

PRESS KIT



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TURBULENT

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WHAT IS TURBULENT

Our mission.

We bring clean and affordable electricity to remote locations by developing new technologies and empowering local cultures to use them.

Our vision.

We believe the future of electricity is in decentralized and connected devices. Just like nature, which also works in networks of small units, our technologies have to go small to have a large impact. Nature is our first source of inspiration.

Our technology was designed with the collaboration of several universities and recognized by MIT for its promising innovations.



TURBULENT

Whirling words into **action.**

Turbulent is a green-tech company developing vortex water turbines for low-head micro-hydro power plants in rivers or canals. In more comprehensible terms: this means that per each turbine, flows with a minimal height difference, starting from 1,5 meters to 5 meters, can be used to generate energy.

How do we do that? Our vortex turbine uses a natural whirlpool to generate energy: the interaction between gravity, the natural flow, and the rotor allows the turbine to harness energy from the stream. The Turbulent technology is designed to be a continuous, resilient and cost-effective alternative to the existing low-head micro-hydro power plants, traditional hydropower as well as intermittent energy solutions such as solar systems, diesel generators and small wind turbines.

What is **new** about this technology, is that by removing all the complexity and substituting it with simple components, Turbulent makes **hydropower more simple** than ever before. As a **scalable solution**, a single turbine can generate up to 200 kilowatts, which provides energy for about **1750 households** in a **remote community**.

As an interconnected organism, a Turbulent low-head micro-hydro power plant can generate up to several megawatts (MW).

The turbine's innovative design ensures a **robust and reliable green energy** technology that can be developed and **maintained locally**. With a remote monitoring system included, the turbine can be controlled and kept at a **high level of performance** from anywhere at any time. In time, this feature will also make a predictive maintenance plan possible; the user will know that a component needs to be maintained in advance, not because production is down. Whether in urban settings or off-grid rural projects, Turbulent believes energy production can **work together with nature** to satisfy growing global energy demands.

In short, the micro-hydro power plant Turbulent developed, is the only 100% green renewable energy source. **Zero environmental impact** (we give the water we use to generate energy right back), built out of 100% circular materials, no impact on the surroundings like big dams (construction, taking up natural space, flood risk), no noise or visual pollution, and **fish friendly** to top it all.

Return on investment & pricing.

Depending on several variables regarding the customer's situation, such as the local energy prices, current energy solution, using expensive diesel and others, Turbulent offers projects with a return on investment between **four to eight years**. In many cases, it can be less than 6 years. When our solution is being used to replace diesel generators in remote areas, the payback period can be as low as 2 years.

Regarding other renewable energy resources, such as solar energy, our hydropower technology has a **competitive** price to a solar plant with batteries.

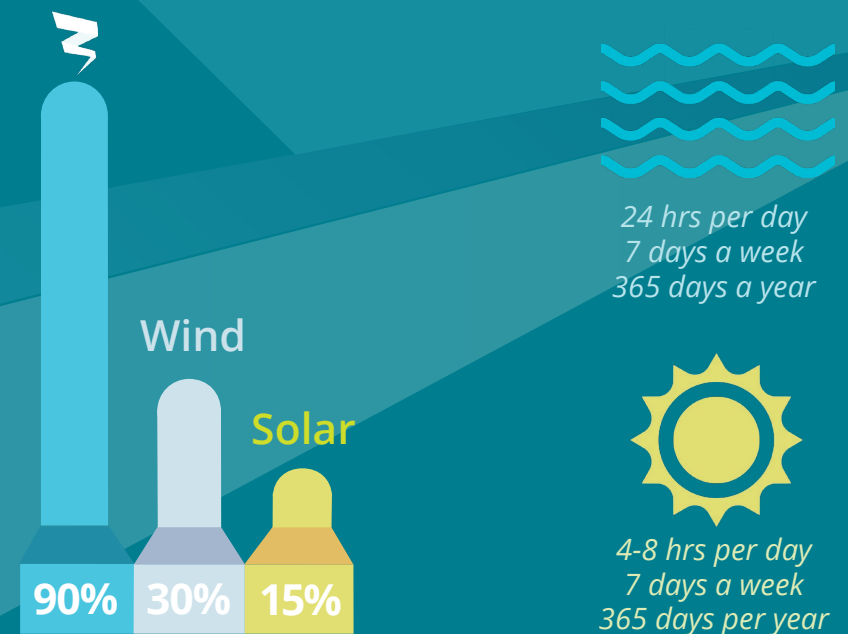
A Turbulent hydropower turbine is an investment. An investment in yourself, your company, in your future, in short, in a better world. Our projects supply enough energy to respectively power between 33 and 440 households*. In a remote community, these numbers can add to 185 to 2000 households**. In addition, our sustainable and eco-friendly technology will withstand severe weather conditions, such as floodings, which means no extra repair costs due to external factors.

