

# CLIMATE CHANGE DEEP DIVE

March 2 – 3, 2017 | Cambridge, MA

## 2017 REPORT

A synthesis of ideas from the Harvard University  
Advanced Leadership Initiative Deep Dive



**HARVARD**  
Advanced Leadership Initiative

# Climate Change Deep Dive 2017 Report

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## ABOUT THE ADVANCED LEADERSHIP INITIATIVE

The Advanced Leadership Initiative (ALI) is a third stage in higher education designed to prepare experienced leaders to take on new challenges in the social sector where they potentially can make an even greater societal impact than they did in their careers.

ALI Deep Dive Sessions highlight one major global or community challenge where ALI Fellows might fill a gap. Deep Dives include readings, outside experts, often faculty from relevant Harvard programs, and a focus on problem-solving and practical applications of knowledge.

ALI Fellows contribute ideas based on their experience and knowledge for immediate solution-seeking with major figures in the field under discussion and with affected constituencies.

## 2017 REPORT CREDITS

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## EXECUTIVE SUMMARY

The 2017 Climate Change Deep Dive presented ALI Fellows with a holistic perspective of the causes and consequences of climate change, as well as potential solutions to mitigate its effects. The two-day conference featured speakers from Harvard Business School (HBS), Harvard's Paulson School of Engineering and Applied Sciences (SEAS), the Harvard Kennedy School of Government (HKS), Harvard Faculty of Arts and Sciences (FAS), and Harvard Law School (HLS).

On the first day of the Deep Dive, presenters examined the root cause of climate change from a scientific perspective and potential responses to climate change from the perspectives of business and policy. Day one presenters were Professor Peter Huybers (SEAS), Professor Forest Reinhardt (HBS), Professor Robert Stavins (HKS), Professor Rosabeth Moss Kanter (HBS), and former administrator of the EPA, Gina McCarthy.

On the second day of the Deep Dive, presenters continued to address the business and policy considerations of climate change, but also added perspectives from the humanities and visual arts. Day two presenters were Professor Joe Lassiter (HBS), Professor James Engell (FAS), Professor Michael Toffel (HBS), Professor Jody Freeman (HLS), and artist Zaria Forman.

Throughout the Deep Dive, ALI Fellows explored the complexities of climate change issues and solutions using case studies to further their thinking. At the close of the two-day conference, Deep Dive Chair Forest Reinhardt pushed ALI Fellows to reflect on their learning and synthesize their takeaways.

From that discussion, the following themes emerged:

- **Education is critical to promote understanding of the consequences of climate change.**
- **Actions focused at local policies are the most pragmatic and effective to combat climate change.**
- **The need for action is urgent and this urgency must be conveyed to the broader public.**

While sobering at times, the Climate Change Deep Dive inspired ALI Fellows to think through the importance of cross-sector coalitions to help protect the environment in the coming decades.





Professor Peter Huybers

## THE FUNDAMENTALS & CONSEQUENCES OF CLIMATE CHANGE

Peter Huybers, Professor of Earth and Planetary Sciences and of Environmental Science and Engineering, launched the Deep Dive by explaining the science behind climate change. His presentation covered a range of topics, including the physical laws underpinning climate science, details on the historical study of the Earth's atmosphere, and the modern day consequences of climate change. Huybers' presentation provided ALL Fellows with the necessary background to inform the rest of the Deep Dive.

Huybers began by noting that understanding climate science is both simple and complicated. While predicting the weather is challenging, understanding the laws that govern our atmosphere is relatively straight-forward: energy from the sun travels to Earth and is, in part, captured by the atmosphere. The atmosphere allows Earth to balance energy and maintain a higher temperature.

Huybers cited the work of two scientists throughout his presentation: John Tyndall and Svante Arrhenius. Both scientists lived in the 1800s, and their predictions formed the basis of much of modern climate science.

Tyndall posited that the Earth's atmosphere trapped energy from the sun and provided a major source of heat to the planet. Tyndall also believed that global warming would occur as greenhouse gas concentrations increased in the atmosphere.

Arrhenius built on this understanding by observing that humans were changing the atmosphere of the Earth. In 1890, he concluded that industry would change the amount of carbon dioxide in the atmosphere, and that global warming would occur as a result.

Huybers presented evidence indicating that the predictions of Arrhenius and Tyndall were remarkably accurate. First, Huybers showed that in the last 100 years, CO<sub>2</sub> levels have increased with incredible rapidity, more so than ever before. He also provided evidence that global sea temperatures were rising and that global warming was, indeed, taking place.

In recent years, the Earth’s temperature has increased by 1 degree Celsius. Scientists estimate, however, that we’ve only realized half of the temperature from the CO<sub>2</sub> increases on the planet. Part of this delayed warming is the result of the ocean absorbing the heat of the atmosphere. Huybers explained that temperatures could continue to rise by 2 – 4.5 degrees C over the course of the next century.

Whereas prior to the industrial revolution, weather events and volcanic eruptions had caused most of the warming and cooling patterns on Earth, Huybers explained, “humans are now the most powerful agents of climate change on the globe.”

He also explained that as ice melts due to climate change, a positive feedback loop will accelerate global warming on Earth. With less ice on the planet to reflect the sun’s energy, more energy will be trapped within the atmosphere causing temperatures of the planet to rise.

Professor Huybers concluded his presentation by explaining that education on this topic was critical. The science behind climate change had become politicized, and prevented serious progress to slow the effects of global warming. He further noted that the only way to truly curb climate change was by focusing on the root problem: the burning of fossil fuels. Only by shifting to wind, solar, and nuclear power could we hope to slow some of the dire consequences of global warming.



