



# CARBON REMOVAL INSIGHT REPORT

Perspectives from the policy,  
investment and private sectors



## INTRODUCTION

Despite the tremendous challenges the global community faced in 2020, there has been an unexpected bright spot in the remarkable groundswell of attention towards climate change. Awareness of the urgency for climate action is more widespread than ever, and we are seeing more and more major corporations and governments committing to achieve net zero or net negative emissions. Private citizens are demanding emissions reductions and environmental improvement, and public opinion is driving governments and companies to act now. As a result, we're starting to see real markets put in place to help pay for the solutions we need to make net zero a reality.

**The field of carbon dioxide removal is one area that progressed rapidly in 2020. Advances in policy, technology, and commercial projects, coupled with a growing recognition of the need for carbon removal solutions to reach net zero, is spurring the emergence of a global carbon removal industry.**

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In the pages of this report, we have brought together five contributors for a Q&A on this new field, with a focus on North America. Each of the contributors brings with them valuable viewpoints and a unique perspective from the important work they do. We strongly believe that encouraging dialogue and sharing of opinions is an important element in any rapidly innovating space, and we hope you enjoy learning from these contributors' thoughtful answers in the following pages.

- CARBON ENGINEERING

## CONTRIBUTOR BIOGRAPHIES



### LEE BECK

Clean Air Task Force

CCUS Policy Innovation Director

Lee Beck is CATF's CCUS Policy Innovation Director, leading the task force's policy work on carbon capture in the US and Europe. Lee also advises on CATF's work in Europe on hydrogen, carbon capture and super pollutants. Lee has worked on clean energy and climate policy on both sides of the Atlantic. Lee previously worked at the Global CCS Institute where she served as a Senior Advisor leading the Institute's advocacy efforts in North America, and was part of a global team focused on advocacy and policy. While at the Institute, she has significantly increased their presence in policy-maker education efforts on climate change, as well as the need for technology innovation and deployment. She is also a Nonresident Senior Fellow at the Atlantic Council Global Energy Center.



### SASHA MACKLER

Bipartisan Policy Center

Director, Energy Project

Sasha Mackler directs the Energy Project at the Bipartisan Policy Center. He has worked for more than two decades at the intersection of energy policy and commercial markets. Prior to leading the Energy Project, he spent nearly 10 years in the private sector, first as vice president of Summit Power Group's carbon capture business and then overseeing market development activities for Envi-va, the largest biomass fuel supplier to the global utility industry. His professional work has focused on the innovations necessary to scale emerging energy technologies along with developing the business models and policy frameworks that support the deployment of low carbon energy systems.

Mackler holds both a Master of Science in Earth Resources Engineering and Master of Public Administration from Columbia University. He earned his Bachelor of Science in Geomechanical Engineering from the University of Rochester.



### STACY KAUK

Shopify

Director, Sustainability Fund

Stacy Kauk, P.Eng. is the Director of Shopify's Sustainability Fund and joined in January 2020. She also serves on the advisory board of the Carbon Management Research Initiative (CaMRI) at Columbia University. Prior to joining Shopify, Stacy was head of the Ozone Layer Protection Program at Environment and Climate Change Canada. Previously, Stacy worked on several chemicals management regulatory initiatives and represented Canada as a member of delegations for the [Stockholm Convention](#) and [Montreal Protocol](#). Stacy began her career as a practicing environmental engineer designing environmental protection measures and pollution prevention controls for a variety of industry sectors. She has worked for the City of Ottawa, Morrison Hershfield, and Golder Associates. Stacy holds a Bachelor of Engineering and Masters in Public Administration from Carleton University.

