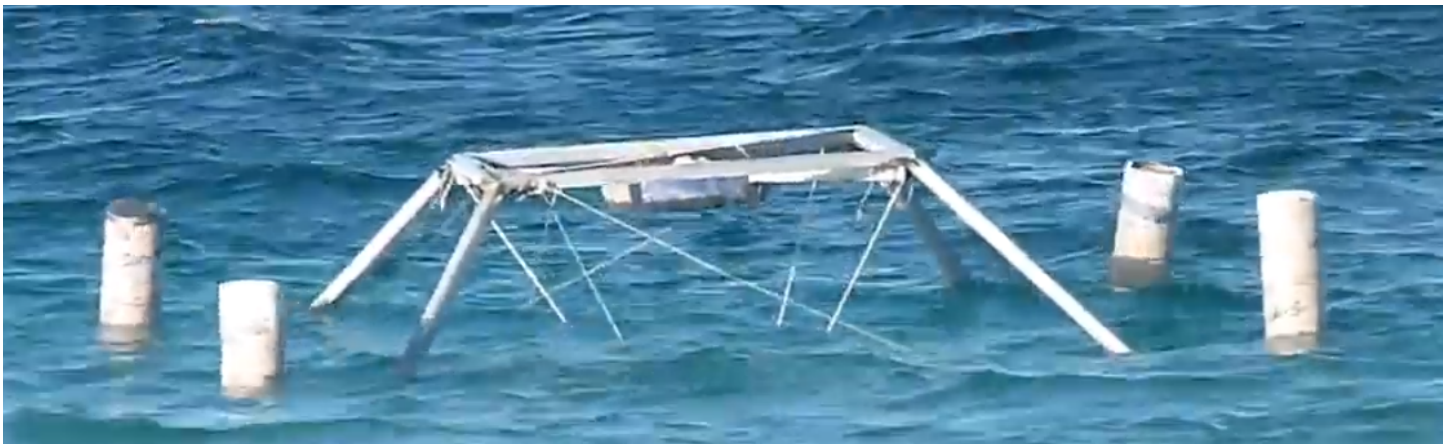
Seastead.AI Ltd. Business Plan

What is a Seastead?

The name "seastead" comes from "sea" and "homestead". A seastead is a floating home designed to move through international waters, allowing its residents to change legal jurisdictions if they choose to. A seastead is designed with spacious living and low cost in mind, with reduced motion being a priority over speed and lifting capacity. Our seasteads will be solar and electric, no gas or diesel at all.

To clarify, we will classify pleasure boats under 40 feet as "cruisers," those between 40 and 70 feet as "yachts," and those above 70 feet as "superyachts." Our objective when designing the seastead is to create a product with the price point of a cruiser, the living space of a yacht, and the stability of a superyacht. If we accomplish this, individuals who are not in a rush may find our seastead to be an appealing choice.

