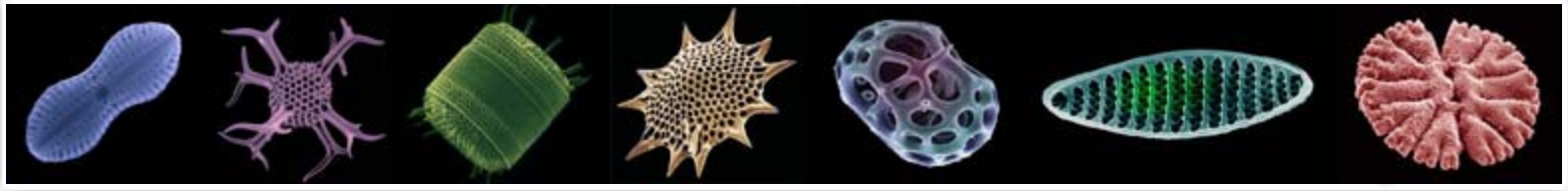
PLANKTOS



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search...

Question and Answer

How long after iron injection do you get measurable results?

Question: "Yes I am retired from the Utilities and Environmental Profession. That's a fascinating introduction to this. Can Russ speak to how soon after iron injections do you get measurable results? Could you discuss, compare, contrast to fossil fuels emissions controls you have received from this alternative?"

Russ: Yes, the ocean has an infinitesimal amount of iron in it as a natural source. The open ocean far from land has only 1-3 parts per trillion iron as a natural source. And only when dust storms or sometimes ocean upwellings occur does iron reach concentrations of 30-100 parts per trillion in the ocean, and that's the level needed to stimulate and sustain an ocean plankton bloom. The ocean has evolved as a system to be able to use iron instantaneously, effectively.

When iron arrives in the ocean, within a matter of days, the ocean turns from blue to green, and the bloom begins. The bloom recycles all of the nutrients over a course of perhaps six months until it depletes the major nutrients, the nitrates and phosphates in the system over that local patch. So the process of an ocean plankton bloom is exceedingly rapid. And if you can create a large bloom like Mother Nature does, and our blooms will only be on the order of 1 percent of a natural bloom. That's a commercially viable size for us. We think we will be able to sequester millions of tons of carbon dioxide in those blooms but they will still be small enough to be commercial pilot projects. So we're testing the three part experiment. Ocean science to date has spent tens of millions of dollars testing the pure academic science research on the blooms.

They haven't looked at the economic or the engineering requirements of whether you can create a bloom economically and sustain it and produced a form of carbon that the carbon credit market will like, or will want to take. We've had a lot of customers from the international community explore this with us. We're certain that already the economics is partially solved. It seems to be the customer base is ready and waiting. They're waiting for the boat to get out to sea and for the real data to show the amount of carbon that's there that's in a verified form.

We have to also convince the political community. That's the third part of a pilot project, to show the regulatory agencies that this new commercial method is acceptable. Just like when somebody has to introduce a new scrubber technology in a smokestack. They don't immediately install the new scrubber in every smokestack that they can sell it to.

They first install it in a few as a pilot project and get the real detailed, commercial stats, information on it. And so our first few blooms will be commercial scale, but they are pilot projects. And one of the keys about the carbon market is transparency. The world will only accept carbon credit tons that are produced, verified, certified in a very transparent fashion. We're not producing a product that you will ever hold in your hand.

We are producing the absence of that something, of a harmful product in the air. The science that certifies, verifies the relocation of carbon dioxide which is what we're in the business of. From the place in the atmosphere where it's a dangerous bad gas. We do kind of an eco-judo; we take carbon dioxide which is a bad product in the atmosphere because it makes global warming.

As soon as you employ green plants into the equation iron becomes a rich vital plant nutrient that becomes a sustaining force for a vibrant thriving ecosystem. And in the course of doing that, sequesters tons of carbon dioxide and produces that valuable product. So we think this year, that we'll be producing millions of tons of that valuable product.

Back to Top

Can you talk about the carbon market and the verification process?

Question: "Could you explain? Have you sold the credits already? When will you sell the credits? And how do

you do this verification process especially since there is a lot of skeptical voices about whether or not you can rely on this process as a way to sequester carbon dioxide?"

Russ: Well we're in the process of negotiating delivery contracts to sell the credits to buyers. And that process has clauses where the sale is subject to satisfactory third party verification, certification mechanisms, where the buyers are satisfied that the methods we employed pass the test of independent review. So we know that we can measure the carbon depth in the ocean, at the surface and at depth, through a variety of means. We have a spectacular fleet of satellites, for instance.

One scientist from Scripps University, Scripps Oceanographic institute in California who calibrates some of the ocean sensors on the satellites, has published work where he says he can measure milligrams of carbon per cubic meter from space. From the source to a thousand meters depth. So that kind of technology is available.

