

Environmental Sustainability and Value Creation

LGST/OIDD 7620

Fall 2023

Professor: Gary Survis

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Classes: Mondays, 3:30pm to 6:30pm ET, Huntsman F65

Professor's Office Hours: Mondays by appointment, phone, or video (Zoom, FaceTime)

Teaching Assistants' Office Hours: By appointment, phone, or video (Zoom, FaceTime, Google Meet)
scheduled via Calendly

Course Objectives

1. Understand **sustainability's levers for value creation** as it relates to corporate strategy, business operations, financial objectives, and social responsibility.
2. Learn how corporations that maintain sustainability as a core strategic tenet are **making a significant impact on the environment**, independent of government regulation, while **driving strong performance**.
3. Gain an appreciation for the **trade-offs** that are being made daily in business around sustainability issues and understand that there is not always a "right answer."
4. Explore meaningful **opportunities** for businesses and entrepreneurs to drive value creation through sustainable strategies and tactics.
5. Focus on **real world topics** through real world examples and current news discussions, enabling exposure to how business and sustainability issues are creating opportunity, while still rapidly evolving.

Course Overview

The TL,DR

Sustainability is no longer a business' side hustle. Businesses in the future will survive or perish depending on their capacity to weave sustainability into their core strategy and drive value creation. Businesses must be prepared for climate change's impacts on their operations and must be fully positioned to drive value creation and innovation in these challenging times.

Business cannot simply react to environmental mandates; they must lead and drive change!

Why should I care?

Today, to effectively work in senior management, an executive has to be knowledgeable not only about their specific business function, but also on how their business will be impacted by environmental supply chain disruptions, requirements around sustainability reporting, ESG (environmental, social, and governance) demands on a business, ability to market sustainable product attributes, managing energy, water, and food needs globally, and sustainable technology to drive new initiatives.

How will it work?

The class will balance the reality that some students come from a background in this space, while, for others, this will be their first course on sustainability. The time spent in class will be integral to the learning experience. Each class will commence with a discussion of current environmental news and events, with emphasis on topics dealing with sustainable innovations, environmental controversies, and break-through business strategies within the sustainability space. This interactive learning environment will leverage multiple tools including simulations, asynchronous learning, in-class exercises, case analysis, real-world artifacts, and guest participants.

The Bottom Line

By the end of this course, every student should be well equipped to understand how a business' actions, across a variety of sustainability issues, can either be value creating or value destroying.

Course Plan

***N.B., CLASS WILL NOT MEET ON Monday, 9/25 due to Yom Kippur holiday. Rescheduled for Friday, 9/22.**

Meeting Date	Focus Area
8/28/23	Class Introduction/Sustainability Strategy and Value Creation
9/11/23	Sustainability Reporting and Investing
9/18/23	Sustainability Marketing and Communications
9/22/23	Climate Change: Managing Risk and Opportunity
10/2/23	Climate Change: Scenarios for Reaching 1.5° Celsius
10/9/23	Financing the Climate Tech Revolution/Class Wrap-Up

Course Requirements

Class Attendance: We will be leveraging both synchronous and asynchronous learning techniques. An asynchronous Base Concepts Lecture (BCL) video recording will be posted on Canvas as part of the preparation prior to the live class. The Integrated Learning Session (ILS) will be our live class where time will be dedicated to utilizing your preparation to fuel interactive learning, discussion, and debate through a combination of lecture, interactive tools, case analyses, breakout groups, and reviews of current issues.

Given that the ILS is central to our class, your attendance is required. We are only meeting for 6 sessions, so each class is critical to your learning. These sessions should fuel students' passions around sustainability and make our time together valuable, fun, and productive. N.B., The course will adhere to the MBA program's policy of student use of devices in class. Any violations of [this policy](#) will be reflected in your participation grade.

If you anticipate **missing a class**, you must inform the professor and teaching assistants via email prior to the respective class. Absences will be excused **only** for advanced notice of family or personal medical emergencies, illness, and religious holidays. Your attendance is otherwise imperative for our dynamic learning environment.