Professor Peter Huybers explains the math behind global warming and shows real time weather patterns to ALI Fellows.



Professor Forest Reinhardt

## THE COSTS OF ENERGY

Professor Forest Reinhardt helped translate the concepts presented by Professor Huybers into a practical example in the business world. Using a case study on Chilean energy company Colbún, Reinhardt pushed the ALI Fellows to think through the complex costs of energy production.

Colbún faced a growing energy demand from Chile while contending with a volatile market for oil and natural gas in South America. With most of its electricity coming from hydro-power and fossil fuels, the future energy plans of the company were uncertain. Colbún had to decide what primary sources of energy to focus on moving forward, and how to manage the risks from supply disruptions and environmental regulations.

ALI Fellows used the example of Colbún to explore the implications of cheap energy. Costs for energy, they discussed, have social and political dimensions that extend far beyond the price of a kilowatt-hour.

Fellows noted that hydraulic fracturing has drastically lowered the costs of natural gas production in the US. To reach demand centers like Chile that are far from production areas, the gas must be liquefied, transported by ship, and re-gasified, all capital-intensive processes. Even so, imported liquefied natural gas is competitive with coal in Chile. Gas gets a further advantage over coal if carbon dioxide emissions are priced through cap and trade or tax systems, since coal produces more CO<sub>2</sub> per unit of energy than gas.

By the end of the discussion, ALI Fellows seemed to agree that providing affordable, reliable energy required a portfolio of energy options. Firms and governments should rely on energy from multiple renewable sources, including wind, solar, and hydro.

Reinhardt challenged participants to think through the deeper implications of Chile's resistance to hydroelectric power. He noted that the willingness to pay for energy is much higher than what consumers actually pay. Despite this huge consumer surplus, individuals look for reasons why cheap energy consumption should not be considered a subsidy.

He wrapped up the discussion by explaining that, "our political system is designed to say no to things," and "looking at the whole is often difficult and uncomfortable." Yet for societies to make progress in addressing climate change, they need to find holistic solutions that span the private, public, and nonprofit sectors.

"Looking at the whole is often difficult and uncomfortable."

Forest Reinhardt





Professor Robert Stavins

## ENVIRONMENTAL ECONOMICS IN THE AGE OF TRUMP

Next, ALI Fellows heard from Harvard Kennedy School Professor Robert Stavins. Stavins explained the value of understanding challenges and solutions to climate change from an economic perspective. He also offered an important summary of how international climate change policy has developed over time, and how the US approach to climate change might shift under the Trump administration.

“When I tell people that I am an environmental economist, they often think I am a living, breathing oxymoron,” said Stavins. But, he continued, the cause of environmental problems is economic and the consequences of these problems have economic dimensions. Taking an economist’s approach to climate change, therefore, is essential to finding sensible, effective, and politically pragmatic public policies.

In outlining the economic challenge of climate change, Stavins said that the mixing of greenhouse gases in the atmosphere presented a “classic free-rider problem.” Because carbon emissions are spread around the world, any country that takes action sees little direct benefit and significant direct costs. To fix climate change issues, he said, we must have international cooperation.

International cooperation, however, has made slow progress over the past several decades. Stavins presented some relevant historical context:

- The Rio Earth Summit (1992) generated the “principle of common but differentiated responsibilities” that placed the burden of addressing CO<sub>2</sub> emissions on developed, industrialized countries
- The First Conference of the Parties (1995) created the “Berlin Mandate” that only Annex I (effectively, OECD) countries should take on emissions reduction targets
- The Kyoto Protocol (1997) codified the Berlin Mandate with numerical targets, but saw little participation from countries around the world
- The Paris Climate Agreement (2015) was a dramatic departure from Kyoto that allowed countries to set individual targets and was adopted by countries accounting for 97% of global emissions

Stavins said that the success of the Paris Climate Agreement was its structure: the individual mandates allowed for greater flexibility and participation among the international community. Nonetheless, he ex-

plained, whether the approach of this agreement is adequate to address global warming will not be known for decades.

The Paris Climate Agreement encompasses the heterogeneous policies that countries around the world have adopted in response to climate change. Some countries have developed CO<sub>2</sub> cap and trade policies, which allow private firms to buy and sell allowances for carbon emissions. Other countries have developed a carbon tax for CO<sub>2</sub> emitters, while others still have created new performance and technology standards.

Under the Trump administration, Stavins continued, the US could expect to see significant changes in environmental policy. Through executive orders and new appointments, the president would likely seek to rollback or repeal several Environmental Protection Agency (EPA) regulations established under the Obama administration. “However, it is non-trivial to change federal laws and regulations,” said Stavins, and new appointees would likely be making cuts with “a scalpel rather than an ax.”

The international community could also expect to see changes in climate policy under President Trump. While Mr. Trump has expressed a desire to cancel the Paris Agreement, the US is part of the deal for at least four years; however, the country can revise its nationally determined emissions targets. Moreover, in an extreme move, the US could withdraw from the United Nations Framework Convention on Climate Change, explained Stavins.

To conclude his remarks, Stavins said the most important effect of the new US position on climate change could be its impact on other countries. The US has been a global leader on climate change in recent years, and other countries may rethink their environmental policies if the Trump administration makes dramatic changes. Fortunately for advocates of environmentally protective policies, Stavins said that China has stepped into the role as the global leader on climate change.





Professor Rosabeth Moss Kanter

## BUSINESS & SUSTAINABILITY

Professor Rosabeth Moss Kanter continued the Deep Dive, leading ALI Fellows through a case study about a firm taking action for the environment. Professor Kanter asked fellows to think about what makes a successful activist, and how firms should evaluate the impact of their activism. At the center of the case was BANCO REAL, a Brazilian bank taking steps to reduce its environmental footprint.

