

Climate Change:

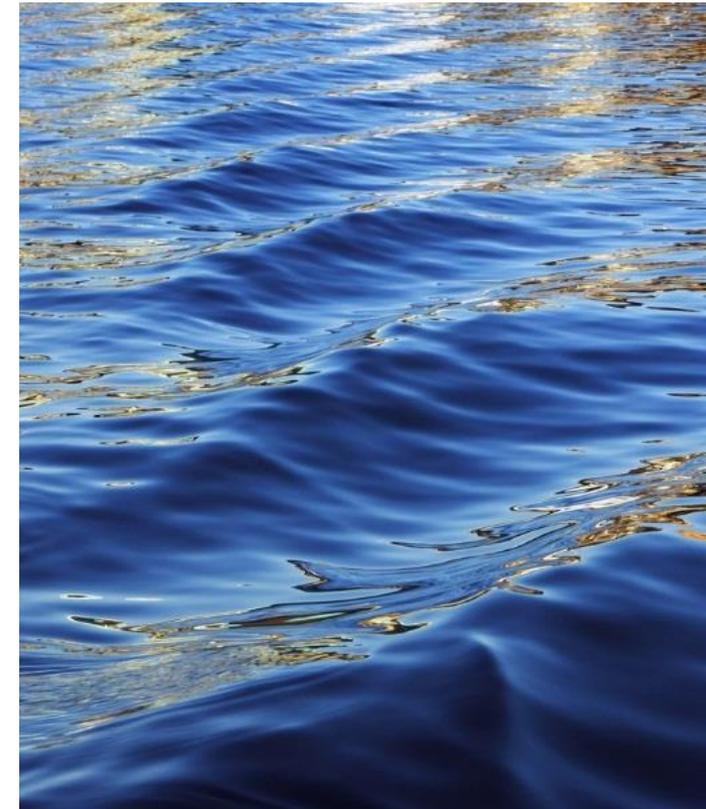
How will oil & gas operations need to change in the 2020s?

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www.ClimateImpactCapital.com



THE WALL STREET JOURNAL

MONDAY, SEPTEMBER 14, 2008 • VOL. CCLXII

The year is 2008...



Crisis on Wall Street as Lehman Totters, Merrill Is Sold, AIG Seeks to Raise Cash

Fed Will Expand Its Lending Arsenal in a Bid to Calm Markets; Moves Cap a Momentous Weekend for American Finance

By **Carroll Nardone**, **Sumner Tang**, **Stephan Lyle**, and **Adam Lashinsky**

The U.S. government, which today will announce that it has taken over the troubled investment bank Lehman Brothers, is expected to take new steps to stabilize the broader financial system. Those steps, expected to be completed, would make it easier for banks and financial firms to borrow from the central bank by using a wider range of collateral. Bankers say these measures are necessary to prevent a credit crunch that could threaten the entire financial system.

Without such support, the Fed's new lending program, which would allow banks to borrow from the central bank by using a wider range of collateral, is expected to be completed, would make it easier for banks and financial firms to borrow from the central bank by using a wider range of collateral. Bankers say these measures are necessary to prevent a credit crunch that could threaten the entire financial system.

What's News—

Business & Finance

World-Wide

Bank of America to Buy Merrill

Bank of America to Buy Merrill

The Washington Post

Monday, September 15, 2008

Massive Shifts on Wall St.

SYSTEM IN CRISIS
A New Architecture For the Financial World

MERRILL LYNCH
Weekend Merger Struck With Bank of America

LEHMAN BROTHERS
Troubled Investment Bank To File for Bankruptcy

Zorn Savors First Win, and That's No Act

Q-and-A: Advice for average investors and homeowners

No 'golden parachutes' for ex-CEOs of Enron and Freddie

The New York Times

Thursday, September 11, 2008

AS INVESTORS RUN TO SAFETY

GLOBAL REACTION
Credit Markets Suffer — Borrowing Costs Soar as Result

BY BRUCE HAIN

The financial crisis entered a particularly dangerous new phase on Wednesday when many credit markets stopped working normally as investors around the world frantically sought the surest way to protect their money from the system's problems.

As a result, the cost of borrowing soared for many companies, while the price of Wall Street stocks fell to historic lows.

At the same time, investors were so worried that they stopped buying stocks and instead began buying Treasury bonds.

Borrowing costs for banks and companies have soared, fueling the credit crisis.

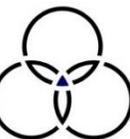
Arguably, the 2008 financial crisis was the culmination of poor **risk management**.



Shareholders began to demand **clarity** of all major corporate risks, including (and especially) **climate risk**.



