

THE BLUE ECONOMY

SUSTAINABLE BLUE GROWTH: A NATIONAL OPPORTUNITY?

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The world's ever-growing population is predicted to become more and more dependent on marine resources. As a result, it is becoming imperative to protect and restore the oceans' health and productive capacity. Today, that means investing in specific and ambitious natural solutions—at all levels.

The way we manage the blue economy's resources will largely determine our response to the challenge of global warming.

The harnessing of research and science, reforms to governance, and innovation—including innovative finance—are the keys to this change: we have to support the development and dissemination of scientific knowledge about the oceans if we are to produce the necessary evaluation, planning and foresight tools. It is also crucial to support the development of adaptation strategies for vulnerable coastal areas and islands, something that is essential in moving toward sustainable lifestyles.

Globally, French waters cover 11 million km²—some twenty times the country's area (and the world's second-largest maritime space). France controls waters in every ocean, with the exception of the Arctic Ocean. 8.5 million French citizens (including 2.5 million living overseas) inhabit on 7,200 km of coastline in 785 coastal municipalities.

The blue economy was a key French economic sector in 2015:

- / **the French fishing sector accounts for €1.7bn of revenue:** more than 500,000 tons of crustaceans and nearly 200,000 tons of shellfish are fished or harvested every year in French waters;
- / **nearly 300,000 direct jobs**, not counting the local tourism sector, are linked to the sea, with a production value of around €69bn;
- / France is a **world leader** in the export of support services for off-shore extraction, and the construction of sailboats and rigid hull inflatable boats (RHIBs).

But France's interests in positioning itself to support the blue economy aren't just **economic**—they're also **environmental, social, political** and **diplomatic**.

France has to support the blue economy as an economic activity that contributes to the eradication of poverty, sustained economic growth, the strengthening of social inclusion, improvements in people's well-being and the creation of employment opportunities and decent work; at the same time, it must also help maintain the proper functioning of the Earth's ecosystem and preserve its biodiversity.



WHAT EXACTLY IS THE BLUE ECONOMY?

A maritime version of the environmental challenges faced by the green economy

The blue economy is a lever for **sustainable development**, **economic growth** and **social inclusion**. As such, it is the maritime equivalent to the green economy, and can be understood as “an economy that results in improved well-being and social equity for people, while significantly reducing environmental risks and resource scarcity”¹.

The political issues associated with the blue economy relate to questions of **international diplomacy and economic development** and are about strengthening the **environmental** (being environmental pioneers in the field, slowing down or even halting the degradation of natural environments, etc.), **social** (guaranteeing the people have a means of income and a livelihood, ensuring the sustainability of resources, etc.) and **economic** (increasing GDP, anticipating ecological transition in the diversification of energy portfolios, etc.) aspects of sustainability.

The blue economy does not encompass geopolitical questions that involve territorial or conflict issues.

Managing resource-based economic growth in marine and coastal ecosystems

The blue economy represents an economic sector with considerable growth potential. It brings together a large number of interconnected sectors in a vision that is encompassing an increasing number of issues:

- / the production of renewable blue energy (especially offshore),
- / extraction of mineral wealth from deep waters,
- / offshore oil and gas production,
- / activity at ports, shipbuilding and repairs,
- / short and long-distance shipping,
- / fishing (including the fight against overfishing and illegal, unreported, and unregulated fishing, known as IUU fishing),
- / aquaculture,
- / bioprospection,
- / biotechnology,
- / action against the pollution of marine nutrients (particularly those related to agriculture and wastewater management),
- / coastal, maritime, and cruise tourism,
- / jobs related to the maritime sector as a whole.

93% of the excess heat generated by human activities is reabsorbed thanks to the oceans

Other sectors, such as marine biomedicine, the marine chemical industry, and the sea salt industry, tend to be included in assessments of the potential of the blue economy, typically when the relevant countries are pioneers in these areas.

The potential is considerable, and all the more so, given that it is estimated that around 90% of marine species are yet to be discovered.