Fellows started the discussion by debating whether the actions of the bank were truly meaningful. In large part, the fellows argued that the bank was having a significant impact in reducing climate change. In particular, fellows noted that the bank had a large effect across different industries and on its community in Brazil.

While some in the audience highlighted the bank's environmentally harmful practices, Kanter encouraged fellows to take a nuanced approach to climate change activism. As activists, she said, ALI Fellows need to start somewhere; an all-or-nothing tactic can waste precious time in addressing the world's most pressing issues.

In addition, she said, the bank's clear focus on taking environmental action helped generate a sense of values and purpose for employees. BANCO REAL was able to attract new talent to the firm because of its increased focus on climate change. Fellows noted, too, that this sense of purpose would help motivate and retain employees, particularly through difficult times.

Beyond its immediate impact on employees, BANCO REAL's decisions had a global influence. The fellows shared that competitors imitated the bank's actions, and the corporate parent of the bank started to take notice. BANCO REAL's actions also helped shape the banking industry by creating an ethical mutual fund and sharing its model with other banks.

Through its focus on climate change, the bank was able to partner with nonprofit organizations including Greenpeace, the International Finance Corporation, and the World Bank. These partnerships had serious benefits for BANCO REAL, including a grant from the World Bank to continue environmentally-friendly practices.

Kanter explained that true activism depends on these sorts of partnerships. BANCO REAL was able to motivate other industries to take action on climate change because it worked with them, not against them. The bank was able to shape industry consciousness around climate change and affected the entire banking ecosystem in Brazil.

In closing, Kanter said that this case was a perfect example of how the actions of a few leaders can drive change on a tremendous scale. She encouraged fellows to think through vehicles and targets for action, and how to embed environmentally friendly actions in laws, policies, and the public consciousness.



Gina McCarthy

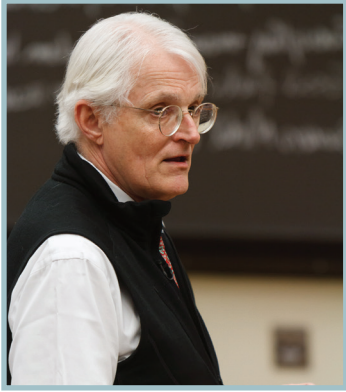
## THE EPA & HOPE FOR THE FUTURE

At the reception on March 2, ALI Fellows had a surprise visit from Gina McCarthy, former administrator for the United States Environmental Protection Agency (EPA). McCarthy took time to offer her thoughts on tackling environmental issues before answering questions from ALI Fellows.

McCarthy highlighted the tremendous new technologies that have developed in response to climate change. She said more efficient, less expensive renewable energy was key to developing an energy portfolio in the US to address climate change. She also expressed excitement around new energy-efficient vehicles that have attracted significant consumer interest.

Ultimately, McCarthy noted that while climate change presented significant challenges both domestically and internationally, there are serious opportunities for progress. She explained that markets are growing for renewable energy sources and the trajectory of the world was headed toward a low-carbon, sustainable system.

In her responses to ALI Fellows' concerns, McCarthy shared some optimism for the future of climate change. She said that the people working at the EPA are incredibly smart and resilient, and despite political changes, maintain a clear focus on their mission of protecting the environment. She also expressed confidence in the collective power of democracy in the US. "People want government to do the right thing and to protect them. I am confident that we'll make it work."



Professor Joe Lassiter

## DEVELOPING ENERGY IN THE DEVELOPING WORLD

The second day of the Climate Change Deep Dive started with a case discussion led by Professor Joe Lassiter of Harvard Business School. Lassiter used the example of Husk Energy to show challenges in bringing electricity to the world's poor.

Started in 2007, Husk Energy operated microgrids (rural, village-sized electric utilities) in Northern India powered by biomass gasification plants that burned locally abundant rice husks. By late 2013, Husk was delivering power to more than 250,000 people located in 350 villages, providing 6-8 hours of power per day from otherwise discarded rice husks. Nonetheless, Husk had fallen far short of the original 1000 village growth target it had set in 2007 and about 50 of its 80 microgrids were still losing money.

Lassiter started the discussion with a question around scope: should Husk seek to raise additional funds for its business model? After hearing arguments from several different perspectives, ALI Fellows concluded that the mission of Husk was valuable enough to pursue additional funding.

While discussing where to seek these new sources of funding, the difficulties of running a for-profit, social venture emerged. Husk felt it had to make a profit from each of its microgrids in order to have a sustainable business, but it also raised money through grants from NGOs to fund its operating profit shortfalls and to accelerate its growth. As a result, the line between nonprofit and for-profit business was often blurry for Husk's management and investors. The group debated if grants - "free money" - helped or hurt Husk management's drive to build a sustainable business.

Lassiter said the case was emblematic of a critical decision faced by all new ventures at some point in their evolution: in the face of what has been learned from actual operations, should ventures abandon their original plans, perhaps even shutting down, pursue new plans, perhaps in very different directions, or stick with their original plans but reset their investors' and employees' expectations for a much longer and more expensive journey?

Following the case discussion, Lassiter outlined an unappreciated trade-off in providing energy to the developing world. Abundant, cheap energy is nearly always a critical tool to free people from poverty in the present and tends to greatly increase short-term quality of life, but it often comes

with a significant environmental cost because of short-lived local pollution as well as long-lived CO<sub>2</sub> emissions. The developing world consistently makes the trade-off in favor of more energy, not less.

