Wind Harvest

Technology Hardware Science Sustainability Energy

Double the Energy from Wind Farms

WINDHARVEST.COM SACRAMENTO CALIFORNIA

Wind Harvesters are ready to open a rich, unused source of energy: the turbulent near-ground wind gusting through 20% of wind farms. Our compact turbines can tap this power, be wildlife safe, and, when placed beneath, boost the output of tall turbines. Invest a new way to harvest renewable energy, reap profit--and help reverse global warming!

Kevin Wolf President, Co-Founder @ Wind Harvest

Why you may want to support us...

1. Our turbines harvest turbulent, unused near-ground wind.
2. Your investment receives 8-10% annual returns plus a potential 3 to 50X upside.
3. Wind Harvest has $5.5 million in its 2021 project pipeline, and $50+ million in 2022/23.
4. If today's wind farm understory market were fully utilized, it would be worth $250+ billion.
5. We have a senior team with eight decades in wind energy.
6. The Pilot Project milestones can be finished in early 2021.
7. Wind Harvest has raised $10M+. Its finance subsidiary, WHPP began with $60 in April 2020 .

Why investors ❤ us

WE'VE RAISED $60 SINCE OUR FOUNDING

Our team

AND OUR MAJOR ACCOMPLISHMENTS

Kevin Wolf
President, Co-Founder
30+ years helping businesses and organizations reach goals by consensus. Raised $6M for Wind Harvest. Chairs the CA Clean Money Action Fund to reduce the influence of big money in politics. Loves to be in nature with family and friends.

Dr. Ariana Marshall

Environmental Scientist

Leads our efforts to analyze the cumulative environmental, cultural and economic impacts that large installations of Wind Harvester would have on Caribbean islands such as Barbados where she lives.

Peder Hansen

Chief Engineer

Danish American, 25+ years of wind energy engineering experience bringing turbines from R&D to global markets. Leader on new patents, manufacturing, turbine design and certification.

Dr. David Malcolm

Senior Engineer

40+ year career at forefront of design engineering of both horizontal axis (propeller-type) and vertical axis H-type turbines.

Janet 'Boog' Bookey

Financial Manager

Entrepreneur assisting sustainability oriented companies. Board member of Sustainable Fairfax, California

Antonio Ojeda

Lead Engineer

Led the mechanical engineering of the Wind Harvester v3.1 and co-authored its four Design Evaluation documents. Now a consulting engineer.

Jeff Olson

Mechanical Engineer

On-site experience with prototypes v1.0 and 2.0. Made all recent SolidWorks drawings for v3.0 and 3.1. Now a consulting engineer.

Kelsey Wolf-Cloud

Communications Manager

Graphics and website designer, social media manager, and researcher and Google Earth expert.

Cornelius Fitzgerald

Director of Finance and Strategy

15+ years strategy and execution in finance and renewable energy. Large project leader for Wind Harvest. Co-founder Clean Energy Holdings, LLC

Christine Nielson

President, Wind Harvest Pilot Project, Inc.

Organic entrepreneur, Climate activist. Founder of Coyuchi Inc, the first U.S. company to manufacture and sell quality bedding and bath products made from organic cotton.

In the news

How to harvest plentiful low-level winds on existing wind farms

By Kevin Wolf / Chief Operating Officer / Wind Harvest International / kwolf@windharvest.com Wind farms in California and other regions of the world exist only in relatively small geographic regions.1 Most of these

July 9, 2020 @ windpowerengineering.com

Downloads

- WHPP 7-year Pro-Forma Financials.pdf
- Wind Harvest 7-Year Financials and Future Valuation.pdf
- Wind Harvest - WHPP Financial Description and Flow Chart.pdf

Double the Energy from Wind Farms

Q: What's missing from this picture?

A: *Wind Harvesters.*
They can harvest the near-ground wind accelerating over the ridgeline.

The Problem

Wind is one of the most cost-effective sources of energy; however, current technologies cannot be used in many exceptionally windy locations. The large, 300+ foot (100m) and taller wind turbines have an impact on views, wildlife, aviation, telecommunication, roads, and more that can prevent them from being installed on many otherwise profitable properties. These wasted locations alone are a $100 Billion market needing a much shorter turbine.

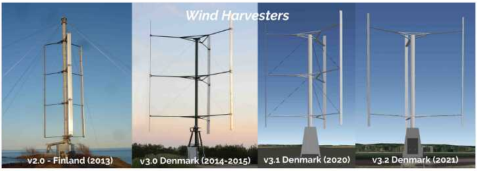
The most valuable unused resource is the gusting layer of near-ground wind that is too turbulent for large propeller-type turbines to handle. Twenty percent of wind farms worldwide sit on ridgelines and other places where the wind funnels and speeds up near the ground. Our analysis shows that almost 130 gigawatts (GW) of existing wind farms have good to excellent wind below the lower sweep of tall turbines' blades. Harvesting this rich layer of wind should, on average, double the land's energy output and open a $250 **billion** undeveloped market.

Simpson Ridge Wind Farm (in development)
Carbon County, Wyoming
Our 2021, four turbine demonstration project
here should lead to a $50 million sale in 2023.

The Solution

Our compact *Wind Harvester* H-type turbines solve problems tall turbines engender and have the durability needed for project financing. Unlike propeller-type turbines with blades attaching to horizontal drive shafts at a single point, *Wind Harvester*s have vertically aligned drive shafts with two connections to each blade. These characteristics are core to surviving the powerful gusts that hit blades rotating close to the ground.

Central to our engineering confidence in this durability is our proprietary fatigue, frequency, mechanical, and aerodynamic models. Our engineers, led by renowned Dr. David Malcolm with his 40 years of vertical and horizontal axis wind turbine experience, used data from prototypes to validate these models. We know *Wind Harvesters* can endure tough conditions for 40+ years, after a low cost refurbishing in year 20.



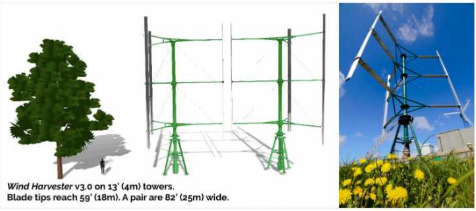
With funding, nothing should stop *Wind Harvesters* from achieving $1 billion in sales within five years. For example, wildlife experts predict birds and bats will avoid three dimensional H-type turbines better than they do two-dimensionally rotating tall turbines. Wind Harvest is committed to using 24/7 motion and sound detection systems to avoid harming birds and bats and to augment the science on wildlife and wind turbines. Once proven safe, many windy properties could use *Wind Harvesters* where wildlife concerns have stopped projects.