*Shopify has planned to purchase CO<sub>2</sub> removal from one of CE's first commercial plants.*



## BORA PLUMPTRE

**Pembina Institute**  
Senior Analyst, Federal Policy

Bora Plumptre is a senior analyst in the federal policy program of the Pembina Institute, Canada's leading clean energy think tank. He conducts research to support clean energy advocacy at the national level, with a special emphasis on policy to ensure a cleaner fuel supply in the transportation and electricity sectors. His professional past includes time as an opposition staffer on Parliament Hill, as a research assistant with the Smart Prosperity Institute (formerly Sustainable Prosperity), and as a project consultant for The Natural Step Canada. He has also co-authored academic work in Case Studies on Transport Policy and the Journal of Canadian Studies. Currently, Bora serves as the Pembina Institute's lead spokesperson on Canada's incoming federal clean fuel standard. Bora holds a joint honours degree in philosophy and history from McGill University, and an M.Sc. in Environmental Sustainability from the University of Ottawa.



## MATT ROGERS

**Incite.org**  
Founder and CEO

Matt Rogers is the founder of Incite.org, a values-based investor that provides catalytic capital and guidance for world positive start-ups, non-profits, and activists. Heeding the call to address the climate crisis, Matt leads Incite.org's investments in climate solutions as well as nonprofits and advocacy groups advancing climate policy; he is an active board member of Carbon180, Activate.org and Advanced Energy Economy. Matt was the co-founder of Nest, where he built the team that created the first machine learning thermostat and the leading brand for the connected home. Prior to Nest, Matt started his career at Apple, building the software team for 10 generations of the iPod. He was one of the first engineers on the original iPhone and was involved in the development of 5 iPhone generations, and the first iPad. Matt earned a bachelor's and master's degrees from Carnegie Mellon University.

*Incite.org has invested in Carbon Engineering.*





## Q&A SECTIONS

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## SECTION 01

# Investment

**Q** Why was it a priority for Shopify to focus on exploring and investing in innovations that can remove carbon from the atmosphere?



**STACY KAUK**

Shopify's Sustainability Fund is an annual commitment to invest a minimum of \$5 million on the most promising technologies and solutions fighting climate change. This year and every year, we will always focus on carbon removal.

We know we have to reduce our emissions, but we can't reverse climate change with reductions or avoidances alone. Essentially, we need to undo 200 years of burning fossil fuels, and all the carbon that has ended up in our atmosphere as a result. To do that, we need to find technologies and solutions that can draw down CO<sub>2</sub> from the air and permanently lock it away.

When exploring options for our fund, we realized there are not currently many carbon removal options available. What is available is very expensive. A lot of companies still need investment so they can innovate and perfect their technology before scaling. Because of this lack of commercially-ready solutions, we decided it was important to spend a large portion of our fund on carbon removal. We wanted to send a market signal, and to provide capital to these companies to help them confirm their research, develop pilot projects, and scale. There's a real need for capital investment here, and we wanted to help lead the way.

**Q** Incite invests in and provides grants to organizations with big ideas and new, unconventional ways of approaching environmental and social problems. Many of these big ideas, by their very nature, can take time to develop and provide return on investment. Why is taking a long-term view important at Incite?



**MATT ROGERS**

To truly make an impact in a problem as big as climate change, a long-term view is essential. Businesses that inherently achieve positive impact as they scale create virtuous cycles, but sometimes we just need to have patience. When we first started investing in carbon removal, we imagined that waste could be made into something of value — despite the fact that a lot of this technology was unproven. Today, we're certain that CCUS can and will provide massive economic opportunities around the world, while helping make a material dent in our collective climate goals. Doing some quick math, if we have gigatons of CO<sub>2</sub> to remove, that should be a pretty big business opportunity, right?

**Q** What would you like more people in the investment and finance community to understand about Direct Air Capture and related carbon removal technologies, and their role in fighting climate change?



**MATT ROGERS**

Funding innovation is sorely needed. Rather than focusing on proven incremental climate solutions, investors and funders have the opportunity to make big bets on technologies that might feel too risky or too capital intensive. DAC and related carbon removal technologies can and will be truly transformative. The biggest risk for the investment and finance communities is not making bets on these types of solutions. It's considering the bigger risk of what happens if you don't, and what that means for our planet.