An excused student absence may earn their participation grade by doing the following no later than **11:59pm EST on the Friday** before the start of the next class:

- **Required:** Post answers to **ALL** of the areas of inquiry questions in the respective Canvas discussion for the week
- **Required:** Listen to the BCL in its entirety and complete the learning consolidation quiz
- **Required:** Review the lecture slides and listen to the ILS recording in its entirety
- *Optional:* Contribution and discussion through articles posted and thoughtful responses on Canvas as well as other offline participation options

Class Participation: Class participation is what powers the enjoyment of teaching and presents diverse points-of-view from classmates. Class time will be enriched by the thoughtful participation of you and your peers. As well, participation begins with being present, both physically and mentally. The success of our class time is dependent on a vibrant, participatory group. The weighting on a student’s course grade reflects this importance. Emphasis in participation grading will be on consistent, meaningful contribution to the class, not on the amount of talk time—it is quality over quantity.

We believe you should have multiple ways to participate in the class. In addition to attending class, you must **choose at least one of the optional choices to receive full participation credit** for that class.

- **Required:** Class attendance at the ILS
- **Required:** Watch the BCL in its entirety prior to class
- **Required:** Collaborative participation in team during class and final group project
- *Option A:* Participate in the ILS class discussions
- *Option B:* Contribution and discussion through articles posted and thoughtful responses on Canvas
- *Option C:* Add comments to the weekly areas of inquiry discussion on Canvas

Learning Resources and Class Preparation: A highly curated listing of essential readings on a topic can be an accelerator of deeper knowledge on a topic. However, every student has their own point-of-view of what is “essential” and when it crosses the line for being “too much.” Mindful of this, there are no readings required for any of our classes, **but this does not mean there is not time required to prepare for each class.**

Chronologically, the recommended preparation for each class is as follows:

- Don’t Miss Concepts: Each ILS will conclude with an overview of important concepts that build upon each other during the course. Prior to the next ILS, review those from the previous week.
- Base Concepts Lecture (BCL): Each week, a pre-recorded lecture of the key areas to know and understand for the upcoming class will be posted on Canvas. This lecture will be no more than 1 hour. It will refer to readings and concepts that, if you choose, you may elect to explore in the Deeper Knowledge Readings (see below).

- **Sustainability Case Study:** Some classes will have a case study associated with the respective week's topic. This case will be integrated into our class discussion and work. You will need to read this case prior to class.
- **Original Artifacts:** Real world videos, policies, or letters can form a rich basis for our class discussion. For some classes, there will be an artifact(s) for you to review in preparation for the class. All are housed on Canvas.
- **Deeper Knowledge Readings:** None of these readings are required to be prepared for the live class. However, for those students who wish to explore and develop a deeper understanding of a particular topic or point-of-view, these outstanding, curated resources will feed your curiosity.

Value Creation Response (VCR) Papers: During the quarter, each student will be responsible for submitting two (2) value creation response papers related to an organization's creation of value through environmental sustainability. *It will be based on a specific article the teaching assistants post on Canvas for each particular week.*

Each student will choose which two weeks to submit these papers and each paper will account for 10%, totaling 20%, of your final grade. The teaching assistants will notify students how to sign-up for their preferred date(s) immediately following the first class. Each response will answer the following questions and fulfill the following requirements:

- **Leveraging our Value Creation Pentagon, explain across which dimensions this company is either creating value or destroying value.**
- **What do you believe the company could be doing differently, based on concepts from our class, to make the necessary changes to create value?**
- The response will be a maximum of 500 words (a single page) and uploaded as a PDF to Canvas.
- The responses will also adhere to the course policy on generative AI and the University's policy and definition of plagiarism, as outlined later in the syllabus.

The response is due for submission on Canvas **by 11:59pm EST on Thursdays**. The system will provide a **30-minute grace period** and then locks out submissions.

En-ROADS Simulation Write-Up: [En-ROADS](#) is a sophisticated policy simulation that enables you to create a scenario of how you might mitigate the impact of climate change. In advance of our 10/2 class, you will develop a scenario and justify the reasoning behind your recommendations. Complete details on how to use En-ROADS and the requirements of this submission are available on Canvas.

Final Group Project Company Analysis: The final project of the course will be a group analysis of how a single business has driven value creation through its sustainable business strategy. The analysis should be comprehensive the topics we covered during the course. The goal is to integrate the knowledge learned in class, readings, and cases and present a comprehensive picture of a major corporation's

sustainability strategies and outcomes. **The paper will be no longer than 15 pages and is due no later than 11:59pm EST on Friday, October 13 (but can be submitted earlier).** Full details of the paper and its requirements will be provided on Canvas following the 9/11 class.

