

Interreg
Mediterranean



BLUE GROWTH

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Innovation for the development of Blue Energies in the Mediterranean

InnoBlueGrowth

Capitalization report for recommendations

Version 12/2017



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Acronym: InnoBlueGrowth

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Blue Growth at Mediterranean level

Priority Axis 1: Promoting Mediterranean innovation capacities
to develop smart and sustainable growth

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sectors of the MED area

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1. Introduction – Objective of the Report

The InnoBlueGrowth project (IBG) – or “Horizontal Communication & Capitalization project for Innovation in Blue Growth at Mediterranean level” (Interreg MED), led by the National Interuniversity Consortium for Marine Sciences (CoNISMa) and counting on the experiences of the Association of Mediterranean Chambers of Commerce and Industry (ASCAME), the Intermediterranean Commission of the Conference of Peripheral Maritime Regions (CPMR), Plan Bleu, the National Technical University of Athens (NTUA), and the University of Montenegro (UoM), aims at **ensuring the connection between communication and capitalization activities of thematic projects dealing with Blue Growth issues in order to increase their impacts towards common identified targets.**

Its activities are focused on the increase of the transnational activity of innovative clusters and networks of key sectors of the Mediterranean area. IBG is implementing concrete actions such as a *communication strategy*, *community building initiatives* and *capitalization events*, among others, to build a real community of Blue Growth actors. This innovative community will allow the reinforcement of an integrated approach between modular projects and transnational key stakeholders. This approach is indeed a *sine qua non* condition to support Mediterranean clusters in their transnational activities processes.

The theme chosen for the second Capitalization event organized by IBG is **blue energies**, as two of the modular projects it capitalizes deal with this topic: **MAESTRALE** and **PELAGOS**.

- MAESTRALE aims to lay the basis for a maritime energy deployment strategy in the Mediterranean. MAESTRALE promotes the creation of Blue Energy Labs (BEL) in each participating region, involving local enterprises, public authorities, agencies and citizens in order to support future blue policies and plan concrete development strategies for blue growth.
- PELAGOS aims to develop smart and sustainable growth by enhancing a transnational Mediterranean cluster in the blue energy sector. PELAGOS facilitates the distribution of targeted solutions and products specifically calibrated for the Med region. It also offers support to relevant stakeholders by promoting knowledge sharing in R&D and by enhancing social acceptance.

This transnational action helped establish the first steps towards the sustainable development of marine renewable energies by involving all actors of the sector. It was also be the opportunity to transfer key messages to the Union for the Mediterranean’s Stakeholders’ Conference that was held the following days.

More precisely, the event aimed at:

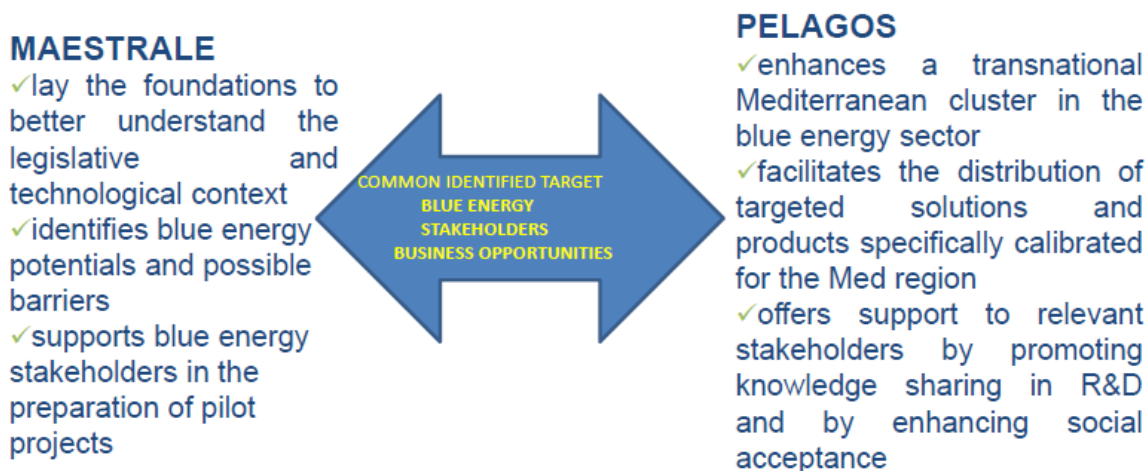
- Enhancing knowledge and exploitation of the outputs resulting from MAESTRALE, PELAGOS, and other projects on blue energies;
- Increasing the visibility of the Blue Growth community and its impact on the policy making process at regional, local, national and Mediterranean level, with specific focus on issues related to:
 - Investments and synergies for technology funding, including the combination of grants and financial engineering;
 - Integrated Coastal Zone Management/Maritime Spatial planning, and social acceptance, in line with the implementation of the EU Directive on Maritime Spatial Planning;
 - Environmental sustainability, components, and natural capital assessment;
 - Awareness raising and education for blue growth;
- Meeting Experts from the blue energy sector for peer-reviewing;
- Exchanging innovation and funding best practices in the blue energy sector.

