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Question: *What is your international expansion roadmap? Are you planning or operating pilot demonstration or commercial scale projects outside of the Netherlands and beyond Europe? Always glad to learn about your strategy towards Latin America, Mexico in specific.*

Answer SeaCurrent: As SeaCurrent we operate a test site near Ameland (NL) where we will deploy our first integrated demonstrator unit as well as an improved version with more wings. We focus on Ireland, UK and France as first target markets in Europe, next to the Benelux.

Answer Kitepower: We currently operate from an R&D test location in the Netherlands and are opening the first dedicated Airborne Wind Energy site together with utility RWE in County Mayo, Ireland in September this year. Our first international deployment was in 2021 in the Caribbean on Aruba for a project with the Dutch Ministry of Defence. We are also starting up operations in Spain with a local utility engineering partner with a first likely project on the island of La Gomera. We are open to explore opportunities outside of Europe and would be happy to discuss opportunities in Latin America and Mexico.

Question: *Kitepower, I have a good prospect for your technology on my mind. I don't think they know about your technology.*

Answer Kitepower: We are always looking for new applications and markets for our airborne wind energy technology as we aim to put our system in the hands of customers to create clean energy with minimal environmental impact. Happy to discuss with you the opportunity you have in mind.

Question: *How is the invention cost-effective and what does it take to replace the non-renewable energy source that we currently utilize?*

Answer SeaCurrent: A kite is a low material, cost-effective structure. The SeaCurrent TidalKite can be towed for deployment by small standard vessels, limiting marine operations cost for deployment substantially. Effective maintenance is done on land in a workshop. The kite has a high energy yield to limit the cost per unit of production.

For tidal energy to become preferred over fossil electricity production, its merits should be recognised and monetised. Next to CO2 emission reduction (a higher/more fair CO2 price would help, preferably in line with calculations as performed for the Dutch province of Utrecht), as well as reliability, predictability and security of (technology needed for) supply, landscape and grid tie-in and local economic spin-off.

Answer Kitepower: Our initial ambition at Kitepower is to replace / reduce diesel as a source of energy in places where currently diesel generators are used. Primary target markets include agriculture, construction and island communities for example. Although the capital investment to place a Kitepower system will be higher, operational cost will be significantly lower over the lifetime of our system.



Question: Is it possible to produce "green hydrogen" using kite power technologies? What would be the production cost of green hydrogen per kg?

Answer SeaCurrent: Electrification is generally seen as the most efficient carbon reduction approach, also for (E-)mobility and heat (pumps). Direct supply of electricity, also at times of low/no wind or solar availability is possible with the TidalKite.

Green hydrogen for reconversion to electricity is inefficient (~40% round trip efficiency) and should be avoided as much as possible, to which the TidalKite can contribute. Where hydrogen is needed for industrial processes, a predictable and more constant production profile is preferred to enable efficient operation of a size-limited and size-optimised hydrogen chain (electrolyser, transport, storage, etc). We specialise in underwater kites and don't know the details of hydrogen production (and storage, which shouldn't be forgotten, certainly not when based on wind and solar electricity). Our aim is to realise the first TidalKite projects at an LCOE of around 16 €/kWh and drive this cost level down.

Answer Kitepower: Producing hydrogen is indeed inefficient, but can be a great way to store energy when there is a surplus of renewables from wind and solar. Our key priority should be to continue to diversify with our renewables mix to ensure we have a more constant supply clean energy to match the times when we need it. However, any surplus energy production can always be stored as hydrogen, including surplus production from Kitepower Airborne Wind Energy Systems.

Question: Is it possible to use this technology for power generation (300 to 500 kW) of a 70 to 100 foot electric drive SWATH motor yacht, especially while underway?

Answer SeaCurrent: Electricity charging for vessels at sea is certainly a possibility. I believe it will first be an 'add-on', next to a grid connection, as likely not all produced power can be absorbed (year round) by vessels.

Answer Kitepower: We have been working with a ship builder in 2023 to develop a concept for a Kitepower system to be integrated on a yacht to produce energy when anchored, charge on ship batteries and replace diesel fuel completely.

We would not produce energy while in movement. There are some interesting concepts that you could look into: <http://www.oceanergy.com/> and <https://beyond-the-sea.com/en/>

Question: Do you have any plans for India?

Answer SeaCurrent: Yes, an interesting market. But not a first target market (we can't do everything in parallel) for SeaCurrent. The bay of Kuchch for example offers substantial tidal potential.

Answer Kitepower: We have not looked into India as a potential market yet. However, we do plan to offer our systems globally and would be open to discuss any partnership that allows us to accelerate commercialization outside of Europe.

Question: Will this interesting technology ever be able to compete with wind energy? Will the operational costs and the price per Kwh reach sufficiently low levels?

Answer SeaCurrent: We need all technologies to combat climate change and realise the energy transition. A mix of sources is logical, as this will be cheaper and more robust. As far as we see it, tidal energy is the cheaper solution for a continuous supply of renewable energy, as reducing storage is needed.