Wild Horse Wind Farm (envisioned)
Kittitas County, Washington
Average near-ground wind speeds - 17 mph (7.6m/s)
A pilot project here could precede a 200 MW understory buildout.

Wind Synergy

When installed close together, the "Coupled Vortex Effect" increases energy from H-type turbines by ~15%. Rows of *Wind Harvesters* also vertically mix wind layers and suck down faster-moving wind from higher altitudes into the rotors of tall turbines and increase their energy output.

Energy in the wind is proportional to the cube of its speed, so small boosts in its velocity significantly increase a turbine's energy production. The synergy between tall and short turbines should result in more profitable wind farms and more development of properties with lower wind speeds.


***Wind Harvester* v3.0 on 13' (4m) towers.**
Blade tips reach 59' (18m). A pair are 82' (25m) wide.

Making Money

We make money from the 20-35% markup on each *Wind Harvester* we sell. In 2021-2022, that will range between $30,000 and $60,000 per turbine. Sale prices will vary based on a project's profitability which is determined by wind speed, Power Purchase Agreement, number of turbines ordered, etc. In 2021-22, we expect to net an average of $700,000 from each megawatt of *Wind Harvesters v3.2* (14-70kW, 20-50kW) turbines we sell.

As the size of the order increases, our per turbine Costs of Goods Sold will go down as might our markups. But even if we made only $15,000 per turbine sold, a 100 MW project would net $21 million for Wind Harvest.

Turbine sales open other revenue streams. Most buyers will pay us for extended warranty protection. Additionally, many buyers will want our 24/7 remote fault monitoring and our unique placement modeling services for near-ground wind turbines. These services create savings and increase energy production for projects. The larger the project, the more the potential for service-generated income.

Hybrid Wind - Solar - Storage Project
Solano County, California
1 MW solar, 1 MW *Wind Harvester* plus 4 MWh of batteries.
In final negotiations for a Power Purchase Agreement with Valley Clean Energy.

Making More Money

We think our most significant stream of income will come from an untraditional source. The vast near-ground market is too big, and climate change too real, to act conventionally, and try to limit competition. So we plan on licensing our patents to partnering companies that want to produce their own brand of H-type turbines.

We have our own projects and customers, and a two-year technological head start, so we aren't concerned about competition. We believe our patents can save manufacturers $20,000 per near-ground turbine they make. If paid $5000 per turbine, we potentially could net millions of dollars annually from licensing the use of our Intellectual Property over the 17-year life of the patents, in addition to profits from our own sales. Doing this would also result in many more well-built near-ground turbines helping to reverse global warming.

Next, we anticipate raising $50 million in 2021 from the sale of Wind Harvest's Series B shares. We will use that to finance and own projects that buy our turbines (see below). A year or two later, after banks refinance these projects, we intend to use that freed up capital to put 30% down and leverage loans on a suite of new projects that we will own. In addition to the income we make selling *Wind Harvesters* to those projects, we will earn revenue from the sale of our projects' energy and use of our services.

Shiloh II Wind Farm (envisioned)
Solano County, California

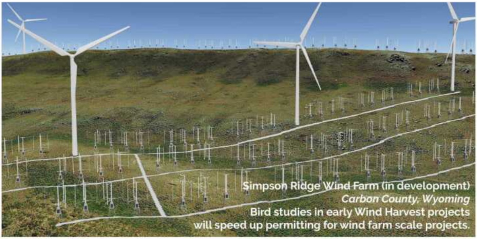
A 3-5 MW pilot project would validate that
***Wind Harvesters* benefit tall turbines and don't harm birds.**
Then thousands of MWs of near-ground turbines could be added to this Wind Resource Area.

Projects in Development

One of our key strategies has been to develop projects that buy our turbines. Below are examples of some of the sales we have in our pipeline. We expect each of our RD&D/pilot projects in 2021-22 to lead to 10 to 100 times more *Wind Harvester*s sold to that customer or into that niche market.

1. Simpson Ridge, *Carbon County, Wyoming*

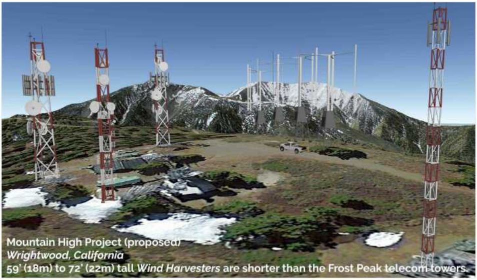
One of our partners, Clean Energy Holdings LLC, is expected to secure a permit and a Power Purchase Agreement (PPA) for a 5MW solar and a four turbine (280kW) *Wind Harvester* installation in 2021. In 2023, they intend to purchase at least 360 of our turbines (25MW) for the understory of the 80MW wind farm they are developing. Near-ground annual wind speeds on Simpson Ridge average 20 mph (9 m/s), making it one of the world's most energetic sites. It is an exceptional resource, just waiting for our turbines.



Simpson Ridge Wind Farm (in development)
Carbon County, Wyoming
Bird studies in early Wind Harvest projects
will speed up permitting for wind farm scale projects.

2. Mountain High, *San Bernardino County, California*

In 2011, a local nonprofit, One Town at a Time, proposed installing a 1 MW, 300' tall (90m) turbine near the telecommunication towers on Frost Peak above the Mountain High Resort. They did not receive a project permit because of the towering turbine's impact on views from the Pacific Crest Trail and on military flights in the area. Now, One Town is proposing to use this 18 mph near-ground wind resource with four 59'-72' (18-22m) shorter *Wind Harvesters* in a demonstration project that should not be easily seen in the clutter of the taller telecom towers on the peak. Eventually, the project could add 30 more turbines with minimal impacts on views from the trail. Its success opens the door to thousands of *Wind Harvesters* being installed globally on other windy telecom sites and send energy down their existing 3-phase transmission lines.



Mountain High Project (proposed)
Wrightwood, California
59' (18m) to 72' (22m) tall *Wind Harvesters* are shorter than the Frost Peak telecom towers.

3. Multiple Projects, *Barbados*

This Caribbean island depends on costly diesel-generated electricity and faces more climate-change-induced droughts. But it has plentiful near-ground trade winds and a goal of 100% renewable energy by adding 600+ MWs by 2030. Here, Wind Harvest is developing projects that provide cultural, environmental, and economic information needed for cumulative impact analyses of much larger projects. For example, we can manufacture 2000 *Wind Harvesters* in Barbados and install them on farms in windy St. Lucy Parish for a 100 MW hybrid desalination-wind project. When wind power exceeds grid capacity, the project would produce potable water from seawater.