Lassiter left the fellows with a message on the disparities in the world: “Rich countries do as they wish. Poor countries do as they must.”



Professor James Engell

## NEW CONSCIOUSNESS FOR CLIMATE DISRUPTION

Professor of English James Engell added a perspective from the humanities to the climate change discussion. Engell led ALI Fellows through a thoughtful analysis of three authors’ pieces to examine how consciousness shapes environmental action. “As a civilization, we have never faced a challenge on this scale,” he said, “Climate disruption already poses an existential threat to species on this planet.”

To analyze one possible reaction to this threat, Engell guided the fellows through a letter from John Ashton, the UK’s lead negotiator on climate talks, to Ben van Beurden, the CEO of Shell. The open letter asks van Beurden what Shell was doing to address the climate change needs of the world. Ashton condemns the Shell executive’s use of a political and economic mask to hide the dangers of climate change.

The ALI Fellows thought Ashton’s message was important, but perhaps too blunt for his audience. The piece referred to van Beurden as a “psychopath” and lacked any argument around the economic incentives of environmental activism. Fellows said Ashton’s letter was symbolic of a tendency to vilify people who do not agree; instead, they urged, we must have reasonable dialogue with those who might deny climate change. However, one ALI Fellow later confided that van Beurden was indeed moved by Ashton’s letter.

Next, Engell turned the discussion to Pope Francis’ encyclical letter, *On Care for our Common Home*. In the letter, Pope Francis outlines the moral and theological rationale for protecting our natural environment. He describes an inter-generational obligation to prevent climate change and states that, “the human environment and the natural environment deteriorate together.”

Engell emphasized Pope Francis' message that a solution to climate change takes more than intellectual appreciation and economic analysis. In particular, Pope Francis stresses the need to understand an "integral ecology" between human beings. In this way, we are able to see the social, moral, and, at times, religious dimensions of climate change.

The final reading of the presentation was Seamus Heaney's short poem "Höfn." In the poem, Heaney describes an aerial view of a melting glacier. He captures the power and intensity of climate change, and reiterates the necessity of social understanding that Pope Francis describes. To understand climate change, Engell explained, we must be able to understand how it impacts other people.

In closing, Engell repeated the need to develop a new consciousness to make the new decisions necessary to prevent climate change. He urged the ALI Fellows to become global leaders in forcing the market to address the rapidly approaching "point of no return" in climate disruption. As a final reminder of the gravity of this problem, Engell showed the fellows video footage of one of the largest glacial calving events in history.

## Höfn

By Seamus Heaney

The three-tongued glacier has begun to melt.  
What will we do, they ask, when boulder-milt  
Comes wallowing across the delta flats

And the miles-deep shag ice makes its move?  
I saw it, ridged and rock-set, from above,  
Undead grey-gristed earth-pelt, aeon scruff,

And feared its coldness that still seemed enough  
To iceblock the plane window dimmed with breath,  
Deepfreeze the seep of adamantine tilth

And every warm, mouthwatering word of mouth.



Professor Michael Toffel

## THE BOUNDARIES OF CORPORATE SUSTAINABILITY

Harvard Business School Professor Michael Toffel led ALI Fellows through a case study examining the boundaries of corporate environmental sustainability initiatives. Toffel used the example of the Aspen Ski Company (ASC) to explore both the obligations and effectiveness of firms and CEOs that take action on environmental issues. He also provided insights into how firms can influence government policies.

To start the discussion, Toffel asked the fellows how serious ASC was about environmental sustainability. Initially, the fellows were divided on the question. Those who thought the company was serious referred to its early investment in sustainable technologies, and its decision to hire an executive director of sustainability. Others thought the company was not doing enough to fundamentally change the way it did business, by continuing to engage in environmentally detrimental activities.

Toffel added some context to the discussion by explaining that ASC was hesitant to make environmental issues too salient at its resorts, since customers came to ski and relax. The company was concerned that an environmental campaign would detract from the vacation experience of its guests. ASC also worried, however, about the long term viability of their resort if they did not take action on climate change.

At the end of the case, fellows were presented with a difficult choice: should ASC support a boycott of one its key suppliers because of its environmentally destructive activities? Boycotting could apply corporate pressure to change its supplier's behavior, but its actions might not be effective because ASC purchased only a tiny share of its supplier's goods. Worse yet, boycotting could backfire and spark a negative media reaction towards ASC.

The discussion also centered on a request by the Natural Resources Defense Council for ASC to file an amicus brief in support of a US Supreme Court case. The case sought to authorize the US Environmental Protection Agency to regulate greenhouse gases in vehicle emissions. Again, Toffel posed the question to the fellows: does this go too far in the firm's efforts to promote corporate sustainability efforts?



Toffel explained that the Aspen Ski Company case highlights how firms need to influence societal issues like climate change. He said that when it comes to climate change, business should not only focus on its own operations, but should also consider using its supply chains to influence public policy, both through lobbying and CEO activism.

In closing, Toffel told ALI Fellows that the climate change movement needs more corporate lobbyists and CEO activists. Companies should stand up to seek policies that address climate change to secure the long-term viability of both their organizations and the societies in which they operate.





Professor Jody Freeman

## ENERGY POLICIES & THE LAW

Next, Professor Jody Freeman brought her experience as a law professor and Counselor for Energy and Climate Change in the Obama administration to the Deep Dive discussion. Freeman shed light on the climate change legacy of President Obama and provided a legal perspective on what ALI Fellows might expect from President Trump.

Under President Obama, Freeman explained, several key policies emerged that made meaningful progress to combat global warming. Specifically, the Obama administration crafted policies to limit emissions from vehicles, to set standards for appliances, to create a Clean Power Plan, and to work with the states to site renewable installations on federal lands. More importantly, according to Freeman, the US partnership with China at the Paris Agreement was an essential step to curbing global carbon emissions.

