ergo
Wind

www.ergowind.it
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WIND …

IS ALL ~~IM~~POSSIBLE

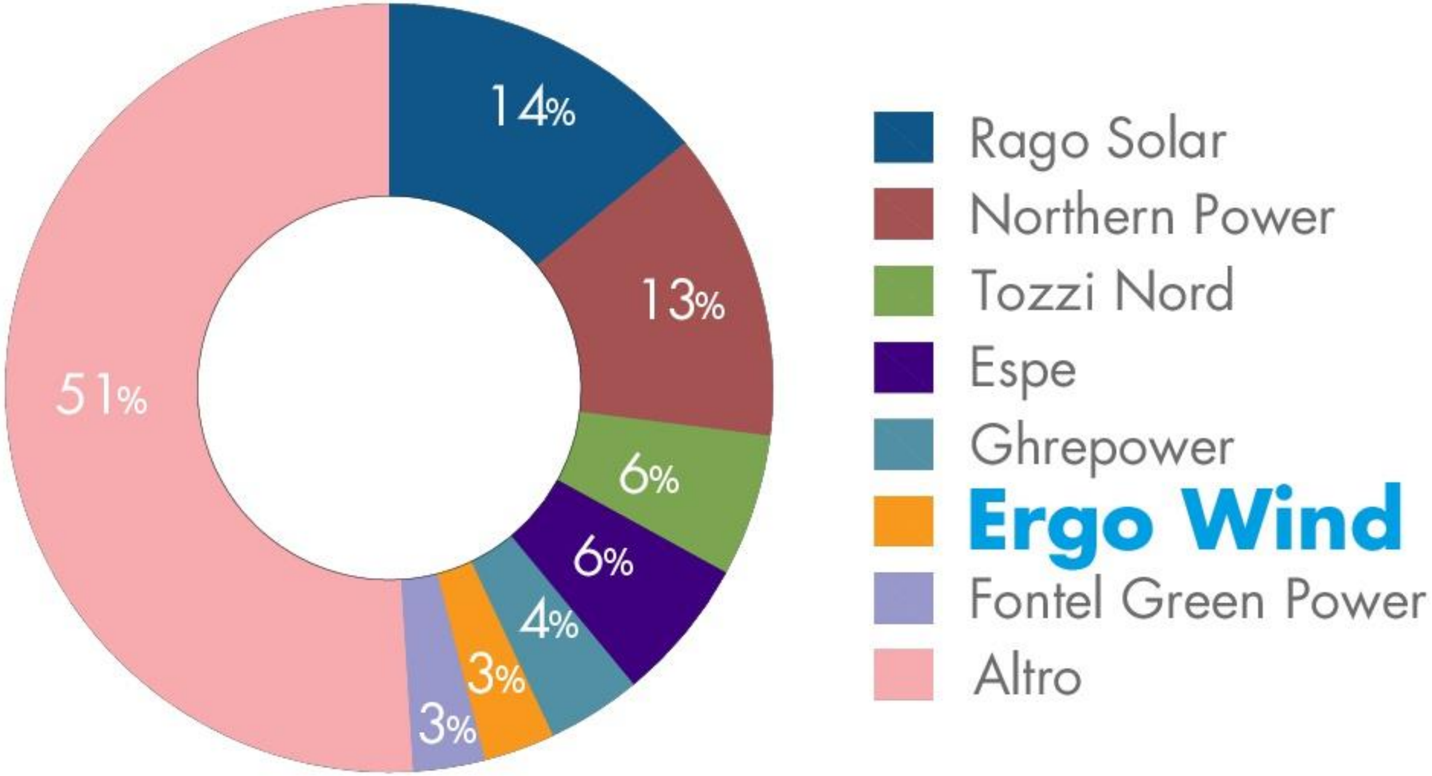
MULTIPURPOSE POLYVALENT ERGO WIND TURBINES

1

Wind turbines

EW 20 / EW 60

Ergo Wind among the top 4 italian companies and among the top 7 global sales companies in Italy



Extract from the market analysis of wind turbine manufacturers from 20 to 60 kW
to the plants built in the two-year period June 2015 - June 2016 in Italy.
Source: Il punto sull'eolico, October 2017, GSE - Gestore Servizi Energetici

OUR STRENGHTS

1

The lowerable/raisable hydraulic tower allows to reduce drastically maintenance costs.

2

Absence of inverter.

“If it isn’t there, it can’t break”

Henry Ford

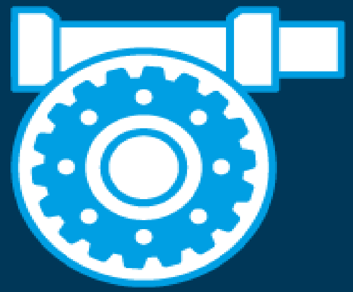
3

Our investors can count on the access to objective and demonstrable production data

TRUSTWORTHINESS

MONITORING SYSTEM AND REMOTE CONTROL WITH OUR ERGO WIND SOFTWARE

Ergo Wind turbines send operational data to the main server where a dedicated software processes them on 4 different levels: real-time monitoring, report, production statistic, alarm signals. Thanks to this system our team is able to supervise constantly our wind turbines with a comprehensive approach, providing an accurate technical assistance. Furthermore, Ergo Wind web app allows our clients the access to daily/weekly/monthly production data, wind direction and wind speed, percentage of wind turbine operation and estimated profitability.

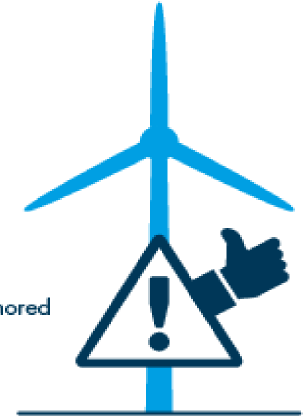


YAW SYSTEM

The yaw system is composed by a slewing drive able to guarantee high rotational coupling and rotor locking during operation. The hydraulic motorization gives profits in terms of trustworthiness, performance, lightness, obstacle and maintenance.
The pump of the slewing drive is located inside the technical compartment on the ground.
Its special sensors allow to optimize the wind heading thanks to accurate corrections.

REDUNDANT SAFETY

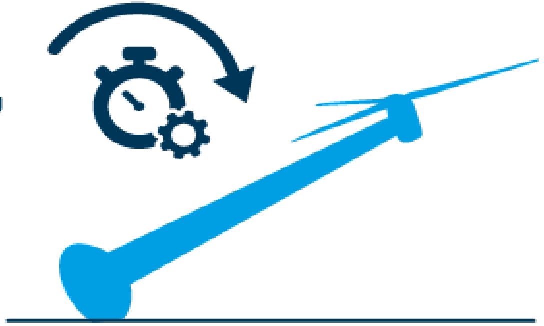
The safety of the wind turbine is guaranteed thanks to the adoption of redundant braking systems. The PLC software controls properly the negative hydraulic braking system and allows to modulate the braking according to operational conditions in order to avoid useless mechanical stress.
The aerodynamic brake, installed on each blade, is automated and completely mechanical and acts by limiting the overspeed of the rotor. Furthermore, this system keeps the appendixes anchored to the hub through a steel cable inside the blade.



LOW INSTALLATION AND MAINTENANCE COSTS

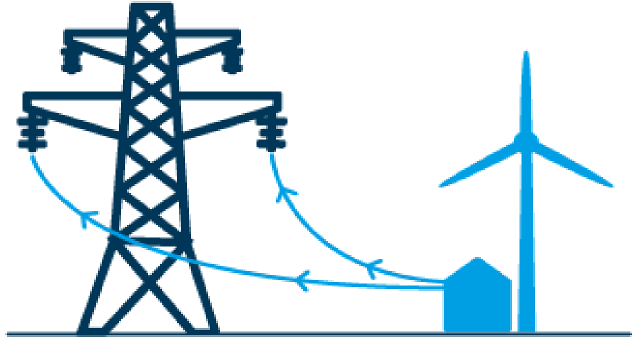
HYDRAULIC TOWER

Our wind turbines have a tower provided with an hydraulic system for the lifting and lowering, in order to obtain economic advantages both during installation and maintenance, as all the operations are carried out in the ground and not in altitude.
The time required to lower/raise the turbine are approximately 20 minutes, without the utilization of cranes, platforms or operators trained to work in high altitude.