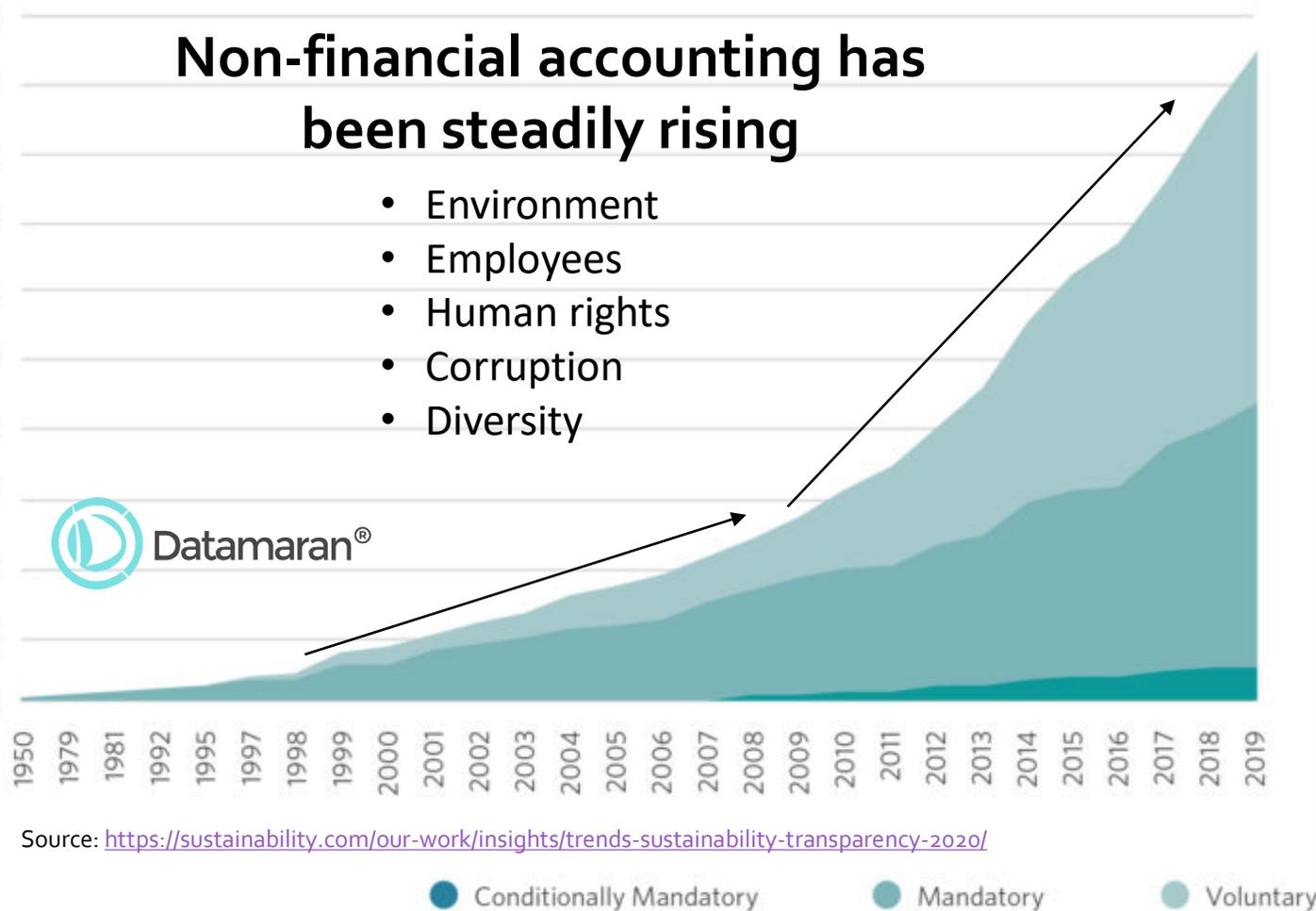
Systemic changes resulted in **increased transparency** and regulation, **targeting undisclosed risks**.



Reporting is no longer optional

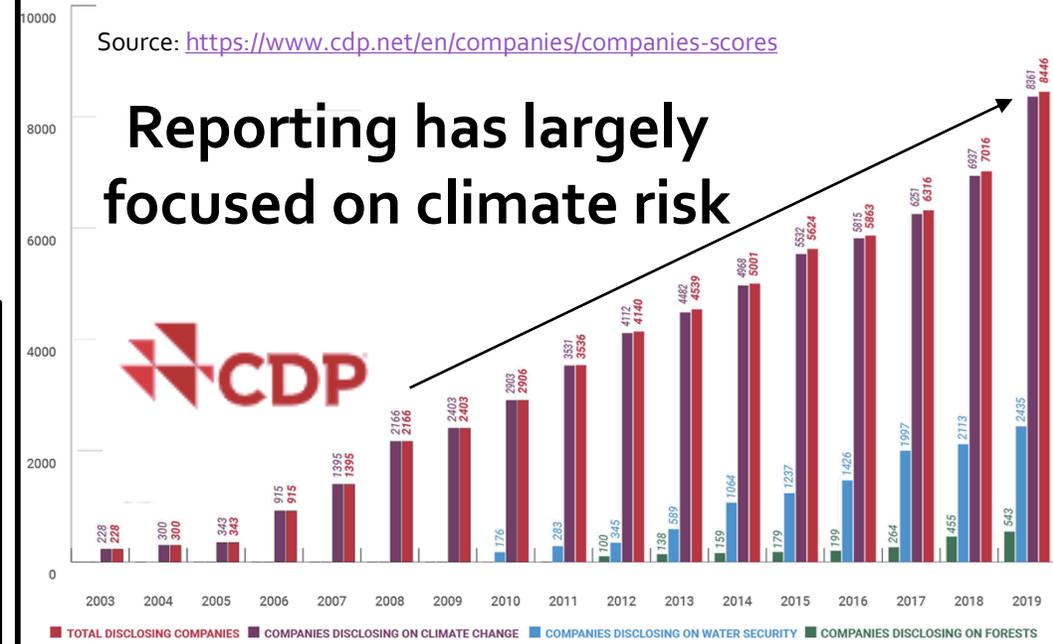
Non-financial accounting has been steadily rising