Hybrid wind-desalination project (envisioned)
St. Lucy Parish, Barbados
Wind Harvesters can be dynamic canvases for local artists.

Use of Funds

Wind Harvest has everything ready to complete Technology Readiness Level (TRL) 7, the pilot project step in the commercialization process. NASA, the airline industry, wind turbine manufacturers and others use the TRL process to guide the development of a new technology. This step-by-step process helps ensure that the product works flawlessly when it is launched.. We have used that same process with our turbines.

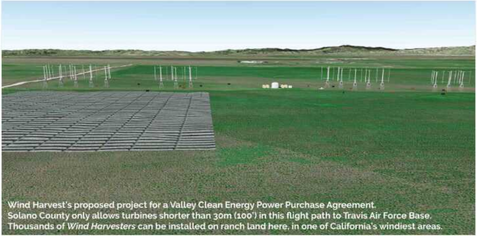
To overcome the difficulties that capital-intensive products face with traditional investors, we formed Wind Harvest Pilot Project Inc. to tap the power of crowdfunding.

This new company secures ~7-year promissory notes from individual investors via the Wefunder platform. 90+% of this money is then lent to Wind Harvest. After $150,000 is raised, we will order one *Wind Harvester v3.1* for installation at Denmark's national wind testing center. The next $450,000 will allow us to complete TRL 7 in the spring of 2021. With the new data that step produces, we will revalidate our computer modeling of *Wind Harvester v3.2*, our final version of the turbine in this series. It is designed to be 25% less expensive and 10% more efficient.

We will also use the initial $600,000 to advance the projects above, and others such as our proposed 2 MW hybrid solar, wind, storage project in Solano County, California.

The next $400,000 from Wefunder investors will be lent to build and certify *Wind Harvester v3.2*. Installed 3 feet away from v3.1, this sleeker turbine will further measure and validate the Coupled Vortex Effect. With funding, v3.2 should be certified (TRL 8) and ready for sales in the fall of 2021.

With $1 million in funding, our *Wind Harvester* can reach TRL 9, the final step in the turbine development process in 2021. The last step concludes after 10+ *Wind Harvesters* have at least one year of operational time and electricity sales. That operational documentation is required by banks before they will allow the turbines to be used as collateral for project loans.



Wind Harvest's proposed project for a Valley Clean Energy Power Purchase Agreement.
Solano County only allows turbines shorter than 30m (100') in this flight path to Travis Air Force Base.
Thousands of *Wind Harvesters* can be installed on ranch land here, in one of California's windiest areas.

The Future

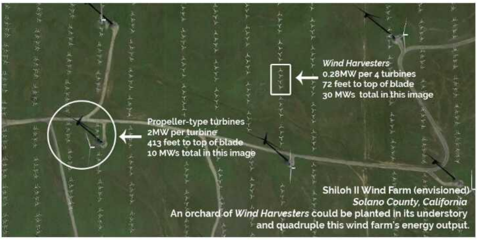
Our 7-year financials predict that Wind Harvest will grow from selling $5.5 million in 2021 to total sales exceeding $1 billion in 2025. Our core strategies include:

1. Launching a $30-$50 million Series B round in 2021. We expect that raising funds in this current offering and completing the associated milestones will put us in a strong position

for our B round. Our sales margins and other income streams should make us profitable by the middle of 2023. This would set us up well for an IPO in 2024.

2. Pursuing non-exclusive licensing agreements. We should sell more *Wind Harvesters* sooner by sharing 20-30% of the sales margin with licensees who help sell our turbines and construction and development companies experienced in large projects.

3. Once our projects have operated for a year or so, we should be able to borrow against their revenue streams to leverage and capitalize on more projects starting in 2023. By then, traditional lenders should finance projects that use our *Wind Harvesters*.



Shiloh II Wind Farm (envisioned)
Solano County, California
An orchard of *Wind Harvesters* could be planted in its understory and quadruple this wind farm's energy output.

4. We plan to float a $150+ million Initial Public Offering (IPO) and create liquidity for our shareholders in 2024. That new capital would allow us to leverage project loans and own another $500+ million in projects that buy our turbines in 2024 and 2025.

5. We will actively support the science and engineering needed to open new markets by proving that our *Wind Harvester* turbines can operate:

- synergistically with tall turbines

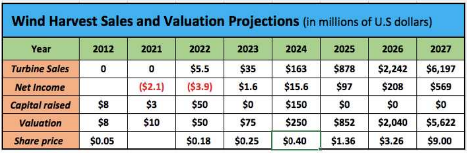
- in harmony with birds and bats

- adjacent to telecommunication and radio towers

- without creating problems for radar or aviation

- to create flexible power in hybrid wind, solar, and storage projects and micro-grids

6. We will invest in developing and patenting larger H-type turbines that can capture more of the energy in these intensely windy but geographically limited areas. We intend to be the leader in near-ground turbine engineering and placement modeling.



Wind Harvest Sales and Valuation Projections (in millions of U.S dollars)

Year	2012	2021	2022	2023	2024	2025	2026	2027
Turbine Sales	0	0	$5.5	$35	$163	$878	$2,242	$6,197
Net Income		($2.1)	($3.9)	$1.6	$15.6	$97	$208	$569
Capital raised	$8	$3	$50	$0	$150	$0	$0	$0
Valuation	$8	$10	$50	$75	$250	$852	$2,040	$5,622
Share price	$0.05		$0.18	$0.25	$0.40	$1.36	$3.26	$9.00

Competition

Our success should stimulate a "gold rush" of competition. The GEs and Vestas of the world won't let us have this considerable market to ourselves. But any competitor will have to master the same prototyping, field-testing, and aeroelastic modeling steps we have already gone through. Each of these takes substantial time and expertise.

Any reputable company in the near-ground wind space is likely to become an acquisition target once we prove that the wakes from understory turbines won't cause harm to tall turbines. Wind Harvest should be sought after because our:

- *Wind Harvesters* will have passed through the steps of a full scale prototype, a pilot project and certification, which precedes sales.

- Pending patents and existing intellectual property are difficult to work around

- Validated aeroelastic model and team of accomplished engineers

- Projects in development such as Simpson Ridge, Wyoming.

Our goal is to stay independent with the help of new capital from the Series B round and with new executives who have experience in IPOs and large projects.