## INVESTMENT

**Q** Close to a quarter of Shopify's Sustainability Fund spend is towards Direct Air Capture. Why?



**STACY KAUK**

Right now, Direct Air Capture is very expensive compared to other solutions out there. Because the price is so high, we think it's even more important for us to spend money here—by purchasing these high-quality but costly removals, we provide a market signal and generate demand. In the long-term, our goal is to help drive down the cost per tonne of DAC. It's early days for this technology, but if the capital costs of equipment decrease, efficiencies increase, and DAC is paired with permanent storage, this will be an incredible solution to scale around the world.

I think about it this way: we have water treatment facilities cleaning our water around the world. We need clean water to live, and therefore we invest in this infrastructure globally and think nothing of it. We also need clean air to live, so we need to build a solution that cleans our air globally, and it should be just as common and accepted as our water treatment facilities.

Shopify has, and will continue to, overpay for DAC because we believe it's an incredibly high-potential solution to reverse climate change; we just have to kickstart the market and begin to scale this technology globally. That's why we'll continue to spend a significant portion of our fund here.

**Q** Why invest in Direct Air Capture now?



**STACY KAUK**

Shopify's Sustainability Fund is not a venture capital fund; we're not seeding companies or making equity investments. This is a capital expenditure fund. This gives us a flexible approach where we can sign contracts with companies (like Carbon Engineering) to purchase carbon that will *eventually* be captured from the atmosphere and stored permanently, almost like purchasing futures. An added bonus is that by paying for permanently stored carbon removal, this sends a signal of the importance for DAC companies to partner up with permanent storage solutions and prioritize this in their roadmap. Sometimes, we are the first customer for these companies. This shows the market that there is a demand for these solutions, even before it's commercially available. When companies can demonstrate they have customers lined up, it helps them get better investment outcomes from other capital sources, and makes them more promising to purchase from. By buying DAC before most people are ready to, our goal is to use market forces to kickstart the carbon removal market, and create demand for this high-potential technology.

**Q** Why should investment in carbon removal start happening now? How do we balance this with actions to reduce emissions and achieve better energy efficiency?



**SASHA MACKLER**

As with many infrastructure and energy technologies, the time required to innovate, scale, commercialize, and cost-effectively deploy DAC will take decades. Although encouraging progress has been made by the companies and stakeholders developing DAC technology, these systems remain in the early stages of their development. If DAC is to be positioned for global impact by 2050, it requires ambitious technology development and deployment programs today.

The most robust climate strategy is likely to be technology inclusive and should enable multiple pathways to success. Much can be accomplished by aggressively deploying technologies available today that can prevent emissions through efficiency or the replacement of emitting technologies with renewable or non-emitting alternatives such as renewable energy or nuclear power. However, these actions are unlikely to be sufficient for managing the entire carbon problem. It is likely DAC will be important in the future and the technology development cycle requires a strategic plan that begins immediately.

## SECTION 02

# Changing attitudes and perceptions

**Q** How would you characterize the state of the carbon removal industry today?



**LEE BECK**

Despite more countries pledging net-zero emissions targets and increasing climate ambition, we are witnessing a continuous failure to substantially reduce emissions through permanent transformation of our energy and industrial systems. This makes carbon removal technologies ever more critical. Fortunately, they have been receiving increasing attention, and the carbon removal industry is showing a strong pace of development from a policy, technology and deployment perspective. An important development that stood out for me in 2020 is the increasing awareness by corporate actors. Microsoft in January announced the aim to become carbon negative by 2030, while also removing its historical emissions. In fall, the company joined the Northern Lights/Longship project, which will be key to accelerating carbon capture, removal and storage in Europe. Stripe and Shopify also progressed major initiatives to facilitate investment in carbon removal. United Airlines' recent announcement that it had committed to invest in carbon removal is another significant milestone, signalling that other kinds of off-sets and fuel innovation are potentially too uncertain to mitigate emissions from difficult to decarbonize sectors like aviation.