Following her discussion of Obama's legacy, Freeman outlined what actions the Trump administration could take on climate policy. Among these actions, President Trump could withdraw from the Paris agreement, rescind the Clean Power Plan, weaken auto industry standards, and renew offshore drilling and coal leasing. She explained that any action taken by the executive branch would be settled in court, and likely drawn out for a substantial period of time.

Some of these actions, however, would be more likely than others, she continued. Actions that would almost certainly occur in the short term include rescinding the Clean Power Plan and certain methane standards. Freeman noted that President Trump's campaign promises, like allowing new coal leasing, were likely to be the highest priority for the new administration.

Freeman also made a point to highlight three important changes that had already been made under the Trump administration. President Trump rescinded the stream protection rule and asked the EPA to reconsider the Waters of the United States rule, and Congress signed two resolutions under the Congressional Review Act. This Congressional Review Act is a fast-track disapproval process for already final rules. Once Congress uses this law to disapprove a rule, no substantially similar rule may be adopted.

Despite these changes, Freeman explained that certain legal constraints make sweeping reform more challenging. Agencies must follow legal procedures when revising or eliminating rules, and it is a near guarantee that significant policy shifts will be challenged in court.

In closing, Freeman highlighted the role of the private sector in the upcoming changes to environmental policy. Businesses, she explained, may prefer environmentally-friendly policies in an effort to maintain competitive advantage, attract employees, and appeal to customer preferences. When asked what they could do to help mitigate the effects of climate change, Professor Freeman urged fellows to “deploy your skill sets, play to your strengths, and take action.”



Zaria Forman

## STILLNESS & MOMENTUM

On the second evening of the Deep Dive, fellows heard an artist’s perspective on climate change. At the Harvard University Center for the Environment, artist Zaria Forman shared her work capturing the transition, tranquility, and turbulence of some of Earth’s most vulnerable places. Forman discussed her representations of ice, water, and snow from the melting glaciers of Antarctica and Greenland.

Having traveled to some of the most remote locations on Earth, Forman hopes to connect viewers to the realities of climate change, a reality they may otherwise never experience first-hand. She conveys the beauty of these places in an effort to preserve and protect them, hoping that viewers will form an emotional connection with the landscapes depicted in her drawings.

Forman’s process begins with the thousands of photos she takes while on expeditions to see melting ice. From there, she creates a pencil sketch on a large panel before layering soft pastel pigment onto paper. She works the pigments into the paper using her fingertips and palms and breaks the pastel into sharp shards to capture finer details. Unlike most pastel artists, Forman prefers to work on smooth paper to render the finer details, without the texture of toothy paper getting in the way.

In her remarks to the ALI Fellows, Forman credited her mother for her love and appreciation of the natural world. Her mother, a landscape photographer, helped Forman see the positive in these deteriorating places, and view her art as a vehicle for social change.

Forman closed her talk by explaining that the climate change crisis facing our world is inter-generational and requires a concerted effort across disciplines to help make serious headway. “By sharing moments of stillness,” she said, “I hope to generate momentum.”



*Zaria Forman at work on Whale Bay, Antarctica, no. 4*



*Whale Bay, Antarctica, no. 2, Zaria Forman*

## REFLECTIONS & SYNTHESIS

At the close of the Deep Dive, ALI Faculty Co-Chair and Deep Dive Chair Forest Reinhardt helped fellows to synthesize the content of the previous two days. In his final remarks on climate change, he was optimistic. Reinhardt reminded the fellows of the enormous progress made around environmental initiatives in the last 70 years.

He encouraged them to think through the actions they could take to limit the effects of climate change. From this conversation, several themes emerged:

- **The importance of education.** Fellows cited a need to educate more people on the reality of climate change. They noted that young people were especially important, as they will need to address the consequences of climate change in the future. Fellows said that gamification could be a helpful tool in the process to educate people about climate change.
- **A focus on local actions.** To have the greatest impact, Fellows said they should focus on local policies. In particular, Fellows wanted to try to emulate the model of California at the state level; in this way, state policies might lead to changes at the federal level.
- **The need for urgency.** Fellows stressed the need to make issues of climate change relevant and urgent for more people. They suggested simplifying the problems of climate change, creating emotional connections, and utilizing technology to engage a broader audience. Specifically, they said social media platforms were a critical tool in creating a sense of urgency among millennials.



## APPENDIX – SPEAKER BIOGRAPHIES



### **James Engell**

Gurney Professor of English Literature and  
Professor of Comparative Literature,  
Harvard Faculty of Arts and Sciences

James Engell, Gurney Professor of English and Professor of Comparative Literature, began his studies first in science and was a young NSF fellow at the Jackson Laboratory in Maine. He also researched comparative effects of non- and biodegradable detergents immediately introduced to freshwater fish populations, with results later confirmed by others.

His first employment was at Janney, Battles & E. W. Clark (now Janney), where he was offered a partnership in a local brokerage office. He decided in the end primarily to pursue studies in the humanities with an emphasis on literature. In that field he has authored four books and edited and contributed to nine others.

His writing on energy policy has appeared in The Huffington Post and The Energy Collective. He conceived of and co-edited the widely used text *Environment* (Yale, 2008). His awards and fellowships include those from the Ford Foundation, the Council for Advancement and Support of Education, and The National Humanities Center. *Saving Higher Education in the Age of Money* (2005, co-authored with Anthony Dangerfield) won the Association of American Colleges and Universities award for “Best Book on Liberal Education.” His essay “The CFR Task Force Report on ‘U.S. Education Reform and National Security’: A Reply and Response,” received acclaim.