Assessment

Weighting

Class Participation/Attendance	20%
Learning Consolidation Quizzes	5%
Value Creation Responses (2)	20%
En-ROADS Simulation Write-Up	15%
Final Case Analysis	40%

Grading

A+	97-100
A	93-96
A-	90-92
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73

Below these scores...let's talk!

Final grades for Wharton MBA students will be subject to [Wharton CMGPA requirements](#).

Additional Information

Class Generative AI (GAI) Policy: The use of Generative AI (GAI), e.g., ChatGPT, Google Bard, Microsoft Bing, and/or any generative image generation tools, is both expected and encouraged. The capacity to leverage GAI skills effectively will be important for your success in any business role... so why wait to learn? This tool will make everyone better communicators and allow students where English is not their first language to face a level grading field. The professor will provide a tutorial on how to appropriately leverage these tools.

As Uncle Ben wisely remarked in Spider-Man, with great power, comes great responsibility. So too must you understand how to harness the power of GAI to achieve the results you want:

- If you provide minimum-effort prompts, you will receive low-quality results in return. You will need to refine your prompts for optimal outcomes. This will take work.
- Don't trust anything it says. If it gives you a number or fact, assume it is wrong unless you either know the answer or can check with another source. You will be responsible for any errors or omissions provided by the tool. It works best for topics you understand.
- If you submit bland, generic responses to prompts in the class, we will know and grade you accordingly. Referencing class materials, concepts, and discussions will enhance your grade.

GAI is a tool, but one that you need to acknowledge using. **Please include at least a paragraph at the end of any assignment that uses GAI explaining what tool(s) you used and what prompts you used to get the results.** Please also footnote the sources of information, provided if utilizing Bard and/or Bing. **This explanation does count towards the assignment's word count limit.** Failure to do so is in violation of academic honesty policies. (Thanks to Ethan Mollick and Lilach Mollick for inspiring this policy.)

Materials for the Class: Most materials are posted in the files section of Canvas. There are additional Harvard Business Review articles and cases available in Study.net on Canvas.

Citations and Plagiarism: Students must give adequate citations for all sources quoted or used in writing papers. No specific form of citations in footnotes is required, as long as the source is identified sufficiently for it to be found and checked. [The Purdue Owl Research and Citation Resources](#) is a helpful, recommended tool when writing. Every written submission, including the final paper, must be the student's own work. Any incident of plagiarism will be fully prosecuted through the usual channels. The University's policy and definition of plagiarism may be found [here](#).

Writing Center: Staffed by friendly, well-qualified peer and faculty writing specialists, The Writing Center is open to Penn students and provides feedback on papers, proposals, manuscripts, and other texts. They focus on many facets of the writing process from tips on how to make your papers more engaging to strengthening sentences, paragraphs, diction, grammar, and mechanics. We strongly advocate for students to utilize this resource. Starting the first week of classes, graduate students can schedule 60-minute virtual appointments (once per week) using the [Writing Center Scheduler](#). For more information on how to schedule and attend an online writing consultation, please visit The Writing Center's [guide](#).

Mental Health and Wellness: If you are feeling overwhelmed or facing unprecedented challenges, we encourage you to reach out to us. As well, there are professional resources for support at Penn. These include all of the offices under [Wellness at Penn](#).

Counseling and Psychological Services (CAPS) offers a wide range of services including individual and group counseling and therapy, crisis intervention, outreach programming, medication management, and consultation. Services are now being provided virtually with some in-person presence. Students may access a counselor confidentially by calling 215-898-7021 (24/7) and pressing 1. More information on CAPS can be found [here](#).

Student Health Services (SHS) offers primary care, gynecologic care, sports medicine, and more. If you are feeling sick or would like a wellness visit, please call 215-746-3535 to schedule an appointment. All students must have a scheduled appointment before arriving at SHS.

Curriculum and Assignments

N.B., **SN** denotes part of Study.net case pack

8/28 - Focus Concept: Sustainability Strategy and Value Creation

Modern business has been challenged to do things differently. The issues of environmental sustainability and the threats of climate change are creating new opportunities for business to drive value. Yet, many organizations have failed to develop a coherent strategy around these issues and ultimately have delivered less value. Delivering value for stakeholders through sustainability is complicated and multi-dimensional. Only organizations that determine a strategy combined with tangible tactics will deliver on the promise.