Following are the main narration as well as the technical and policy conclusions and recommendations drawn from these exchanges. A shorter document shall be transmitted to the main project targets.

2. Narration of events

The event started at noon time with a welcome speech by *Alberto Carotenoto*, Dean of the Parthenope University, followed by *Serena Angioli*, Vice-President of the CPMR Intermediterranean Commission, and *Caterina Practico*, Project Manager from CONISMA. The latter delivered information about the latest advancements of IBC and expectations from the COM&CAP event.

The floor was then given to the MAESTRALE & PELAGOS representatives, describing the projects' achievements after one year of studying and the future steps that will be followed. By the end of the presentations, the activities and impacts of each project towards common identified targets, blue energy stakeholders and business opportunities, were presented (see below image).



Based on an analysis of the wall-activity results gathered from the Launch Community Event (April 2017) and the experience gathered from previous MED cooperation projects (COM&CAP MarInA-Med), the following issues were decided by the IBC team members in order to be analyzed/presented by all speakers and challengers during the first day. The same issues were also at the core of the discussions for the round-table activities.

- **Issue 1:** Investments and synergies for technology funding.
- **Issue 2:** Integrated Coastal Zone Management/Maritime Spatial planning, and social acceptance.
- **Issue 3:** Environmental sustainability, components, and natural capital assessment.
- **Issue 4:** Awareness raising in education, how to explain blue growth and energy potential to schools and universities.

For issue 1, Mr. Damien Périssé, Director for Maritime Affairs at the CPMR, France raised three very important questions with regards to Investment and Synergies for technology funding in the Med area:

- a) what is the need to invest in Marine Energies in the MED area?
- b) which are the key challenges? and
- c) how could these EU funds provide better contribution at regional/transnational level in the basin, with a focus on financial engineering?

As explained, *“funds are not allocated to marine energies, which explains why blue energy is less developed in the Mediterranean than in other basins, beyond the characteristics of the area.”* To tackle this issue, the creation of a special fund dedicated to blue energies (a “fund of funds”), combining public and private partnerships, was suggested. The Juncker plan was cited in order to emphasize the need of using civil engineering and improve synergies with the European Investment Bank (EIB) and smaller projects, which are not financed much.

Regarding investments for blue energies in the Mediterranean, one can therefore bear in mind the following elements:

- The objectives for investments are about the characteristics of the Mediterranean and the lack of knowledge about the needs of the Mediterranean. They can nonetheless have an impact on:
 - Employment and growth
 - Climate policy's objectives
 - Energy autonomy
 - Growing international competition

These elements are very important ones in view of post-2020 Europe and the current definition of funds allocations for the next programming period.