¹- United Nations Environment Programme (UNEP)



WHAT ARE THE CHALLENGES FOR THE BLUE ECONOMY? WHY FRANCE HAS TO POSITION ITSELF EFFECTIVELY

Covering **71% of the earth's surface**, the oceans are the world's principal climate regulator: they produce more than **50% of the oxygen we breathe**, absorb about **30% of the CO₂** and **93% of the excess heat generated by human activity**. The ocean contains 50 times more carbon than the atmosphere, and its capacity for thermal regulation is over 1,000 times greater.

The objectives to be achieved are not just environmental—they are economic too. For example, marine biotechnologies are now considered as an emerging field with very promising potential for innovation and economic growth: the market is worth €2.8bn, with **annual growth of 10 to 12%**.

Fish is the main source of animal protein for **one billion** people around the world

Economy: Securing livelihoods, capitalizing on employment potential and improving the balance of trade through exports

What are the issues for food security?

Three billion people around the world depend on marine and coastal areas for their livelihoods, in particular, income from fishing, tourism, commerce, transportation and energy.

According to the FAO (the Food and Agriculture Organization of the United Nations), 10-12% of the world's population makes its living from fisheries and aquaculture. Fishing is the main source of income for

half a billion people. Fish is the main source of animal protein for one billion people around the world.

Food security is also assured by the livelihoods that oceans support:

/ **Fisheries**

/ **Aquaculture** : : France generates the highest revenue from aquaculture in Europe: €550m a year, with just over 3,000 companies employing 18,000 people. Aquaculture includes, in particular:

- **fish farming**: French fish production (marine and mainland) represents only about 8% of the European Union's (EU's) annual production, and only 0.3% of world production;
- **shellfish farming**: France ranks second in Europe with 146,000 tons of shellfish marketed in 2011. French oyster production represents by far the largest proportion of EU production in this sector (over 90% of the production), ranking France fourth in terms of world production;
- **algaculture**: this sector remains a minor producer (50 tons produced in 2010) but offers significant potential in the fields of food and animal feeds, health and nutraceuticals, cosmetics, and energy production, but also, more broadly, industries that are substituting oil with bio-mass-based resources

What are the economic issues?

The Act of 20 June 2016, on the blue economy, aims to strengthen the competitiveness of maritime operations and commercial ports. Essentially focused on the issues of **strengthening the competitiveness of maritime operations and commercial ports, and supporting marine fishing and fish farming**, it provides for the establishment of an insurance regime adapted to the needs of renewable marine energy installations (i.e. offshore wind projects).

French waters are responsible for equivalent of 14% of the country's GDP, according to France's Fondation de la Mer (the French Oceans Foundation), in particular, but not solely, as a result of the jobs linked to them. The oceans' contribution to the French economy is about 1.5 times that of the United Kingdom or the United States.

In fact, in France, almost 300,000 direct jobs, not including those in the local tourism sector, are linked to the oceans, with a production value of about €69bn.

Consumption of **fish and aquaculture products** increased from 28.6kg/inhabitant in 1998 to 34.7kg/inhabitant in 2009, while, on the other hand, supply stagnated. Aquaculture has considerable room for

improvement: 60% of the fish consumed in France comes from breeding, and 80% of this farmed fish come from Asia. The European Union, as a whole, imports 80% of the seafood it consumes (fish, shrimps, and mollusks). Since 1995, only one new aquaculture farm has been opened in France.

Maritime transport and port facilities also involve major economic issues. In fact, the vast majority of international trade is transported by sea (about 8.7 billion tons per year, including 80% of the world's oil shipments). **More than 80% of the world's goods are transported by sea**, and as much as 90% for African imports and exports. OECD projections indicate that container traffic will triple by 2030. Maritime countries, such as France, can maximize opportunities by improving the quality of their port facilities and their ability to handle such volumes of trade.