Tejona Wind Farm, *Costa Rica* (envisioned)
Average near-ground wind speeds - >20mph (8.9m/s)
3.3 MWs of tall turbines are shown in this graphic.
A 2 MW understory pilot project is possible in 2022.

Impact on Climate Change

By 2030 or soon after, more than 200,000 MWs of turbines could be producing energy in wind farm understories where land and infrastructure are already in place. At 14.3 turbines per MW, *Wind Harvesters* should produce 3000 MW hours (MWh) yearly in a 15.7 mph (7m/s) resource, the average near-ground wind speed in those locations.

200 GWs of our type of turbines can produce 600,000 GWhs of electricity, enough to supply ~120 million average global households (assuming each uses 5000 kWh annually). Electricity from fossil fuel produces 1000 pounds of CO2 per MWh. 200 GWs of near-ground turbines can stop over 600 trillion pounds (0.25 gigatons) of CO2 from being released each year, the equivalent to halting CO2 emissions from 200 large 500 MW coal plants plus all the other pollutants they spew and habitat destruction their mining creates..

Once turbines are available, the understory market should build out quickly. Land, roads and infrastructure are in place. Most importantly, high energy wind is there.

Tejona Wind Farm, *Costa Rica* (envisioned)
A full understory buildout could exceed 200 MWs of *Wind Harvesters*
and increase the energy output of this amazing wind resource by 10x.

Conclusions

We are excited to be just a year away from sales. We are thrilled that the Wefunder platform allows you to invest $100 and more in Wind Harvest. It is not often that a company is at our stage in the technology commercialization process with a huge, untapped market before it. It is less frequent that the average person has a chance to invest early, before we become a household name, before a Series B round or IPO.

We intend to make our mark on the world by opening up its many near-ground wind markets to rapid development and to help reverse global warming. In the process, we'll sell billions of dollars of our turbines and services and do well for our investors while following principles that we hope other companies will emulate:

- Act on the urgency of the climate crisis as if our lives depended on it. Don't put short-term profits over momentum and large scale progress.

- Select ethical vendors and partners who are working to reduce their environmental impacts.

- Know how our products affect wildlife and actively minimize any harm.

- Build rugged machines that use easily replaceable, recyclable parts, and run for 40+ years.

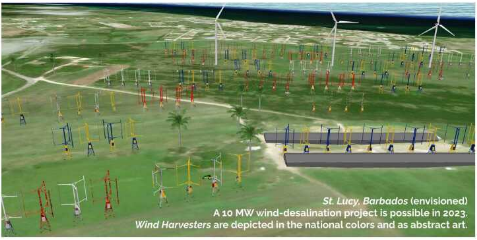
- Bring local environmental, economic, and cultural stakeholders into the development process and produce better and more equitable projects and more sales as a result.

- Be generous in sharing the wealth we create with shareholders, staff, partners, and everyone on whom we rely.

We hope you will invest and help us open a massive, untapped worldwide renewable resource for the benefit of all.

For More Information

The FAQs on our business plans, technology, sales and markets, our 7-year financial and valuation predictions, and our windharvest.com website provide more information on how we plan to get from where we are now to $1 **billion** in sales in five years. Another source of information is our Form C (a link to that is on this page). We also welcome your questions, help, and comments. And please remember, our forward-looking projections cannot be guaranteed.


St. Lucy, Barbados (envisioned)
A 10 MW wind-desalination project is possible in 2023.
Wind Harvesters are depicted in the national colors and as abstract art.

Investor Q&A

– COLLAPSE ALL

What does your company do?

Wind Harvest makes and sells a unique wind turbine for a large untapped renewable resource. Our engineers design near-ground wind technologies. Our scientists test how our Wind Harvesters can increase the energy output of tall turbines and be safe for wildlife. Our regional licensees develop projects that use our products and services. We finance and own projects that buy our turbines. We license our patents. We bring value to our shareholders and stakeholders. We help reverse global warming.

Where will your company be in 5 years?

Our vision is to be the leading manufacturer of near-ground wind turbines with a large share of the $250 billion and growing wind farm understory market. In 5 years, we expect that we will: - Achieve $1 billion in annual sales - Own $500+ million in projects - Be a publicly-traded company with executives who executed our $150 million IPO in 2024. - Be on a path to $25 billion in total sales by 2030 - Stimulate the wildlife-friendly development of the world's near-ground wind resources

Why did you choose this idea?

Wind Harvesters are ready to open a rich, unused source of energy: the turbulent near-ground wind gusting through 20% of wind farms. Our compact turbines can tap this power, be wildlife safe, and, when placed beneath, boost the output of tall turbines. Invest a new way to harvest renewable energy, reap profit--and help reverse global warming!

Why is this a good idea, right now? What changed in the world? Why wasn't this done a few years ago?

Until recently, few knew about near-ground wind resources. Recently, we used UL's Windnavigator to evaluate 27% of the world's wind farms. From that data, we extrapolated to estimate 20% (129+ GWs) of wind farms around the world have good to excellent average annual wind speeds at 66' (20m) above ground (14-20 mph, 6.5-9.0 m/s).

We also validated our aeroelastic models using data from our first full-scale, Wind Harvester v3.0 turbine. Without that, it wasn't possible to confirm what the loads, aerodynamic efficiencies, and harmonic resonance would be for our turbines and know that they can last 40+ years in highly energetic, near-ground turbulence.

How far along are you? What is your biggest obstacle?

We passed Technology Readiness Level (TRL) 6 with our full-scale commercial prototype v3.0. With the funds raised in this offering, we should be 6 months from completing TRL 7 (the Pilot Project) and 12 months from TRL 8 (certification) and installing 25+ turbines in our own projects. That gets us into full commercial level sales (TRL 9). See
- https://windharvest.com/frequently-asked-questions/#technology_2

Shortage of capital has always been our biggest obstacle. Turbine prototyping and the full commercialization process cost a lot at a time when companies have no income from product sales. This crowdfunding campaign is our way around this difficult challenge.

Who competes with you? What do you understand that they don't?

We expect that makers of big turbines will be our competitors because they will want a slice of the 200,000+ MW near-ground wind market. Our head start, computer models and experience in vertical axis wind turbine design and engineering are not easy to replicate. Our pending suite of new patents should make it difficult for other turbines to be as cost-effective as ours. Over the next two years, while the tall turbine manufacturers likely wait for us to prove the market, we should gain enormous amounts of data and validate modeling for how to place H-type turbines to most effectively increase the output of tall turbines in wind farms. Licensing our patents and models to turbine manufacturers such as Vestas and GE should accelerate the number of near-ground wind projects developed each year, and improve Wind Harvest's net income.