*Based on a 4000 kWh average yearly energy consumption, for an on-grid project.

**Based on a 700 kWh average yearly energy consumption, for an off-grid project.

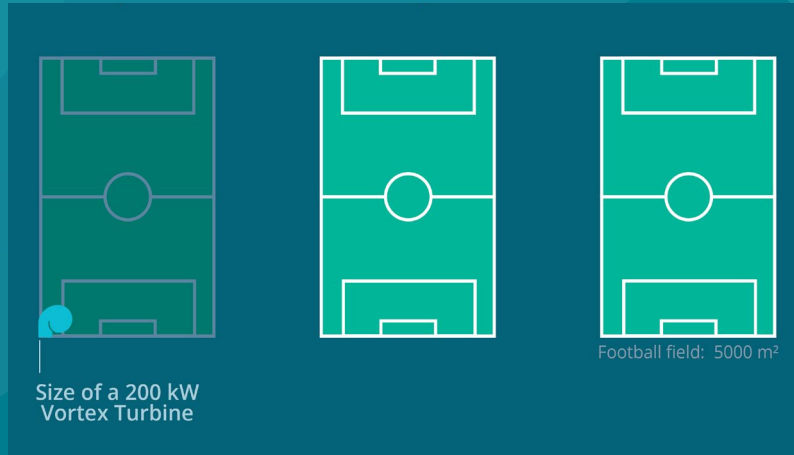
Ten things you should know about Turbulent technology.

1. Hydropower is always there: **24 hours a day, 7 days a week, 365 days a year**. Every hour is a peak hour for hydro energy, while solar power is not available at night and wind power is not available on calm and windstill days. Due to the intermittency of wind and solar production, hydropower is one of the most attractive and intriguing solutions to harness energy, yet there are not many types of viable technologies for low-head micro-hydro power plants.



Energy generated over a year, in comparison with the energy that can be produced when always generating at designed capacity (also known as plant factor)

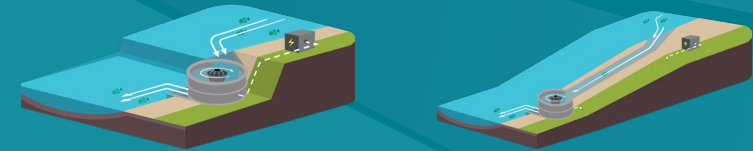
2. To produce the same amount of continuous power as a 200 kilowatts Turbulent turbine, you would have to install a solar plant the size of 3 football fields. The Turbulent turbine needs only 2.5% of that space.



3. Turbulent micro-hydro power plants, have their "fuel" (a.k.a. water) available and running on-site 24/7. It needs minimal logistics, has no CO2 emissions and does not require expensive maintenance. To top it all, a Turbulent 200 kW turbine will save 1252 tonnes of CO2 every year that a diesel generator of similar capacity would otherwise produce.

In contrast, a modern diesel generator of similar capacity as our 200 kW turbine needs around 55 litres of diesel every single hour. That means at a cost of 0.2 US dollars, you would spend 100,000 US dollars on diesel only every single year. In most countries (with the exception of Venezuela, Iran and Saudi Arabia and other oil-rich countries), *prices per litre can be much higher*. Not to mention the cost of logistics, transport and storage.

4. Turbulent can generate energy in rivers and canals with a minimal height difference between the upper and lower stream, starting from 1,5 meters to 5 meter with a single turbine, by using the natural flow of the stream.



5. The turbines are designed for continuous energy, decentralized, damless, easy-to-install, low-maintenance, fish-friendly, remotely monitored, storm-proof without flood risk and with a long operating life.



