



Folkecenter News

Also Small Wind Turbines Can Now Float!

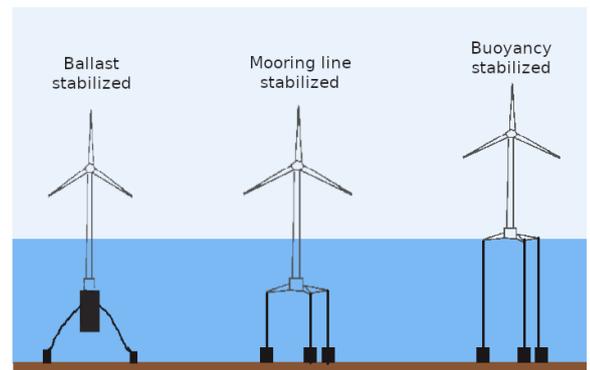
Thanks to their limited impact on the environment, renewable energy technologies have become increasingly popular in the last years, reaching 18.1% of the total final energy consumption worldwide in 2018 (source: REN 21). The wind industry is an important player in this sector and it has already a well developed business.

It goes without saying that several technological innovations have been achieved in the past decades by wind turbines manufactures and that modern machines are considerably more efficient than the older ones. This development was driven by the huge potential that wind energy has worldwide, which could theoretically cover all the world's consumption several times.

Europe is particularly lucky in terms of wind resources: a [recent study](#) found out that, even when considering socio-technical constraints, the onshore potential capacity for the continent is 52.5 TW, equivalent to the joint consumption of 52.5 billion washing machines. Despite this large potential, there is the risk that not enough installations are put in place in time to meet the climate goals and this delay is partly due to protests of people. This, together with other reasons, have allowed the market for offshore installations to increase: at sea, wind resources are normally better and more constant than on land and the lack of obstacles allows for a better energy harvest. Costs for offshore are still two to three times higher than equivalent on-land installations, but this does not seem to be a problem for developers. On the other hand, a major problem is constituted by the maximum depth at which wind turbines can be installed, which is currently 50-60 m. This depth is sufficient for many locations, but it represents a challenge for those countries which are surrounded by deeper waters.

To overcome the problem, the industry is now developing concepts which allow the floating of wind turbines, so that deeper waters can be used. As for now, there are three main solutions available: the ballast stabilized, the mooring line stabilized and the buoyancy stabilized wind turbine. The aspect they all have in common is that they are designed for large wind turbines, since the considerable expenses needs to be covered.

In Folkecenter, however, we thought that this solution could also be interesting for smaller units, which is why we decided to develop our own model. The idea behind that is that there are many places in the world (e.g. Bangladesh) in which people are facing floods or they are directly living on water. This concept would allow also villages which are disconnected from the grid to have electricity, without the need of complicated installations. The



Types of floating foundations

design is, in fact, thought to be build in areas with limited resources, possibly using waste material.

The realization of the idea started at the beginning of 2019, where the needed theoretical knowledge was obtained and where the drawings and the 3D modelling were carried out. The result of this first phase are summarized in [this report](#). Next, the work continued throughout the year, where the wooden blades were realized according to the method described [here](#). At that time, we also prepared some [videos](#) showing the parts of the procedure.

The following step was the actual construction of the floating platform, which took place at the end of the year, with the actual test in water in December. Some modification to the original structure were made, to simplify the construction process. The work is described in [this report](#).

Finally, the last step, which took place at the beginning of 2020, was to connect the wind turbine with a home made LED lamp, process which is described [here](#).

The design of the prototype, its construction, its [testing](#), as well as the blade construction and the LED connection were all done by Folkecenter trainees, which makes us very proud, because besides doing a very good job, they manage to learn a lot and have fun.

The floating foundation is now part of Folkecenter's exhibition and the LED lamp now shines in the night when wind is blowing! The project is open source and all the material is available online.



In the background: Folkecenter's floating foundation with the small wind turbine on top. In the foreground the LED light powered by the wind turbine

The Importance of Energy Savings

The fact that Danish people switch to LED bulbs means that we save CO₂ and, therefore, we are part of Denmark's target of reducing the emissions by 70%.

Today (01.04) I changed a LED bulb from Philips: the bulb has a rated consumption of 9 W, but it can make as much light (806 lumen) as a conventional 60 W model. The bulb emitted a warm white (2700 Kelvin) light and it has been in operation as reading lamp for 68 months.

During these months, the bulb was on for about 6 hours per day, meaning that it had operated for 12,240 hours. For this period, the consumption was 110 kWh which, considering an average cost of 2.30 DKK/kWh, results in a total of 253 DKK. For better understanding, if instead of this bulb I would have used a conventional 60 W model, it would have costed me 1,690 DKK for the same period of operation.