Theory

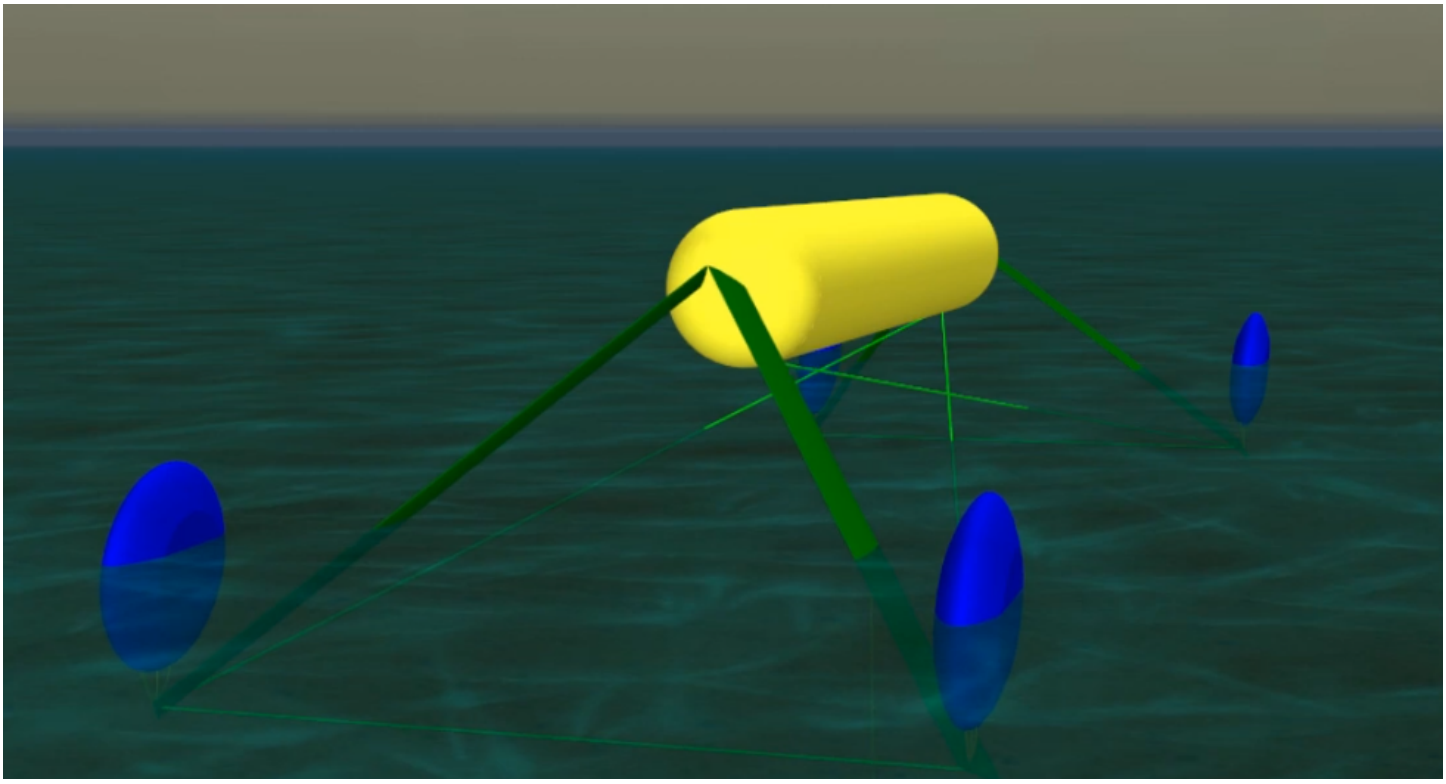


The cost of boats is roughly proportional to the weight. The weight of a normal boat is roughly proportional to the cube of the length. So large boats are very expensive. We have designs that give us a large length, so waves are less of a problem, with far less weight than a normal boat of similar length. Floats with a small waterline area, like above, means that as a wave goes up it does not change the lifting force so suddenly, helping to give a gentle motion. If the floats are 100 feet apart then a 5 foot wave is never going to tip the seastead nearly as abruptly as the same wave might tip a 35 foot boat. This has been confirmed with experiments using models in real waves like that above.

Part of the stability of a sailboat comes from the wind pushing on the sail so the sailboat does not roll too much in the waves. Part of the stability of a powerboat comes from its speed and sort of averaging out the effects of many different waves. A slow solar powered regular boat would be less comfortable than either a regular sailboat or a regular powerboat. We need to design in much greater stability so that moving slowly on solar is comfortable.

