



## ***AquaSpace***

Ecosystem Approach to making Space for Aquaculture

EU Horizon 2020 project grant no. 633476



### ***Deliverable D2.4***

***Smartphone 'Investor Appeal' application***

and

### ***Task T2.1***

***Assessment of policy-management related issues***

and

### ***Milestone MS2.6***

***Roll out of smartphone 'Investor-Appeal' app***

|                     |  |
|---------------------|--|
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|                |             |                 |                 |



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## Executive Summary

An Aquaculture Investor Index was developed, in order to provide a broad view of the relative attraction of different European countries to aquaculture investors. To ensure a wide dissemination and maximum visual appeal, to both investors and the public, the index was deployed as a smartphone application, available on the Google Play Store.

The aquaculture investor index ranks twenty indicators into five categories, all of which are disparate in nature, but account for the connectivity in the aquaculture industry. The attraction of investment into aquaculture depends on the viability of developing aquaculture for each country. The index benchmarks and tracks countries' progress, aggregated across five categories, market, production, regulatory, environmental, and social. The index is designed to rank the aquaculture competitiveness for each country, by producing a quantitative, and scalable assessment, for stakeholders to assess and monitor aquaculture attractiveness.

The index scores calculated for Europe range from moderate to good. Countries with well-established aquaculture sectors in northern Europe score well, whereas countries in southern Europe tend to score moderately. Countries with developing aquaculture sectors tend to score moderately. High scores within single categories can be achieved, however to provide the highest appeal for stakeholders, the index rewards countries with high scores across the five categories.

No countries within Europe rank below the middle of the moderate range. The index identifies several countries with high scores that do not have significant aquaculture industries (e.g. Sweden and Finland), and further research is warranted to identify why aquaculture has not developed. It is expected that as the index is expanded to lower income countries spanning other geographic regions, countries with lower quality indicator scores will have lower overall scores.

The AquaSpace partner countries Canada, China, United States, and Australia have not been included due to data limitations, including but not limited to price information and environmental data, meaning that the data collection did not fulfil the minimum requirements to obtain a score. Additional data collection is required to ensure sufficient data for inclusion of these partner countries into the index.

The index provides a broad-scale approach, across a wide range of categories, and must be interpreted in this context. Appropriate due diligence for specific circumstances is warranted by all stakeholders requiring further knowledge to assist decision-making. The Aquaculture Investor Index is designed to provide high-level guidance of the general attractiveness for aquaculture in each country, and to our knowledge provides the first integrated approach in this regard, available to investors and the general public.





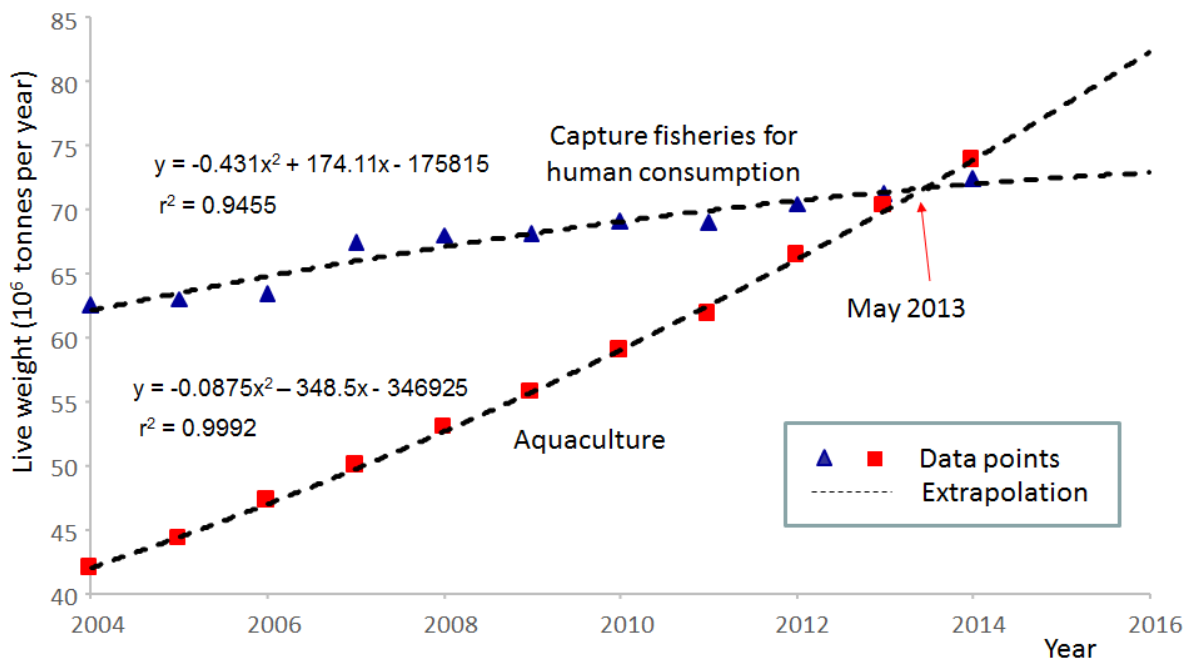
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## Introduction

There has been a significant increase in worldwide consumption of aquatic products, from 9.9 kg *per capita* fifty years ago, to the current peak of 20 kg *per capita* in 2014 (Carlucci et al., 2015; FAO, 2016). Over the next thirty years, humanity faces the huge challenge of providing safe and adequate nutrition to a world population estimated to reach 9.7 billion by 2050 (Cressey, 2009; FAO, 2016; Godfray et al., 2012); in 2025, worldwide seafood consumption is predicted to reach 21.8 kg *per capita* which will require an additional 31 X 10<sup>6</sup> t y<sup>-1</sup> of aquatic products (FAO, 2016).

Wild fisheries have been declining since the late 1970's, whereas aquaculture has been growing at an APR of 6%. In 2014, 73.8 X 10<sup>6</sup> t of fish were farmed, representing 44% of total aquatic production (FAO, 2016; Merino et al., 2012; Naylor et al., 2000), and in May 2013, world aquaculture production overtook capture fisheries for human consumption (Figure 1).



**Figure 1 - Worldwide production of capture fisheries for direct human use, and of aquaculture, over the period 2004-2014.**

By contrast with world growth of aquaculture, production in the European Union is stagnant or falling. In 2012, European aquaculture produced 2.88 x 10<sup>6</sup> t, representing 4.3% of world supply, down from 12.2% in 1990 (FAO 2014). For the European Union, those numbers are substantially worse, down from 7.9% in 1990 to 1.9% in 2012. The difference between Europe and the EU is largely explained by a significant increase in Norwegian salmonid aquaculture.

Over the next 15-20 years, European aquaculture faces several significant challenges. A report commissioned by the EU Directorate-General for Internal Policies (Lane et al, 2014) proposes minimum increases of 100% in marine culture and 40% in freshwater culture by 2030. The Common Fisheries Policy (CFP), supported through the European Maritime and Fisheries Fund (EMFF), National



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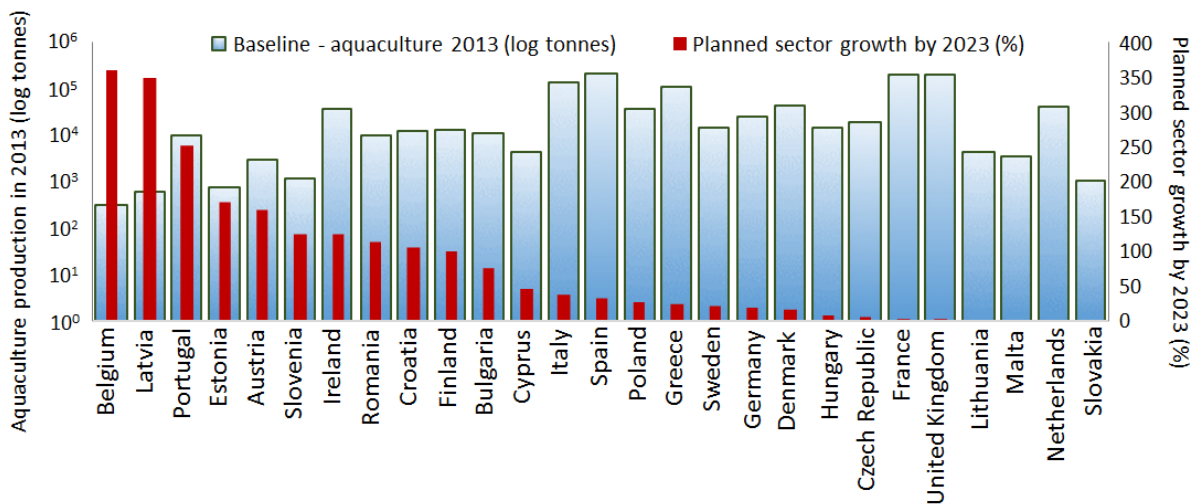
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Aquaculture Plans and the EC Strategic Guidelines for Sustainable Aquaculture Development (European Commission, 2013), together document the imperative for sustainable increases in aquaculture production to provide economic growth, increased employment and to reduce the EU’s trade deficit in aquatic products (€16.7 billion, European Commission, 2016a).

Nevertheless, the projected growth of EU aquaculture to 2030, based on the EMFF aquaculture development plans submitted by EU Member-States (Figure 2), will result only in an overall growth of 51.4% (Lopes et al, 2017).



**Figure 2 - Summary of national aquaculture development plans for the decade between 2013-2023 submitted to the EMFF (note log scale for production data).**

Overall, the national plans thus fall short of the 2030 target by 50%, and there is a further concern that almost no information is provided to lend credibility to these estimates. There are no data concerning which species will be responsible for this extra growth, where and how cultivation will increase, or on market tendencies and global trade, which will undoubtedly condition investment and business success.

Considering the strategic importance of aquaculture in the European Union Blue Growth Initiative (see e.g. EC, 2015; EC, 2016b), aquaculture development requires new analytical approaches to guide sector investments and achieve an efficient allocation of resources.

Multimetric indices have been applied in a variety of contexts, from broad-scale health assessment of the global ocean (Halpern et al., 2012) to more specific ecosystem analyses focusing on e.g. habitat integrity (Shi et al., 2016), phytoplankton diversity (Laplace-Tretyure & Feret, 2016), freshwater wetlands (Miller et al., 2016), and sea-level rise (Raposa et al., 2016). However, very little work has been carried out on the application of this type of index to aquaculture, and the existing literature focuses only on the impact of aquaculture on the environment, either in general terms, such as environmental pressures (e.g. Borja et al., 2011), or with respect to specific aspects such as benthic shellfish cultivation (Wang et al., 2017).





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Aquaculture investors are faced with decisions under conditions of uncertainty, and require analytical solutions to find an equilibrium between multiple competing factors, such as regulation, markets, and environmental conditions, that drive the due diligence of aquaculture investment, rather than relying on diffuse individual indicators to measure the potential of success for aquaculture development.

This work aims to provide such an approach to support investment decisions for growth of aquaculture in Europe, by developing a multimetric Aquaculture Investor Index that is easily understood, and allows a rapid assessment of the relative competitive advantages of different nations. Three specific objectives were considered:

1. To identify major categories for an Investor Index, and their respective indicators, and to develop methodologies for (a) obtaining suitable data; (b) aggregating the component categories into a meaningful final score, i.e. an index that translates the investor appeal of different European nations for aquaculture growth;
2. To identify knowledge gaps and help define priorities for use of resources by policy-makers, to promote improved management of the aquaculture sector;
3. To promote widespread access to the index through the delivery of a smartphone application oriented towards industry and investors, and to increase public awareness by means of a dedicated website.

### **Methodology**

The index ranks country performance based on indicators that influence aquaculture investment in Europe, identifying where the best conditions to develop aquaculture exist, based on a broad set of goals, denominated categories, and indicators that form the constituents of each category. Each of the five goals (categories) can be considered separately or aggregated into an overall score. The combination of the categories, measures a set of goals, that account for an eclectic number of considerations that make up the broader aquaculture framework. The approach measures the appeal for aquaculture as a function of five (5) goals (categories) that are each comprised of four (4) sub-goals (indicators). The index recognises the linkages in the aquaculture industry, accounting for upstream and downstream elements, and ensuring that an ecosystem approach to aquaculture is considered. The index provides a rating of the current appeal to investing in aquaculture for each country, and is not intended to predict future trends in aquaculture development, but to provide a general indication of the current state in each country.

### ***Categories and indicators***

The index measures the outcomes of the categories which are influencers of aquaculture investment. Output measures are used in detriment of input measures to avoid double counting. The index is measured through five categories (Figure 3), market, production, regulatory, environment, and social data at the national level, using quantitative and qualitative assessments to derive an individual category and overall country score.



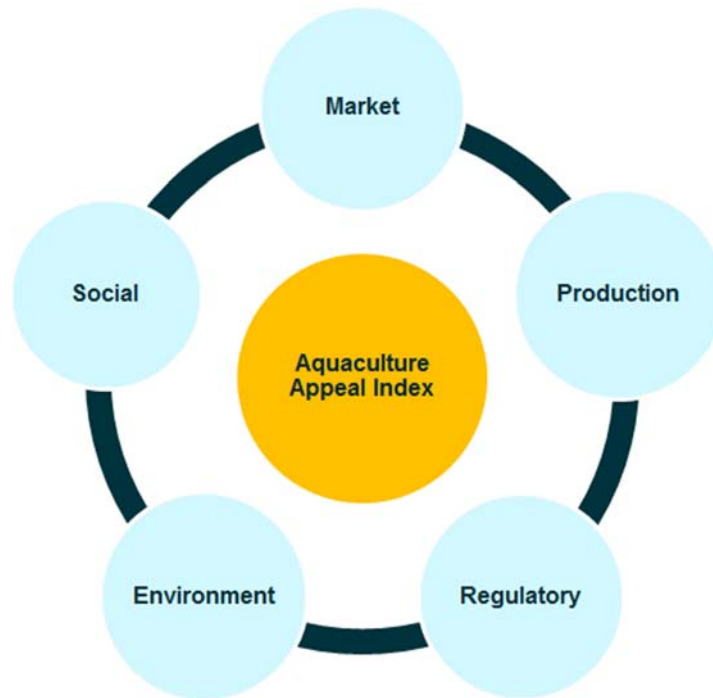




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**Figure 3 - Aquaculture Investor Index categories**

The rationale for category determination is to encompass the foundations of a successful aquaculture industry. The market, production, regulatory, environment, and social elements when combined provide an assessment framework for decisions about the allocation of resources in the aquaculture industry. The category selection recognises the diverse linkages between human, societal, and environmental systems, and emphasises the benefits of addressing goals in an integrated manner. The coupling of the categories requires a range of data to drive score calculation.

A common attribute between aquaculture markets with sustainable competitive advantages, is the tendency to have high combinatorial scores across the categories. Whilst categories can be viewed in isolation to address specific questions, the combination of category scores provides a more robust indication of the conditions for aquaculture development. The indicators span a wide range of areas at the country level, requiring extensive data sets to capture variations.

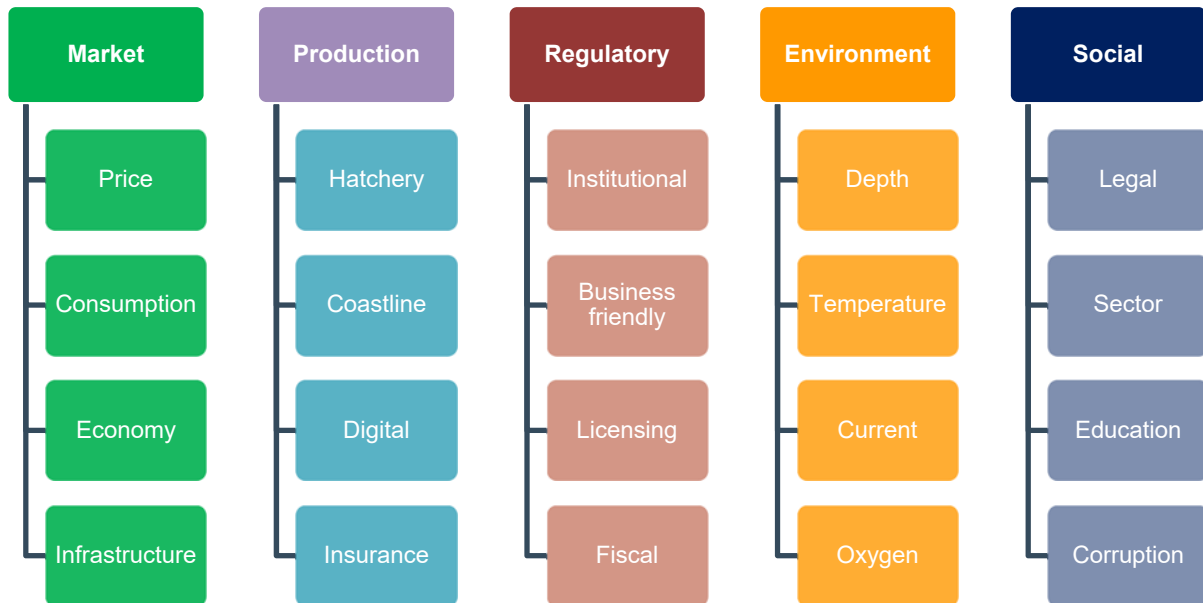
The index is comprised of four (4) indicators per category, that make up the individual scores used to calculate the category scores. The indicators are selected to reflect the primary concerns to investors across the categories, identified through consultation from the AquaSpace consortium and project stakeholders.



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**Figure 4 - Aquaculture Investor Index indicators**

The indicator composition in the index is presented in Table 1, providing a description of the data types and methods used, discriminated both by category and by indicator. Data accuracy and completion are prioritised for each indicator, to ensure that each country has data points, or valid proxies, making use of datasets with high resolution and confidence.