How will you make money?

On average, each Wind Harvester should generate a 20-25% margin on a 2021-22 turbine sale price of around $225,000. That $40-60K per turbine either goes directly to Wind Harvest or is shared with licensees. We make money as developers and owners of projects that buy our turbines. This projects provide the company with annual energy sales and developer profits. We also expect to earn income streams from the turbine-related services we provide, including 24/7 fault monitoring, extended warranties, and wind farm modeling. Our largest source of net income is expected to come from technology licensing agreements with partnering wind turbine manufacturers.

What are the biggest risks? If you fail, what would be the reason?

The biggest risk is not raising the money needed to complete the pilot project phase and finish certification of the final commercial product in 2021. Version 3.1 of our Wind Harvester turbine needs to produce energy and operate as predicted in the pending pilot project in order for the company to grow rapidly. Raising capital dramatically reduces this risk.

How much money has been invested in Wind Harvest and how much more is needed before it becomes profitable?

Millions of dollars and many years of work went into the original company's Windstar prototypes. Since Wind Harvest was incorporated in 2006, another $10+ million has been invested in our technology and project developments. (see https://windharvest.com/wind-harvesters/#prototypes)

With $600,000 from this offering, we should finish the testing of Wind Harvester v3.1 in spring of 2021 and complete TRL 7 the Pilot Project step in the Technology Readiness Level process. Another $400,000 raised in this offering will pay for the manufacturing, installation and certification testing (TRL 8) of one Wind Harvester v3.2 to be installed in Denmark 3 feet away from the first turbine, v3.1.

The goal of this offering is to raise up to $3 million (up to $1.07 million) under Regulation Crowdfunding and the balance under Regulation D). The more this offering raises, the better positioned we are for a higher valuation in our anticipated 2021 Series B round. Then we plan to raise another $30-$50 million and use all of it to finance projects that purchase our turbines in 2021-22.

Wind Harvest's primary income stream will be from the price markup on the sale of our turbines. After all expenses and sharing of a portion of the sales income with the local licensees, Wind Harvest expects to average 10% net profit on each sale. In 2021, we expect to have a net loss of $2.2M while we set up $5.5M in sales for 2022. In 20223, we predict $36M in sales will result in a $1;5M profit after $4.9M in expenses.

All of this would set us up for a 1150+M initial public offering in 2023 or 2024, when the world should be quite interested in renewable energy companies with our growth potential and future. In 2023, revenue streams from project ownership, siting services, warranty contracts, and technology licensing should also increase but still, our main source of revenue should be from sales. Capital raised from the IPO is expected to be used to leverage another $500 million in projects that buy our turbines and services.

Does Wind Harvest plan to manage the construction of projects that use its turbines? ⌄

Wind Harvest Pilot Project Inc. (WHPP), a wholly owned subsidiary of Wind Harvest is raising up to a total of $3 million on the Wefunder platform through this offering under Regulation Crowdfunding and Rule 506(c).

1. You invest by loaning money to WHPP. WHPP pays you 8% or 10% interest annually on your promissory note.

2. Wind Harvest provides you with a guaranty that annual payments will be made and your loan will be paid in full before Dec. 31, 2027.

3. WHPP lends 90+% of what it raises from you to Wind Harvest so Wind Harvest can commercialize its Wind Harvester turbines. Wefunder receives 7.5% of the first $1.07 million raised. The remaining not loaned to Wind Harvest goes to taxes and administration.

4. With the loans from WHPP, Wind Harvest pays its suppliers to produce and install Wind Harvester v3.1 and v3.2 at the Nordic Folkecenter testing site in Denmark. The turbines and the energy they produce become collateral for the loans. This provides further protection to WHPP noteholders because it helps ensure that WHPP will be able to pay investors. (See item 6 below.)

5. WHPP uses the interest payments from Wind Harvest to have Wefunder send you the 8% or 10% interest you earned each year, starting on Dec. 31, 2020. Wind Harvest will pay back the principal on its loans so that WHPP can pay the principal on its investors' notes before Dec. 31, 2027

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6. For each $1 that investors in this offering loan to WHPP, Wind Harvest gives WHPP ~6.4 warrants with an exercise price of $.01 per share. A total of 24.5 million shares have been authorized by Wind Harvest shareholders to reward regular and lead investors in this offering.

7. As different liquidity events occur (e.g. an IPO), WHPP will exercise some or all of the warrants, sell those shares and divide the resulting profits on a pro-rata basis between you and other noteholders. If those shares sell for the projected $9.00 per share in 2026, then you could earn a 50X+ return on your original investment.

Why does Wind Harvest think it can have almost exponential growth in sales starting in a few years? ⌄

The sales growth of most products is usually limited by the size of the market, the costs to expand manufacturing, and the ability of customers to finance and easily buy the product. We don't believe these limitations apply to Wind Harvesters.

1. Wind farms that would buy our turbines already own the land that is zoned for wind energy. Current estimates show 129,000 MWs of existing wind farms should have profitable near-ground wind resources. This market should grow to at least 200,000 MWs by 2030. Once Wind Harvesters are proven safe for wildlife, there should be little beyond transmission line capacity stopping the buildout of wind farm understories. Even the transmission line capacity issues are resolvable by adding Wind Harvesters and batteries to wind farms. Batteries and turbines in the understory would increase wind farm capacity factors and be a flexible, reliable supply energy while staying within the limits of the wind farm's transmission capacity.

2. Many vendors can supply our turbines components; thus, their manufacturing is not limited. There are other advantages to having multiple suppliers. For example, our smaller, simpler turbines should not experience the manufacturing bottlenecks that can be expensive for large turbines.

3. Project financing should become more accessible, especially with larger Wind Harvester projects. There is a growing demand for renewable energy project investments. The political climate continues to move in the direction of increasing support for renewable energy projects. Project capital should not be a limiting factor.

4. We will use a non-exclusive licensing model and work with large engineering, procurement, construction, and management (EPCM) companies. This method means that the project development and installation processes shouldn't limit our sales and growth.

Why do islands such as Barbados have large potential markets for near-ground turbines?

Barbados is representative of energy markets and ecosystem conditions most islands face. Almost all small island utilities import expensive fossil fuel to run large diesel generators. As a result, energy prices for island businesses and residents are significantly higher than for mainlanders. At the same time, many islands have the right topographies and steady, strong trade winds that make them well suited for near-ground turbines.