The tourism sector accounts for 9% of global GDP. In particular, France has every interest in continuing its investment in coastal tourism. Degradation of coastal and marine environments can, however, undermine the attractiveness of these areas, and, thus, seriously affect the potential of their tourist economies. Moreover, the vulnerability of the French territories to climate change, in particular that of its overseas territories, calls for

innovative adaptation and mitigation strategies, including new policies, programs, and legal frameworks to ensure their economic sustainability.

As an order of magnitude, in 2015, **marine biotechnology** represented a market worth €3bn. The sector is growing at varying rates, depending on the segment, but overall estimates are about 10% a year, something that offers significant economic development potential for France. With its 50 or so companies exploiting marine bio resources, three competitiveness clusters specializing in marine issues (the Brittany Marine Cluster, PACA [Provence-Alpes-Côte d'Azur] and Aquimer), and the creation of a network in the Nantes region – known as the Blue Cluster, France is at the leading edge of this sector in Europe and must continue its investments if it is to be recognized as a benchmark in the field.

When developing strategies to boost employment in the blue economy, it will also be essential to innovate in shipbuilding, aquaculture, port infrastructure, and fishing.

A balance between the different activities and uses of the oceans can, therefore, generate complementary benefits across a range of sectors.



What are the risks?

Illegal fishing and overfishing

Sea fishing directly, or indirectly, employs more than 200 million people around the world. However, today, 30% of the world's fish stocks are over-exploited, well above the levels needed to safeguard consistent yields. Overfishing and illegal fishing prevent fish stocks from regenerating themselves and therefore being sustainable in the long-term: overfishing is threatening the total extinction of 29% of species fished.

Unintentionally, but counter-productively, some international fishing subsidies are contributing to the rapid depletion of many species of fish. They are preventing the safeguarding and restoration efforts of the global fishing industry, and its associated jobs, and generating losses of \$50bn a year for the marine fisheries sector. Illegal fishing and overfishing are thus threatening global food security, even though fish, which is highly nutritious, provides income and livelihoods for a great many communities around the world.

Marine pollution

In addition, the fishing industry is sustaining losses due to three factors related to the **pollution of the oceans**:

- / damaged catches;
- / “ghost fishing,” i.e. unintentional catches, caused by lost or abandoned fishing tackle;
- / the repair, or replacement, costs associated with equipment and/or boats damaged by marine debris.

On the other hand, **marine pollution** is reaching alarming levels, something that can have harmful effects on biodiversity and marine ecosystems. The changes to the quality of the waters that it causes result in a loss of biodiversity, risks to human health, and barriers to maritime activities such as fishing, tourism and leisure.

About eight million items of litter are thrown into the sea every day, most of which consists of land-created plastic waste that is mainly packaging: plastic shopping bags and bottles, etc. This pollution erodes, or destroys, coastlines, coral reefs, and natural habitats. It is compromising the survival of marine and coastal species.

For example, plastic is present in the stomachs of 95% of North Sea fulmars, and mussel flesh harvested in northern France contains one to two pieces of plastic per gram. Oceans, then, are facing—at the same time— food, health, and economic issues. UNEP estimates the cost of damage from plastic waste discharged into the sea at **\$13bn per year**, which particularly concerns the fishing, transport, and tourism sectors.



**The environment and tourism:
reducing risks related to the loss
of biodiversity and the degradation
of the environment**

What are the key figures?

25% of marine mammals are in danger.

Bycatches are threatening 83 species of seabirds—more than 27% of them. More than a quarter (27%) of reef-building corals have been classified as “threatened” by the IUCN, and 20% as “near-threatened.”

On World Biodiversity Day, on May 22, 2012, Ban Ki-Moon said that more than half of the world’s fish stocks were depleted, and an additional one-third impoverished: “It is estimated that 30 to 35% of the most important marine environments—including spermato-phytes, mangroves and coral reefs—have been destroyed.”

