Business Plan

GIAR ENERGY S.R.L. BENEFIT COMPANY

– OFFICE –

Registered Office
Borgo Conce, 29 – 62027 San Severino Marche (MC)

Operational Headquarters
Via E. Mattei, 27 – 62027 San Severino Marche (MC)

Certified E-mail
giarenergy.green.sb@pec.buffetti.it

VAT Number
02064820430

Company Registration Number:
MC-275955

CEO:	Simone D'Ambrosio Via Pomezia, 8 – 63074 San Benedetto del Tronto (AP)
Telephone:	+39 348 5655284
Fax:	-
E-mail:	simone.dambrosio@giarenergy.green

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1. Executive Summary

1.1. Quick Pitch

Our Company has GIAR technology – Reaction Turbine – related to the homonymous Universal Turbine with Patent valid in 23 European countries and University Certification of the average mechanical efficiency (94%) in fluvial application, capable of generating Green Energy with a very high level of efficiency through the exploitation of the fluids' properties and therefore to bring positive consequences on the environment and on the community.

GIAR Energy S.r.l. Benefit Company is an Innovative Start Up born with the aim of providing innovative products and services with high technological value in the energy sector, while producing a positive impact on society and the biosphere.

GIAR Energy S.r.l. Benefit Company is the exclusive licensee for the use of the GIAR Patents, for their entire duration, in order to foster the enhancement and promotion of the subject matter of the Patents themselves:
(i) National Patent filed on 06/09/2012 with application no. MC-2012-A-000074 – entitled "Multiblade turbine featuring central core with polygonal section" – whose National Patent Certificate no. 0001413577 for Industrial Invention is dated 30/01/2015;
(ii) International Patent filed on 04/09/2013 via patent application no. 13759443.8 claiming the right of ownership of the aforementioned national application – with the title "Multiblade turbine with polygonal cross-section core" – whose grant of patent number is 2893185 and whose certificate of International Patent for Industrial Invention is dated 09/11/2016, has no. PCT/EP/2013/002653 and is validated in: Belgium, Cyprus, Croatia, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Ireland, Iceland, Italy, Latvia, Lithuania, Malta, Norway, Holland, Poland, Portugal, Spain, Sweden and Turkey.

The uniqueness of the "GIAR Turbine", which motivates its definition of Universal Turbine, consists in the possibility of extracting energy from multiple renewable sources:

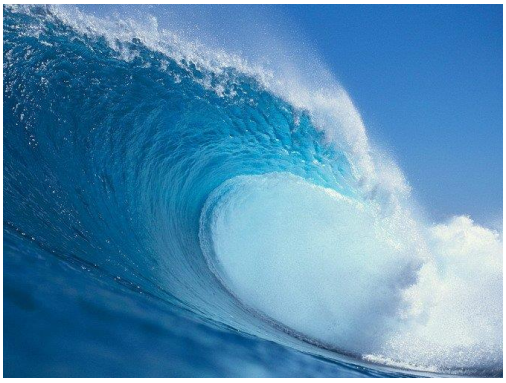
- Wave motion (OWC - Oscillating Water Column application);
- River, sea and tidal currents;
- Wind.

The "GIAR Turbine" has a Certification of the average mechanical efficiency (94%) in fluvial application, obtained on 30/07/2019 following tests carried out on a 1:1 scale model at Pievebovigliana (MC), issued by the Department of Physics of the University of Camerino.
Since the University recognized as an "operating environment" the fluvial application in which the prototype was tested, the GIAR Patent is certified to grade "**TRL 7**" of the ISO 16290:2013 standard from the point of view of the Technology Readiness Level.
River application is the main field of application and development for the GIAR Turbine, since the GIAR technology has extraordinary positive implications from the point of view of environmental sustainability, for the reasons illustrated below.

The comprehensive descriptive presentation of GIAR technology is reported below, with a video section linked to YouTube.

GIAR

Reaction Turbine

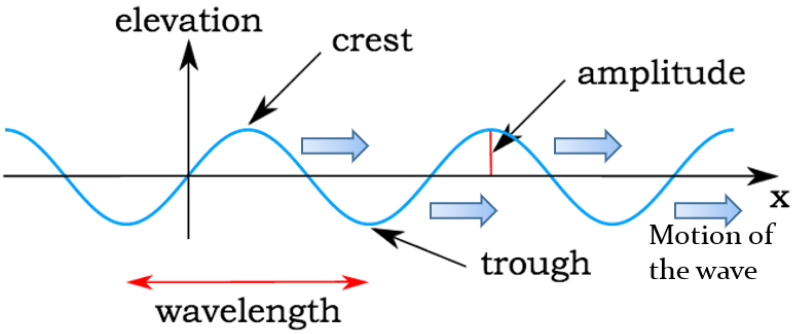


GIAR Energy presents The Universal Turbine

1. Background

The ever-increasing demand for energy availability by the industry requires the production of more and more energy, with serious consequences for the Environment since it is mainly produced with fuels that consume atmospheric oxygen and release a large amount of carbon dioxide and pollutant dusts.

1.1. Energy from wave motion (OWC)



The sea constitutes an inexhaustible and largely unused reserve of renewable energy, with a potential electricity production estimated up to 90.000 TWh/y.

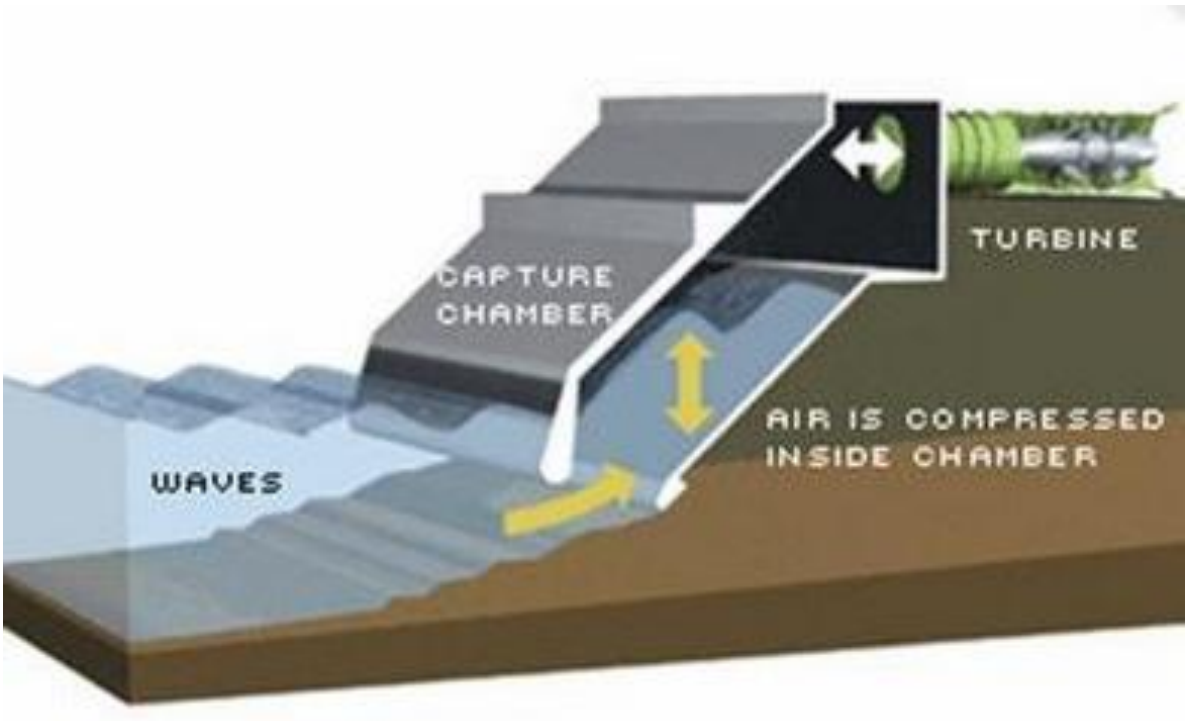
From now on up to 2030, it is expected that wave energy production will have a growth greater than all other renewable sources, with a potential market estimated in the order of 100 billion dollars.

Technologies aimed at the exploitation of wave motion have always been the subject of serious interest in the renewable sources scenario.

However – although the energy from wave motion is the one studied for the longest time and therefore the one that has seen the largest number of experiments, solutions and plant prototypes – it is not yet very widespread due to the specific complexities it presents.

Among the main technologies aimed at producing energy from wave motion, the one exploiting the principle of the Oscillating Water Column (OWC) is the subject of research and growing consideration both in Italy and in other countries.

Fig. I: Operation schematics of OWC technologies

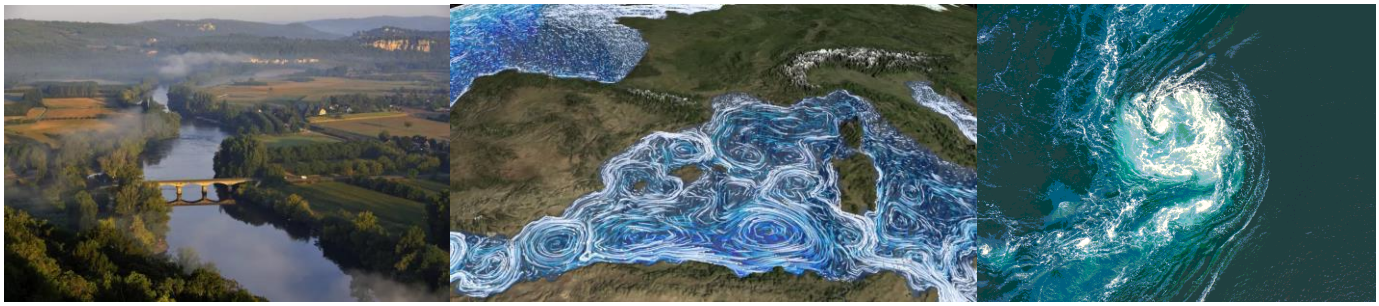


OWC plants can be:

- Offshore (marine) → having the advantage of operating at high levels of wave height and, therefore, of being able to produce large amounts of energy;
- Onshore (terrestrial) → having the advantage of entailing low construction and power grid connection costs.

The Mediterranean Sea presents peculiar conditions, hence the need for further research and experimentation aiming to extract energy even from low waves.

1.2. Energy from river, sea and tidal currents



The electrical energy obtained from the exploitation of kinetic energy from river, sea and tidal currents has an extraordinary potential in the future scenario of electricity generation from renewable sources. Moreover – since river, sea and tidal currents are more predictable than wind and solar energy – they are certainly suitable for the use of devices for the production of energy.

River currents were the first renewable energy source to be used, since the times of the Greeks and Romans, who used the energy from the moving water to run the mills for grinding grain, up to modern hydroelectric technologies. However, much can still be done to increase energy yields.

All scientists agree that the sea will become the largest source of renewable energy in the world, not only thanks to the exploitation of its waves but also thanks to the exploitation of its currents.

Sea and tidal currents have immense potential for electricity generation: a 2006 report from United States Department of the Interior estimates that capturing just 0,1% of the available energy from the Gulf Stream would supply Florida with 35,0% of its electrical needs.

1.3. Wind energy

Unlike the energy coming from the combustion of fossil fuels, wind energy is renewable, abundant, widely distributed, clean; it produces no greenhouse gas emissions during operation and it consumes no water. The effects it produces on the Environment are far less deleterious than those produced by non-renewable energy sources.

Onshore wind is a cheaper source of electricity than coal or gas-fired power plants; offshore wind is steadier and stronger than on land and offshore farms have less visual impact, but their construction and maintenance costs are considerably higher.

Wind is a variable energy source, that is characterized by quite stable average annual values but also by significant variations over shorter time scales. Therefore, in order to obtain a more stable electrical supply, it is exploited in conjunction with other energy sources.

2. The GIAR Patent

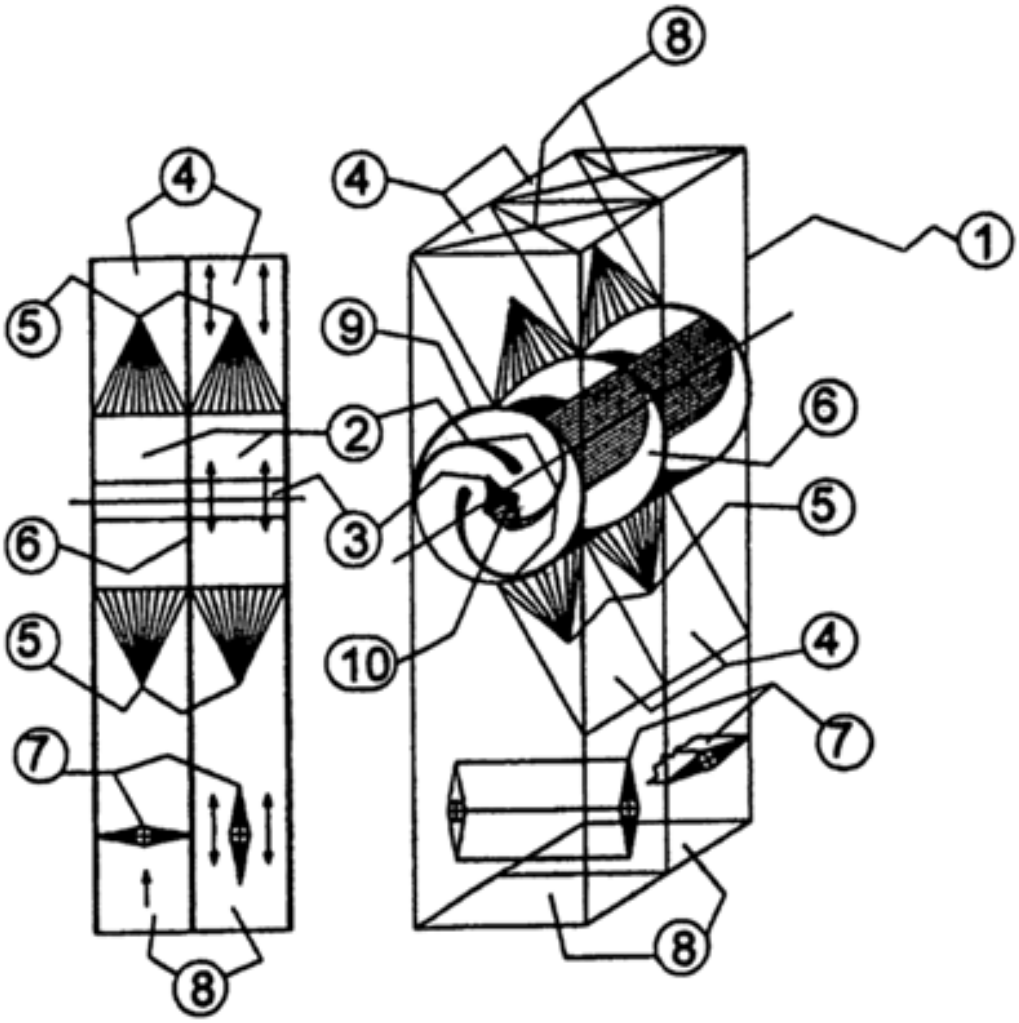
GIAR is the Universal Turbine that exploits the properties of fluids – ***air and water*** – to extract energy from multiple renewable sources in efficient way, with Patent for Industrial Innovation valid in 23 European countries and provided with the average mechanical Efficiency Certification released by the Department of Physics of Camerino University: **94%**. Obtained following tests conducted in a fluvial environment at Pievebovigliana site by means of a 1:1 scale prototype, this Certification places the GIAR Patent at grade "**TRL 7**" of the Technology Readiness Levels scale defined by the ISO 16290:2013 standard.

The Invention can be classified as a vertical axis turbine, free or ducted.

It is an aeraulic Reaction Turbine. It is able to efficiently convert renewable energies – coming from wave motion, from river, sea and tidal currents and from wind – into mechanical energy available at the axis of the device itself, that can be transformed into electrical energy for the widest uses.

The GIAR Turbine has the characteristic that the reversal of the fluid flow does not imply the reversal of the direction of rotation of the turbine's blades, thus offering considerable advantages in practical applications.