**Table 1 – Indicator metrics**

| Indicator          | Metric   | Notes  |
|--------------------|--|--|
| <b>Market</b>      |  |  |
| Price              | Historical import/export prices from 2007-2015   | Double weight (production and proportion) percent price deviation                            |
| Consumption        | Fish consumption per capita  | Time-series per kilogram consumption of fish per capita                                      |
| Economy            | GDP per capita & current account balance   | Measure of economic performance  |
| Infrastructure     | Rail lines per km <sup>2</sup> , Air transport, registered carrier departures, and Container port traffic (20 foot equivalent units)                               | Tiered systems measuring rail, air, and port movements                                       |
| <b>Production</b>  |  |  |
| Hatchery & nursery | Production of hatcheries and nurseries at eggs stage in life cycle (millions)<br>Production of hatcheries and nurseries at juvenile stage in life cycle (millions) | X= hatchery and Y=nursery, normalised hatchery/total production and nursery/total production |



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| Coastline          | Ratio of World Resource Institute coastline length, measured against Google Earth values   | The larger the ratio, the greater the discrepancy in measurement indicating potentially suitable sites for aquaculture   |
| Digital capacity   | Mobile phone subscriptions and internet users (per 100 people)   | Digital coverage increases the access to information   |
| Insurance          | Heuristic assessment and/or surveys of the principal insurance markets   | Categorisation of the tiers of insurance penetration per country   |
| <b>Regulation</b>  |  |  |
| Institutional      | Matrix comparing the percentile rank of government effectiveness, political stability, regulatory quality, voice and accountability (% percentile rank)  | Assessment to determine rankings of institutional frameworks   |
| Business-friendly  | Matrix comparing the time to start a new business (days), cost of starting a new business (% of GNI per capita), and burden of customs procedure   | Assessment to determine the attractiveness of new businesses   |
| Licensing          | Length of time required to obtain an aquaculture licence (0-6, 6-12, 12-18, 18-30, 30+ months)   | Tiered scoring per months for aquaculture licensing, accounting for marine, freshwater aquaculture   |
| Fiscal             | Fiscal burden through tax revenue (% of GBP) and labour tax and contributions (% of commercial profits)  | Relative fiscal burden faced by private enterprise in each country   |
| <b>Environment</b> |  |  |
| Depth              | Area and proportion of a country's EEZ that falls into different classes<br>Depth classes:<br>0-10 m<br>>300 m<br>10-40 m<br>150-300 m<br>40-150 m   | Categorization of depth classes ranging from desirable to undesirable  |
| Temperature        | Months during minimum and maximum species temperatures (SST) ranges in a country's EEZ<br><br>6-15°C 12 months (salmon) – CAT1<br>11-26°C 12 months (breem) – CAT2<br>8-22°C 12 months (bass) – CAT3 | Categorization of water temperature ranges in the Exclusive Economic Zones (per country) for salmon, sea bream, and sea bass<br><br>For each range if the country's annual water temperatures fall outside of the range, for every 2 |



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|                        |  |  |
|------------------------|--|--|
|                        |  | <p>months off the range, a point is withdrawn, so for CAT1:</p> <p>6-15°C 10 months' score 4</p> <p>6-15 °C 8 months' score 3</p> <p>6-15 °C 6 months' score 2</p> <p>6-15 °C 4 months or less score</p> |
| Current speed          | <p>Current speed</p> <p>Area and proportion of a country's EEZ that falls into different classes</p> <p>Current speed classes:</p> <p>0-3 cm s<sup>-1</sup></p> <p>50-80 cm s<sup>-1</sup></p> <p>25-50 cm s<sup>-1</sup></p> <p>3-10 cm s<sup>-1</sup></p> <p>10-25 cm s<sup>-1</sup></p> | <p>Categorization of current speeds ranging from desirable to undesirable</p>  |
| Dissolved oxygen       | <p>Dissolved oxygen</p> <p>Area and proportion of a country's EEZ that falls into different classes</p> <p>Dissolve oxygen classes include:</p> <p>≤ 2 mg L<sup>-1</sup></p> <p>2-5 mg L<sup>-1</sup></p> <p>5-7 mg L<sup>-1</sup></p> <p>&gt; 7 mg L<sup>-1</sup></p>                     | <p>Categorization of dissolved oxygen ranging from desirable to undesirable</p>  |
| <b>Social</b>          |  |  |
| Legal                  | Rule of law (percentile rank)  | Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society  |
| Sectoral               | Value of domestic aquaculture as a percentage of aquaculture, first sale and landings, and import/export seafood   | Social licence   |
| Education and training | Grants and other revenue (% of revenue) and gross enrolment ratio in tertiary education  | A proxy for the degree of labour force sophistication  |
| Corruption             | Control of corruption (percentile ranking)   | The extent of which public power is exercised for private gain   |



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## Market indicators

The market indicators are comprised of price, consumption, economy, and infrastructure. Table 2 outlines the rationale for each indicator, and contextualises the importance of each indicator in the market category. The market goal helps stakeholders assess their competitive advantage when compared to like-for-like producers in other European countries competing for the market dimension of aquaculture, assisting stakeholders identify which countries provide the best opportunities.

**Table 2 – Market indicator description**

| Indicator      | Rationale  |
|----------------|--|
| Price          | The sales price of seafood is one of the major determinants of income and a constraining factor in the economics of aquaculture. Aquaculture products are in direct competition with seafood from fisheries, in addition to terrestrial protein. Prices are determined by market forces; however distorting policies exert a significant influence in price discovery and dictate the feasibility in competing in different markets. The seafood industry is highly competitive and aquaculture stakeholders pay close attention to current and historical prices to evaluate the economic opportunity |
| Consumption    | The fish consumption per capita provides an indication of the market size for the aquaculture products. The current consumption trends do not reflect future potential, but nonetheless provide an indication of the relative acceptance of aquaculture products   |
| Economy        | The economic environment is important for the private sector to transact with a degree of certainty. Macro-economic indicators influence decisions at the firm level. The availability of capital dictates how efficiently resources can be allocated to achieve the highest expected rates of return. Aquaculture, like other sectors, benefits from macroeconomic stability, including a well-developed financial sector and access to international capital, well-regulated financial markets, securities exchanges, and venture capital in a transparent and trustworthy environment               |
| Infrastructure | Infrastructure is a critical influencer of competitiveness in aquaculture. A competitive road, rail, port, and air infrastructure allows for stakeholders to move outputs (sales) and inputs (raw materials) in an efficient manner and cost effective way. The freight cost influences the ability to be competitive in export markets. The aquaculture sector relies on logistical efficiency, processing, and other linkages of the aquaculture value chain.  |

## Production indicators

The production indicators are comprised of hatchery and nursery production, absolute and relative coastline ratio, digital capacity, and aquaculture insurance availability. Table 3 outlines the rationale for each indicator, and contextualises the importance of each indicator in the production category. The production goal summarises the infrastructure availability for aquaculture to potential investors in different countries. The supply-chain component required to service aquaculture, from hatchery to insurance availability, can have a material impact on the competitiveness of an aquaculture industry.





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**Table 3 – Production indicator description**

|                    |  |
|--------------------|--|
| Hatchery & nursery | Aquaculture relies on growing animals in a closed biological cycle, save for specific exceptions in shellfish where wild seed or wild fish are collected. The availability of hatcheries producing high quality juveniles (fingerlings or spat) that are tolerant of different conditions such as varying sea temperatures, disease challenges, and other factors, are vital to the aquaculture industry. The hatchery technology and fingerling availability in specific markets, provides a competitive edge to countries with ease of access to such facilities. The main European finfish aquaculture species, such as salmon, trout, sea bream, sea bass, have good functioning hatcheries, whereas emerging species often experience bottlenecks with respect to juvenile availability |
| Coastline          | The coastline contours make a difference to the ability to produce in a balanced environment. Discriminating between coastline measurement discrepancies, through absolute and relative coastlines, provides a useful starting point to understand the protection potential a coastline from adverse conditions  |
| Digital capacity   | Digital connectivity influences the quality and speed of sharing operational and logistical information. The ability, speed, and cost to communicate within the aquaculture sector is crucial. The digital capacity yields information about how efficiently a country can service the operational, sales, distribution, customer service components of the supply chain   |
| Insurance          | The biomass is the most valued asset on aquaculture balance sheets. The penetration, awareness, and availability of aquaculture insurance in each country can influence the investors risk perception, when transferring risk to third parties, and influence the financial and credit components of the business  |

### **Regulatory indicators**

The regulatory indicators are comprised of institutional metrics, business-friendly assessment, expected licensing times, and fiscal burden.





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Table 4 outlines the rationale for each indicator, and contextualises the importance of each indicator in the regulatory category. The regulatory goal is a major barrier to European aquaculture, with the assessment ranking the licensing procedures and associated factors, providing guidance on the regulatory dimension, and locating opportunities to develop aquaculture within acceptable time-frames. Informing potential stakeholders of the licensing and institutional framework is a key component to decision-making.



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**Table 4 – Regulatory indicator description**

|                   |  |
|-------------------|--|
| Institutional     | The institutional framework of a country is shaped by private and public stakeholders. In aquaculture, the institutional framework refers to the interaction between stakeholders in terms of process and simplicity. The interaction between firms and government determines the quality of the institutional framework in a country and influences competitiveness and growth. The institutional framework has a direct impact on investment decisions and can additionally stimulate sustainable development. In aquaculture, the institutional framework governs the sector development, and provides institutional support in managing key areas and executing monitoring activities beyond the scope of private stakeholders |
| Business-friendly | The ease of transacting business in countries provide an increased incentive or disincentive for firms to invest in aquaculture. A business-friendly environment impacts the small and medium size company base in areas that affect business regulation, legal extent of property protection, among other considerations  |
| Licensing         | The licensing process in aquaculture is a significant constraint to aquaculture development in Europe. The licensing process is often governed by several institutions which increases the uncertainty and transaction cost for aquaculture operators to comply with the necessary requirements. The availability of licenses is severely constrained, such as in Scotland and Norway, albeit efficient, whereas other European countries have different license attribution mechanisms. A transparent and simple licensing process improves the incentive for aquaculture to develop  |
| Fiscal            | The fiscal burden incurred by economic actors has an influence on investment in the aquaculture sector. The fiscal framework considers an array of taxes, including but not limited to corporate tax, income tax, value added taxes, and additional taxes levied and payable to transact business within legal frameworks. Jurisdictions with tax regimes that provide flexibility intuitively appear more appealing to investors  |

**Environment indicators**

The environment indicators are comprised of water depth, water temperatures, current speed, and dissolved oxygen ranges.





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Table 5 outlines the rationale for each indicator, and contextualises the importance of each environment indicator for aquaculture. The environment goal identifies areas within country Exclusive Economic Zones (EEZ) with the optimal environmental profile ranges for aquaculture. The identification of pre-disposing conditions for specific types of aquaculture is crucial to inform investors where to allocate resources. The outputs from remote sensing and Geographic Information Service (GIS) based outputs based on species thresholds.



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**Table 5 – Environment indicator description**

|                  |  |
|------------------|--|
| Depth            | The water depth profile is a key consideration for correct siting of aquaculture farm. The sustainable development of near-shore and offshore aquaculture (both marine and freshwater) has an optimal range. A site that is too shallow may impact the benthic community and surrounding ecosystem beyond acceptable levels, whereas a site that is too deep requires additional capital investment and know-how to service the mooring arrangements |
| Temperature      | Water temperature has a significant effect on animal growth. Growing animals within favourable temperature ranges lends a significant biological growth advantage, that is translated into cost savings. Temperature profiles for the different species in commercial aquaculture have a material impact in the viability of the industry  |
| Current speed    | The current speed has a material impact on the quality of the product as well as the water quality profile. The ideal current speed ranges promote a healthy animal, distribution and disperse waste effects, reducing concentrations, however excessive current can materially impact animal growth and structural considerations   |
| Dissolved oxygen | The dissolved oxygen profile is key to maintain a healthy stock of animals, and a key consideration when developing the aquaculture industry. The identification of the dissolved oxygen surface profiles is crucial in selecting broad regions where aquaculture can develop  |

### **Social indicators**

The social indicators are comprised of the legal frameworks, sectoral importance, education and training, and corruption.





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Table 6 outlines the rationale for each indicator, and contextualises the importance of each social indicator for aquaculture. The social goal is to measure the level of resistance from societal aspects in different countries, which alongside the regulatory dimension, often introduce material bottlenecks to aquaculture growth. Quantifying the degree to which the social dimension is a constraining factor to aquaculture in Europe is critical for investors to make informed decisions on the degree of local acceptance and level of conflict aquaculture is deemed to present to local stakeholders.



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**Table 6 – Social indicator description**

|                      |   |
|----------------------|---|
| Legal                | <p>The efficiency of legal systems impacts competitiveness because economic agents make provisions based on the enforceability of the law. A functioning, impartial, and transparent legal system provides greater certainty when engaging in economic activity. The lack of a functioning or impartial legal system detracts from a country’s competitive advantage. Investor wish to have appropriate legal recourse in areas such as labour markets, enforceability of contractual obligations and relationships, litigation, and trade disputes</p>   |
| Sectoral importance  | <p>Aquaculture is often in direct competition with rival sectors such as tourism, shipping, among others. The presence of long-standing conflicts detracts from the competitiveness of aquaculture, as it increases the uncertainty of the aquaculture development. The acceptance of aquaculture by society is a challenging prospect, and suffers the “new kid on the block” syndrome due to the fact commercial aquaculture in Europe is recent. Older established industries such as cattle do not have the same acceptance issues since the existence of commercial farms has spanned a far longer period. The acceptance of aquaculture is also a cultural aspect, and therefore the degree of aquaculture acceptance affects the sectoral strength</p>   |
| Education & training | <p>Skilled labour across the supply chain can increase the competitiveness of the aquaculture industry. Knowledge relating to husbandry, biology, veterinary, maintenance, processing is vital to a thriving aquaculture industry. Pools of skilled labour can be found in consolidated aquaculture industries, influencing the availability qualified labour. The mobility of labour, and cultural aspects play important roles in influencing the sophistication of the labour force.</p> <p>Education is crucial for economies to develop the value chain. The globalised nature of the world requires the investment in a well-educated workforce to allow for the development of human capital that can adapt to changing circumstances and execute complex task in aquaculture. The education of the work force considers enrolment rates and another metrics</p> |
| Corruption           | <p>The corruption level in a country is a good indicator for measuring the institutional efficacy and whether the incentives enforced promote or detract from corruption. Aquaculture in countries with corruption can materially impact of the aquaculture investment partly due to the inefficiencies in accounting for the true economic value of the supply chain, in the form of informal taxes</p>  |



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### **Data considerations**

The index provides flexibility by accommodating additions or changes in the types of data that are used for index score calculation. All units of assessment must follow a standard numeric format and value for each of the indicators, with all the indicators being required to have data points. The datasets were obtained from a variety of sources, and were required to have sufficient resolution to be included for indicator calculation. The selection of the indicator frameworks was materially influenced by the availability of comprehensive datasets. When new data becomes available, the indicator framework may experience modifications to improve the accuracy of the index. European data is presented and published with a high degree of homogeneity, as data collection efforts are coordinated centrally through the respective regional and European agencies. Expansion of the index to other geographical areas will incur challenges related to data quality gaps both spatially and in dimension, and collection methodology may vary. The need for consistent datasets both regionally and nationally is warranted to obtain valid comparisons across countries.

### **Model setup**

The objective of the index is to maximum its score ( $S$ ), where  $S$  is the linear weighted sum of the scores for each of the categories ( $S_1, S_2, S_3, S_4, S_5$ ), weighted equally, whereby  $S$  represents the final score,  $n$  represents the number of categories,  $C_i$  represents the category scores for the  $i^{\text{th}}$  category.

$$S = \sum_{i=1}^n \frac{C_i}{n} \quad (\text{Eq. 1})$$

The index weights scores equally to avoid guessing societal preferences for one category over another. The index recognises that different investors will place individual weightings on different categories. Rather than providing, pre-established unequal weighting to approximate the outcome of different preferences, we provide user-defined weighting in the smartphone application, to oscillate between a range of 0.5 and 1.5, and  $W_i$  is the category weight for  $i^{\text{th}}$  category:

$$S = \sum_{i=1}^n \left( \frac{C_i W_i}{\sum_{i=1}^n W_i} \right) \quad (\text{Eq. 2})$$

### **Market**

#### **M1 – Price**

Price is a leading indicator that signals production and market decisions. Import and export time-series data is compiled for the European Union and Norway, and weighted for the percentage price deviation in each country from the European mean. In addition, a double weighting of the percentage price deviation is executed to account for production volumes in each country and ranked from 1 (lowest) to 5 (highest). The price component considers the top 8 produced species by tonnage in Europe for comparison purposes: Atlantic salmon, common carp, gilthead seabream, European seabass, Mediterranean mussel, blue mussel, and the Pacific oyster.

**1 - Production matrix** - The implementation of a production matrix applies a binary approach to determines whether a country ( $c$ ) produces ( $P$ ) one of the top eight (8) produced species within the European Union.





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$$|P_c = 0, a = 0| \quad (\text{Eq. 3})$$

$$|P_c = 1, a = 1| \quad (\text{Eq. 4})$$

The presence of species specific aquaculture scoring is binary, with 1 signalling that a country undertakes aquaculture of the species, and 0 signalling that it does not.

**2 - Mean time-series price data** - Time-series price data is obtained from the European Market Observatory for Fisheries and Aquaculture from 2006-2015 for first sale price and import/export prices. The data is compiled from numerous sources, including national sources, EU institutional sources.

The data for import/export prices has a greater resolution when compared to the first sale price, because of the customs declaring and publishing all movement to EUMOFA. The mean import/export price per species is calculated across the time for each European country per species.

P – production of species;

V – average EU species price (value);

B – aquatic production (biomass);

T – total aquatic production (biomass);

W – % price deviation from mean (weighted);

M – production-weighted EU percent price deviation;

Q - double-weighted (production and proportion) percent price deviation;

C = country;

$$S = \text{species. } V_{s,c} = \frac{1}{c} \sum_{i=c}^{i=1} V_{i,s} \quad (\text{Eq. 5})$$

The mean time-series import/export price (V) across the European countries (C) per species (S) is calculated.

**3 - Country output** – The production output per species per country is determined, to balance discrepancies in price where production is negligible, through weighting, to avoid skewing the competitiveness of a country, which faces good prices because of a negligible production due to there being no aquaculture for a specific species.

$$T_c = \sum_{i=1}^s C_{s,i} \quad (\text{Eq. 6})$$

$$T_s = \sum_{i=1}^c S_{c,i} \quad (\text{Eq. 7})$$

**4 - Percent price deviation** – The mean percent price deviation for each European country per species is calculated. The mean price deviation is a measure of dispersion, computed by taking the arithmetic mean of the absolute values of the deviations from the functional values. The mean percent price deviation provides an initial indicator to determine, in relative terms the competitiveness of a species price in each country, when compared to the European mean price per kilogram.

$$W_{c,s} = \frac{V_{c,s} V_s}{V_s} * 100 \quad (\text{Eq. 8})$$



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**5 - Europe production weighted percent price deviation** – The production weighted mean price deviation for each European country per species accounts for country production to be considered. The mean price deviation determines the price deviation per species for each country compared to the European average. The price percent deviation for each species is multiplied by each country's production, and expressed out of the total European species production. The production weighted percent price deviation doesn't allow countries with small productions and good prices to influence their overall score.

$$M_{c,s} = \frac{W_{c,s} * B_{c,s}}{T_s} \quad (\text{Eq. 9})$$

**6 - Double-weight (production and proportion) percent price deviation** – The double-weight percent price deviation accounts for production and proportion. The production weighted price percent deviation is multiplied by the species production per country, and expressed out of total country production for all species, showing the relative representative each species by production and proportion.

$$Q_{c,s} = \frac{M_{c,s} * B_{c,s}}{T_c} \quad (\text{Eq. 10})$$

**7 - Sum of country double weighted percent price deviation** – The sum of the country double weighted percent price deviations is computed to determine the final score for each country accounting for weighted production and price in Europe.

$$Q_c = \sum_{i=1}^{i=s} Q_{c,i} \quad (\text{Eq. 11})$$

## **M2 - Consumption**

Seafood consumption per capita per annum is analysed by type of aquaculture product, including freshwater, demersal, pelagic, marine, crustacean, cephalopod, molluscs, and other. The data ranges between 1990 and 2011. The Aquaculture Investor Index takes the mean of data points to capture the relative degree of seafood consumption per country.

$$F_{Y,L} = \frac{1}{Y} \sum_{i=1}^{i=Y} F_{Y,L} \quad (\text{Eq. 12})$$

## **M3 - Economy**

**Gross Domestic Product (per capita)** – GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.

$$F(GBP)_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} F_{Y,C} \quad (\text{Eq. 13})$$

**Current account balance** – Current account balance is the sum of net exports of goods and services, net primary income, and net secondary income. Data are in current U.S. dollars. The balance of payments (BoP) is a double-entry accounting system that shows all flows of goods and services into and out of an economy; all transfers that are the counterpart of real resources or financial claims provided to or by the rest of the world without a quid pro quo, such as donations and grants; and all



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changes in residents' claims on and liabilities to non-residents that arise from economic transactions. All transactions are recorded twice - once as a credit and once as a debit. In principle, the net balance should be zero, but in practice the accounts often do not balance, requiring inclusion of a balancing item, net errors and omissions.