The increased use of fossil fuels disrupts the planet’s climate, warming the surface of the water, raising sea levels and increasing the acidity of the oceans, even though fishing is the source of more than 15% of the animal protein consumed worldwide, and the

fact that oceans and coastal areas provide valuable ecosystem services. **Yet, only 1% of marine environments are protected, compared with about 15% of the earth’s land surface.**

Mangroves **mitigate coastal erosion** caused by rising sea levels and the effects of natural disasters. They serve as refuges for many species, and provide basic and vital needs for millions of people, as well as helping maintain traditional cultures. Coral reefs are hotspots of biodiversity, where 0.2% of the ocean surface accounts for 40% of species. Mangrove, seagrass, and coral reef ecosystems are interdependent, yet, too often, coastal ecosystem restoration initiatives focus on only one type of species at a site.

Some fish species (such as salmon) are highly sensitive to **changes in water temperature** which cause them to change habitat, increasing the risk of cross-species contamination. Aquaculture is also highly vulnerable to thunderstorms and floods, the increase in which is related to climate change. Moreover, ocean acidification is an additional stressor on fish.

**At least 1,000,000
marine birds and
100,000 marine
mammals die every
year due to plastic
pollution in the oceans
(through ingestion of
waste, destruction of
habitats, migration of
invasive species, etc.).**

About one third of the world's oceans are overexploited or depleted due to technological improvements and open access to fish stocks. It is estimated that rates of fishing are about 2.5 times higher than the sustainable level of catches. Underutilized species account for about 10% of stocks, species exploited to a maximum about 60%, and overfished species about 30%. Science is now being harnessed to encourage sustainable fishing, in particular in the use of MSC certification for sustainable fisheries.

Ten million tons of macro-waste are discharged to sea each year and 80% of this waste comes from land (via wind and water-courses). 400 marine areas are now considered "biologically dead", covering an area of about 246,000 km². Plastic is everywhere, even in the Arctic and Antarctic; at times there is as much plastic as plankton in the water; and it is estimated that, by 2050, there will be more plastics than fish in the oceans!

Current economic and societal practices are part of a non-virtuous model of carbon emissions and preservation of natural resources, especially marine ones. Yet, globally, oceans cover more than 70% of the earth's surface, and marine life accounts for over 80% of the world's biodiversity.

In 2016, increasingly aware of the dramatic consequences of the production and consumption of plastics, France banned single-use plastic shopping bags. By 2020, disposable plastic tableware (disposable cups, glasses and plates) will be banned unless they are made from bio sourced materials and can be composted through domestic composting. In fact, the problem lies upstream, in the quantity of plastic designed for use; not downstream, in its treatment and recovery as waste, a process that is laborious and necessarily fragmented, given that plastic pollution is diffuse in form.

Lost earnings in tourism affect areas where employment is closely correlated with the attractiveness of landscapes and recreational activities. However, the costs of cleaning beaches invaded by the macro-waste are almost exclusively the responsibility of the local authorities that manage them: unlike in the polluter pays principle, here it is the "polluted" who bear the costs of the nuisance they have been subjected to.

CORAL REEFS

UNEP estimates the goods and services produced by coral reefs as having a value of between \$100,000 and \$600,000 dollars/yr/km².

Coral reefs play an important role in mitigating the impacts of climate change by acting as a barrier against storms and tsunamis. They also contribute to food security: 1km² of reef produces 10 to 15 tons of fish a year.

France, which is responsible for 10% of the world's coral reefs, must pay particular attention to this environmental and economic issue.

Innovation and economic levers: Boosting French influence and being seen as a first mover

How is France positioning itself?

In December 2015, for the first time, **the Paris Agreement introduced the term “ocean” into the text of a climate agreement**, and, in June 2017, the United Nations organized the first international conference on oceans.

Regions - sometimes in a cross-border fashion, countries, and international bodies, are taking up the challenge brought by the blue economy. Although the initial approach often remains environmental, the development and deepening of the themes involved lead to investigation of the social and—core to any negotiations—economic dimensions. Partnerships and programs for the blue economy are often constructed at regional level, for example, those addressing the North and Baltic Seas, which bring together several countries.