HUB

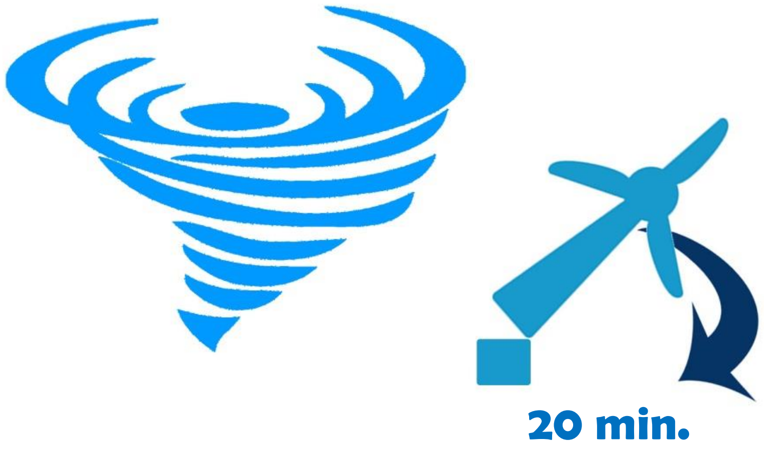
The hub is made by a single block in high-strenght aluminium alloy. Inside there is a cast iron bush for the coupling of turbine shaft. Each hub is x-rayed, connecting the benefit of the lightness and trustworthiness.

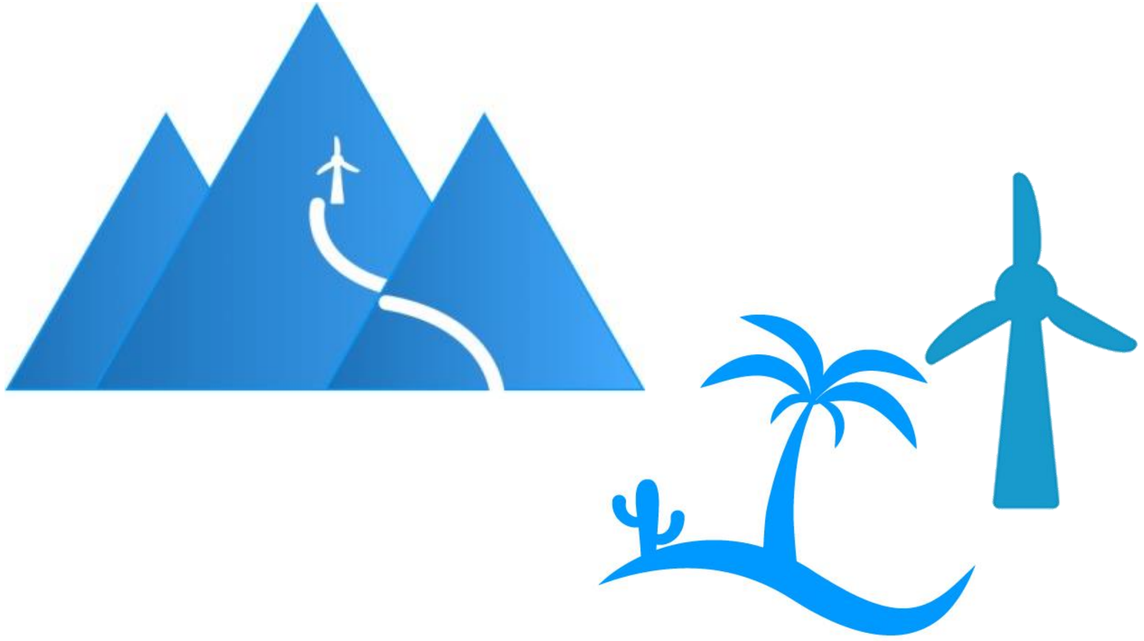


DIRECT CONNECTION TO THE POWER GRID WITHOUT INVERTER

Our wind turbines are connected directly to grid power without inverter (through the interface system required by the electricity service provider), increasing the global efficiency of the system and deleting the odds of damages in electronic devices.

VERSATILITY OF ERGO WIND TURBINES





- Lowerable hydraulic tower even with unfavorable weather conditions
- The installation is also possible in areas hard to reach and with difficult roads

TECHNICAL FEATURES EW 20

Wind turbine	
Configuration	Upwind
Rated Power (kW)	20
Rated generator speed (Rpm)	78
SWT Class IEC 61400-2	II
Cut-in wind speed (m/s)	3
Rated wind speed (m/s)	10
Cut-off wind speed (m/s)	25
Survival wind speed (m/s)	59,5
Top tower mass (nacelle + rotor) (kg)	1100

Rotor	
Rotor diameter (m)	10,8
Swept area (m2)	92,00
Blade lenght (m)	5,1
Blade material	Reinforced fiber glass
Power regulation	Yaw

Generator	
Tipology	Asynchronous
Configuration	Three phases, 4 poles, 400 Vac
Rated Power (kW)	20
Multiplier	Two stages parallel axes

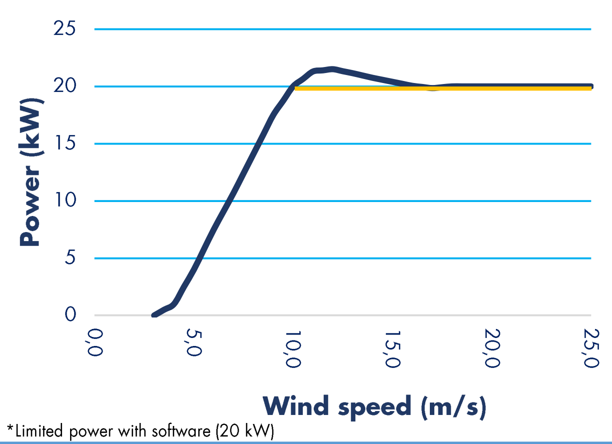
Inverter	No
Braking system and safety	Negative brake system on the turbine/Aaero dynamic brake/Yaw system

Control system	
Control system	PLC + touch screen
Monitoring system	Web app, daily/weekly/mothly /annual report, Log data

Tower	
Available hub heights (m)	24
Tower typology	Polygonal section tower with raisable/lowerable hydraulic system

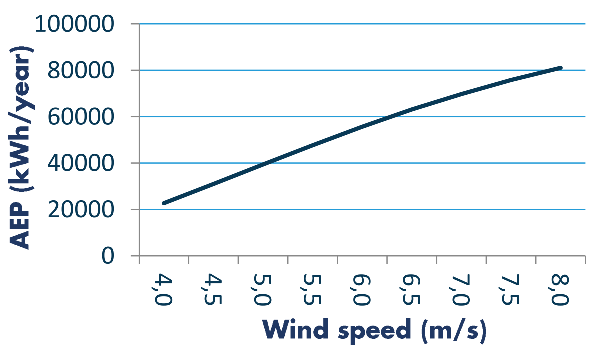
Warranty	2 years subject to possible extension

Power curve (kW-m/s)



*Limited power with software (20 kW)

Gross Annual Electricity Production AEP (kWh/year)



*Data shown in graphs are calculated on standard conditions using: k(shape parameter, Weibull slope) =2, air density = 1,225 Kg/m³.
**Ergo Wind reserves the right to alter product specifications without prior notice.

TECHNICAL FEATURES EW 60

Wind turbine	
Configuration	Upwind
Rated Power (kW)	60
Rated generator speed (Rpm	60
SWT Class IEC 61400-2	III
Cut-in wind speed (m/s)	3
Rated wind speed (m/s)	12
Cut-off wind speed (m/s)	25
Survival wind speed (m/s)	52,5
Top tower mass (nacelle + rotor) (kg)	2600

Rotor	
Rotor diameter (m)	15,95
Swept area (m2)	199,99
Blade lenght (m)	7,5
Blade material	Reinforced fiber glass
Power regulation	Yaw

Generator	
Tipology	Asynchronous
Configuration	Three phases, 4 poles, 400 Vac
Rated Power (kW)	60
Multiplier	Two stages parallel axes

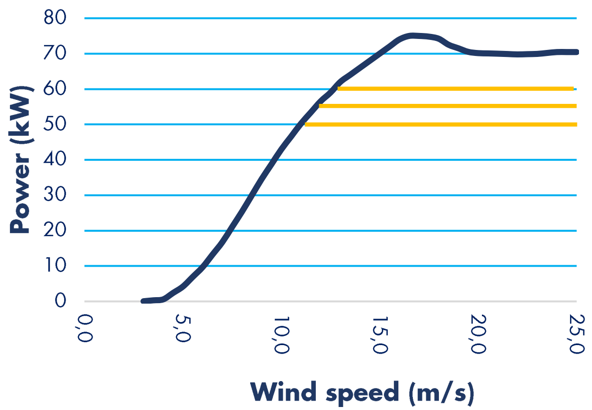
Inverter	No
Braking system and safety	Negative brake system on the turbine/A aerodynamic brake/Yaw system

Control system	
Control system	PLC + touch screen
Monitoring system	Web app, daily/weekly/mothly/ annual report, Log data

Tower	
Available hub heights (m)	24/27
Tower typology	Polygonal section tower with raisable/lowerable hydraulic system