The balance of payments records an economy's transactions with the rest of the world. Balance of payments accounts are divided into two groups: the current account, which records transactions in goods, services, primary income, and secondary income, and the capital and financial account, which records capital transfers, acquisition or disposal of non-produced, nonfinancial assets, and transactions in financial assets and liabilities. The current account balance is one of the most analytically useful indicators of an external imbalance.

A primary purpose of the balance of payments accounts is to indicate the need to adjust an external imbalance. Where to draw the line for analytical purposes requires a judgment concerning the imbalance that best indicates the need for adjustment. There are several definitions in common use for this and related analytical purposes. The trade balance is the difference between exports and imports of goods. From an analytical view, it is arbitrary to distinguish goods from services. For example, a unit of foreign exchange earned by a freight company strengthens the balance of payments to the same extent as the foreign exchange earned by a goods exporter. Even so, the trade balance is useful because it is often the timeliest indicator of trends in the current account balance. Customs authorities are typically able to provide data on trade in goods long before data on trade in services are available.

$$F(CUR)_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} F_{Y,C} \quad (\text{Eq. 14})$$

### M4 - Infrastructure

Transport infrastructure - highways, railways, ports and waterways, and airports and air traffic control systems - and the services that flow from it are crucial to the activities of households, producers, and governments. Because performance indicators vary widely by transport mode and focus (whether physical infrastructure or the services flowing from that infrastructure), highly specialized and carefully specified indicators are required to measure a country's transport infrastructure.

Rail, air and shipping transport account for a large percentage of traded goods. The rail lines, air transport (registered departures), and container port traffic are normalised by expressing the country score as a percentage of the country of with the highest value. The final score is the mean of the individual rail, air, container scores ranging from 1 (lowest) to 5 (highest).

$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \quad (\text{Eq. 15})$$

**Rail lines** – Rail lines are the length of railway route available for train service, irrespective of the number of parallel tracks. The rail lines per area of country is ascertained, to obtain a normalised value for the rail infrastructure in each country. The total number of rail lines (total route – kilometres) is divided by the country area.

$$V(RAIL) = \frac{T_c}{T_{max}} \quad (\text{Eq. 16})$$







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The railway transport industry a vital engine of global socio-economic growth. It is of importance for economic development, creating direct and indirect employment, supporting businesses. Economic growth, technological change, and market liberalization affect road transport throughout the world. Railways have helped in the industrialization process of a country by easy transportation of coal and raw-materials at a cheaper rate.

Rail transport is a major form of passenger and freight transport in many countries. The western Europe region has the highest railway density in the world and has many individual trains which operate through several countries despite technical and organizational differences in each national network.

**Air transport (registered carrier departures)** – Registered carrier departures worldwide are domestic take-offs and take-offs abroad of air carriers registered in the country. Air transport is calculated through the arithmetic mean of the annual registered carrier departures from 2006 to 2014. The dataset is normalised by expressing the relative importance of each country as a percentage of the country of with the highest value.

$$V(AIR) = \frac{T_c}{T_{max}} \quad (\text{Eq. 17})$$

For statistical uses, departures are equal to the number of landings made or flight stages flown. A flight stage is the operation of an aircraft from take-off to its next landing. A flight stage is classified as either international or domestic. International flight stage is one or both terminals in the territory of a State, other than the State in which the air carrier has its principal place of business.

Domestic flight stage is not classifiable as international. Domestic flight stages include all flight stages flown between points within the domestic boundaries of a State by an air carrier whose principal place of business is in that State. Flight stages between a State and territories belonging to it, as well as any flight stages between two such territories, should be classified as domestic. This applies even though a stage may cross international waters or over the territory of another State.

**Container port traffic** – Port container traffic measures the flow of containers from land to sea transport modes., and vice versa, in twenty-foot equivalent units (TEUs), a standard-size container. Data refer to coastal shipping as well as international journeys. Transshipment traffic is counted as two lifts at the intermediate port (once to off-load and again as an outbound lift) and includes empty units. Container transport is calculated through the arithmetic mean of the annual container port traffic (20 foot equivalent units) departures from 2006 to 2014. The dataset is normalised by expressing the relative importance of each country as a percentage of the country of with the highest value.

$$V(CAR) = \frac{T_c}{T_{max}} \quad (\text{Eq. 18})$$

TEU is the standard unit, referring to 20-foot equivalent units or 20-foot-long cargo container. The size of cargo containers range from 20 feet long to more than 50 feet long. The international measure is the smallest box, the 20-footer or 20-foot-equivalent unit (TEU). Two twenty-foot containers (TEUs) equal one FEU. Container vessel capacity and port throughput capacity are frequently referred to in TEUs.





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Measures of port container traffic give some indication of economic growth in a country. But when traffic is merely transshipment, much of the economic benefit goes to the terminal operator and ancillary services for ships and containers rather than to the country more broadly. In transshipment centres, empty containers may account for as much as 40 percent of traffic.

Data cover coastal shipping as well as international journeys. Transshipment traffic is counted as two lifts at the intermediate port (once to off-load and again as an outbound lift) and includes empty units. Data for transport sectors are not always internationally comparable. Unlike for demographic statistics, national income accounts, and international trade data, the collection of infrastructure data has not been "internationalized."

## Production

### P1 – Hatchery & nursery

The hatchery and nursery output of a country is important to ascertain the national capacity to is measured by normalising and then hatchery production (x) and nursery production (y) against each other in a matrix (Rubik cube), to provide and combinatorial x and y score ranging from 2 (lowest) to 6 (highest).

$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \tag{Eq. 19}$$

**Hatcheries and nurseries at egg stage** – Data on the production of fertilised eggs at first sale for further on-growing or release to the wild by species in Millions is sourced from Eurostat per European Union member country and Norway and is calculated through the arithmetic mean of the annual production from 2008 to 2014. The dataset is normalised by expressing the relative importance of each country as a percentage of the country of with the highest value.

$$V(HAT) = \frac{T_c}{T_{max}} \tag{Eq. 20}$$

**Hatcheries and nurseries at juvenile stage** – Production of juveniles at first sale for further on-growing or release to the wild by species in Millions is sourced from Eurostat per European Union member country and Norway and is calculated through the arithmetic mean of the annual production from 2008 to 2014. The dataset is normalised by expressing the relative importance of each country as a percentage of the country of with the highest value.

$$V(NUR) = \frac{T_c}{T_{max}} \tag{Eq. 21}$$

### P2 – Coastline

The coastline paradox means that the length of a country’s coastline varies significantly, depending on the resolution of the measurement due to inlets, bays, estuaries and other land characteristics. Coastline measurement from the World Resource Institute is used, and in addition to a manual measurement of all the European coastlines. The World Resource Institute coastline length is divided by the Google Earth coastline length to obtain a ratio. The larger the ratio, the greater the discrepancy between the World Resources Institute and Google Earth measurement, meaning that the coastline has a greater number of coastal features (bays, estuaries, etc.), that could indicate increased suitability for aquaculture.





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$$R_C = \frac{A_c}{M_c} \tag{Eq. 22}$$

### P3 – Digital capacity

The digital capacity of a country is measured by normalising and then ranking mobile phone subscriptions (x) and internet users (y) against each other in a matrix (Rubik cube), to provide and combinatorial x and y score ranging between 2 (lowest) and 6 (highest).

$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \tag{Eq. 23}$$

**Mobile phone subscriptions** – Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology. The indicator includes (and is split into) the number of post-paid subscriptions, and the number of active prepaid accounts (i.e. that have been used during the last three months). The indicator applies to all mobile cellular subscriptions that offer voice communications. It excludes subscriptions via data cards or USB modems, subscriptions to public mobile data services, private trunked mobile radio, telepoint, radio paging and telemetry services.

Data on the mobile phone subscription per country is sourced from the World Bank per European Union member country and Norway and is calculated through the arithmetic mean of the annual production from 2006 to 2014. Most European citizens have more than one mobile phone subscription, however we treat one subscription at the maximum score, as having multiple subscription does not appear to increase competitiveness.

Refers to the subscriptions to a public mobile telephone service and provides access to Public Switched Telephone Network (PSTN) using cellular technology, including number of pre-paid SIM cards active during the past three months. This includes both analogue and digital cellular systems (IMT-2000 (Third Generation, 3G) and 4G subscriptions. This should include all mobile cellular subscriptions that offer voice communications. Data on mobile cellular subscribers are derived using administrative data that countries (usually the regulatory telecommunication authority or the Ministry in charge of telecommunications) regularly, and at least annually, collect from telecommunications operators.

Data for this indicator are readily available for approximately 90 percent of countries, either through ITU's World Telecommunication Indicators questionnaires or from official information available on the Ministry or Regulator's website. For the rest, information can be aggregated through operators' data (mainly through annual reports) and complemented by market research reports.

**Internet users** – Internet users are individuals who have used the Internet (from any location) in the last 12 months. Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc. Data on the internet users per country is sourced from the World Bank per European Union member country and Norway and is calculated through the arithmetic mean of the annual production from 2006 to 2014. The values are normalised in percentage terms and scored.

The digital and information revolution has changed the global supply chain. New information and communications technologies offer vast opportunities for economic growth, better service delivery, learning through distance education, and social and cultural advances. Comparable statistics on





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access, use, quality, and affordability of ICT are needed to formulate growth-enabling policies for the sector and to monitor and evaluate the sector's impact on development.

Operators have traditionally been the main source of telecommunications data, so information on subscriptions has been widely available for most countries. This gives a general idea of access, but a more precise measure is the penetration rate - the share of households with access to telecommunications. During the past few years more information on information and communication technology use has become available from household and business surveys. Also important are data on actual use of telecommunications services. Ideally, statistics on telecommunications (and other information and communications technologies) should be compiled for all three measures: subscriptions, access, and use. The quality of data varies among reporting countries because of differences in regulations covering data provision and availability.

### P4 – Insurance

The published data on aquaculture insurance within the European Union and Norway is scarce. Several the leading aquaculture insurers and reinsurers were interviewed to ascertain the level of awareness of the availability of aquaculture insurance in each country. Countries are scored from 1 (lowest) to 5 (highest).

### Regulatory

#### R1 – Institutional

The institutional indicators aim to measure the quality of the institutions in the European Union and Norway, and include government effectiveness, political stability, regulatory quality, and voice and accountability. Data was obtained from the World Bank and is expressed annually as a percentile rank from 2005 to 2014. The annual means for each category are taken and averaged again to obtain a final score ranging between 1 (lowest) and 5 (highest).

$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \tag{Eq. 24}$$

**Government effectiveness** – Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. Percentile ranks have been adjusted to correct for changes over time in the composition of the countries covered by the WGI.

**Political stability** – Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. Percentile ranks have been adjusted to correct for changes over time in the composition of the countries covered by the world governance indicators (WGI).





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**Regulatory quality** – Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. Percentile ranks have been adjusted to correct for changes over time in the composition of the countries covered by the WGI.

**Voice and accountability** – Voice and Accountability captures perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. Percentile ranks have been adjusted to correct for changes over time in the composition of the countries covered by the WGI.

### **R2 – Business friendly**

The institutional indicators aim to measure the quality of the institutions in the European Union and Norway, and includes the time to start a new business, the cost of business start-up procedures and burden of customs procedure. Data was obtained from the World Bank and is expressed annually as a percentile rank from 2005 to 2014. The annual means for each category are taken and averaged again to obtain a final score ranging between 1 (lowest) and 5 (highest).

Data are collected by the World Bank with a standardized survey that uses a simple business case to ensure comparability across economies and over time - with assumptions about the legal form of the business, its size, its location, and nature of its operation. Surveys are administered through more than 9,000 local experts, including lawyers, business consultants, accountants, freight forwarders, government officials, and other professionals who routinely administer or advise on legal and regulatory requirements.

Entrepreneurs around the world face a range of challenges. One of them is inefficient regulation. The indicator measures the procedures, time, cost and paid-in minimum capital required for a small or medium-size limited liability company to start up and formally operate.

Entrepreneurs may not be aware of all required procedures or may avoid legally required procedures altogether. But where regulation is particularly onerous, levels of informality are higher, which comes at a cost: firms in the informal sector usually grow more slowly, have less access to credit, and employ fewer workers - and those workers remain outside the protections of labour law. The indicator can help policymakers understand the business environment in a country.

The Doing Business methodology has limitations that should be considered when interpreting the data. First, the data collected refer to businesses in the economy's largest city and may not represent regulations in other locations of the economy. Second, the data often focus on a specific business form - generally a limited liability company of a specified size - and may not represent regulation for other types of businesses such as sole proprietorships. Third, transactions described in a standardized business case refer to a specific set of issues and may not represent the full set of issues a business encounters. Fourth, the time measures involve an element of judgment by the expert respondents.





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When sources indicate different estimates, the Doing Business time indicators represent the median values of several responses given under the assumptions of the standardized case. Fifth, the methodology assumes that a business has full information on what is required and does not waste time when completing procedures.

**Time to start a new business** – The number of calendar days needed to complete all required procedures to legally operate a commercial or industrial firm are recorded by this indicator. Requirements may include obtaining necessary licenses and permits as well as completing any required notifications, verifications, and inscriptions for the company and its employees with relevant authorities. The measure captures the median duration that incorporation lawyers indicate is necessary to complete each procedure. If a procedure can be speeded up at additional cost, the fastest procedure, independent of cost, is chosen.

$$V(TIME) = \frac{T_c}{T_{max}} \quad (\text{Eq. 25})$$

The economic health of a country is measured not only in macroeconomic terms but also by other factors that shape daily economic activity such as laws, regulations, and institutional arrangements. The data measure business regulation, gauge regulatory outcomes, and measure the extent of legal protection of property, the flexibility of employment regulation, and the tax burden on businesses.

The fundamental premise of this data is that economic activity requires good rules and regulations that are efficient, accessible to all who need to use them, and simple to implement. Thus, sometimes there is more emphasis on more regulation, such as stricter disclosure requirements in related-party transactions, and other times emphasis is on for simplified regulations, such as a one-stop shop for completing business start-up formalities.

**Cost of business start-up procedures** – Cost to register a business is normalized by presenting it as a percentage of gross national income (GNI) per capita.

$$V(COST) = \frac{T_c}{T_{max}} \quad (\text{Eq. 26})$$

**Burden of customs procedures** – Burden of Customs Procedure measures business executives' perceptions of their country's efficiency of customs procedures. The rating ranges from 1 to 7, with a higher score indicating greater efficiency. Data are from the World Economic Forum's Executive Opinion Survey, conducted for 30 years in collaboration with 150 partner institutes. The 2009 round included more than 13,000 respondents from 133 countries. Sampling follows a dual stratification based on company size and the sector of activity. Data are collected online or through in-person interviews. Responses are aggregated using sector-weighted averaging. The data for the latest year are combined with the data for the previous year to create a two-year moving average. Respondents evaluated the efficiency of customs procedures in their country. The lowest score (1) rates the customs procedure as extremely inefficient, and the highest score (7) as extremely efficient.

$$V(BURD) = \frac{T_c}{T_{max}} \quad (\text{Eq. 27})$$

The World Economic Forum's annual Global Competitiveness Reports have studied and benchmarked the many factors underpinning national competitiveness. The goal has been to provide insight and





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stimulate the discussion among all stakeholders on the best strategies and policies to help countries overcome the obstacles to improving competitiveness. It serves as a critical reminder of the importance of structural economic fundamentals for sustained growth.

### R3 – Licensing

The published data on licensing times for aquaculture presents several challenges, because of different legal frameworks and institutional setups, ranging from national to local approvals, across marine, freshwater, inter-tidal and other systems, which all contain different licensing processes. For assessing licensing framework, licensing times were obtained through the limited available literature and requests sent to the national authorities to comment on the expected licensing time. Due to the sensitivity of the issue, the Aquaculture Investor Index uses a precautionary principle, whereby if there is lack of information, then a country is ranking in the lowest category.

### R4 – Fiscal

$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \quad (\text{Eq. 28})$$

**Tax revenue** – Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue.

The International Monetary Fund's Government Finance Statistics Manual 2014 recommends an accrual accounting method, focusing on all economic events affecting assets, liabilities, revenues, and expenses, not just those represented by cash transactions. It accounts for all changes in stocks, so stock data at the end of an accounting period equal stock data at the beginning of the period plus flows over the period. Government finance statistics are reported in local currency. Many countries report government finance data by fiscal year; see country metadata for information on fiscal year end by country.

**Labour tax and contributions** – Labour tax and contributions is the amount of taxes and mandatory contributions on labour paid by the business.

The data covering taxes payable by businesses, measure all taxes and contributions that are government mandated (at any level - federal, state, or local), apply to standardized businesses, and have an impact in their income statements. The taxes covered go beyond the definition of a tax for government national accounts (compulsory, unrequited payments to general government) and measure any imposts that affect business accounts. The main differences are in labour contributions and value added taxes. The data account for government-mandated contributions paid by the employer to a required private pension fund or workers insurance fund but exclude value added taxes because they do not affect the accounting profits of the business, they are not reflected in the income statement.



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## Environmental

A Geographic Information Systems (GIS) analysis is implemented to determine the environment conditions available on each Exclusive Economic Zone (EEZ). Layers are created for water depths, water temperatures, current speeds, and dissolved oxygen at the resolution of 1 km<sup>2</sup>. The superimposition of the data layers provides an identification of the areas where aquaculture is suitable in Europe.

### E1 – Depth

Water depth is a key consideration for aquaculture, and ensuring the aquaculture environment has suitable depth profiles is a pre-requisite. The area and proportion of a country's Exclusive Economic zone is divided into classes ranging from good to poor (< 10m, 10-40m, 40-150, 150-300, 300m+). Depth profiles are obtained using General Bathymetric Chart of the Oceans (GEBCO).