Among the most important issues is that of **renewable marine energies**². Given the current environmental situation, the

development of clean energies is imperative. In addition, France's geography enables it to benefit from some **of the greatest potential in Europe for the development of renewable marine energy**. Indeed, France has the capacity to be a major player in this form of energy. For France, it is as much a question of influence as of the urgent need for action on greenhouse gases.

Behind in terms of offshore wind turbines, compared with the United Kingdom, Germany or Denmark, **France is developing both its floating-wind and marine turbine capacities**. Several pilot farms were brought online in 2016, which will allow manufacturers to gauge potential, identify risks, and reduce production costs, so that, in a second stage, they can raise the necessary funds and move to industrial-scale production. France must continue in its efforts to develop a national industry in this respect. **France's overseas territories possess undeniable assets which, in time, could constitute centers of excellence in renewable marine energy and thus serve to capitalize on French skills in this field**, generating export earnings as a secondary effect.

France must also **increase its efforts on marine biotechnologies**, which can contribute to the development of more environmentally-friendly economies. In fact, this could enable the putting in place of biosensors and analyzers that would contribute to the improvement of marine-environment quality monitoring systems. Bioremediation techniques, as accelerators of biodegradation, represent an innovative lever for biological soil remediation, an area where investments could be made in research methods and small-scale experimentation.

In the field of **health**, a number of products are already in clinical use, such as painkillers and anticancer drugs, while others are undergoing clinical trials. In cosmetics, many French companies use algae in the manufacture of basic products for cosmetics and seawater therapy. The development of this sector would also allow France to develop its export markets.

2- See Focus No.1 “Renewable Marine Energy” p.14



What are the levers of innovation?

Marine science research is being boosted by **high technology** in many areas, such as the fields of underwater interventions, instrument systems, (coastal, offshore, and seabed) observatories, mineral and energy resources, and fishing and aquaculture.

In addition to its environmental benefits, marine biotechnology is a field with strong potential for innovation. Involving the application of biological techniques and knowledge to produce goods and services from marine resources, marine biotechnology comprises five major sectors: health, food - especially through the optimization of aquaculture techniques, second- and especially third-generation biofuels-based

on micro-organisms, and the environment and industry - using processes that combine chemistry and bio catalysis. And we can add to that other activities such as cosmetics.

In addition, **marine genetic resources are increasingly being used in the manufacture of antitumor drugs, antidiabetic drugs, anti-coagulants, etc.** This terminology refers to the natural resources that constitute a range of living species, both animal and vegetable. Bioprospecting is the search for organisms or genes used to create new products that are biological in origin (drugs, cosmetic products, etc.). **More than 18,000 natural products have been developed from some 4,800 marine organisms;** and the number of natural products derived from marine species is growing at a rate of 4% a year.

Much research still needs to be done, for which France could position itself as the scientific leader. Several avenues have been highlighted by the French Research Institute for the Exploitation of Marine Resources (Ifremer):

- / increase research efforts on habitat identification, the determinants of the spatial distributions of populations, and migration phenomena and connectivity;
- / understand the processes governing the spatio-temporal dynamics of populations, by seeking to disentangle the effects of exploitation and climate in order to understand response mechanisms to global climate changes;
- / better understand the interactions between fishing activity and resources/habitats; such an approach should help to improve the selectivity of equipment by reducing rejections and minimizing the effects of dragging on the seabed;
- / support the growth of digital modeling techniques in fisheries.

The United Nations Ocean Conference in New York: :

- Identifies ways to encourage the implementation of SDG 14
- shares experiences at national, regional, and international levels
- contributes to the process of monitoring and reviewing the 2030 Agenda for Sustainable Development

2017

2016

17 sustainable development goals (SDGs) defined by the United Nations Sustainable Development Program Goal Objective 14: **Conserve and sustainably use the oceans, seas and marine resources for sustainable development**

The launch of the project, "Fisheries Governance in Marine Protected Areas: Potential for the Blue Economy" ("FishMPABlue"), by **the International Union for the Conservation of Nature (IUCN)**, with the aim of resolving existing conflicts between fisheries and ecosystem elements.