Designs

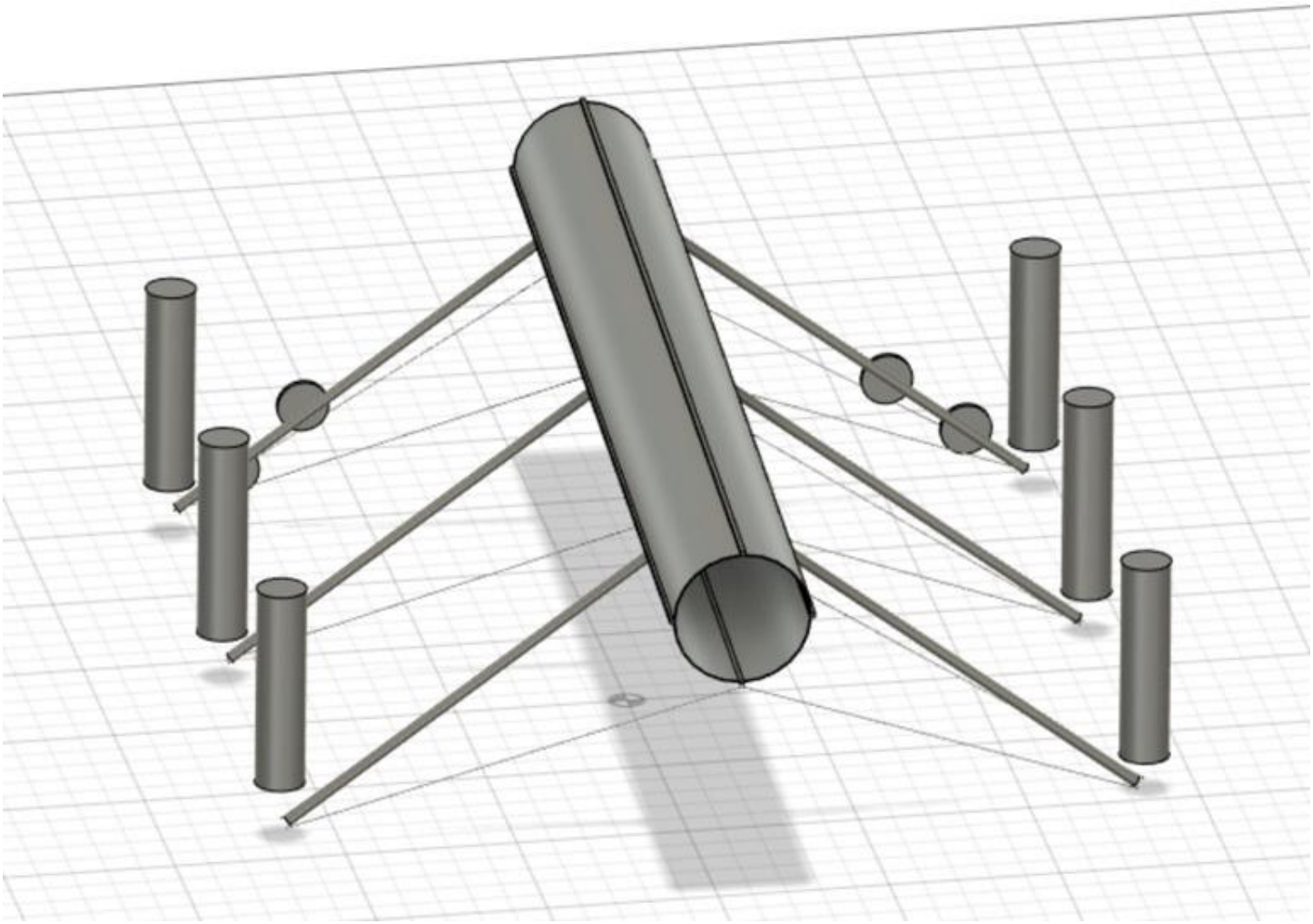
Our general plan is to have a “body” where people and equipment are above the water. Then there are “legs” that go down into the water. Then cables connect the legs to “floats” that support the weight of everything. There are also cables that hold the legs in position. We will test out different possible designs for each of these components and also different combinations of the components.



In the above simulation the yellow part is the “body” or living space, the green the “legs” and the blue the “floats”. These legs are shaped like a wing so they can move through the water easily. The blue floats would have an electric motor on each side. With differential thrust each float could be turned independently. This will give us great maneuverability for such a large boat (perhaps 100 feet long).

The round shape is better for holding lots of solar and not getting pushed around by the wind too much but the first prototype will probably use a 40 foot container. We want to get some kind of prototype up fast so we can work on the software controlling the thrusters. We are also eager to see what the stability feels like on the actual ocean. In particular we hope it feels stable enough that you can work on a computer without too much distraction. Another question the early prototype can answer is how much electric power it takes to move at different speeds.

We might even have a Seastead with just 3 legs and 3 floats. This is simple but not as aerodynamic and does not have as much room for solar. For a customer who did not care at all about speed, it might be ok.



We might even have 6 legs and 6 floats. With this design it is possible to connect several seasteads into a sort of train on the water. We have tested models of trains of seasteads that worked well. This way different families might get together for a long voyage, or to work on some project. They could later separate and go their own ways.

Materials for Legs

The legs might be made of Green Heart logs, aluminum extruded in the shape of a wing, or titanium pipes. Green Heart is easy for prototypes.