- Environment
- Employees
- Human rights
- Corruption
- Diversity



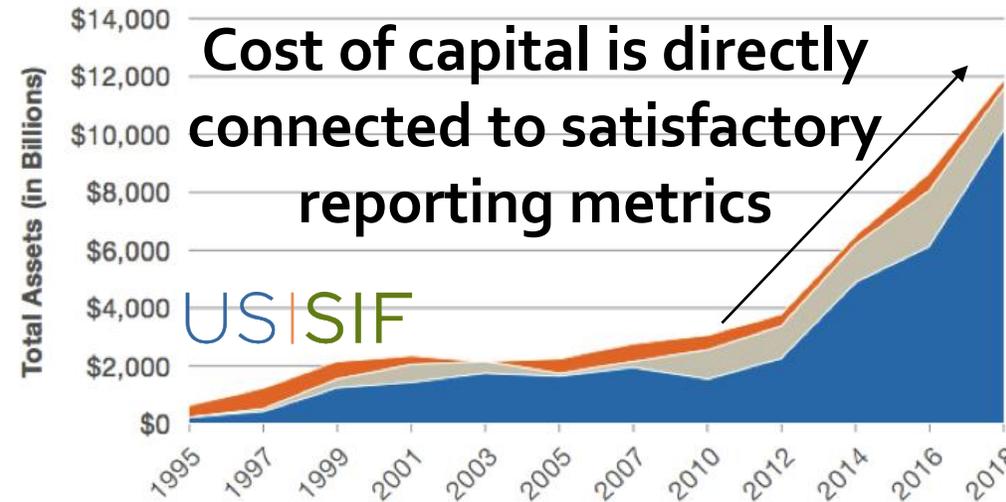
Source: <https://www.cdp.net/en/companies/companies-scores>

Reporting has largely focused on climate risk



ESG Incorporation Overlapping Strategies Shareholder Advocacy

Cost of capital is directly connected to satisfactory reporting metrics

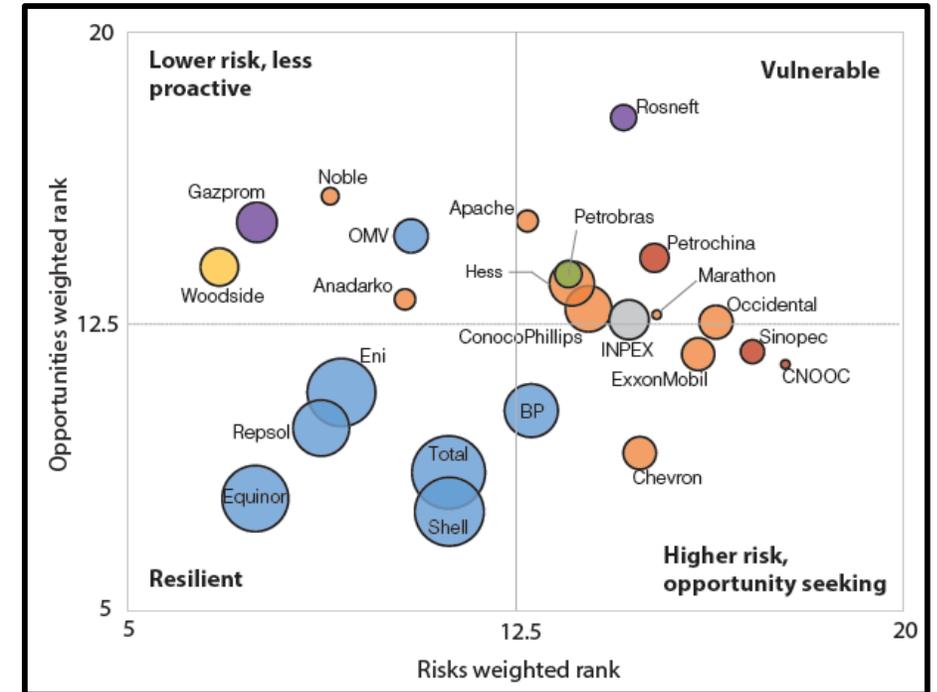


You are now getting a grade and being compared to your peers...

LT rank	Company ^(v)	Country	Average market cap Q3 2018 (US\$bn) ^(w)	Production 2017 (million boe/d)	2017 Emissions (S1+2 Mt CO ₂)	Weighted rank	Transition risks rank	Physical risks rank	Transition opportunities rank	Climate governance & strategy rank
1	Equinor	Norway	78	1.9	16	6.72	3	4	2	4
2	Total	France	152	2.5	40	8.10	10	5	3	1
3	Shell	UK / Netherlands	275	3.7	84	8.11	9	14	1	2
4	Eni	Italy	64	1.7	43	8.16	6	8	7	3
5	Repsol	Spain	29	0.7	23	8.58	5	12	5	5
6	Woodside	Australia	22	0.2	10	10.29	2	1	18	11
7	BP ^(v)	UK	139	2.5	56	10.75	11	16	6	6
8	Gazprom	Russia	54	9.7	247	10.81	4	3	21	9
9	OMV	Austria	19	0.3	11	12.50	7	17	20	12
10	ConocoPhillips	USA	72	1.4	21	12.57	15	9	14	7
11	Hess	USA	17	0.3	4.1	12.73	14	7	16	8
12	Chevron	USA	230	2.6	60	12.89	16	15	4	14
13	Anadarko	USA	32	0.7	6.6	12.91	8	6	15	21
14	INPEX	Japan	17	0.4	0.9	13.32	20	13	12	10
15	Noble Energy	USA	15	0.4	2.5	13.33	1	21	23	22
16	Petrobras	Brazil	73	2.5	67	14.08	17	2	17	17
17	ExxonMobil	USA	343	4.0	125	14.17	23	20	9	15
18	Occidental	USA	56	0.6	16	14.51	22	22	11	13
19	Apache	USA	16	0.5	8.9	14.54	13	10	22	20
20	Petrochina	China	215	4.0	193	14.84	12	23	19	16
21	Sinopec	China	117	1.2	163	15.34	18	24	10	19
22	Marathon Oil	USA	15	0.4	3.8	15.85	19	18	13	23
23	Rosneft	Russia	61	5.7	76	15.89	21	11	24	18
24	CNOOC	China	68	1.3	7.8	16.60	24	19	8	24