Table 7 – Water depth parameters

| Variables                                  | Classes and Scores               |
|--|----------------------------------|
| $E_d$ = Environmental depth category score | 0-10 m                      1    |
| $D_c$ = EEZ area in depth class (%)        | >300 m                      2    |
| $N_d$ = Number of depth classes            | 10-40 m                      3   |
|  | 150-300 m                      4 |
| Depth class scores ( $D_s$ )               | 40-150 m                      5  |

The country scores are calculated through the summation of the depth category ( $N_d$ ) multiplied by the depth value class scores ( $D_c, D_s$ ) divided by 100.

$$E_d = \sum_{i=1}^{i=N_d} \frac{D_c D_s}{100} \tag{Eq. 29}$$





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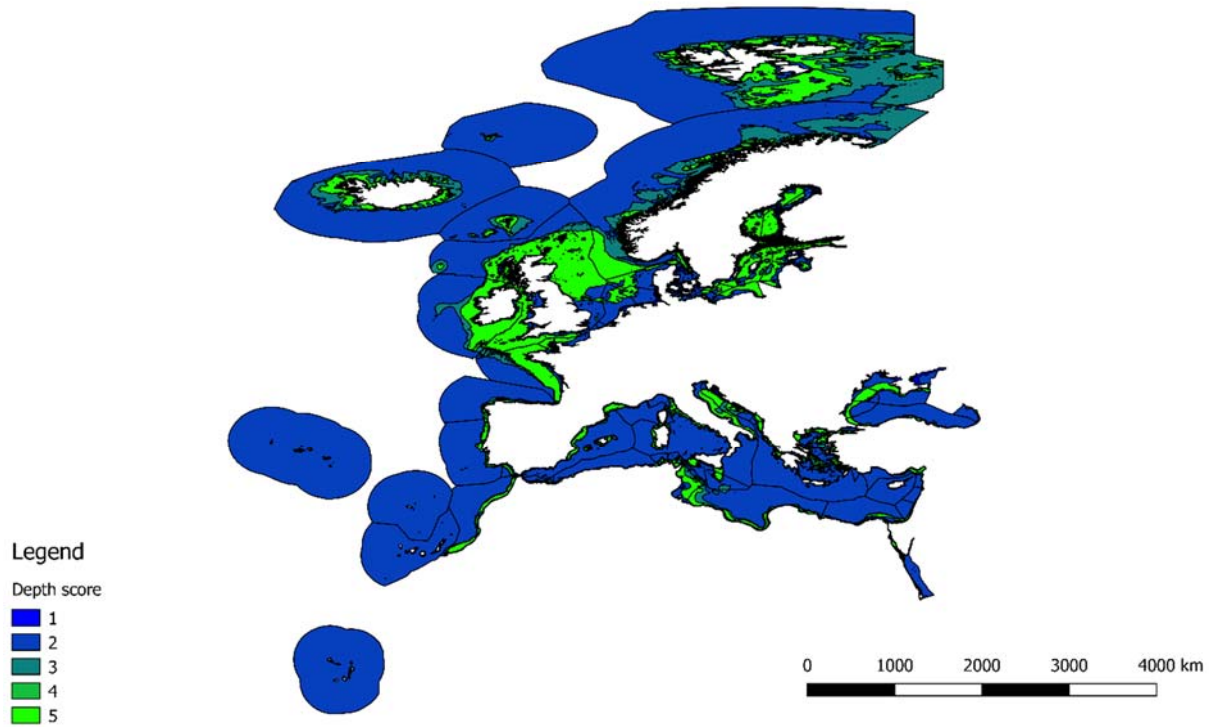


Figure 5 – Depth results

## E2 – Water temperature

Water temperature is a primary consideration for aquaculture to compute growth curves to determine the time involved in raising a species to a commercial size. The layers plot the number of months the sea temperatures are between the minimum and maximum species temperatures (SST) ranges for each Exclusive Economic Zone. Fresh water temperature which is calculated using the MODIS land surface temperature product, and marine water temperature is acquired using Copernicus.

Table 8 – Water temperature parameters

| Variables   | Classes and Scores   |
|---|--|
| $E_{t,s}$ = Temperature category score (salmon)<br>$E_{t,b}$ = Temperature category score (seabass)<br>$E_{t,g}$ = Temperature category score (gilthead)<br>$T_{c,s}$ = EEZ area in temperature class salmon (%)<br>$T_{c,b}$ = EEZ area in temperature class bass (%)<br>$T_{c,g}$ = EEZ area in temperature class gilthead (%)<br>$N_t$ = Number of temperature classes<br>$E_t$ = Environmental temperature category score | <u>Temperature category ranges per species - score 5 for 12 months:</u><br>6-15 °C ( $D_{c,s}$ : salmon),<br>11-26 °C ( $D_{c,g}$ : gilthead bream),<br>8-22 °C ( $D_{c,b}$ : bass)<br><br><u>If compliant period is:</u><br>4 months or less      1<br>6 months                    2<br>8 months                    3 |





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|  |           |   |
|--|-----------|---|
|  | 10 months | 4 |
|--|-----------|---|

For every two months that the water temperature is outside the ideal minimum and maximum range for the target species (salmon, sea bream or sea bass) then for each category if one month is off the range take a point off as exemplified in Table 8. The country scores are calculated through the summation of the water temperature class ( $N_t$ ) for each country and multiplied by the temperature category values per species (e.g.  $T_{c,s}$ ,  $D_{c,s}$ ) divided by 100.

$$E_{t,s} = \sum_{i=1}^{i=N_t} \frac{T_{c,s} D_{c,s}}{100} \tag{Eq. 30}$$

$$E_{t,b} = \sum_{i=1}^{i=N_t} \frac{T_{c,b} D_{c,b}}{100} \tag{Eq. 31}$$

$$E_{t,g} = \sum_{i=1}^{i=N_t} \frac{T_{c,g} D_{c,g}}{100} \tag{Eq. 32}$$

$$E_t = \max(E_{t,s}, E_{t,b}, E_{t,g}) \tag{Eq. 33}$$

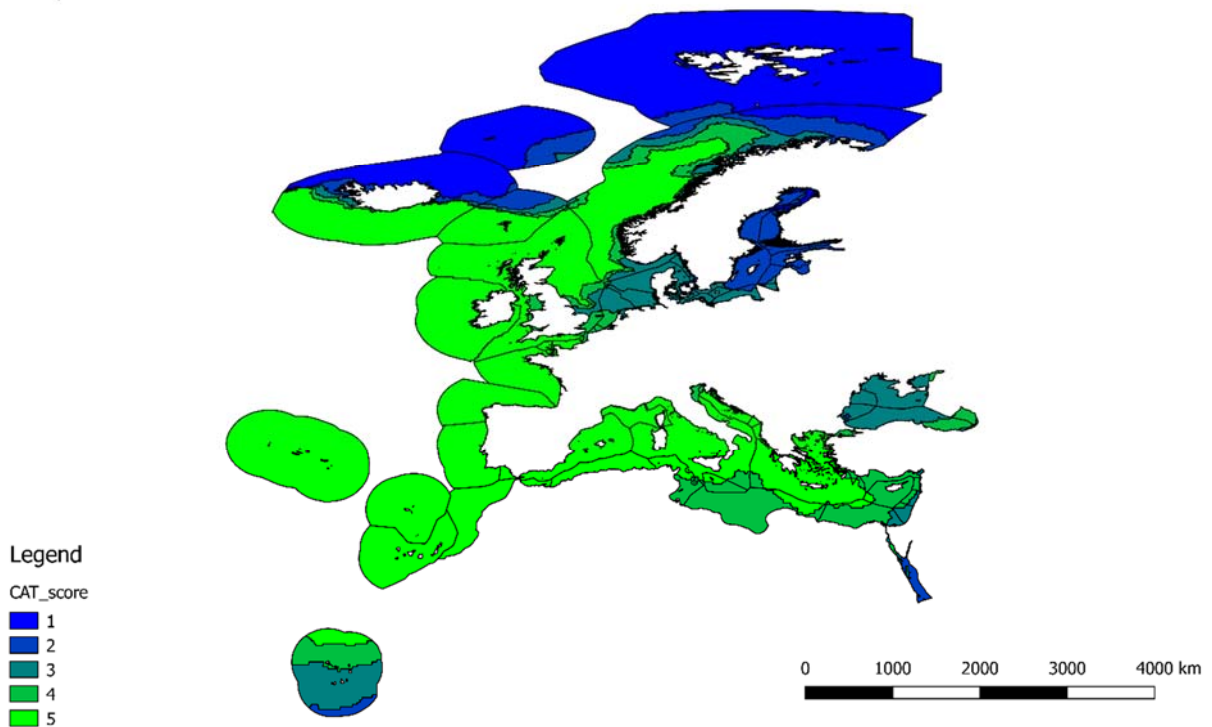


Figure 6 – Water temperature results

### E3 – Current speed

The current speed is relevant to determine whether the environmental conditions of a coastline are suitable for aquaculture. The area and proportion of a country's Exclusive Economic Zone that falls into different current speed classes is plotted. Data for current speeds is acquired from Ifremer.

Table 9 – Current speed parameters





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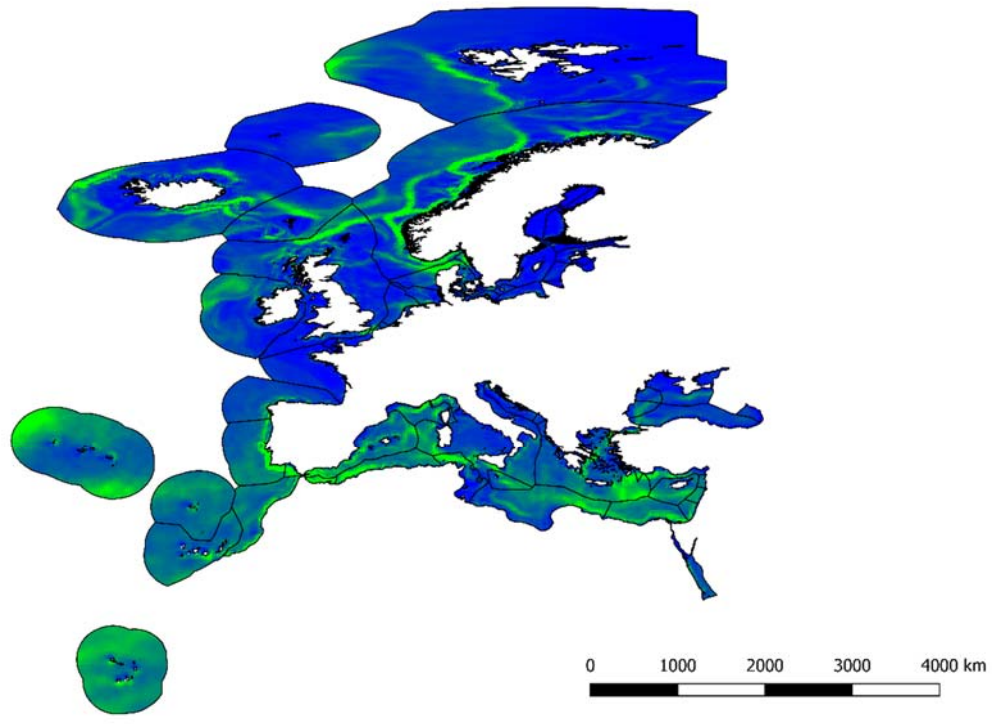
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| Variables  | Classes and Scores       |   |
|--|--------------------------|---|
| $E_s$ = Environmental current speed category score<br>$S_c$ = EEZ area in current speed class (%)<br>$N_s$ = Number of current speed classes | 0-3 $\text{cm s}^{-1}$   | 1 |
|  | 50-80 $\text{cm s}^{-1}$ | 2 |
|  | 25-50 $\text{cm s}^{-1}$ | 3 |
|  | 3-10 $\text{cm s}^{-1}$  | 4 |
|  | 10-25 $\text{cm s}^{-1}$ | 5 |

The country scores are calculated through the summation of the current speed category ( $N_s$ ) multiplied by the category values ( $S_{c,s}$ ) divided by 100.

$$E_s = \sum_{i=1}^{i=N_s} \frac{S_c S_s}{100} \quad (\text{Eq. 34})$$



**Figure 7 – Current speed results**

## E4 – Dissolved oxygen

The dissolved oxygen profile is key for aquatic health and favourable dissolved oxygen profiles determine whether the environmental conditions of a coastline are suitable for aquaculture. The area and proportion of a country's Exclusive Economic Zone that falls into different dissolved oxygen classes is plotted. Data is acquired using Copernicus.

**Table 10 – Dissolved oxygen parameters**

| Variables | Classes and Scores |
|-----------|--------------------|
|-----------|--------------------|





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|   |                            |   |
|---|----------------------------|---|
| $E_o$ = Environmental dissolved oxygen scores | $\leq 2 \text{ mg L}^{-1}$ | 1 |
| $O_c$ = EEZ area in dissolved oxygen class    | 2-5 $\text{mg L}^{-1}$     | 2 |
| $N_o$ = number of dissolved oxygen classes    | 5-7 $\text{mg L}^{-1}$     | 4 |
|   | $> 7 \text{ mg L}^{-1}$    | 5 |
| Dissolved oxygen scores ( $O_s$ )             | – note there is no score 3 |   |

The country scores are calculated through the summation of the dissolved oxygen category ( $N_o$ ) multiplied by the category values ( $O_{c,s}$ ) divided by 100.

$$E_o = \sum_{i=1}^{i=N_o} \frac{O_c O_s}{100} \tag{Eq. 35}$$

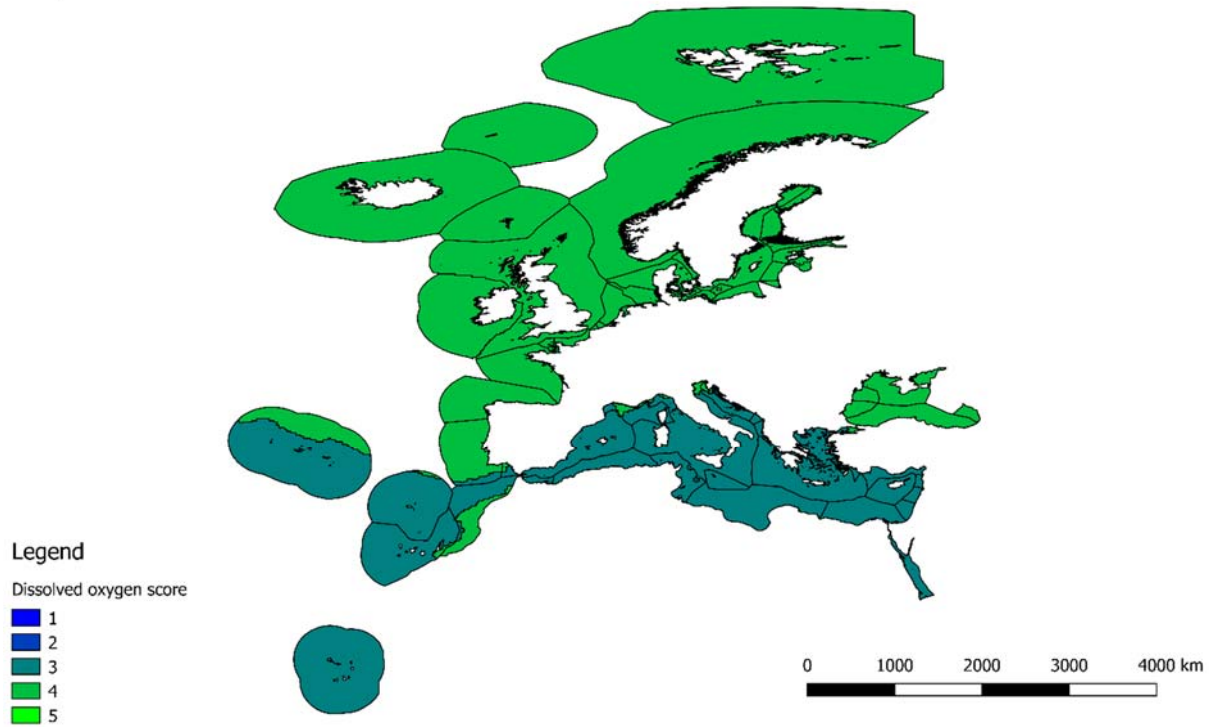


Figure 8 – Dissolved oxygen results

## Social

### S1 – Legal

Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. Percentile ranks have been adjusted to correct for changes over time in the composition of the countries covered by the WGI.





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$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \quad (\text{Eq. 36})$$

### S2 - Sectoral importance

The sectoral importance analyses the percentage value of aquaculture, when summing aquaculture, first sale/landings, and export/important value to determine the relative importance of aquaculture in the supply chain. The indicator attempts to quantify the relative importance of aquaculture in terms of value, when compared to the aquatic supply chain in each country. Countries with high percentages such as Norway, suggests that aquaculture is an importance sector, and therefore is likely to have an increased sectoral importance when to compare to countries with little aquaculture.

$$T_{A,C,Y} = \sum_{i=1}^{i=Y} A_{C,i} \quad (\text{Eq. 37})$$

$$T_{F,C,Y} = \sum_{i=1}^{i=Y} F_{C,i} \quad (\text{Eq. 38})$$

$$T_{W,C,Y} = \sum_{i=1}^{i=Y} W_{C,i} \quad (\text{Eq. 39})$$

$$T_{total} = \sum T_A, T_F, T_W \quad (\text{Eq. 40})$$

$$R = \frac{T_A}{T_{total}} \quad (\text{Eq. 41})$$

### S3 - Education & training

**Grants and other revenue** – Grants and other revenue include grants from other foreign governments, international organizations, and other government units; interest; dividends; rent; required, nonrepayable receipts for public purposes (such as fines, administrative fees, and entrepreneurial income from government owner-ship of property); and voluntary, unrequited, nonrepayable receipts other than grants.

$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \quad (\text{Eq. 42})$$

**Gross enrolment ratio** – Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

Gross enrollment ratios indicate the capacity of each level of the education system, but a high ratio may reflect a substantial number of overage children enrolled in each grade because of repetition or late entry rather than a successful education system. The net enrollment rate excludes overage and underage students and more accurately captures the system's coverage and internal efficiency. Differences between the gross enrollment ratio and the net enrollment rate show the incidence of overage and underage enrollments.

$$E_c = \frac{T_c}{T_{max}} \quad (\text{Eq. 43})$$



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## S4 - Corruption

Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank. Percentile ranks have been adjusted to correct for changes over time in the composition of the countries covered by the WGI.

$$T_{Y,C} = \frac{1}{Y} \sum_{i=1}^Y T_{Y,C} \tag{Eq. 44}$$

## Scores

The overall scores are represented in Figure 9 to provide a comparison across European countries. The colour coding system defines the following ranges: High (90-100), Good (70-90), Moderate (30-70), Poor (10-30), and Bad (0-10).