The aluminum extruded wing shape would let the legs move through the water faster. Extruded aluminum is where they warm up the aluminum and then use a big press to squeeze it through a die to make some shape. This avoids lots of welding and lowers costs.

The wing shape has the additional benefit of resisting rolling or pitching motions. It has a wide side resisting such motion. So a wing shaped leg would help give a seastead a gentle motion.

The advantage of titanium is that titanium is so hard that no sea creatures can damage it. With titanium you could let stuff grow on the legs without any worry that they would damage them. It could eventually be a sort of floating reef. But titanium costs more and would not be in a wing shape. We will experiment to see how much slower it would be than the wing shape and how much more costly it will be. We might have titanium legs as an option or perhaps it becomes the default and wing shaped aluminum legs become an option.

Materials for Floats

The first prototype seasteads will probably use large ship bumpers as floats. The end of the float will be connected to a leg so that it orients vertically in the water giving a small waterline area. A small waterline area means waves don't change the lift force too quickly, giving a soft ride. It is also easy and fast to buy these.

Longer term using two aluminum "dished ends" welded together to make sort of a flying saucer on its side seems promising. There are presses that make "dished ends" as caps for large cylindrical containers. These might be 12 foot in diameter. Because they make these dished ends in volume without any welding the price is low compared to normal aluminum boat construction pricing. We could even buy one of these presses to make dished ends on our own. The cost of such a press is around $35,000 though with shipping and duty it will come to more. These would each move through the water much like a 12 foot boat. We would have 4 on each seastead. Steering each float with two thrusters would give great control.

It may be possible to make wing shaped floats that can move through the water more easily and provide a very soft motion. We are talking with suppliers about possible designs for this.

Thrusters

Our seasteads will move at slower speeds than normal boats. Moving through the water at slow speeds requires less power. At slow speeds it is more efficient to have larger propellers. We may be ok by using 8 trolling motors to get the effect of a larger propeller. However, we may have to do a more custom design with a very large propeller. Someone on the Internet used 3 foot propellers designed for large drones to push a slow boat very efficiently. We bought some of these large propellers and some motors so we can also experiment with this sort of option.

Designing for Safety

We intend to eventually have an extremely safe design and will be working towards this all along the way.

Because the living area is above the water there is no danger of leaks in the living area sinking things.

The floats will be filled with foam so even if punctured they will not sink. If one of our seasteads runs into a floating log at night it should not be a big problem.

There will be multiple chains connecting the floats to the legs giving redundancy here.

The body will be able to float upright on its own even if all the legs were to come off. The weight of batteries and other heavy things will be low in the body. It will also float upright if just the front two legs or the back two legs were to come off.

The body will have enough foam inside that even if it were to lose the legs so it is down in the water and get large punctures, it still would not sink.

The solar panels, controllers, and battery banks will be designed with redundancy to ensure that the whole power system does not go offline if some parts fail.

We will have 8 thrusters and will be able to continue to operate even with multiple thruster failures.

We will have a lifeboat.

We will have starlink for worldwide communications and also emergency communications like EPRB.

The seastead will be so wide and long that it would take a really huge wave to tip it over.

My boys and I will be the test pilots so we have a real personal interest in designing for safety.

Crane

We have ordered a crane to assist in assembling different seastead designs on our lot in Sandy Ground. We will also use the same crane to lift seasteads into the water or take them out. The crane is an 85 ton crane and our initial seasteads may only be around 10 tons. This should let the crane lift them with a long boom, maybe 100 feet.

We are buying the containers the crane will ship in. This will give us containers to use for storage space and containers for prototype seasteads.

Solar

The first cylindrical body may be 12 foot in diameter and 40 feet long. The top half will be covered with solar. This is a lot of solar area.

At some slow speed the solar will be enough to power the motors without draining the batteries, but we can only estimate this. Perhaps it will be 1 mph. So in practice we will probably charge batteries for a couple days at one island and then mostly use batteries to move to the next island at a more reasonable speed like 3 mph.

If we can go 25 hours at 3 mph that would mean it could move to an island as far as 75 miles away. We don't know the exact numbers, and in practice there will be safety margins, but this gives an idea of the kind of thing we are aiming for. Lithium Iron Phosphate batteries are light enough and cheap enough that it seems practical to have enough batteries to move such a distance.