**Q** Have you seen any shifts in policymaker perceptions in the US about Direct Air Capture or other carbon removal technologies in the last 12 months?



**SASHA MACKLER**

Yes, absolutely. We have seen increasing interest from Congress over the past year. It is remarkable how significantly the awareness of DAC has grown in the policy community, with perceptions maturing from a vague impression of a far-fetched technology borrowed from the shelves of science fiction to a place where it is increasingly included in mainstream discussions around a carbon management policy agenda in the halls of Capitol Hill.

**Q** Direct Air Capture has seen bipartisan support in the US. Do you see this continuing in the future?



**SASHA MACKLER**

It is true that DAC has enjoyed support from liberals and conservatives in the U.S. This is largely due to the role it could play in enabling a path for traditionally emitting and hard-to-abate sectors to continue operating while also offering the tantalizing promise of carbon removal at scale. This unique set of attributes suggests that its appeal to Democrats and Republicans will continue, provided the safety and efficacy of initial projects is consistent with expectations.



## CHANGING ATTITUDES AND PERCEPTIONS

**Q** You have written previously about the power of collective action, and its potential in the climate crisis. Where do you see the most potential for collective action in Canada as we work to meeting our 2030 emissions reduction goal?



**BORA PLUMPTRE**

Collective action can be conceptualized in different ways. Without discounting the need for collective organizing by Canadian individuals, labour groups, associations, companies, and so on, I think Canada also has a unique chance over the next decade to drive collective climate ambition in the community of nations, and to help shape—by the Canadian example, as well as by financial support—other countries' emissions commitments. Canadian international leadership, which we've already seen in initiatives like the Powering Past Coal Alliance, not to mention the central efforts of Canada's UN negotiating team in helping to enshrine the goal of 1.5 degrees in Article 2 of the Paris Agreement—our leadership exerts an outsized influence on the whole global effort.

As far as meeting our own domestic emissions pledge is concerned, Canadians must continue to express their strong belief in the need for climate policy to their elected officials, and, ultimately, must give voice to that belief at the ballot box. We also need to reckon more honestly with the fact that climate policies will have uneven regional impacts across the country: in this sense, collective action might mean that wealthier provinces with less carbon-intensive economies should be prepared to help their fossil-fuelled neighbours overcome the serious challenges that go along with the transition away from high-carbon society.

**Q** In your policy work in the last year, have you seen any shifts in attitudes and awareness of carbon removal technologies, including DAC?



**LEE BECK**

From my perspective, it is important to establish principles and regulatory mechanisms for carbon removal deployment ensuring commercialization but preventing overreliance on the technology to deliver emissions reductions. In addition, I also think that, as a collective, we need to regard them as a tool to mitigate the different speeds at which regions and countries will achieve emissions reductions on the road to net-zero. Again, what stood out to me in 2020 is how fast the political economy of carbon removal is developing in North America and Europe. In Brussels, the conversation around the role of carbon removals in climate neutrality was kick-started, with stakeholders demanding clear rules for governance from the European Commission. The new 2030 climate target to reduce emissions by 55% also leaves the door open for carbon removal, which has caused mixed responses. At the same time, a carbon removal trade association was established in Brussels, while in the UK the Coalition for Negative Emissions was launched. In the US multiple proposals from diverse stakeholder groups have emerged, aiming to create market-based commercialization policies, including procurement requirements and enhanced incentives. The Select Committee on Climate Change acknowledged the need for carbon removal to mitigate climate change and proposed deployment policies in its landmark report in the summer. From a technology commercialization perspective, these are important political economic developments. They show that the industry is becoming more established with more diverse stakeholders and proliferated interest, increasing its political influence in shaping innovation and decarbonization policies.

## SECTION 03

# The role of policy

Q What are the most promising policy developments you've seen in the US in the last year with regards to carbon removal?



