

«Casi di successo ed esperienze delle imprese vincitrici»



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RIVER POWER

**«Water flow kinetics energy exploitation for mini/micro
hydropower plants»**

"Mission"

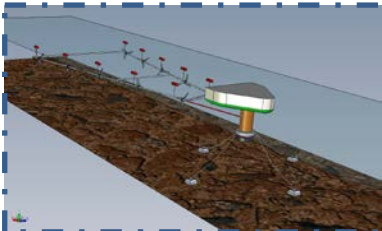
Design, implementation and test of the most innovative technologies for the exploitation of renewable energy

"Areas of interest"



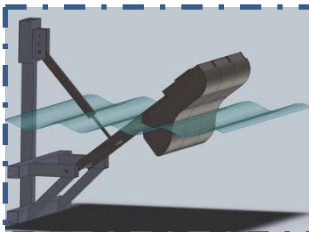
WIND TURBINE

- ✓ Design of 80% of Italian wind turbines
- ✓ Due diligence technical services
- ✓ verification and optimization of existing products
- ✓ joint ventures in manufacturing and marketing of turbines



RIVER TURBINE

- ✓ Design new systems for the exploitation of zero-head flows



OCEAN TURBINE

- ✓ Innovative devices for marine currents and waves
- ✓ National test laboratory

OUR PARTNERS

SEAPOW^{ER} scrI

Consortium with University of Naples Federico II

- ✓ Design of wind turbines
- ✓ Design systems for tidal and wave currents
- ✓ Design of river turbines
- ✓ Design of targeted components
- ✓ Optimizing existing systems
- ✓ Prototyping of wind / sea / river systems
- ✓ Support for industrialization and marketing
- ✓ Experimental tests in a controlled environment: gallery of Wind and naval tank
- ✓ Experimental field tests
- ✓ Assumption of performance of different systems



- ✓ Manufacture , assembly, installation and maintenance of wind turbine
- ✓ Large size mechanical



SMALL WIND TURBINES DEVELOPED

EOL-H-5

5kW@9 m/s
Diameter=6m
Passive pitch



WL-30

30kW@10 m/s
Diameter=15m
Variable pitch



FX-21

60kW@9.5 m/s
Diameter=21m
Variable pitch



EOL-H-2.5

2.5kW@10 m/s
Diameter=3.7 m
Furling



EOL-CK-60

60kW@10 m/s
Diameter=18m
Variable pitch



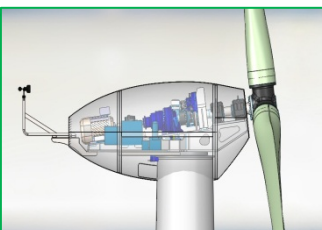
WIND 60-23

60kW@9,5 m/s
Diameter=23 m
Variable pitch



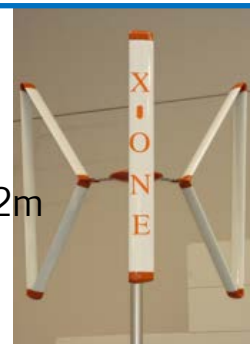
SIMPLY

60kW@8,5 m/s
Diameter=28m
Stall



X ONE

kW@10 m/s
Diameter=2,2m
Vertical axis



HYDRO TURBINES DEVELOPED



VERTICAL AXIS TURBINE: KOBOLD 160 kW

in collaboration with Ponte di Archimede

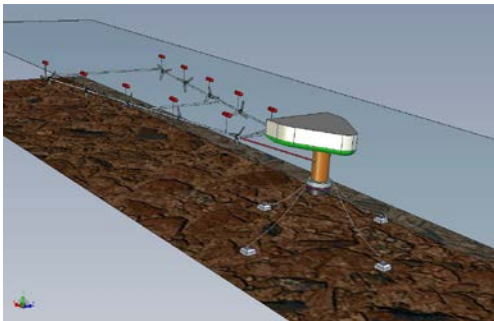
Diameter: 6 m

Length: 5 m

3 blades in fiberglass

Floating platform diameter: 10 m

TRL 9: Installation in the Strait of Messina with a nominal power output of 160 kW