Answer Kitepower: We believe our Kitepower technology is complementary to wind since we access wind at higher altitude where there is more and more consistent wind. Adding Airborne Wind Energy will help diversify our renewable energy mix to ensure we have renewables available when we need them. Obviously, our scale of production is nowhere near what wind turbines can produce. However, we do plan for a scaling of systems and we have recently published a white paper on this topic, including potential pricing, through our industry association: <https://airbornewindeurope.org/wp-content/uploads/2023/03/BVGA-Getting-Airborne-White-Paper-220929.pdf>

Question: Could you please elaborate on specific use cases, i.e. location, population and/or user supplied, financing, intermittency mitigation?

Answer SeaCurrent: Many points you raise, some short reflections. The TidalKite fits well for islands and coastal regions. Ocean energy project developers, offshore wind operators, large baseload electricity consumers (e.g. data centers) are typical use cases. Tidal energy is available every day, complemented with a small storage to cover for the moments of high and low water, so that it can provide a continuous flow of renewable energy. Financing can be sourced locally and/or complemented with (Atradius) export finance.

Answer Kitepower: Our initial ambition at Kitepower is to replace / reduce diesel as a source of energy in places where currently diesel generators are used. Primary target markets include agriculture, construction and island communities for example. These initial use cases will be in near, remote or off-grid scenarios. Our technology how however is very suitable to scale and we also planning for larger grid-connected MW systems on our roadmap.

Question: What is the physical environment or geographic conditions required (terrain, water depth, wind/current exposure, flat, nature presence, no trees, etc.). to deploy each of the solutions? How common/available are those places and how relevant for energy requirements?

Answer SeaCurrent: For the TidalKite we require sufficient depth and sufficient water velocity. Ideally a reserved area is available, the TidalKite can certainly not be combined with bottom trawling fishing. Nature and other possible use combinations are location specific.

There are many such locations in coastal regions and near islands. Where land masses restrict (tidal) water flows, the water flow speed accelerates and concentrates of energy can be contained.

In Europe, the largest potential is found around Ireland, UK and France (British Channel region). Beyond, example markets with large potential are island nations as Indonesia, Philippines, Japan, but also countries with long coastlines with inlets and landmasses sticking out like China, Canada, New Zealand, Australia, India, US.

Answer Kitepower: Our Kitepower system requires a very low footprint on the ground (basically a 20 ft container) and has been certified to fly above sparsely populated areas. We do require a location with good wind conditions from 4 m/s and coastal regions are therefore a likely place to start. However, we can fly anywhere where there is enough wind and no large buildings are obstructing our flight path. Our operational height is 350 to 800 metres currently.

Question: I'm curious about the balance between technology development and business development for them.

Answer SeaCurrent: That is a very good question. We spend most efforts on technology development at the moment, but substantial efforts also on business development. One area of focus in latter area includes ecological impact on which our dedicated ecologist focuses. As an additional example, we focus on marine spatial planning, to get tidal energy included in the (future) zoning plans at sea.

Answer Kitepower: We have been exclusively operating as an R&D team since our spin-off from Delft University of Technology. However our research included some customer segments in test projects. In 2023 we started preparation for commercialization of our first smaller system which will allow us to build operational muscle in manufacturing, go-to-market and customer service. This happens in a second organizational stream next to our continued R&D stream where we are building a pipeline of scaled new products.

Next to our own R&D stream, we strongly benefit from our relationship with the Airborne Wind Energy research group at Delft University of Technology which remains the academic leader in our field. They continue to contribute to Kitepower as a shareholder and research partner.





Question: Expected capacity factor for prime / average / bad conditions.

Answer SeaCurrent: The expected capacity factor of the TidalKite is 40-45%. Obviously, this will depend heavily on site (water flow speed) conditions. There is hardly any difference between bad and average or good conditions. The tides follow the moon's position, which has a 29.5 day cycle (time it takes for the moon to make one orbit around the earth) which repeats itself.

Answer Kitepower: We anticipate a capacity factor of around 50% in suitable locations (above 4 m/s wind speed). We would not place our system in a bad location where there is no wind. If you are interested in more details, please have a look at this whitepaper: <https://airbornewindeurope.org/wp-content/uploads/2023/03/BVGA-Getting-Airborne-White-Paper-220929.pdf>

Question: What would be the main constraint in green hydrogen mission and associated risks in hydrogen gas handling?

Answer SeaCurrent: We don't envisage to produce or handle hydrogen as SeaCurrent, but gladly deliver green electricity for its production in a cooperation with a hydrogen expert company.

Answer Kitepower: For Kitepower the hydrogen handling is the same as for all other companies dealing with hydrogen on the land. Kitepower can provide the electricity to run the hydrogen electrolyser. Especially for Kitepower, the combination with a container-based electrolyser could be very valuable to power remote areas.

Question: Did you study impact to marine life of the sea kite and have your limit of disturbed/killed fish per year?

Answer SeaCurrent: Yes, we have performed ample impact studies of the TidalKite. One particular study relates to the implementation of the NEN8775 norm on the TidalKite. This is a norm for fish safety of pumps and turbines (in the Netherlands, more than half of the population lives below the sea level, so there is a lot of experience with pumping out water and fish). The norm has been adapted for application on the TidalKite and this was reviewed by the team that has composed the NEN8775 norm to confirm the safety of the TidalKite for fish. Key aspects are speed (impact collision risk) and shapes (more rounded shapes positively impact collision damage), that the TidalKite can control and positively differentiates in.



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We can share more in a personal conversation or demo, so feel free to contact us: info@kyos.com

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