6. 1 turbine of 200 kilowatts can provide 440 Belgian households or 1756 households in a remote community with energy.



7. Eco-friendly: as a run-in-river technology, Turbulent has one of the lowest carbon footprint of all electricity generation technologies as it requires much less raw materials (steel, concrete) than most. (Source, UK Parliament).



8. Return on investment: the Turbulent micro-hydro power plant has a considerably lower cost than solar power and a competitive price to traditional hydropower solutions.

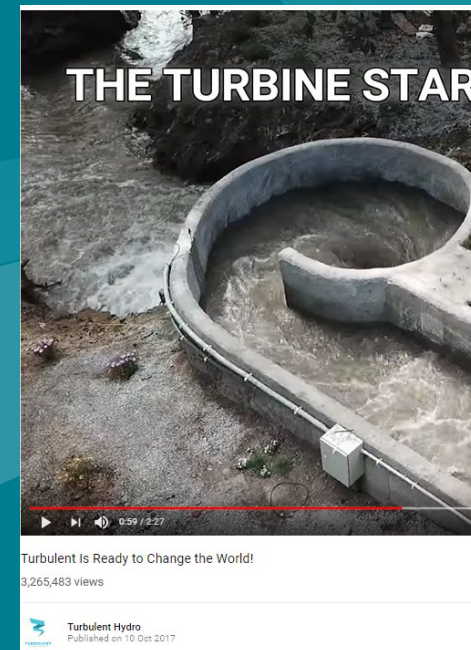


Average Levelized Cost of Energy (LCOE) comparison Turbulent vs Diesel vs Solar

9. Accessible for locals, also in remote areas: the civil works are locally manufactured and they can be done by local workers without specific construction skills, which facilitates a smooth local distribution and development partnership.



10. In 2018 Turbulent went viral, reaching more than 100 million views on social media. Since then, Turbulent has received more than 15,000 requests for its projects from distributors, customers and investors.



PARTNERSHIPS

Around the world.

With a distributorship rate of three per year, Turbulent aims to be producing 45 megawatts of continuous power by the end of 2023.

Turbulent is currently engaging in distributor and development partnerships within the ASEAN region.



A SELECTION OF OUR PROJECTS

Green School Bali, Indonesia.

The turbine supplies reliable energy to the Green School, the world-famous sustainable school located next to the Ayung River in Bali, Indonesia. The 13 kilowatts vortex Turbine benefits more than seven hundred students, teachers and staff. The turbine was inserted into a pre-existing concrete basin. It was custom-designed to spin in a counter-clockwise direction. In addition, the installation does not produce noise pollution: it is very quiet, with minimal squeaking and vibration. Finally, they will earn their investment back within four years. Turbulent is currently engaging in distributor and development partnerships within the ASEAN region.

13 kW
Bali, Indonesia



A SELECTION OF OUR PROJECTS

Molino California Donihue, Chile.

The turbine in Donihue has been active since January 9, 2018, and in full operational mode since March 2018. It provides energy - 15 kilowatts around the clock - for a local avicultural farm, and was built by local Chilean workers with the help of our engineers.

15 kW
Donihue, Chile

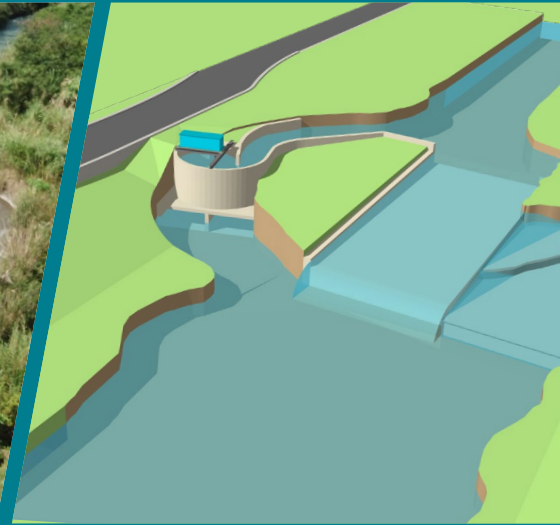
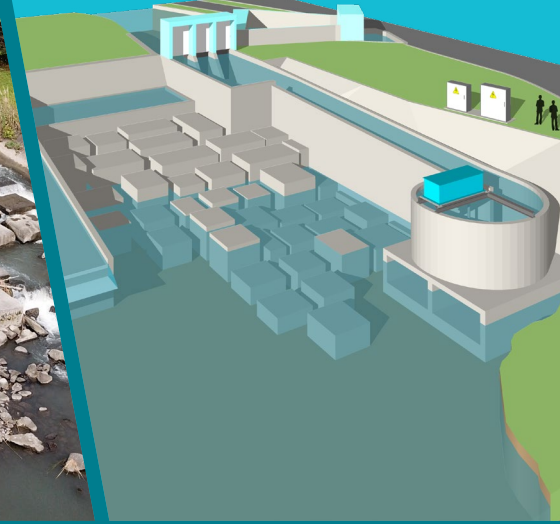