LEE BECK

The energy innovation package passed in late 2020 as part of the Omnibus includes some of the most important carbon capture, removal, and storage and climate provisions ever passed, including critical support for technology demonstration and commercialization. The 45Q commencement of construction date was also extended by two years. 45Q remains the most progressive carbon capture, removal, and storage incentive globally. Further optimizations to it will thus be vital. This includes further extension of the commence construction deadline, providing a direct pay option as well as expanding options for hard-to-decarbonize sectors and Direct Air Capture. But in the near-term we also need to understand, plan, and construct the infrastructure needed to achieve net-zero emissions, while also expanding investment into saline geologic storage. The introduction of the SCALE Act to establish the necessary shared CO<sub>2</sub> transport and storage infrastructure to enable the scale-up of carbon capture and carbon removal, as well as saline geologic storage, is one of the most important steps we have taken towards that goal.

Q What kinds of policy developments would you like to see in the US in the coming years to spur more investment in carbon removal technologies like Direct Air Capture?



MATT ROGERS

We're very fortunate to have an incoming administration who takes this issue seriously. We have a unique opportunity to generate high-paying jobs for America's most rural and industrial communities, create new sources of revenue for farmers, ranchers and foresters, and increase the ecosystem benefits of natural lands while positioning the U.S. as the international leader of climate action. I would expect the Biden team to overturn the Affordable Clean Energy rule and begin to revive carbon policy to push the electric power sector toward clean energy. I would also expect the administration to restore motor vehicle fuel standards to move toward zero emission transportation. The more ambitious action I would like to see includes overhauling the Department of Energy to better prioritize carbon removal innovation, along with expanding funding across R&D programming. I would also like the White House to release a series of executive orders that establish the administration's leadership on climate and carbon removal.

## Q What role do you see the Clean Fuel Standard having on Canadian technological innovation?



BORA PLUMPTRE

The potential impact of this policy on Canada's innovation ecosystem, especially in terms of energy technologies to address climate change, can hardly be overstated. The Clean Fuel Standard represents a paradigm shift in the regulatory apparatus around transport fuels in Canada, and it will accomplish at least two important outcomes for Canadian technological innovation toward a lower carbon economy. First, it will create a financial base for clean fuel developers and technology providers to scale up operations and increase the domestic production and use of existing, current-generation clean fuels. And it will do this according to one chief organizing principle, namely the concept of "lifecycle carbon intensity." Under the CFS, a growing share of the supply for energy (mainly for transportation) will have to orient itself according to this criterion—a criterion that is long overdue in domestic and international fuel markets, but which is clearly gathering momentum. In this new context, where carbon-competitiveness is what counts, all fuels, including fossil fuels, will have a chance to compete. But the advantage will increasingly go to electricity, sustainable bio-fuels, synthetic fuels, hydrogen, renewable natural gas, and other technologies that can reliably drive deep emissions reductions. Second, and related to the previous point, the financial platform for growth enabled by the CFS will empower clean fuel developers to invest in research and development that further pushes down the cost and the carbon intensity of their fuel products. That's what is really exciting about the CFS—that it can enable not only innovation, but continuous innovation that makes clean energy more widely available, while driving down the average carbon intensity of many major energy sources (and carriers, like hydrogen and electricity). The continuity of this economic signal will help unlock more radical innovations and cost reductions, in turn empowering Canada to seize new industrial opportunities and meet the climate challenge at the scale that's truly needed.

## Q What are some common misconceptions about the Clean Fuel Standard?



BORA PLUMPTRE

Where to begin? There are understandably many misconceptions associated with this type of policy, in which an integrated approach to industrial, environmental, and energy policy-making is implemented through fairly complex regulation. But complexity and sophistication are not bad or unmanageable in themselves, and, from my point of view, the hybrid or holistic paradigm enabled by the CFS will actually help Canadian companies rise to new challenges and adapt to fundamental changes already occurring in energy markets here and abroad. Of course, misconceptions about the CFS persist. For example, that the policy will cost society too much. Or, that it is a "second carbon tax" or a manifestation of "regulatory pancaking" (don't know about you, but I like pancakes – especially when you can have more than one). That it won't achieve any meaningful environmental outcome, and that even if it did, it wouldn't matter for the global climate. It's even a misconception that the policy will be a failure if it doesn't achieve a certain absolute level of emissions reductions by a definite date (to be sure, absolute GHG reductions are incredibly important, but having an economic incentive to reduce lifecycle emissions is also, I believe, essential if we're to preserve our shot at mid-century decarbonization).