Wind Harvesters, being the height of medium size palm trees help address a confluence of other challenges that islands face in attempting to harvest the wind with traditional tall turbines. These include visual impacts on tourism, limited infrastructure (roads, ports, etc.) and environmental considerations, all of which our turbines should solve.

In addition, most islands have the capacity to assemble the turbines, and three islands in the Caribbean including Barbados have existing manufacturing companies that can make most of our turbines' components. The resulting high-paying local jobs that aren't reliant on tourism are a political plus. This is above and beyond the benefits the islands receive from not having to import fuel. Wind blows free across the island, waiting to be harvested.

How did Wind Harvest survive over the many years it took to bring a commercial wind turbine to the Pilot Project step in technology development?

The founders of and investors in Wind Harvest have long believed in its mission and the potential of its turbines to open up the near ground wind market. We have known since the company's beginning that our turbines can make a difference in the fight against pollution and climate change. That vision kept us going when times were tough, and little capital was available. Founders, friends, family, and change-driven new investors have continued to finance the company. Also, the executives have worked without pay for the last five years.

What patents and intellectual property does Wind Harvest own now and what will it have in the future?

Wind Harvest discovered the Coupled Vortex Effect and has a suite of proprietary aeroelastic models and turbine design trade secrets. Multiple new international patents will be filed with U.S. Patent and Trademark Office. These patents will be implemented on v3.2 and should make it more expensive for competitors to build their own low-cost H-type turbines without first licensing our patents. We think it is possible that we will make more profit licensing our patents than through the sales of our own turbines.

Will Wind Harvest own manufacturing and assembly facilities for its turbines?

Wind Harvest does not plan on owning any manufacturing facilities, with the possible exception of strategic sub-assembly facilities in key countries. Our technology is specifically designed so that many existing facilities with ISO 9001 certifications can fabricate, forge, machine, and assemble our turbines' components. This flexibility has distinct advantages over the highly specialized manufacturing requirements for traditional large turbines.
1. Manufacturing and developing projects in the same location increases public support and government funding opportunities while also meeting local content requirements.
2. Local fabrication costs can be much lower than importing our turbines from the EU or the US.

2. Volume discounts can be available for expensive components like permanent magnet generators, power converters, and bearings for locally manufactured Wind Harvesters.
4. Wind Harvest doesn't have to invest its capital in building and manufacturing facilities. It can put its capital into financing more projects. We see countries as large as the United States and as small as Barbados supplying and assembling Wind Harvester components and turbines.

What causes certain places and not others to have good average annual wind speeds at 10-100′ (3-30m) above ground level?

Trees, buildings, and steep terrain produce a rough surface to the wind which leads to lower wind speeds and greater turbulence close to the ground. Smoother terrain and surfaces lead to less wind shear and higher wind speeds near the ground. When wind funnels over a ridgeline or hill or through a mountain pass, it accelerates because of the physics of fluids moving through narrower spaces. When there is an inversion layer above, the wind funnels into an even narrower space that amplifies the effect. This acceleration shows up in lower wind shear and higher near ground wind speeds in these topographies, especially when they lie between hot rising air on one side and cooler air upwind.

How dense can rows of Wind Harvesters be "planted" and how does that compare with large propeller-type turbines?

Wind Harvesters will typically be installed very close to each other in groups of two to more than seven turbines so that they can take advantage of the Coupled Vortex Effect. The CVE increases the efficiency of the rotor and enables more power to be extracted from the wind. Modeling shows that the next row of H-type turbines needs to be five times the rotor height downwind from the first row in order to produce the same amount of energy as the first row.

With Wind Harvester rotors at 43' (13m) tall, modeling predicts that their rows can as close be 213' (65m) downwind. Theoretically there can be 15.4 rows with 74 turbines per row equal to 1139 turbines (70kW each) per square kilometer of flat land. This would produce 80 MWs of added capacity. In reality, terrain and erosion concerns, bird and bat flyways, internal roads and other factors will result in a less dense project.

Doppler LiDAR data from pilot projects in Denmark and elsewhere will confirm how far downwind the next array of Wind Harvesters can be installed in different terrains and produce as much energy as the first row.

Why is there so much unused space between tall turbines in a wind farm?

All turbines create downwind wake – an area where the wind is more turbulent and its speed is diminished. When a next row of turbines is too close to the upwind row, that second row of turbines will produce less energy due to the lower wind speed.

If the next row is sufficiently far downwind, wind speed recovers and the energy generation and maintenance does not suffer. The optimum spacing for rows of conventional turbines is seven to 10 times the diameter of the rotor. Since that diameter can be as much as 400 feet (120m), the spacing of the rows should be up to 4,000 feet (1200m) apart.

Large propeller-type turbines also need to be placed far apart from one another to escape the turbulence and gusts that shed from their neighboring turbines' blades and blade tips that are circling at 150 to 200 mph (67 - 89 m/s). Rows of these turbines in wind farms are seldom less than 300m apart from each other. It is possible that the rows of Wind Harvesters upwind can reduce the impact of the wake related problems that tall turbines create for their neighboring turbines.

How are you going to prove that rows of Wind Harvesters can increase the energy output of the existing tall turbines in wind farms?

A sophisticated Doppler LiDAR will be placed ~400m downwind and will measure the wake and turbulence that rows of Wind Harvesters create. How far downwind is it before wind speeds return to normal? What happens to the wind speeds and turbulence in the layer of wind above the rows? How far downwind does that last? The LiDAR can efficiently and rapidly collect this data in different wind conditions and topographies. Modelers can then use that data to validate their algorithms and predictions for how rows of Wind Harvesters can increase wind speeds entering the rotors of the taller turbines based on the height of turbine towers and sizes of their rotors, wind farm topographies and other factors. For more information, see https://windharvest.com/synergy-in-wind-farms/#lidar_modeling

How many of the world's wind farms have good to excellent average annual

wind speeds (>6.5m/s or 14.5 mph) at 20m above ground level?

Wind Harvest found the locations of 27% of wind farms around the world. UL's Windnavigator provided the estimates for average annual wind speeds for these locations. That data shows that 21% of wind farms have near ground wind speeds (15/20m above ground level- agl) that exceed 14.5 mph (6.5 m/s). If we extrapolate the 21% to the total 625,700 MWs reported as being installed onshore worldwide as of the end of 2019, there would be 129,200 MWs of wind farms with potentially profitable near-ground wind resources. To give this context, the average household in the world uses ~3500 kWh annually, so 1 MW of Wind Harvester turbines would, on average produce enough energy for about 860 homes. For more information on near-ground wind potential in each country, visit https://windharvest.com/library/#libresources.