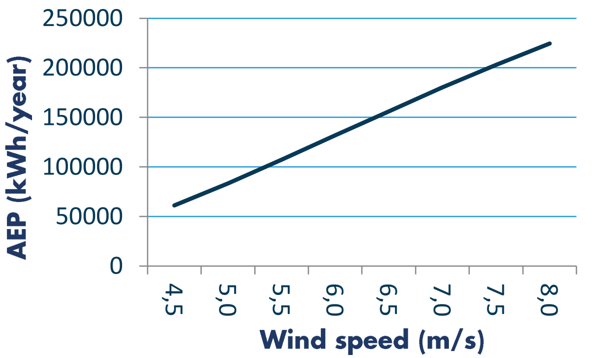
Warranty	2 years subject to possible extension

Power curve (kW-m/s)



*Limited power with software (50-55-60 kW)

Gross Annual Electricity Production AEP (kWh/year)



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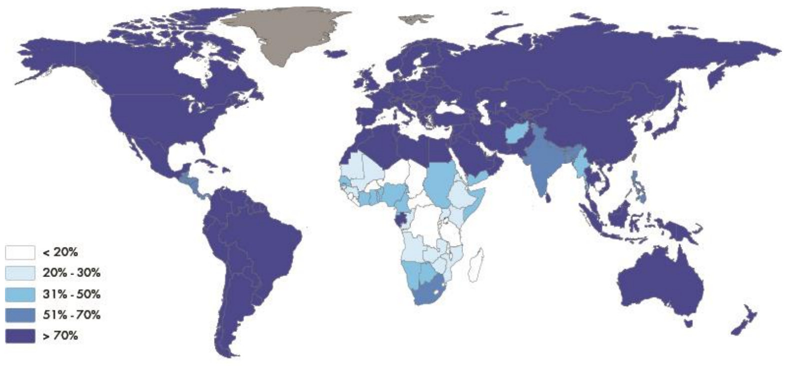
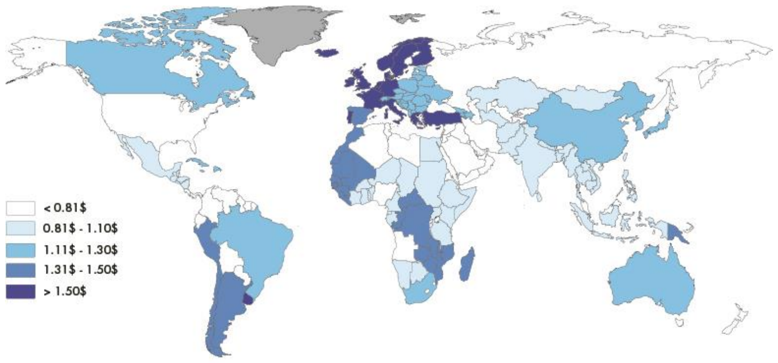
UTILISATION OPPORTUNITIES

Tourism, agricultural or industrial activities, villages located in areas not connected to the power grid.

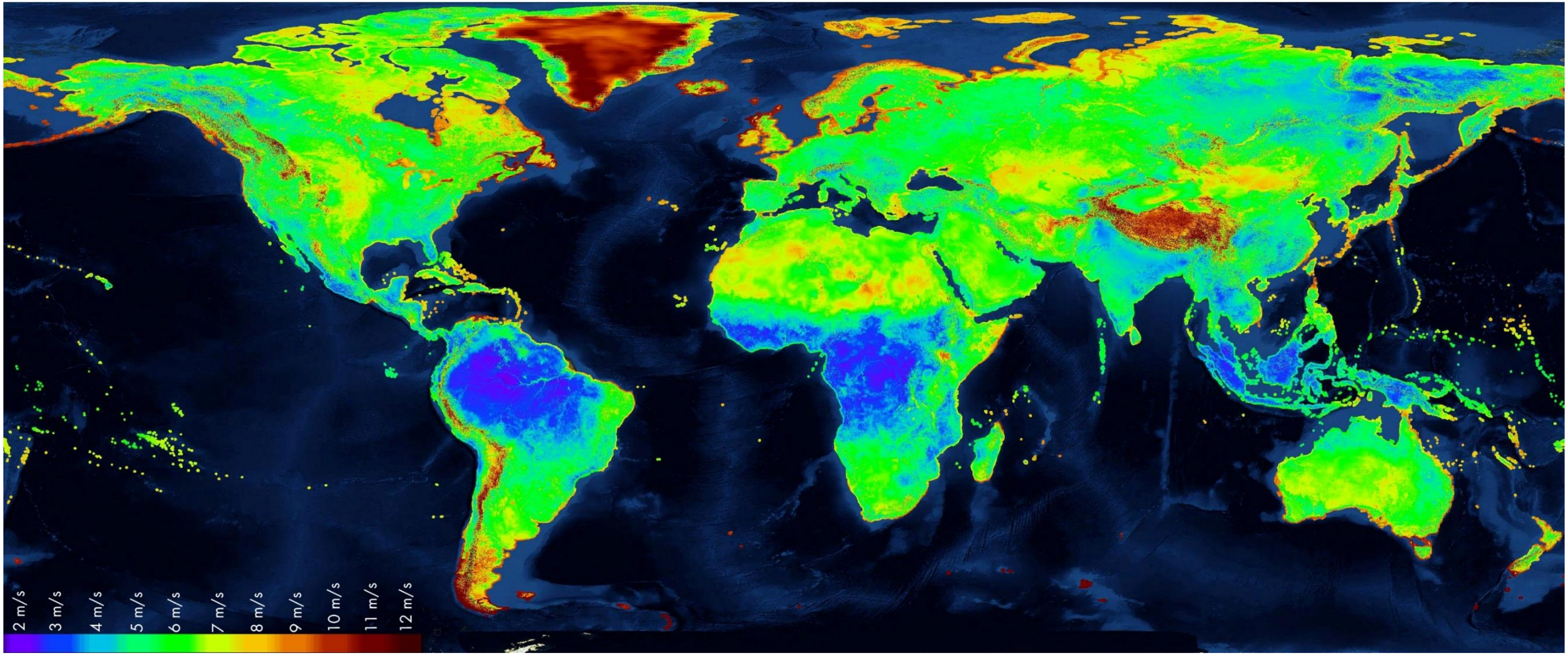




- Countries subjected to twisters or typhoons
- Countries connected to the grid
- Fuel price average in $

UTILISATION OPPORTUNITIES

World wind speed atlas at 30/40 metres of height



FUTURE GOALS AND PERSPECTIVES

➢ WIND TURBINE EW20

- Aerodynamic stall reached by design conditions.
  Blades begin loosing lifting capacity gradually approaching maximum power, starting from tip to root, this allows keeping the rotor at full wind without extra power deliver.
  Is made possible to gain in production while maintaining stability.
- IEC 61400 certification by end of July 2018.
  Certification will confirm and give **certainty of production data** and acoustic emissions, while testing the durability of the machine itself.
- New version implementing inverter ready for Japanese market.
- 5 – 10% augmented AEP by means of Inverter.
  (depending on site)

➢ WIND TURBINE EW50/EW60

- IEC 61400 certification by end of 2018.
  Strictly recommended for funding opportunities, european projects access and foreign marketing.
- Aerodynamic optimization of the blades for stable stall control.
- Optimization of control parameters according to the site.
  (against 1 year of data collecting)

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Renewable energies do not guarantee continuity.

Fossil fuels cannot guarantee the future.

The hybrid solution is the only one to achieve a sustainable future.

2

Hybrid system

HWG

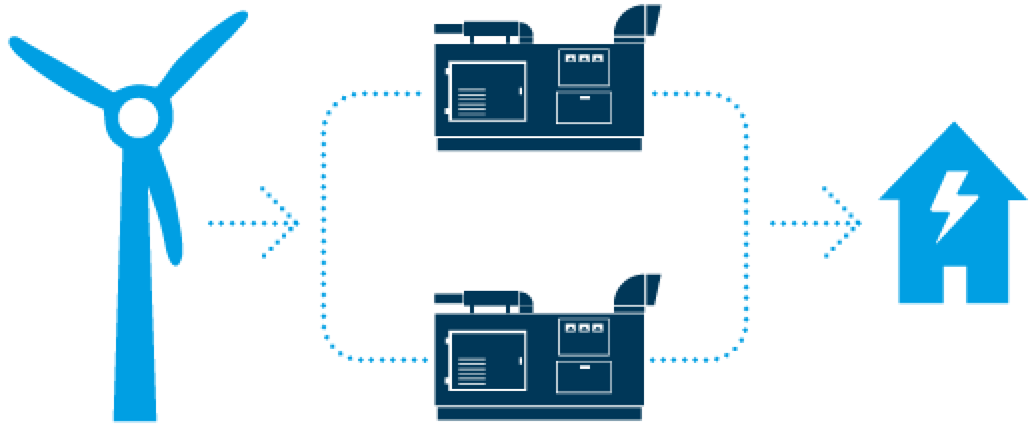
Fossil fuel fired generators can guarantee continuous electricity production and are able to adjust to the variability of electrical load but they have higher operational and maintenance costs and produce pollution

Wind turbines have lower operational costs and do not pollute but they do not guarantee a steady stream of power and cannot adjust to the variability of electrical loads.