CDP : Which oil and gas companies are ready for the low-carbon transition? Executive Summary, November 2018

Weighting: Transition risks rank (35%), Physical risks rank (10%), Transition opportunities rank (30%), Climate governance & strategy rank (25%)



Major producers are now creating business strategies around climate risk



...even if you choose to abstain.

Largest non-responders to CDP request for disclosure

Company	Country	First year approached by CDP	Public GHG emissions disclosure
Apache Corporation	USA	2004	Yes
Chesapeake	USA	2007	No
Continental Resources	USA	2011	No
Marathon Oil	USA	2004	Partial
Pioneer Natural Resources	USA	2009	Partial
Saudi Aramco	Saudi Arabia	2016	No
China National Offshore Oil Corporation (CNOOC)	China	2003	Partial
PetroChina	China	2006	No
Sinopec (China Petroleum & Chemical Corporation)	China	2006	Partial

Source: <http://globalinvestorcoalition.org/wp-content/uploads/2017/05/IIGCC-2017-Oil-and-Gas-Investor-Expectations-v4.2.pdf>

Independents are also feeling industry and shareholder pressure, and non-responders are being called out

Climate Resolutions Facing Oil and Gas Companies



Climate change remains a focus of shareholder resolutions in 2018. Many of them ask oil and gas companies to address four key issue areas: climate risk assessment, methane emissions, political lobbying disclosure and the transition to cleaner energy.

COMPANY	RESOLUTION	filer
Anadarko Petroleum Corporation		As You Sow; Miller/Howard Investments, Inc.
Chesapeake Energy Corporation		Unitarian Universalist Association of Congregations; New York State Common Retirement Fund
Chevron Corporation		Unitarian Universalist Association of Congregations; Philadelphia Public Employees Retirement System; As You Sow
ConocoPhillips		Walden Asset Management
Devon Energy Corporation		The George Gund Foundation; Rhode Island Office of the General Treasurer
EQT Corporation		Miller/Howard Investments, Inc.
ExxonMobil Corporation		United Steelworkers of America; As You Sow; Unitarian Universalist Association of Congregations
Kinder Morgan Inc.		Zevin Asset Management; New York State Comptroller; Zevin Asset Management; Miller/Howard Investments, Inc.
Marathon Petroleum Corporation		Trillium Asset Management
Noble Energy, Inc.		Presbyterian Church (USA)
Range Resources		Unitarian Universalist Association of Congregations
Valero Energy Corporation		Mercy Investment Services, Inc.

SOURCES: Ceres; Proxy Review

PAUL HORN / InsideClimate News

Expectations for complete climate transparency are growing

Degree of disclosure is increasing, and the process is becoming more sophisticated

What started as an accounting, now must include *strategy* and what, why, how, and when

Core Elements of Recommended Climate-Related Financial Disclosures

Governance

Disclose the organization's governance around climate-related risks and opportunities.

Find out more here →

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.

Find out more here →

Risk Management

Disclose how the organization identifies, assesses, and manages climate-related risks.

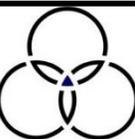
Find out more here →

Metrics & Targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.

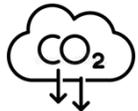
Find out more here →

Source: <https://www.fsb-tcfd.org/publications/>



Climate risk is more than CO₂ emissions

- Extreme weather events
 - Planning, forecasting
 - Resiliency
 - Gas evacuation
- License to operate
 - Legal regulations
 - Socially acceptable
- Operational decarbonization
- Scope 3 impacts
 - Products
- Water management
- Advanced materials



Overall Fracking

Source: <http://disclosingthefacts.org>

THE SCORECARD		(Out Of Possible 32 Points)
COMPANY		SCORE
Encana Corp. (Encana)		14
Apache Corp. (Apache)		10
Ultra Petroleum Corp. ² (Ultra)		10
Hess Corp. (Hess)		8
Noble Energy, Inc. (Noble)		7
Royal Dutch Shell plc (Shell)		7
EOG Resources, Inc. (EOG)		6
Cabot Oil & Gas Corp. (Cabot)		5
Chesapeake Energy Corp. (Chesapeake)		5
ConocoPhillips Corp. (ConocoPhillips)		5
CONSOL Energy, Inc (Consol)		5
EQT Corp. (EQT)		5
Anadarko Petroleum Corp. (Anadarko)		4
Devon Energy Corp. (Devon)		4
Chevron Corp. (Chevron)		3
Range Resources Corp. (Range)		3
Talisman Energy, Inc. (Talisman)		3
WPX Energy, Inc. (WPX)		3
BHP Billiton Ltd. (BHP)		2
BP plc (BP)		2
Exxon Mobil Corp. (Exxon)		2
Occidental Petroleum Corp. (Occidental)		2
Southwestern Energy Co. (Southwestern)		2
QEP Resources, Inc. (QEP)		1