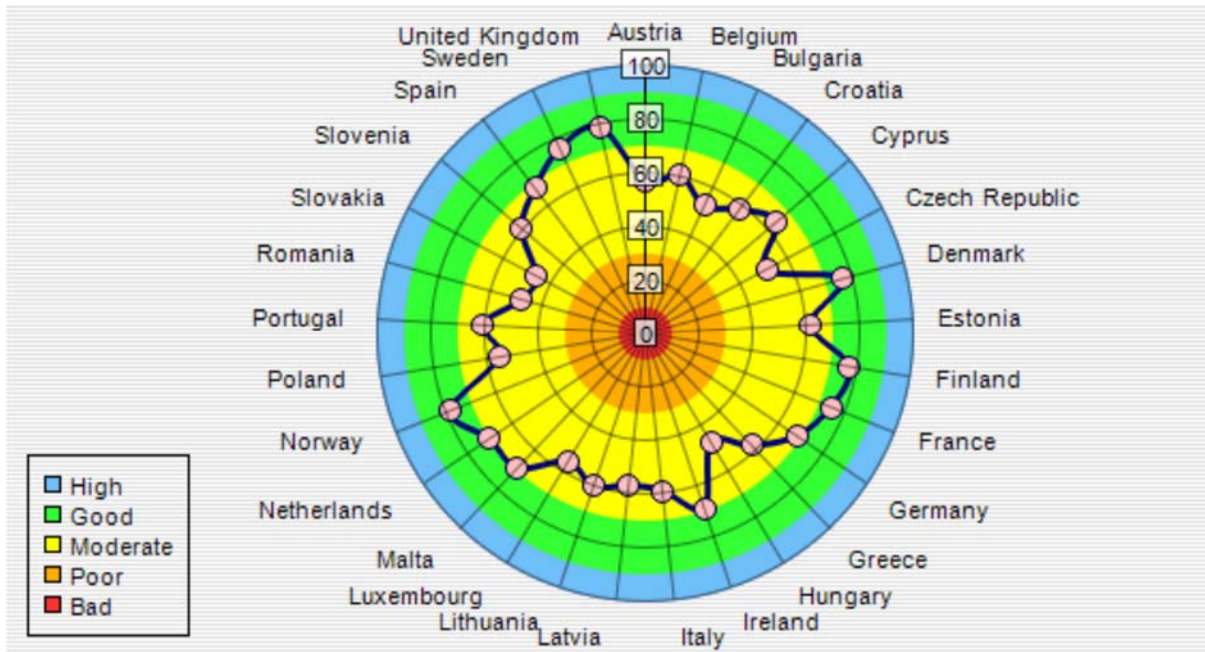


Figure 9 – AquaSpace Investor Index results

The ranges defined follow a typical Gaussian distribution of classes, reflecting the fact that the Moderate band, at the centre of the distribution, is broadest, followed by narrower ranges of Good and Poor on either side, and finally by the extreme ranges of High and Bad. The nomenclature is taken from the Water Framework Directive (WFD - 2000/60/EC), which itself considers this kind of distribution as a potential ranking order for biological quality elements (*sensu* WFD).

The indicator and category scores are provided in Table 11, allowing a score comparison across European countries. The highest scoring countries are the United Kingdom (78.83), Norway (78.50), and Finland (77.17) at the highest end of the good category. The worst scoring countries are Slovakia (46.17), Hungary (47.50), and Romania (47.83) falling in the middle of the moderate category.





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**Table 11 – Overall index scores**

| Country        | Total | Market | Production | Regulatory | Environmental | Social |
|----------------|-------|--------|------------|------------|---------------|--------|
| Austria        | 57.00 | 15.17  | 11.50      | 12.00      | 4.00          | 14.33  |
| Belgium        | 60.50 | 15.33  | 10.67      | 11.00      | 12.00         | 11.50  |
| Bulgaria       | 52.50 | 9.67   | 11.50      | 9.00       | 14.00         | 8.33   |
| Croatia        | 58.17 | 9.67   | 12.83      | 12.00      | 17.00         | 6.67   |
| Cyprus         | 64.50 | 12.50  | 9.83       | 13.00      | 13.00         | 16.17  |
| Czech Republic | 51.17 | 13.50  | 11.33      | 11.00      | 4.00          | 11.33  |
| Denmark        | 76.50 | 16.00  | 17.17      | 16.00      | 13.00         | 14.33  |
| Estonia        | 61.67 | 13.33  | 10.67      | 13.00      | 14.00         | 10.67  |
| Finland        | 77.17 | 16.17  | 16.33      | 16.00      | 14.00         | 14.67  |
| France         | 74.67 | 14.33  | 16.00      | 13.00      | 16.00         | 15.33  |
| Germany        | 68.33 | 17.17  | 12.67      | 12.00      | 13.00         | 13.50  |
| Greece         | 57.83 | 10.50  | 13.83      | 11.00      | 13.00         | 9.50   |
| Hungary        | 47.50 | 8.50   | 9.67       | 13.00      | 4.00          | 12.33  |
| Ireland        | 69.17 | 11.17  | 15.33      | 14.00      | 14.00         | 14.67  |
| Italy          | 59.17 | 14.33  | 14.33      | 8.00       | 14.00         | 8.50   |
| Latvia         | 57.17 | 13.33  | 10.50      | 10.00      | 14.00         | 9.33   |
| Lithuania      | 60.33 | 14.33  | 10.67      | 10.00      | 16.00         | 9.33   |
| Luxembourg     | 56.00 | 15.00  | 10.67      | 12.00      | 4.00          | 14.33  |
| Malta          | 69.33 | 12.50  | 11.83      | 13.00      | 15.00         | 17.00  |
| Netherlands    | 70.33 | 18.00  | 12.67      | 14.00      | 13.00         | 12.67  |
| Norway         | 78.50 | 12.00  | 18.17      | 17.00      | 13.00         | 18.33  |
| Poland         | 57.33 | 14.50  | 14.17      | 8.00       | 14.00         | 6.67   |
| Portugal       | 61.00 | 12.67  | 11.83      | 11.00      | 14.00         | 11.50  |
| Romania        | 47.83 | 10.67  | 12.50      | 8.00       | 12.00         | 4.67   |
| Slovakia       | 46.17 | 12.50  | 10.50      | 10.00      | 4.00          | 9.17   |
| Slovenia       | 60.50 | 12.33  | 8.83       | 13.00      | 15.00         | 11.33  |
| Spain          | 68.00 | 16.50  | 16.17      | 8.00       | 14.00         | 13.33  |
| Sweden         | 76.00 | 17.00  | 13.67      | 15.00      | 16.00         | 14.33  |
| United Kingdom | 78.83 | 17.33  | 17.17      | 13.00      | 16.00         | 15.33  |

## Market

The top three performing countries in the market category which aggregates prices, consumption, economy, and infrastructure were the Netherlands (18.00), the United Kingdom (17.33), and Germany (17.17). The worst three performing countries were Hungary (8.50), Bulgaria (9.67), and Croatia (9.67).

**Table 12 – Market indicator scores**

| Country  | Total | M1-Prices | M2-Consumption | M3-Economy | M4-Infrastructure |
|----------|-------|-----------|----------------|------------|-------------------|
| Austria  | 15.17 | 4         | 4              | 4.17       | 3                 |
| Belgium  | 15.33 | 4         | 4              | 3.33       | 4                 |
| Bulgaria | 9.67  | 4         | 2              | 1.67       | 2                 |





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|                |       |   |   |      |   |
|----------------|-------|---|---|------|---|
| Croatia        | 9.67  | 4 | 3 | 1.67 | 1 |
| Cyprus         | 12.50 | 5 | 4 | 2.50 | 1 |
| Czech Republic | 13.50 | 5 | 3 | 2.50 | 3 |
| Denmark        | 16.00 | 5 | 5 | 5.00 | 1 |
| Estonia        | 13.33 | 5 | 4 | 3.33 | 1 |
| Finland        | 16.17 | 4 | 5 | 4.17 | 3 |
| France         | 14.33 | 1 | 5 | 3.33 | 5 |
| Germany        | 17.17 | 4 | 4 | 4.17 | 5 |
| Greece         | 10.50 | 1 | 5 | 2.50 | 2 |
| Hungary        | 8.50  | 2 | 2 | 2.50 | 2 |
| Ireland        | 11.17 | 1 | 5 | 4.17 | 1 |
| Italy          | 14.33 | 1 | 5 | 3.33 | 5 |
| Latvia         | 13.33 | 4 | 4 | 3.33 | 2 |
| Lithuania      | 14.33 | 4 | 5 | 3.33 | 2 |
| Luxembourg     | 15.00 | 5 | 4 | 5.00 | 1 |
| Malta          | 12.50 | 4 | 5 | 2.50 | 1 |
| Netherlands    | 18.00 | 5 | 4 | 5.00 | 4 |
| Norway         | 12.00 | 1 | 5 | 5.00 | 1 |
| Poland         | 14.50 | 4 | 4 | 2.50 | 4 |
| Portugal       | 12.67 | 4 | 5 | 1.67 | 2 |
| Romania        | 10.67 | 4 | 2 | 1.67 | 3 |
| Slovakia       | 12.50 | 5 | 3 | 2.50 | 2 |
| Slovenia       | 12.33 | 5 | 3 | 3.33 | 1 |
| Spain          | 16.50 | 4 | 5 | 2.50 | 5 |
| Sweden         | 17.00 | 4 | 5 | 5.00 | 3 |
| United Kingdom | 17.33 | 5 | 4 | 3.33 | 5 |

### Production

The top three performing countries in the production category which aggregates hatchery and nursery, coastline, digital capacity, and aquaculture insurance were Norway (18.17), Denmark (17.17), and the United Kingdom (17.17). The worst three performing countries were Slovenia (8.83), Hungary (9.67), and Cyprus (9.83).

Table 13 – Production indicator scores

| Country        | Total | P1-Hatchery | P2-Coastline | P3-Digital | P4-Insurance |
|----------------|-------|-------------|--------------|------------|--------------|
| Austria        | 11.50 | 2.50        | 1            | 5.00       | 3            |
| Belgium        | 10.67 | 1.67        | 1            | 5.00       | 3            |
| Bulgaria       | 11.50 | 3.33        | 2            | 4.17       | 2            |
| Croatia        | 12.83 | 1.67        | 3            | 4.17       | 4            |
| Cyprus         | 9.83  | 1.67        | 1            | 4.17       | 3            |
| Czech Republic | 11.33 | 4.17        | 1            | 4.17       | 2            |
| Denmark        | 17.17 | 4.17        | 3            | 5.00       | 5            |







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|                |       |      |   |      |   |
|----------------|-------|------|---|------|---|
| Estonia        | 10.67 | 1.67 | 2 | 5.00 | 2 |
| Finland        | 16.33 | 3.33 | 5 | 5.00 | 3 |
| France         | 16.00 | 5.00 | 2 | 5.00 | 4 |
| Germany        | 12.67 | 1.67 | 3 | 5.00 | 3 |
| Greece         | 13.83 | 1.67 | 3 | 4.17 | 5 |
| Hungary        | 9.67  | 2.50 | 1 | 4.17 | 2 |
| Ireland        | 15.33 | 3.33 | 3 | 5.00 | 4 |
| Italy          | 14.33 | 4.17 | 2 | 4.17 | 4 |
| Latvia         | 10.50 | 2.50 | 1 | 5.00 | 2 |
| Lithuania      | 10.67 | 2.50 | 2 | 4.17 | 2 |
| Luxembourg     | 10.67 | 1.67 | 1 | 5.00 | 3 |
| Malta          | 11.83 | 1.67 | 2 | 4.17 | 4 |
| Netherlands    | 12.67 | 1.67 | 2 | 5.00 | 4 |
| Norway         | 18.17 | 4.17 | 4 | 5.00 | 5 |
| Poland         | 14.17 | 5.00 | 2 | 4.17 | 3 |
| Portugal       | 11.83 | 1.67 | 2 | 4.17 | 4 |
| Romania        | 12.50 | 3.33 | 3 | 4.17 | 2 |
| Slovakia       | 10.50 | 2.50 | 1 | 5.00 | 2 |
| Slovenia       | 8.83  | 1.67 | 1 | 4.17 | 2 |
| Spain          | 16.17 | 5.00 | 2 | 4.17 | 5 |
| Sweden         | 13.67 | 1.67 | 4 | 5.00 | 3 |
| United Kingdom | 17.17 | 4.17 | 3 | 5.00 | 5 |

### Regulatory

The top three performing countries in the regulatory category which aggregates institutional capacity, business friendliness, licensing process, and fiscal framework were Norway (17.00), Denmark (17.00), and Finland (17.00). The worst performing countries were Italy, Poland, Romania, and Spain with a score of 8.00.

Table 14 – Regulatory indicator scores

| Country        | Total | R1-Institutional | R2-Business | R3-Licensing | R4-Fiscal |
|----------------|-------|------------------|-------------|--------------|-----------|
| Austria        | 12.00 | 5                | 3           | 1            | 3         |
| Belgium        | 11.00 | 4                | 4           | 1            | 2         |
| Bulgaria       | 9.00  | 2                | 3           | 1            | 3         |
| Croatia        | 12.00 | 2                | 2           | 4            | 4         |
| Cyprus         | 13.00 | 3                | 3           | 4            | 3         |
| Czech Republic | 11.00 | 4                | 3           | 1            | 3         |
| Denmark        | 16.00 | 5                | 5           | 2            | 4         |
| Estonia        | 13.00 | 4                | 4           | 2            | 3         |
| Finland        | 16.00 | 5                | 4           | 4            | 3         |
| France         | 13.00 | 4                | 4           | 3            | 2         |
| Germany        | 12.00 | 4                | 3           | 1            | 4         |





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|                |       |   |   |   |   |
|----------------|-------|---|---|---|---|
| Greece         | 11.00 | 2 | 2 | 4 | 3 |
| Hungary        | 13.00 | 3 | 3 | 4 | 3 |
| Ireland        | 14.00 | 5 | 4 | 1 | 4 |
| Italy          | 8.00  | 2 | 2 | 2 | 2 |
| Latvia         | 10.00 | 3 | 3 | 1 | 3 |
| Lithuania      | 10.00 | 3 | 3 | 1 | 3 |
| Luxembourg     | 12.00 | 5 | 3 | 1 | 3 |
| Malta          | 13.00 | 4 | 2 | 4 | 3 |
| Netherlands    | 14.00 | 5 | 4 | 1 | 4 |
| Norway         | 17.00 | 5 | 4 | 5 | 3 |
| Poland         | 8.00  | 3 | 1 | 1 | 3 |
| Portugal       | 11.00 | 3 | 4 | 1 | 3 |
| Romania        | 8.00  | 1 | 3 | 1 | 3 |
| Slovakia       | 10.00 | 3 | 3 | 1 | 3 |
| Slovenia       | 13.00 | 3 | 4 | 2 | 4 |
| Spain          | 8.00  | 3 | 1 | 1 | 3 |
| Sweden         | 15.00 | 5 | 4 | 4 | 2 |
| United Kingdom | 13.00 | 4 | 4 | 1 | 4 |

### **Environmental**

The top performing countries in the environment category which aggregates water depth, water temperature, current speed, and dissolved oxygen were Croatia (17.00), the United Kingdom, France, Lithuania, Sweden, and the United Kingdom (16.00). The worst performing countries were Austria, Hungary, Czech Republic, Luxembourg, and Slovakia (4.00). However, there is at present a bias with respect to land-bound countries, which will perform more poorly than those where marine waters are considered. This is an area for improvement of the Aquaculture Investor Index.

**Table 15 – Environmental indicator scores**

| Country        | Total | E1-Depth | E2-Temperature | E3-Current | E4-Oxygen |
|----------------|-------|----------|----------------|------------|-----------|
| Austria        | 4.00  | 1        | 1              | 1          | 1         |
| Belgium        | 12.00 | 2        | 4              | 2          | 4         |
| Bulgaria       | 14.00 | 5        | 3              | 2          | 4         |
| Croatia        | 17.00 | 5        | 5              | 3          | 4         |
| Cyprus         | 13.00 | 3        | 5              | 2          | 3         |
| Czech Republic | 4.00  | 1        | 1              | 1          | 1         |
| Denmark        | 13.00 | 4        | 3              | 2          | 4         |
| Estonia        | 14.00 | 4        | 2              | 4          | 4         |
| Finland        | 14.00 | 4        | 2              | 4          | 4         |
| France         | 16.00 | 4        | 5              | 3          | 4         |
| Germany        | 13.00 | 2        | 4              | 3          | 4         |
| Greece         | 13.00 | 3        | 5              | 2          | 3         |
| Hungary        | 4.00  | 1        | 1              | 1          | 1         |





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|                |       |   |   |   |   |
|----------------|-------|---|---|---|---|
| Ireland        | 14.00 | 3 | 5 | 2 | 4 |
| Italy          | 14.00 | 3 | 5 | 2 | 4 |
| Latvia         | 14.00 | 3 | 3 | 4 | 4 |
| Lithuania      | 16.00 | 5 | 3 | 4 | 4 |
| Luxembourg     | 4.00  | 1 | 1 | 1 | 1 |
| Malta          | 15.00 | 5 | 5 | 2 | 3 |
| Netherlands    | 13.00 | 2 | 4 | 3 | 4 |
| Norway         | 13.00 | 3 | 4 | 2 | 4 |
| Poland         | 14.00 | 4 | 3 | 3 | 4 |
| Portugal       | 14.00 | 3 | 5 | 2 | 4 |
| Romania        | 12.00 | 3 | 3 | 2 | 4 |
| Slovakia       | 4.00  | 1 | 1 | 1 | 1 |
| Slovenia       | 15.00 | 2 | 4 | 5 | 4 |
| Spain          | 14.00 | 3 | 5 | 2 | 4 |
| Sweden         | 16.00 | 5 | 3 | 4 | 4 |
| United Kingdom | 16.00 | 4 | 5 | 3 | 4 |

### Social

The top performing countries in the social category which aggregates legal framework, sectoral importance, education, and corruption were Norway (18.83), Malta (17.00), and Cyprus (16.17). The worst performing countries were Romania (4.67), Croatia (6.67), and Poland (6.67).

