

Call for Makers

Project description (max 225 characters)

VentolONE: renewables meet makers

We are developing an open-hardware wind turbine kit called VentolONE to supply houses with electricity, both in Developed Countries and Developing ones. Main target is to use our scientific and technical knowledge to make some kind of useful product, in terms of energy production, environmental safety and appropriate renewables usage: to do this we focused on a vertical axis turbine because it can be extremely simple to build but effective.

The original idea came some years ago, during a travel in Tanzania in 2006, looking at the high speed wind always blowing without anyone taking advantage of it.

We thought it would have been a good idea to use appropriate technologies as E.F. Schumacher explained, so only local materials and technologies should have been used.

We also thought the best would have been to have an open-hardware project, in order to achieve collaboration over the web, sharing knowledge and knowing experiences, giving everyone the possibility to build his own turbine.

After some attempts and tests in Italy, we built three wind turbines during early years in Tanzania to pump water and produce electricity.

Now we are focusing on the production of a kit everyone can mount by himself or build with some DIY skills.

Activities (max 1000 characters)

What we did

After a first master thesis in collaboration with Politecnico of Turin and another one with Università dell'Insubria we built our first vertical axis wind turbine prototype in 2008 (1).

Studies and prototypes went on till 2011 when we finally built a bigger one in Italy (2), still working and used for tests, and another one in Zanzibar (3) to pump water for vegetables and fruit growing.

In 2012 we started the construction of two windmills in Tanzania to supply with electricity to a secondary school in the savana (4). All these projects were totally crowd funded through events and the aid of a charity, Solare Collettivo ONLUS.

Lots of scientific and technical materials are shared and available on our blog.

What we are doing

We are now working in two directions: the first one aims to complete the 2012 windmills in Tanzania improving the collaboration with some NGOs like the italian A.C.R.A. in order to outline future african projects; the second is to perfect the **wind turbine kit** (6) we are making, defining a commercial way to sell it. We built one and we are going on with tests, hoping to have a definitive version at the end of 2013.

For these tests we need instruments and structures such as anemometers, CNC routers and wind tunnels: we decided to build by ourselves most of them, in order to be independent in our researches, to improve our knowledge and to save money.

So we built a scaled wind turbine called **VentolINO** (5) to test different solutions and different blades in our DIY **small wind tunnel**; we're gonna building a **CNC hot wire cutter** for the blades.

We are also improving wind data collecting with an Arduino based **anemometer**, adding the possibility to send data over the web.

The wind turbine kit – buy or DIY

The vertical axis wind turbine kit is 1,5m tall with a 1,5m diameter, expandable to 3m tall in a modular way. One module can produce 400W in 10m/s wind. The rotor is very simple, made of some metal laser cut bars to sustain 3 plastic blades and two bearing support the rotor axle. The generator is a permanent magnet one, three-phase or single-phase depending on the needs.

The most important part of vertical axis wind turbines is the airfoil profile of the blades: plenty of forums talk about the best airfoil to be used to improve performances, and the conclusion is that it depends on the anemological site conditions. So we think the best should be to have the possibility to choose the preferred airfoil depending on the wind speed measures.

We make the blades with hot wire cutting technique using a polyurethane foam panel, using the desired profile NACA4416. Then we reinforce them with fiberglass and resin. In parallel we found some factories able to do this indsterially, in a one-off way with an affordable price. make it renewable, spread your knowledge, do it together!

Electrical parts such as generator, inverter and regulator are bought over the web.

The anemometer and datalogger

Since we need anemological data to estimate power and energy production and to design the turbine we developed a simple open-hardware anemometer, completely stand alone, Arduino based and solar powered with data logging functions, far away less expensive than other commercial models. We want to add web uploading functions in order to access data from wherever in the world without the need to be in site to transfer.

The wind tunnel and VentolINO

We made a simple wind tunnel to test different airfoil profiles for turbine blades: the wind tunnel is 6 meter long with 0,6 m² test section area (0,8m by 0,8m), with a factory fan able to generate up to 9 m/s air flow. Side walls are made with wood panels. We used our VentolINO to test different blades, lift or drag types, collecting data with Arduino based logging boxes.

What we wanna do

We want a product that anyone can

- build by himself, following the instructions on the blog and the (future) dedicated website
- make customizations and sharing opinions on the (future) forum
- buy as a kit disassembled
- buy assembled
- buy as a kit, asking for specific customizations like the airfoil profile

For italian customers, we started a collaboration with SlowD, a platform with which design can meet local artisans, reducing costs and transports and improving product chain.

We also want to start and encourage a forum where customers, hobbyists and technicians can share experiences and knowledge about the turbine and wind speed data.