AREAS OF INQUIRY

- What is the role of goals in driving meaningful sustainability initiative results?
- How are organizations driving value from their sustainability initiatives?
- How do different frameworks for competitive sustainability strategies compare?
- Can competitive businesses collaborate on sustainable initiatives?
- How does leadership deliver on sustainability goals?
- What is the role of purpose in value creation from sustainability?

PREPARE CASE FOR CLASS DISCUSSION: *Unilever's New Global Strategy: Competing through Sustainability*, by Christopher A. Bartlett. Source: Harvard Business School. **SN**

OPTIONAL DEEPER KNOWLEDGE READINGS

Sustainability & Value Creation

[The 2023 State of Green Business Report](#), *GreenBiz*, Jan. 2023

[The Business of Sustainability](#), Bonini and Gerner, McKinsey, 2011

[How Companies Capture the Value of Sustainability](#), McKinsey, Apr. 2021

Strategic Frameworks for Capturing Value

[Creating Shared Value](#), Porter and Kramer, *Harvard Business Review*, Jan. 2011 **SN**

[Green Innovation Games: Value-Creation Strategies for Corporate Sustainability](#), Lampikoski, Westerlund, et al., *California Management Review*, Fall 2014 **SN**

Sustainability Leadership

[Climate Leadership in the Eleventh Hour: The 2021 United Nations Global Compact](#)
[Accenture CEO Study on Sustainability](#), Nov. 2021

The Role of Sustainability Goals

Setting Science-Based Targets to Combat Climate Change, Mendiluce, *Harvard Business Review*, Feb. 2, 2022 **SN**

Creating Value Through Collaboration

The Collaboration Imperative, Nidumolu, Ellison, Whalen, & Billman, *Harvard Business Review*, Apr. 2014 **SN**

Employee Engagement and Sustainability Value Creation

Engaging Employees to Create a Sustainable Business, Paul Polman & CB Bhattacharya, *Stanford Social Innovation Review*, Fall 2016

Purpose and Value Creation

Purpose: Shifting from Why to How, *McKinsey Quarterly*, Q2 2020, pp. 116-127

9/11 - Focus Concept: Sustainability Reporting and Investing

Every organization has an environmental footprint. The ability for a business to perform a base line analysis of its impact both “upstream” and “downstream” is critical in developing an environmental strategy. A key strategy that business is leveraging to create value and reduce its footprint is circular economy tactics. The ability to measure and deliver on reduction of a business's environmental footprint is core to driving value.

As well, business lives by numbers. So do organizations that take a strategic view of sustainability. From basic tracking metrics to sophisticated systems to measure value creation and performance, no successful sustainability program can succeed without measurement and goals. The more recent demands of investors have pushed ESG reporting and the value of quantifiable results to the forefront. Yet, reporting standards are a relatively new space and there are few agreed upon guidelines or benchmarks.

AREAS OF INQUIRY

- What is the circular economy and the actions business is taking to close the loop?
- What is the impact of materiality versus double materiality on metrics and reporting?
- What are the current standards for reporting?
- What is the impact of the SEC’s new requirements?
- What is ESG and how does data drive ESG investing?

ORIGINAL ARTIFACTS

- Larry Fink’s 2023 [Letter](#) to Investors

GUEST PARTICIPANT: [KC Roney](#), Director, ESG Strategy and Engagement, [Walmart](#)

PREPARE CASE FOR CLASS DISCUSSION: *BlackRock: Linking Purpose to Profit*, by Deshpande, Dey, and Serafeim. Source: Harvard Business School. **SN**

OPTIONAL DEEPER KNOWLEDGE READINGS

Environmental Footprint and Circular Economy

[Towards the Circular Economy: Business Rationale for an Accelerated Transition](#), Ellen MacArthur Foundation, 2015

[The Circular Business Model](#), Atasu, Dumas, and Van Wassenhove, *Harvard Business Review*, July-Aug. 2021 **SN**

Materiality and Reporting Standards

[Bob Eccles and Jean Rogers on ISSB and the future of ESG reporting](#), GreenBiz, Grant Harrison, Nov. 17, 2021

[Executive Summary of the SEC's proposed Rule on Climate Disclosure Requirements](#), Deloitte

[Understanding the SEC's Proposed Climate Disclosure Rule](#), Mckinsey.com, June 3, 2022

[Sustainability Materiality Matrices Explained](#), NYU Stern Center for Sustainable Business, May 2019

[Task Force on Climate-Related Financial Disclosure 2021 Status Report](#), Oct. 2021

Sustainability and ESG Investing

[The Making and Meaning of ESG](#), Elizabeth Pollman, *Univ. of Pa. Inst. for Law and Econ. Paper and Eur. Corp. Governance Inst. Law Working Paper*, Oct. 31, 2022 Rsch.