I bought the LED lamp in 2014 for 60 DKK, but now you can find the same model for only 33 DKK; this means that the bulb has paid back the "investment" in only two months. LED lamps can be a little bit more expensive than the conventional ones when buying them, but the difference be balanced by the much lower energy consumption.

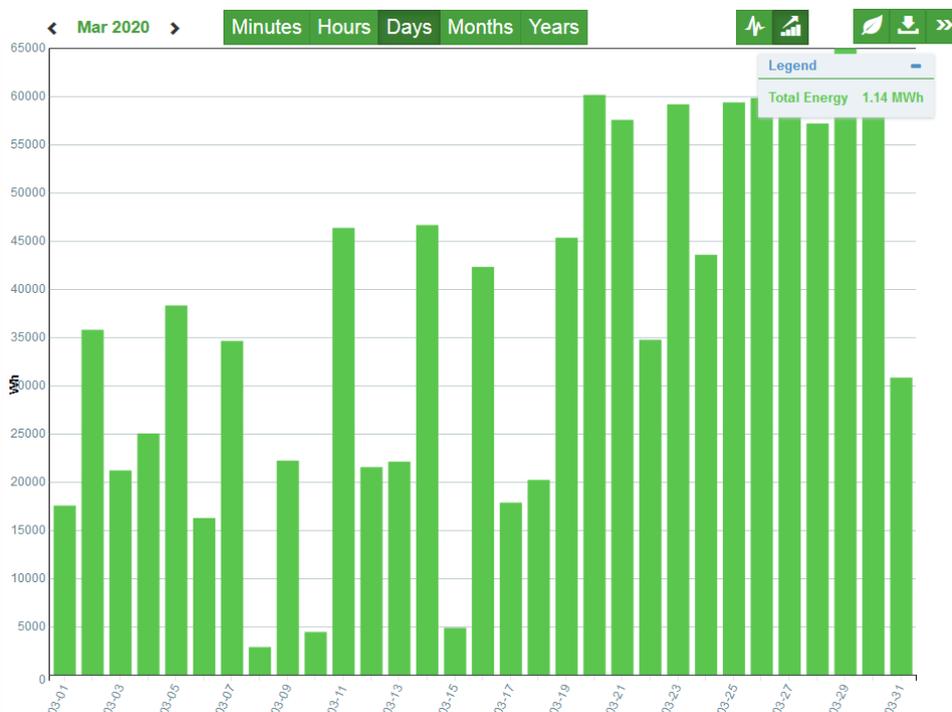
Using this bulb has saved the environment about 90 Kg of CO₂...not bad for only 60 DKK!

Folkecenter works a lot with LED technology; you can find out more about that [here](#).



A selection of LED bulbs

PV System at Folkecenter



Realtime overview of the production can be found [here](#).

Total energy produced in February:
1.14 MWh

Total energy produced in 2020:
1.50 MWh

Total energy produced from 2012:
66.53 MWh

E-Mobility in Folkecenter

Vehicle	Purchased	Km	Regenerated energy	Kg CO2 saved
Nissan e-NV200	February 2019	12,828	16% (2,052 km for free!)	1,757
Streetscooter (Van)	End 2015	11,175	-	1,530

Meet the Trainee

Micha Sörgel

Micha, 21 years old, is a trainee from Germany who was with us in the period 1 October 2019 - 1 February 2020; enrolled in the Renewable Energy Engineering and Energy Efficiency program of the Ostbayerische Technische Hochschule, he came here because he wanted to do an internship in the Northern part of Europe and because he wanted to focus on wind energy. The reason behind his interest on the topic lies in the wind potential that the area he lives in has, despite which the amount of wind installations is still limited. According to Micha, this can be because electricity from wind is still a rather new concept for the most, especially when comparing it with conventional ways of generating energy by mean of fossil fuels, meaning that people are still neither aware of the huge potential that wind can have on the society, nor of the technological advances the industry had in the last years.

When selecting the location of his internship, a big recommendation came from [Valentin Heusgen](#), a former Folkecenter trainee, who was with us about a year ago; it is a very big pleasure for us to see that trainees enjoy their stay and that they recommend us to their fellow students and friends.

Once in Folkecenter, Micha focused his attention on several projects; during his internship he did a lot of work with LED technology: together with other students, he designed and constructed a LED system which is operated by the small wind turbine that we have on the roof, system which will probably be used by another former trainee who will install it in a Nepalese school. Micha also worked with the [Sun Generator](#): together with his group, he constructed one, he installed the needed PV panels on the roof and he expanded our solar kitchen located in the garden; he was also part of the team taking care of [Folkecenter's garden](#) and also thanks to him we will soon launch a new concept of gardening!