HORIZONTAL AXIS TURBINE WIRES 20 kW

in collaboration with FRI-EL GREEN POWER

Horizontal axis turbine wires connected to a floating body attached to the bottom

TRL 7: Prototypes of 6kW and 20kW tested in Strait of Messina

HYDRO TURBINES DEVELOPED

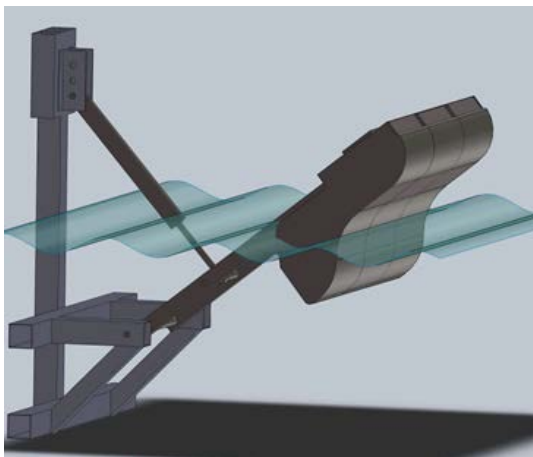


GEM "Ocean's kite" 100 kW

in collaboration with eng. Nicola G. Morrone

Horizontal axis hydrokinetic – Real scale prototype

- Rated speed: 2,6 m/s
- Rotor diameter: 3 m
- Rotor efficiency: 0,8
- TRL 7 Full scale prototype design, manufacture and deployment in Venice Lagoon



GEL PROJECT 5kW

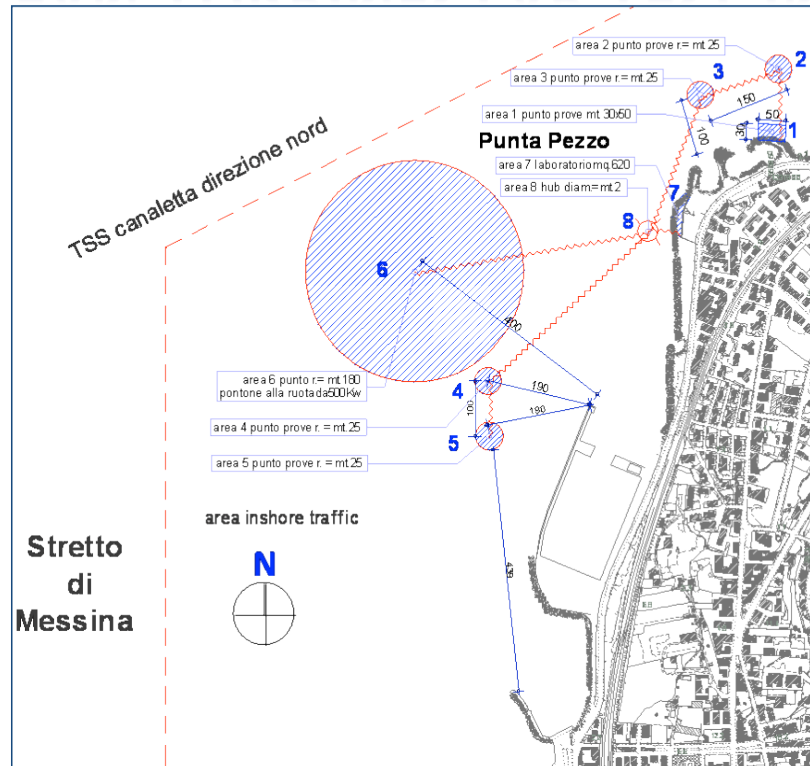
in collaboration with UMBRA GROUP Sp.A.