A SELECTION OF OUR PROJECTS

SJS Development Ylang, Taiwan.

The project is the first micro-hydro power plant in Taiwan to be installed in a natural river. It will generate a total of 600 kilowatts of continuous power from separate core units installed in the Annon river, one of the most scenic rivers in Yilan County, Taiwan. The energy will be sold back to the grid, generating a new revenue stream for SJS Development. The company is also aiming for a joint cooperation with other local business to create the first community-made micro-hydro power plant. Stretching through 17.2 km, the Annon river is formed by the tailwater of Langyan Power plant and it fertilizes more than 50 km² of farmlands. The river is also used for whitewater rafting, which is most of the time an excellent signal of the suitability of the stream for Turbulent turbines. For comparison: by switching to the Turbulent technology, the emission of 744 tons of CO₂ will be avoided. Coming soon!

600 kW
Ylang, Taiwan

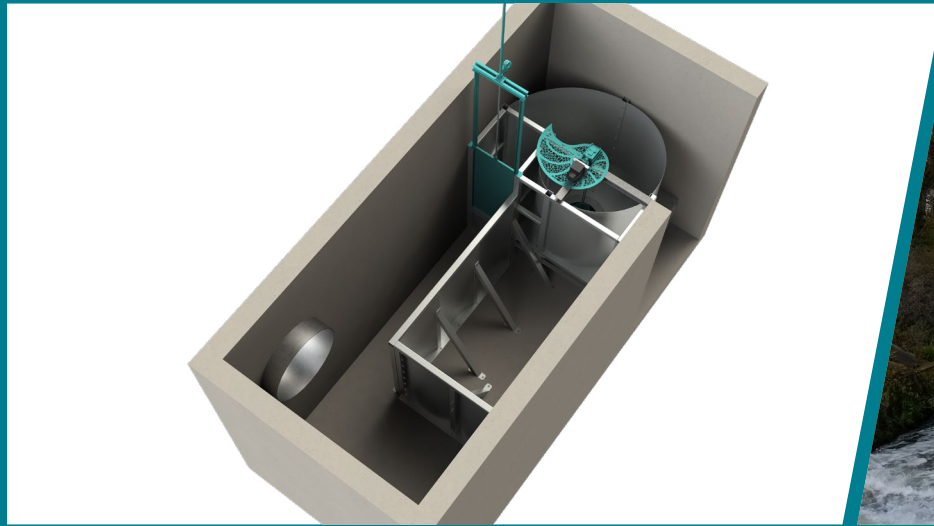


A SELECTION OF OUR PROJECTS

Suez Versailles, France.

Our technology is not only for far away remote areas, we also have projects closer to home. For example, our turbine in France. Versailles used to belong to the Sun King, but soon it will be conquered by the Emperor of Hydropower. The turbine will provide electricity to the Carré de Réunion, a chemical-free wastewater treatment plant in Versailles. Since 2017, it is the largest membrane treatment unit in Europe; a mix of green innovation beautifully blending into the classified plain of the Palace of Versailles. This 5 kilowatts turbine will provide energy for 8,5 households, and will push back CO2 emission by 34 tons each year.