HWG system is an hybrid system designed by Ergo Wind that matches generators and wind generators making the most of their qualities.

LESS CO_2 EMISSIONS

MORE SAVINGS

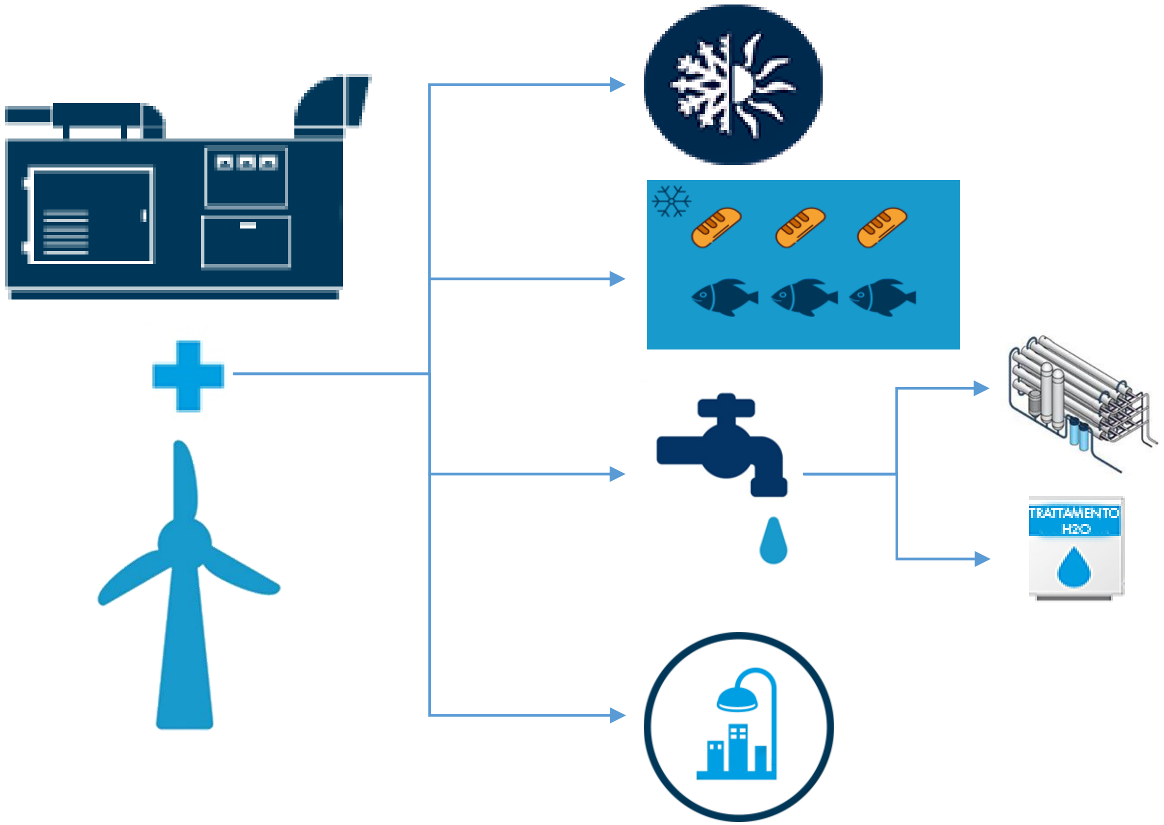


HWG ADVANTAGES

1. Fuel saving
2. Continuity of electricity supply
3. Reduction of CO_2 emissions
4. Life extension of generator

..AND THE OVERPRODUCTION?

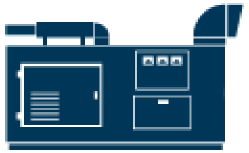
How can we use the energy without the employment of resistances or production restrictions, when the load is pretty lower than the production?



- Air conditioning
- Cold storages
- Production / transformation of water from water
- Production / transformation of water from air
- Lighting
-

EXAMPLE OF INSTALLATION

EW 60

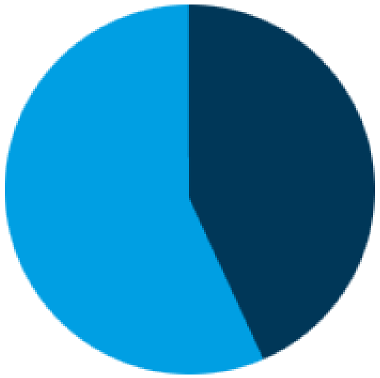


Generator 100 kW

Annual medium request of 200.000 kWh

Wind speed (m/s)	Estimated annual production (AEP, kWh)	Litres of spared fuel (lt)
5,0	109.140	27.285
5,5	128.400	32.100
6,0	146.590	36.648
6,5	163.710	40.928
7,0	179.760	44.940
7,5	192.600	48.150

Wind speed 5 m/s → Estimated annual production 109.140 kWh → Litres of spared fuel 27.285 lt

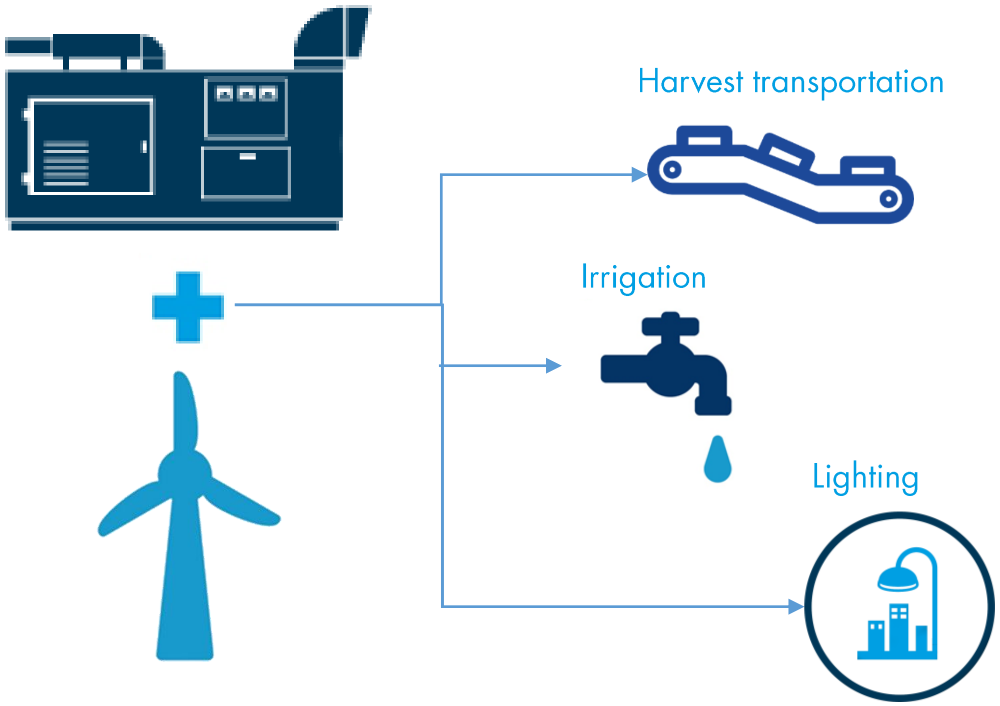


54% **production from wind energy**

46% **production from G.E.**

STARTING PROJECT

Currently at the study **the first plant** of relevant dimensions owned by Sir. Fezzardi Mauro, at a large plantation based in Agadir (Morocco), actually powered by diesel generators, which will be integrated with **Ergo Wind HWG hybrid system with 60kW wind turbines**.
Note that **Ergo Wind wind turbines will produce up to 80kW** having no power supply limitation from the grid.