However, the project that saw him most involved was the construction of a floating wind turbine, based on the drawings of Nikita Vinogradov, a previous trainee. The task was carried out by all the trainees present in Folkecenter at that time and, once the foundation was ready, a small wind turbine was installed on it. The blades of the wind turbine were constructed in wood by [Valentin Heusgen](#), [Eliana Marcela Melgarejo Peña](#) and [Mariem Bahloul](#), all previous trainees of Folkecenter. In this way, we managed to integrate different generations of trainees in a single project! The floating foundation was then tested in the surroundings of Folkecenter and a video of the process can be found [here](#). The installation is now part of our exhibition and it produced illumination in the parking, thanks to the connection to a LED system (also made by Micha and his team).

Overall, Micha was very satisfied of his experience in Folkecenter and he would like to suggest it to future trainees as well; one of the things he liked most was that he could apply the learned theory in practice and that he could learn by his mistakes, progress and finally achieve a result.

From the social point of view, Micha liked a lot the atmosphere in Folkecenter: *"The combination between community life and possibility to be alone when needed was perfect"*, he said.

We wish Micha a good continuation of his studies and we hope he will come in visit soon!

Material involving Micha: [Wind Energy to Light, Redesigning a Floating Foundation for Small Wind Installments](#)

Carolina Nunes Hidalgo

Originally from Spain, Carolina (28) came to Folkecenter for an internship in the period 16 September - 17 January; the internship was a compulsory part of her education as civil engineering at VIA University College, in Horsens (DK). Although Folkecenter might not be the first choice for civil engineering students, Carolina selected us because she wanted to learn more about renewables, since she would like her career to develop in that direction; her main interest when she came was wind turbines, of which she is fascinated, and wave energy, because she likes the idea of integrating the marine environment with energy production.

In Folkecenter she could integrate both this interest in a single project: she was, in fact, also part of the team which constructed the floating foundation for the small wind turbine, in addition to which she also developed a [report on marine energy](#); the outcome of this report was then used to develop some new explanatory panels for our wave energy exhibition.

Besides wind and marine energy, Carolina also learned a lot about solar energy and about many electrical components of which she did not know the function before. Her hopes about finding a job within the renewable energy field became reality after just few months from the end of her internship: of course, most of the merit is hers, but we like to think that the period in Folkecenter also helped her in going through the admission process.

"The atmosphere in Folkecenter was really nice and welcoming", she says, "and I was very happy of being able to work with all other trainees and to learn about their projects. People seems happy to be working here".

The aspect of Folkecenter Carolina liked most was the possibility to participate in our conferences and workshops, where she could meet a lot of people and learn a lot of new knowledge. Furthermore, she also enjoyed a lot the trips which she did with the other trainees.

It looks like we have one more satisfied trainee! Thank you Carolina for joining us and for bring your sunny mood in our team! All the best for your new career!

Material involving Carolina: [Marine Energy - An Overview](#), [Redesigning a Floating Foundation for Small Wind Installments](#)



Upcoming Events

Many events and educational courses were scheduled for 2020, but due to the Corona virus situation we had to cancel most of them. Nevertheless, the following two will still take place, even if with some modifications. We hope in your understanding.

3rd International Conference on Small & Medium Wind Energy

After two successful editions, Folkecenter, the Small Test and Resource Centre for Small Wind Turbines, the Danish Association for Small and Medium Wind Turbines and the World Wind Energy Association are organizing a third conference with focus on small and medium energy. The event will gather national and international experts from the industry, who will discuss testing and certification opportunities, off-grid solutions and the importance of education for the small wind industry.

The conference will take place **ONLINE** between the 27th and the 30th of April.

The event is open to everyone, but registration is required. Please, note that the deadline for registration is Sunday 26th of April. The detailed program and the registration form can be found on folkecenterevents.net.



Build your own Tiny House—Workshop



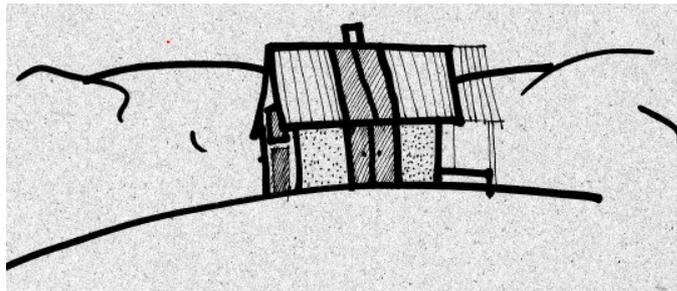
Have you ever thought about building your own house? You have now the chance to do it!

A tiny house is a house which, although small, it can fulfill all the needs of its inhabitants. Not only! It is the perfect solution for students and retired people who do not want to have mortgages or spend excessive money in housing.

The workshop will combine theory and practice and it will conclude with a real tiny house being built.

The workshop will take place in Nordic Folkecenter for Renewable Energy and it will last 5 days. Participation to the workshop is open to everyone, but registration is required. Registrations should be done on folkecenterevents.net latest the 17th of August.

The workshop will be mostly held in Danish, but we kindly ask you to contact us if some English-speaking person is really interested to participate.



24-28 August 2020