Wave power generator – Big scale prototype

- Immersed volume: 4mc
- Amp./Freq. wave: 0.24m/0.35 Hz
- Wave power: 3.5 kW
- Mechanical power: 2.6 kW ($\eta_{\text{buoy}}=0.74$)
- Electric power: 2.0 kW ($\eta_{\text{global}}=0.60$)

TRL 4: Experimental tests in the water tank

OCEAN TURBINES LAB TEST IN THE STRAIT OF MESSINA



SERVICES OFFERED

- certification of production capacity and performance of the devices; structural performance and reliability;
- network connection assistance and certification of renewable energy;
- offices and computing centers;
- educational laboratories for the promotion of primary school and up to university specialization

FACILITIES

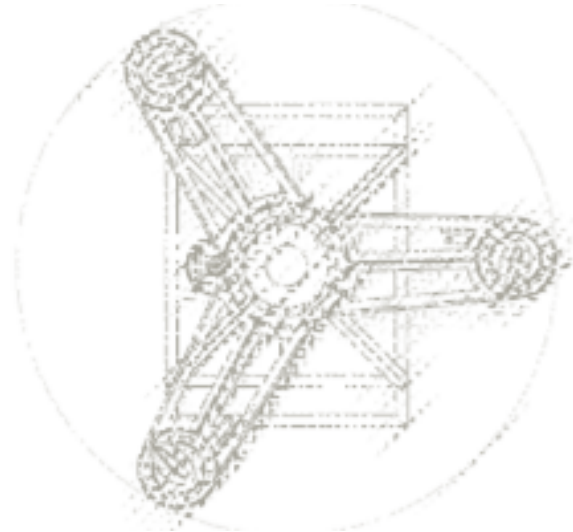
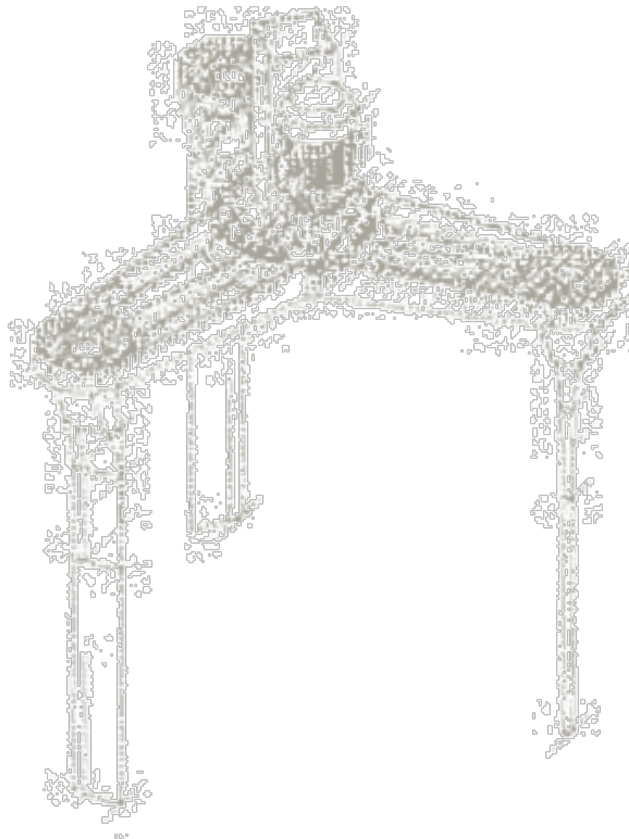
- 5 sea areas for periodic tests of prototype turbines
- 1 test area on artificial pier
- 1 submarine hub
- 1 ground workshop for test related activities

OUR PARTECIPATION IN SME INSTRUMENT



RIVER POWER

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OUR PARTICIPATION IN THE SME INSTRUMENT



CHRONOLOGY OF RIVER POWER PROJECT

February 2017 – Presentation of the proposal

April 2017 – Win Phase 1  **next step**

Presentation of a Feasibility Study on September 2017



Industrialization
and
commercialization

HYDROPOWER MARKET (established market)



WORLD

Installation: 720 GW (70% total renewable energy source)

EUROPE

Installation: 136 GW

ITALY

Installation: 18 GW

SHPP MARKET (< 10 MW) are still scarcely exploited..