Moreover, as seen already ([COM&CAP MarInA-Med](#), 2014), there exists a real potential for marine renewable energies development in the Mediterranean. *“Marine energy remains one of the most promising sectors on the production of heat/coolness and electricity from renewable sources, especially in Mediterranean countries, which have a lesser share of renewable energy sources than Northern Europe. Most potential resides in offshore wind, waves, tides-currents, thermal gradient produced energy.”*

- The technological challenges implied for blue energies (COM&CAP MarInA-Med, 2014) are:
 - Physical characteristics (wind and waves climate milder than other EU basins)
 - A co-related lack of knowledge

- The need for technologies more adapted to the characteristics of the Med in terms of environmental restrictions (bottom depth, bottom morphology, distance from shore, grid connection, etc.), R&D restrictions (lack of advanced WECs, low current speeds, lack of tides), mean wind speed and bottom depth, lack of underwater grid connections.
- The investment challenges (COM&CAP MarInA-Med, 2014) are:
 - The potential funding sources that exist but that are not directed enough to blue growth investments
 - Blue energy projects can be very risky (high investments and specific skills)
 - A special fund for blue energies, combined with energy supply contracting as one of Public-Private-Partnership could be an idea to explore
- The Framework conditions applying in this case would be:
 - Maritime Spatial Planning and Integrated Coastal Zone Management
 - Social acceptance and awareness among citizens
- Several ideas and notions exist on how to improve financing:
 - Idea: create a special fund for blue energy (projects) in the Mediterranean region, combining private and public partnerships, especially because funds are usually not easily allocated to fund marine energies that is still considered as a risky market.

Also, EU spending for blue energies are closer to R&D phases, and focus less on segments closer to the market, which is missing. More capital is needed for the development of BE in the Med through investments close to the market.

 - Draw more links with the Juncker Plan/EFSI even though most projects for blue energies are located in Northern EU. Why not, again, create a specific Mediterranean fund allocated to BE, which would mix both public and private investors?
- In order to resort to the Juncker plan, using finance engineering and improving synergies of the European Investment Bank (EIB) and the smaller projects which are not financed much is clearly needed (usually, about 10M euros worth of projects financed by this bank (EIB) which are “big” projects)
 - Smaller projects do exist though, and funding opportunities should also exist to fund more of them.
 - In this sense, the need to develop a more dedicated fund is crucial, and DG MARE is currently identifying a fundable projects base. As an example, PELAGOS’s work is very important as it could be used to provide DG MARE with very useful information.

- There also exists the idea to develop a blue investment platform related to the Juncker plan
 - For example, the creation of InnoFin type instruments for blue growth (H2020)
 - Or the EFSI Territorial platforms focusing on blue growth (regional scheme with, for example, regional entities that could organize themselves to give a legal status in order to create a platform, or mechanism, creating a “fund of funds” made out of public or private capital to be added to Juncker plan funds).
- Concerning regions, potential investment in blue energies are part of a lot of regions’ priorities, notably through RIS3 (structural funds). It is necessary to assess the potential of regions, with regions and processes at sea-basin level (e.g. West-Med, UfM, BlueMed) for:
 - A joint identification of potential bankable projects (based on works from PELAGOS and MAESTRALE, as an example)
 - The set-up of mechanisms (“funds of funds” type)
 - Answering the needs in terms of technical assistance (training, etc.) so that all actors can learn how to use those tools for investments.

At very practical level, the **Challenger**, *Domenico Coiro, University of Naples II* underlined the following aspects:

- Any device in order to stay in the market has to prove that levelised cost of energy (LCOE) is below a certain level; without which it is impossible to find investors;
- It is necessary to demonstrate and test the devices at least on pre-commercial level (wave devices...);
- Regarding insurance, it appears that nobody would insure the device without knowing its survivability (especially for wave devices to show that they can avoid destruction), and reliability (the devices should be designed with a failsafe mechanism, able to survive extreme conditions and with very short time of inoperability). It is therefore necessary to test all devices in order to increase reliability and performance, and this needs to be standardized and certified (tidal, wave devices...);
- It is important to build a value chain (being certain that the manufacturer can build a certain part according to design specificities, with a track number, etc.). Indeed, a lot of testing is implied with simulation, scale tests in control conditions, comparisons between tests and records of the procedures throughout various years to prove that the devices work;
- Grid connections are also very important elements not for forget;
- Multi-level and multi-sector actors are needed in order to produce these devices.