Table 16 – Social indicator scores

| Country        | Total | S1-Legal | S2-Sectoral | S3-Education | S4-Corruption |
|----------------|-------|----------|-------------|--------------|---------------|
| Austria        | 14.33 | 5        | 1           | 3.33         | 5             |
| Belgium        | 11.50 | 4        | 1           | 2.50         | 4             |
| Bulgaria       | 8.33  | 1        | 3           | 3.33         | 1             |
| Croatia        | 6.67  | 1        | 3           | 1.67         | 1             |
| Cyprus         | 16.17 | 4        | 4           | 4.17         | 4             |
| Czech Republic | 11.33 | 3        | 3           | 3.33         | 2             |
| Denmark        | 14.33 | 5        | 1           | 3.33         | 5             |
| Estonia        | 10.67 | 4        | 1           | 1.67         | 4             |
| Finland        | 14.67 | 5        | 3           | 1.67         | 5             |
| France         | 15.33 | 4        | 3           | 3.33         | 5             |
| Germany        | 13.50 | 5        | 1           | 2.50         | 5             |
| Greece         | 9.50  | 2        | 4           | 2.50         | 1             |
| Hungary        | 12.33 | 3        | 4           | 3.33         | 2             |
| Ireland        | 14.67 | 5        | 3           | 1.67         | 5             |
| Italy          | 8.50  | 2        | 2           | 2.50         | 2             |
| Latvia         | 9.33  | 3        | 1           | 3.33         | 2             |
| Lithuania      | 9.33  | 3        | 1           | 3.33         | 2             |
| Luxembourg     | 14.33 | 5        | 1           | 3.33         | 5             |



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|                |       |   |   |      |   |
|----------------|-------|---|---|------|---|
| Malta          | 17.00 | 4 | 5 | 5.00 | 3 |
| Netherlands    | 12.67 | 5 | 1 | 1.67 | 5 |
| Norway         | 18.33 | 5 | 5 | 3.33 | 5 |
| Poland         | 6.67  | 2 | 1 | 1.67 | 2 |
| Portugal       | 11.50 | 4 | 1 | 2.50 | 4 |
| Romania        | 4.67  | 1 | 1 | 1.67 | 1 |
| Slovakia       | 9.17  | 2 | 1 | 4.17 | 2 |
| Slovenia       | 11.33 | 4 | 1 | 3.33 | 3 |
| Spain          | 13.33 | 4 | 2 | 3.33 | 4 |
| Sweden         | 14.33 | 5 | 1 | 3.33 | 5 |
| United Kingdom | 15.33 | 5 | 2 | 3.33 | 5 |

## Weighting criteria

The weighting criteria that apply to each category are assumed to be equal, despite knowing that the interests and motivations for aquaculture stakeholders differ, and is not likely to be representative through techniques such as averaging across the spectrum of the outcome scenarios. Given the complexity of assuming stakeholder preferences, instead of applying a scenario analysis, with pre-defined weighting permutations, the Aquaculture Investor Index mobile application provides the user the ability to establish individual weighting criteria, based on individual interest per category, to recalculate the final country scores.

Table 17 – Weighting indicators and calculating scores

| Categories  | Underweight |     |     |     | Neutral |     |     | Overweight |     |     |     |
|-------------|-------------|-----|-----|-----|---------|-----|-----|------------|-----|-----|-----|
|             | 0.5         | 0.6 | 0.7 | 0.8 | 0.9     | 1.0 | 1.1 | 1.2        | 1.3 | 1.4 | 1.5 |
| Market      | 0.5         | 0.6 | 0.7 | 0.8 | 0.9     | 1.0 | 1.1 | 1.2        | 1.3 | 1.4 | 1.5 |
| Production  | 0.5         | 0.6 | 0.7 | 0.8 | 0.9     | 1.0 | 1.1 | 1.2        | 1.3 | 1.4 | 1.5 |
| Regulatory  | 0.5         | 0.6 | 0.7 | 0.8 | 0.9     | 1.0 | 1.1 | 1.2        | 1.3 | 1.4 | 1.5 |
| Environment | 0.5         | 0.6 | 0.7 | 0.8 | 0.9     | 1.0 | 1.1 | 1.2        | 1.3 | 1.4 | 1.5 |
| Social      | 0.5         | 0.6 | 0.7 | 0.8 | 0.9     | 1.0 | 1.1 | 1.2        | 1.3 | 1.4 | 1.5 |



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Figure 10 – Weighting categories in the score explorer

The values presented in Table 17 and Figure 10 represent a specific user preference, whereby a hypothetical stakeholder is underweight market (0.7) and social (0.8), slightly overweight on production and environmental (1.2), overweight on regulation (1.4). The ability to allow stakeholders to choose between a weighting range of 0.5 to 1.5 allows the index to be representative, rather than predictive.

An individual stakeholder preference-based approach, removes the need to derive pre-defined weightings empirically, allowing for the score calculation of all preferences within the weighting ranges. Using mobile technology to capture user choices lends value to the index through its flexibility, enabling main stream and long-tail preferences to be accounted, increasing the usefulness of the index for the end-user.

## Discussion

The index scores calculated for Europe range from moderate to good. Countries with well-established aquaculture sectors in northern Europe score well, whereas countries in southern Europe tend to score moderately. Countries with developing aquaculture sectors tend to score moderately. High scores within single categories can be achieved, however to provide the highest appeal for stakeholders, the index rewards countries with high scores across the five categories. No countries within Europe rank below the middle of the moderate range. The index identifies several countries with high scores that do not have significant aquaculture industries (e.g. Sweden and Finland), and further research is warranted to identify why aquaculture has not developed. It is expected that as the index is expanded to lower income countries spanning other geographic regions, countries with lower quality indicator scores will have lower overall scores.

The index only considers past information, and will be updated as new information is made available, relying on accurate data to calculate score results. No provisions are made to predict future improvements or deteriorations in indicator scores. It is possible that national statistics offices have failed to collect or report material facts and statistics that could influence national scores. The environment category currently accounts for marine (EEZ) and freshwater (lakes) environments in the geographic information system (GIS) analysis. For freshwater environments, current speeds, and dissolved oxygen profiles are not considered due to data restrictions, a factor that penalises land-locked countries. The thresholds for water depth, water temperature, current speed, and dissolved oxygen negatively impact the score obtained for landlocked countries such as Austria, Czech Republic, Hungary, Luxembourg, and Slovakia, since the thresholds do not incorporate pond based aquaculture for the environment category, and the species water temperature thresholds are calculated based on salmon, sea bream, and sea bass ranges, which are not cultivated in land-locked countries. Species water temperature thresholds for freshwater fish are in the process of being added and may result in





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a revision of scores. Likewise, the current speed and dissolved oxygen indicators also penalise land-locked countries, as calculations are based on marine exclusive economic zones.

The AquaSpace partner countries Canada, China, United States, and Australia have not been included due to data limitations, including but not limited to price information and environmental data, meaning that the data collection did not fulfil the minimum requirements to obtain a score. Additional data collection is required to ensure sufficient data for inclusion of these partner countries into the index.

The index provides a broad-scale approach, across a wide range of categories, and must be interpreted in this context. Appropriate due diligence for specific circumstances is warranted by all stakeholders requiring further knowledge to assist decision-making. The Aquaculture Investor Index is designed to provide high-level guidance of the general attractiveness for aquaculture in each country, and to our knowledge provides the first integrated approach in this regard, available to investors and the general public.

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**Annex 1 – Indicator scores**

**Market scores**

**M1 – Price**

| Prices | Score |
|--------|-------|
| -6     | 1     |
| -4     | 2     |
| -2     | 3     |
| 0      | 4     |
| 2      | 5     |

| Country        | Score | Category ranking |   |   |   |   | All Score |
|----------------|-------|------------------|---|---|---|---|-----------|
|                |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | -0.07 |                  |   |   | 4 |   | 4         |
| Belgium        | 0.00  |                  |   |   | 4 |   | 4         |
| Bulgaria       | -0.24 |                  |   |   | 4 |   | 4         |
| Croatia        | -0.36 |                  |   |   | 4 |   | 4         |
| Cyprus         | 0.26  |                  |   |   |   | 5 | 5         |
| Czech Republic | 15.58 |                  |   |   |   | 5 | 5         |
| Denmark        | 0.43  |                  |   |   |   | 5 | 5         |
| Estonia        | 0.00  |                  |   |   |   | 5 | 5         |
| Finland        | -1.22 |                  |   |   | 4 |   | 4         |
| France         | -6.34 | 1                |   |   |   |   | 1         |
| Germany        | -0.35 |                  |   |   | 4 |   | 4         |
| Greece         | -8.22 | 1                |   |   |   |   | 1         |
| Hungary        | -4.09 |                  | 2 |   |   |   | 2         |
| Ireland        | -7.99 | 1                |   |   |   |   | 1         |
| Italy          | -6.44 | 1                |   |   |   |   | 1         |
| Latvia         | -0.13 |                  |   |   | 4 |   | 4         |
| Lithuania      | -1.44 |                  |   |   | 4 |   | 4         |
| Luxembourg     | 0.00  |                  |   |   |   | 5 | 5         |
| Malta          | -0.12 |                  |   |   | 4 |   | 4         |
| Netherlands    | 0.84  |                  |   |   |   | 5 | 5         |
| Norway         | -8.14 | 1                |   |   |   |   | 1         |
| Poland         | -0.09 |                  |   |   | 4 |   | 4         |
| Portugal       | -0.09 |                  |   |   | 4 |   | 4         |
| Romania        | -1.22 |                  |   |   | 4 |   | 4         |
| Slovakia       | 0.51  |                  |   |   |   | 5 | 5         |
| Slovenia       | 0.01  |                  |   |   |   | 5 | 5         |
| Spain          | -0.78 |                  |   |   | 4 |   | 4         |
| Sweden         | -0.81 |                  |   |   | 4 |   | 4         |





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|                |      |  |  |  |  |   |   |
|----------------|------|--|--|--|--|---|---|
| United Kingdom | 0.67 |  |  |  |  | 5 | 5 |
|----------------|------|--|--|--|--|---|---|

## M2 - Consumption

| Consumption | Score |
|-------------|-------|
| 2           | 1     |
| 5           | 2     |
| 10          | 3     |
| 20          | 4     |
| 30          | 5     |

| Country        | Score | Category ranking |   |   |   |   | All Score |
|----------------|-------|------------------|---|---|---|---|-----------|
|                |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | 11.55 |                  |   |   | 4 |   | 4         |
| Belgium        | 13.34 |                  |   |   | 4 |   | 4         |
| Bulgaria       | 3.89  |                  | 2 |   |   |   | 2         |
| Croatia        | 9.71  |                  |   | 3 |   |   | 3         |
| Cyprus         | 19.61 |                  |   |   | 4 |   | 4         |
| Czech Republic | 8.09  |                  |   | 3 |   |   | 3         |
| Denmark        | 23.15 |                  |   |   |   | 5 | 5         |
| Estonia        | 15.90 |                  |   |   | 4 |   | 4         |
| Finland        | 33.08 |                  |   |   |   | 5 | 5         |
| France         | 32.66 |                  |   |   |   | 5 | 5         |
| Germany        | 14.15 |                  |   |   | 4 |   | 4         |
| Greece         | 23.39 |                  |   |   |   | 5 | 5         |
| Hungary        | 4.31  |                  | 2 |   |   |   | 2         |
| Ireland        | 20.24 |                  |   |   |   | 5 | 5         |
| Italy          | 23.43 |                  |   |   |   | 5 | 5         |
| Latvia         | 18.73 |                  |   |   | 4 |   | 4         |
| Lithuania      | 31.18 |                  |   |   |   | 5 | 5         |
| Luxembourg     | 14.69 |                  |   |   | 4 |   | 4         |
| Malta          | 27.00 |                  |   |   |   | 5 | 5         |
| Netherlands    | 18.80 |                  |   |   | 4 |   | 4         |
| Norway         | 53.10 |                  |   |   |   | 5 | 5         |
| Poland         | 10.05 |                  |   |   | 4 |   | 4         |
| Portugal       | 57.45 |                  |   |   |   | 5 | 5         |
| Romania        | 3.93  |                  | 2 |   |   |   | 2         |
| Slovakia       | 6.45  |                  |   | 3 |   |   | 3         |
| Slovenia       | 7.33  |                  |   | 3 |   |   | 3         |
| Spain          | 41.99 |                  |   |   |   | 5 | 5         |
| Sweden         | 29.69 |                  |   |   |   | 5 | 5         |





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|                |       |  |  |  |   |  |   |
|----------------|-------|--|--|--|---|--|---|
| United Kingdom | 19.60 |  |  |  | 4 |  | 4 |
|----------------|-------|--|--|--|---|--|---|

## M3 - Economy

|   |   |   |   |
|---|---|---|---|
| 3 | 4 | 5 | 6 |
| 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 |
|   | 1 | 2 | 3 |

| GDP per capital | Score | Current account | Score |
|-----------------|-------|-----------------|-------|
| 25,000          | 1     | -5              | 1     |
| 50,000          | 2     | 0               | 2     |
| 150,000         | 3     | 5               | 3     |

| Country        | GDP Capita (X) | Cur Account (Y) | X <sub>1</sub> | X <sub>2</sub> | X <sub>3</sub> | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>3</sub> | All Score |
|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| Austria        | 49,712.01      | 1.92            |                | 2              |                |                |                | 3              | 5         |
| Belgium        | 45,545.39      | -0.04           |                | 2              |                |                | 2              |                | 4         |
| Bulgaria       | 7,519.08       | -9.13           | 1              |                |                | 1              |                |                | 2         |
| Croatia        | 15,974.69      | -6.98           | 1              |                |                | 1              |                |                | 2         |
| Cyprus         | 30,503.35      | -11.76          |                | 2              |                | 1              |                |                | 3         |
| Czech Republic | 22,507.71      | -2.35           | 1              |                |                |                | 2              |                | 3         |
| Denmark        | 61,701.26      | 2.33            |                |                | 3              |                |                | 3              | 6         |
| Estonia        | 15,500.22      | 0.37            | 1              |                |                |                |                | 3              | 4         |
| Finland        | 47,188.26      | 1.96            |                | 2              |                |                |                | 3              | 5         |
| France         | 44,885.81      | -1.66           |                | 2              |                |                | 2              |                | 4         |
| Germany        | 42,959.98      | 5.14            |                | 2              |                |                |                | 3              | 5         |
| Greece         | 29,666.70      | -9.39           |                | 2              |                | 1              |                |                | 3         |
| Hungary        | 16,231.74      | -2.40           | 1              |                |                |                | 2              |                | 3         |
| Ireland        | 52,958.77      | -1.21           |                |                | 3              |                | 2              |                | 5         |
| Italy          | 36,917.40      | -2.83           |                | 2              |                |                | 2              |                | 4         |
| Latvia         | 11,881.98      | 3.71            | 1              |                |                |                |                | 3              | 4         |
| Lithuania      | 11,912.05      | 0.03            | 1              |                |                |                |                | 3              | 4         |
| Luxembourg     | 112,534.03     | 10.20           |                |                | 3              |                |                | 3              | 6         |
| Malta          | 20,247.16      | -4.69           | 1              |                |                |                | 2              |                | 3         |
| Netherlands    | 50,141.20      | 5.18            |                |                | 3              |                |                | 3              | 6         |
| Norway         | 91,144.39      | 16.18           |                |                | 3              |                |                | 3              | 6         |
| Poland         | 14,151.67      | -3.21           | 1              |                |                |                | 2              |                | 3         |
| Portugal       | 22,067.29      | -9.95           | 1              |                |                | 1              |                |                | 2         |
| Romania        | 10,109.21      | -6.32           | 1              |                |                | 1              |                |                | 2         |
| Slovakia       | 18,969.89      | -2.80           | 1              |                |                |                | 2              |                | 3         |





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|                |           |       |  |   |   |   |   |   |   |
|----------------|-----------|-------|--|---|---|---|---|---|---|
| Slovenia       | 26,873.80 | -1.22 |  | 2 |   |   | 2 |   | 4 |
| Spain          | 32,577.87 | -5.72 |  | 2 |   | 1 |   |   | 3 |
| Sweden         | 53,183.52 | 6.17  |  |   | 3 |   |   | 3 | 6 |
| United Kingdom | 39,534.37 | -1.53 |  | 2 |   |   | 2 |   | 4 |

## M4 - Infrastructure

| Infrastructure | Score |
|----------------|-------|
| 2              | 1     |
| 5              | 2     |
| 10             | 3     |
| 20             | 4     |
| 30             | 5     |

| Country        | Rail  | Air   | Container | Score | Category ranking |   |   |   |   | All Score |
|----------------|-------|-------|-----------|-------|------------------|---|---|---|---|-----------|
|                |       |       |           |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | 15.92 | 19.56 | 2.28      | 12.59 |                  |   | 3 |   |   | 3         |
| Belgium        | 10.52 | 6.85  | 62.22     | 26.53 |                  |   |   | 4 |   | 4         |
| Bulgaria       | 12.09 | 3.79  | 0.95      | 5.61  |                  | 2 |   |   |   | 2         |
| Croatia        | 8.04  | 2.81  | 0.88      | 3.91  | 1                |   |   |   |   | 1         |
| Cyprus         | 0.00  | 0.00  | 2.03      | 0.68  | 1                |   |   |   |   | 1         |
| Czech Republic | 28.17 | 13.80 | 0.00      | 13.99 |                  |   | 3 |   |   | 3         |
| Denmark        | 6.29  | 0.00  | 4.54      | 3.61  | 1                |   |   |   |   | 1         |
| Estonia        | 2.46  | 6.50  | 1.04      | 3.34  | 1                |   |   |   |   | 1         |
| Finland        | 17.59 | 10.21 | 8.85      | 12.21 |                  |   | 3 |   |   | 3         |
| France         | 92.65 | 33.84 | 32.27     | 52.92 |                  |   |   |   | 5 | 5         |
| Germany        | 100   | 100   | 100.00    | 100   |                  |   |   |   | 5 | 5         |
| Greece         | 7.03  | 0.63  | 12.43     | 6.70  |                  | 2 |   |   |   | 2         |
| Hungary        | 23.44 | 3.52  | 0.00      | 8.99  |                  | 2 |   |   |   | 2         |
| Ireland        | 5.70  | 0.11  | 5.36      | 3.72  | 1                |   |   |   |   | 1         |
| Italy          | 50.63 | 15.35 | 61.59     | 42.52 |                  |   |   |   | 5 | 5         |
| Latvia         | 5.98  | 17.26 | 1.63      | 8.29  |                  | 2 |   |   |   | 2         |
| Lithuania      | 5.24  | 14.30 | 2.10      | 7.22  |                  | 2 |   |   |   | 2         |
| Luxembourg     | 0.82  | 0.25  | 0.00      | 0.35  | 1                |   |   |   |   | 1         |
| Malta          | 0.00  | 0.00  | 14.25     | 4.75  | 1                |   |   |   |   | 1         |
| Netherlands    | 8.71  | 0.00  | 67.69     | 25.47 |                  |   |   | 4 |   | 4         |
| Norway         | 12.23 | 0.00  | 2.04      | 4.76  | 1                |   |   |   |   | 1         |
| Poland         | 57.77 | 37.41 | 7.72      | 34.30 |                  |   |   | 4 |   | 4         |
| Portugal       | 8.12  | 2.34  | 10.33     | 6.93  |                  | 2 |   |   |   | 2         |
| Romania        | 32.88 | 11.98 | 5.17      | 16.68 |                  |   | 3 |   |   | 3         |
| Slovakia       | 10.73 | 8.11  | 0.00      | 6.28  |                  | 2 |   |   |   | 2         |