While devoting most of his career to the humanities, he has pursued a life-long formal and informal interest in science. A member of the American Academy of Arts and Sciences and recipient of several faculty-wide teaching prizes as well as a national mentoring award, Engell teaches (as well as co-teaches, in the Economics Department at Harvard) courses that engage environmental and other issues involving human values and expression, history, science, economics, and reform.



## Zaria Forman

Artist

The inspiration for Forman's drawings began in early childhood when she traveled with her family throughout several of the world's most remote landscapes, which were the subject of her mother's fine art photography.

Zaria's most recent achievements include participation in Banksy's Dismaland (Aug-Sep 2015), a solo exhibition at Winston Wächter Fine Art in New York City (Sep-Oct 2015), and a four week art residency in Antarctica aboard the National Geographic Explorer (Nov-Dec 2015). Last November Zaria delivered a TEDTalk at the Town Hall Theater in NYC that aired on PBS, and is featured on TED.com. Zaria recently flew over Antarctica with NASA's Operation IceBridge; the largest airborne survey of Earth's Polar ice. Zaria recently spoke at Harvard University's Center for the Environment, where her drawings will remain on display for the 2017 academic year. Her next solo show is at Winston Wächter Fine Art, Seattle, WA, June 21 - August 5, 2017.

Zaria Forman's works have appeared in National Geographic, Smithsonian Magazine, the Wall Street Journal and The Huffington Post. Zaria was featured on Good Day New York and Fox News and was interviewed by Lucy Yang on ABC7 Eyewitness News. Her drawings have been used in the set design for the Netflix TV series House of Cards.

Born in South Natick, Massachusetts, Zaria currently works and resides in Brooklyn, New York. She studied at Studio Art Centers International in Florence, Italy and received a B.S. in Studio Art from Skidmore College.



### **Jody Freeman**

Archibald Cox Professor of Law,  
Director, Environmental Law Program,  
Harvard Law School

Jody Freeman is the Archibald Cox Professor of Law and the founding director of the Harvard Law School Environmental Law and Policy Program. She is a leading scholar of both administrative law and environmental law and has written extensively on federal agency regulation, climate change, energy and environmental policy, and executive authority. Professor Freeman's book, *Global Climate Change and U.S. Law* (co-edited with Michael Gerrard) was published in 2015.

Professor Freeman served in the White House as Counselor for Energy and Climate Change in 2009-10, where she was the architect of the president's historic agreement with the auto industry to double fuel efficiency standards, launching the administration's greenhouse gas program under the Clean Air Act. In her role, she also contributed to a host of initiatives on renewable energy, energy efficiency, transmission policy and oil and gas drilling, as well as the administration's effort to pass climate and energy legislation.

After leaving the administration, Freeman served as an independent consultant to the President's bipartisan Commission on the BP Deepwater Horizon Oil Spill. She has been appointed to the Administrative Conference of the United States, the government think tank for improving the administrative and regulatory process, and elected the American College of Environmental Lawyers. In 2012, Professor Freeman was elected as an outside director of ConocoPhillips, where she serves on the public policy and compensation committees.

Professor Freeman has written for the *New York Times*, *Wall Street Journal*, *Guardian*, *Los Angeles Times*, *Politico* and *Foreign Affairs* and is a frequent guest on national public radio.





### **Peter Huybers**

Professor of Earth and Planetary Sciences,  
Harvard Faculty of Arts and Sciences;  
Professor of Environmental Science and Engineering,  
Harvard John A. Paulson School of Engineering and  
Applied Sciences

Dr. Peter Huybers is a professor at Harvard University in the Department of Earth Planetary Sciences and School of Engineering and Applied Sciences.

He received his B.S. in physics from the United States Military Academy in 1996 and served as an Armor Officer. Peter received a Ph.D. in climate physics from MIT in 2004 and, after completing a post-doc at the Woods Hole Oceanographic Institute, joined the faculty at Harvard University in 2007.

Peter's research interests lie in developing a better understanding of the climate system and its implications for society. One line of his work involves changes in glaciation, temperature, and ocean circulation over the past thousands and millions of years. Another focuses on weather and climate extremes over recent decades, especially as they influence crop production.

Peter is a recipient of a MacArthur 'genius' grant, a Packard Fellowship, and the American Geophysical Union's Macelwane Medal. In 2012-2013 Peter worked as an advisor in the White House's Office of Science Technology Policy, and he is presently the co-director of the Harvard University Center for the Environment.



### **Rosabeth Moss Kanter**

Ernest L. Arbuckle Professor of Business Administration,  
Harvard Business School;  
Chair and Director,  
Harvard University Advanced Leadership Initiative

Rosabeth Moss Kanter holds the Ernest L. Arbuckle Professorship at Harvard Business School, where she specializes in strategy, innovation, and leadership for change. She is also Chair and Director of the Harvard University Advanced Leadership Initiative, an innovation that helps successful leaders at the top of their professions apply their skills to national and global challenges in their next life stage. A collaboration across all of Harvard, the Advanced Leadership Initiative aims to build a new leadership force for the world. Her latest book, *MOVE: Putting America's Infrastructure Back in the Lead*, a New York Times' Book review Editor's Choice, is a sweeping look across industries and technologies shaping the future of mobility and the leadership required for transformation.