What remains from the **round-table exercises** that followed is that a common effort is needed in Med countries to build up a common platform as an alternative to northern EU countries dominated sectors in blue energies. This way, Med countries putting money together would help fund projects for blue energy in the basin.

The idea would be to start with a survey of actors working in this area in the main countries such as Italy, Greece, France, Spain (floating off-shore wind, tidal, and wave energy), and then install pilot sites corresponding to these typologies in each countries and where the resources are. Then, allow to choose the ones that are at the highest technological level to further spread and implement them.

Platforms should take advantage of existing projects such as MAESTRALE and PELAGOS, and launch calls to develop technologies to typical Med climatology for waves, floating wind energy infrastructures, etc.

The next question is who would be responsible for leading such initiatives?

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As regards issue 2, Ms. Eleni Hatziyanni, Director of Environment & Spatial Planning, Region of Crete, Greece and representing CPMR, suggested to focus on regional and inter-regional integrated coastal zone management (ICZM). *"It is important to identify synergies among maritime sectors, which will also minimize possible conflicts,"* she stated. She also highlighted that MSP is an interactive tool, as well as a process of bringing different stakeholders at the same table (maritime sector, regional and national competitiveness actors...). MSP also entails outlining an integrated map of current uses, which can be an added value to achieve Good Environmental Status (GES), while implementing the directive through an ecosystem approach in terms of planning.

- In terms of adaption of maritime spatial development plans, the legislation implementation, Stakeholder's consultation, and involvement of local users of coastal zone should be applied.
- Attempts to focus on regional and interregional ICZM would ensure:
 - The identification of synergies among maritime sectors,
 - The minimization of conflicts,
 - An ecosystem approach in terms of planning,
 - The preservation of sea-ocean space, and marine resources.
- The key maritime sectors identified in which MSP/ICZM can applied are:
 - **Maritime transports:** shipping and ports, planning of port infrastructure, autonomous vessels, yachting, weather re-routing;

- **Fishing:** mobile activity, illegal vessels not able to be recorded by GPS, a “traditional” spatial demand;
- **Offshore oil and gas:** new exploration, new drilling, possible conflicts with other uses;
- **Aquaculture:** as ocean are open areas, they constitute a great place for expansion where abiotic parameters must be taken into account for the development of activities in coastal area;
- **Coastal and Maritime tourism:** 2-way environmental impacts (impact of tourism on the coastal environment and the impact of not-so good coastal areas on the income of tourism in coastal and insular areas, which highlights once again the importance of the protection of coastal zones in the Med region), fast growing sector, importance of the protection of coastal zone;
- **Pipelines/sub-sea cables:** can possibly cause damages (damages on fishing activities and ships anchorages, unknown possible biological impacts);
- **Marine mining:** unknown demand, no research on environmental protection, innovative applications & use;
- **Offshore wind:** installations at the shore and deep waters, multi-use of wind energy; high economical potential;
- **Tidal and Wave energy, and more broadly, ocean energy:** Depending on the resource potential of the area, specific installation, specific spatial demand.
- All these sectors coexist more or less at the same time in the same place, which make interactions at sea and on land particularly complex.
- Focusing on tidal and wave energy, here are some key findings about MSP that were exposed during the Conference held last October 2017 in Brussels:
 - The certainty of investors must be improved;
 - Environmental and social constraints assessments are very important as well and stakeholders need to work on these elements better;
 - Device testing, coordinating technologies is of utmost importance;
 - Wave and tidal technologies must be adjusted on their potential;
 - Strategically planning integration with onshore planning is also key for an efficient and performant coordination of activities;
 - Raising the sector's profile nationally or regionally demonstrates investments can contribute to increase its development.