5 kW
Versailles, France

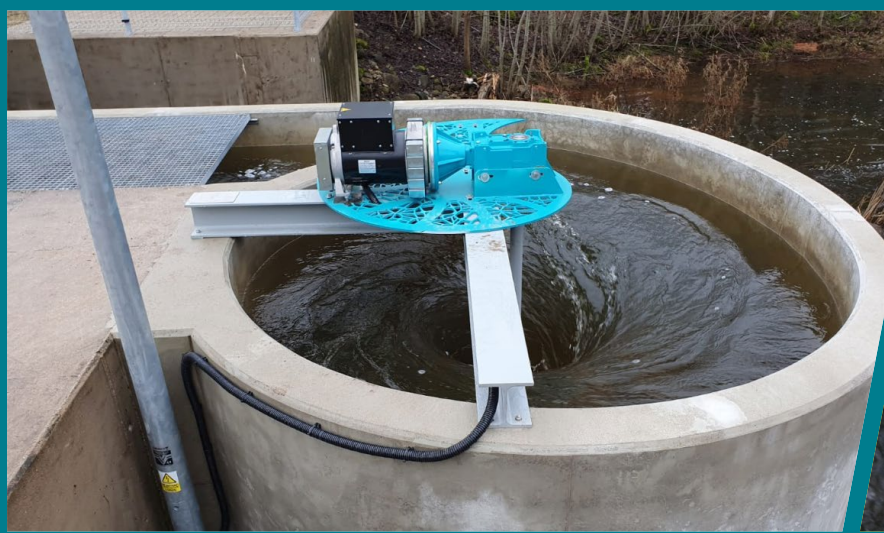


A SELECTION OF OUR PROJECTS

Private house Otepää, Estonia.

This 5.5 kW vortex turbine provides reliable, off-grid electricity for a private house in Otepää, a small town situated in the southern Estonian hills and valleys. The house is in the middle of beautiful natural landscapes and due to its remote location, our customer had to use a diesel generator for the lack of better alternatives. Fortunately, they had a river passing nearby and discovered the Turbulent vortex turbine. When our customer saw our viral video, he felt so inspired he started to build the civil works himself before even contacting the Turbulent headquarters. The turbine will save them 17 tons of CO2 per year.

5.5 kW
Otepää, Estonia



A SELECTION OF OUR PROJECTS

Mapuche community Cunco, Chile.

The turbine was made to bring electricity to the indigenous Indian Community of Mapuche, and was installed by local people with the help of our expert engineers on site and provides energy for six households. The indigenous religious chief blessed the project as it was built out of respect for the natural environment and wildlife.

The project is currently in the mechanical/electrical finishing process. Furthermore, it is funded by Academics For Development, a Belgian NGO.

5 kW
Mindanao, Philippines



ABOUT US

Meet the Turbulent team.



FOUNDER & CTO

/GEERTSLACHMUYLERS



FOUNDER & CEO

/JASPERVERREYDT



CO-FOUNDER, COO

/LUCBERBEN



We are a multicultural team with three co-founders from Belgium. Jasper has Master degrees in both Finance and Law. Geert is a Master in Electromechanic and Intelligent Mobility. Luc has more than 20 years of experience in IT, business procedures and project management. Their backgrounds come together in a complementary way ever since they first started working together in 2012 on a start-up challenge. Other team members with expertise in IT, sales, marketing, product development, come from Europe, Asia and South America. We are also backed by a network of experienced advisors and consultants.

The Turbulent team has secured a Belgian research grant since 2015, and is being supported by the European KIC Innoenergy program, the iMinds-IMEC incubator, Start it @KBC, Start-up Chile and Parallel 18.



Turbulent NV has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873765.

make cool shit everyday



MEET THE TURBULENT TEAM

HISTORY AND MILESTONES

A new chapter on hydropower.

2014

JANUARY TO MARCH

Geert and Jasper (founders) decide to start Turbulent, a green-tech company creating water turbines based on Geert's thesis about the gravitational vortex. The goal? Bringing green energy to thousands of communities around the world. By having a scalable solution, they could now harness the untapped potential of rivers and canals that were previously not suitable for hydropower. The theoretical study of the vortex is validated by the renowned Belgian university KU Leuven.

Turbulent wins the Cleantech Challenge in Leuven, Belgium and earns the second place in Cleantech Challenge International in London, UK. The prestigious competition is organized by the London Business School and University College London.