Fig. II: Structure of the GIAR Turbine



When the fluid gets in contact with the blades of the turbine's rotor, it transfers to them the most part of its kinetic and pressure energy, which is transformed into mechanical energy available directly at the axis of the turbine for further applications.

The GIAR Turbine presents a central rotating core with polygonal cross-section performing the function of dividing and orienting the fluid that flows through the turbine's rotor, so that it increases the overall Efficiency. The surfaces of the central core, which can be flat, concave or convex, together with the blades form a reduced passage section for the fluid (Venturi tube like): during the crossing, the fluid converts the pressure energy that it still possesses into kinetic energy, and that is then recovered by the blades when the fluid leaves the body of the rotor.

Since the GIAR Turbine is symmetrical, it guarantees the same levels of Efficiency also when the direction of the fluid flow is reversed.

3. The reasons why the GIAR Turbine is more efficient than the others

In 2013 the GIAR Patent was originally developed to address the particular challenges of wave motion in OWC systems, anyway – since it extracts energy from fluids (air and water) by exploiting their properties – it can also be applied for generating electrical energy from river, sea and tidal currents and from wind.

During the period between the granting of the European Patent (09/11/2016) and nowadays, further studies have been carried out for the application of the GIAR Turbine in river, sea and tidal currents through using floating modules.

In 2019 tests in fluvial application were carried out by means of a 1:1 scale model for the performance Certification of the GIAR Turbine – drawn up by the Department of Physics of Camerino University – which confirmed the very high average mechanical Efficiency of the Invention: 94%.

By ensuring the normal flow of water, the GIAR Turbine does not cause any damage to the fauna; being silent, in the multiplicity of its applications the GIAR Turbine does not cause any damage to the Environment.

The following paragraphs describe the advantages of GIAR technology in relation to each of its various applications.

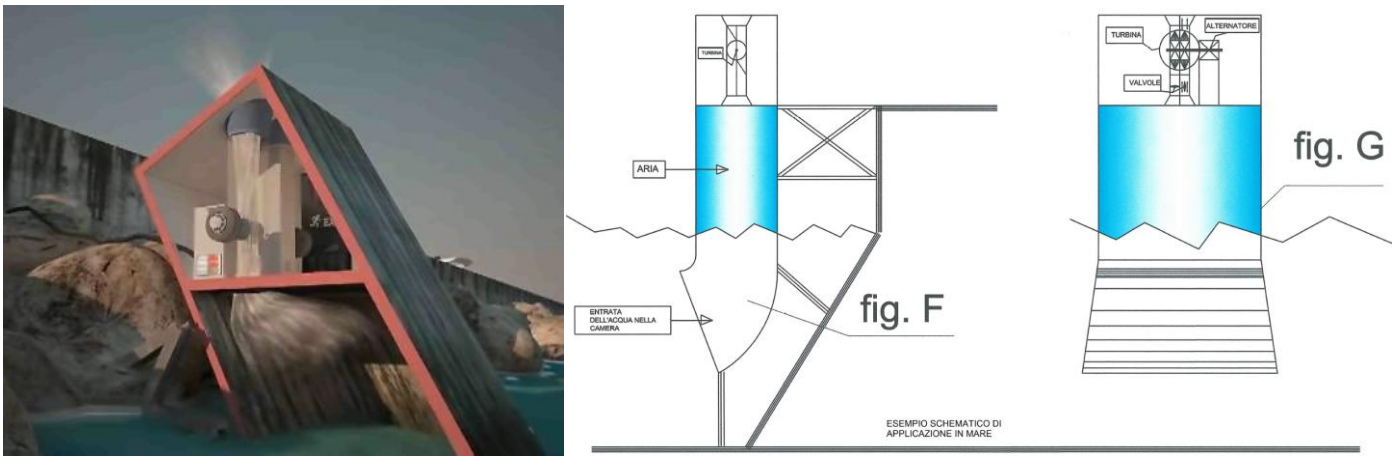
3.1. Energy from wave motion (OWC)

GIAR technology can be applied to OWC plants both inshore (breakwaters in harbors: for connection to power grid) and offshore (platforms: for connection to power grid or self-consumption). It is aimed at institutional subjects, electricity companies and private investors.

The GIAR Turbine demonstrates greater Efficiency than competing turbines with any wave height, placing itself as the best solution for use in the oscillating chambers of the OWC systems of the EcoPorts.

Being able to operate at a wave height of 20 cm – when competing turbines struggle even to activate – the GIAR Turbine has what it takes to represent the best clean source to produce energy to be used for generating Hydrogen in port's cold ironing.

Fig. III: Application of the GIAR Turbine for the production of energy from wave motion



► Compared to already existing OWC technologies, GIAR technology brings important technical advantages by presenting the following features.

A. It is composed of a single turbine body that can be divided by means of bulkheads and dividing plates, which create compartments increasing in percentage respect to the entire turbine body, in order to always guarantee the maximum Efficiency.

B. It is capable of developing high torques available to the axis of the turbine even with low rpm.

C. It is capable of delivering a high specific power.

D. It has low noise and low vibrations.

E. It ensures easy access to the maintenance of electrical components and it has low risks of corrosion, due to the fact that the alternator is located outside the duct.

F. It is provided with the Variable Displacement feature, which allows the oscillating chambers (EcoPorts OWC) to get into resonance with the frequency of wave motion, as it is necessary in OWC plants, in order to increase the overall Efficiency and to always obtain very high energy yields.

G. Again thanks to the Variable Displacement feature, it is active with both low and high waves, thus solving both the problem of turbine activation with low pressures and the problem of turbine stall (power loss) with high pressures, which commonly occurs in OWC plants.

H. Being a Reaction Turbine, it determines that the inlet speed and the outlet speed of the fluid – ***air*** – are very low, hence very low noise levels.

I. It is compact in size and overall dimensions (reduced diameter translates into lower peripheric speeds).

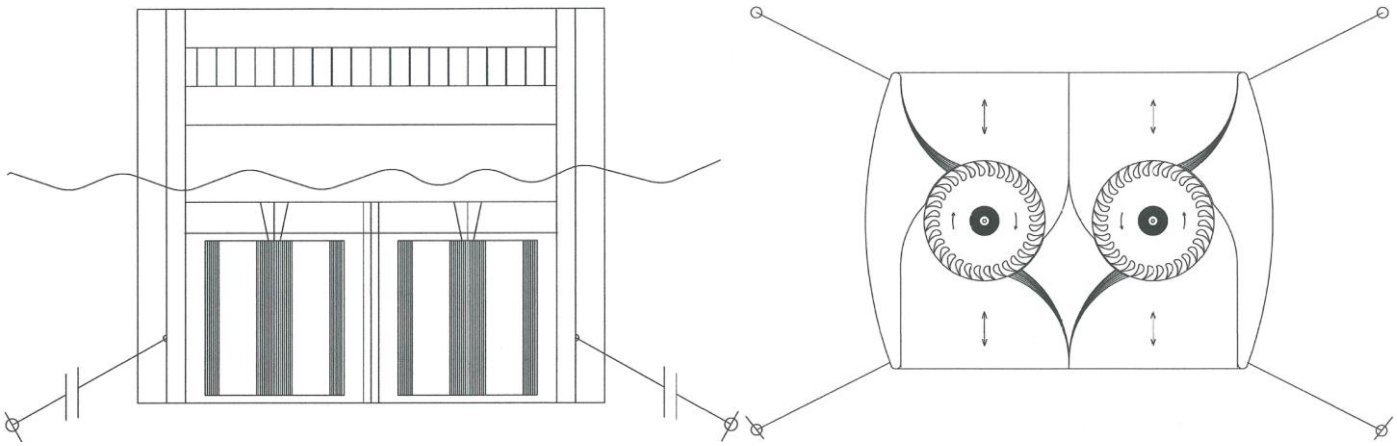
L. Being symmetrical, it is able to guarantee the same very high energy yields also when the fluid flow is reversed.

M. Perfectly suitable for being employed in OWC systems, it represents the best alternative to the problematic and less performing Wells Turbine with horizontal axis.

3.2. Energy from river, sea and tidal currents

Many of the advantages described in the applications in OWC systems characterize the GIAR technology also in applications for the exploitation of river, sea and tidal currents.

Fig. IV: Application of the GIAR Turbine for the production of energy from wave motion



► Especially in river applications, GIAR technology brings great technical advantages by virtue of the following characteristics.

A. It is composed of a single turbine body that can be divided by means of bulkheads and dividing plates, which create compartments increasing in percentage respect to the entire turbine body, in order to always guarantee the maximum Efficiency.

B. It is capable of developing high torques available to the axis of the turbine even with low rpm.

C. It is capable of delivering a high specific power.

D. It has low noise and low vibrations.

E. It ensures easy access to the maintenance of electrical components and it has low risks of corrosion, due to the fact that the alternator is located outside the duct.

F. It is provided with the Variable Displacement feature, which allows it to obtain very high and constant energy yields regardless of the water flow rates.

G. Again thanks to the Variable Displacement features, it can operate where other turbines cannot operate, that is to say even with low pressures.

H. Being a Reaction Turbine, it determines that the inlet speed and the outlet speed of the fluid – ***water*** – are very low.
This involves a reduced passage speed of the sediments that are suspended in the fluid crossing the system, which leads to minimum wear of the components of the system itself, both in its fix parts and in its moving parts (rotor).

I. Again, by being a Reaction Turbine, in the river environment it guarantees greater efficiency than the Banki turbine (cross-flow turbine), whose Efficiency in river applications varies between 40% and 86% depending on the water flow rates.

L. Due to its design characteristics, it is the GIAR Turbine itself that "creates" the river jump: The positioning of the GIAR Turbine determines the elevation of the fluid vein and therefore an altitude difference (Δ h), a difference in height between the fluid vein entering and the fluid vein exiting the system, leaving the fluid vein downstream of the system itself completely unaltered, just as if the system was not there.

Precisely thanks to this peculiarity, in river applications the GIAR Turbine can bring specific complementary advantages, which are truly valuable in terms of environmental sustainability.

a. By virtue of the Δ h resulting from the positioning of the system, it allows to take full advantage of the height of the incoming fluid vein, always keeping it below the level of the existing containment embankments.
   This way, it allows to take full advantage of the height of the river banks, without the need to carry out additional preparation works for the construction of the system, so as to combine low construction costs and environmental protection.
   Therefore, for river systems with GIAR technology, the heights of the water jumps are proportional to the heights of the river banks: the higher the river banks are, the higher the exploitable water jumps are, with consequent greater production of electrical energy.
b. It can allow the navigability of previously non-navigable waterways.
c. It can improve the navigability of waterways which are already navigable.
d. It can significantly contribute to the reduction of the phenomenon of marine intrusion ("saline wedge") connected to the lowering of the fluid vein near the maritime river mouths, caused by climatic variations, which has the consequence of making vast land surfaces unproductive in proximity to such areas.
   In correspondence with the river mouths, in fact, the further rise of the saline wedge due to the lack of pressure causes the unusability of the pumped water which rises upwards, as it is saline, therefore the pumping of water suitable for irrigation takes place at ever greater depths with ever greater costs.
   The rise in the level of rivers determined by the positioning of the GIAR Turbine has the effect of easing water withdrawals for irrigation canals, so as to replenish the aquifers too.
e. It can perform a relevant function from an urban perspective: the realization of sequenced installations gives life to the virtuous combination of renewable electricity generation and river crossing.

Fig. V: Application of the GIAR Turbine for the production of energy from river, sea or tidal currents

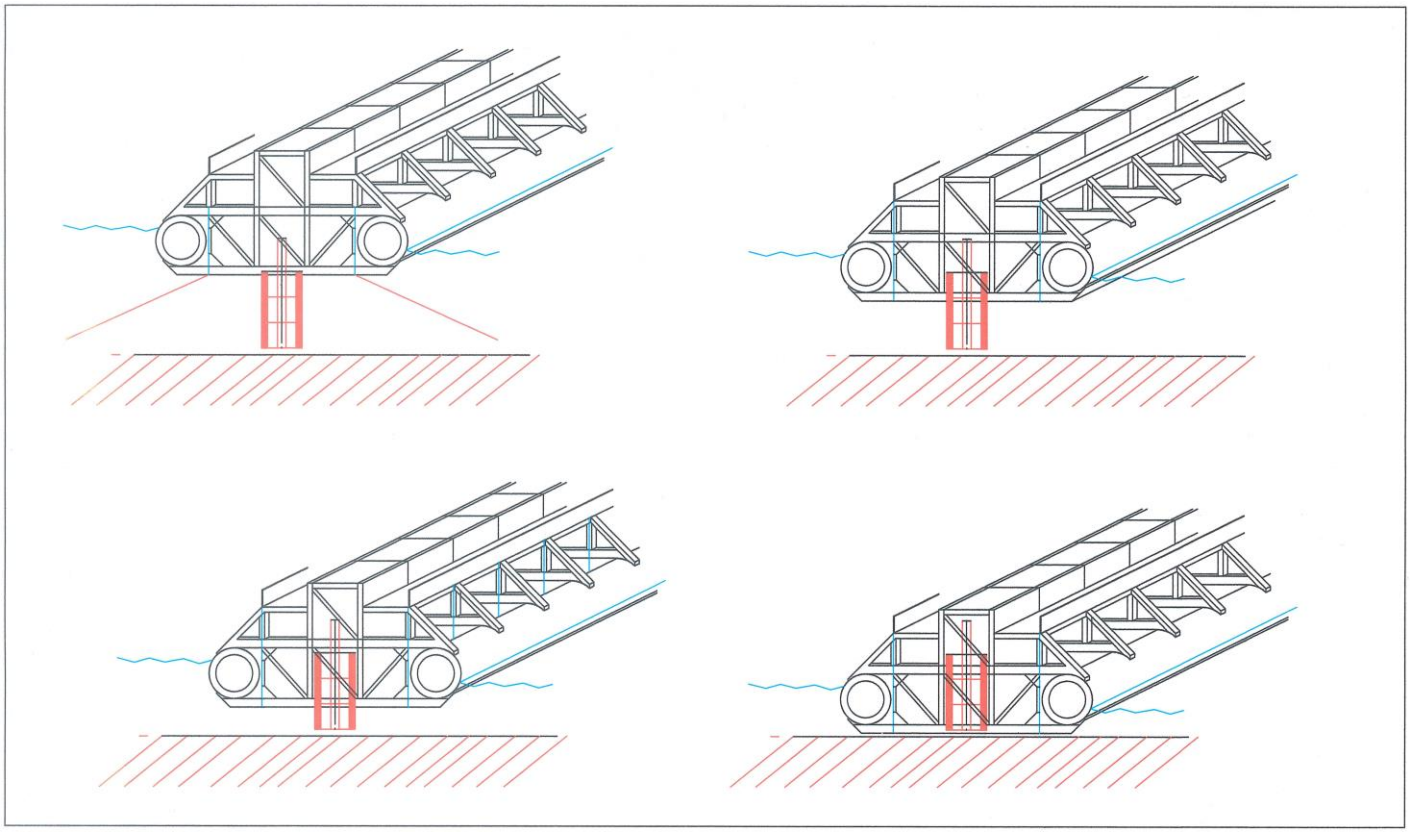
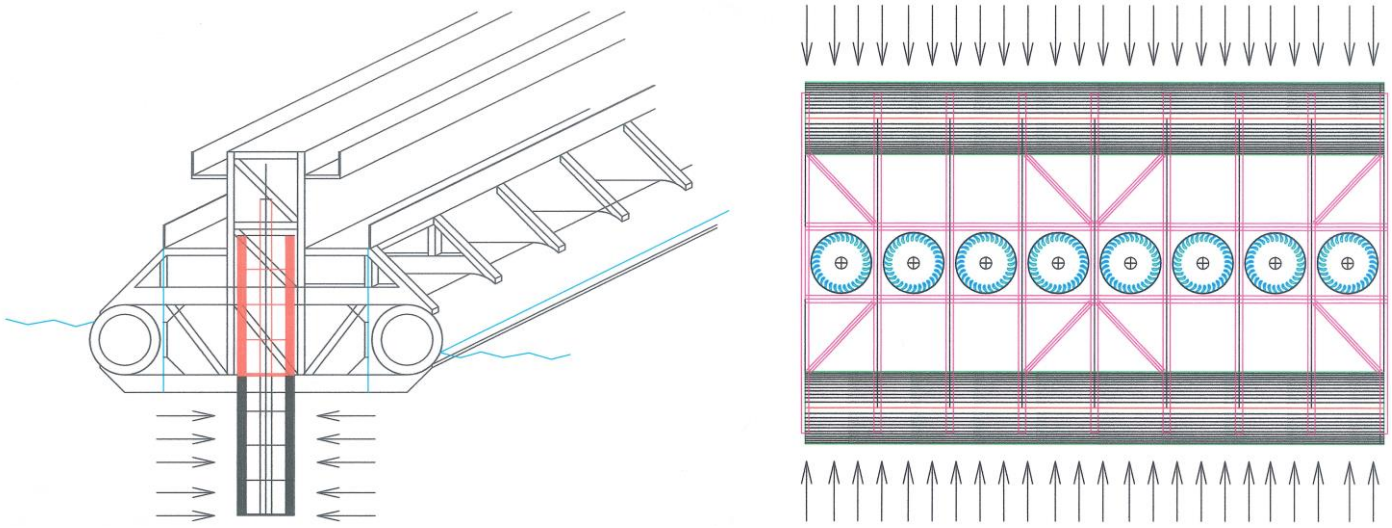