- Offshore wind energy:
 - Commitments for renewable energy need to be strong;
 - Co-design of multi-use off-shore wind parks: multi-use on economic development and environmental protection should be the approach to encourage;
 - More studies are necessary on cost and benefits of multi-use wind parks;
 - Strategic use of MSP would be translated in terms of:
 - assessing environmental impacts;
 - engaging multi-stakeholders, policy makers and local communities.
- Looking at MSP in terms of social acceptance: maritime community. Focus on 3 different levels (national, regional and the macro regional or sea-basin one) with total different approaches
 - Regional level: territories are usually looking at their ICZM, encompassing:
 - Territorial development, following maritime national strategies which could strengthen the emerging of investments on a local scale;
 - Focus on land/sea interactions;
 - Raise awareness of coastal zone users.
 - National level: a National Spatial planning on a country level
 - Specific maritime strategies;
 - National Maritime Spatial Plans;
 - Involvement of stakeholders and users of the coastal and maritime zone as well as their end-users.
 - Macro-regional /sea-basin level: A Macroregional spatial compatibility
 - Focus on Macroregional Maritime Strategies;
 - Blue Growth Strategy;
 - Multi-sectors planning and stakeholders' engagement;
 - Identify common goals for sharing the marine environment and make comparison of challenges between different sectors;
 - Cross-border cooperation;
 - Synergies among national strategies and policies (as well as on the regional level);

- A broader planning for a larger environment and ecosystem management rather than local plans.
- It is worth noting that there are also specific requirements in terms of adaptation of Member States development plans:
 - National Legislation implementation;
 - Stakeholders consultation;
 - Involvement of local users from the coastal zones.
- This can be explained because MSP aims to alleviate all environmental pressures in order to include policies not only for environmental protection but also to the adaptation and mitigation to climate change.
 - A relevant example is that of ADRIPLAN in the Adriatic-Ionian area. The project was very supportive to the MSP Directive implementation and addressed barriers for the development of activities such as bureaucratic ones, unclear legislation, the lack of a direct dialogue with public authorities, and the lack of infrastructures.
 - Another example is that of the RIS3 Consultation results for marine energies. As per Crete, it was highlighted that there was no specific interest for innovative investments due to the lack of information about Blue Energy, the fact that it is a “new” sector, and that there is also a lack of trust for investment plans.

To conclude and focusing on key findings in order to improve social acceptance, one could say that:

- Legislation exists, but there is a problem implementing it;
- Establish a direct dialogue with public authorities/associations/industries and a DSS tool is of utmost importance;
- Allowing a long-term vision of investments would be helpful to gain trust for this market;
- Bureaucratic and legislative issues such as the lack of a clear legislative framework (authorizations, licenses, infrastructural development, etc.) need to be tackled;
- The overlapping of competences among regional sectors should be better coordinated in order to be avoided to the best extent possible and render MSP/ICZM more efficient.

Is it to remind that MSP/ICZM is important for:

- The improvement of the traditional and unsustainable sectoral approach to the management of marine space;
- The enhancement of the competitiveness of enterprises (SMEs)

- The promotion of the of maritime economic activities development and job creation stimulation;
- MSP will provide an added value to achieve Good Environmental Status, implementing the Directive through an ecosystem approach.
- Organizations such as the CPMR lead a deep work on MSP/ICZM issues, notably through their Maritime agenda guided by its [Final Declaration](#).

With a focus on MSP, the **Challenger** *Mrs. Ariana Azzelino from Politecnico di Milano, Italy* underlined that more barriers need to be overcome. From the list of 9 human uses listed, it is very important to bear in mind the necessity of sharing data about these activities. Some data are indeed much more difficult to track (e.g. data about the local fishing places (fishermen) are not so well known).

- For example, the fisheries community is not so willing to share these information, which is an issue because this can collide with other uses;
- Traffic is another big issue. There are some areas where impact on just the routes of the ships... some areas are totally occupied by bunkers;
- Open databases still make it hard to achieve sufficient numbers.

Moreover, as previously said, stronger interaction should be achieved between the management of coastal areas and the management of the maritime space. There are however still strong barriers since local authorities are completely different and multiple. Even the countries more expert on this like the Baltic ones still encounter some difficulties.

- In this sense, for sure communication is very important. There is also the need for a new vision of this type of planning. All terrestrial planning is internal to a single country and few is known about it. Even there, the authorities do not talk too much to each other and this needs to be overcome.
- The issue of data sharing and the importance of the participation of different type of (incl. public) stakeholders should be overcome because their vision is often different. Communication should address different levels, technical (local, territorial authorities to learn how to solve the problems).