Software

There is open source boating software for displaying charts, planning routes, logging measurements, and autopilot. We will use some of this software. We will also add some of our own low-level to control the 8 thrusters. Over the years we have made a model that our own software controlled and also had hardware and software that controlled trolling motors similar to the ones we plan to use. So we are confident we can get the software to work.

Development Plan

We believe the "rapid prototyping" strategy is a good one for us. We want to test things out and gain experience as we go along. This is a new type of design so there is not a set of guidelines anywhere or any people experienced at this sort of design. So we want to get a prototype on the water fast. The basic design of body, legs, and floats is very modular so we can swap out and try different floats, legs, and body as we get those. We can measure how much each changes speed or stability.

The initial floats, legs, and body will be ship bumpers, greenheart logs, and a shipping container. Eventually we expect to use floats made from dished ends, wing shaped legs, and a cylindrical aluminum body.

The first time we launch a seastead it will not have solar, computers, or thrusters. We will just check that the structure works out. We will use another boat to pull it out of the harbor into some waves and observe and measure things.

Next we will add thrusters, small batteries and computers. There will probably be 8 electric thrusters with 2 on each float so that the 4 floats can be turned by the thruster. So we might turn the front 2 floats to the right and the back 2 floats to the left to turn sharply to the right. We might also aim the body into the wind but have the floats aimed in a different direction. The software development to control all of this will be fun and interesting.

At first we may just charge the batteries before launching and have a small amount of solar. The batteries will be enough for testing, not going to other islands. We will measure how much power is needed at different speeds and so be able to decide how much battery capacity we will need. We will test this with different legs and floats to see what the numbers are for each. Once we have this we can start testing our software.

Next we will put on a full set of solar and batteries.

Moving parts, like the chain connecting the legs to the floats, will wear. We will check the wear very often in the development stage. There will also be secondary chains if the first were to fail. We need to find a type and size of connector/chain that will last a reasonable length of time.

Once we have a stable and reliable platform we will start to make the interior nice. Things like air conditioning, insulation, bathroom, shower, bed, fridge, freezer, stove, washing machine, dryer, dishwasher, etc.

With a comfortable interior we can start doing longer and longer test runs. Instead of a couple hours we might be going out for a couple of weeks.

After getting the first design near finished we will start on a next design. It may be that if the first design does not let seasteads connect together in trains that we work on that for the second design. It may be that we work on a larger design for the second design. We will learn more about which direction makes sense while making and marketing the first design so we can better decide which direction to go later. However, we will keep developing better and better seasteads.

Market

Compared to yachts or sailboats of similar living space our Seasteads will be more stable, slower, and cheaper. This should be enough differentiation to carve out a market niche. Some potential starting places are:

1) Older retired couples. A more stable platform reduces the chances of falling. Unlike a diesel boat, your life will never depend on your ability to maintain a combustion engine. Unlike a sailboat, you will never have to go out in stormy weather and change sails.
2) Younger couples. The lower cost of our seasteads could appeal to some younger couples.
3) Fishing. With lots of solar power and stability it is reasonable to go fishing for a week or more at a time so you can fish further from land. There will be plenty of electricity to operate freezers for fish. Not having to pay for expensive gasoline or diesel could save the fisherman lots of money. A seastead that is stationary or moving slowly should act as a "Fish Aggregating Device" or "FAD". It could make catching fish particularly easy.
4) Digital Nomads. Many people are able to work from home these days. With Starlink a seastead can be a fine home for a digital nomad.
5) Ocean Research. A normal ocean research vessel large enough to spend weeks in the open ocean costs lots of money to buy and to operate. A seastead can provide enough stability to stay in the open ocean for weeks. The purchase and operating costs of a seastead will be far lower than ocean research vessels.
6) Tourism. Spending a week fishing in the open ocean and cooking/eating fresh fish could be a fun vacation for some people.
7) Survivalists. There are people who want to be prepared to handle various possible hard scenarios like war, plague, famine, hyperinflation, societal breakdown, or whatever. A seastead that produces its own power and water, lets you catch fish, can hold a year's supply of food, and can get you hundreds of miles away from problems will probably appeal to some of these people.
8) Solar Enthusiasts. People who don't like the noise and CO2 of large engines but who also don't want to take the time to develop the skills to operate a sailboat.
9) Aquaculture. Raising fish in a pen in the open ocean would be easier if you can live in a seastead next to the pen. This can make that much more affordable.