Fig. VI: Modules configuration for river, sea or tidal currents



3.3. Wind energy

► The GIAR Turbine can be used in a wide range of sizes and installed capacities in wind applications as well, thanks to the following advantages:

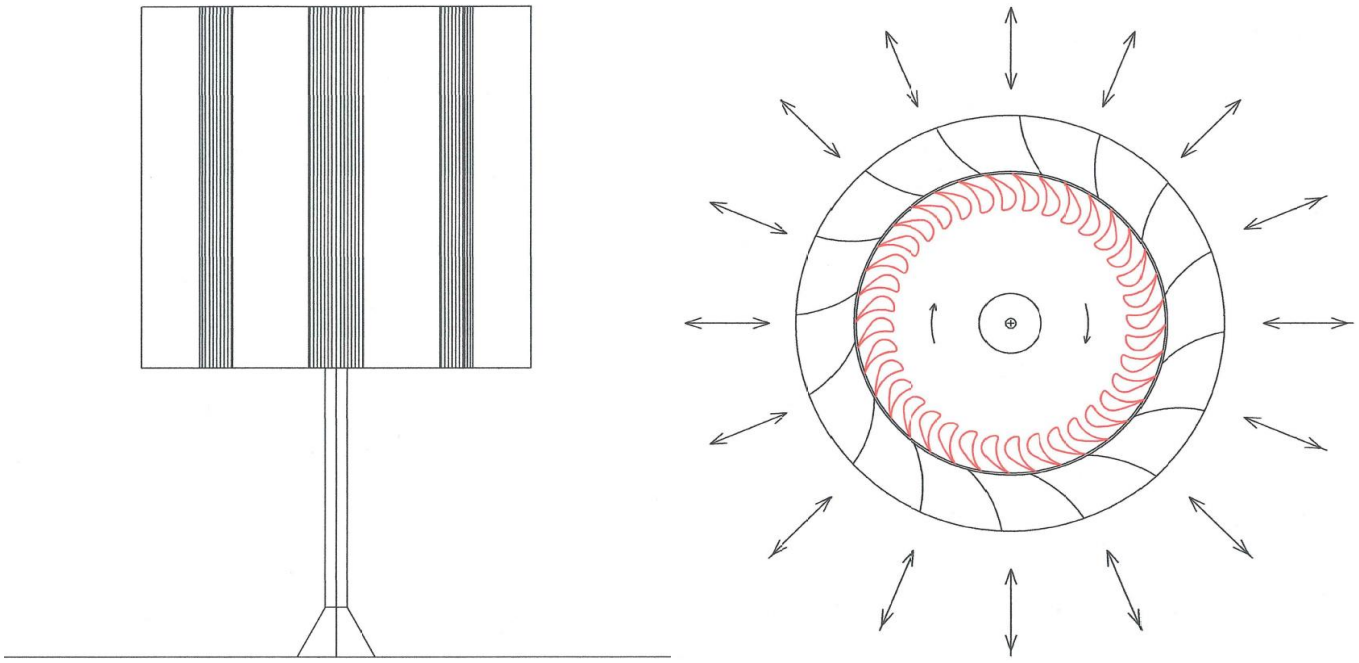
A. It is suitable both for wind farms (for connection to power grid) and isolated locations (for connection to power grid or self-consumption);

B. It has minimum environmental impact (very low visibility impact, very low noise emission);

C. It has minimum maintenance needs, by virtue of its minimum number of components and moving parts;

D. Since it is independent on wind direction, unlike traditional wind blades, it needs no orientation.

Fig. VII: Application of the GIAR Turbine for the production of energy from wind



4. Comparison with the different types of turbines used for the production of electrical energy

The turbines on the market show numerous critical issues, including low Efficiency, exclusive use in high- or low-power plants, high noise, reverse flow inactivity, complexity of construction and high maintenance costs.

► The following synoptic comparative table shows the features of the main turbines currently in use in comparison with the features of the GIAR Turbine.

TECHNOLOGY	FEATURES						
	Reaction Turbine	Active also with reverse flow (*)	Variable Displa-cement (**)	NACA type blades (***)	Low noise	Active also at very low pressures (****)	Suitable also with variable pressures and flow rates (*****)
GIAR	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Wells	YES	YES	NO	NO	NO	NO	NO
Francis	YES	NO	NO	NO	NO	NO	NO
Kaplan	YES	NO	NO	NO	NO	NO	NO
Banki	NO	NO	NO	NO	NO	NO	NO
Pelton	NO	NO	NO	NO	NO	NO	NO

* The GIAR Turbine produces energy also when the direction of the fluid flow is reversed.

** The Variable Displacement feature ensures the optimization of the resonance parameters of OWC plants, increasing their overall Efficiency.

*** The NACA type blades make the GIAR Turbine a Reaction Turbine.

**** The GIAR Turbine can operate even in the presence of very low jumps.

***** In ensuring maximus Efficiency by optimizing the pressure and the speed of fluids, the Variable Displacement feature makes the GIAR Turbine the most suitable device for producing energy from fluids.

► Below are described the main critical issues the most common turbines show, which are overcome by GIAR technology.

Wells Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It does not activate operating with low pressures (low jumps);
- It stalls (loss of power) operating with high pressures, that are typical in OWC plants;
- It is highly noisy;
- It has very low Efficiency.

Francis Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It activates with jumps starting from about 3 meters;
- It does not produce energy when the direction of the fluid flow is reversed. On the contrary, since it acts like a pump, when the direction of the fluid flow is reversed it absorbs energy.

Kaplan Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- Its use is limited to jumps between 2 and 20 meters;
- It is not a reversible flow turbine, therefore it is not suitable for OWC systems.

Banki Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It is not a Reaction Turbine: the push on the blades is due to the centrifugal force exerted by the water flow forced to bend along the profile of the blades themselves, therefore there is no pressure difference in the water between the point of entry and the point of exit from the blades;
- It does not activate with low jumps, it is suitable for water jumps from 5 to 100 meters;
- Its use is limited to low-power plants;
- It is not a reversible flow turbine, therefore it is not suitable for OWC systems.

Pelton Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It is suitable for high jumps and low flow rates;
- It is not a Reaction Turbine;
- It is not a reversible flow turbine, therefore it is not suitable for OWC systems.

5. Application in projects related to the generation of Hydrogen and positioning in the supply chain

The Maritime Space management Plans (MSP) have as a general purpose the coexistence of different uses in marine waters in ways that guarantee the achievement and the maintenance of the good ecological status of the sea and the preservation of the landscape and of the cultural heritage. The Plans for the three Italian maritime areas are geared towards the growth and development – which must be balanced and projected over the medium to long term – of the maritime sectors, mature or emerging, in ways to enhance the vocations of the territories and the well-being of coastal communities and of the whole national community.

Given the strategic objectives defined on a national scale and the specific objectives set out in the maritime areas, the guidelines provide for the identification of measures and actions aimed at achieving them (D.P.C.M. 1 December 2017, par. 20), to which indicators will be associated in order to be able to follow up on the monitoring during the implementation phase and to be able to proceed effectively in the event of misalignments between the expected objectives and what is produced.

The specific purpose of the MSP measures and actions is the unitary management of the interactions among the uses and of the interactions between uses and transversal objectives.

The analysis of both current and to-be-developed uses confirmed that the primary need to which the MSP must respond is precisely the unitary management of the interactions among uses, to reduce conflicts, and to strengthen the synergies between uses and transversal objectives.

In fact, there are several combinations of uses in each sub-area and in each Production Unit (PU), which must be regulated directly by the Plans or by the competent administrations following the recommendations and guidelines of the Plans themselves, above all: where multiple priorities have been assigned in the same PU; where other uses compatible with priority or limited use are indicated; where the vocation is for generic use.

In the current context, therefore, **the production of electrical energy from river currents and wave motion can be focused on the generation of Green Hydrogen by means of Electrolysis**.

In the port area, this process – that is notoriously energy-intensive (it takes over 4 kWh of

electricity to produce 1 m³ of H2, therefore it takes 48 kWh to produce 1 kg of H2) – can benefit from the interfacing of the energy produced by GIAR technology through a series of turbines that can be installed in the oscillating chambers that can be placed along the breakwaters of the ports.

Indeed the GIAR Turbine has operating characteristics such as to ensure a good constant supply even in the port area – which is the most challenging area – so as to be able to provide the energy necessary for the operation of electrolysers with even medium-high production capacity.

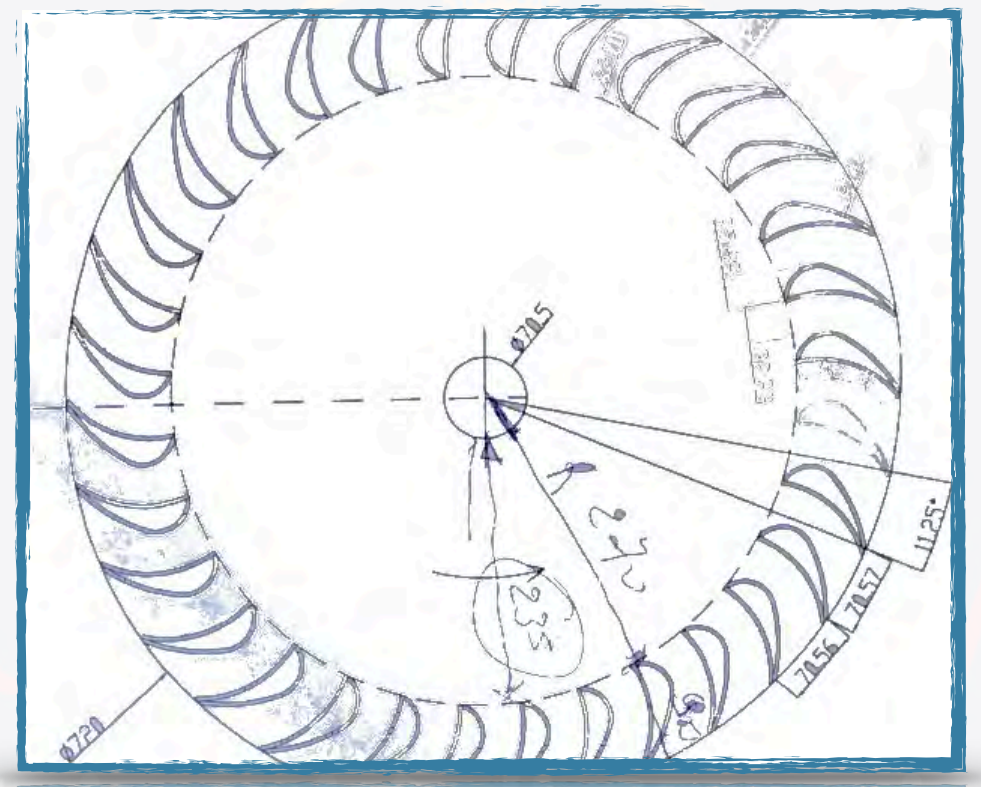
The Hydrogen Valleys that are springing up at some Italian ports are perfect ecosystems for the insertion of GIAR technology, which can be coupled to electrolysers as a source of electrical energy with Guarantee of Origin (GO) for the generation of Hydrogen.

Since river currents and wave motion are completely natural and therefore ecological resources, **the GO of Hydrogen generated from the electricity production of the GIAR Turbine is perfectly in line with the criteria that distinguish the generation of Green Hydrogen**.

6. Video (links)

- GIAR – La Turbina Universale – Video Presentation ITA (2022)
- GIAR – The Universal Turbine – Video Presentation ENG (2022)
- GIAR Turbine – Very first video rendering...4 years before it became a Patent (Oct 2012)
- GIAR Turbine – Very first prototype, First experimental test (Nov 2012)
- GIAR Turbine – Very first prototype, Second experimental test (Dec 2012)
- GIAR Turbine & Wells Turbine – First experimental tests in wind gallery (Jan 2013)
- GIAR Turbine vs Wells Turbine – Comparative experimental tests in wind gallery (Feb 2013)
- GIAR Turbine – TV News TG3 Marche (23/03/2013)
- GIAR Turbine – Experimental test for average mechanical Efficiency Certification (Jun 2019)

Below is the Certification of the average mechanical Efficiency (94%) of the GIAR Turbine in river application, obtained with a 1:1 scale prototype through tests conducted by the Department of Physics of Camerino University, which places the GIAR Patent at grade "TRL 7" of the Technological Readiness Levels scale defined by the ISO 16290: 2013 standard.



Misure di rendimento energetico & efficienza meccanica sulla Turbina GiAr Multiblade

VERBALE

Obiettivi

L'obiettivo delle misure era quello di verificare la funzionalità della Turbina GiAr Multiblade valutando la potenza erogata dal sistema e l'efficienza di produzione elettrica.

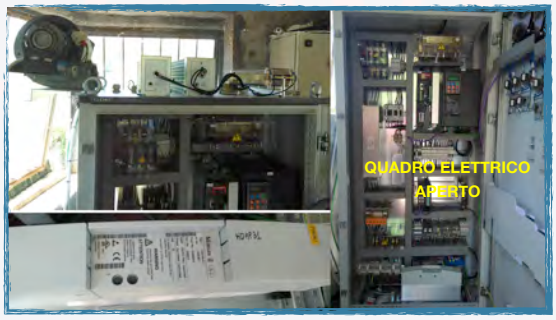
Configurazione del sistema

La turbina è stata montata su un canale artificiale, (immagine in alto a sinistra) posizionata a 15 cm dal fondo per evitare che eventuali elementi solidi possano danneggiare il corpo rotante (immagine in alto a destra). È fissata alla struttura preesistente in calcestruzzo da tiranti in acciaio, come mostrato nella figura al centro a destra. Una paratia preesistente a monte del sistema permette di controllare la portata dell'acqua nel canale dove è posizionata la turbina. Nella facciata interna della turbina, che funge da sbarramento del canale, sono state tracciate tacche di riferimento per la rilevazione dell'altezza della colonna d'acqua che alimenta la turbina (immagine in basso a sinistra).

Il sistema in esame e' costituito da una catena di componenti/apparati certificati dalle ditte costruttrici. Si parte dalla *turbina GiAr Multiblade* (immagine in basso a destra). Essa e' accoppiata ad un riduttore di giri meccanico modello *mr 31 125 uc2a 38x300* con rapporto di riduzione di 30,2 e forma costruttiva B3 (in asse) della ditta *Rossi*, avente un rendimento del 94% (ALLEGATO A). In questo caso il numero di giri della turbina viene moltiplicato per il rapporto di riduzione. Dal riduttore/moltiplica si arriva al motore/generatore costituito dal modello *1LE1001-1CB22-2FA4* della ditta *Simotics/Siemens*, motore a 400V, 3 fasi (4 poli), 50 Hz da 7,5 KW nominali, con un rendimento nominale dell' 89% (ALLEGATO B).