### Q What are your hopes policy-wise in 2021 with regards to carbon removal technologies?



**BORA PLUMPTRE**

There are some exciting policy opportunities on the horizon. The Clean Fuel Standard clearly needs to be finalized and then to enter into effect as planned in 2022. This means the market for credits will also soon begin operation, thus generating both a demand for credits that carbon removal technology developers can compete to fill directly, as well as an incentive for low-carbon fuel producers to adopt carbon removal solutions that would further the increase credit value of their final products.

There is also opportunity for Canada, following the model of the 45Q provisions in the US tax code, to adopt new tax policies to support increased deployment of carbon capture, use, and storage technology. That type of policy innovation is needed arguably just to ensure Canada has a hope of joining in the wave of recent American investment in this space. Legislators and policymakers are showing signs they recognize the need to catch up: [Bill C-262](#), a Private Member's Bill that would provide tax credits for CCUS, was recently introduced for first reading in the House of Commons by a member of the official opposition. Though private bills are usually not likely to make it very far in the legislative process, it's significant that the bill is coming from across the aisle. Meanwhile, the federal government has just released [on Dec. 11, 2020] a major update to its official plan for climate and clean growth, in which it [states its intention](#) to "consult with investors and other stakeholders in developing tax measures to ensure that Canada has a competitive investment environment for the commercialization of technologies to help meet and exceed Canada's Paris Agreement target." Taken together with the broader movement toward a net-zero world, these are encouraging signs that carbon removal technology can expect stronger policy support in the near future.



**SASHA MACKLER**

My policy priorities for carbon removal and DAC in 2021 are centered on (1) the development of a coordinated, strategic, and ambitious federal innovation plan, (2) a focused strategy at the Department of Energy to support multiple commercial scale DAC demonstration projects, (3) refinement of the 45Q tax credit to better support the DAC business model, and (4) federal procurements that create the early markets for deployment of DAC plants.



### Q What supportive policies are needed in the US to take carbon removal innovations to the next level?



**LEE BECK**

Apart from putting in place comprehensive climate policy, the US needs to complete its innovation policy frameworks for advanced decarbonization technologies, particularly for carbon capture and carbon removal. At CATF, we would like to see a paradigm shift – innovation isn't a linear, sequential process from government funded R&D to private sector uptake as the current policy framework suggests. Moreover, ambitious climate policy does not replace innovation policy, both go hand in hand.

Innovation policy needs to aid making the technologies available through being deployment-driven and infrastructure-oriented, leading to cost reductions, shortened deployment timelines, and access to affordable financing. Moreover, innovation policy isn't a one-off undertaking, we need to look at it as an evolution where we are continuously optimizing policy – think 45Q. Tailoring incentives to deliver steel in the ground in the near-term, including optimizing 45Q, and expanding the current policy framework with demonstration grants supporting first-of-a-kind through Nth of a kind, would be a first step in the right direction. Medium-term infrastructure needs can be addressed with the passage of the SCALE Act. Building out a large-scale deployment-oriented policy framework in the near-term will be the most important step for carbon capture, removal, and storage to make significant emissions reductions contributions on the path towards net-zero.