Her strategic and practical insights guide leaders of large and small organizations worldwide, through her teaching, writing, and direct consultation to major corporations and governments. The former chief Editor of Harvard Business Review, Professor Kanter has been repeatedly named to lists of the "50 most powerful women in the world" (Times of London), and the "50 most influential business thinkers in the world" (Thinkers 50). She has received 24 honorary doctoral degrees, as well as numerous leadership awards, lifetime achievement awards, and prizes. These include the Academy of Management's Distinguished Career Award for scholarly contributions to management knowledge; the World Teleport Association's "Intelligent Community Visionary of the Year" award; the International Leadership Award from the Association of Leadership Professionals; and the Warren Bennis Award for Leadership Excellence.

She is the author or coauthor of 19 books. Her book *The Change Masters* was named one of the most influential business books of the 20th century (Financial Times). *SuperCorp: How Vanguard Companies Create Innovation, Profits, Growth, and Social Good*, a manifesto for leadership of sustainable enterprises, was named one of the ten best business books of 2009 by Amazon.com. A related article, "How Great Companies Think Differently," received Harvard Business Review's 2011 McKinsey Award for the year's two best articles. *Confidence: How Winning Streaks & Losing Streaks Begin & End* (a New York Times business bestseller and #1 Business Week bestseller), describes the culture of high-performance organizations compared with those in decline and shows how to lead turnarounds, whether in businesses, schools, sports teams, or countries. *Men & Women of the Corporation*, winner of the C. Wright Mills award

for the best book on social issues and called a classic, offers insight into the individual and organizational factors that promote success or perpetuate disadvantage; a spin-off video, *A Tale of 'O': On Being Different*, is a widely-used tool for diversity training. A related book, *Work & Family in the United States*, set a policy agenda; later, a coalition of university centers created in her honor the Rosabeth Moss Kanter Award for the best research on work/family issues. Another award-winning book, *When Giants Learn to Dance*, showed how to master the new terms of competition at the dawn of the global information age. *World Class: Thriving Locally in the Global Economy* identified the rise of new business networks and dilemmas of globalization, a theme she continues to pursue in her new book *MOVE* and the Harvard Business School U.S. Competitiveness Project.

Through her consulting arm, Goodmeasure Inc., she advises numerous CEOs and has partnered with IBM on applying her leadership tools from business to other sectors as a Senior Advisor for IBM's Global Citizenship portfolio. She has served on many business and non-profit boards, such as City Year, the urban "Peace Corps" addressing the school dropout crisis through national service, and on a variety of national or regional commissions including the Governor's Council of Economic Advisors. She speaks widely, often sharing the platform with Presidents, Prime Ministers, and CEOs at national and international events, such as the World Economic Forum in Davos, Switzerland. Before joining the Harvard Business School faculty, she held tenured professorships at Yale University and Brandeis University and was a Fellow at Harvard Law School, simultaneously holding a Guggenheim Fellowship. Her Ph.D. is from the University of Michigan.



### **Joseph B. Lassiter**

Senior Fellow,  
Senator John Heinz Professor of Management Practice in  
Environmental Management, Retired,  
Harvard Business School

Joe is the Senator John Heinz Professor of Management Practice in Environmental Management, Retired. He focuses on one of the world's most pressing problems: developing clean, secure and carbon-neutral supplies of reliable, low-cost energy all around the world. He studies how high-potential ventures attacking this problem are being financed and how their innovations are being brought to market in different parts of the world. In the HBS MBA and Executive Education programs, he teaches about the lessons learned as well as potential improvements in business practices, regulation and government policy. On retiring in 2015, Joe was appointed as a Senior Fellow to continue his work on energy and climate change related issues at HBS as well as in supporting University-wide efforts as a Faculty Fellow of the Harvard Environmental Economics Program (HEEP) and a Faculty Associate of the Harvard University Center for the Environment (HUCE).

After joining HBS in 1996 as a Senior Lecturer, he was appointed a Professor of Management Practice in 1997. He was awarded the MBA Class of 1954 Chair in 2000 and the Senator John Heinz Chair in Environmental Management in 2012. From 2010 until 2015, Joe was Faculty Chair of the University-wide Harvard Innovation Lab (Harvard i-lab). Joe's academic and professional work focused on the creation of high-potential ventures --both as new companies and within existing companies-- and the efforts of their managers to turn these ventures into high-performance businesses. At HBS, he taught courses in Entrepreneurial Finance, Entrepreneurial Marketing, Entrepreneurial Management, Building Green Businesses and Innovation in Business, Energy & Environment. For Harvard University, he taught courses in Innovation & Entrepreneurship to undergraduates, graduate students and post-doctoral fellows from across the University and its affiliated hospitals. Outside Harvard, Joe was active as an investor in and director of a wide range of both new ventures and public companies.

From 1994 to 1996, Joe was President of Wildfire Communications, a telecommunications software venture backed by Matrix Partners and Greylock Partners. From 1977 to 1994, Joe was a Vice President of Teradyne (NYSE/ automatic test equipment) and a member of its Management Committee. Joe joined Teradyne in 1974 as a Product Manager while on sabbatical from MIT.

Joe began his career at MIT's Department of Ocean Engineering as an Instructor in 1970 and was promoted to Assistant Professor in 1972. He developed and taught a course on marine mineral resource economics. He lectured in hydrodynamics, marine transportation, and computer simulation modeling. In a joint program with Harvard Law School, he lectured on marine legal / regulatory policy. His research focused on forecasting economic and environmental consequences of offshore oil and gas development. He was appointed to the MIT-led National Academy of Engineering study on the future of engineering education. Joe received his BS, MS, and PhD from MIT and was awarded National Science, Adams and McDermott Fellowships. He was elected to Sigma Xi.



**Professor Forest L. Reinhardt**

John D. Black Professor of Business Administration,  
Harvard Business School;  
Faculty Co-Chair,  
Harvard University Advanced Leadership Initiative

Forest L. Reinhardt is the John D. Black Professor of Business Administration at Harvard Business School.

