The tech opportunity in climate change

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The market for green tech is exploding with the urgency to address global warming.

LESSONS FOR LEADERS

- Understand the impact that climate change has on your business. Determine how the data can work in your favor.
- Setting achievable goals for your business is the practical start.
- Research into energy storage is critical.

Here's a phrase rarely heard during serious climate change debates: Damn those farmers!

Agricultural growers aren't often part of sustainability conversations. Yet, more of them are working to reduce their carbon footprints using data and analytics technology. Why? Because, like businesses in every industry, environmental sustainability isn't only a regulatory compliance issue anymore. It's a profit opportunity.

Ask Steele Lorenz of the Farmers Business Network (FBN). In 2014, his company established an online community for farmers to anonymously share production data so everyone could find relevant information to improve their finances and operations. The model initially attracted millions of dollars in venture capital funding. But it hit its stride a few years later when increasing wildfires, rising global temperatures, melting ice caps, and other natural calamities intensified concerns about climate change.

Farmers, oddly enough, are one of the world's major contributors of carbon emissions. Indeed, 10 percent of U.S. greenhouse gas emissions stem from agricultural practices, such as driving tractors, tilling the soil, and spraying pesticides and herbicides, according to the U.S. Environmental Protection Agency.

Looking to reduce their carbon intensity scores, differentiate their grains and produce around sustainability, and make some money around those efforts, growers turned to FBN for assistance.

"We had everybody from grain processors and consumer packaged goods companies to large retailers asking if our platform could help with their conservation efforts, and it turned out it could," says Steele, who heads sustainable farm technology for FBN. "The data we were already collecting to evaluate farm practice efficiency was the same as what you would need to track carbon intensity scores."

"Green is the new digital."

Gerd Leonhard CEO, The Futures Agency

Answering a call

FBN quickly extended its data capabilities to help farmers measure and report their carbon intensity scores. It provided advice on producing environmentally friendly crops and grains that could generate a lower carbon score and then be sold at premium prices. It also guided them on how to sell the value of emissions they do not put into the atmosphere as carbon credits to businesses looking to offset their own noncompliance. (The market around carbon credits is expected to be worth $100 billion by 2050.) And most recently, FBN joined with the Environmental Defense Fund to provide lines of credit to farmers at lower rates in exchange for meeting nitrogen management and soil conservation standards. In short: It jumped into banking.

Nancy Pfund, founder and managing partner of DBL Partners, a venture capital firm focused on climate change, says FBN is just one example of how technology can be innovatively applied to address environmental sustainability—while making considerable amounts of money along the way.

"When Tesla was founded nearly 20 years ago, there was some interest in lowering the carbon profiles of cars, but there was limited interest in clean-energy vehicles because they didn't exist. As a result, people discounted the possibility of a transition away from oil and gas," she says. "Now, with skyrocketing gas prices and the push in many places to ban gas cars by 2035, the curtain is closing on combustion engines. I think you'll see similar mainstreaming of carbon-saving businesses in other industries very soon."

Sustainability futurist Gerd Leonhard, CEO of The Futures Agency, agrees. Under the 2015 Paris Agreement, about 200 countries have committed to trying to limit the rise in average temperatures to 2 degrees Celsius compared to pre-industrial levels. Nonetheless, experts say the world is on pace to warm somewhere between 2 and 3 degrees Celsius this century. Leonhard says an urgent desire to reverse that will drive continued and increasing investment in green technology for years to come.

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"Green is the new digital," he says. "The key problem we face today isn't just energy or getting away from fossil fuels. It's also the complete waste and pollution that we're creating by having very unintelligent approaches to almost every practical problem such as traffic planning and local commuting. We're at the trigger point now with sustainability because it's no longer just a nice-to-have but an imperative that is driving the next iteration of the digital boom."

Experts say that while the opportunity to apply technology is far and wide, current activity tends to fall into a few specific categories, namely modeling, carbon offsets, batteries, and cooling.

Modeling and intelligence mania

To get ahead of climate change, experts say it is vitally important to model how and where change is occurring if anyone is going to tackle it. Admittedly, models aren't very sexy. But the ability to see and even predict slight variations in sea levels, ocean temperatures, cloud cover, glacier melting rates, or the exact moments that wildfires erupt adds up to a big business opportunity for tech companies.

John Frey, chief technologist for sustainable transformation at Hewlett Packard Enterprise, notes that modeling and intelligence isn't just about data scientists and engineers sitting down to analyze and assign numbers to data. Doing it right could potentially require a wide variety of emerging technologies.