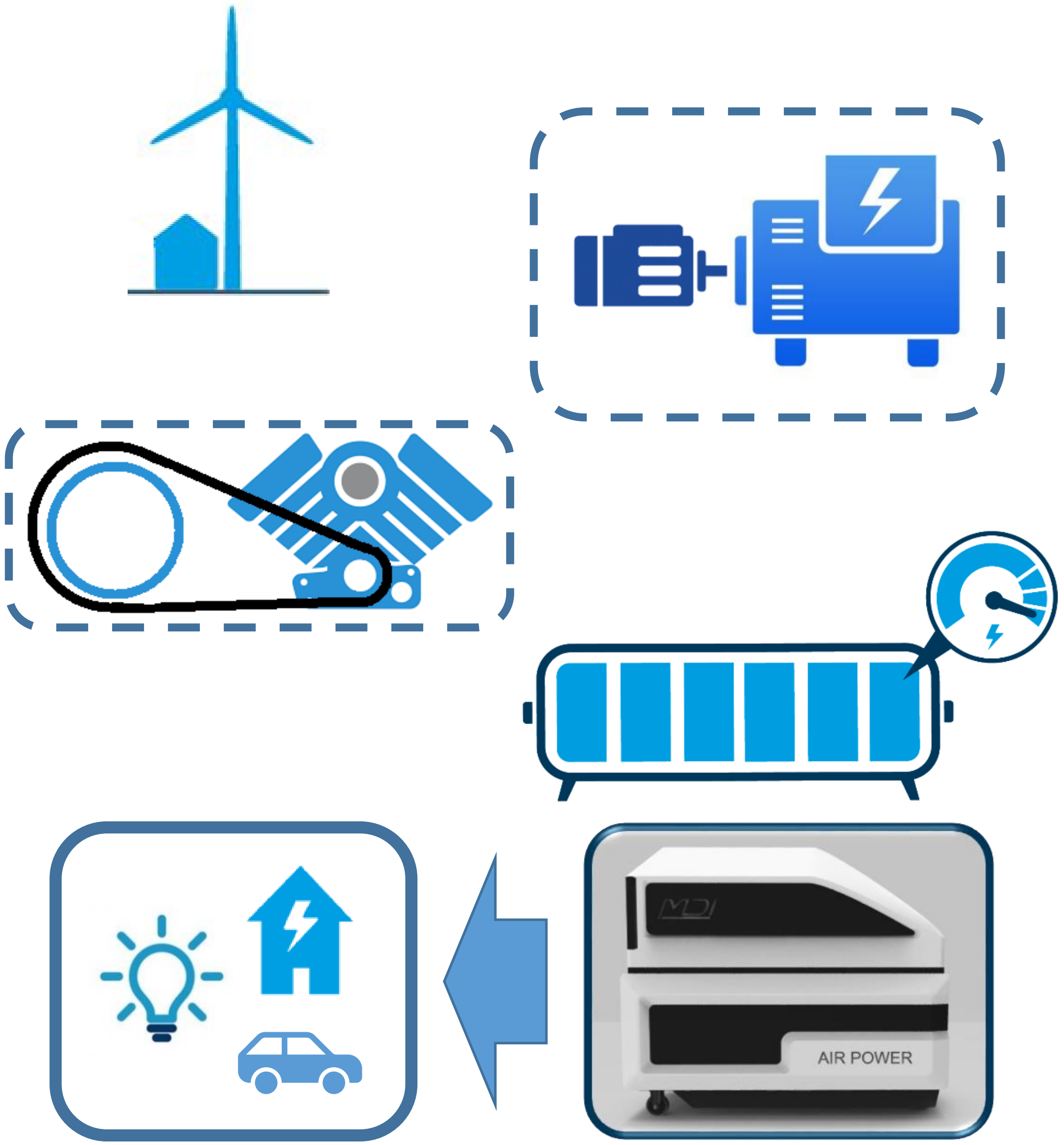
3

Energy storage

WAC

Wind
Air
Compressor

WAC – Main Components



- EW20/EW60 WIND TURBINES
- PRIMARY GENERATING UNIT
- AIR COMPRESSOR UNIT
- STORAGE UNIT
- SECONDARY GENERATING UNIT

WAC – Wind Air Compressor

- **NO DIRECT ELECTRICITY GENERATION**

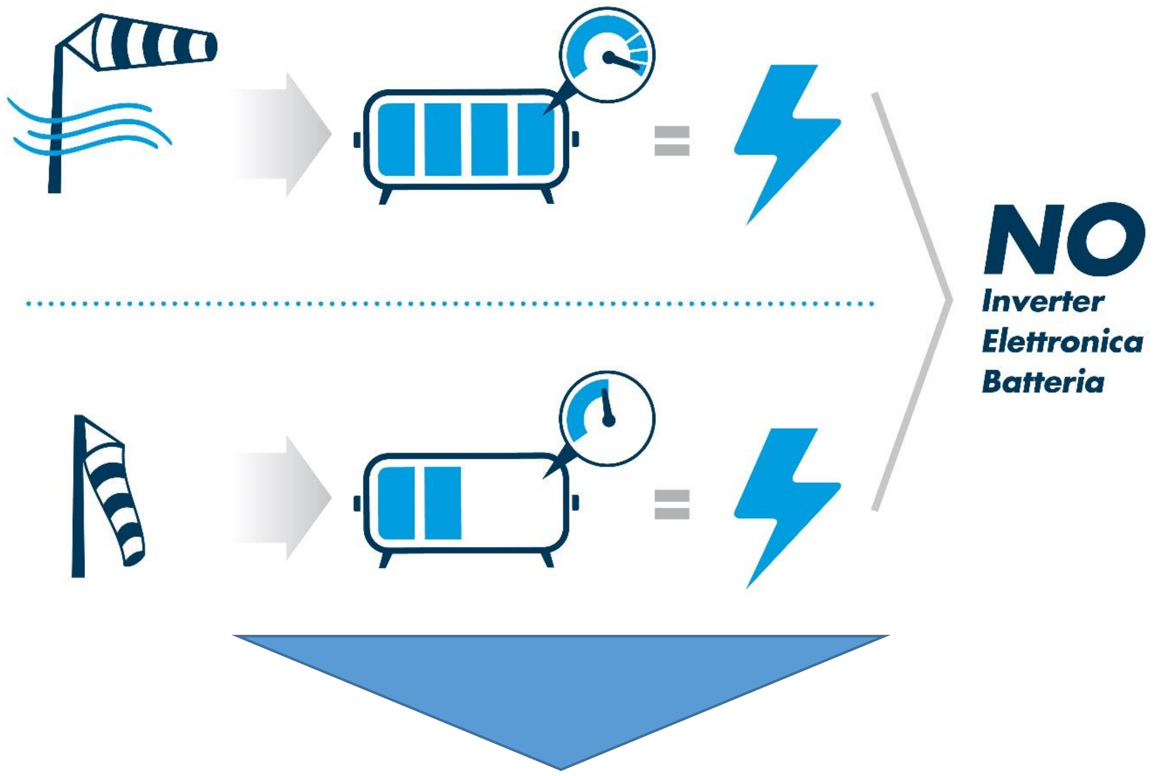
Hydraulic Transmission

- Strong and thrustworthy technology
- Lower maintenance costs
- Tracking of the optimal functioning

- **NO STORAGE BATTERIES**

ENERGY IN COMPRESSED AIR

- Easy modulation of capacity
- Maximum security
- No costs for replacement of exhausted batteries



- ✓ Tracking of energy request
- ✓ Absence of interruption in energy supply

WAC – System Performance

- **ENERGY DENSITY**

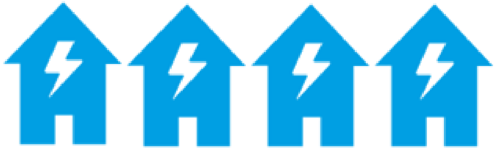
  Electric energy per storage unit volume.
  Increasing storage capacity, increasing available energy

  13 kWh/m³

- **AVAILABLE ENERGY**

  As the mean daily electric demand for a group of 4 households
  (at given storage volume)

  276 kWh

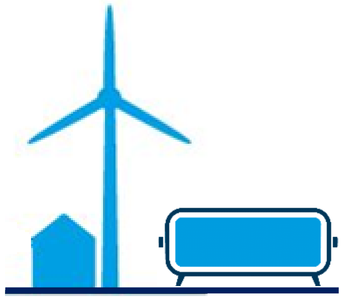


- **STANDALONE AUTONOMY**

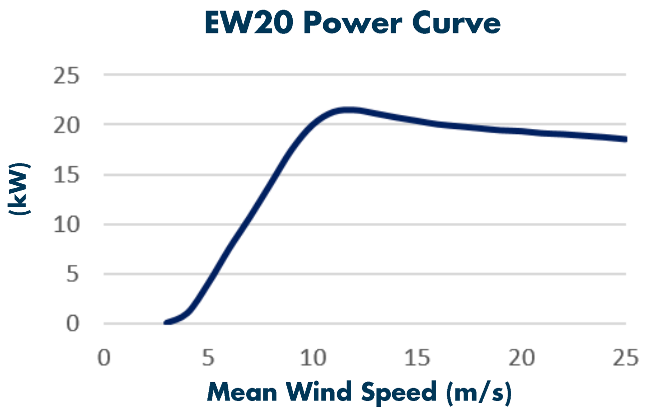
  At a given electric demand made of
  7 kW for 4 h/day and 3,5 kW for 20 h/day
  (in case of no wind)