[ESG and Alpha: Sales or Substance](#), Institutional Investor, Feb. 25, 2022

[ESG in the Cross Hairs: Don't Give Up on Economics for the Sake of Ideology](#), Witold Henisz, LinkedIn, July 21, 2022

[The Secret Life of ESG Ratings](#), GreenBiz, Joel Makower, May 9, 2022

[How ESG ratings are built](#), GreenBiz, Joel Makower, May 11, 2022

[Are ESG ratings really necessary?](#), GreenBiz, Joel Makower, May 16, 2022

Sustainability and Financial Performance

[The End of ESG](#), Alex Edmans, *Financial Management*, Forthcoming 2023

[Do Corporate Sustainability and Sustainable Finance Generate Better Financial Performance? A Review and Meta-analysis](#), Atz, Holt, Liu, and Bruno, SSRN, Revised Mar. 2022

[The Business Impact of ESG Performance](#), Moody's Analytics, June 2022

9/18 - Focus Concept: Sustainability Marketing and Communications

Business is being challenged to determine how best to communicate the ways that sustainability is creating value for the enterprise. Yet the standards of both marketing and communicating to stakeholders is evolving rapidly. If business isn't careful, it can easily end up destroying enterprise value despite best efforts to communicate sustainability product benefits, goals, and progress through various forms of X-washing.

Today, the concept of ESG, "woke" investing, and many social issues challenge a businesses' capacity to know what to communicate to the market, its employees, and shareholders that balances the need to manage value destroying risk to the business against what it believes is right for that business and its stakeholders.

AREAS OF INQUIRY

- How does sustainability marketing destroy and create value?
- Will consumers actually buy sustainable products?
- What is greenwashing? purpose washing? ESG washing?
- What are "allowable" sustainability claims?
- How is sustainability and ESG marketing being regulated?
- What are the particular challenges of marketing and climate change?
- How do companies navigate social issues in their communications?

ORIGINAL ARTIFACTS

- The Case of Tide Cold Water: Will we ever change? (Video)
- The Case of Whole Foods: No longer "Whole Paycheck" (Video)
- [A Greenwashing Lawsuit Against Delta Aims to Set a Precedent](#)
- [Behind the Backlash Against Bud Light](#)

OPTIONAL DEEPER KNOWLEDGE READINGS

Consumers and Sustainability

[Consumers Care about Sustainability and Back it up with their Wallets](#), McKinsey, Feb. 2023

Greenwashing

[Is 'greenwash' the new 'fake news?'](#), GreenBiz, Apr. 2021

[Environmental Claims: Summary of the Green Guides](#), Federal Trade Commission, Oct. 2012.

[Regulating Corporate Green Claims and Greenwashing: Policy Recommendations](#), Carbon Market Watch, Feb. 2022

[Greenwashing & the First Amendment](#), Amanda Shanor and Sarah E. Light, *Columbia Law Review*, Forthcoming 2022

Sustainable Communications

[When it Comes to Creating Shareholder Value from Climate & Sustainability Commitments, there are No Shortcuts](#), BCG, June 23, 2022

Purpose Marketing

[“Woke-Washing”: Your Company Won’t Cut It](#), *Harvard Business Review*, July 2020. **SN**
[Recognizing your Customer’s Purpose is Key to Growth](#), *HBR*, May 2021. **SN**
[What is the Purpose of ‘Purpose’?](#), Joel Makower, *GreenBiz*, Aug. 8, 2022

ESG Washing

[BlackRock’s Former Head of Sustainable Investing Says ESG and Sustainability Investing Are Distractions](#), Peter McKillop, *GreenBiz*, Apr. 2021
[Larry Fink Isn’t Going to Read Your Sustainability Report](#), Mark R. Kramer, *Harvard Business Review*, Jan. 2020. **SN**

Carbon Offset Washing

[This Week Tonight with John Oliver- Carbon Offsets](#)

9/22 - Focus Concept: Climate Change: Managing Risk and Opportunity

We have reached the tipping point of impact from the global change to our climate. Business is acutely aware of the risk to its operations and the need for adaptation. It has a unique role to create resilient companies in the face of dramatic climate changes, but also mitigate further climate damage. It has never been clearer that business must take a leadership role in collaborating with industry and world bodies to manage this change. Ultimately, climate change will present many opportunities for business to drive value creation.