**SASHA MACKLER**

Scaling carbon removal in the U.S. will require a combination of targeted policies and new market frameworks. Given the nascent state of the industry, ambitious public innovation programs should be implemented with a focus on advancing the research and development for materials and engineering processes associated with multiple carbon removal technology pathways. In addition, support for commercial-scale demonstration projects is a critically important step in the technology development path that requires significant public engagement and support. Creating the initial markets for carbon removal projects through procurement programs can help to accelerate the deployment of projects and catalyze the industry. Finally, developing the frameworks that clearly delineate the quality, quantity, and durability of removal products is an important existing gap that should be prioritized as part of any emerging policy agenda. History shows that multiple coordinated policy interventions are likely to be more effective than any single approach and therefore a combination of policies like these will be important ingredients for successfully launching a meaningful carbon removal commercial sector in the U.S.

## SECTION 04

# The role of private industry

Q The last 12 months has seen some of North America's largest technology companies making carbon neutral or carbon negative commitments. What ongoing role do you think private industry will play in scaling climate innovations?



MATT ROGERS

Private industry has the unique opportunity to fund innovative technologies at the most capital intensive stages. Now more than ever, there's mounting pressure from employees, customers, investors and suppliers to ensure these global companies go beyond taking a stand to be carbon neutral or carbon negative. If you're one of the most profitable companies in the world, you're rightfully expected to put real money towards these problems via grants, investments or carbon-offset credit purchases.



STACY KAUK

I think what we're witnessing right now is the current lack of ability for countries around the world to come together to solve the problem of climate change internationally. The policy and regulation landscape required to scale solutions like DAC is just not in place yet. But we can't let this stop us. By acting now and buying carbon removals, Shopify is able to provide some certainty to this market. We hope that by sharing our approach and amplifying what these innovative companies are working on, other corporations and private sector participants will join us and pour capital into these markets, increasing the overall supply. When we demonstrate demand here, the world wins—because we're starting the important and difficult task of pulling carbon dioxide out of the atmosphere. We can't wait for governments to lead the way. We need to forge this frontier ourselves, as voluntary participants who understand the importance of reversing climate change, and who believe in the power of human ingenuity to solve the world's most difficult problems. This is how we will reverse climate change: by acting as role models in this area, by showing instead of telling, and by encouraging others to join us in the fight for our planet.

Q In what ways do you see ecommerce playing a powerful role in climate action?



STACY KAUK

Shopify has more than 1.7 million merchants, which means we have a powerful global ecosystem that could collectively have a significant impact on the climate. We're constantly looking for ways to help our merchants join us in our efforts to reverse climate change. Shopify's mission is to make commerce better for everyone, and we believe in harnessing the power of commerce for good. There's no denying that global commerce leads to some negative side effects for our planet, especially in the form of carbon emissions from package deliveries. And so we've been laser focused on finding ways to mitigate this.

We launched an app called [Offset](#), which allows merchants to opt in to offset all carbon emissions from their order deliveries. For every order placed through [Shop Pay](#), Shopify offsets all delivery emissions too. Specifically for the Black Friday Cyber Monday shopping weekend, [we offset all delivery emissions](#) from every order placed globally on our platform.

Another goal of ours is to use Shopify's voice to help reach more consumers so they're better informed about sustainable options and the effects of their purchases, and provide them with a way to mitigate those outcomes. We believe that commerce and sustainability can exist in harmony, and we continually find ways to demonstrate this.

## SECTION 05

# Looking Ahead

**Q** It is the year 2100. What is your prediction for what energy usage looks like in the US?



**LEE BECK**

I cannot predict what energy usage will look like in the US in 2100. However, my vision of what I would like to see, would be an equitable net-zero emissions economy that has created jobs and growth opportunities through innovation as well as provided just and positive impacts for communities throughout its transformation. Ideally, the US will be the heart of a net-zero manufacturing economy. And of course, we will still be removing historical emissions.

**Q** How do you see the growth of the carbon removal industry and other newer clean tech innovations impacting Canada's economic resilience, especially in terms of COVID-19 recovery?