What remains from the **round-tables** that followed are that ICZM and MSP imply an integration of different levels of governance, hence the need to harmonize legislation (national coordination boards, including an ecosystem approach to ICZM & MSP, which is a way of implementing the MSFD too and of mitigating landscape issues through integrating legislation restrictions). Legislative frameworks should also be adapted to new practices, new users...

In parallel, innovation and skills would need to be shared between countries, as well as more data sharing to know more about the relationships between sources of marine pollution (e.g. litter).

Monitoring tools are needed for the MSFD (EmodNet) and the translation of data to innovative models, DSS tools, and multi-user platforms to raise awareness and social acceptance, as well as the capacity of mobilizing funds.

Last but not least, optimal siting for infrastructure of renewables energies would present opportunities for regional development or renewing existing infrastructures (as conditions have changed over years...). This could help avoid social acceptance issues. To benefit from experience, more capitalization on existing (ex. pilot) projects is also important.

Finally, the stakeholders to be targeted for these actions to be undertaken and effective would be the private sector in order to find a solution in implementing a plan in a specific area; National, regional and EU Commission actors; Research centers (providing models) & SMEs (using data); the civil society; the Blue Growth Community in its whole; multinational private companies; LRAs; all actors from the cooperation sphere (e.g. Interreg) as a platform of the platforms.

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Concerning issue 3, and in complementarity to the previous exchanges, *Mr. Federico di Penta, International Relations Officer from Marevivo, Italy* firstly raised the legislation issue that should be overcome in Italy so as to consider the country as a whole, including its many islands, in order to meet the birthing opportunities from wave energy systems generation.

At the same time, environmental impacts of marine energy infrastructures should be taken into consideration, on the basis of the constraints and consequences that wave energy systems may create. Due to limited literature for potential environmental impacts on Wave Energy Converters (WECs), he suggested for NGOs to “invest more on relative research.”

Potential environmental impacts on wave energy systems can be summed up as follows:

- In the 1960's, Italy was a “renewable energies country,” with over 60% of energy coming from renewable resources (mostly hydroelectric);
- Italy has 80 inhabited islands, a lot of which are not connected to the mainland and therefore need to generate their own energy, within a very strict legislative context. Most islands in Italy generate power through diesel or coal, with considerable environmental impact;
- MAREVIVO has tried to promote the development of different types of renewable energies on Italian islands, through the “[Sole Vento e Mare](#)” initiative and international calls of proposals;
- Given the local context (especially legal), wave systems represent a great opportunity for Italy's islands and the country as a whole. However, it is of vital importance to better assess their

potential impact on marine ecosystems before proceeding with the construction of large-scale projects;

- Since there is a broad selection of wave generation and conversion systems available (on-shore, near-shore, far from shore, surface systems, vertical, etc.), this analysis will remain at high level in order to look at all possible impacts for all types of systems;
- Broadly speaking, it is harder to understand and quantify impacts of wave systems because we know much less about marine environments than terrestrial ones, however WECs:
 - Can have direct impacts on waves, affecting tides, wave patterns and currents that may impact coastal environments (erosion, upset shoreline ecosystems);
 - Can alter and create new habitats through systems that would need to be anchored and that can therefore impact sediments, eggs, algae. Once installed, these systems will inevitably create new “reef-like” habitats. This aspect is particularly relevant since the expansion of the Suez Canal, though so far not that common in the Mediterranean. Colonization also impacts maintenance and efficiency (apparition of new species in the Suez Canal, etc.) on the food chain or on the system itself;
 - Would propagate sound and electromagnetic waves, as some wave systems are very loud, with sound waves travelling long distances underwater, potentially upsetting many species (for communicating, hunting...), and the same applies to electromagnetic fields generated by wave systems;
 - Can impact Fishing through the presence of large wave systems that may have a negative impact on commercial fishing (this might actually be positive since there also exists overfishing!), although it may attract foreign species by altering environment, rather than indigenous ones;
 - Could exert additional impacts that may include migration of species, disposal of systems, visual pollution, and maritime navigation. There is however less information on these issues.