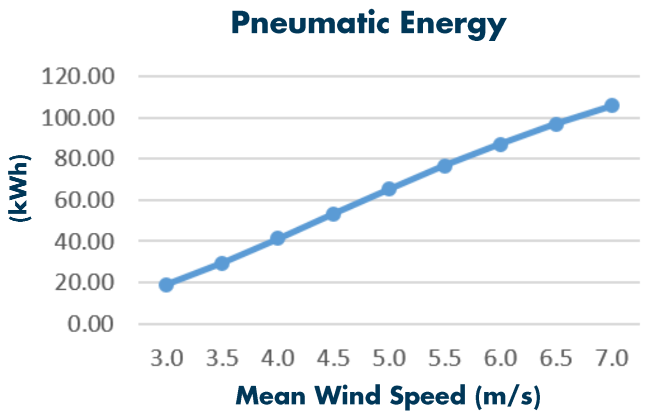
  + 68 h
  (~ 3 days)

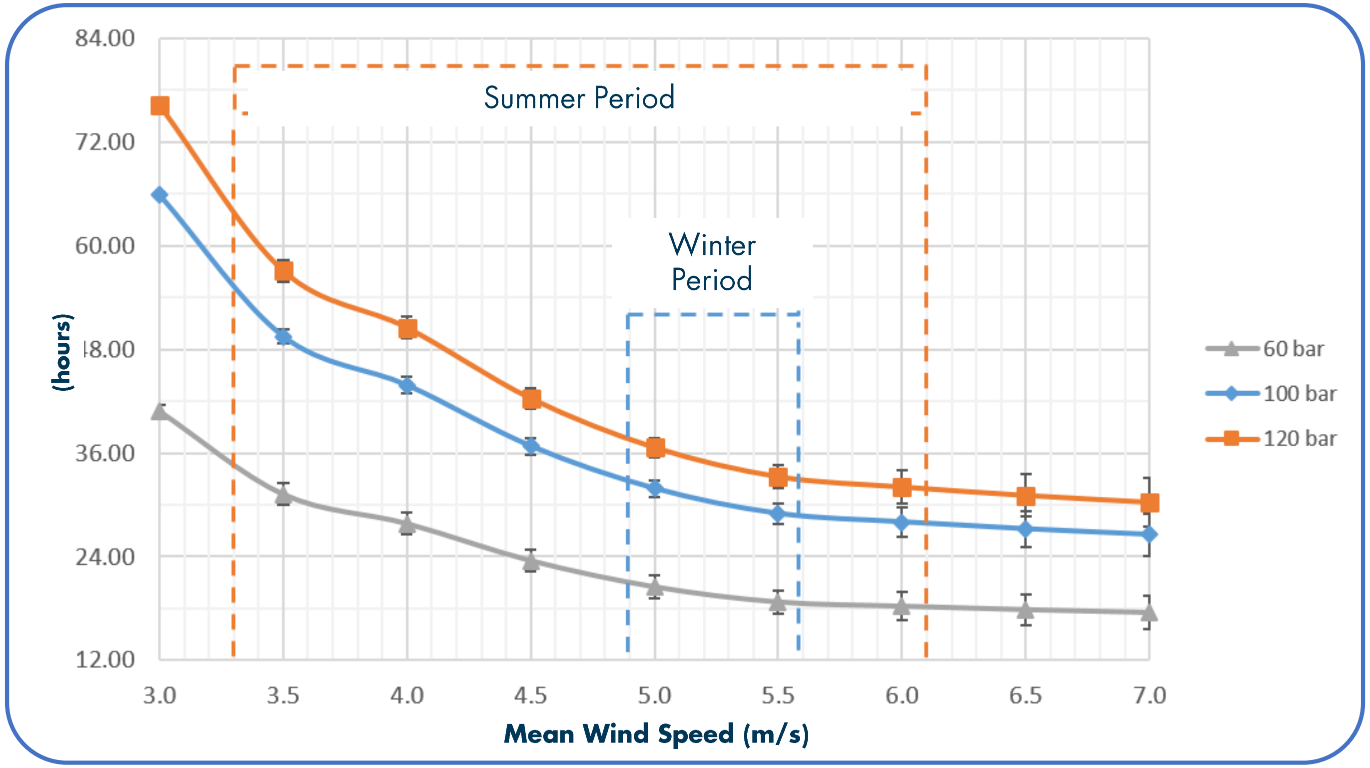
WAC – Application Example



- Ergo Wind EW20 wind turbine
- Site specs:
  - P spec = 146 W/m^2
  - Weibull k = 1,60
  - Weibull C = 5,52 m/s
  - Mean wind = 4,9 m/s
- 21,2 m^3 storage tank
- 276 kWh available energy







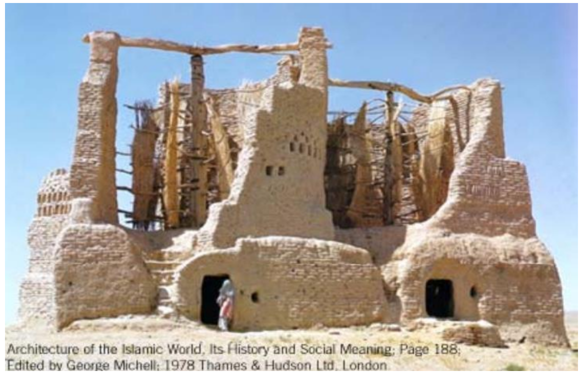
➢ CHARGING TIME

- **Summer period** (april – september)
  - Mean Wind Speed from 3,3 to 6,1 m/s
  - Mean Temperature 25 °C
  - Estimated Charging Time **from 16 to 36 h**
- **Winter period** (october – march)
  - Mean Wind Speed from 4,9 to 5,6 m/s
  - Mean Temperature 12 °C
  - Estimated Charging Time **from 18 to 22 h**
- **Storage tank pressure** 60 – 100 – 120 bar


A look to the future
ErgoWind wind turbines heading to a new way of sustainability

Wind exploitation in history

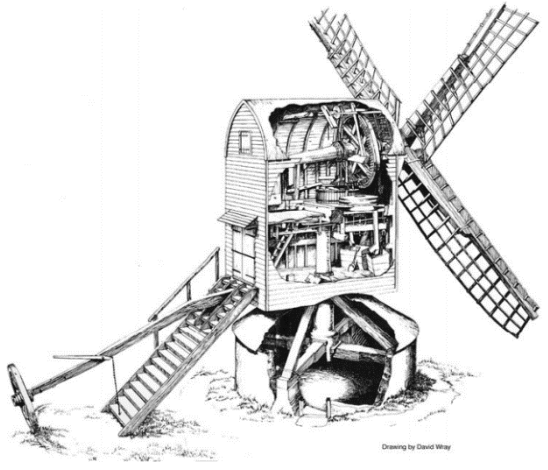
1700 B.C.
First historical testimony



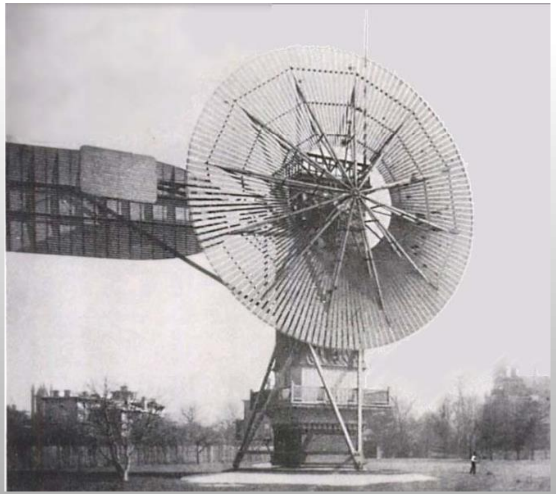
Capturing the energy of the wind has been a man's ambition ever.
First wind generators have been used in irrigation or in cereal milling.
Only in recent times have been used for power production, including storage systems.
Thanks to the growing knowledge in aerodynamics applied to the blades, rated power has grown significantly, and multi-megawatt turbines are born.

1990 - 2000
Enercon E-126 7,5 MW

1270
Pole windmill with full rotating structure



1887
First large-scale electrical production



1891
Aerodynamic optimization

A LOOK TO THE FUTURE

Wind has been harnessed to meet the temporary needs so far, but it's something unpredictable, thus a not programmable resource.