Marketing

We will make youtube videos showing what life living on a Seastead in the Caribbean is like. Since the Seastead will be novel and interesting we expect that some of these videos will be shared widely. We should be able to get the word out without spending money on advertising.

Competition

There is only one other company, Ocean Builders in Panama, that is making Seasteads. They expect to deliver their first seasteads to customers this year. However, these seasteads are not for

open ocean and do not move on their own power. Their seasteads are also in a higher price range than we expect to be. Our product and theirs are different enough that there will be some customers only interested in one or the other.

Financing

Vincent Cate has made money through his ownership of Cate.ai Ltd, which generates revenue from its ownership of DataHaven.net Ltd, which in turn generates revenue from .ai domain sales. This has been a substantial amount of money and seems to be growing. It is hoped and expected that Vincent Cate has or will have sufficient funds to get Seasteads to the production stage. It is not known how long this will take, but hopefully less than 2 years.

Location

The company Seastead.AI Ltd. is solely owned by Vincent Cate. Vincent Cate acquired 1.2 acres of beach land in Sandy Ground on Feb 15h. The lot is located between The Government port area and the Mariner's resort land. This lot will be used by Seastead.AI Ltd. to develop and eventually produce Seasteads.

Financial Projections

We have spent about $800,000 US on the land. The crane will be around $200,000 US. Probably we will spend another $500,000 US in the first year on different seastead parts and labor. So about $1.5 million US will be spent in the first year. There will be no sales in the first year.

The second year may be another $500,000 US in parts and labor. By some time in the second year we expect to have a prototype Seastead working well enough that there are some potential customers interested in getting in line for a purchase. If the Seastead will sell for $250,000 US we might take a deposit of $50,000 US to hold a place in line. Perhaps we will have 5 such deposits in the second year.

The third year we hope to have done enough testing that it is safe to actually start shipping Seasteads. If we can ship two before the end of the year we can probably cover our costs for the year. By the end of the 3rd year we hope to be in a position to make and sell one seastead each month.

The fourth year we hope to ramp up production and sales to 1 seastead per week.

Family

Seastead development is also a good project for Vincent Cate and his four sons to work on. This will give the boys jobs doing meaningful and interesting work where they will learn many things. Starting up a company they will learn about hardware and software development, marketing, sales, customer support, etc.

Seasteading is an idea that Vincent Cate has thought about and felt passionate about for more than 30 years. You can see many youtube videos where my boys and I tested many different model designs as they have grown up. Now that we have the money to do so, we want to start building and testing full sized seasteads.

Engineers transform dreams into reality. I want my boys to experience the work, fun, and excitement of doing this.

Legal

Our seasteads will move through the water on their own power so will legally be some type of vessel.

Anguilla follows the The Maritime and Coastguard Agency (MCA). The MCA defines an “experimental vessel” as one that is "designed or adapted for the purpose of undertaking scientific or experimental work, or is used for the development of new or innovative technology". We will probably qualify for this “experimental vessel” type of license during the development and testing phase. Experimental vessels are not allowed to carry passengers or cargo for hire, so we won’t do that.

It may be possible to have the body of the seastead qualify as a boat and have the legs count legally as “stabilizers”. We might even be able to use an existing licensed boat as the body.

Along with getting a license for the seastead we may need insurance. This could be a hard problem as insurance companies have no historical data to use to compute rates.

To wire money to buy things for building the Seasteads the bank would rather I had a bank account for Seastead.ai Ltd so I have tried to open one. To get the bank account they want a business license. I won’t be selling things for a long time, as first comes a lot of research and testing. So while it does not feel like I will be “doing business” soon, I do need a business license.

Eventually it is probably reasonable to have rented seasteads pay Anguilla Villa Tax. So it could contribute to government revenue.

I have a lawyer, Eustella Fontaine, and have also spoken with Gifford Connor about helping with the legal issues. We will work on the license issue while we are getting the parts and building the Seastead. We will get some kind of license before we launch the Seastead.

Vincent Cate

March 8, 2023