Against this backdrop, the global middle class will grow by 3 billion people in the next 20 years. Business must manage resources around food, water, and energy to ensure that it will continue to drive value creation against the climate crisis. The nexus of these three critical resources will create incredible challenges because of their interconnectivity as well as, opportunities for businesses that innovate.

AREAS OF INQUIRY

- How has and will climate change impact business?
- What are the risks to business of not mitigating and adapting to climate change?
- What is a resilient business?
- What are the special challenges that climate change poses to supply chains?
- How will business's approaches to food, water, and energy alter the path of climate change?
- How do the challenges of the nexus of food, water, and energy impact climate change?

ORIGINAL ARTIFACTS

- BP Strategy Presentation
- Re-Energize Exxon Presentation

PREPARE CASE FOR CLASS DISCUSSION: *ExxonMobil: Business as Usual (A) and (B)*, by Serafeim, Rajgopal, and Freiberg. Source: Harvard Business School. **SN**

OPTIONAL DEEPER KNOWLEDGE READINGS

Energy

[Energy Strategy for the C-Suite](#), Andrew Winston; George Favaloro; Tim Healy, *Harvard Business Review*, Jan. 2017 **SN**

[GREEN ENERGY CHOICES: The Benefits, Risks and Trade-Offs of Low-Carbon Technologies for Electricity Production](#), UN Environmental Programs
[Solar Futures Study](#), US Department of Energy, Office of Energy Efficiency and Renewable Energy, Sept. 2021

Water

Water: A Human and Business Priority, Hundertmark, Lueck, and Packer, *McKinsey Quarterly*, Q2 2020, pp. 46-53

Food

Agriculture Takes Center Stage in the Drive to Reduce Emissions, Daniel Aminetzah, Joshua Katz, and Peter Mannion, *McKinsey Quarterly*, Q2 2020, pp. 76-79

The Path to 2060: Decarbonizing the Agriculture Industry, Rebecca Duff and Michael J. Lenox, UVA Darden School of Business, Batten Report Darden School, 2019

Nexus Thinking

The Nexus of Food, Water, and Energy, Knowledge@Wharton and IGEL, 2013

Climate Change Adaptation and Resilience

Supply Chain Resilience in the Era of Climate Change, Kara Baskin, *MIT Sloan Review*, Feb. 2020

Making the Case for Climate Change Adaptation, Janine White, *Wharton Magazine*, Spring/Summer 2020

Climate Change and Corporate Value, KPMG and Eversheds Sutherland, 2020

Climate Change Risk

Climate Change 2021: The Physical Science Basis, IPCC 2021

Climate Change 2022: Impacts, Adaptation, and Vulnerability, IPCC 2022

Climate Change 2023: AR6 Synthesis Report, IPCC 2023

Understanding Climate Risk, Jonathan Woetzel et al., *McKinsey Quarterly*, Q2 2020, pp. 6-17

Climate Change Litigation

Global Trends in Climate Change Litigation: 2022 Snapshot, Joana Setzer and Catherine Higham, The London School of Economics and Political Science, Grantham Research Institute on Climate Change and the Environment, June 2022

Why Climate Litigators May Be Coming For Your Company, Joel Makower, GreenBiz, June 20, 2022

10/2 - Focus Concept: Climate Change: Scenarios for Reaching 1.5° Celsius

The Intergovernmental Panel on Climate Change (IPCC) determined in 2018 that the world needs to slow its warming to 1.5° Celsius above pre-industrial levels to avoid catastrophic consequences to our planet from climate change. The challenges facing the world, and business, are immense to achieve this level of greenhouse gas emissions. It is critical for every leader to understand how the different levers that impact climate change interact and appreciate the tradeoffs that are required to drive true impact.

With COP27 upcoming in El Sheikh, Egypt, environmentalists and world leaders in government, NGOs, and business will convene to build off the historic Paris Agreement and set ambitious 2030 GHG emissions reductions that both align with reaching net zero and slowing our planet's warming to 1.5° Celsius.