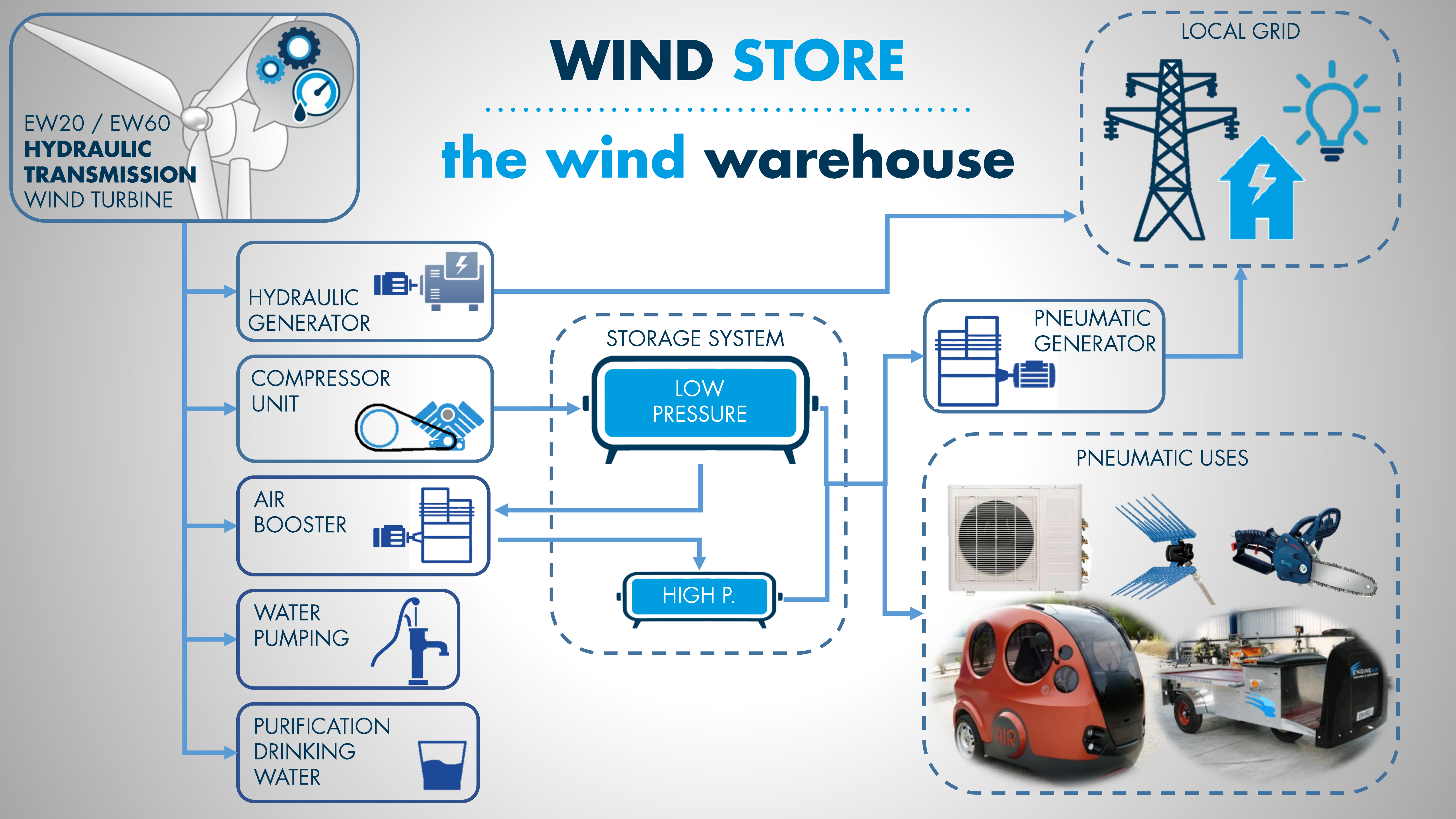
What if we could catch it to use it to the needs?

We know everything can be shelved for future use.
Refrigerators store food for the days to come, cupboards will get the clothing we will use as the seasons pass… as well as tanks store the water for everyday uses or batteries the energy that power our technology.

What about wind?

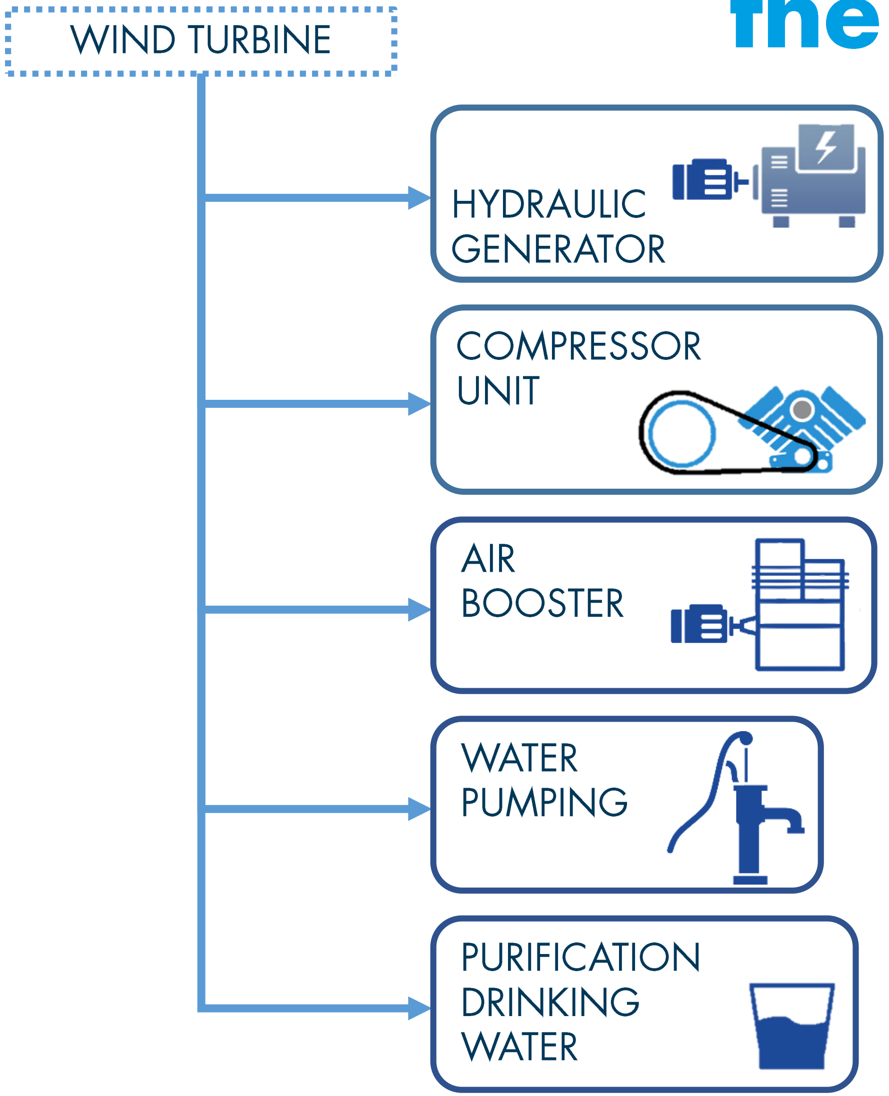
WIND STORE

the wind warehouse


WIND STORE
the wind warehouse
EW20 / EW60
HYDRAULIC
TRANSMISSION
WIND TURBINE
HYDRAULIC
GENERATOR
COMPRESSOR
UNIT
AIR
BOOSTER
WATER
PUMPING
PURIFICATION
DRINKING
WATER
STORAGE SYSTEM
LOW
PRESSURE
HIGH P.
LOCAL GRID
PNEUMATIC
GENERATOR
PNEUMATIC USES
AIR

WIND STORE

the wind warehouse



HYDRAULIC POWER DISTRIBUTION

The mechanical energy available to the rotor is exploited in parallel and according to the request after being transformed by the **hydraulic transmission.**
It is mainly converted to electrical power for mains input, by means of a **hydraulic generator set**.