Reinhardt is co-chair of the Harvard Business School's Global Energy Seminar, a new executive education course for the leaders of firms that produce oil and gas, generate and distribute electricity, or play other important roles in the delivery of energy services. He also teaches regularly in the HBS Agribusiness Seminar.

In the HBS Owner/President Management Program, Reinhardt teaches a core course on Global Markets. Drawing on microeconomics, macroeconomics, political science, and history, the course helps business leaders understand the economic and political environment in which business is conducted, and the strategic opportunities and risks to which globalization gives rise.

Reinhardt recently served as course head for the required MBA course, Strategy, which covers topics in industry analysis, competitive advantage, and corporate strategy.

Reinhardt currently serves as the faculty chair of Harvard Business School's Asia-Pacific Research Center and the chair of the HBS Executive Education Asia-Pacific Region.

Reinhardt is interested in the relationships between market and nonmarket strategy, the relations between government regulation and corporate strategy, the behavior of private and public organizations that manage

natural resources, and the economics of externalities and public goods. He is the author of *Down to Earth: Applying Business Principles to Environmental Management*, published by Harvard Business School Press. Like that book, many of his articles and papers analyze problems of environmental and natural resource management. He has written numerous classroom cases on these and related topics, used at Harvard and many other schools in MBA curricula and in executive programs.

Reinhardt received his Ph.D. in Business Economics from Harvard University in 1990. He also holds an MBA from Harvard Business School, where he was a Baker Scholar, and an A.B., cum laude, from Harvard College.

Born and raised in Montana, he lives in Belmont, Massachusetts.



### **Professor Robert N. Stavins**

Albert Pratt Professor Business and Government  
Harvard Kennedy School

Robert N. Stavins is the Albert Pratt Professor of Business and Government, John F. Kennedy School of Government, Harvard University, Director of the Harvard Environmental Economics Program, Director of Graduate Studies for the Doctoral Program in Public Policy and the Doctoral Program in Political Economy and Government, Co-Chair of the Harvard Business School-Kennedy School Joint Degree Programs, and Director of the Harvard Project on Climate Agreements.

He is a University Fellow of Resources for the Future, a Research Associate of the National Bureau of Economic Research, Co-Editor of the *Review of Environmental Economics and Policy*, Editor of the *Journal of Wine Economics*, an elected Fellow of the Association of Environmental and Resource Economics, and a member of the Board of Directors of Resources for the Future, as well as the editorial boards of several journals. He was formerly the Chairman of the Environmental Economics Advisory Committee of the U.S. Environmental Protection Agency's Science Advisory Board. He was a Lead Author of the Second and Third Assessment Reports of the Intergovernmental Panel on Climate Change, and is currently a Coordinating Lead Author of the Fifth Assessment Report.

Professor Stavins' research has examined diverse areas of environmental economics and policy, and his work has appeared in a hundred articles in academic journals and popular periodicals, and several books. He holds a B.A. in philosophy from Northwestern University, an M.S. in agricultural economics from Cornell, and a Ph.D. in economics from Harvard.



## **Professor Michael W. Toffel**

Senator John Heinz Professor of Environmental Management  
Harvard Business School

Mike Toffel's research examines companies' environmental, occupational safety, and quality programs and performance. He seeks to identify which types of programs distinguish participating companies as having superior environmental, safety, or quality performance, and which of these programs help companies improve such performance.

His work ranges from academic articles based on econometric analyses of large datasets to case studies of individual companies. His research on occupational health and safety has been profiled by the head of U.S. OSHA and featured in the national press including US News & World Report, BusinessWeek, and Scientific American. His research has been published in many top scholarly journals including Science, Management Science, Strategic Management Journal, Administrative Science Quarterly, and Organization Science, in practitioners journals including Sloan Management Review and California Management Review, and in mainstream outlets including The Atlantic Monthly and Newsweek/DailyBeast.

Prof. Toffel serves on the Editorial Boards of the Strategic Management Journal and Organization Science. He serves as a founding board member of the Alliance for Research on Corporate Sustainability (ARCS), which organizes a leading annual conference to foster highquality research on corporate sustainability and to build collaboration among scholars engaged in these topics.

His co-authors include Julia Adler-Milstein, Ronnie Chatterji, Magali Delmas, Anil Doshi, Glen Dowell, Kira Fabrizio, Andrea Hugill, Chonikarn (Fern) Jira, Matthew Johnson, Andrew King, David Levine, Julian Marshall, Chris Marquis, Melissa Ouellet, Lamar Pierce, Erin Reid, Tim Simcoe, Sara Singer, Jodi Short, and David Vogel.

He recommends the HBS Business & Environment Initiative, Environmental Leader, Grist, Ethical Corporation, and SustainableBusiness.com to keep up on corporate environmental news.

Professor Toffel received a Ph.D. from the Haas School of Business' Business and Public Policy department at the University of California at Berkeley, an MBA from the Yale School of Management, a Master's in Environmental Management (Industrial Environmental Management) from the Yale School of Forestry & Environmental Studies, and a BA in Government from Lehigh University. He has worked as the Director of Environment, Health and Safety at the Jebson & Jessen (South East Asia)

Group of Companies, based in Singapore. He has also worked as an environmental management consultant for Arthur Andersen, Arthur D. Little, and Xerox Corporation. He started his career as an operations management analyst at J.P. Morgan.

Prof. Toffel has served on the Advisory Panel of the Newsweek Green Rankings and on the School Site Council of the Edward Devotion School, a public school in Brookline, MA.





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