Water and Chemicals

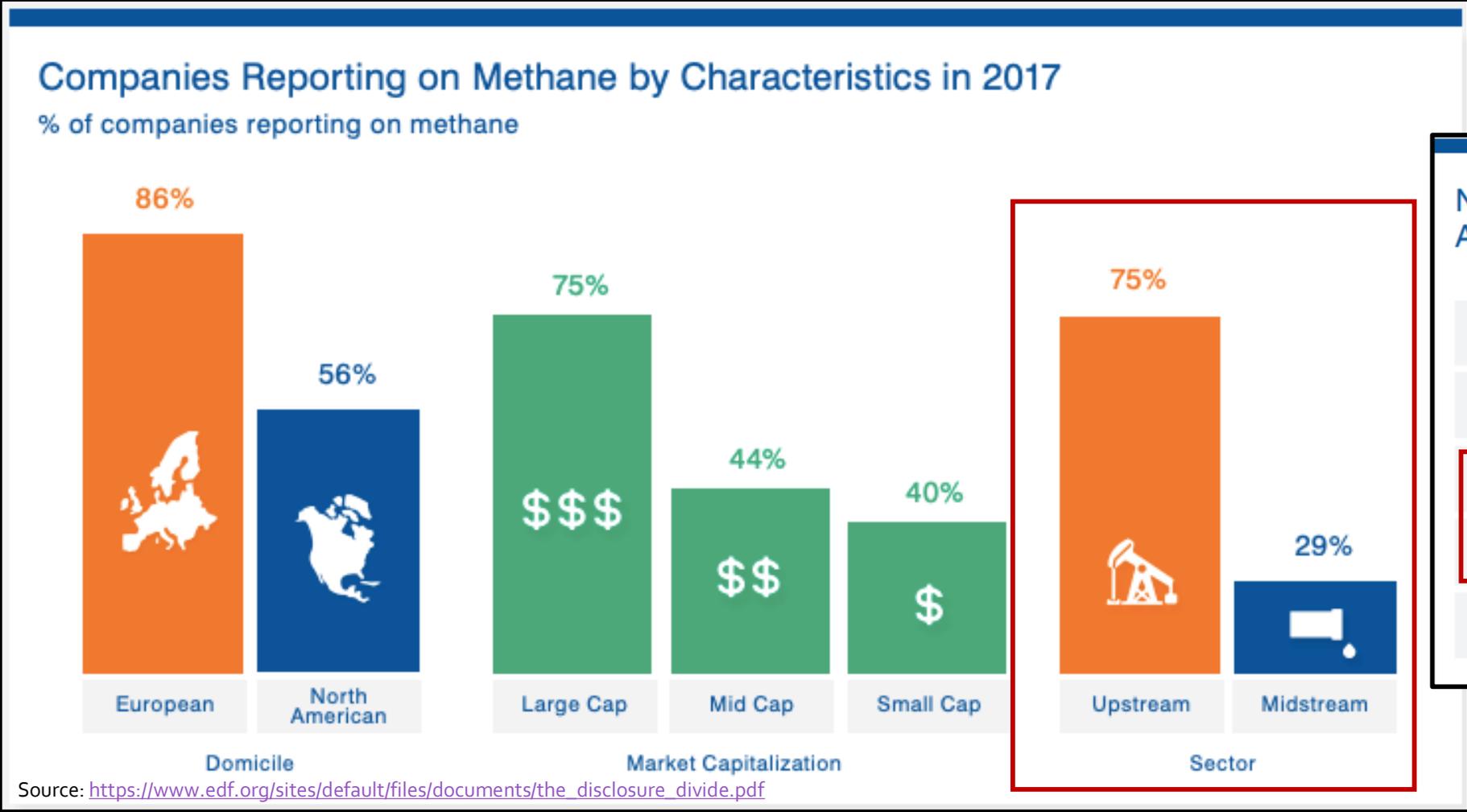
2019 COMPANY SCORES		
COMPANY		TOTAL
Southwestern Energy Co. (SWN)		23
Apache Corp. (APA)		22
Anadarko Petroleum Corp. (APC)		20
Range Resources Corp. (RRC)		20
Occidental Petroleum Corp. (OXY)		19
Antero Resources Inc. (AR)		17
Royal Dutch Shell plc. (RDS)		17
ConocoPhillips Co. (COP)		16
Hess Corp. (HES)		15
Devon Energy Corp. (DVN)		12
Chesapeake Energy Corp. (CHK)		11
Newfield Exploration Co. (NFX)		11
EQT Corp. (EQT)		8
Noble Energy, Inc. (NBL)		6
BP plc. (BP)		5
Chevron Corp. (CVX)		5
Cimarex Energy Co. (XEC)		5
Marathon Oil Corp. (MRO)		5
Cabot Oil and Gas Corp. (COG)		4
Encana Corp. (ECA)		4
Equinor ASA (EQNR)		4
Exxon Mobil Corp. (XOM)		4
Ultra Petroleum Corp. (UPL)		3
CNX Resources Corp. (CNX)		2
Concho Resources Inc. (CXO)		2
Pioneer Natural Resources (PXD)		2
EOG Resources, Inc. (EOG)		1
Total S.A. (FP)		1
Continental Resources, Inc. (CLR)		0
Gulfport Energy Corp. (GPOR)		0