Il motore/generatore e' collegato ad un quadro elettrico di comando (immagine in alto a destra) che permette di controllare e misurare i parametri di lavoro della turbina e del motore/generatore. Il quadro elettrico e' stato progettato e costruito dalla ditta *SEI Sistemi* (Drawing Number: 170054, conformità dichiarate negli ALLEGATO C, D e E).

All'interno del quadro ci sono i sistemi elettrici di controllo del numero di giri del motore/generatore e della misura della potenza effettivamente generata. Il tutto viene impostato e monitorato tramite il pannello con display della ditta *Simatic/Siemens modello HMI KP400 Comfor*t, 6av2 124-1dc01-0ax0.



Nella fase di generazione, ossia nella fase in cui il motore/generatore funziona come alternatore (messo in rotazione dalla turbina attraverso il riduttore/moltiplica meccanico di giri), la tensione alternata prodotta dal generatore viene convertita in tensione continua da un apposito convertitore.

La tensione continua prodotta viene inviata ad una unita' di frenamento a Chopper (*modello DE4-BU4-1* della ditta *Moeller*) collegato per questo test a delle resistenze di frenamento. Il principio di funzionamento del sistema e' tale per cui la potenza viene scaricata sulle resistenze di frenamento in modo tale da mantenere costante la velocità di rotazione della turbina. In questo modo un sistema a retroazione permette di scaricare più potenza sulle resistenze se la turbina accelera, viceversa la potenza dissipata sarà minore se decelera.

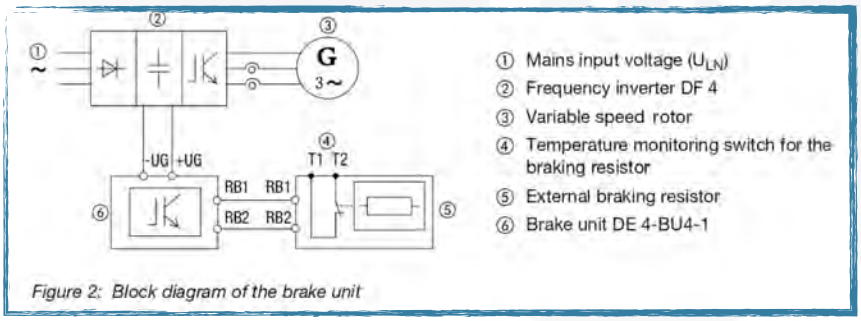


Figure 2: Block diagram of the brake unit

Misurando questa potenza dissipata sulle resistenze si può conoscere l'effettiva potenza generata dalla turbina e dissipata in calore. Per questo test la potenza generata viene appunto dissipata e misurata e non viene immessa nella rete elettrica nazionale.

Misure e strumentazioni

Poiché non era presente un sistema per misurare la portata dell'acqua utile alla turbina, questa si è stimata dal valore teorico determinato dal prodotto della sezione attiva della turbina, s, per la velocità teorica dell'acqua alla turbina, v:

$$P = s \times v$$

La sezione attiva è fornita dal prodotto della base, b, per l'altezza, a, dell'apertura efficace (come da progetto):

$s = a \times b = (0{,}49 \times 0{,}235)\mathrm{m}^2 \simeq 0{,}115\mathrm{m}^2$,

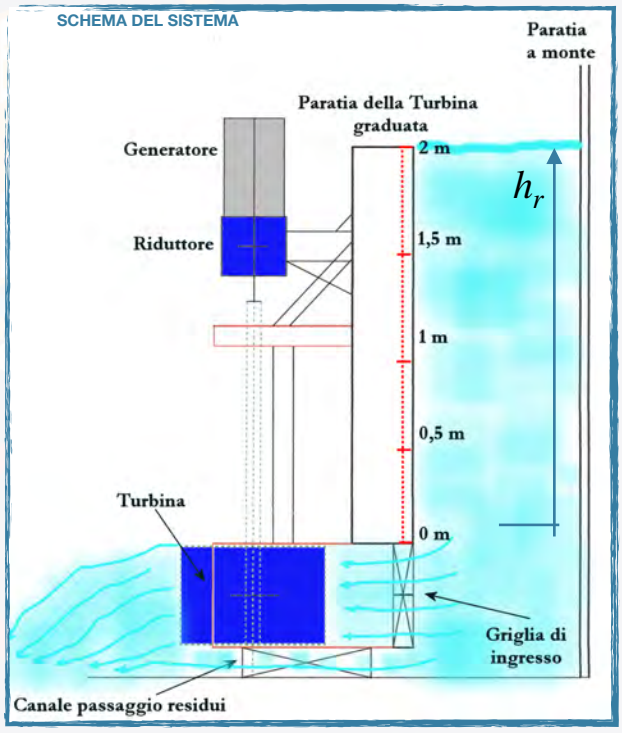
La velocità teorica dell'acqua è ottenuta dalla relazione

$$v = \sqrt{2gh_r}$$

dove $g = 9{,}8\ ms^{-2}$ è l'accelerazione gravitazionale e h_r l'altezza del livello d'acqua misurata dalle tacche di riferimento (come schematizzato nel disegno a lato).

La potenza *teorica* fornita al sistema, W_F, è quindi

$$W_F = \frac{dm}{dt} \times g \times h_r = sv\rho \times g \times h_r$$



$$W_F = \left(\sqrt{2}s\rho g^{3/2}\right) \times h_r^{3/2}.$$

La potenza erogata W_E è misurata come riportato nella sezione precedente *"Configurazione del sistema"*.

Il rendimento energetico η è definito come il rapporto tra la potenza erogata, W_E ,e la potenza *teorica* fornita al sistema, W_F, cioè

$$\eta = \frac{W_E}{W_F}.$$

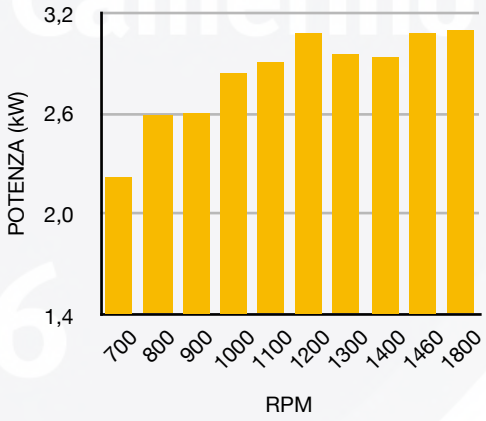
TEST DEL 12 GIUGNO 2019

Procedura di misura

Il giorno 12 giugno 2019 alle ore 16:00 sono stati effettuati i test sul sistema. Alle ore 16:15 si è preparata la turbina avviando il motore (guidante) per riscaldare l'olio lubrificante del riduttore. Alle 16:25 si è effettuato il controllo del quadro elettrico e la verifica della certificazione. Alle 16:30 sono iniziati i test sulla turbina predisponendo il livello d'acqua all'altezza $h_r = 1{,}5$ m. Si è quindi fissato il numero di giri del rotore e si sono effettuate dieci misurazioni di potenza dal quadro elettrico necessarie per un'analisi statistica delle misurazioni. Le misure di potenza si sono ripetute per diversi valori del numero di giri del rotore. Si è quindi spenta la turbina per permettere al bacino del canale artificiale di riempirsi d'acqua e alle resistenze di raffreddarsi. Alle 17:00 è iniziato il test al livello $h_r = 2{,}0$ m ripetendo le misure effettuate precedentemente, ed alle 17:30 il test per $h_r = 1{,}0$ m. Le misure sono riportate nelle tabelle seguenti.

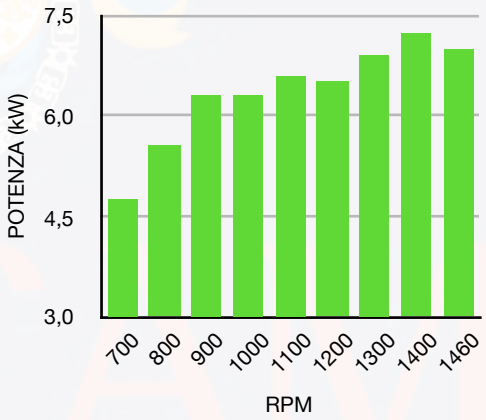
MISURE DI POTENZA ALLA QUOTA DI 1 m

RPM	ERRORE RPM	POTENZA (KW)	ERRORE POTENZA (KW)
700	5	**2,2**	0,2
800	5	**2,6**	0,3
900	5	**2,6**	0,3
1000	10	**2.8**	0,3
1100	10	**2,9**	0,2
1200	10	**3,1**	0,3
1300	10	**3,0**	0,3
1400	10	**3,0**	0,2
1460	10	**3,1**	0,2
1800	15	**3.1**	0,3



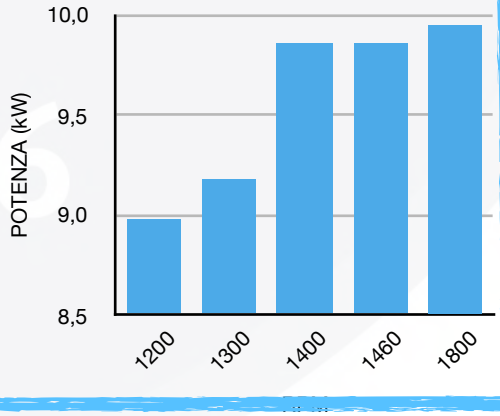
MISURE DI POTENZA ALLA QUOTA DI 1,5 m

RPM	ERRORE RPM	POTENZA (KW)	ERRORE POTENZA (KW)
700	5	**4,8**	0,2
800	5	**5,6**	0,3
900	5	**6,4**	0,2
1000	10	**6,3**	0,3
1100	10	**6,6**	0,2
1200	10	**6,5**	0,3
1300	10	**6,9**	0,4
1400	10	**7,2**	0,4
1460	10	**7,0**	0,4



MISURE DI POTENZA ALLA QUOTA DI 2 m

RPM	ERRORE RPM	POTENZA (KW)	ERRORE POTENZA (KW)
1200	10	**8,9**	0,2
1300	10	**9,2**	0,2
1400	10	**9,9**	0,2
1460	10	**9,9**	0,3
1800	15	**10,0**	0,4



RISULTATI

Potenza in funzione del livello d'acqua

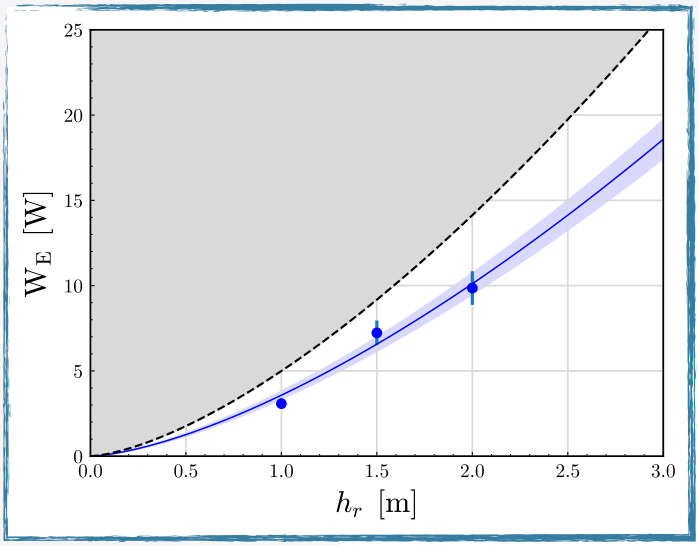
L'analisi dei risultati precedenti ci permette di determinare la potenza massima per i tre livelli d'acqua fissati, corrispondente al numero di giri ottimale. Tali risultati sono riportati nella tabella seguente, nella quale è stato inserito anche il rendimento energetico, l'efficienza η, valutato come rapporto tra la potenza erogata W_E e la potenza fornita W_F.

LIVELLO D'ACQUA		GIRI MOTORE	POTENZA MASSIMA		EFFICIENZA	
h_r (m)	Δh_r (m)	RPM	W (kW)	ΔW (kW)	η	$\Delta\eta$
1,00	0,05	1460	3,1	0,2	0,62	0,09
1,50	0,05	1400	7,2	0,4	0,79	0,08
2,00	0,05	1460	9,9	0,3	0,70	0,05

Rendimento energetico MEDIO

Il rendimento energetico medio $\overline{\eta}$ è valutato come best—fit della potenza erogata W_E in funzione dell'altezza del livello d'acqua h_r, $W_E = \overline{\eta}\, W_F(h_r)$, con intervallo di confidenza al 95%. La curva nera tratteggiata rappresenta la potenza fornita al sistema $W_F(h_r)$, cioè il limite fisico per rendimento unitario. L'efficienza stimata è:

$$\overline{\eta} = 0.716 \pm 0.035$$



CONCLUSIONI

L'efficienza meccanica, η_T, della Turbina GiAr Multiblade può esser valutata considerando i diversi contributi al rendimento energetico η. Infatti, stimando che

$$\eta = \eta_T \cdot \eta_R \cdot \eta_M \quad \longrightarrow \quad \eta_T = \frac{\eta}{\eta_R \cdot \eta_M}$$

e conoscendo l'efficienza del motore $\eta_M = (0{,}893 \pm 0{,}007)$ (media delle efficiente per diverse potenze d'utilizzo fornite dal costruttore: ALLEGATO B), l'efficienza del riduttore $\eta_R = (0{,}94 \pm 0{,}01)$ (ALLEGATO A), ed il rendimento stimato dal test del 12 giugno 2019, si ottengono le efficienze meccaniche riportate in tabella:

LIVELLO D'ACQUA		EFFICIENZA		EFFICIENZA MECCANICA	
h_r (m)	Δh_r (m)	η	$\Delta\eta$	η_M	$\Delta\eta_M$
1,00	0,05	0,62	0,09	0,73	0,12
1,50	0,05	0,79	0,08	0,94	0,12
2,00	0,05	0,70	0,05	0,83	0,07

Dal rendimento energetico medio $\overline{\eta} = (0.716 \pm 0.035)$, si ottiene l'efficenza meccanica media della turbina $\overline{\eta}_T = (0{,}85 \pm 0{,}06)$.

Si fa notare che per la misura con livello d'acqua di 2 m, la potenza generata e' di circa 10 KW, che risulta essere maggiore della potenza nominale del generatore impiegato (7,5 KW nominali). Anche la coppia applicata al riduttore e' maggiore di quella nominale. Infine sono presenti perdite meccaniche dovute ai due cuscinetti usati nel sistema. Questi fattori determinano una sottostima del rendimento reale della turbina, non facilmente quantificabili. Anche in queste condizioni limitanti il rendimento massimo misurato nelle condizioni di lavoro ottimali del sistema, determina un'efficienza meccanica della turbina di $\eta_T^{max} = (0{,}94 \pm 0{,}12)$.

Camerino, **30 luglio 2019**

Riccardo NATALI

Giovanni DI GIUSEPPE

15 - Dettagli costruttivi e funzionali

Rendimento η:

– riduttore a 2 ingranaggi (2I) 0,96, a 3 ingranaggi (3I) 0,94; per $M_2 \ll M_{N2}$, η diminuisce anche di molto; interpellarci.

Sovraccarichi

Quando il riduttore è sottoposto a elevati sovraccarichi statici e dinamici si presenta la necessità di verificare che il valore di questi sovraccarichi sia sempre inferiore a $\mathbf{2 \cdot M_{N2}}$ (cap. 6; capp. 8 e 9 dove $M_{N2} = M_2 \cdot fs$).

Normalmente si generano sovraccarichi quando si hanno:
– avviamenti a pieno carico (specialmente per elevate inerzie e bassi rapporti di trasmissione), frenature, urti;
– casi di riduttori in cui l'asse lento diventa motore per effetto delle inerzie della macchina azionata;
– potenza applicata superiore a quella richiesta; altre cause statiche o dinamiche.

Qui di seguito diamo alcune considerazioni generali su questi sovraccarichi e, per alcuni casi tipici, alcune formule per la loro valutazione.
Quando non è possibile valutarli, inserire dispositivi di sicurezza in modo da non superare mai $\mathbf{2 \cdot M_{N2}}$.