As there is very little literature on this whole issue of environmental impacts of WECs, it is important to keep research in this sense. As an NGO, MAREVIVO strongly advises to invest more on research before moving on with large-scale projects developments.

The **Challenger**, *Mr. Jason Bongailas from Malta Marittima*, Malta agreed with most of the topics, and underlined that there is little literature on the topic indeed. He added that other biodiversity components may be taken into account (alien species, sea floor integrity,...), and underlined that human activities are not limited to the sea but also to what happens on land. More threats such as fishing, marine litter, and e.g. climate change need to be addressed.

He also questioned the Directives of the EU and their implementations “*what are the authorities doing?*” and emphasized their lack of integration in sectoral policies. The MSFD, Air quality Directives... are there any regulations in place? What are the authorities doing concretely? How to give visibility or have data about this? All countries need to be on board, and not only some.

To conclude, one could ask about what is really understood by sustainability? What measures are the States and LRAs implementing in reality? What balance can be found between economically viable and sustainability projects? The key words to answer these questions could stand in “education, awareness, and good governance.”

From the **round-tables** that followed, the debates dealt with the definition of sustainability, which has to be taken as a very strong sense and interdisciplinary sense as well (whole sustainability assessment). The lack of data, previously identified as a true issue, was also discussed since the effect of blue energy infrastructures on marine ecosystems are not well known – and this also because of the few infrastructures installed in the Mediterranean. However, it is also necessary to bear in mind that blue energies are intrinsically sustainable.

As a converging point, the proper way to address sustainability should take into account the *life cycle thinking* including biodiversity protection (which often is not part of it).

Moreover, education is indeed key for the development of blue energy because the public and potential workforce need to be informed to understand what the feeling/knowledge on the acceptance of blue energy is now when they are not yet in place, and be able to assess their development to a better extent.

Finally, the main actors to be targeted for more environmental consideration when studying the potential implementation of WECs would be policy makers mainly, in particular to provide education. They are in the position to perform good actions and to bet high.

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As for the last issue 4, Ms. Clemence Le Corff, EU Project Manager, representing Pole Mer Méditerranée, France, pointed out that blue energy cannot be considered separate from other issues related to Blue Growth; a holistic view should be implemented.

In order to create awareness among citizens, it is necessary to act towards the new generations by introducing these issues into the school levels and through targeted dissemination and consciousness programs, in policy & decision makers’ level.

Furthermore, and at the specialized technological level it is necessary to create, within the universities, new professional figures starting from the existing competences and taken into account the adaptation of existing jobs (from other marine/martime sectors (i.e. Oil and Gas)) in new skills, in the sectors that

require it (specialized training). However, gaps still exist in terms of dissemination towards citizens, decision and policies makers' level and at a specialized technological level. Therefore, it is necessary to act in all levels to overcome barriers and adapt new skills.

Regarding the skills or new trainings needed, one could observe the following points:

- Taking the example of the off-shore wind farm value chain, there are 4 phases noticeable:
 - (1) Studies and design
 - (2) Manufacturing components
 - (3) Farms installation and construction
 - (4) Operation and maintenance
- What skills are needed? Respectively:
 - (1) Need of various studies on the environment, socio-economic impact, legal aspects, design (what material, dimensions, etc.) via the works of environmentalists, surveys, modelling, engineering;
 - These skills already exist;
 - They are being transferred from the offshore oil and gas sector (engineering in material resistance, shapes, grid connections...) and maritime works, and take advantage of decreasing sectors for skills transfers;
 - One additional training would be needed though, e.g. on biofuel resistance.
 - (2) Manufacturing is currently not performed in Mediterranean countries (in case of commercial farms, some components could be manufactured in those countries – floating platforms, anchoring...) but rather northern EU countries (Germany, Denmark);
 - No skills are specifically needed, as they already exist in the EU. Maybe mechanical expertise for the assemblage and integration of turbine devices though skills already exist too.
 - (3) Naval civil engineering / shipbuilding, where companies are looking for diversification;
 - No new skills seem to be needed, but the adaptation of skilled people working in other sectors would be useful;
 - There is however a need to adapt equipment for marine energies (easy lift vessels).
 - (4) Operation and maintenance, which is for now a new sector since there are not floating farms nowadays in the Mediterranean;

- Skills will be needed from other sectors such as robotics (teleoperations) and security and defense (skills and technologies);
- Equipment would also need to be adapted.