2015

2014

The implementation of an action plan by the European Commission:

- **a digital map** of the entire European seabed by 2020
- The creation of **a business and science forum for the blue economy**

2013

The launch of the "Blue Growth" initiative by the Food and Agriculture Organization of the United Nations: a sustainable approach to managing oceans and wetlands

Focus No.1 - Marine Renewable Energy

Sources of marine renewable energy are numerous, and provide alternative solutions to fossil fuels:

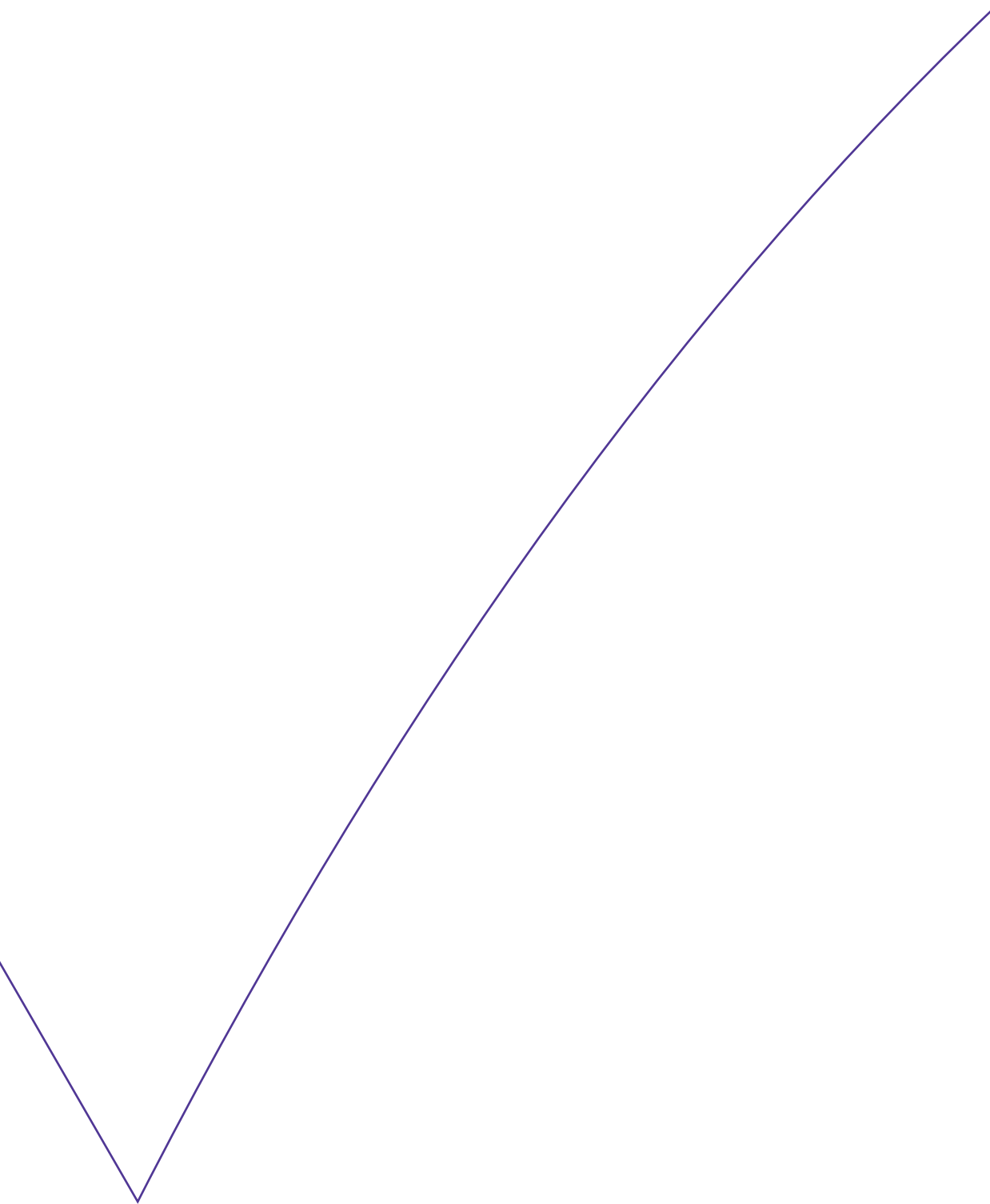
- / **Offshore wind energy:** the Grenelle Environment Act has set a national target of 6GW of installed capacity, from offshore wind turbines and marine energy, by 2020.
- / **Tidal turbine energy:** France has the second-largest European capacity after the United Kingdom, with 20% of this national potential (estimated at 3GW) distributed between Brittany and the Cherbourg Peninsula. The United Kingdom is willing to obtain 15 to 20% of its electricity needs from marine energies. On the other hand, the equivalent French potential, estimated by EDF, would be in the order of 10TWh per year, the equivalent annual output of a 1,500MW nuclear reactor
- / **Tidal energy:** France has significant natural potential in the Channel, close to distribution networks and consumers. In the early 1960s, a voluntary industrial program helped to design and install the first tidal power plant in the world, at the mouth of the River Rance in Brittany. This equipment, operated by EDF, has since produced more than 500GWh per year (equivalent to 0.1% of French electricity production) and contributes to the opening up of energy in this region.
- / **Osmotic energy:** net electricity production, using this method, reached nearly 541TWh in 2011.
- / **Ocean thermal energy:** in France, the production potential could technically reach 1.4TWh in 2020, equivalent to 0.3% of gross domestic consumption, subject to there being an installed capacity of 0.2GW at that point. India, Japan, Taiwan, and the United States—along with France—are the main players currently investing in thermal energy from the seas. Pilot plants are being set up in Norway, Japan, and the United States.
- / **Wave energy:** in the short-term, France Énergies Marines (French Marine Energy) plans to enter the market at production costs similar to those of wave turbines (between €200 and €250/MWh) for the first commercial farms near to the coast; these are rated at 30 to 50MW of installed power. Plans to upgrade this resource, with units further from the coast, suggest a significant penetration of this technology after 2020 as a result of economies of scale. Given that the wave systems are not yet mature, their electricity production costs remain difficult to assess.