AREAS OF INQUIRY

- How does scenario planning help business manage risk?
- How is business valuing carbon and should a carbon tax be part of the solution?
- Why is climate change considered a “wicked problem?”
- Why is 1.5° Celsius the goal?
- What role does innovation have in addressing climate change?
- What opportunities to drive value creation does climate change present to business?

ORIGINAL ARTIFACTS

- [En-ROADS Guided Assignment](#) for Interactive Learning Session
- En-ROADS control panel summary

PREPARE AND SUBMIT ASSIGNMENT FOR CLASS DISCUSSION: En-ROADS Climate Simulation Scenario

OPTIONAL DEEPER KNOWLEDGE READINGS

Scenario Planning

[Climate Path: What a 1.5 degree path would take](#), *McKinsey Quarterly*, Q2 2020, 28-47
[Summary for Policymakers in Global Warming of 1.5° – An Intergovernmental Panel on Climate Change \(IPCC\) Special Report](#), IPCC, 2018

Climate Change and Business

[Climate Change in 2020: Implications for Business](#), Henderson, Reinert, Oseguera, HBS, 2020 **SN**

[10 Reasons Why Climate Change is a “Wicked” Problem](#), Murtgudde, *The Wire*, Dec. 2019

[Leading a New Era of Climate Action](#), Andrew Winston, *HBR*, Jan. 2020 **SN**

Carbon Pricing

The Baker Shultz Carbon Dividend Plan: Bipartisan Climate Roadmap, Climate Leadership Council, Apr. 2020

The Social Cost of Carbon, Methane, and Nitrous Oxide, Interagency Working Group on the Social Cost of Greenhouse Gases, United States Government, Feb. 2021

Updating the United States Government's Social Cost of Carbon, Energy Policy Institute at the University of Chicago, Jan. 2021

Net Zero Strategies

Time is running out for business leaders who don't have a 'net zero' strategy, McKinsey Blog, May 21, 2021

Council on Environmental Quality Report to Congress on Carbon Capture, Utilization, and Sequestration, June 2021

Climate Innovation

These 9 technological innovations will shape the sustainability agenda in 2019, McKinsey Blog, Jan. 17, 2019

10/9 - Focus Concept: Financing the Cleantech Revolution

There are many that believe that our most pressing sustainability challenges will not be solved by existing approaches, but by major, discontinuous advances that leverage technology. Data, AI, ML, and blockchain are just some of the tools that will help us deliver a more sustainable future. No doubt that advances in technology will transform our lives in the future, but also, maybe, help preserve them as well.

The challenges to the agriculture, water, and energy segments in the coming years are significant. Climate change will impact all these areas and demand new innovations to begin driving toward our required net-zero world.

Today, there is an incredible amount of excitement around money that is poised to be invested in climate tech from both the government and private sectors. The Inflation Reduction Act (IRA) is going to add billions. Yet, we have seen this story before, and it did not end well! So, have we learned from the lessons of the past? What is different this time?

AREAS OF INQUIRY

- What was cleantech 1.0? Why did it fail?
- How has the definition of cleantech evolved?
- Why is climate tech attracting investment today?
- What technologies can help battle climate change?
- What is the current venture environment for climate tech businesses?
- What are the different options for funding climate tech businesses?
- How will the IRA help finance the next wave of climate tech innovation?

ORIGINAL ARTIFACTS: Pitch deck Palooza

- Ecolocked
- Framework
- Juicy Marbles
- Sourceful
- Sylvera

OPTIONAL DEEPER KNOWLEDGE READINGS

Technology and Sustainability

[Unlocking Technology for the Global Goals](#), World Economic Forum, Jan. 2020

[What Key Technologies are unlocking Sustainability in your Sector](#), Bain, Mar. 2022

Climate Tech

The Future of Climate Tech, Silicon Valley Bank, 2022

The State of Climate Tech 2021, PWC, 2021

Financing Cleantech

Venture Capital in the Rise of Sustainable Investment, European Business Organization Law Review, Feb. 17, 2022

Energy Transition Investment Trends 2022: Tracking global investment in the low-carbon energy transition, BNEF Bloomberg, Jan. 2022

[Explainer: The “Valley of Death” and the Challenges of Scaling Climate Tech](#), Bryson Wiese, Cleaner Energy Finance Forum, Mar. 28, 2022

[Climate Tech VC IRA Tracker](#), Aug. 2022