Does Wind Harvest plan on managing the construction of its own projects?

While we plan to own most of the projects that buy our turbines in 2021 and 2022, we won't manage their development and construction. Wind Harvest has strategic relationships with project developers such as AltaTerra Energy LLC and Clean Energy Holdings LLC that will do this work. Large projects that buy our turbines will mostly use Engineering Procurement Construction and Management (EPCM) companies that handle all aspects of the project including product and energy production warranties. Wind Harvest helps projects get started and will help finance many of the early ones. Once a project is permitted and a PPA is secured for the sale of its electricity, a local project management company takes over.

Why and how are investor loans to WHPP investors "guaranteed" by Wind Harvest?

WHPP is the borrower (the issuer of the promissory note). Wind Harvest is the guarantor (the issuer of the guarantee, also known as the guaranty). As guarantor, Wind Harvest promises to repay your loan if WHPP does not. WHPP will loan the proceeds of this offering to Wind Harvest to fund its operations, which include manufacturing, testing, and installation of the Wind Harvesters. WHPP would be unable to repay your loan -- or pay any interest or other payments thereon -- without funds from Wind Harvest (which may include funds derived from WHPP's sale of Wind Harvest securities). WHPP is a finance subsidiary of Wind Harvest. As such, WHPP's primary purpose is to finance the business operations of Wind Harvest. WHPP has no revenue (other than what it receives from or through Wind Harvest); no assets beyond the collateral; and no operations independent of Wind Harvest. The repayment of and return on your investment are dependent on the financial stability and success of Wind Harvest.

How will Wind Harvest's success benefit investors?

WHPP, the issuer of the promissory notes in this offering, will own warrants in Wind Harvest. The warrants give WHPP the option to purchase a set number of common shares of the parent company at a steep discount to the latest company valuation. The more valuable the parent company becomes, the higher the value of the shares issuable under the warrants that WHPP owns. If and when WHPP sells the shares issued under the warrants, WHPP will divide the profits from the sale among the investors in this offering, pro rata according to the amount each investor invested, provided that WHPP makes the sale before December 31, 2027. WHPP will make reasonable efforts to exercise the warrants and sell the shares before the end of 2027. Please see the forms of promissory notes being issued in this offering for full details. The notes are included with our Form C.

How are WHPP's loans to Wind Harvest backed up with collateral?

WHPP is making a secured loan to Wind Harvest. The turbines, associated revenue streams and other equipment (e.g. LiDAR system) are collateral for the loan Wind Harvest receives. Should Wind Harvest ever fail to make interest or principal payments, then WHPP becomes the legal owner and sole beneficiary of the turbines, equipment and all associated revenue streams (e.g. 20-year sale of electricity, future leasing of LiDAR system, etc.).

Will Wind Harvesters survive hurricanes?

The Wind Harvester is designed to operate in and survive wind conditions specified in the internationally accepted standards. One of those specifications corresponds to a severe hurricane. In such an event, with wind gusts exceeding 150 mph, the turbine would be in the braked position to weather the storm. Their stationary blades would experience high bending loads and would not likely be harmed unless something heavy was blown into and hit the rotor. The corresponding stresses from the 150-mph event have been calculated and shown to be within the blades and turbine's material strengths. Any Wind Harvester that does incur damage in a hurricane can be repaired quickly and relatively inexpensively.

Will Wind Harvester-type turbines harm birds and bats?

We plan on installing early projects with high definition cameras and microphones with motion and sound detection systems that enable us to slow down our turbines or stop them entirely when the systems detect birds or bats in the area. Ornithologists predict that birds will see and avoid 3-dimensional H-type turbines. If certain species are not able to do this, then their flight "signature" can be programmed to trigger the slowing/stopping of the turbines' rotational speed within seconds of detection. For more information, see https://windharvest.com/wildlife/.

What will be the impacts of Wind Harvesters on aviation and radar?

Almost none is expected due to our turbines' close proximity to the ground. For example, zoning by Solano County of the ranch land under the Travis Air Force Base flight zone limits the tops of wind turbines to 100' (30m). Regular wind farm turbines are three to four times taller while the tips of Wind Harvesters are under 75' and thus can be permitted in this wind area. For more information on aviation and our turbines, see https://windharvest.com/environmental-impact-of-wind-harvesters/#aviation

How do Wind Harvester transportation and installation costs compare to traditional wind farm scale turbines?

Wind Harvester turbines can be transported to a project site on standard flat-bed trucks which are much less expensive than the specialized trucks and equipment needed to move typical wind farm turbines. Our turbines are installed using small truck mounted cranes or a rough terrain crane while the tall turbines use cranes that rent for tens of thousands of dollars per day. Once the foundations have been poured and grid connection set up, the installation of one pre-assembled turbine only needs a trained manager and one day with a crew of 2-3 people with basic mechanical skills.

For more information, see https://windharvest.com/wind-harvesters-h-type-turbines//#manufacturing.

Could a customer buy a Wind Harvester that will last 40+ years?

Most of the Wind Harvester v3.2 is designed so that it will last for 40+ years in a Class IIa wind conditions, which is standard for most wind farm turbines. For example, our extruded blades are marvels of simplicity and aircraft aluminum. Our modeling shows that they should have a fatigue live of 50+ years. Critically important subcomponents like fasteners and fairings will be replaced sooner but those are not costly items. As long as the pipe mast, forged driveshaft, steel blade arms and lattice tower are properly galvanized and maintained, there is no reason they can't be in operation for 40 years. Their concrete foundations can last for 100 years.

So yes, the core of Wind Harvesters should last even 50+years in the wind conditions it is designed for with roughly 1 in 10,000 of each of the machines' components failing before the design life.

Other components will need replacing on roughly this schedule
- 10 years - control computer
- 15 years - power converter (similar to solar inverters)
- 20-25 years - drive shaft and generator bearings
- 20 years - rewind Permanent Magnet Generator
- 20 years - brakes
- 20 years - blade fairings and fasteners
- 30 years - copper wiring to the transformers and substation

Pressures from wind farm developers to cut upfront costs has caused wind turbine manufacturers to design their turbines so that only last 20 years. Then they soon need replacing. Driving this are Project PPAs that last 20 years or less. It is hard for the financial institutions to value a product beyond the length of the PPA, and the 5% or so that can be saved in project costs with a 20 year vs 30+ year turbine is money now, when it is most valued.