Beside this we want to give the possibility to buy CNC kits for foam hot wire cutting and anemometer kits.

In the end we will start workshops to teach about wind energy, building wind turbines and measuring performances.

The product will be affordable both for Developed Countries and Developing ones, because of its industrial and DIY nature.

Make it open, make it appropriate

Our project is open, our vertical axis wind turbine is open-hardware. We think open-hardware is a good choice to simplify spreading the product, the knowledge and the improvements. We decided for a CC BY-NC-SA license, so that our work has a full kind of protection but still will be available for those who wants to learn and to build one.

Our project aims to be an appropriate technology as it is small-scale, decentralized, labor-intensive, energy-efficient, environmentally sound, people-centered and locally controlled, following E.F. Schumacher definition of.

Do it yourself – do it together

From Italy to Africa and back, we think any part of this project have been possible thanks to plenty of people sharing knowledge and experiences. We like this because it gives

everyone the possibility to collaborate.

We would like to organize periodical workshops to encourage DIY around our turbine, and continue to spread windmill in Developing Countries, in a simpler way than today using part of the money earned selling the kit.

- (1) <http://inventiamoci1sviluppo.wordpress.com/2009/04/06/realizzato-il-1%C2%B0-prototipo-di-ventolone-10/>
- (2) <https://www.youtube.com/watch?v=KAxHZZW942I>
- (3) <https://www.youtube.com/watch?v=i5vscEPfh6k>
- (4) <https://www.youtube.com/watch?v=4du69Lbd-jQ>
- (5) https://www.youtube.com/watch?v=fHjm_wsbPkM
- (6) <http://inventiamoci1sviluppo.wordpress.com/2013/05/27/il-kit-primo-prototipo-ventolone-diy-prototype/>

About you (max 500 characters)

My name is Mario Milanesio, I'm 38 years old, italian, mechanical engineer, working as a teacher in secondary schools.

I like science, technology and DIY, expecially all that stuff concerning electricity and small automation.

After one year work at Politecnico of Turin I was sure I have been loving research and development, but I was also sure I didn't like the way it usually goes on, in a closed form where you mustn't share what you know as other reasearchers don't share what they know. So I started teaching in technical schools, trying to found a chance of continuing research in another way.

I also like to travel and to know different way of living. I've been in Africa (Tanzania) in 2003 for the first time, and then back in 2006. During that journey I saw how much unused wind energy there were, and VentolONE project started.

In 2007 I knew Linux: it was love at first sight! Finally able to tinker with operative system, without any problem with laws. My first experience with open-source.

In 2008 I knew Arduino: it was love at first sight again! Finally able to tinker with automation with affordable costs and lots of help over the web.

I decided: VentolONE would have been open, open-hardware. I started a blog (0) to share experiences and collecting contacts: some of them became active members of the team.

I'm really fond of environment problems and ecology: through the blog I knew a local association with similar aims and target, so VentolONE became part of it.

Now I'm the VentolONE team leader. My specific tasks concern electronics DIY, sensors and anemometers monitoring, jobs coordination, blog update, and, sure, open-hardware studying.

About your team (max 500 characters)

The VentolONE team was born in 2008 with the essential contribute of Solare Collettivo ONLUS, a charity involved in spreading renewables and environmental awareness. Now we are five volunteers, technicians with a lot of curiosity and a good dose of resourcefulness and imagination. Everyone of us has its own work: VentolONE started as a dream and an hobby, but now we think it can become something more structured. Everyone of us has specific skills, too: we collected many experiences to share with all the members of VentolONE team and the other people around us or following official blog.

Team's motto: make it renewable, spread your knowledge, do it together!

Walter Vassallo: VentolONE team member since 2008, 40 year old, works as a technician in Edison Energia; he is also a member of Solare Collettivo ONLUS steering committee; involved in everything concerns human rights and environment defense, his specific tasks in our team concern public relations, fund raising, and DIY

Andrea: 29 years old, environmental engineer, author of first VentolONE master thesis, works as a consultant in NRG Zero for energy evaluations of residential and commercial buildings; fond of human rights and environment defense, his specific task in our team concerns public relations with NGOs, fund raising, DIY

Mirko: 34 years old, mechanical engineer, works as a teacher at IPSIA "Castigliano" in Asti, Italy. He is the welder, and anything concerns steel and metal in general can be source of interest for him; the tower in Zanzibar, the other in Italy and those in Tanzania are his daughters! So DIY, soldering, drilling, screwing are his main skills

Marco: 28 years old, he is our CAD chief designer; we were able to draw lines and solids before his arrival in 2012, while he is able to design products, interfacing mechanics and commercial components, and this is not a small difference! He works as a designer in Valeo, automotive industry in Mondovì, Italy.