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|                |       |       |       |       |   |  |   |  |   |   |
|----------------|-------|-------|-------|-------|---|--|---|--|---|---|
| Slovenia       | 3.62  | 3.53  | 2.90  | 3.35  | 1 |  |   |  |   | 1 |
| Spain          | 46.18 | 9.14  | 77.93 | 44.42 |   |  |   |  | 5 | 5 |
| Sweden         | 29.32 | 11.92 | 8.52  | 16.58 |   |  | 3 |  |   | 3 |
| United Kingdom | 54.14 | 19.46 | 50.47 | 41.36 |   |  |   |  | 5 | 5 |

## Production scores

### P1 - Hatchery & nursery

|   |   |   |   |
|---|---|---|---|
| 3 | 4 | 5 | 6 |
| 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 |
|   | 1 | 2 | 3 |

| Hatchery | Score | Nursery | Score |
|----------|-------|---------|-------|
| 1        | 1     | 1       | 1     |
| 20       | 2     | 20      | 2     |
| 100      | 3     | 100     | 3     |

| Country        | Hatchery (X) | Nursery (Y) | X <sub>1</sub> | X <sub>2</sub> | X <sub>3</sub> | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>3</sub> | All Score |
|----------------|--------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| Austria        | 3.25         | 0.83        |                | 2              |                | 1              |                |                | 3         |
| Belgium        | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Bulgaria       | 9.15         | 1.01        |                | 2              |                |                | 2              |                | 4         |
| Croatia        | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Cyprus         | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Czech Republic | 35.85        | 15.13       |                |                | 3              |                | 2              |                | 5         |
| Denmark        | 54.91        | 3.81        |                |                | 3              |                | 2              |                | 5         |
| Estonia        | 0.60         | 0.07        | 1              |                |                | 1              |                |                | 2         |
| Finland        | 9.97         | 9.09        |                | 2              |                |                | 2              |                | 4         |
| France         | 84.84        | 100.00      |                |                | 3              |                |                | 3              | 6         |
| Germany        | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Greece         | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Hungary        | 0.22         | 2.35        | 1              |                |                |                | 2              |                | 3         |
| Ireland        | 1.78         | 3.84        |                | 2              |                |                | 2              |                | 4         |
| Italy          | 47.92        | 8.20        |                |                | 3              |                | 2              |                | 5         |
| Latvia         | 0.11         | 1.78        | 1              |                |                |                | 2              |                | 3         |
| Lithuania      | 0.65         | 3.46        | 1              |                |                |                | 2              |                | 3         |
| Luxembourg     | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Malta          | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Netherlands    | 0.00         | 0.00        | 1              |                |                | 1              |                |                | 2         |
| Norway         | 100.00       | 13.13       |                |                | 3              |                | 2              |                | 5         |



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|                |       |       |   |   |   |   |   |   |   |
|----------------|-------|-------|---|---|---|---|---|---|---|
| Poland         | 76.70 | 21.79 |   |   | 3 |   |   | 3 | 6 |
| Portugal       | 0.00  | 0.00  | 1 |   |   | 1 |   |   | 2 |
| Romania        | 8.96  | 6.65  |   | 2 |   |   | 2 |   | 4 |
| Slovakia       | 5.98  | 0.76  |   | 2 |   | 1 |   |   | 3 |
| Slovenia       | 0.00  | 0.00  | 1 |   |   | 1 |   |   | 2 |
| Spain          | 58.08 | 26.85 |   |   | 3 |   |   | 3 | 6 |
| Sweden         | 0.00  | 0.00  | 1 |   |   | 1 |   |   | 2 |
| United Kingdom | 26.48 | 12.80 |   |   | 3 |   | 2 |   | 5 |

## P2 - Coastline

| Coastline | Score |
|-----------|-------|
| 5         | 1     |
| 10        | 2     |
| 20        | 3     |
| 40        | 4     |
| 100       | 5     |

| Country        | Absolute coastline | Measured coastline | Absolute-Measured Ratio | Score  | Category ranking |   |   |   |   | All Score |
|----------------|--------------------|--------------------|-------------------------|--------|------------------|---|---|---|---|-----------|
|                |                    |                    |                         |        | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | 0                  | 0                  | -                       | 0.00   | 1                |   |   |   |   | 1         |
| Belgium        | 76                 | 64.5               | 1.18                    | 4.41   | 1                |   |   |   |   | 1         |
| Bulgaria       | 457                | 287.98             | 1.59                    | 5.94   |                  | 2 |   |   |   | 2         |
| Croatia        | 5664               | 1430.69            | 3.96                    | 14.82  |                  |   | 3 |   |   | 3         |
| Cyprus         | 671                | 576.25             | 1.16                    | 4.36   | 1                |   |   |   |   | 1         |
| Czech Republic | 0                  | 0                  | -                       | 0.00   | 1                |   |   |   |   | 1         |
| Denmark        | 5,316              | 1979.61            | 2.69                    | 10.05  |                  |   | 3 |   |   | 3         |
| Estonia        | 2956               | 1115.44            | 2.65                    | 9.92   |                  | 2 |   |   |   | 2         |
| Finland        | 31119              | 1165               | 26.71                   | 100.00 |                  |   |   |   | 5 | 5         |
| France         | 7330               | 3118               | 2.35                    | 8.80   |                  | 2 |   |   |   | 2         |
| Germany        | 3624               | 1108               | 3.27                    | 12.24  |                  |   | 3 |   |   | 3         |
| Greece         | 15147              | 4365               | 3.47                    | 12.99  |                  |   | 3 |   |   | 3         |
| Hungary        | 0                  | 0                  | -                       | 0.00   | 1                |   |   |   |   | 1         |
| Ireland        | 6437               | 1721               | 3.74                    | 14.00  |                  |   | 3 |   |   | 3         |
| Italy          | 9226               | 5086.39            | 1.81                    | 6.79   |                  | 2 |   |   |   | 2         |
| Latvia         | 566                | 487                | 1.16                    | 4.35   | 1                |   |   |   |   | 1         |
| Lithuania      | 258                | 168.9              | 1.53                    | 5.72   |                  | 2 |   |   |   | 2         |
| Luxembourg     | 0                  | 0                  | -                       | 0.00   | 1                |   |   |   |   | 1         |





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|                |          |         |       |       |   |   |   |  |   |
|----------------|----------|---------|-------|-------|---|---|---|--|---|
| Malta          | 198      | 129.94  | 1.52  | 5.70  |   | 2 |   |  | 2 |
| Netherlands    | 1914     | 1270    | 1.51  | 5.64  |   | 2 |   |  | 2 |
| Norway         | 53199    | 5073    | 10.49 | 39.26 |   |   | 4 |  | 4 |
| Poland         | 1032     | 465.97  | 2.21  | 8.29  |   | 2 |   |  | 2 |
| Portugal       | 2830     | 1734.39 | 1.63  | 6.11  |   | 2 |   |  | 2 |
| Romania        | 696      | 218     | 3.19  | 11.95 |   |   | 3 |  | 3 |
| Slovakia       | 0.00     | 0       | -     | 0.00  | 1 |   |   |  | 1 |
| Slovenia       | 41.00    | 32.3    | 1.27  | 4.75  | 1 |   |   |  | 1 |
| Spain          | 7268.00  | 4359.4  | 1.67  | 6.24  |   | 2 |   |  | 2 |
| Sweden         | 26384.00 | 2488.53 | 10.60 | 39.69 |   |   | 4 |  | 4 |
| United Kingdom | 19717.00 | 5098.41 | 3.87  | 14.48 |   |   | 3 |  | 3 |

## P3 - Digital capacity

|   |   |   |   |
|---|---|---|---|
| 3 | 4 | 5 | 6 |
| 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 |
|   | 1 | 2 | 3 |

| Cell phone penetration (%) | Score | Internet penetration (%) | Score |
|----------------------------|-------|--------------------------|-------|
| 0.333                      | 1     | 0.333                    | 1     |
| 0.666                      | 2     | 0.666                    | 2     |
| 1                          | 3     | 1                        | 3     |

| Country        | Cell (X) | Internet (Y) | Score | X <sub>1</sub> | X <sub>2</sub> | X <sub>3</sub> | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>3</sub> | All Score |
|----------------|----------|--------------|-------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| Austria        | 1.00     | 0.75         | 0.87  |                |                | 3              |                |                | 3              | 6         |
| Belgium        | 1.00     | 0.74         | 0.87  |                |                | 3              |                |                | 3              | 6         |
| Bulgaria       | 1.00     | 0.44         | 0.72  |                |                | 3              |                | 2              |                | 5         |
| Croatia        | 1.00     | 0.54         | 0.77  |                |                | 3              |                | 2              |                | 5         |
| Cyprus         | 0.94     | 0.53         | 0.73  |                |                | 3              |                | 2              |                | 5         |
| Czech Republic | 1.00     | 0.66         | 0.83  |                |                | 3              |                | 2              |                | 5         |
| Denmark        | 1.00     | 0.89         | 0.95  |                |                | 3              |                |                | 3              | 6         |
| Estonia        | 1.00     | 0.74         | 0.87  |                |                | 3              |                |                | 3              | 6         |
| Finland        | 1.00     | 0.86         | 0.93  |                |                | 3              |                |                | 3              | 6         |
| France         | 0.93     | 0.73         | 0.83  |                |                | 3              |                |                | 3              | 6         |
| Germany        | 1.00     | 0.80         | 0.90  |                |                | 3              |                |                | 3              | 6         |
| Greece         | 1.00     | 0.47         | 0.73  |                |                | 3              |                | 2              |                | 5         |
| Hungary        | 1.00     | 0.64         | 0.82  |                |                | 3              |                | 2              |                | 5         |
| Ireland        | 1.00     | 0.70         | 0.85  |                |                | 3              |                |                | 3              | 6         |





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|                |      |      |      |  |  |   |  |   |   |   |
|----------------|------|------|------|--|--|---|--|---|---|---|
| Italy          | 1.00 | 0.51 | 0.75 |  |  | 3 |  | 2 |   | 5 |
| Latvia         | 1.00 | 0.67 | 0.84 |  |  | 3 |  |   | 3 | 6 |
| Lithuania      | 1.00 | 0.60 | 0.80 |  |  | 3 |  | 2 |   | 5 |
| Luxembourg     | 1.00 | 0.87 | 0.93 |  |  | 3 |  |   | 3 | 6 |
| Malta          | 1.00 | 0.60 | 0.80 |  |  | 3 |  | 2 |   | 5 |
| Netherlands    | 1.00 | 0.90 | 0.95 |  |  | 3 |  |   | 3 | 6 |
| Norway         | 1.00 | 0.92 | 0.96 |  |  | 3 |  |   | 3 | 6 |
| Poland         | 1.00 | 0.58 | 0.79 |  |  | 3 |  | 2 |   | 5 |
| Portugal       | 1.00 | 0.52 | 0.76 |  |  | 3 |  | 2 |   | 5 |
| Romania        | 1.00 | 0.39 | 0.70 |  |  | 3 |  | 2 |   | 5 |
| Slovakia       | 1.00 | 0.71 | 0.85 |  |  | 3 |  |   | 3 | 6 |
| Slovenia       | 1.00 | 0.65 | 0.82 |  |  | 3 |  | 2 |   | 5 |
| Spain          | 1.00 | 0.64 | 0.82 |  |  | 3 |  | 2 |   | 5 |
| Sweden         | 1.00 | 0.90 | 0.95 |  |  | 3 |  |   | 3 | 6 |
| United Kingdom | 1.00 | 0.83 | 0.91 |  |  | 3 |  |   | 3 | 6 |

## P4 - Insurance

| Insurance | Score |
|-----------|-------|
| 0-20      | 1     |
| 20-40     | 2     |
| 40-60     | 3     |
| 60-80     | 4     |
| 80-100    | 5     |

| Country        | Control | Insurer A | Insurer B | Score | Category ranking |   |   |   |   | All Score |
|----------------|---------|-----------|-----------|-------|------------------|---|---|---|---|-----------|
|                |         |           |           |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | 2       | 3         | 3         | 53.33 |                  |   | 3 |   |   | 3         |
| Belgium        | 3       | 3         | 3         | 60.00 |                  |   | 3 |   |   | 3         |
| Bulgaria       | 1       | 1         | 2         | 26.67 |                  | 2 |   |   |   | 2         |
| Croatia        | 4       | 3         | 4         | 73.33 |                  |   |   | 4 |   | 4         |
| Cyprus         | 2       | 4         | 3         | 60.00 |                  |   | 3 |   |   | 3         |
| Czech Republic | 1       | 3         | 2         | 40.00 |                  | 2 |   |   |   | 2         |
| Denmark        | 5       | 5         | 4         | 93.33 |                  |   |   |   | 5 | 5         |
| Estonia        | 2       | 2         | 1         | 33.33 |                  | 2 |   |   |   | 2         |
| Finland        | 3       | 3         | 3         | 60.00 |                  |   | 3 |   |   | 3         |
| France         | 3       | 4         | 3         | 66.67 |                  |   |   | 4 |   | 4         |
| Germany        | 2       | 4         | 2         | 53.33 |                  |   | 3 |   |   | 3         |
| Greece         | 4       | 5         | 4         | 86.67 |                  |   |   |   | 5 | 5         |
| Hungary        | 2       | 2         | 2         | 40.00 |                  | 2 |   |   |   | 2         |
| Ireland        | 3       | 5         | 4         | 80.00 |                  |   |   | 4 |   | 4         |





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|                |   |   |   |        |  |   |   |   |   |   |
|----------------|---|---|---|--------|--|---|---|---|---|---|
| Italy          | 3 | 5 | 4 | 80.00  |  |   |   | 4 |   | 4 |
| Latvia         | 1 | 2 | 1 | 26.67  |  | 2 |   |   |   | 2 |
| Lithuania      | 1 | 2 | 1 | 26.67  |  | 2 |   |   |   | 2 |
| Luxembourg     | 1 | 4 | 3 | 53.33  |  |   | 3 |   |   | 3 |
| Malta          | 3 | 5 | 4 | 80.00  |  |   |   | 4 |   | 4 |
| Netherlands    | 2 | 5 | 3 | 66.67  |  |   |   | 4 |   | 4 |
| Norway         | 5 | 5 | 5 | 100.00 |  |   |   |   | 5 | 5 |
| Poland         | 2 | 3 | 3 | 53.33  |  |   | 3 |   |   | 3 |
| Portugal       | 2 | 4 | 4 | 66.67  |  |   |   | 4 |   | 4 |
| Romania        | 1 | 1 | 2 | 26.67  |  | 2 |   |   |   | 2 |
| Slovakia       | 1 | 2 | 2 | 33.33  |  | 2 |   |   |   | 2 |
| Slovenia       | 1 | 2 | 2 | 33.33  |  | 2 |   |   |   | 2 |
| Spain          | 4 | 5 | 4 | 86.67  |  |   |   |   | 5 | 5 |
| Sweden         | 3 | 3 | 3 | 60.00  |  |   | 3 |   |   | 3 |
| United Kingdom | 4 | 5 | 4 | 86.67  |  |   |   |   | 5 | 5 |

## Regulatory scores

### R1 - Institutional

| Institutional | Score |
|---------------|-------|
| 60            | 1     |
| 70            | 2     |
| 40-60         | 3     |
| 60-80         | 4     |
| 80-100        | 5     |

| Country        | Govern. effective | Political stability | Regulatory quality | Voice and Accountability | Score | Category ranking |   |   |   |   | All Score |
|----------------|-------------------|---------------------|--------------------|--------------------------|-------|------------------|---|---|---|---|-----------|
|                |                   |                     |                    |                          |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | 94.08             | 92.23               | 93.08              | 94.55                    | 93.48 |                  |   |   |   | 5 | 5         |
| Belgium        | 92.15             | 72.65               | 87.63              | 93.22                    | 86.41 |                  |   |   | 4 |   | 4         |
| Bulgaria       | 57.91             | 55.29               | 70.45              | 63.05                    | 61.67 |                  | 2 |   |   |   | 2         |
| Croatia        | 70.77             | 65.17               | 67.02              | 61.57                    | 66.13 |                  | 2 |   |   |   | 2         |
| Cyprus         | 88.14             | 64.28               | 86.42              | 80.45                    | 79.82 |                  |   | 3 |   |   | 3         |
| Czech Republic | 78.68             | 82.19               | 83.56              | 76.96                    | 80.35 |                  |   |   | 4 |   | 4         |
| Denmark        | 98.99             | 83.11               | 98.31              | 98.90                    | 94.83 |                  |   |   |   | 5 | 5         |
| Estonia        | 81.66             | 66.81               | 90.60              | 83.50                    | 80.64 |                  |   |   | 4 |   | 4         |
| Finland        | 99.37             | 97.81               | 97.24              | 97.23                    | 97.91 |                  |   |   |   | 5 | 5         |
| France         | 89.51             | 63.20               | 85.45              | 90.35                    | 82.13 |                  |   |   | 4 |   | 4         |







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|                |       |       |       |       |       |   |   |   |   |   |
|----------------|-------|-------|-------|-------|-------|---|---|---|---|---|
| Germany        | 92.05 | 76.60 | 93.16 | 93.60 | 88.85 |   |   | 4 |   | 4 |
| Greece         | 69.64 | 49.45 | 72.65 | 72.90 | 66.16 |   | 2 |   |   | 2 |
| Hungary        | 73.49 | 71.16 | 81.57 | 75.38 | 75.40 |   |   | 3 |   | 3 |
| Ireland        | 90.09 | 84.54 | 95.72 | 93.98 | 91.08 |   |   |   | 5 | 5 |
| Italy          | 62.17 | 62.22 | 76.64 | 78.69 | 69.93 |   | 2 |   |   | 2 |
| Latvia         | 73.12 | 63.10 | 80.24 | 71.09 | 71.89 |   |   | 3 |   | 3 |
| Lithuania      | 74.68 | 71.10 | 81.49 | 74.28 | 75.39 |   |   | 3 |   | 3 |
| Luxembourg     | 93.83 | 96.96 | 96.29 | 97.37 | 96.11 |   |   |   | 5 | 5 |
| Malta          | 83.52 | 89.96 | 86.09 | 87.77 | 86.84 |   |   | 4 |   | 4 |
| Netherlands    | 95.91 | 81.90 | 96.97 | 97.81 | 93.15 |   |   |   | 5 | 5 |
| Norway         | 97.50 | 93.02 | 91.45 | 99.62 | 95.40 |   |   |   | 5 | 5 |
| Poland         | 69.99 | 74.51 | 76.93 | 77.24 | 74.67 |   |   | 3 |   | 3 |
| Portugal       | 80.98 | 73.88 | 78.74 | 85.58 | 79.80 |   |   | 3 |   | 3 |
| Romania        | 47.28 | 51.42 | 68.78 | 60.48 | 56.99 | 1 |   |   |   | 1 |
| Slovakia       | 76.37 | 81.71 | 81.47 | 75.33 | 78.72 |   |   | 3 |   | 3 |
| Slovenia       | 80.69 | 79.88 | 74.17 | 80.53 | 78.82 |   |   | 3 |   | 3 |
| Spain          | 81.71 | 42.21 | 83.01 | 83.90 | 72.71 |   |   | 3 |   | 3 |
| Sweden         | 97.78 | 90.51 | 95.69 | 98.52 | 95.62 |   |   |   | 5 | 5 |
| United Kingdom | 92.31 | 59.03 | 96.73 | 92.35 | 85.11 |   |   |   | 4 | 4 |