Methane

2017 SCORECARD		
COMPANY		TOTAL
Apache		12
BHP		12
Southwestern		12
Conoco		11
Hess		11
Shell		11
Chesapeake		10
Newfield		10
Range		10
Exxon		9
Noble		9
Pioneer		9
Carrizo		7
CONSOL		7
Devon		7
EOG		6
Anadarko		5
WPX		5
Antero		4
Occidental		4
BP		3
Chevron		2
Continental		1
EQT		1
QEP		1
Cabot		0
Whiting		1
Encana		0

The trend is moving downstream

As upstream complies, investor focus shifts down the value chain and to adjacent sectors



New Companies Reporting After Resolutions

Antero Resources
Cimarex Energy
Kinder Morgan
Targa Resources Partners
WPX Energy



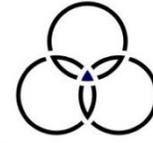
Which do you think is midstream?

A

COMPANY	Reports Methane Emissions as a Standalone Figure	Reports Methane Emissions as a Rate	Reports Using Some Direct Measurement	Reports a Quantitative Methane Goal	Discusses Methane Reducing Activities	Participates Publicly in Voluntary Methane Initiatives	Reports Position On Methane-Related Regulations	Discusses General LDAR Use	Reports LDAR Program Scope	Reports LDAR Program Frequency	Reports LDAR Program Methodology
Anadarko	X	X	X	X	✓	✓	✓	✓	✓	X	✓
Apache	X	X	X	X	✓	✓	X	✓	X	X	✓
BHP Billiton	✓	X	X	X	✓	✓	X	X	X	X	X
BP	✓	✓	X	X	✓	✓	X	✓	X	✓	✓
Cabot Oil & Gas	X	X	X	X	X	✓	X	X	X	X	X
Chevron	✓	X	X	X	✓	✓	✓	✓	X	X	✓
Cimarex Energy	✓	✓	X	X	✓	X	X	✓	X	X	X
Conoco Phillips	✓	✓	✓	X	✓	✓	X	✓	✓	✓	✓
Continental Resources	X	X	X	X	X	X	X	X	X	X	X
Devon Energy	✓	✓	✓	X	✓	✓	X	✓	✓	X	✓
Encana	X	X	X	X	X	X	X	X	X	X	X
EOG Resources	✓	X	X	X	✓	X	X	✓	✓	✓	✓
EP Energy LLC	X	X	X	X	X	✓	X	X	X	X	X
EQT Resources	✓	X	X	X	✓	✓	X	X	X	X	X
Exxon Mobil	✓	✓	✓	X	✓	✓	X	✓	✓	✓	✓
Freeport-Memoran Inc.	✓	X	X	X	X	X	X	X	X	X	X
Hess Corp	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓
Marathon Oil	✓	✓	✓	X	✓	✓	X	✓	X	X	✓
Noble Energy, Inc	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓
Occidental	✓	X	✓	X	✓	✓	X	✓	X	X	✓
Pioneer Natural Resources	X	X	✓	X	✓	✓	X	✓	X	X	✓
Royal Dutch Shell plc	✓	X	X	X	✓	✓	✓	✓	X	X	✓
Total S.A.	✓	✓	X	X	✓	✓	X	✓	X	X	X

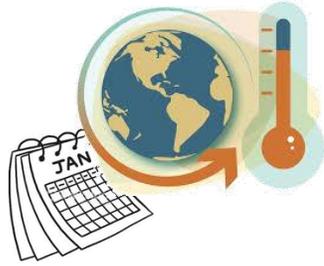
B

COMPANY	Reports Methane Emissions as a Standalone Figure	Reports Methane Emissions as a Rate	Reports Using Some Direct Measurement	Reports a Quantitative Methane Goal	Discusses Methane Reducing Activities	Participates Publicly in Voluntary Methane Initiatives	Reports Position on Methane-Related Regulations	Discusses General LDAR Use	Reports LDAR Program Scope	Reports LDAR Program Frequency	Reports LDAR Program Methodology
Boardwalk Pipeline Partners	X	X	X	X	X	X	X	X	X	X	X
Buckeye Partners	X	X	X	X	X	X	X	X	X	X	X
Crestwood Midstream partners	X	X	X	X	X	X	X	X	X	X	X
DCP Midstream Partners	X	X	X	X	X	✓	X	X	X	X	X
Dominion Midstream Partners	X	X	X	X	X	✓	X	X	X	X	X
Enable Midstream Partners	X	X	X	X	X	✓	X	X	X	X	X
Enbridge Inc	X	X	X	X	✓	✓	X	✓	X	✓	✓
Energy Transfer Partners	X	X	X	X	X	X	X	X	X	X	X
Enlink Midstream Partners	X	X	X	X	X	X	X	X	X	X	X
Enterprise Products Partners	X	X	X	X	X	X	X	X	X	X	X
EQT Midstream Partners	X	X	X	X	X	X	X	X	X	X	X
Kinder Morgan	X	X	X	✓	✓	✓	✓	✓	X	X	X
Magellan Midstream Partners	X	X	X	X	X	X	X	X	X	X	X
MarkWest Energy Partners	X	X	X	X	X	X	X	X	X	X	X



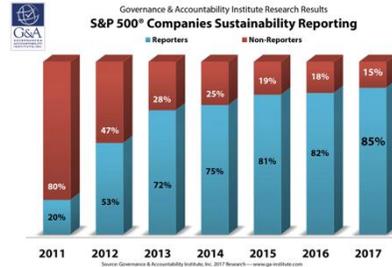
What does this mean?

