**As you can probably tell by my accent, I live in the UK, which is one of the windiest countries in Europe. It’s a meteorological advantage that has enabled us to deploy no fewer than two and a half thousand huge wind turbines around the coast line of our little island, with a combined generating capacity of almost thirteen gigawatts, providing up to thirteen percent of Britain’s electricity. It’s not just us though, as I’m sure you know. Wind power is one of the fastest growing renewable energy sources in many parts of the world.**

**The laws of physics and fluid dynamics, which include the fact that wind speeds are generally faster at higher altitudes and that doubling the wind speed increases its energy by eight times, mean that wind turbines are growing ever larger in order to capture that energy and increase their efficiency. But it’s a pretty expensive business, with the largest turbines in the world now coming in at well over twelve million dollars to manufacture and install. Massive installations like these also, quite rightly, require extensive planning and regulatory permissions before they can proceed, and they typically require some kind of financial backing and guarantees from national governments to prevent them becoming very costly white elephants further down the line. For all those reasons, wind generation today remains almost exclusively the responsibility of larger, centralised state or national power producers and grids.**

**That fact hasn’t stopped a small but growing number of intrepid innovators from trying to harness the power of the wind at a micro generation level though. The potential prize of cheap, efficient, off-grid electricity has produced all sorts of weird and wonderful designs in recent years, one or two of which we’ve looked at on this channel.**

**And now there’s a new kid on the block, with a radical new roof mounted design that has no visible moving parts, makes no noise, and can be used in combination with solar panels, on the same roof, to provide a far more consistent and continuous flow of electrical power to the building below.**

**So, how does that work?**

**Hello and welcome to Just Have a Think**

**The innovation I’m referring to has been developed by a US start-up called Aeromine Technologies.**

**The design is really the culmination of a lifetime of experience in the wind industry for its inventor, Carsten Westergaard. Carsten started his career as a wind technician twenty-eight years ago and more recently has held senior executive positions with Vestas North America, and LM Wind Power. He developed this particular technological breakthrough in twenty sixteen in conjunction with Sandia National Labs, who are affiliated with the United States Department of Energy.**

**I caught up with Aeromine’s co-founder and CEO, David Asarnow, via Zoom recently to find out more about the system and the impact it could have on the wind energy market.**

**One of the major advantages that the Aeromine design has over pretty much all the other micro wind power generation systems that have come before, is that it has no exposed rotating blades or fins. We’ll take a closer look at how that actually works a bit later in the video, but one of the big bonuses of having no visible moving parts is that the unit is virtually silent in operation. That overcomes one of the main objections raised against existing roof mounted wind turbine technologies. It also means the construction of an Aeromine unit doesn’t require any expensive advanced materials like carbon fibre, which makes it relatively inexpensive to produce. Plus, it’s been designed to come apart very easily for shipping. That keeps costs down even further for regular customers, but it also means these units could be inexpensively deployed to remote locations, either as part of emergency disaster recovery or as a full-time installation.**

**The genius of the design lies in two main elements. The first is the shape of the static fins on the top section. They’re very similar to components that can be found on Formula One racing cars, which are there to optimise wind flow and aerodynamic interactions across the vehicle to keep it pinned firmly to the track and moving as fast as possible. Carsten Westergaard and his team applied those same fluid dynamic principles to arrive at the optimum shape for this particular application. The static wind foils exploit a phenomenon known as the Venturi Effect, named after an eighteenth-century Italian physicist, called Giovanni Battista Venturi, who first discovered it.**

**What Venturi found was that if a fluid is forced to flow through a constricted section of a pipe, its flow speed increases, and the fluid pressure drops. Fluids will always move from a high-pressure region to a low-pressure region in an attempt to equalize the overall system. It’s kind of how the shape of an aeroplane wings provides lift. Aeromine takes advantage of this phenomenon by positioning its units at the edge of a building and facing them towards the annually predominant wind direction. At the top of a buildings wall there’s a significant increase in wind speed as the air flowing up the wall is pressed over the roof. On a flat roof building that effect is particularly pronounced. The static aerofoils of the Aeromine unit have been optimised to create a negative pressure, which draws that rising air up even more quickly.**