Momento torcente di spunto

Quando l'avviamento è a pieno carico (specialmente per elevate inerzie e bassi rapporti di trasmissione), verificare che $\mathbf{2 \cdot M_{N2}}$ sia maggiore o uguale al momento torcente di spunto il quale può essere calcolato con la formula:

$$M_2 \text{ spunto} = \left(\frac{M \text{ spunto}}{M_N} \cdot M_2 \text{ disponibile} - M_2 \text{ richiesto}\right) \frac{J}{J + J_0} + M_2 \text{ richiesto}$$

dove:
M_2 richiesto è il momento torcente assorbito dalla macchina per lavoro e attriti;
M_2 disponibile è il momento torcente in uscita dovuto alla potenza nominale del motore;
J_0 è il momento d'inerzia (di massa) del motore;
J è il momento d'inerzia (di massa) esterno (riduttore, giunti, macchina azionata) in kg m², riferito all'asse del motore;
per gli altri simboli ved. cap. 2b.

NOTA: quando si vuole verificare che il momento torcente di spunto sia sufficientemente elevato per l'avviamento considerare, nella valutazione di M_2 richiesto, eventuali attriti di primo distacco.

Arresti di macchine con elevata energia cinetica (elevati momenti d'inerzia con elevate velocità) con motore autofrenante

Verificare la sollecitazione di frenatura con la formula:

$$\left(\frac{Mf}{\eta} \cdot i + M_2 \text{ richiesto}\right) \frac{J}{J + J_0} - M_2 \text{ richiesto} \leq 2 \cdot M_{N2}$$

dove:
Mf è il momento frenante di taratura (ved. tabella del cap. 2b); per gli altri simboli ved. sopra e cap. 1.

Funzionamento con motore autofrenante

Tempo di avviamento ta e angolo di rotazione del motore φa_1

$$ta = \frac{(J_0 + J) \cdot n_1}{95{,}5 \left(M \text{ spunto} - \frac{M_2 \text{ richiesto}}{i}\right)} \text{ [s]}; \qquad \varphi a_1 = \frac{ta \cdot n_1}{19{,}1} \text{ [rad]}$$

Tempo di frenatura tf e angolo di rotazione del motore φf_1

$$tf = \frac{(J_0 + J) \cdot n_1}{95{,}5 \left(Mf + \frac{M_2 \text{ richiesto}}{i}\right)} \text{ [s]}; \qquad \varphi f_1 = \frac{tf \cdot n_1}{19{,}1} \text{ [rad]}$$

dove:
M spunto [daN m] è il momento torcente di spunto del motore $\left(\frac{955 \cdot P_1}{n_1} \cdot \frac{M \text{ spunto}}{M_N}\right)$ (ved. cap. 2b);
Mf [daN m] è il momento frenante di taratura del motore (ved. cap. 2b);
per altri simboli ved. sopra e cap. 1.

La ripetitività di frenatura al variare della temperatura del freno e dello stato di usura della guarnizione di attrito è – entro i limiti normali del traferro e dell'umidità ambiente e con adeguata apparecchiatura elettrica – circa $\pm 0{,}1 \cdot \varphi f_1$.

Durata della guarnizione di attrito

Orientativamente il numero di frenature ammesso tra due registrazioni è dato dalla formula:

$$\frac{W \cdot 10^5}{Mf \cdot \varphi f_1}$$

dove:
W [MJ] è il lavoro di attrito fra due registrazioni del traferro indicato in tabella; per altri simboli ved. sopra.

Il valore del traferro va da un minimo di 0,25 a un massimo di 0,6; orientativamente il numero di registrazioni è 5.

Grandezza motore Motor size	W MJ
63	10,6
71	14
80	18
90	24
100	24
112	45
132	67
160, 180M	90
180L, 200	125

15 - Structural and operational details

Efficiency η:

– gear reducer with 2 gear pairs (2I) 0,96, with 3 gear pairs (3I) 0,94; for $M_2 \ll M_{N2}$, η could considerably decrease; consult us.

Overloads

Where a gear reducer is subjected to high static and dynamic overloads, the need arises for verifying that such overloads will always remain lower than $\mathbf{2 \cdot M_{N2}}$ (see ch. 6; see ch. 8 and 9 where $M_{N2} = M_2 \cdot fs$).

Overloads are normally generated when one has:
– starting on full load (especially for high inertias and low transmission ratios), braking, shocks;
– gear reducers in which the low speed shaft becomes driving member due to driven machine inertia;
– applied power higher than that required; other static or dynamic causes.

The following general observations on overloads are accompanied by some formulae for carrying out evaluations in certain typical instances.
Where no evaluation is possible, install safety devices which will keep values within $\mathbf{2 \cdot M_{N2}}$.

Starting torque

When starting on full load (especially for high inertias and low transmission ratios) verify that $\mathbf{2 \cdot M_{N2}}$ is equal to or greater than starting torque, by using the following formula:

$$M_2 \text{ start} = \left(\frac{M \text{ start}}{M_N} \cdot M_2 \text{ available} - M_2 \text{ required}\right) \frac{J}{J + J_0} + M_2 \text{ required}$$

where:
M_2 required is torque absorbed by the machine through work and frictions;
M_2 available is output torque due to the motor's nominal power;
J_0 is the moment of inertia (of mass) of the motor;
J is the external moment of inertia (of mass) in kg m² (gear reducers, couplings, driven machine) referred to the motor shaft;
for other symbols see ch. 2b.

NOTE: when seeking to verify that starting torque is sufficiently high for starting, take into account starting friction, if any, in evaluating M_2 required.

Stopping machines with high kinetic energy (high moments of inertia combined with high speeds) with brake motor

Verify braking stress by means of the formula:

$$\left(\frac{Mf}{\eta} \cdot i + M_2 \text{ required}\right) \frac{J}{J + J_0} - M_2 \text{ required} \leq 2 \cdot M_{N2}$$

where:
Mf is the braking torque setting (see table in ch. 2b); for other symbols see above and ch. 1.

Operation with brake motor

Starting time ta and revolutions of motor φa_1

$$ta = \frac{(J_0 + J) \cdot n_1}{95{,}5 \left(M \text{ start} - \frac{M_2 \text{ required}}{i}\right)} \text{ [s]}; \qquad \varphi a_1 = \frac{ta \cdot n_1}{19{,}1} \text{ [rad]}$$

Braking time tf and revolutions of motor φf_1

$$tf = \frac{(J_0 + J) \cdot n_1}{95{,}5 \left(Mf + \frac{M_2 \text{ required}}{i}\right)} \text{ [s]}; \qquad \varphi f_1 = \frac{tf \cdot n_1}{19{,}1} \text{ [rad]}$$

where:
M start [daN m] is motor starting torque $\left(\frac{955 \cdot P_1}{n_1} \cdot \frac{M \text{ start}}{M_N}\right)$ (see ch. 2b);
Mf [daN m] is the braking torque setting of the motor (see ch. 2b);
for other symbols see above and ch. 1.

Assuming a regular air-gap and ambient humidity, and utilizing suitable electrical equipment, repetition of the braking action, as affected by variation in temperature of the brake and by the state of wear of friction surface, is approx $\pm 0{,}1 \cdot \varphi f_1$.

Duration of friction surface

As a rough guide, the number of applications permissible between successive adjustments of the air-gap is given by the formula:

$$\frac{W \cdot 10^5}{Mf \cdot \varphi f_1}$$

where:
W [MJ] is the work of friction between successive adjustments of the air-gap as indicated in the table; for other symbols see above.

The air-gap should measure between 0,25 minimum and 0,6 maximum; as a rule, 5 adjustments can be made.

Motori standard SIMOTICS GP 1LE1

Motori con High Efficiency IE2

Motori autoventilati o a ventilazione assistita
Serie in alluminio 1LE1001

IE2

CARICO

Dati per la scelta e l'ordinazione

P_N 50 Hz	P_N 60 Hz 1)	Grandezza costruttiva	n_N 50 Hz	M_N 50 Hz	Classe IE	η_N 50 Hz 4/4	η_N 50 Hz 3/4	η_N 50 Hz 2/4	$\cos\varphi_N$ 50 Hz 4/4	I_N 50 Hz 400 V	M_A/M_N	I_A/I_N	M_K/M_N	L_{pfA} 50 Hz	L_{WA} 50 Hz	Serie in alluminio 1LE1001 – Esecuzione IE2 secondo IEC 60034-30 N. di ordinazione ▲ Nuovo inserimento	$m_{IM\ B3}$	J	Classe di coppia
kW	kW	GR	giri/min	Nm		%	%	%		A				dB(A)	dB(A)		kg	kgm²	CL
• Raffreddamento: autoventilati (IC 411) opp. con sigla abbreviata F90, a ventilazione assistita, senza ventilatore esterno e calotta copriventola (IC 416) • Rendimento: High Efficiency IE2, fattore di servizio (SF) 1,15 • Isolamento: classe termica 155 (classe di isolamento F), grado di protezione IP55, utilizzo secondo la classe termica 130 (classe di isolamento B)																			
2 poli: 3000 giri/min a 50 Hz, 3600 giri/min a 60 Hz 1)																			
0,75	0,86	80 M	2805	2,6	IE2	77,4	79,5	78,8	0,84	1,67	1,9	4,9	2,3	60	71	▲ 1LE1001-0DA2■-■■■■	9,0	0,00080	16
1,1	1,27	80 M	2835	3,7	IE2	79,6	81,3	80,8	0,83	2,40	2,7	6,0	3,1	60	71	▲ 1LE1001-0DA3■-■■■■	11	0,0011	16
1,5	1,75	90 S	2885	5,0	IE2	81,3	82,3	80,8	0,84	3,15	2,7	6,9	3,6	65	77	▲ 1LE1001-0EA0■-■■■■	13	0,0017	16
2,2	2,55	90 L	2890	7,3	IE2	83,2	83,9	82,3	0,85	4,5	2,5	7,1	3,7	65	77	▲ 1LE1001-0EA4■-■■■■	15	0,0021	16
3	3,45	100 L	2905	9,9	IE2	84,6	85,2	84,7	0,84	6,1	2,3	7,0	3,3	67	79	1LE1001-1AA4■-■■■■	21	0,0044	16
4	4,55	112 M	2950	13	IE2	85,8	86,7	86,1	0,86	7,8	2,4	7,4	3,3	69	81	1LE1001-1BA2■-■■■■	27	0,0092	16
5,5	6,3	132 S	2950	18	IE2	87,0	88,0	87,4	0,87	10,5	1,8	6,6	2,9	68	80	1LE1001-1CA0■-■■■■	39	0,020	16
7,5	8,6	132 S	2950	24	IE2	88,1	88,7	88,6	0,87	14,1	2,2	7,5	3,1	68	80	1LE1001-1CA1■-■■■■	43	0,024	16
11	12,6	160 M	2955	36	IE2	89,4	90,0	89,1	0,87	20,5	2,1	7,4	3,2	70	82	1LE1001-1DA2■-■■■■	67	0,045	16
15	17,3	160 M	2955	48	IE2	90,3	90,9	90,3	0,88	27	2,4	7,6	3,4	70	82	1LE1001-1DA3■-■■■■	75	0,053	16
18,5	21,3	160 L	2955	60	IE2	90,9	91,2	90,4	0,88	33,5	2,9	7,9	3,6	70	82	1LE1001-1DA4■-■■■■	84	0,061	16
4 poli: 1500 giri/min a 50 Hz, 1800 giri/min a 60 Hz 1)																			
0,55	0,63	80 M	1440	3,7	–	78,1	78,9	76,1	0,74	1,37	2,2	5,3	3,1	53	64	▲ 1LE1001-0DB2■-■■■■	10	0,0017	16
0,75	0,86	80 M	1440	5,0	IE2	79,6	80,2	78,0	0,76	1,79	2,2	5,6	3,1	53	64	▲ 1LE1001-0DB3■-■■■■	11	0,0021	16
1,1	1,27	90 S	1425	7,4	IE2	81,4	81,7	79,9	0,78	2,5	2,3	5,6	2,9	56	68	▲ 1LE1001-0EB0■-■■■■	13	0,0028	16
1,5	1,75	90 L	1435	10	IE2	82,8	83,5	82,0	0,79	3,3	2,6	6,4	3,4	56	68	▲ 1LE1001-0EB4■-■■■■	16	0,0036	16
2,2	2,55	100 L	1455	14	IE2	84,3	85,1	84,3	0,81	4,65	2,1	6,9	3,3	60	72	1LE1001-1AB4■-■■■■	21	0,0086	16
3	3,45	100 L	1455	20	IE2	85,5	86,7	86,0	0,82	6,2	2,0	6,9	3,1	60	72	1LE1001-1AB5■-■■■■	25	0,011	16
4	4,55	112 M	1460	26	IE2	86,6	87,3	86,5	0,81	8,2	2,5	7,1	3,2	58	70	1LE1001-1BB2■-■■■■	29	0,014	16
5,5	6,3	132 S	1465	36	IE2	87,7	89,0	87,7	0,80	11,3	2,3	6,9	2,9	64	76	1LE1001-1CB0■-■■■■	42	0,027	16
7,5	8,6	132 M	1465	49	IE2	88,7	90,3	88,8	0,83	14,7	2,3	6,9	2,9	64	76	1LE1001-1CB2■-■■■■	49	0,034	16
11	12,6	160 M	1470	71	IE2	89,8	90,9	90,8	0,85	21	2,1	6,7	2,8	65	77	1LE1001-1DB2■-■■■■	71	0,065	16
15	17,3	160 L	1475	97	IE2	90,6	91,3	91,0	0,85	28	2,3	7,3	3,0	65	77	1LE1001-1DB4■-■■■■	83	0,083	16

Tensioni				Prot. motore	N. poli	Grand. costr.	Tipo di motore	Esecuzione				Sigle abbreviate
Grandezze costruttive 80 M ... 90 L: Impiego della morsettiera ruotabile liberamente di 360° per motori a 2 e 4 poli 2)												
50 Hz	230 VΔ/400 VY	60 Hz 1)	460 VY	Termistore	2, 4	80 M ... 90 L	1LE1001-0D ... -0E	**Normale**	2	2	B	–
50 Hz	400 VΔ/690 VY	60 Hz 1)	460 VΔ	con 1 sensore di temperatura	2, 4	80 M ... 90 L	1LE1001-0D ... -0E	**Normale**	3	4	B	–
50 Hz	400 VY	60 Hz 1)	460 VY	Senza	2, 4	80 M ... 90 L	1LE1001-0D ... -0E	**Normale**	0	2	A	–
Grandezze costruttive 100 L ... 160 L: Impiego della morsettiera ruotabile 4 x 90°												
50 Hz	230 VΔ/400 VY	60 Hz 1)	460 VY	Scelta libera	2, 4	100 L ... 160 L	1LE1001-1A ... -1D	**Normale**	2	2		–
50 Hz	400 VΔ/690 VY	60 Hz 1)	460 VΔ	Scelta libera	2, 4	100 L ... 160 L	1LE1001-1A ... -1D	**Normale**	3	4		–
50 Hz	500 VY			Scelta libera	2, 4	100 L ... 160 L	1LE1001-1A ... -1D	Senza sovrapprezzo	2	7		–
50 Hz	500 VΔ			Scelta libera	2, 4	100 L ... 160 L	1LE1001-1A ... -1D	Senza sovrapprezzo	4	0		–
Ulteriori tensioni 1)				Per sovrapprezzi, codici numerici, sigle abbreviate e descrizioni vedere da pagina 1/47					9	0		...

Forme costruttive		N. poli	Grand. costr.	Tipo di motore	Esecuzione		Sigle abbreviate
Senza flangia	IM B3 3)	2, 4	80 M ... 160 L	1LE1001-0D ... -1D	**Normale**	A	–
Con flangia	IM B5 3)	2, 4	80 M ... 160 L	1LE1001-0D ... -1D	Con sovrapprezzo	F	–
Con flangia normalizzata	IM B14 3)	2, 4	80 M ... 160 L	1LE1001-0D ... -1D	Con sovrapprezzo	K	–
Ulteriori forme costruttive	Per sovrapprezzi, lettere identificative e descrizioni vedere da pagina 1/50					■	...