THEN



5 years ago, "climate change" was a four-letter word in our industry.

NOW



85% of S&P 500 companies have sustainability disclosures.

If you aren't considering climate risk, you are the exception

Transparency is now the expectation, and decarbonization targets must be established or put license to operate at risk

No plan for opportunities

Reactive, considers risks but not opportunities

Active and proactive

Climate Unaware

Climate Aware

Climate Beware

<https://www.mercer.com/our-thinking/wealth/investing-in-a-time-of-climate-change.html>

To secure a place in the future, companies need to move into a Climate Beware position

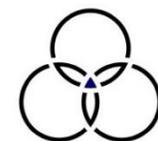


Key climate risks for midstream and downstream



	Real Asset Risk	Stranded Asset & Technology Risk	Regulatory Risk	Social (buying) Preference
<p>Key Climate Risks</p> 	<ul style="list-style-type: none"> • Ocean rise, tide surge, storm surge • Drought or flood • Extreme weather events • Temperature dependent operations • Transportation and logistics disruption 	<ul style="list-style-type: none"> • Baseload power and transmission load shift • Mobility infrastructure shift • Customer demographics • Technology evolution speed 	<ul style="list-style-type: none"> • Carbon tax • Water rights and pricing • Insurance costs • Technology or commodity phase-out 	<ul style="list-style-type: none"> • Country risk (see Regulatory) • Carbon and ESG ratings • Demographic changes • Living and food consumption

Climate affects all parts of the business from assets, to business models, to customer (B2B or B2C) engagement



Managing risk – what can you do?