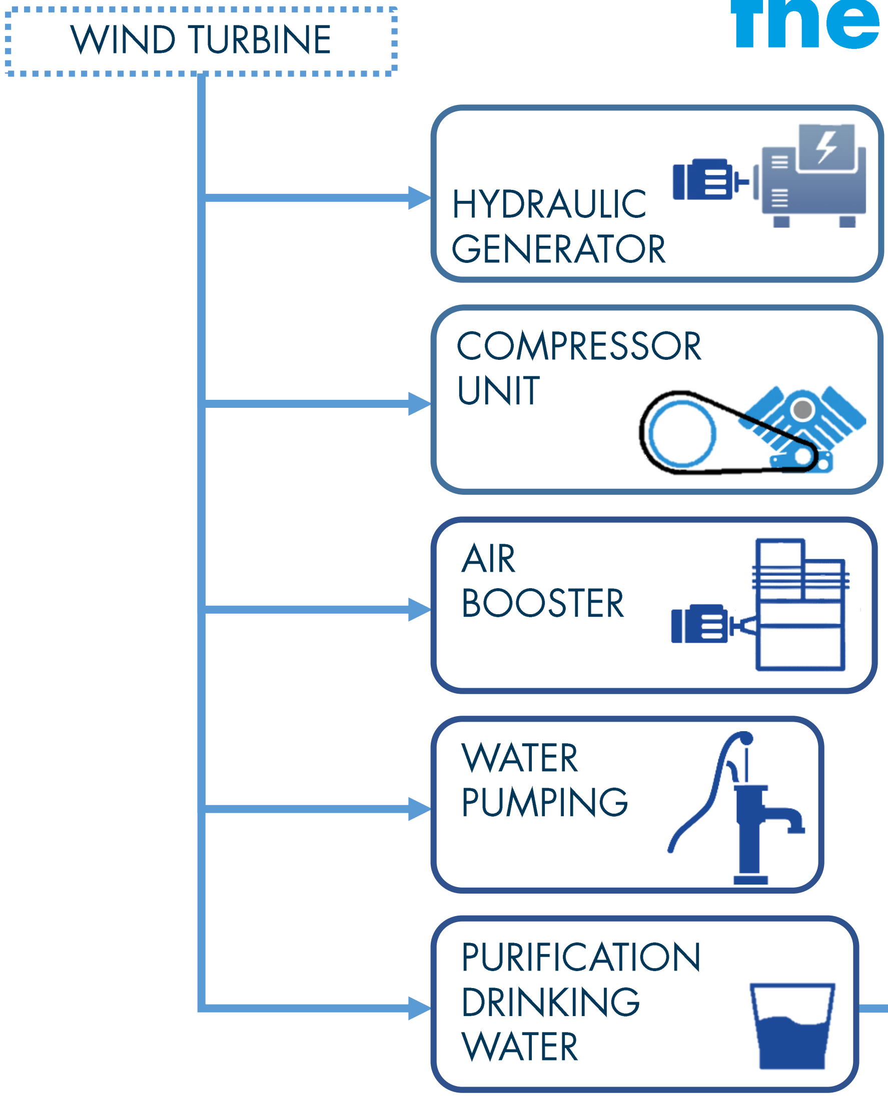
The excess energy not required by the network feeds the **compressor group** that accumulates the production surplus as **low pressure compressed air** for greater efficiency and less filling time of the tank.

If the low pressure tank is already full, the mechanical power that is not directly converted to electric power is utilized to bring the compressed air to the top pressure thanks to the **booster**, to ensure greater energy available in the high pressure tank.

If necessary, hydraulic power can be used for **pumping water** into collection basins, or for **sewage purification**, by reverse osmosis.
Otherwise, the combined use of hydraulics and high-pressure air can be used for the process of **collecting atmospheric humidity** for drinking water production.

WIND STORE

the wind warehouse



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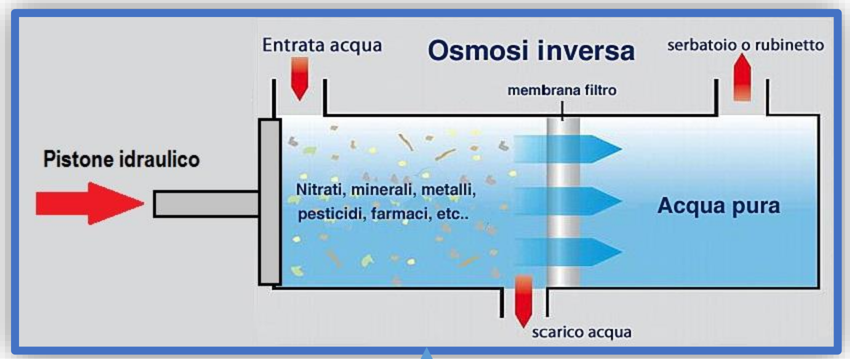
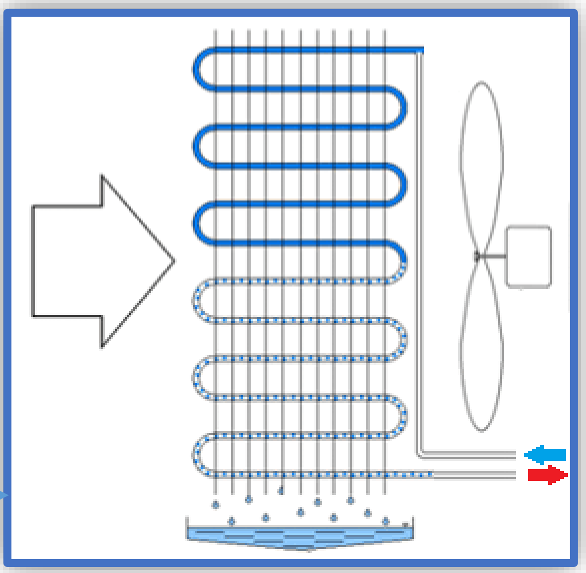
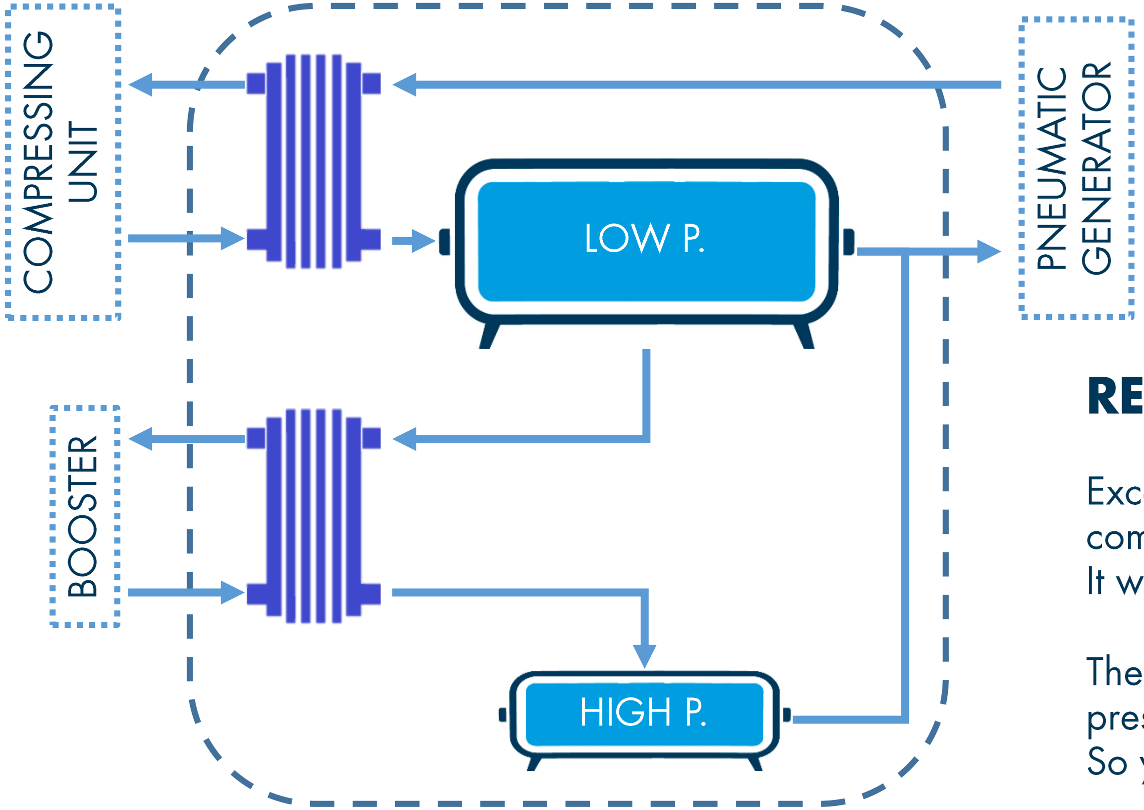




WIND STORE

the wind warehouse



RECOVERY AND STORAGE SYSTEM

Excess wind energy is mainly stored at **low pressure** for increased compression efficiency.
It will be available for conversion to electricity on days of absence of wind.

The **booster** exploits the surplus of wind energy to bring the air at the top pressure.
So you can have more energy for subsequent operations.

Thanks to the **recovery of compression heat**, it is possible to improve the overall efficiency of the compression-expansion cycle.

WIND STORE

the wind warehouse

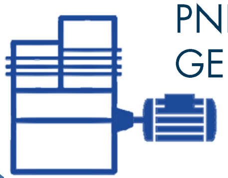
PNEUMATIC ENERGY ON REQUEST

The energy accumulated in the tanks is mainly converted to electricity by the **pneumatic generator** to serve the users in periods of wind calm or demand peaks.

Both storage pressure steps are useful for many activities.

STORAGE SYSTEM

PNEUMATIC GENERATOR



LOCAL GRID

AIR CONDITIONING

AUTOMOTIVE USES

PNEUMATIC EQUIPMENT

WIND STORE

PNEUMATIC
EQUIPMENT

AUTOMOTIVE
USES


2019
OCTOBER
1
PRODUCT LINE
EXTENSION
20 kW
50-60 kW
100 kW
250 kW
ergo
Wind

ergo Wind

Thanks for your attention