



## *Engineering Solutions to Climate Change Problems*

Alex Perkins

Nantucket/Vermont, USA

Alex Perkins peered through his binoculars, carefully scanning the blue surface of the ocean around him. As first mate and “whale spotter” on his family’s 47-foot catamaran, he and his dad had a little competition going, to see who could spot the first whale.

Alex grew up on the small island of Nantucket, off the coast of Cape Cod, Massachusetts. Starting at a young age, he helped his parents with their ecotourism company, Shearwater Excursions. Alex started navigating and steering the boat for whale watches and seal cruises when he was a teenager and first mate. Now as a captain himself, Alex guides ecotourism trips around the island.

“My passion for sustainability and renewable energy evolved from growing up on a small island,” Alex says. “Each and every day you’re aware of the beauty and fragility of your environment; and you’re immediately more connected with ~~all of~~ nature.”

Early on Alex had observed the dangers of pollution for the ocean's precious marine life. When they sailed out to visit the colonies of ~~gray~~ grey seals, he would frequently spot at least one seal tangled up in discarded fishing nets. “As the seals grow,” Alex explains, “The fishing line doesn’t, and it starts to strangle them.”

When he was in high school Alex joined his school’s Students for Sustainability Club. And when he learned about an exchange program with The Island School in the Bahamas, he immediately applied. He was always ready to explore island life in other places, and he was especially excited to leave the cold New England winter behind and head to warmer waters. At The Island School, 50 students from all around the world live together on a remote campus for a semester. And as they learned about sustainability, leadership, and marine biology issues, they would also strive to live as sustainably as possible. “It really checked a lot of boxes for the things I was interested in, and I was lucky enough to be accepted,” he says.

Alex’s time in the Bahamas was a wonderful learning experience. However, one thing that really bothered him was the way ~~locals~~ the country discarded plastic waste. At home, he grew up recycling everything—especially plastics. He learned to be conscious of the importance of doing this, since islands have very limited space for landfills. He was shocked to see that plastic was simply being tossed into pits with the rest of the trash. Then, once the pits were full, they were lit on fire. The thick, nasty, terrible-smelling smoke would fill the air. “It was awful,” he says.

An even greater source of pollution was the island’s source of energy. Generators as big as houses burned diesel fuel around the clock to supply the islanders with energy. “The oil gets shipped in on huge barges and then they just burn it,” Alex explains. “And they’re old generators, they are not efficient.”

The sight of these generators spewing ugly black smoke across the light blue Bahamian skies was sickening to Alex. He could see that something needed to be done; and he was determined to continue to learn whatever he could about sustainability, and was especially keen to see how emerging technologies could help solve these kinds of problems.

Upon his return to high school in Nantucket, Alex put his newly acquired knowledge about sustainability to use. He reconnected with the Students for Sustainability Club and collaborated on a proposal to install 100-kiloWatt wind

turbine at their school. A turbine of this size would be able to satisfy fifteen-percent of the energy needs for the island's middle and high schools with a clean, renewable source of energy: wind power.

First, they would have to overcome many obstacles. Locals worried that a 131-foot turbine in the center of the island that was visible from almost anywhere on the island would be an eyesore. They were also concerned about how this would affect the island's main economic engine: summer tourism.

“One of the hardest issues was convincing the Nantucket Historic District Commission that this was good for the island,” Alex says. “Getting them to approve a wind turbine and convincing them that it wasn't going to negatively impact the historical integrity of the island was a huge challenge.”

Like most wind turbines, the turbine Alex and his schoolmates were planning was supposed to be white. But the Commission decided that they would have to repaint the turbine gray, so that it would blend in better with the sky. “Little things like this became very challenging,” Alex says.

Working with school and town officials, the utility company, and the project's funder, ReMain Nantucket, they were successful in gaining permission to install the turbine. After all, wind turbines represent the future—a sustainable future.

Alex is understandably very proud of his island community. “It's a huge testament to the commitment to renewable energy on the island that we were able to do this,” he says. And awareness of the importance of renewable energy on Nantucket has only grown over the years—from dialogues with business leaders and influential seasonal residents, to teachers who have incorporated wind power into their lesson plans. “It's a great tribute and a successful case study for our island,” he says.