Back to Top

How do you monitor the carbon sequestered and is there a control?

Question: "I'm sorry. So you measure it somehow from the sky, and then you a test area where you don't add iron?"

Russ: Of course, so we have a control. There's always a control area nearby, where we haven't added iron. And if it doesn't bloom and the patch where we've added iron does bloom, then we can say its cause and effect. So we produce the bloom. We can measure it both from satellite observations and from air borne observations. We'll meaure from the ship, the surface, and from the instrument packages that we lower down into the water column to great depth and pull up samples.

So we have sort of a multi-layered sensing system as well as being able to deploy remote sensing, autonomous sea satellites into the bloom that will drift with the bloom and will constantly measure key characteristics and allow us to do our calculations, our data reduction, which are called models, and to run the carbon models on the data streams.

And make accurate measurements of how many tons of carbon dioxide has repositioned itself into different forms.

Back to Top

Have you already sold credits?

Question: "Have you already sold credits?"

Russ: Well, we are in the process of selling credits because we are in the process of growing forests as well. So we have trees, and sea programs. And forests are a much easier sale. So a couple of years ago, a major utility industry executive, who loved the ocean project, said to me, well the ocean project is so new we don't understand it, can't you possibly grow forest projects?

Because we buy blended fuel supplies all the time for our energy plants. Because if you sold us a blended carbon credits, some of the familiar forest carbon with some of the unfamiliar ocean carbon, we'd find it a more palatable mix. Because the ocean is so brand new. But these will be the first projects that have ever grown substantial tons of measured, verified, carbon value and been able to offer those onto the market.

So we're not actually selling any, at the moment. But the carbon market is sort of an annual market, so the carbon market lies with a vantage of a year, and with a label from the former. A one ton or carbon credit, is not the same for every source.

It's kind of like wine. There are really great quality carbon credits and there are some lower quality carbon credits and the price varies. The forest credits that we are growing in the National Parks of the European Union are about as delicious as the market can dream of.

Everyone believes that a tree, a forest growing in a National Park is well protected and serves so many uses that that's a really good way to solve your problems. We think they'll discover that the ocean products are equally valuable, but they're in an introductory stage.

Back to Top

What verification do you presently have?

Question: "What verification do you presently have?"

Russ: Well, we're working with several different leading third party verifying groups to develop the methodology. Since ocean carbon credits have never been sold, everybody is at square one. So we're developing those mechanisms and many of the third parties verifying organization are talking to us because they're very eager to develop their business, which is watching over us on behalf of the regulators. So we're working with those people very closely.

Dr. Brown: Just a comment, Russ, in your presentation, you introduced a paradox in the argument by looking at the issue of the Sahara dust, and the dust transport system. There are many of us who are very concerned about the march of the deserts. We'd like to control this; we'd like to reduce it. In Asia, for example, the land

use patterns are changing and reclaiming the desert. Now if we were to reduce that surface area in area would we not diminish or deplete the transport ability of the iron, and therefore compound that problem?

Russ: Yes, and in fact that's very much what's happening and the reason why the North Pacific has lost 20 percent of its productivity is because of the Dry Lands of the world. Dry Lands are place where they grow grass, and it's green in the spring and brown in the summer. And those are the major sources of circulating dust on the planet. And so places like the Asian continent, the Gobi Desert of Mongolia, have been the primary sources, contributors of dust to the Northern Hemisphere.

Well, the dramatic rise in agriculture, especially winter wheat farming in that part of the world has enormously affected and depleted the amount of circulating dust that blows off the ground. If you have grass growing on the ground, we call that groundcover that protects the land, dirt from blowing away. Well that dust in the wind was not a problem for the ocean, it was a viable nutrient.

So the grasslands of the world are growing greener because of high carbon dioxide. The reason why they grow brown in the summer is because they run out of water. And the reason why they run out of water is that the water is drying up and they have to exchange gases to get the CO2 out of the atmosphere. That's when they dry up

Well, with 40% more CO2 in the atmosphere today then there was 100 years ago, the dry lands grasses are demonstrably and measurably greener for a few weeks more each year. And they're providing much better ground cover to the land, and the planet. And that's the worst thing in the world for the world's oceans that could happen. Even becoming a greener environment on land does not mean you have a green ocean environment.

Back to Top

Where does your funding come from?

Question: "Where do you get the money now? You sell some carbon credits, but where do you get the money?"

Russ: Well, we're a private, for-profit company that has been raising money in adventure capital and investment banking in North America, but more importantly in the European Union. Presently, our funding has come from the investment community, because we will be a publicly trading company very shortly.

That provides a liquidity mechanism for those investment groups to do the right thing, and invest in green solutions. And in fact it's proof that the Kyoto accord has been a fantastic success. Kyoto was not designed to provide the solution to global warming and climate change but it was designed to be a big financial incentive for people to invent technologies to solve this problem.