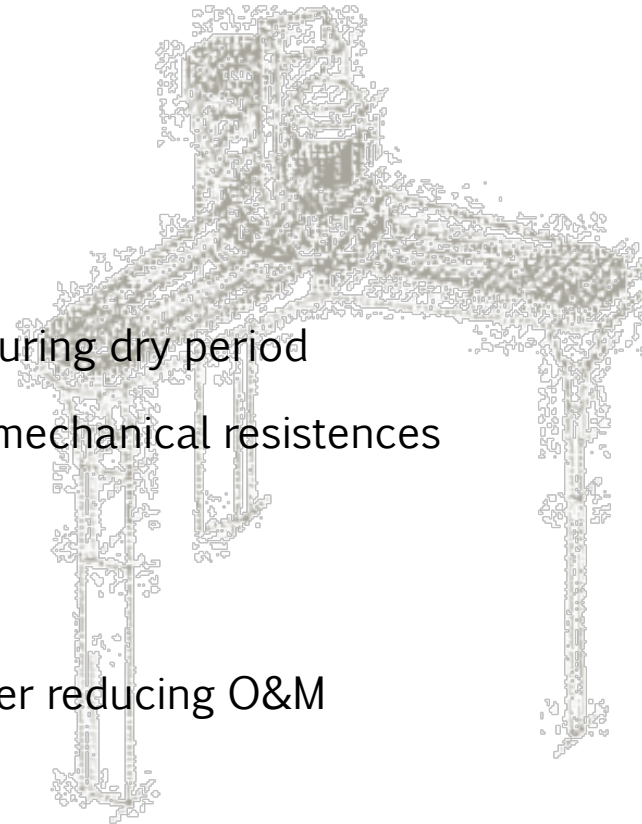
50% of the SHPP potentially exploitable is due to mini/micro HP, for a total presently unexploited RES electricity generation of 50-90 TWh/y in EU at least



LARGE MARKET OPPORTUNITY

RIVER POWER IDEA...only advantages

- ✦ Exploiting the hydro-kinetics energy of the water flow
- ✦ Zero-head application
- ✦ Any fall and dam required
- ✦ Design is based on the wind vertical-axis technology
- ✦ Operate also if blades are only partially submerged during dry period
- ✦ Design optimization focused on the reduction of the mechanical resistences
- ✦ Improvement of the global efficiency of the device
- ✦ Efficiency target=45%
- ✦ Placing the motor and kinematic chain out of the water reducing O&M operation
- ✦ Absence of significant civil works reducing environmental impact and the investment costs





A first 4 kW prototype
already fabricated and
tested

TRL 6

Fabrication and testing of a 50
kW prototype will be installed in
the Strait of Messina

TRL 9



Industrialization and
commercialization of
River Power



- ⊕ Production= 211 MWh/y
- ⊕ Design with a modularity logic: 4 modules installed together for a total power of 200 kW
- ⊕ LCOE < 7 c€/kWh
- ⊕ Plant installation cost < 2,000 €/kW

MARKET AND NEEDS

- **MARKET SEGMENTS:** New installations of mini/micro HydroPower
- **EUROPEAN MARKET SIZE:** 67 GW of installation potentialities
(HIGH VOLUME MARKET)
- **GEOGRAPHICAL AREA:** Global. First markets would be the European countries because of the largest HP tech penetration
- **KEY STAKEHOLDERS:** RES associations, public entities, energy utilities, banks and private investments funds
- **PARTNERS SOUGHT:** Joint Venture business partners