**BORA PLUMPTRE**

As we embark on the path to economic recovery, low-carbon technologies and innovations have a vital role to play in securing greater resilience for Canadians. Alongside the Alberta Clean Technology Industry Alliance (ACTia) and CMC Research Institutes, the Pembina Institute just released a [new report](#) examining the growth opportunity for the Canadian 'carbontech' innovation ecosystem. Last spring, we also released a [comprehensive set of recommendations](#) for 'green stimulus' measures that would enable a cleaner post-pandemic recovery. With these reports, our message has been that there is a substantial—and indeed unmissable—opportunity for Canada to build on existing strengths in clean technology, including through the conversion of captured carbon to commercial goods. That said, we do not foresee a specific or even a necessary role for technological carbon removal in the immediate post-COVID-19 context. In terms of financial support, government is clearly prioritizing nature-based solutions like planting trees, restoring or enhancing wetlands, improving soil management, and so on.

**Q** What role do you see carbon removal technology playing in US job creation as well as COVID-19 recovery?



**LEE BECK**

Climate-forward innovation as part of an economic stimulus package can catalyze regional economic opportunities. Investment in carbon capture and carbon removal deployment such as through demonstration grants and related CO<sub>2</sub> infrastructure has the potential to create tens of thousands of high-quality, high-paying jobs over the next decade, as modelling that the Clean Air Task Force, Third Way and the Bipartisan Policy Center has commissioned has shown. We need to recognize that climate-related innovation and technological emissions reductions and removal will become an integral part of our economy, including a whole new manufacturing industry with the potential to bring immense economic opportunities to communities and regions. Thinking back to the Great Recession, the green stimulus measures included a decade ago helped mobilize billions of dollars of investment in technologies such as wind and solar that are much closer to commercialization today thanks to these policies. We now have an opportunity to replicate this blueprint, and increase our chances of reaching net-zero emissions by mid-century.

## LOOKING AHEAD

**Q** How important do you see carbon removal solutions like Direct Air Capture being as Canada works towards meeting its 2030 goal of reducing emissions 30% below the 2005 level?



**BORA PLUMPTRE**

The landmark special report on the impacts of 1.5°C (from the Intergovernmental Panel on Climate Change) makes clear that some form(s) of carbon dioxide removal technology will likely be necessary if the world is to meet its most ambitious long-term temperature objective under the Paris Agreement. The Panel stated with high confidence that carbon removal technologies are especially important in scenarios that limit or entirely avoid overshoot of the 1.5-degree limit. Given the strong possibility that increases in average temperature above this threshold could lead to dangerous tipping points in planetary and ecological systems, carbon removal technologies may prove critical to avoiding the more dangerous futures looming over our warming world. However, meeting the long-term global temperature goal and meeting an interim national emissions target are different challenges at different scales. Solutions like Direct Air Capture have an important role to play, particularly when it comes to decarbonizing the really difficult, emissions-intensive sectors like heavy industry. But these solutions are not, in my view, necessary to achieve the 30% reduction versus a 2005 baseline; many other options for reducing emissions are already easier, cheaper, and faster to deploy. Carbon removal cannot be an excuse to sideline other opportunities for mitigation. At the same time, given the scale at which carbon removal solutions must probably be implemented, there is every reason to start preparing now—in terms of policy, financing, technology development, piloting and demonstration, and so on—for eventual broader deployment.

**Q** Why is Direct Air Capture a promising potential tool for the US in the transition to a net-zero carbon economy?



**SASHA MACKLER**

As the world coalesces around a net-zero emissions framework, all sectors will not transition at the same rate. Direct Air Capture can help reduce the carbon impacts of certain activities that will be difficult to decarbonize, for example certain industrial processes and long-haul transportation. In these cases, it may prove more cost-effective to displace the emissions associated with these activities through DAC than to directly develop alternative technologies.

Furthermore, beyond the goal of balancing emissions through a net-zero framework, multiple science-based organizations, including the Intergovernmental Panel on Climate Change (IPCC), have concluded the risks associated with climate impacts will likely necessitate the removal of legacy carbon dioxide from the atmosphere at a significant scale in the decades ahead. Achieving net-negative carbon emissions is only possible if scalable carbon removal technologies such as DAC are widely available.