An additional positive comes with longer-lasting Wind Harvesters. If at the end of 20 years, a wind farm could make more money with more modern near-ground turbines, then the Wind Harvesters, including their foundations could be removed, reconditioned and sold to a new customer with a new 20+ year life expectancy.

What is the history of Wind Harvester prototypes and related Technology Readiness Levels? ⌄

NASA, the military, aviation and many industries use Technology Readiness Levels (TRL) to plan a path to full commercialization of their products. Wind turbines also go through these different levels of technology development. It starts with an idea, then a first prototype (TRL 1) and it ends with banks using the turbines as collateral in project loans (TRL 9).

Wind Harvest has been through the early steps in the development process with different models of its H-type turbines. The original Windstar turbines used five external stators to move more wind through their rotors and hold the top of the rotor mast steady. The next turbines were guyed to hold the mast steady without stators. In this configuration, the Windstar 530G turbines proved the Coupled Vortex Effect. Wind Harvesters resulted from testing the guyed turbines with three blades, and for the first time, cantilevering the rotor without any external support to the top of the center mast.

The most difficult Level for almost any product is TRL 6, full-scale prototype, (e.g. Wind Harvester v3.0). Only the strain and load data from a full scale prototype will fully validate the aeroelastic model that underlies the wind turbine's engineering and design. The next step is to make needed improvements and test it (v3.1) again in a pilot project (TRL 7). Then to pass TRL 8, the final, fully commercial version (v3.2) needs to pass international certification. Our v3.2 reduces manufacturing costs 20+% and improves efficiency (10%). TRL 9, the last level is met by operating dozens of turbines for a year or more in as many different field conditions as possible.

For more information including photos and more, see https://windharvest.com/frequently-asked-questions/#technology_2

How do maintenance costs compare between Wind Harvesters and large conventional turbines? ⌄

The O and M costs for Wind Harvesters should be about half the cost per kWh produced than the large propeller-type turbines ($0.002 -$0.005 vs $0.004-$0.010). The main factors behind this expectation include:
- The access to Wind Harvester parts needing maintenance is 13-33' (4-10m) above ground level. The access point for large turbines is 160-250' (50-80m) agl.
- The only annual maintenance that Wind Harvesters need is the replacement of their auto-pump grease cartridges for the Permanent Magnet Generator and drive shaft bearings. Tall turbines need semi-annual maintenance and checking on more components.
- Wind Harvesters don't have as many internal machines (e.g. three blade pitch mechanisms, a large yaw bearing and motor, elevators and more)
- The large turbines need more skilled labor and workers who aren't afraid of heights.

Why can Wind Harvesters operate for 30+ years in turbulent wind conditions while propeller-type turbines avoid near-ground wind? ⌄

The blades of propeller-type turbines connect at only one end to their drive shafts. When their long blades pass through near-ground turbulence, they experience unsteady forces. The resulting vibrations amplified by their blades create problematic fatigue issues for the blades, gearboxes and bearings. Therefore, despite excellent near-ground wind resources in many wind farms, traditional turbines are not placed on shorter, less expensive towers. They can't afford the fatigue damage that would result if their blades swept through the gusting and turbulent near-ground wind layer. This problem causes them to be installed high above the ground and far apart from one another where the wind flow is smoother and more laminar.

H-type vertical axis wind turbines like Wind Harvesters have long been considered capable of withstanding turbulence because:

1. Two connection points from each blade to the rotor shaft prevent the shaking and unsteady forces that propeller type blades experience in turbulence.

2. The physics involved with the Wind Harvester's NACA 0018 shaped blades causes them to stall in high winds. This naturally regulates blade loads and keeps the rotor from over speeding.

3. When a propeller turbine is not facing directly into the wind, its blades experience added fatigue loads. Vertical axis wind turbines don't have a "yaw" mechanism and are immune to any added loads due to changes in wind direction.

4. A vertically oriented driveshaft is not subject to cyclic loads due to gravity – unlike the horizontally aligned driveshaft of a propeller turbine.

5. Propeller-type turbines work best when the wind is steady and the turbulence is low. In contrast, the blades of a vertical axis turbines are designed to withstand a cyclically varying wind speed, and extract energy from turbulence while having little impact on their fatigue life.

6. Three-bladed vertical axis turbines have been shown to be less susceptible to harmful harmonic resonance conditions than two-bladed turbines.

The Wind Harvest team of engineers has confidence in our turbines' frequency response, structural, aerodynamic and fatigue models because the models have been validated against the field data collected from v3.0. Through a rigorous process, the team produced Design Files for the Wind Harvester v3.1 (see the Library at windharvest.com)/ That analysis shows the structural components should survive 30+ years in standard wind conditions.

The Wind Harvester v3.2 will use the third-party collected strain gauge data from v3.1 to do a second validation of our suite of H-type turbine aeroelastic models. Wind turbine IEC 61400 certifications will be secured for power performance, acoustics, durability, manufacturing, and computer modeling. These are important milestones to achieve but don't ensure a turbine will last. To meet that goal, Wind Harvesters are designed using higher safety margins that should result in 30+ years of operation.

Why is a validated aeroelastic model the key difference in Wind Harvesters succeeding where other similar turbines haven't?

An aeroelastic model is a computer code into which the configuration and physical properties of a turbine are programmed as well as the nature of the ambient wind flow. The model will predict the loads and stresses in all of the critical components under the specified conditions. Validating an aeroelastic model involves comparing the computer predictions with measurements from the operating turbine. If this agreement is achieved over a range of conditions, then the model is considered to be validated. It can then be used with confidence to predict the effects of changing the turbine and how new versions and similar products will perform.

How do Wind Harvester power curves and Annual Energy Production compare to those of large turbines?

The main difference between the power curve (electrical power vs. wind speed) of the large propeller-type turbines and Wind Harvesters is at the top end of the curve. This is because most traditional wind farm turbines have pitchable blades (they can be twisted at their root) to control the forces on the blade; this allows them to precisely maintain their maximum output power. Wind Harvesters do not have pitchable blades but control the maximum power by allowing the flow of air over the blades to stall in high winds; this is less precise but does not rely on bearings, actuators, and a control system; it is, therefore, simpler, more robust and less expensive.

Wind Harvesters will most often come in pairs or longer arrays because they realize ~20% increase in energy output when installed one meter apart from each other. It is in this position that their predicted power performance curve and resulting Annual Energy Production nears that of the best of their taller cousins. For more power curves and more information. see https://windharvest.com/wind-harvesters-h-type-turbines/#specifications