Overall, there is no need of new skills nor specialized trainings for the development of Blue energies in the Mediterranean. Resources from various sectors are however needed for capacity building (from environment, shipbuilding, maritime works, oil and gas, robotics, security and surveillance).

There is a need for more trained people though, with some adaptation (maritime adaptation of existing jobs and ship crews. The expansion of the offshore wind energy sector needs to be considered as well (floating wind farms will be booming in some years).

The PELAGOS project can be used to increase the awareness of stakeholders on the potential for floating offshore wind farms in the Mediterranean since it can create spaces where stakeholders can learn about skills needed and where to find the concrete skilled workforce.

To conclude regarding knowledge, there are gaps in terms of dissemination towards the citizens, decision and policy-makers level and at a specialized technological level. So is necessary to act on all levels:

- In order to create awareness among citizens, it is necessary to act with regard towards the new generations by introducing these issues into the school levels;
- Regarding policy and decision makers by targeted dissemination and consciousness programs;
- At a specialized technological level, it is necessary to create, in the universities, new professional figures starting from the existing competences and taken into account the adaptation of existing jobs in new skills, in the sectors that require it.

The **Challenger** *Mr. Yannis Chatjigeorgiou, Professor at the National Technical University of Athens*, underlined that a bigger framework in education is needed. Lots of blue energies is new, especially for environmentalists. How to know the impacts of marine energies? Let the machines work and then see the impacts?

He added that off-shore wind turbines are the most known and the ones that make most profit. Skills may be required on the design to unify designs (semi-submersibles, etc.), and restrictions systems. Offshore energy concepts are also very demanding in terms of expertise needed for efficient design, installation and operation. Thereafter, many specializations are required (e.g. statisticians, several disciplines of engineering, law, mechanics, ship operators, etc.), in the same time that the existing knowledge gained from offshore industry is insufficient given that analogous devises should be operable with limited or no attendance at all. Concepts of wind, wave, current, tidal energy, geothermic devises

etc., are very much science based and the existing state-of-the-art must be improved, enriched and upgraded.

Lastly, he underlined that things need to be answered such as mitigating the effect of waves on wind turbines, and vice versa.

From the **round-table** discussions that followed, one could keep in mind that to attract people in marine energies, a picture of the needs to be produced so as to create figures on job potentials (how could unemployed people be included as well?). In this sense, the potential of blue growth and marine renewable energies should be made better known to the citizens, public authorities, research institutes, companies, and youngsters (future).

Training a new generation of scientists, engineers and entrepreneurs and workers that are able to tackle complex ecological, economic and societal problems from a holistic perspective, while supporting learning, tertiary education, development and transfer of technologies and knowledge for new and qualified “jobs in the BG context” is also to bear in mind.

The priorities for the future would therefore be summed up to:

- Plan and work with key public and private players and decision makers to define relevant Research and Capacity building actions that will tackle local social and economic challenges and boost the creation of new jobs;
- Create awareness amongst EU citizens of the importance of a sustainable prosperous Mediterranean for the surrounding countries and for Europe as a whole;
- Consider education, training and public engagement as fundamental activities to improve and develop new skills, to spread knowledge on blue growth and to develop education and training schemes oriented towards relevant careers including exchanges of researchers, technicians and the further development of skills to support blue growth activities.
- This could be connected to trainings and workshops, the sharing of concrete experiences, the balance between economic needs and environmental impacts, public investments (infrastructures, trainings, research and development...), and aim to include all relevant sectors (tourism, fishery, transports...) and combine systems.

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