We think we're proof of this success of the Kyoto accord. We've been able to attract for-profit funding into a region, a topic, that has only historically been funded by government grants or charitable contributions. And now people can say, well wait a minute, you actually can save the world, and make a little money on the side in this business. In fact that's our corporate mantra that we keep chanting and it seems to be working.

Kyle Hence: I just wanted to add that there is a part of Senator Lieberman's bill, S-280, that says they will provide money to help develop these technologies. So there is money in the pipeline down the road to advance this science and this application further.

David: I think once you break through the initial resistance you are going to find that it's going to be a stampede into this field. The science is developing very rapidly and hopefully the political climate for it will be euphoric also. Any more questions?

Back to Top

What is the time frame for the pilot plankton blooms?

Question: "What's the time frame? When are you going to sail this thing? There are six pilot projects going up? How long does each go up?"

Russ: The Voyage of Recovery starts tomorrow morning from the Potomac River. 150 some years ago Darwin took the Voyage of Discovery to the Galapagos Islands. Tomorrow morning, the Weather Bird begins the Voyage of Recovery back to the Galapagos Islands. We'll be putting iron in the international waters, in that region of the Pacific, which happens to be an ideal place. It happens to be very rich in nutrients and very low in iron. It has been shown to be a part of the ocean that can be restored, very readily, by this method.

And we'll have iron in water the by late April or May. And there will be vital green plankton blooms growing there. And we hope to have the internet connections on board through satellite technologies so that our Planktos educational sites can broadcast some educational programs on exactly what phytoplankton look like in the process of eco-restoration, etc.

Follow Up Question: "So it takes about a month to get out there?"

Russ: Yeah, I think so. It takes a while. You have to travel through the Panama Canal and bring scientific gear on board and bring science teams on board. Science teams have already applied to come on board from the National Science Foundations of different countries in the European Union, from the university and other groups in North America, from Japan and from Australia.

We're just putting out a request for proposals for other science groups to come aboard.

Second Follow Up Question: "So that's the first pilot project in the Galapagos. What are you looking at for follow-on pilot projects?"

Russ: Well we're planning on doing six. We expect the first one to be successful. But we'll do a series of pilot projects. Those will take place probably over a course of two years. And we hope those will take place in all of the oceans, so that we have a good representative sample of how this works in different regions of the world.

Back to Top

What are the ocean regulations and are there any negative impacts from the blooms you create?

Question: "Does anyone regulate what you do? Or can you just go scatter iron wherever you want to and are there any negative impact on the environment of what you plan to do?"

Russ: There are regulations that govern putting substances into the ocean, international regulations, but the concentrations of the materials we put in are almost homeopathic medicine, parts per trillion. If you think about normal fertilizer used to grow plants on land. You change the concentration of nitrates in your lawn by a part per thousand when you put fertilizer on your lawn.

In the ocean, to green up the ocean, you need to change the concentration of iron by tens of parts per trillion. If you think about how tiny that amount is, it is almost an immeasurable amount.

Follow Up Question: "Will fish die? Or will anything be harmed?"

Russ: No, there have been no deleterious effects shown in any of the other experiments. And also, Mother Nature does this on a regular basis, a constant basis through dust storms. And the material she takes to the ocean through a dust storm is an identical material. It's the red hematite iron ore that happens to be mixed with dirt. If you look at dirt on land and it looks reddish, it's 2 or 3 percent iron. So that's a very low grade iron ore deposit.

But if you go to an iron ore deposit, that might be upstream from that red clay, and you might be able to dig dirt out of the ground that's 60 or 70 percent iron. So, we choose to take the dirt from high grade iron dirt as opposed to low grade iron dirt. Mother Nature doesn't have the luxury of doing that. She has to take what she can get. And so the process is as close to mimicking a natural process as one could possibly do.

In all the 200 years of ocean science we've never seen a harmful pelagic plankton bloom. Red tides, those are

exclusively near shore, where iron is not in a deficit of emissions. Its iron replete water, as opposed to iron deplete water. In the pelagic zone, there's never been a harmful algal bloom ever reported.

Back to Top

What is the quantity of iron?

Question: "So, where are you going to get the iron from? And how much are you going to put in the first time out?"

Russ: What you have to put in the ocean is sufficient to maintain the concentration at these 50 parts per trillion levels for a number of weeks. So there's a hundred by hundred kilometer patch of ocean, some ten of tons, goes into that patch. Tens of tons of iron ore. But that's a very small amount, considering the size and the potency of the iron ore.

Follow Up Question: "But you're going to have tens of tons of iron on the boat?"

Russ: Yes. When we put in the ocean we mix it in the tank in the boat, and we use a standard garden hose to trickle a garden hose stream of the red mixture off the stern of the boat. It is mixed in the ship's wake.