Protezione motore		N. poli	Grand. costr.	Tipo di motore	Esecuzione		Sigle abbreviate
Grandezze costruttive 100 L ... 160 L: Impiego della morsettiera ruotabile 4 x 90°							
Senza		2, 4	100 L ... 160 L	1LE1001-1A ... -1D	**Normale**	A	–
Termistore con 3 sensori di temperatura		2, 4	100 L ... 160 L	1LE1001-1A ... -1D	Con sovrapprezzo	B	–
Ulteriore protezione motore	Per sovrapprezzi, lettere identificative e descrizioni vedere da pagina 1/56					■	...

Posizione della morsettiera		N. poli	Grand. costr.	Tipo di motore	Esecuzione		Sigle abbreviate
Morsettiera in alto		2, 4	80 M ... 160 L	1LE1001-0D ... -1D	**Normale**	4	–
Ulteriori posizioni della morsettiera	Per sovrapprezzi, codici numerici e descrizioni vedere da pagina 1/58						

Esecuzioni speciali		N. poli	Grand. costr.	Tipo di motore		Sigle abbreviate
A ventilaz. assistita, senza ventilatore esterno/calotta copriventola (IC 416)		2, 4	80 M ... 160 L	1LE1001-0D ... -1D	1LE1001-....■-■■■■-Z	F90 +...+...+...
Opzioni	Per sovrapprezzi, sigle abbreviate e descrizioni vedere da pagina 1/60				1LE1001-....■-■■■■-Z	...+...+...+...

1) Valori di esercizio alla potenza nominale per 60 Hz su richiesta.

2) Per il funzionamento delle altezze d'asse 80 e 90 con convertitore si consiglia un'ordinazione con termistore e relativo collegamento al convertitore.

3) Sono possibili forme costruttive diverse da IM B3 (IM B6/7/8, IM V6 e IM V5), da IM B5 (IM V3 e IM V1) e da IM B14 (IM V19 e IM V18) se non sono richiesti fori per lo scarico della condensa (H03) e stampigliatura di queste forme costruttive sulla targhetta dei dati tecnici. Di serie sulla targhetta sono stampigliate le forme costruttive IM B3, IM B5 oppure IM B14. Ordinando i fori per lo scarico della condensa (H03) è necessaria l'indicazione della forma costruttiva.

SEI SISTEMI S.R.L.
Sede legale , amministrativa, magazzino:
Via Calamelli, n. 40 - 40026 IMOLA(BO)
P.I. 00698181203 - C.F. e Nr. Iscr.
04075410375 Reg. Impr. BO – REA 337424
Cap.Soc.Int.Vers. euro 51.480,00
Tel. 0542.640245 – Fax 0542.641018
E_mail: siei@sieisistemi.it

SEI Sistemi

SEI SISTEMI S.R.L.
Stab.to e Magazzino:
Via Per Uboldo, 48
21040 GERENZANO (VA)
Tel. 02.9681713 – 02.9681704
Fax 02.9680559
REA Varese 243775
www.sieisistemi.it

DICHIARAZIONE DI CONFORMITÀ

Dichiarazione redatta secondo le norme ISO/IEC 2 e ISO/IEC 22 Guide, EN 45020, EN 17050

La Ditta SEI SISTEMI s.r.l.

dichiara, sotto la sua esclusiva responsabilità, che gli equipaggiamenti elettrici di macchina, oggetto della fornitura di cui al Vostro ordine e nostra commessa:

Ordine del committente nr.	
Commessa del committente :	
	Conferma d'ordine nr. 01/70054 del 15/03/19 Commessa nr. 170054 Schemi di riferimento : TURBINA IDROELETTRICA
Committente	

in base alle verifiche effettuate dal nostro personale, sono conformi alla:

Direttiva Comunitaria "Bassa Tensione", 2014/35/EU

in vigore dal 26/02/2014.

Gli equipaggiamenti forniti sono stati progettati e costruiti applicando le Norme Tecniche armonizzate

EN 60204-1(2014), EN 61439-1/2

La Sei Sistemi specifica quanto segue:
le apparecchiature sopra indicate costituiscono una parte di una macchina industriale. Esse non rappresentano singolarmente una macchina o un apparecchio elettrico in grado di lavorare autonomamente. Debbono pertanto fare parte di un impianto industriale per fare produzione. Il costruttore dell'impianto completo, che integra il prodotto della Sei Sistemi, e che ricade nel campo di applicazione della direttiva "Macchine" 2006/42/CE, si farà carico della dichiarazione di conformità del sistema completo.
Si fa pertanto divieto dell'uso delle apparecchiature SEI SISTEMI prima della eventuale dichiarazione di conformità del sistema completo alla direttiva "Macchine" 2006/42/CE.
Per quanto concerne la compatibilità elettromagnetica (EMC) la SEI SISTEMI srl dichiara di aver utilizzato assemblati elettronici ed elettromeccanici singolarmente conformi alla direttiva EMC 2014/30/UE e che gli azionamenti elettrici sono conformi alla normativa CEI EN 61800-3.
SEI Sistemi srl tuttavia non si assume la responsabilità di dichiarare l'impianto nel suo complesso conforme alla direttiva EMC 2014/30/UE, non essendo sotto la sua responsabilità la realizzazione dell' installazione e delle interconnessioni elettriche delle apparecchiature oggetto della fornitura.

Firma del fabbricante

SEI SISTEMI s.r.l.
Sede legale e amministrativa:
Via Calamelli, 40 - 40026 IMOLA (BO)
Tel. 0542 640245 - Fax 0542 641018
Cod. Fisc. 04075410375
Part. I.V.A. 00698181203

Legale Rappresentante
Libero Castelli

Luogo e data

Imola, 23/03/2019

TDE MACNO
s.p.a. tecnologie digitali elettroniche

CE

DICHIARAZIONE DI CONFORMITÀ CE

Nome del fabbricante:	TDE MACNO S.p.A. Via dell'Oreficeria, 41 36100 Vicenza - Italy
Dichiara che i prodotti:	convertitori DC/AC trifasi
Tipo:	OPDE
Serie:	OPDE S

ai quali la seguente dichiarazione si riferisce, sono conformi ai requisiti delle seguenti direttive europee:

2006/95/CE Direttiva Bassa Tensione

Le norme armonizzate applicate sono le seguenti:

EN 62109-1: 2010-12	Sicurezza degli apparati di conversione di potenza utilizzati in impianti fotovoltaici di potenza Parte 1: Prescrizioni generali
EN 62109-2: 2012-04	Sicurezza dei convertitori di potenza utilizzati negli impianti fotovoltaici Parte 2: Prescrizioni particolari per gli inverter
EN 50178: 1997-10	Apparecchiature elettroniche da utilizzare negli impianti di potenza

2004/108/CE Direttiva Compatibilità Elettromagnetica

Le norme armonizzate applicate sono le seguenti:

EN 61000-6-2: 2006	Compatibilità elettromagnetica (EMC) Parte 6-2: Norme generiche - Immunità per gli ambienti industriali
EN 61000-6-4: 2007	Compatibilità elettromagnetica (EMC) Parte 6-4: Norme generiche - Emissione per gli ambienti industriali

Vicenza *(Luogo)* 07/01/2013 *(Data)*

Fabio Illetterati
(Legale Rappresentante)

CE 2013

TDE MACNO S.p.A.
Via dell'Oreficeria, 41
36100 Vicenza – Italy
P.IVA 00516300241

Tel. ++39 0444 343555
Fax ++39 0444 343509
Internet: www.tdemacno.it
E-mail: info@tdemacno.it

TDE MACNO
s.p.a. tecnologie digitali elettroniche

Dichiarazione di conformità CEI 0-21

Costruttore: **TDE MACNO** S.p.A.
Via dell'Oreficeria, 41
36100 Vicenza – Italy

Apparato oggetto della dichiarazione:	**Convertitore DC/AC trifase**					
Modello:	OPDE S 7	OPDE S 15	OPDE S 22	OPDE S 32	OPDE S 48	OPDE S 60
Versione FW:	40.73 (Nucleo) – 3.02 (Applicativo)					
Nr. Di fasi:	3					
Potenza nominale (kVA): *Per applicazioni Energy Fotovoltaico, Vnom 225Vac*	2,7	5,8	8,6	12,5	18,7	23,4
Potenza nominale (kVA): *Per applicazioni Energy con macchine rotanti sotto inverter AC/DC, Vnom 400Vac*	4,8	10,4	15,2	22,2	33,3	41,6

Nota: Il dispositivo necessita di essere abbinato ad un trasformatore di isolamento esterno

Apparato oggetto della dichiarazione:	**Convertitore DC/AC trifase**									
Modello:	OPDE S 70	OPDE S 90	OPDE S 110	OPDE S 150	OPDE S 175	OPDE S 220	OPDE S 250	OPDE S 310	OPDE S 370	OPDE S 460
Versione FW:	40.73 (Nucleo) – 3.02 (Applicativo)									
Nr. Di fasi:	3									
Potenza nominale (kVA): *Per applicazioni Energy Fotovoltaico, Vnom 270Vac*	37	48	51	71	91	116	132	163	194	224
Potenza nominale (kVA): *Per applicazioni Energy con macchine rotanti sotto inverter AC/DC, Vnom 400Vac*	55	71	76	105	135	172	195	241		

Nota: Il dispositivo necessita di essere abbinato ad un trasformatore di isolamento esterno

Riferimenti ai fascicoli di prova ed ai laboratori che hanno eseguito le prove:

Fascicoli Prova: 131075LP, 131077LP — emessi da **CREI VEN** s.c.a.r.l.
Via Corso Spagna 12, 35127 Padova – Italy
Accreditamento: ACCREDIA – LAB N° 0259 – Italy
Rif. ISO/IEC EN 17025:2005

Fascicolo Prova: DOC01N002_V00 — emesso dal laboratorio **TDE MACNO**

Con la presente dichiarazione, resa ai sensi degli artt. 46 e 47 DPR 28 dicembre 2000, n. 445, consapevole delle responsabilità e delle sanzioni penali previste dall'art. 76 del citato DPR per false attestazioni e dichiarazioni mendaci, il sottoscritto Illetterati Fabio codice fiscale LLTFBA56D13L840Z, residente in via Rovigo n. 18 nel Comune di Altavilla Vicentina provincia di Vicenza, in qualità di legale rappresentante della società TDE MACNO S.p.A. con sede a Vicenza in via dell'Oreficeria n. 41, codice fiscale – P. IVA n. 00516300241, iscritta al registro delle imprese della Camera di Commercio Industria Artigianato Agricoltura (CCIAA) di Vicenza R.E.A. 133867

DICHIARA

che i prodotti indicati sono conformi alle seguenti norme/parti di:
- allegato B della norma italiana **CEI 0-21** ed. 2012-06 e del relativo foglio di interpretazione ed V1: 2012-12.

TDE MACNO S.p.A.
Via dell'Oreficeria, 41
36100 Vicenza – Italy
P.IVA 00516300241

Tel. ++39 0444 343555
Fax ++39 0444 343509
Internet: www.tdemacno.it
E-mail: info@tdemacno.it

TDE MACNO
s.p.a. tecnologie digitali elettroniche

Dichiarazione di conformità CEI 0-21

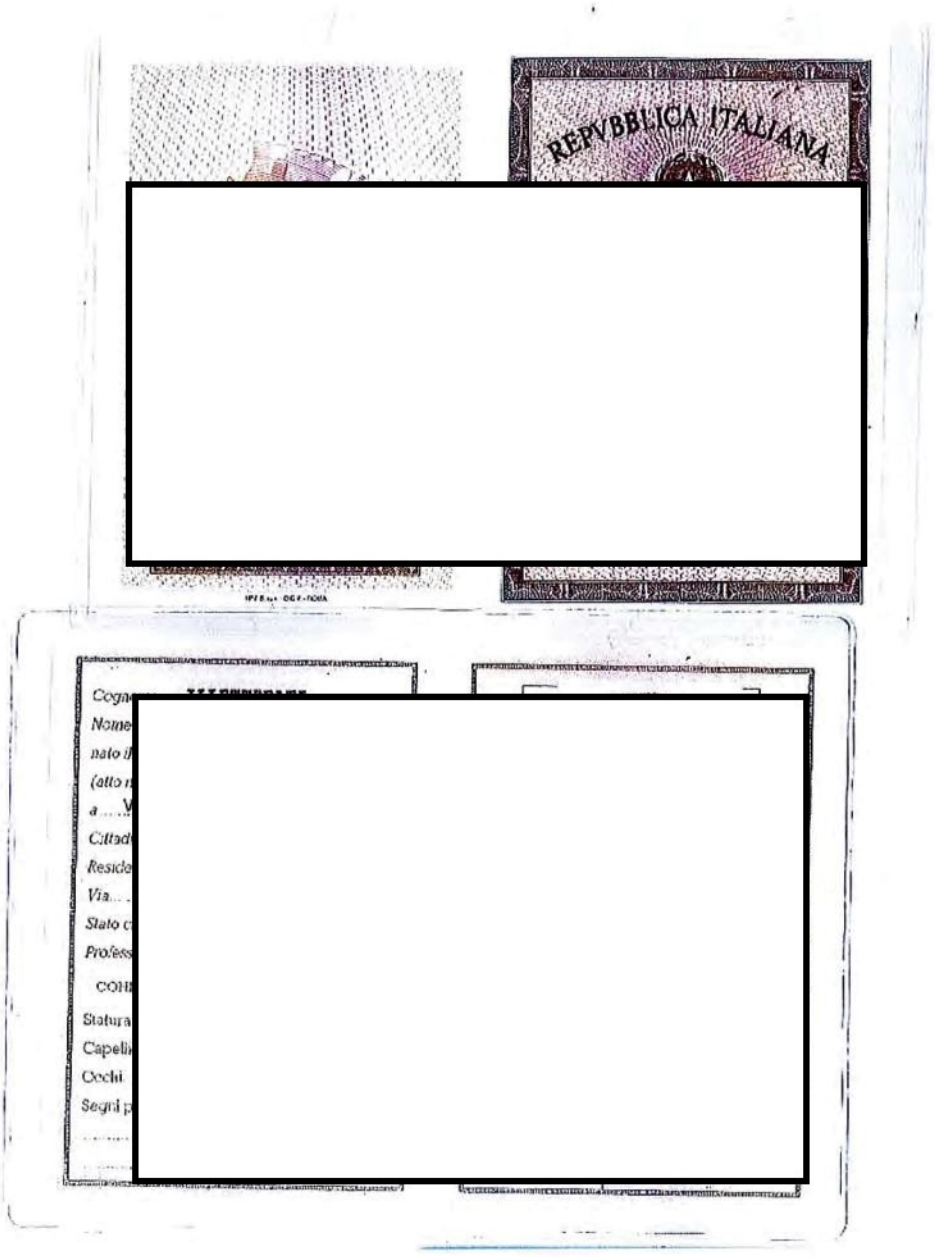
Si attesta inoltre che la produzione e la gestione delle apparecchiature oggetto della presente dichiarazione avviene in ambito di un sistema Qualità certificato conforme alla norma UNI EN ISO 9001:2008 (SGS – certificato Nr. IT95/0025).

Informativa ai sensi dell'art. 13 D.lg. 196/03: I dati sopra riportati sono previsti dalle disposizioni vigenti ai fini del procedimento amministrativo per il quale sono richiesti e verranno utilizzati solo per tale scopo.

Vicenza, 16 Dicembre 2014

Fabio Letterati
(Legale rappresentante)

Si allega la fotocopia (fronte/retro), in carta semplice, di un documento di identità valido.



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Via dell'Oreficeria, 41
36100 Vicenza – Italy
P.IVA 00516300241

Tel. ++39 0444 343555
Fax ++39 0444 343509
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E-mail: info@tdemacno.it

1.2. The Problem

By virtue of the very high level of efficiency of GIAR technology, we are able to guarantee the Customer who purchases a Green Energy Generation Plant from river currents a shorter break-even time than any of our competitors who use a different technology.

The installation of a traditional electricity generation plant exploiting river flows in Italy in most cases involves the prescription of compensation works due to the invasive auxiliary works of the plant itself.
The GIAR Turbine, on the other hand, creates a water height difference by its own design: the positioning of the plant using GIAR technology determines the elevation of the river flow upstream of the plant, and therefore a difference in height between the fluid flow entering the plant and the fluid flow exiting it, leaving the fluid flow downstream completely unaltered, just as if the plant weren't there.
Thanks to this peculiarity, in fluvial applications GIAR technology combines lower costs, shorter construction times and obvious advantages in terms of environmental sustainability.