Focus No.2 - Marine Genetic Resources

The ocean is subject to huge investments, especially since technology has made it possible to reach depths that were not previously accessible. Bioprospecting on the high seas is an expensive and risky activity in which only a handful of companies, from developed countries, are engaged. This raises questions of equity of access to these global resources, as well as the potential sharing of the benefits from their exploitation.

Since it has not defined the term “marine genetic resources”, the Montego Bay Convention does not propose any specific provisions to define the legal status of these resources. While, within Exclusive Economic Zones, the Convention for Biological Diversity still allows the protection of biodiversity and limits the scope for biopiracy (subject to its transposition into national legislation), there are no laws in place covering the high seas, which is where most of these resources are. The development of a legally binding instrument on the protection of biodiversity on the high seas is therefore in train. In fact, the UN General Assembly adopted a resolution on June 3, 2016, launching large-scale multilateral negotiations. These started with a preparatory committee in 2016 and 2017, with the aim of reaching a UNGA decision before the end of 2018, which will lead to the opening of an intergovernmental conference with responsibility for negotiating the treaty and are expected to last several years.

While ever this legislation is not in place, the risk of marine biopiracy increases accordingly. Biopiracy is the appropriation of marine genetic resources by “patent law”. It is most often carried out by companies or universities in the Northern Hemisphere, and relates to the genetic resources of a state, usually situated in the South, which has not agreed to it and does not benefit from it. The emergence of a governance for the high seas is therefore a necessity.



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