors, other asset managers or with market trends.

Case studies presented herein were selected based on objective non-performance based criteria, are for illustrative purposes only, and are not intended to be a representative reflection of all portfolio companies or used as an indication of the current or future performance of Quantum’s portfolio companies and do not purport to be a complete list thereof. It should not be assumed that investments made in the future will be comparable in quality or performance to the investments described herein. Unless otherwise stated, references to ESG initiatives and performance at portfolio companies are not intended to indicate that Quantum has materially contributed to such initiatives or performance. For instance, Quantum’s ESG efforts may have been one of many factors — including such other factors as engagement by portfolio company management, advisors, and other third parties — contributing to the success described in each of the selected case studies. Further, references to the investments included in the illustrative case studies should not be construed as a recommendation of any particular investment or security. Certain information was provided by third parties and certain statements reflect Quantum’s beliefs as of the date hereof based on prior experience and certain assumptions that Quantum believes are reasonable, but may prove incorrect. Past performance is not necessarily indicative of future results. Investors may lose investment capital.

Further, the receipt of any awards by Quantum or the portfolio companies described herein is no assurance that Quantum’s investment objectives have been achieved or successful. Further, such awards are not, and should not be deemed to be, a recommendation or evaluation of Quantum’s investment management business.

Except where opinions and views are expressly attributed to individuals, general discussions contained within this report regarding the market or market conditions represent the view of either the source cited or Quantum. Nothing contained herein is intended to predict the performance of any investment. There can be no assurance that actual outcomes will match the assumptions or that actual returns will match any expected returns.

Certain information contained herein has been obtained from third parties, and in certain cases have not been updated through the date hereof. While these third party sources are believed to be reliable, Quantum makes no representation or warranty, express or implied, with respect to the accuracy, fairness, reasonableness or completeness of any of the information contained herein, and expressly disclaims any responsibility or liability therefor. None of the figures included in this document were audited, assured, or independently verified by auditors or third-party assurance providers. Quantum does not independently verify [all] ESG information it receives from investments or third-party advisors or data sources, and it may decide in its discretion not to use certain information or accept certain recommendations. Actual results may differ materially from any forward-looking statements.

Materiality is used within this document to describe issues relating to ESG strategies that we consider to be of high or medium importance in terms of stakeholder interest and potential business impact. Materiality, for the purposes of this document should not, therefore, be read as equating to any use of the word in other Quantum reporting or filings. No part of this Report shall be taken to constitute an invitation or inducement to invest in Quantum, nor should this Report be relied upon in making investment decisions.

The inclusion of any third-party firm and/or company names, brands, and/or logos does not imply any affiliation with these firms or companies. None of these firms or companies have endorsed the Quantum.

There is no guarantee that any ESG measures, targets, programs, commitments, incentives, initiatives, or benefits will be implemented or applicable to the assets held by funds advised or managed by Quantum and any implementation of such ESG measures, targets, programs, commitments, incentives, initiatives, or benefits may be overridden or ignored at the sole discretion of Quantum at any time and in accordance with applicable sectoral legislation unless otherwise specified in the relevant fund documentation or regulatory disclosures made pursuant to Regulation (EU) 2019/2088 (“SFDR”). Any ESG measures, targets, programs, commitments, incentives, initiatives, or benefits referenced are not promoted to investors and do not bind any investment decisions or the management or stewardship of any funds advised or managed by Quantum for the purpose of the SFDR unless otherwise specified in the relevant fund documentation or regulatory disclosures.

References to “sustainable,” “sustainability,” “or variations thereof are not intended to reflect the meaning of “sustainable investment” under the SFDR.

Unless otherwise stated, the information in this report has been compiled as of 12/31/2022.