The exploitation of river currents is achievable through numerous technologies, none of which, however, is comparable to GIAR technology for one or more of the following reasons:

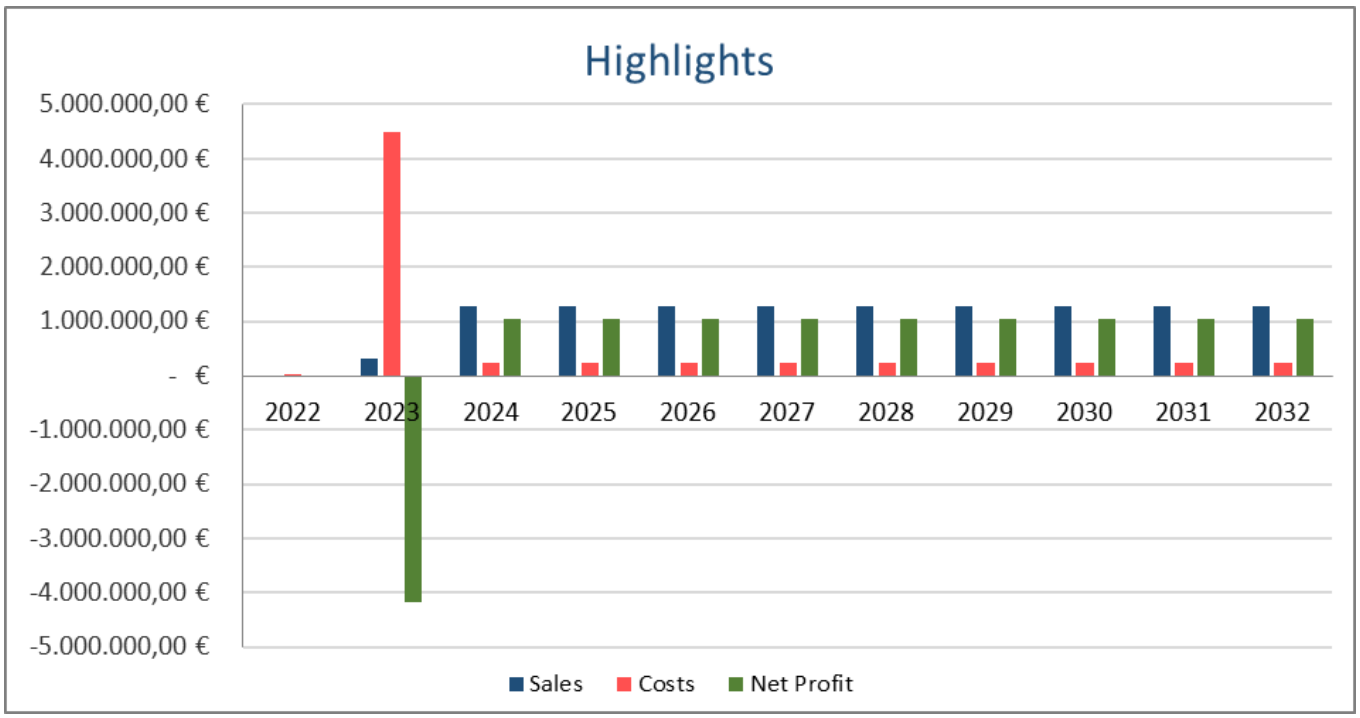
- They have lower energy efficiency;
- They involve higher construction costs, as well as greater difficulties and extended timelines for finding river sites suitable for the installation of generation plants, due to the need to build barriers in order to be used;
- They involve higher costs and extended times for maintenance interventions, due to the fact that the electric generator is not located outside the turbine body.

1.3. The Solution

Our Company can solve the problem through the use of the technology referred to in the GIAR Patent, which guarantees very high energy yields, respect of the environment and the highest level of reliability, with low maintenance costs.
Since the company already has the patent relating to the technology functional to the extraction of renewable energy from river flows, the solution is a loan of € 5.400.000,00 over 10 years that allows it to build its own river system in which to use it.

1.4. Highlights

Ten-year plan of the financial statement of the company GIAR Energy S.r.l. Benefit Company – from 2023 to 2032 – which shows the profits achieved after obtaining financing.



Year	Sales	Costs	Net Profit
2022	- €	3.178,00 €	- 3.178,00 €
2023	320.000,00 €	4.489.102,00 €	- 4.169.102,00 €
2024	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2025	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2026	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2027	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2028	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2029	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2030	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2031	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2032	1.280.000,00 €	225.000,00 €	1.055.000,00 €

1.5. Keys to Success

Upon obtaining financing, it will be put into the company's capital account.
The waterway concession request will be filed for the installation of the electricity production plant through the use of GIAR Turbines.
In the first year, all requests and planning for the installation of the fluvial system itself for the production of electricity will be handled.
In the second year, the river system will be installed, with plant start up expected by 30/09/2023.

2. Our Team & Organization

2.1. Mission Statement

Our corporate mission is to concretely contribute to the protection of the environment through the positive effects deriving from the use of GIAR technology, in order to promote and enhance it, while creating a better world.

2.2. Management & Team

The corporate structure of GIAR Energy S.r.l. Benefit Company is the synergy of professionalism, experience and skills:

- Giuseppe D'Ambrosio - Inventor and Mechanical Designer, inventor and owner of the GIAR Patent and holder of the technology know-how.
- SDS Energia S.r.l. - Energy Services Company owned 50% by Simone D'Ambrosio (Energy Manager) and 50% by Daniel Antonelli (Energy Manager), with decades of experience in technical-economic and operational conditions in the supply of energy commodities on the power grid, energy efficiency measures and solutions aimed at reducing energy costs.
- Simone D'Ambrosio – Energy Manager
- Luigi Gagliardi – Chartered Accountant and Statutory Auditor
- Oliviero Carducci – Entrepreneur

Simone D'Ambrosio
Administrative Area

Giuseppe D'Ambrosio & Eng. Benedetto D'Ambrosio
Technical and Design Area

Oliviero Carducci
Commercial Area

Dr. Luigi Gagliardi
Financial Area

Professional and Advisory Support	
Board of Directors	Simone D'Ambrosio, Luigi Gagliardi
Management Advisory Board	-
Attorney	Law. Pamela Provenzano – Gruppo Ingegneria S.r.l. Benefit Company
Accountant	Dr. Luigi Gagliardi – Euroconsulenze S.r.l.
Insurance Agent	-
Banker	Intesa San Paolo
Consultant(s)	Gruppo Ingegneria S.r.l. Benefit Company
Mentors and Key Advisors	-

2.3. Company Goals and Objectives

GIAR Energy S.r.l. Benefit Company pursues purposes of common benefit and operates in a responsible, sustainable and transparent way towards people, communities, territories and the environment, cultural and social assets and activities, bodies and associations and other stakeholders, producing the following positive effects:

- generation of energy from renewable sources, with environmental and social benefits through the reduction of the emission of greenhouse gases into the atmosphere and consequent decrease in global warming;
- achievement of environmental benefits also in terms of landscape and public peace protection, thanks to the minimum visual and acoustic impacts that characterize GIAR technology;
- concrete contribution to increasing energy independence from fossil sources, thanks to the vastness of the scope of application and the very high level of efficiency of GIAR technology;
- raising the level of environmental education and awareness in the community and the level of sensitivity to issues related to sustainable development among institutional and private subjects.

3. Products & Services

Our products consist of renewable energy generation plants focused on the use of the GIAR Universal Turbine, thanks to the exclusive possession of the relevant licenses.
Our services consist in the design of the plants themselves, thanks to the possession of the related know-how, being the Inventor of the GIAR Patent the majority shareholder of GIAR Energy S.r.l. Benefit Company.
The GIAR Universal Turbine exploits the properties of fluids – ***air and water*** – to efficiently extract energy from renewable sources: it is able to convert the energy of Wave motion, River currents, Sea and tidal currents and Wind into electricity usable for the widest applications.

4. Market Analysis

4.1. Market Summary

Since our potential market is represented by the demand for renewable electricity generation plants, it is objectively very broad, especially in the current European context characterized by the need for the implementation of technologies aimed at generating electricity from renewable sources.

4.2. Customers

GIAR technology is aimed at:

- Investors who already own river concessions or who wish to acquire them;
- Electric resellers who do not have a renewable electricity generation portfolio, who intend to acquire it;
- Electric resellers with a renewable electricity generation portfolio, who intend to expand it, diversify it and increase its yield and therefore income;
- Multinational utilities with a renewable electricity generation portfolio, which intend to expand it, diversify it and increase its yield and therefore its income;
- Multinational utilities with a large portfolio of renewable electricity generation, able to cover most or all of the electricity volumes marketed, which intend to diversify it, increase the yield and therefore the income and, at the same time, promote themselves towards their shareholders thanks to the use of a technology that impacts the environment to a much lesser extent than the others.

Potential customers for the use of our technology are therefore private investors of various sizes, as well as, as in the present case, the company GIAR Energy S.r.l. Benefit Company itself.

4.3. Competition

The energy of river currents has been exploited since the time of the Greeks and Romans, who used the energy of moving water to operate the mills for grinding grain, and today it can be exploited in various ways and through the use of various technologies.
None of our competitors have technologies capable of ensuring the high average mechanical efficiency of the GIAR Turbine (94%).
Furthermore, none of them can benefit from the advantages provided by the Variable Displacement feature – an exclusive feature of the GIAR Patent and a fundamental patent claim recognized by the European Patent Office – which is functional to the constant optimization of the efficiency, which, thanks to the Variable Displacement feature, is not affected by variations in water flow rates.
Thanks to the very characteristics of our technology, renewable electricity generation plants focused on its use represent a guarantee of high efficiency and reliability.

► The following synoptic comparative table shows the features of the main turbines currently in use in comparison with the features of the GIAR Turbine.

TECHNOLOGY	FEATURES						
	Reaction Turbine	Active also with reverse flow (*)	Variable Displa-cement (**)	NACA type blades (***)	Low noise	Active also at very low pressures (****)	Suitable also with variable pressures and flow rates (*****)
GIAR	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Wells	YES	YES	NO	NO	NO	NO	NO
Francis	YES	NO	NO	NO	NO	NO	NO
Kaplan	YES	NO	NO	NO	NO	NO	NO
Banki	NO	NO	NO	NO	NO	NO	NO
Pelton	NO	NO	NO	NO	NO	NO	NO

* The GIAR Turbine produces energy also when the direction of the fluid flow is reversed.

** The Variable Displacement feature ensures the optimization of the resonance parameters of OWC plants, increasing their overall Efficiency.

*** The NACA type blades make the GIAR Turbine a Reaction Turbine.

**** The GIAR Turbine can operate even in the presence of very low jumps.

***** In ensuring maximus Efficiency by optimizing the pressure and the speed of fluids, the Variable Displacement feature makes the GIAR Turbine the most suitable device for producing energy from fluids.

► Below are described the main critical issues the most common turbines show, which are overcome by GIAR technology.

Wells Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It does not activate operating with low pressures (low jumps);
- It stalls (loss of power) operating with high pressures, that are typical in OWC plants;
- It is highly noisy;
- It has very low Efficiency.

Francis Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It activates with jumps starting from about 3 meters;
- It does not produce energy when the direction of the fluid flow is reversed. On the contrary, since it acts like a pump, when the direction of the fluid flow is reversed it absorbs energy.

Kaplan Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- Its use is limited to jumps between 2 and 20 meters;
- It is not a reversible flow turbine, therefore it is not suitable for OWC systems.

Banki Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It is not a Reaction Turbine: the push on the blades is due to the centrifugal force exerted by the water flow forced to bend along the profile of the blades themselves, therefore there is no pressure difference in the water between the point of entry and the point of exit from the blades;
- It does not activate with low jumps, it is suitable for water jumps from 5 to 100 meters;
- Its use is limited to low-power plants;
- It is not a reversible flow turbine, therefore it is not suitable for OWC systems.

Pelton Turbine → main critical issues:

- It is not provided with the Variable Displacement feature, therefore it is not able to increase the overall Efficiency of OWC plants by optimizing the resonance parameters;
- It is suitable for high jumps and low flow rates;
- It is not a Reaction Turbine;
- It is not a reversible flow turbine, therefore it is not suitable for OWC systems.

5. Strategy & Implementation

5.1. Milestones (Keys to Success)

The National Energy Strategy is redefining the rules of the energy market with the aim of obtaining carbon-free energy production by 2030. The Italian government too plans to invest heavily in increasing energy efficiency, in order to reduce final consumption, and to reduce as well the congestions that currently characterize the distribution networks.
Recent international tensions, reflecting in significant increases in prices to end users, have also highlighted the importance of having their own electrical generating capacity.
Once built renewable electricity generation plants on behalf of customers, and once built at least one plant on behalf of GIAR Energy S.r.l. Benefit Company itself, we believe the sale of our technology to a multinational Utility with a large portfolio of renewable electricity generation is the most likely ending. Such a large company would not encounter particular difficulties in using GIAR technology even in the marine environment, which in our country presents a particularly high degree of complexity due to the related bureaucracy.

5.2. Customer Acquisition

We rely on the possibility of acquiring new customers by virtue of the positive references disseminated on the GIAR Turbine in relation to its use in functioning plants, by both ourselves and customers already acquired, that is to say by historicizing the electrical volumes generated by GIAR plants.
By virtue of this, the acquisition of new customers will have very low costs for us in terms of both economic resources and time.
The value that we transfer to the Customer in the form of renewable energy generation plants is high and particularly long-lasting: since GIAR is a Reaction Turbine, the inlet speed and the outlet speed of the fluid are very low, which leads to a reduced passage speed of sediments suspended in the fluid passing through the system, with minimal wear of the system components.

5.3. Pricing Strategy and Revenue Model

Thanks to the very high certified Efficiency of GIAR technology in river applications (94%), as well as to less frequent and easier maintenance interventions, our pricing strategy does not encounter any particular difficulty: it can be based, case by case, on timing of return to be offered to the customer that are more contained than the competition.
A fundamental element in this regard is the height difference between the fluid vein entering and the fluid vein exiting the plant, which derives from the installation of the plant itself, allowing to take full advantage of the height of the river banks without the need for additional preparation works for the building of the system, which translates into lower construction costs.

Following the construction of a renewable electricity generation plant from river currents on behalf of a customer, our revenue model envisages to replicate the same activity on behalf of both further subsequent customers and ours.