In a joint cooperation with the Flemish institute for Technology VITO, Turbulent receives 10.000 euro for technical development such as validation of the vortex theory using CFD models and lab testing.

2015

JANUARY

The official founding of Turbulent.

Turbulent receives a 175.000 euro seed funding from KIC Innoenergy and Iminds along with a 50.000 euro grant for feasibility research by the Flemish government.

SEPTEMBER

Turbulent wins first prize of renown Chilean incubator and accelerator program Start-up Chile along with a grant of 30.000 euro.

DECEMBER

Another first prize for Turbulent, getting them the title "Best startup in the world" of the Pitch Startup Nations Summit in Monterrey, Mexico. 33 startups around the world were competing for the title in front of a panel of leading investors and managers.

2016

FEBRUARY

Official opening of a small, in-river 2.2 kW prototype installation for experimentation in Cleerkbeek, Belgium.

MAY

On the 25th of May, founder Geert Slachmuylders receives the prestigious award by the Massachusetts Institute of Technology (MIT) Innovators Under 35.

JUNE

Although having been working with Turbulent since January 2015, Luc Berben officially incorporates to the team as the third co-founder.

Later in June, Turbulent gets a 110.000 euro innovation grant from Vlaio (Flemish government for innovation and entrepreneurship) for the technical development of a pilot operational installation.

In another strike against climate change, Turbulent wins the Engie Endeavor Innovation South America in Santiago, Chile. This program is made to support the development of enterprises aiming for zero-carbon solutions. The winner gets a cooperation with Engie Factory and an investment of 60.000 USD.

SEPTEMBER

Turbulent becomes the winner of the 5-months accelerator incubator program Parallel 18 in Puerto Rico receiving 40.000 USD for technical development.

NOVEMBER

Turbulent takes home the first prize 2016 WW Orcelle® Award worth 100 000 euro for tech development in the US. The award is given to the most sustainable solution for shipping and logistics due to zero-emission, commercially viable technology.

2017

JANUARY

Official start of daughter company Turbulent Chile SpA for business development in Chile. Start of cooperation with Engie Factory and the investment for the 15 kW turbine in Donihue.

SEPTEMBER

Turbulent wins the Hotdesq incubator program in Brisbane, Australia, with a price of about 50.000 AUD for general startup development.

By the end of the month, Turbulent has finished the innovation research study with a full analysis of the 2.2 kW prototype, a complete technical and engineering development towards a 15 kW installation. Furthermore, major implementations have been added for low-cost remote monitoring, sedimentation, and turn-key electronics for immediate use.

NOVEMBER

The first commercial prototype installation of 15 kW is installed in Donihue, Chile. As the first real-life test, it is used to test the supply chain, validate the different stakeholders, production and installation, regulation and to test the local market potential. The turbine has reached 15 kW steadily and is now operating in a full, real-life environment.

2018

FEBRUARY

Turbulent goes viral: Video footage of the 15 kW installation in Donihue has over a hundred million views across different social media channels and over four thousand requests for the new vortex turbine.

MARCH

Final IT bugs are fixed for the 15 kW installation in Donihue, Chile. The turbine has been extensively tested to find and fix any possible issues. The turbine now operates autonomously without need of supervision!

The official opening of the first micro power plant in Chile!: Turbulent's 15 kW vortex turbine in Donihue. The ceremony is attended among others by former Chilean minister of Energy Andrés Rebolledo and Engie Factory CEO Lodewijk erdeyen.

MAY

On the 4th of May Jasper (founder) wins for Turbulent Start it @ KBC Bolero Crowdfunding Award 2018 for the strongest business pitch in front of 450 critical investors and entrepreneurs. The awards provided Turbulent with 10.000 euros cash, 18 months of expert mentorship at business accelerators Start it @KBC and strategic branding and communication coaching with multinational Accenture.

Turbulent raises 3.2 million euros with two new investors to fuel international business plans with; Inventions II, a pioneer venture capital company investing in companies addressing the United Nations Sustainable Development Goals (SDGs) and Victrix, a family-owned holding with investments in shipping,

OCTOBER

Turbulent takes the bronze medal home from the EIT InnoEnergy awards in Budapest, Hungary. The awards are given to companies who achieve a sustainable energy future for Europe.