LDAR

Opportunity

Repair & maintenance logistics

Strategy

Deploy quickly and efficiently

Risks Addressed

Regulatory, social preference



Gas Monetization

Opportunity

LNG, chemicals

Strategy

Grid-like storage for increased flexibility

Risks Addressed

Extreme weather, stranded assets, social preference



Infrastructure

Opportunity

Utilize existing pipeline infrastructure

Strategy

Location optimization and dual use

Risks Addressed

Regulatory, stranded assets



Decarbonization

Opportunity

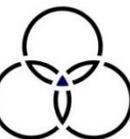
Hydrogen, ammonia, CO₂ utilization

Strategy

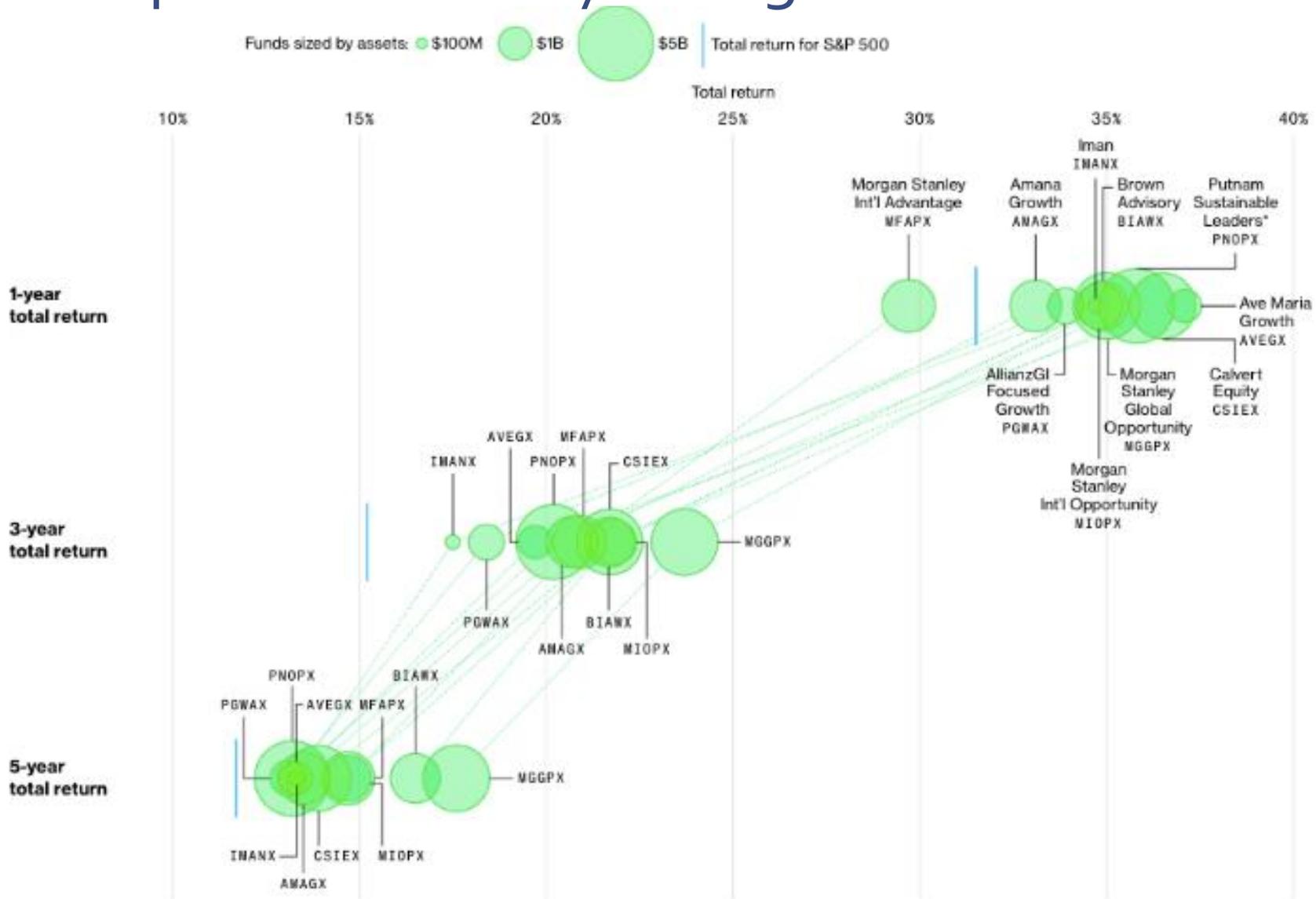
Technology that matches need

Risks Addressed

New business opportunities, social preference



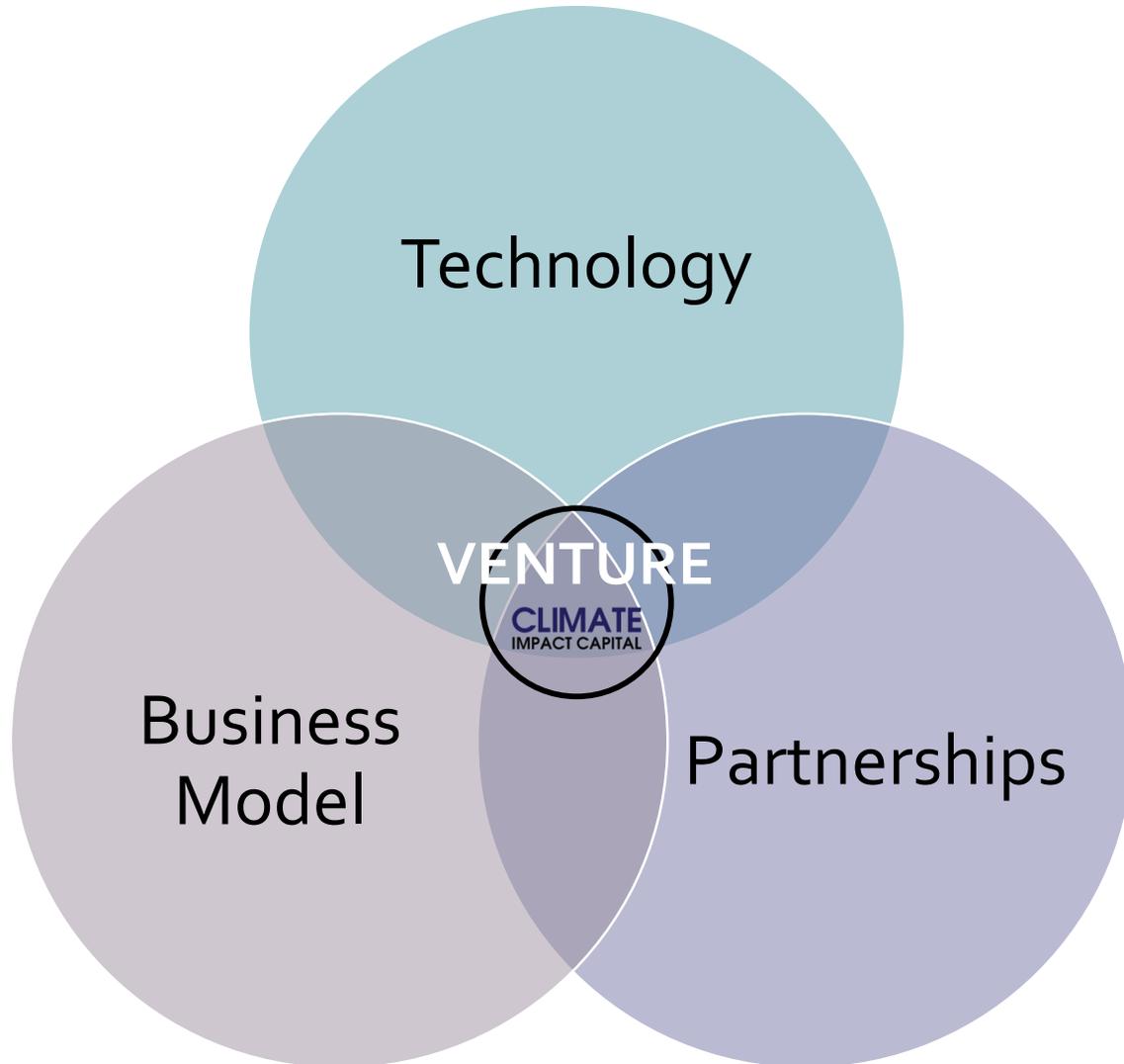
How will capital availability change in the future?



Source: Bloomberg



Innovation is a key to unlocking value



Innovation as a platform

Venture capital as a vehicle

Proactive companies will secure a spot for themselves in the future



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