To understand what's happening in, say, a forest or an iceberg, thermal sensors, cameras, drones, and satellites are needed, he says. Servers are required at the network edge to retrieve local data as fluidly as possible. Advances in memory and storage will be needed to handle increasing data volumes, while analytics and artificial intelligence tools will become vital for sorting through data and automatically retrieving actionable, real-time insights to advise modeling and intelligence. High-performance computing and quantum computing, meantime, will play a major role in maximizing the effectiveness of data collection, integration, and analysis while minimizing power consumption.

"The big opportunity in climate technology is to not only collect data but to come up with ways to analyze and model all of it to understand what is happening, and then compare it to regulatory compliance goals," Frey0 says. "Technology can really be a force multiplier for knowing how to tackle carbon reduction."

A large market is also emerging for purchasing good climate modeling data, adds Ilene Carpenter, earth sciences segment manager at HPE. "This used to be the realm of national weather services, government agencies, and academics," she says. "Now, there's a really big, healthy private sector for providing targeted climate information to insurance and re-insurance companies, departments of transportation, emergency management organizations—anyone who needs that data but doesn't have the wherewithal to gather it themselves."

Carbon offset obsession

One of the biggest tech opportunities in climate change undoubtedly involves carbon offsets.

A carbon offset is any activity that compensates for the emission of carbon dioxide or other greenhouse gases by providing for an emission reduction elsewhere. In other words, you either directly reduce emissions below a certain level or pay a company

somewhere in the world to reduce emissions for you. Theoretically, this means your organization did its part for the planet.

While such practices are certainly controversial, they nevertheless have given rise to a whole cottage industry that is providing the technological tools and services to sell or exchange carbon offset credits.

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Pachama and Sylvera, for example, are applying AI technology—and attracting tens of millions of dollars in venture capital funding—to help close the accountability gap around forest carbon emissions. Meantime, another company, NCX (formerly SilviaTerra), which helps landowners get carbon credits for not chopping down their trees, recently raised $50 million from investors that included Salesforce CEO Marc Benioff's investment fund, Time Ventures, and J.P. Morgan.

"Carbon offset credits are a hot area, no pun intended, because of the devastation and serious nature of overharvesting and, especially, all these wildfires," says DBL's Pfund. "Going forward, they will also extend to other areas, like biodiversity, restoring coral reefs, and making oceans healthier."

Batteries abound

With the 2015 Paris Agreement calling for 100 million electric vehicles to hit global roads by 2030, it should come as little surprise the market for batteries appears set to explode.

Look no further than Tesla for evidence of this. The automaking giant, which now has more than 1 million vehicles cruising down highways, is reportedly striving to become its own power company, competing with the likes of Pacific Gas & Electric and Tokyo Electric Power. As part of that, it is working on a "million-mile battery" that will rely on a new mix of chemistry, materials, and coatings. And it is approaching this development with the circular economy—where everything is created to be repurposed—in mind.

According to the World Economic Forum, the battery market is expected to be worth $100 billion by 2025, driven partly by an anticipated need to store more solar power for businesses and households.

"Batteries are at the forefront of the sustainability battle because, if you're going to have a car that runs for 2,000 miles or share your solar energy with someone over a mountain, that becomes a battery issue," says The Future Agency's Leonhard.

Cooling gets hot

Experts also anticipate the market for efficient, low-carbon cooling technologies to take off as a means of shedding heat from tomorrow's advanced computing systems. This doesn't necessarily mean finding better air conditioners, although those are important. After all, the effects of overheated servers can become a huge point of failure for data centers that require 99.999 percent uptime. And with those systems working overtime trying to handle remote workers, internet of things devices, and metaverse applications, the overheating threat is becoming more problematic. What this suggests is entrepreneurs have an opportunity to find ways of applying AI and other emerging technologies to help maximize operational efficiency and carbon intensity scores for data centers.

Advanced cooling technology could also become a hot commodity for another obvious reason: global warming makes homes, offices, and public buildings hotter, which means more need for air conditioning—which is not good for the environment. In fact, studies show heating, ventilation, and air conditioning now accounts for about 40 percent of a typical building's total energy consumption. Finding novel ways to apply technology to sustainably lower facility temperatures, therefore, is likely to become a higher priority in the next few years, experts say. To that point, a recent report from the U.N. Environmental Programme and the International Energy Agency says that a shift to energy-efficient air conditioners and other appliances could eliminate up to 460 billion metric tons of global greenhouse gas emissions—or about eight years of emissions based on 2018 levels.

The time is now

Experts say that with climate change seemingly wreaking increasing havoc around the globe, pressure will continue to mount on organizations to play their part in doing something about it. Technological innovation can help, they say, and the profit potential certainly exists to make that happen. But it needs to accelerate more quickly than it has if it's going to slow global warming at all.

"We're running out of time," says Leonhard. "We have a decade at best to do something about all of this. That's it. If we don't get it done by then, I fear it's going to get very ugly."