2019

FEBRUARY

Business is booming! Turbulent has received more than 15 000 requests for the vortex turbines after the viral video of the installation in Donihue.

MARCH

A 13 kW pilot is installed in the famous sustainable school Green School in Bali Indonesia. The project brings continuous energy to over six hundred residents in the middle of the Balinese jungle. The Turbulent turbine is the definitive solution to the Green School's 11 years of trials and errors with other hydro technologies.

APRIL

Official opening of the Turbulent vortex turbine in Green School, Bali. The ceremony includes Green School's administrative board as well as new potential customers from the ASEAN region.

JUNE

First 100 kW pilot turbine goes into production for SJS Development in Ylang, Taiwan with the goal of having 600 kW installed by 2020. Top management team had previously attended the official opening of the Turbulent micro hydro turbine in Green School, Bali.

AUGUST

Yet another major milestone. Turbulent wins the so-called "Champions League" of innovations grants, the EU Research and Innovation program Horizon 2020, worth 2.4 million euros. Turbulent NV has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 873765.

NOVEMBER

Turbulent wins the silver medal for the Limburg Innovation Award 2019 in Hasselt, Belgium.

2020

JANUARY

A new turbine model of 5.5 kW for a private project is installed into a self-made basin in Otepää, Estonia.

MEDIA

What they say about us.

Lode Verdeyen, CEO de Engie Factory comentó: "Estamos felices de ver cómo Turbulent está creciendo y aportando al país con este tipo de proyectos, creando centrales de generación de energía muy eficientes y de muy bajo costo. Esperemos que, así como hoy presenciamos la primera micro central hidroeléctrica en Chile, sigamos viendo proyectos de este tipo que tanto aportan a Chile".

Translation: We are happy to see how Turbulent is growing and contributing to the country with these types of projects, creating very efficient power plants at a very low cost. Let's hope that, just as we saw today the first micro power plant in Chile, we keep on seeing these types of projects that greatly contribute to Chile.

LODEWIJK VERDEYEN
CEO ENGIE FACTORY



AUDIO JOHN HARDY

Transcript: "11 years ago we dreamt of the vortex, we dreamt of a school that was off-the-grid. And after many, many years of struggle and many false starts, we discovered the Turbulent vortex. It is a vortex built using modern engineering principles. and I'm very happy to say that is working well and we certainly will consider putting one [extra] just down the river. In fact, every river in the world could have one of these, every time the river drops a meter and a half and I would totally recommend it. Local, beautiful, hydropower."

JONH HARDY
CO-FOUNDER GREEN SCHOOL, BALI.
SPEAKER TED TALKS.

MEDIA

What they say about us.

"Alle puzzelstukjes van Turbulent zijn exact wat ik met het Vlaams innovatiebeleid wil bereiken", aldus Muylers. "Ze pakken een maatschappelijke problematiek zoals hernieuwbare energie aan vanuit een internationale visie en werken daarvoor met een zelf ontwikkeld innovatief product binnen een schaalbaar businessmodel. Vlaanderen heeft al een goede traditie en reputatie bij het aanpakken van maatschappelijke uitdagingen via onze kennis en vindingrijkheid. De waterkrachtcentrale van Turbulent is een nieuwe parel aan die ketting."

Translation: "The idea behind Turbulent is exactly what I want to achieve with the Flemish innovation policy," says Muylers. "They tackle a social problem, such as renewable energy, from an international point of view and work with a self-developed innovative product with a scalable business model. Flanders already has a good tradition and reputation in addressing social changes through our knowledge and resourcefulness. With Turbulent's hydroelectric power plant a new jewel to the crown."

PHILIPPE MUYTERS

FORMER FLEMISH MINISTER OF ECONOMY AND INNOVATION

Klaas Schuring, CEO van KIC InnoEnergy Benelux: "Dit is een uniek moment voor zowel Turbulent als KIC InnoEnergy. Het is onze rol om innovatie in duurzame energie naar de markt te brengen, en om innovatoren de rugensteun en hulp te bieden die zij nodig hebben om hun concepten op de markt te brengen. De technologie van Turbulent is een mooi voorbeeld van hoe wij waarde zien in innovatieve ideeën die een enorm verschil zullen maken in de manier waarop we nu en in de toekomst energie produceren en gebruiken."