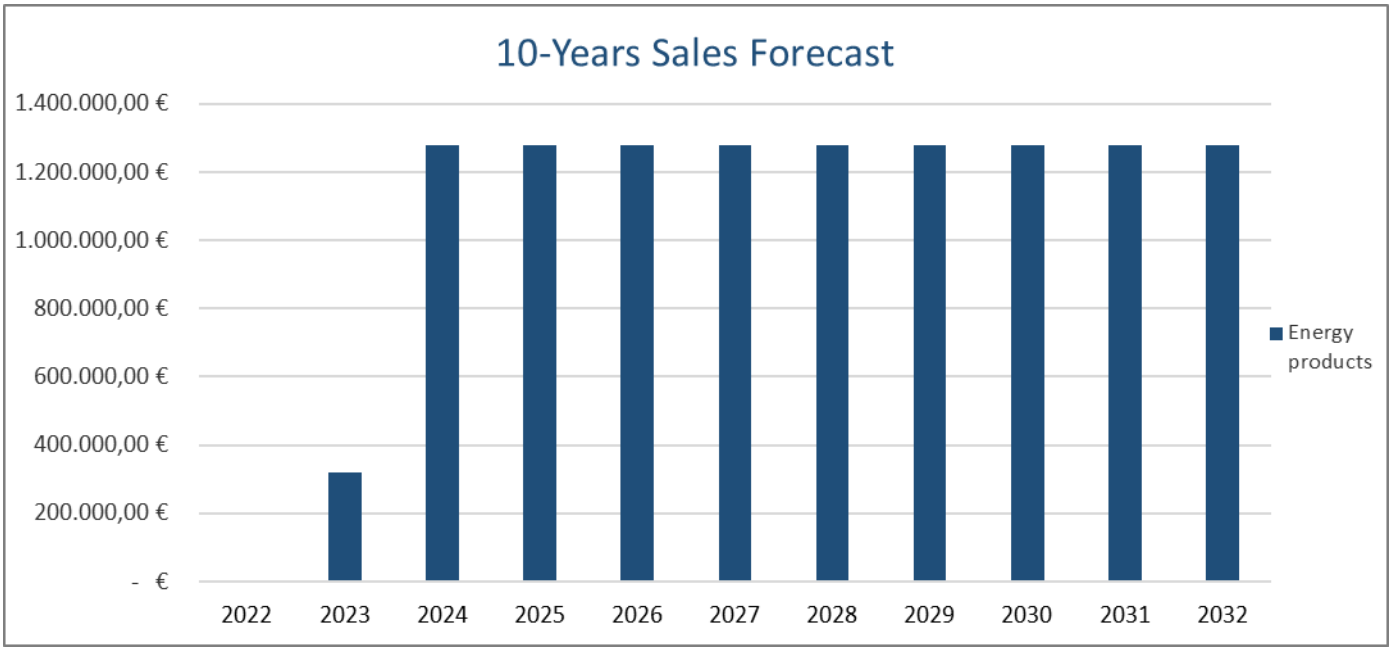
6. Financial Plan & Projections

► Start-Up Expenses & Funding

Start-Up Expenses	
Fixed Costs	
Raw materials	4.314.102,00 €
Services	45.000,00 €
Enjoyment of third parties	130.000,00 €
Amortisation	540.000,00 €
Total Fixed Costs	**5.029.102,00 €**
Average Monthly Costs	
Others	5.000,00 €
Salaries / Wages	416,67 €
Total Average Monthly Costs	**5.416,67 €**
Number of Months:	12
Total Monthly Costs	**65.000,00 €**
Total Start-Up Expenses	**5.094.102,00 €**

Start-Up Assets	
Owner Funding	
GIUSEPPE D'AMBROSIO - Cash	29.000,00 €
LUIGI GAGLIARDI - Cash	4.200,00 €
SDS ENERGIA SRL - Cash	8.400,00 €
OLICOR S.R.L. SOC. UNINOM. - Cash	4.200,00 €
SIMONE D'AMBROSIO - Cash	4.200,00 €
Total Owner Funding	**50.000,00 €**
Loans	
Financing 1	5.400.000,00 €
Total Loans	**5.400.000,00 €**
Other Funding	
Grant 1	- €
Grant 2	- €
Total Other Funding	**- €**
Total Start-Up Assets	**5.450.000,00 €**

▶ 10-Year Sales Forecast



▶ Cash Flow

CASH BALANCE	2022	2023	2024	2025
Date Ending	31/12/2022	31/12/2023	31/12/2024	31/12/2025
Cash at Beginning of Period	- 8.500,00 €	531.500,00 €	- 3.154.102,00 €	2.205.000,00 €
Cash at End of Period	- 8.500,00 €	- 3.694.102,00 €	1.665.000,00 €	2.745.000,00 €

CASH BALANCE	2026	2027	2028	2029
Date Ending	31/12/2026	31/12/2027	31/12/2028	31/12/2029
Cash at Beginning of Period	3.285.000,00 €	4.365.000,00 €	5.445.000,00 €	6.525.000,00 €
Cash at End of Period	3.825.000,00 €	4.905.000,00 €	5.985.000,00 €	7.065.000,00 €

CASH BALANCE	2030	2031	2032
Date Ending	31/12/2030	31/12/2031	31/12/2032
Cash at Beginning of Period	7.605.000,00 €	8.685.000,00 €	9.765.000,00 €
Cash at End of Period	8.145.000,00 €	9.225.000,00 €	4.365.000,00 €

▶ Payback Time

Payback Time [y]
5,12

To complete this report, attachments are made below:

- *Detailed economic statement of the ten-year investment plan;*
- *GIAR Energy S.r.l. Benefit Company certificate of incorporation (business profile).*

DETAILED ECONOMIC STATEMENT OF A TEN-YEAR INVESTMENT PLAN FOR THE CONSTRUCTION OF A 12 METER WIDTH FLUVIAL PLANT USING "GIAR" TECHNOLOGY FOR THE GENERATION OF RENEWABLE ENERGY

GIAR ENERGY S.R.L. BENEFIT COMPANY

Registered Office:
Borgo Conce, 29 – 62027 San Severino Marche (MC)

Operational Headquarters:
Via E. Mattei, 27 – 62027 San Severino Marche (MC)

Certified E-mail:
giarenergy.green.sb@pec.buffetti.it

VAT Number:
02064820430

Company Registration Number:
MC-275955

MACRODATA FOR A TEN-YEAR INVESTMENT PLAN FOR THE CONSTRUCTION OF A 12 METER WIDTH FLUVIAL PLANT USING "GIAR" TECHNOLOGY FOR THE GENERATION OF RENEWABLE ENERGY

Fluvial Plant Width [m]	12,00
Amount Financed [€]	5.400.000,00
Interest - Rate [%]	2,50
Interest - Annual Fee [€]	135.000,00
Company Share Capital [€]	50.000,00
Available Power of the Fluvial Plant [kW]	2.000,00
Annual Electricity Generation [kWh]	16.000.000,00
Incentive for Electricity Generation [€/kWh]	0,080000
Annual Contribution [€]	1.280.000,00

Highlights

Year	Sales	Costs	Net Profit
2022	- €	3.178,00 €	- 3.178,00 €
2023	320.000,00 €	4.489.102,00 €	- 4.169.102,00 €
2024	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2025	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2026	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2027	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2028	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2029	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2030	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2031	1.280.000,00 €	225.000,00 €	1.055.000,00 €
2032	1.280.000,00 €	225.000,00 €	1.055.000,00 €

2022

	► INCOME STATEMENT AS OF 31/12/2022 [€]	
A	**Production value → TOTAL**	**-**
A1	Revenues from sales and services	-
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**8.500,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	3.178,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	16.110,00
	a) amortization of intangible fixed assets	16.110,00
	b) depreciation of tangible fixed assets	-
B14	Operating expenses	322,00
	Difference between Production value and Production costs (A-B)	- 8.500,00
C	**Financial income and charges → TOTAL**	**-**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	-
	Result before taxes (A-B+C)	- 8.500,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	- 8.500,00

	► INCOME STATEMENT AS OF 31/12/2022 [€]	
	PROFIT → TOTAL	**199.518,00**
B	**Fixed assets → TOTAL**	**146.723,00**
	I - Intangible fixed assets	146.723,00
	II - Tangible fixed assets	-
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**52.795,00**
	II - Credits → TOTAL	13.626,00
	due within the next financial year	13.626,00
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	39.169,00
D	**Accruals and deferrals**	**-**

	LIABILITIES → TOTAL	**58.500,00**
A	**Equity → TOTAL**	**58.500,00**
	I - Capital	50.000,00
	IV - Legal reserve	-
	VI - Other reserves	-
B	**Provisions for risks and charges**	**-**
C	**Employees' severance indemnity**	**-**
D	**Payables → TOTAL**	**12.738,00**
	due within the next financial year	-
	due beyond the next financial year	12.738,00
E	**Accruals and deferrals**	**-**

2023

	► INCOME STATEMENT AS OF 31/12/2023 [€]	
A	**Production value → TOTAL**	**320.000,00**
A1	Revenues from sales and services	320.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**4.554.102,00**
B6	For raw materials, ancillary materials, consumables and goods	4.314.102,00
	▪ *Auxiliary works to metallic carpentry*	*800.000,00*
	▪ *Metal carpentry (fixed and mobile parts)*	*2.000.000,00*
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	*400.000,00*
	▪ *Electricity connection charges*	*118.540,00*
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	*995.562,00*
B7	For services (inc. maintenance)	45.000,00
B8	For use of third party assets (state concession cost)	130.000,00
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	540.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	540.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	- 4.234.102,00
C	**Financial income and charges → TOTAL**	**-**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	-
	Result before taxes (A-B+C)	- 4.234.102,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	- 4.234.102,00

	► INCOME STATEMENT AS OF 31/12/2023 [€]	
	PROFIT → TOTAL	**1.070.416,00**
B	**Fixed assets → TOTAL**	**4.554.102,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	4.554.102,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**1.755.898,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	1.755.898,00
D	**Accruals and deferrals**	**-**

	LIABILITIES → TOTAL	**4.910.000,00**
A	**Equity → TOTAL**	**4.910.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	**-**
C	**Employees' severance indemnity**	**-**
D	**Payables → TOTAL**	**12.738,00**
	due within the next financial year	-
	due beyond the next financial year	12.738,00
E	**Accruals and deferrals**	**-**

2024

	► INCOME STATEMENT AS OF 31/12/2024 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	1.080.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	1.080.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2024 [€]	
	PROFIT → TOTAL	**1.720.416,00**
B	**Fixed assets → TOTAL**	**155.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	155.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**2.120.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	2.120.000,00
D	**Accruals and deferrals**	-

	LIABILITIES → TOTAL	**4.370.000,00**
A	**Equity → TOTAL**	**4.370.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	-
C	**Employees' severance indemnity**	-
D	**Payables → TOTAL**	**4.467.738,00**
	due within the next financial year	-
	due beyond the next financial year	4.467.738,00
E	**Accruals and deferrals**	-

2025

	► INCOME STATEMENT AS OF 31/12/2025 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	1.620.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	1.620.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2025 [€]	
	PROFIT → TOTAL	**2.370.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**2.660.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	2.660.000,00
D	**Accruals and deferrals**	**-**

	LIABILITIES → TOTAL	**3.830.000,00**
A	**Equity → TOTAL**	**3.830.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	**-**
C	**Employees' severance indemnity**	**-**
D	**Payables → TOTAL**	**3.927.738,00**
	due within the next financial year	-
	due beyond the next financial year	3.927.738,00
E	**Accruals and deferrals**	**-**

2026

	► INCOME STATEMENT AS OF 31/12/2026 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	2.160.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	2.160.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2026 [€]	
	PROFIT → TOTAL	**3.020.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**3.200.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	3.200.000,00
D	**Accruals and deferrals**	-

	LIABILITIES → TOTAL	**3.290.000,00**
A	**Equity → TOTAL**	**3.290.000,00**
	I - Capital	3.290.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	-
C	**Employees' severance indemnity**	-
D	**Payables → TOTAL**	**3.387.738,00**
	due within the next financial year	-
	due beyond the next financial year	3.387.738,00
E	**Accruals and deferrals**	-

2027

	► INCOME STATEMENT AS OF 31/12/2027 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	2.700.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	2.700.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2027 [€]	
	PROFIT → TOTAL	**3.670.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**3.740.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	3.740.000,00
D	**Accruals and deferrals**	**-**

	LIABILITIES → TOTAL	**2.750.000,00**
A	**Equity → TOTAL**	**2.750.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	**-**
C	**Employees' severance indemnity**	**-**
D	**Payables → TOTAL**	**2.847.738,00**
	due within the next financial year	-
	due beyond the next financial year	2.847.738,00
E	**Accruals and deferrals**	**-**

2028

	► INCOME STATEMENT AS OF 31/12/2028 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	3.240.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	3.240.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2028 [€]	
	PROFIT → TOTAL	**4.320.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**4.280.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	4.280.000,00
D	**Accruals and deferrals**	**-**

	LIABILITIES → TOTAL	**2.210.000,00**
A	**Equity → TOTAL**	**2.210.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	**-**
C	**Employees' severance indemnity**	**-**
D	**Payables → TOTAL**	**2.307.738,00**
	due within the next financial year	-
	due beyond the next financial year	2.307.738,00
E	**Accruals and deferrals**	**-**

2029

	► INCOME STATEMENT AS OF 31/12/2029 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	3.780.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	3.780.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2029 [€]	
	PROFIT → TOTAL	**4.970.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**4.820.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	4.820.000,00
D	**Accruals and deferrals**	-

	LIABILITIES → TOTAL	**1.670.000,00**
A	**Equity → TOTAL**	**1.670.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	-
C	**Employees' severance indemnity**	-
D	**Payables → TOTAL**	**1.767.738,00**
	due within the next financial year	-
	due beyond the next financial year	1.767.738,00
E	**Accruals and deferrals**	-

2030

	► INCOME STATEMENT AS OF 31/12/2030 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	4.320.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	4.320.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2030 [€]	
	PROFIT → TOTAL	**5.620.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**5.360.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	5.360.000,00
D	**Accruals and deferrals**	**-**

	LIABILITIES → TOTAL	**1.130.000,00**
A	**Equity → TOTAL**	**1.130.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	**-**
C	**Employees' severance indemnity**	**-**
D	**Payables → TOTAL**	**1.227.738,00**
	due within the next financial year	-
	due beyond the next financial year	1.227.738,00
E	**Accruals and deferrals**	**-**

2031

	► INCOME STATEMENT AS OF 31/12/2031 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	4.860.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	4.860.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2031 [€]	
	PROFIT → TOTAL	**6.270.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**5.900.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	5.900.000,00
D	**Accruals and deferrals**	-

	LIABILITIES → TOTAL	**590.000,00**
A	**Equity → TOTAL**	**590.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	-
C	**Employees' severance indemnity**	-
D	**Payables → TOTAL**	**687.738,00**
	due within the next financial year	-
	due beyond the next financial year	687.738,00
E	**Accruals and deferrals**	-

2032

	► INCOME STATEMENT AS OF 31/12/2032 [€]	
A	**Production value → TOTAL**	**1.280.000,00**
A1	Revenues from sales and services	1.280.000,00
A5	Other revenues and income → TOTAL	-
	Grants related to income	-
	Others	-
B	**Production costs → TOTAL**	**155.000,00**
B6	For raw materials, ancillary materials, consumables and goods	-
	▪ *Auxiliary works to metallic carpentry*	-
	▪ *Metal carpentry (fixed and mobile parts)*	-
	▪ *Electrical components (Cabin, Generator, Inverter, LV/MV Transformer)*	-
	▪ *Electricity connection charges*	-
	▪ *Estimate of higher costs for unforeseen events (inc. easement)*	-
B7	For services (inc. maintenance)	90.000,00
B8	For use of third party assets (state concession cost)	-
B9	For staff → TOTAL	5.000,00
	a) wages and salaries	-
	b) social security contributions	5.000,00
	c), d), e) severance pay, other personnel costs	-
B10	Depreciation and write-downs → TOTAL	5.400.000,00
	a) amortization of intangible fixed assets	-
	b) depreciation of tangible fixed assets	5.400.000,00
B14	Operating expenses	60.000,00
	Difference between Production value and Production costs (A-B)	1.125.000,00
C	**Financial income and charges → TOTAL**	**135.000,00**
C16	Other financial income → TOTALE	-
	b), c) from securities held as fixed assets	-
	d) income other than the above	-
C17	Interest and other financial charges → TOTALE	135.000,00
	Result before taxes (A-B+C)	1.260.000,00
C20	Taxes on operating income → TOTAL	-
	Current taxes	-
	Deferred and prepaid taxes	-
C21	Operating Profit/Loss	1.260.000,00

	► INCOME STATEMENT AS OF 31/12/2032 [€]	
	PROFIT → TOTAL	**6.920.416,00**
B	**Fixed assets → TOTAL**	**540.000,00**
	I - Intangible fixed assets	-
	II - Tangible fixed assets	540.000,00
	III - Financial fixed assets	-
C	**Current assets → TOTAL**	**6.440.000,00**
	II - Credits → TOTAL	-
	due within the next financial year	-
	due beyond the next financial year	-
	Prepaid taxes	-
	IV - Cash and cash equivalents	6.440.000,00
D	**Accruals and deferrals**	**-**

	LIABILITIES → TOTAL	**50.000,00**
A	**Equity → TOTAL**	**50.000,00**
	I - Capital	5.450.000,00
	IV - Legal reserve	540.000,00
	VI - Other reserves	-
B	**Provisions for risks and charges**	**-**
C	**Employees' severance indemnity**	**-**
D	**Payables → TOTAL**	**147.738,00**
	due within the next financial year	-
	due beyond the next financial year	147.738,00
E	**Accruals and deferrals**	**-**