So it's not like there is a massive volume of material. And it quickly dilutes. If you look at this picture, that streak of redness is really so rich because it's a dye. It's the pigment. All red paint in the world is made form hematite iron ore. Or red lipstick. It's a natural pigment. Anytime you see something red, it's hematite iron pigment that's making it red. That's the primary red substance on the planet.

Back to Top

Where do you get the iron?

Question: "So what's your source for the iron? Where are you going to get it?"

Russ: We buy it from iron ore producers. We buy an ultra, ultra fine dust, where the dust particle is smaller than that that blows in the wind, so that it won't sink.

Follow Up Question: "And how do you get it at the level of the ocean that you want it to be? Because you

said you don't want it at the surface?"

Russ: Well, you do want it at the surface. No, the plants all live near the surface. So you want to keep the iron as close to the surface as possible. And that's where the phytoplankton are churning and mixing. They pull the iron out of the system, and they use it to enhance photosynthesis. The atoms of iron sort of decorate the surface of chlorophyll molecules and in doing so enormously increase the efficiency of chlorophyll in capturing the sun's energy.

Follow Up Question 2: "When you showed the slide that showed the depths."

Russ: This is what we have to do in order to show, that to produce a carbon credit ton, some of the plankton sink. For instance, a Japanese study at a major ocean science conference last year I attended last year studied what in ocean science is called a fecal pellet express.

So what is it that sinks fastest to the bottom? It's the fecal pellets of the animals that eat phytoplankton. The coco pods, krill, and shrimp like creatures. So the Japanese studies looked at two big natural plankton blooms and in one of the studies they found that 27% of the bloom biomass was showing up as fecal pellets that were rapidly sinking to the bottom.

And in the other one, it was something like 36% was in fecal pellets. So that's an enormous export of atmospheric carbon that's been processed. A lot of the nutrient value of the biomass has gone into growing that animal life and rejuvenating the ocean's food chain but the waste material is going to great depth. So that's a rapid export mechanism.

Bill: It's also called marine snow.

Russ: And that's what we have to show. So the fact that you can do that. That there's technology for measuring zooplankton poop that's sinking under a plankton bloom. There's a scatological side of ocean science.

Follow Up Question 3: "So then, it's going to be, world saved by plankton poop, or something like that?"

David: Framing comes in, that's why we go to marine snow.

Back to Top

Are Planktos carbon credits immediately valuable on the voluntary market?

Question: Speaking about measuring, one more question is: I understand that on the compliance market the community may need a bit more time to accept what Planktos is doing as far as terms of certification, but is there any reason why carbon credits cannot be immediately valuable on the voluntary market?

Russ: Yes, that's a really good question. Because the world is leaping to the task of helping to save the planet and so you can go to the Planktos website right now, and you can voluntarily reduce your carbon footprint. A typical family of four in North America emits about 20 tons of carbon dioxide in one year.

Well it costs us on a for-profit basis; we can sell carbon credits for about 5 bucks per ton by doing eco-restoration of the trees and seas of the planet. So if your family of four has a 20 ton footprint, that's a $100 per year of ecosystem restoration that you need to perform. Or $8 a month, you can voluntarily go carbon neutral at very low cost, if you employ the trees and seas of the planet.

And we're the middle man in that equitation

Follow Up Question: "And wouldn't that apply to companies, as well?"

Russ: Yeah, it's true, it does apply to companies. One of the major semi-conductor companies of the European Union called ST Microelectronics several years ago decided that they didn't wish to only meet the terms and conditions of the Kyoto Report, and reduce it's footprint by the 8 and 10 percent to what the Kyoto reductions were.

It wanted to go to zero, so it invested in a forestry project in Australia. It put up enough money, 145 million dollars to regrow the forest in Australia that would serve to reduce the carbon footprint of the corporation for the next 30 years. So there's a lot going on. Swiss Ray has recently done the same thing, to reduce its footprint 100%.

Way beyond, the regulatory requirements. And individuals are doing that all over the world. A lot of internet sites where you buy your airline tickets offer to sell you the reduction to the emissions of you airport flight.

In fact the unregulated market, voluntary market, has the opportunity to step up to the plate, and take care of the entire problem of the planet. People could voluntarily solve the bulk of the global warming problem, by simply chipping in and restoring the planet's ecosystems.

Are you the only company doing this?

Question: Are you the only ones doing this?

Russ: We're the only ones out in public who are doing this. We think that there are a couple of other companies who are working in secret. There have been a couple of new stories over the years. We know that this has to have transparency.

So that's why we hold press conferences and our very public about our work. It invites people to come. We live in the world of the high seas. On the high seas there are desperadoes out there, and we're sure that we'll be victims of them sooner or later.

Back to Top