Translation: "Klaas Schuring, CEO of KIC InnoEnergy Benelux: " This is a unique moment for both Turbulent and KIC InnoEnergy. It is our role to bring innovation in renewable energy to the market, and to provide innovators with the support and assistance they need to bring their concepts to the market. Turbulent technology is a good example of how we see value in innovative ideas that will make a huge difference in the way we produce and use energy now and in the future. "

KLAAS SCHURING

CEO OF KIC INNOENERGY BENELUX

MEDIA

What the press says about Turbulent.

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AGENDA Sustentable

Presentado por:

NOTICIAS AGENDA DESTACADOS

Sustentabilidad

Micro turbinas basadas en la naturaleza llegan a Chile revolucionar industria de energía renovable

por Agenda País | 31 agosto, 2017



30/08/2017

Electricidad La revista energética de Chile

NEGOCIOS E INDUSTRIAL | LEX | SUSTENTABILIDAD | PROYECTOS | FORMACIÓN | MARKETING | TENDENCIAS | CONTINUACIÓN

Se inauguró la primera micro turbina hidroeléctrica de Chile

La turbina hidroeléctrica fue desarrollada por Turbulent, una compañía brega que llegó a nuestro país en 2016 por medio de Startup Chile y Corfo.



10/01/2017

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This whirlpool turbine can be installed in a wee power up to 60 homes

David Bekker Feb 12 2016 6:02 PM

TURBULENT HYDRO



This whirlpool turbine can power dozens of homes

07/02/2018

Turbulent can produce 24/7, using 100% renewable energy.

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Are Damless Hydro Power Plants the Future of Electricity?

Download PDF Copy

By Isabelle Robinson, M.Sc. Feb 8 2018

Currently, the world relies on the use of finite energy sources such as coal, gas and oil. These fossil fuels are not only being consumed at an alarming rate, they are also notoriously bad for the environment. An assessment report released by the Intergovernmental Panel on Climate Change (IPCC) in 2007 revealed that the Earth is close to the point that when carbon dioxide rises, released by burning fossil fuels, it will bring irreversible changes to the Earth.

Globally, 64.2% of electricity is generated by fossil fuels, followed by hydroelectric plants which stand at 18.4%. However, with crude oil deposits set to be exhausted by 2052 based on current consumption and expected population growth, the energy industry and global governments

08/02/2018

PLANETA | ARO & URB | INOVAÇÃO | VIDA SUSTENTÁVEL | MÃO NA MASSA

CCLOVIVO

PLANETA | ARO & URB | INOVAÇÃO | VIDA SUSTENTÁVEL | MÃO NA MASSA



Micro usina hidroelétrica para gerar energia

A tecnologia brega pode ser instalada em um rio e gerar energia para o consumo de até 60 casas.

14/02/2018

DeMorgen.

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techpioniers

Start me up: nieuwe reeks over vijf Vlaamse technologiepioniers



09/08/2018

DeMorgen.

Start me up

Deze man runt een start-up die een revolutionaire waterkrachtcentrale uitvond



11/08/2018

These whirlpool turbines can power...

Like Comment Share

Tech Insider Follow

1.2K 61 Comments 1,660 Shares

37M Views · about a year ago

This whirlpool can power your home.

Like Comment Share

Cheddar Follow

124K 3.6K Comments 186,864 Shares

10M Views · about a year ago

This man-made whirlpool generates...

Like Comment Share

World Economic Forum

10K 233 Comments 5,574 Shares

406K Views · about a year ago

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Vlaamse uitvinding helpt Maleisische dorpen aan stroom



24/06/2019

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REMOTE COMMUNITIES



INDUSTRIAL PLANTATIONS



ECO RESORTS



HYDROELECTRIC PLANTS



GOVERNMENT RE PROJECTS



MINING

WHAT'S NEXT
A glimpse into the future.

Media.

PICTURES

VIDEOS

LOGOS

PRESS ROOM



Press Contact.

Would you like to receive more information about Turbulent?

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TURBULENT.BE

REV 02-2020