**So, we’ve got a strong flow of air across our unit. All that’s needed now is to put an internal propellor generator into that air flow and connect a couple of wires to it to produce and electrical circuit that can then be fed directly into the building’s system. It’s really a very elegantly simple design that belies the many years of research and development in computer simulations and wind tunnels to arrive at the perfect shape.**

**And the fact that the Aeromine units run along the edge of the roof means that the rest of the roof is still available for an installation of solar PV panels. So, the building operator can potentially use two completely complimentary technologies to achieve much more consistent electricity generation over a longer period of each day. As solar energy starts to fade during the afternoon, the Aeromine system can continue to provide power well into the evening. And if the rooftop installations are partnered up with a battery energy storage system in the building’s plant room, then there’s the potential to operate almost entirely independently of grid power.**

**The units themselves are roughly three metres, or ten feet, in height with a power rating of five kilowatts. That means a single Aeromine unit has the same capacity as about sixteen standard solar panels but with a far smaller footprint. And because they have no moving parts and operate silently, they have a minimal environmental and visual impact, which means planning consents should be far easier to achieve too.**

**In Spring of twenty-twenty-two, Aeromine installed their first commercial pilot in the Detroit area in partnership with the German industrial giant BASF. BASF had apparently been looking for an on-site power generation solution for years that could work across their extensive international portfolio. They worked very closely with Aeromine, holding weekly discussions to iron out any issues to ensure the pilot installation was a success. If the numbers stack up, then the partnership with BASF could represent a huge opportunity for Aeromine to gain traction in Europe and elsewhere.**

**The original focus for Aeromine’s technology was the millions of large industrial buildings with flat rooftops that scatter the landscapes of the Unites States and most other countries around the world. But David Asarnow told me they’ve also had interest from multi-family developers and owners who are really prioritising on-site power generation for all the reasons of low carbon independence and sustainability that we’re all hearing so much about in the news these days. Those developers can see the opportunity to shave a little off their peak energy costs, and of course most of them are now planning their systems to be able to cope with the rapid deployment of the Electric Vehicle infrastructure that looks set to grow very rapidly in the coming years.**

**Now, as always, I suspect many of you good folks out there are keen to see the cold hard numbers like levelised cost of electricity and all of that lovely stuff.**

**At this early stage in their evolution the company are not yet divulging that information, but David Asarnow did confirm that the real-world performance of the units has been remarkably consistent with the efficiencies and costings produced by their computer simulations, and he reckons that, once they reach full scale production, the Aeromine units will be cheaper than solar panels, producing fifty percent more energy for the same cost.**

**That’s something I’ll keep an eye on in the coming months, and we may well come back to have another look at Aeromine in a year or so to review how they’re progressing.**

**In the meantime, though, this does look like a very promising technology that does away with many of the problems faced by other small micro wind generation solutions, so I’d be interested to see what you think. Could it be a real gamechanger, or do you see problems that we haven’t discussed here? If you’ve got industry experience of small wind power generation systems, then maybe you have some insights that you can share with us all. If you do then, as always, the place to do all that is in the comments section below.**

**That’s it for this week though. If you’ve found this video useful and informative, then please do give us a like and hit that subscribe button if you haven’t already done so.**

**And if you want to get actively involved in guiding the content of the channel, and get exclusive monthly content from me, then you can do just that by joining the channel’s amazing team of supporters over at Patreon, who make these videos possible.**

**And, if you’re keen to learn more about the smart sustainable technologies like this one, then I think you’ll enjoy this video too.**

**As always, thanks very much for watching, have a great week, and remember to Just Have a Think.**

**See you next week**