Alex's passion, commitment, and hard work was noticed: in 2011 he and his classmate Will Horyn were nominated to serve as youth delegates to the Stone Soup Leadership Institute's 7th annual Youth Leadership Summit for Sustainable Development. Held on the neighboring island of Martha's Vineyard, Alex joined with youth from islands like Vieques, Puerto Rico, Virgin Gorda, the British Virgin Islands, and Hawaii for an intensive, week-long real-world solutions-oriented training. “It was a fantastic experience,” Alex says. “We shared our own stories and were exposed to inspiring stories from other youth leaders from around the world who were also striving to bring sustainable solutions to their islands.”

Learning from other young island leaders ~~youth~~, and finding ways to collaborate with them, was a huge benefit for Alex. When he went back home, he and Will organized a community forum with the local Chamber of Commerce, and presented ~~his~~ their vision for a Sustainable Nantucket. Former U.S. Secretary of State John Kerry commented on their vision by writing, “Alex and Will's passion for the environment has empowered their peers and their entire community to make positive changes in their daily lives. I commend them on being inspiring young leaders who are willing to confront – and to solve – some of the most difficult and perplexing problems that our world faces.”

When it comes to fighting the effects of climate change, there are various aspects that make up the struggle, Alex says. While activism and policy changes are needed, Alex was most interested in finding solutions through technology. “I always thought of myself as an engineer,” Alex says. “The technology side has been my approach to solving these problems.”

So, after high school, Alex pursued his education at the University of Vermont and studied mechanical engineering. As a senior, Alex created Books4Equity, to encourage upper classmen to donate their books. The free library with an online database for all UVM students to search, view and borrow donated textbooks now has over 2,000 textbooks, calculators and iClickers.

Then, with his freshly minted diploma in hand, Alex returned to his adopted island home in the Bahamas to work with the Center for Sustainable Development (CSD). This time, he hoped to be able to work with the local community to solve some of the problems he'd seen during the high school semester he had spent there.

The global warming potential from the emissions of burning plastic are significantly worse than CO<sub>2</sub>,” Alex says. “It’s pretty much the worst thing you can do. Not to mention the plastic contaminating the water through leaching or hurricanes.

Courageous enough to accept this challenge, and curious to see how mechanical engineering could address this issue, Alex and his new CSD team embarked on an ambitious venture. Their idea was simple: since plastic is a petroleum-based product, made from fossil fuels, what if there were a way to take the plastic and turn it back into petroleum?

“It turns out there is this process called pyrolysis, which is kind of a reverse process,” he says. “It turns plastic back into its petroleum building blocks.”

Alex and his team decided to use this discovery to build a small-scale reaction vessel. Using this vessel, at first they were able to convert a hundred grams of plastic at a time, and use the end product to run a diesel engine. “We were super excited about that,” Alex remembers. “So we got some more funding, and we were able to scale up our machine so we could do about 10 to 15 kilos of plastic at a time. We were turning a zero-value product (waste plastic) into a value-added product (fuel).”

While the project was eventually discontinued due to costs, Alex learned a powerful lesson – and it is one that is fueling his own future.

“We need to find innovative solutions to the problems we’re facing,” he says. “A lot of times I’ve been working on cutting-edge projects that have not been commercially proven yet. But to me, that’s where change happens, from a technological point of view.”

Alex has moved back to Vermont, where he is now a sustainable manufacturing research & development engineer for the technology start-up Synticos. Alex and his team are building a system to reduce the cost and environmental impact of a manufacturing process.

Alex believes that it is up to everyone to ask themselves a few important questions: What issues or problems do I feel passionate about? What skill set can I bring to solving them? What do I need to learn in order to be able to *do* something about it?

“If you have an awesome skill, and you’re trying to solve a problem, you’ll need help from someone else,” Alex says. “Then it’s all about collaboration: talking about problems with friends, talking about ideas that you can build together.”

*The future will be green, or not at all.*

Jonathon Porritt

**Call to Action:** Identify a problem you feel passionate about and figure out what skills you need to learn so you can *do* something about it. Find others who can work with you to create a solution. Learn more about Alex’s work in technological solutions to climate change problems. <https://www.roadpitch.co/pitcher/synticos-llc/>

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