## R2 - Business friendly

| Institutional | Score |
|---------------|-------|
| 40            | 1     |
| 60            | 2     |
| 75            | 3     |
| 90            | 4     |
| 100           | 5     |

| Country        | Time to start business | Cost to start business | Burden of customs | Score | Category ranking |   |   |   |   | All Score |
|----------------|------------------------|------------------------|-------------------|-------|------------------|---|---|---|---|-----------|
|                |                        |                        |                   |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | 43.22                  | 74.18                  | 89.04             | 68.81 |                  |   | 3 |   |   | 3         |
| Belgium        | 84.91                  | 70.45                  | 82.35             | 79.24 |                  |   |   | 4 |   | 4         |
| Bulgaria       | 43.48                  | 85.10                  | 61.76             | 63.45 |                  |   | 3 |   |   | 3         |
| Croatia        | 57.03                  | 52.64                  | 69.74             | 59.80 |                  | 2 |   |   |   | 2         |
| Cyprus         | 81.59                  | 29.13                  | 82.59             | 64.44 |                  |   | 3 |   |   | 3         |
| Czech Republic | 59.85                  | 51.77                  | 75.96             | 62.52 |                  |   | 3 |   |   | 3         |
| Denmark        | 86.83                  | 99.63                  | 93.20             | 93.22 |                  |   |   |   | 5 | 5         |
| Estonia        | 78.26                  | 88.39                  | 90.02             | 85.56 |                  |   |   | 4 |   | 4         |





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|                |       |       |        |       |   |   |   |   |  |   |
|----------------|-------|-------|--------|-------|---|---|---|---|--|---|
| Finland        | 63.23 | 94.23 | 100.00 | 85.82 |   |   |   | 4 |  | 4 |
| France         | 67.77 | 94.66 | 80.93  | 81.12 |   |   |   | 4 |  | 4 |
| Germany        | 62.28 | 69.58 | 84.22  | 72.03 |   |   | 3 |   |  | 3 |
| Greece         | 53.45 | 0.00  | 68.18  | 40.54 |   | 2 |   |   |  | 2 |
| Hungary        | 78.01 | 40.16 | 76.40  | 64.86 |   |   | 3 |   |  | 3 |
| Ireland        | 73.40 | 98.20 | 88.96  | 86.85 |   |   |   | 4 |  | 4 |
| Italy          | 80.05 | 2.73  | 68.50  | 50.43 |   | 2 |   |   |  | 2 |
| Latvia         | 65.60 | 85.85 | 71.62  | 74.36 |   |   | 3 |   |  | 3 |
| Lithuania      | 54.60 | 88.39 | 77.64  | 73.55 |   |   | 3 |   |  | 3 |
| Luxembourg     | 51.02 | 74.67 | 93.77  | 73.15 |   |   | 3 |   |  | 3 |
| Malta          | 14.26 | 35.47 | 80.18  | 43.30 |   | 2 |   |   |  | 2 |
| Netherlands    | 84.40 | 68.22 | 90.42  | 81.01 |   |   |   | 4 |  | 4 |
| Norway         | 85.68 | 89.70 | 88.04  | 87.80 |   |   |   | 4 |  | 4 |
| Poland         | 28.13 | 10.74 | 70.25  | 36.37 | 1 |   |   |   |  | 1 |
| Portugal       | 90.41 | 73.12 | 81.48  | 81.67 |   |   |   | 4 |  | 4 |
| Romania        | 77.88 | 82.56 | 61.74  | 74.06 |   |   | 3 |   |  | 3 |
| Slovakia       | 55.24 | 86.22 | 76.75  | 72.74 |   |   | 3 |   |  | 3 |
| Slovenia       | 57.16 | 88.83 | 85.54  | 77.18 |   |   |   | 4 |  | 4 |
| Spain          | 0.00  | 40.22 | 78.42  | 39.55 | 1 |   |   |   |  | 1 |
| Sweden         | 63.17 | 96.77 | 96.96  | 85.63 |   |   |   | 4 |  | 4 |
| United Kingdom | 75.96 | 96.46 | 83.37  | 85.26 |   |   |   | 4 |  | 4 |

## R3 - Licensing

| Licensing | Score |
|-----------|-------|
| 30+       | 1     |
| 18-30     | 2     |
| 12-18     | 3     |
| 6-12      | 4     |
| 0-6       | 5     |

| Country        | Months | Category ranking |   |   |   |   | All Score |
|----------------|--------|------------------|---|---|---|---|-----------|
|                |        | 1                | 2 | 3 | 4 | 5 |           |
| Austria        | 60     | 1                |   |   |   |   | 1         |
| Belgium        | 60     | 1                |   |   |   |   | 1         |
| Bulgaria       | 60     | 1                |   |   |   |   | 1         |
| Croatia        | 12     |                  |   |   | 4 |   | 4         |
| Cyprus         | 12     |                  |   |   | 4 |   | 4         |
| Czech Republic | 60     | 1                |   |   |   |   | 1         |
| Denmark        | 24     |                  | 2 |   |   |   | 2         |
| Estonia        | 28     |                  | 2 |   |   |   | 2         |





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|                |    |   |   |   |   |   |   |
|----------------|----|---|---|---|---|---|---|
| Finland        | 12 |   |   |   | 4 |   | 4 |
| France         | 18 |   |   | 3 |   |   | 3 |
| Germany        | 60 | 1 |   |   |   |   | 1 |
| Greece         | 12 |   |   |   | 4 |   | 4 |
| Hungary        | 8  |   |   |   | 4 |   | 4 |
| Ireland        | 60 | 1 |   |   |   |   | 1 |
| Italy          | 24 |   | 2 |   |   |   | 2 |
| Latvia         | 60 | 1 |   |   |   |   | 1 |
| Lithuania      | 60 | 1 |   |   |   |   | 1 |
| Luxembourg     | 60 | 1 |   |   |   |   | 1 |
| Malta          | 12 |   |   |   | 4 |   | 4 |
| Netherlands    | 60 | 1 |   |   |   |   | 1 |
| Norway         | 6  |   |   |   |   | 5 | 5 |
| Poland         | 60 | 1 |   |   |   |   | 1 |
| Portugal       | 36 | 1 |   |   |   |   | 1 |
| Romania        | 60 | 1 |   |   |   |   | 1 |
| Slovakia       | 60 | 1 |   |   |   |   | 1 |
| Slovenia       | 24 |   | 2 |   |   |   | 2 |
| Spain          | 60 | 1 |   |   |   |   | 1 |
| Sweden         | 12 |   |   |   |   | 4 | 4 |
| United Kingdom | 60 | 1 |   |   |   |   | 1 |

## R4 - Fiscal

|   |   |   |   |
|---|---|---|---|
| 3 | 4 | 5 | 6 |
| 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 |
|   | 1 | 2 | 3 |

| Tax revenue (% GDP) | Score | Labour tax (% profits) | Score |
|---------------------|-------|------------------------|-------|
| 30                  | 1     | 30                     | 1     |
| 20                  | 2     | 20                     | 2     |
| 15                  | 3     | 15                     | 3     |

| Country  | Tax revenue (X) | Labour tax (Y) | X <sub>1</sub> | X <sub>2</sub> | X <sub>3</sub> | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>3</sub> | All Score |
|----------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| Austria  | 25.53           | 34.43          |                | 2              |                | 1              |                |                | 3         |
| Belgium  | 25.07           | 50.30          |                | 2              |                | 1              |                |                | 3         |
| Bulgaria | 20.02           | 20.20          |                | 2              |                |                | 2              |                | 4         |
| Croatia  | 19.46           | 18.43          |                |                | 3              |                |                | 3              | 6         |
| Cyprus   | 31.05           | 12.40          | 1              |                |                |                |                | 3              | 4         |





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|                |       |       |   |   |   |   |   |   |   |
|----------------|-------|-------|---|---|---|---|---|---|---|
| Czech Republic | 13.29 | 38.40 |   |   | 3 | 1 |   |   | 4 |
| Denmark        | 33.48 | 3.20  | 1 |   |   |   |   | 3 | 4 |
| Estonia        | 1.02  | 39.13 |   |   | 3 | 1 |   |   | 4 |
| Finland        | 20.30 | 24.47 |   | 2 |   |   | 2 |   | 4 |
| France         | 22.24 | 52.30 |   | 2 |   | 1 |   |   | 3 |
| Germany        | 11.36 | 21.43 |   |   | 3 |   | 2 |   | 5 |
| Greece         | 21.60 | 30.83 |   | 2 |   | 1 |   |   | 3 |
| Hungary        | 22.38 | 34.37 |   | 2 |   | 1 |   |   | 3 |
| Ireland        | 23.49 | 11.93 |   | 2 |   |   |   | 3 | 5 |
| Italy          | 22.69 | 43.40 |   | 2 |   | 1 |   |   | 3 |
| Latvia         | 13.86 | 27.03 |   |   | 3 |   | 2 |   | 5 |
| Lithuania      | 5.05  | 35.17 |   |   | 3 | 1 |   |   | 4 |
| Luxembourg     | 25.25 | 15.50 |   | 2 |   |   |   | 3 | 5 |
| Malta          | 36.88 | 10.90 | 1 |   |   |   |   | 3 | 4 |
| Netherlands    | 20.92 | 18.63 |   | 2 |   |   |   | 3 | 5 |
| Norway         | 26.82 | 15.90 |   | 2 |   |   |   | 3 | 5 |
| Poland         | 16.64 | 24.43 |   |   | 3 |   | 2 |   | 5 |
| Portugal       | 21.09 | 26.80 |   | 2 |   |   | 2 |   | 4 |
| Romania        | 17.44 | 31.00 |   |   | 3 | 1 |   |   | 4 |
| Slovakia       | 13.23 | 39.67 |   |   | 3 | 1 |   |   | 4 |
| Slovenia       | 18.40 | 18.20 |   |   | 3 |   |   | 3 | 6 |
| Spain          | 13.45 | 36.13 |   |   | 3 | 1 |   |   | 4 |
| Sweden         | 27.02 | 35.47 |   | 2 |   | 1 |   |   | 3 |
| United Kingdom | 25.99 | 10.90 |   | 2 |   |   |   | 3 | 5 |

## Environment scores

### E1 - Depth

| Depth          | Score |
|----------------|-------|
| 0-10 metres    | 1     |
| > 300 metres   | 2     |
| 10-40 metres   | 3     |
| 150-300 metres | 4     |
| 40-150 metres  | 5     |

| Country  | Months | Category ranking |   |   |   |   | All Score |
|----------|--------|------------------|---|---|---|---|-----------|
|          |        | 1                | 2 | 3 | 4 | 5 |           |
|          | Score  |                  |   |   |   |   |           |
| Austria  | 1.00   | 1                |   |   |   |   | 1         |
| Belgium  | 2.00   |                  | 2 |   |   |   | 2         |
| Bulgaria | 4.40   |                  |   |   |   | 5 | 5         |
| Croatia  | 4.39   |                  |   |   |   | 5 | 5         |





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|                |      |   |   |   |   |   |   |
|----------------|------|---|---|---|---|---|---|
| Cyprus         | 2.05 |   |   | 3 |   |   | 3 |
| Czech Republic | 1.00 | 1 |   |   |   |   | 1 |
| Denmark        | 3.09 |   |   |   | 4 |   | 4 |
| Estonia        | 3.45 |   |   |   | 4 |   | 4 |
| Finland        | 3.25 |   |   |   | 4 |   | 4 |
| France         | 3.05 |   |   |   | 4 |   | 4 |
| Germany        | 1.96 |   | 2 |   |   |   | 2 |
| Greece         | 2.30 |   |   | 3 |   |   | 3 |
| Hungary        | 1.00 | 1 |   |   |   |   | 1 |
| Ireland        | 2.87 |   |   | 3 |   |   | 3 |
| Italy          | 2.43 |   |   | 3 |   |   | 3 |
| Latvia         | 2.01 |   |   | 3 |   |   | 3 |
| Lithuania      | 4.01 |   |   |   |   | 5 | 5 |
| Luxembourg     | 1.00 | 1 |   |   |   |   | 1 |
| Malta          | 4.26 |   |   |   |   | 5 | 5 |
| Netherlands    | 1.92 |   | 2 |   |   |   | 2 |
| Norway         | 2.47 |   |   | 3 |   |   | 3 |
| Poland         | 3.90 |   |   |   | 4 |   | 4 |
| Portugal       | 2.18 |   |   | 3 |   |   | 3 |
| Romania        | 2.12 |   |   | 3 |   |   | 3 |
| Slovakia       | 1.00 | 1 |   |   |   |   | 1 |
| Slovenia       | 1.98 |   | 2 |   |   |   | 2 |
| Spain          | 2.22 |   |   | 3 |   |   | 3 |
| Sweden         | 4.03 |   |   |   |   | 5 | 5 |
| United Kingdom | 3.65 |   |   |   | 4 |   | 4 |

## E2 - Water temperature

| Water temperature | Score |
|-------------------|-------|
| Very poor         | 1     |
| Below average     | 2     |
| Average           | 3     |
| Above average     | 4     |
| Excellent         | 5     |

| Country  | Score | Category ranking |   |   |   |   | All Score |
|----------|-------|------------------|---|---|---|---|-----------|
|          |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria  | 1.00  | 1                |   |   |   |   | 1         |
| Belgium  | 1.96  |                  | 2 |   |   |   | 2         |
| Bulgaria | 1.57  |                  | 2 |   |   |   | 2         |
| Croatia  | 2.58  |                  |   | 3 |   |   | 3         |





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|                |      |   |   |   |   |   |   |
|----------------|------|---|---|---|---|---|---|
| Cyprus         | 1.17 |   | 2 |   |   |   | 2 |
| Czech Republic | 1.00 | 1 |   |   |   |   | 1 |
| Denmark        | 1.87 |   | 2 |   |   |   | 2 |
| Estonia        | 3.44 |   |   |   | 4 |   | 4 |
| Finland        | 3.55 |   |   |   | 4 |   | 4 |
| France         | 2.33 |   |   | 3 |   |   | 3 |
| Germany        | 2.21 |   |   | 3 |   |   | 3 |
| Greece         | 1.50 |   | 2 |   |   |   | 2 |
| Hungary        | 1.00 | 1 |   |   |   |   | 1 |
| Ireland        | 1.86 |   | 2 |   |   |   | 2 |
| Italy          | 1.75 |   | 2 |   |   |   | 2 |
| Latvia         | 3.08 |   |   |   | 4 |   | 4 |
| Lithuania      | 3.78 |   |   |   | 4 |   | 4 |
| Luxembourg     | 1.00 | 1 |   |   |   |   | 1 |
| Malta          | 1.29 |   | 2 |   |   |   | 2 |
| Netherlands    | 2.07 |   |   | 3 |   |   | 3 |
| Norway         | 1.84 |   | 2 |   |   |   | 2 |
| Poland         | 2.58 |   |   | 3 |   |   | 3 |
| Portugal       | 1.23 |   | 2 |   |   |   | 2 |
| Romania        | 1.95 |   | 2 |   |   |   | 2 |
| Slovakia       | 1.00 | 1 |   |   |   |   | 1 |
| Slovenia       | 4.60 |   |   |   |   | 5 | 5 |
| Spain          | 1.58 |   | 2 |   |   |   | 2 |
| Sweden         | 3.10 |   |   |   | 4 |   | 4 |
| United Kingdom | 2.19 |   |   | 3 |   |   | 3 |

## E3 - Current speed

| Current speed            | Score |
|--------------------------|-------|
| 0-3 cm s <sup>-1</sup>   | 1     |
| 50-80 cm s <sup>-1</sup> | 2     |
| 25-50 cm s <sup>-1</sup> | 3     |
| 3-10 cm s <sup>-1</sup>  | 4     |
| 10-25 cm s <sup>-1</sup> | 5     |

| Country  | Score | Category ranking |   |   |   |   | All Score |
|----------|-------|------------------|---|---|---|---|-----------|
|          |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria  | 1.00  | 1                |   |   |   |   | 1         |
| Belgium  | 2.00  |                  | 2 |   |   |   | 2         |
| Bulgaria | 4.40  |                  |   |   |   | 5 | 5         |
| Croatia  | 4.39  |                  |   |   |   | 5 | 5         |





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|                |      |   |   |   |   |   |   |
|----------------|------|---|---|---|---|---|---|
| Cyprus         | 2.05 |   |   | 3 |   |   | 3 |
| Czech Republic | 1.00 | 1 |   |   |   |   | 1 |
| Denmark        | 3.09 |   |   |   | 4 |   | 4 |
| Estonia        | 3.45 |   |   |   | 4 |   | 4 |
| Finland        | 3.25 |   |   |   | 4 |   | 4 |
| France         | 3.05 |   |   |   | 4 |   | 4 |
| Germany        | 1.96 |   | 2 |   |   |   | 2 |
| Greece         | 2.30 |   |   | 3 |   |   | 3 |
| Hungary        | 1.00 | 1 |   |   |   |   | 1 |
| Ireland        | 2.87 |   |   | 3 |   |   | 3 |
| Italy          | 2.43 |   |   | 3 |   |   | 3 |
| Latvia         | 2.01 |   |   | 3 |   |   | 3 |
| Lithuania      | 4.01 |   |   |   |   | 5 | 5 |
| Luxembourg     | 1.00 | 1 |   |   |   |   | 1 |
| Malta          | 4.26 |   |   |   |   | 5 | 5 |
| Netherlands    | 1.92 |   | 2 |   |   |   | 2 |
| Norway         | 2.47 |   |   | 3 |   |   | 3 |
| Poland         | 3.90 |   |   |   | 4 |   | 4 |
| Portugal       | 2.18 |   |   | 3 |   |   | 3 |
| Romania        | 2.12 |   |   | 3 |   |   | 3 |
| Slovakia       | 1.00 | 1 |   |   |   |   | 1 |
| Slovenia       | 1.98 |   | 2 |   |   |   | 2 |
| Spain          | 2.22 |   |   | 3 |   |   | 3 |
| Sweden         | 4.03 |   |   |   |   | 5 | 5 |
| United Kingdom | 3.65 |   |   |   | 4 |   | 4 |

**E4 - Dissolved oxygen**

| Depth   | Score |
|---|-------|
| >60 $\mu\text{g L}^{-1}$ ( $\text{mg m}^{-3}$ )   | 1     |
| 20-60 $\mu\text{g L}^{-1}$ ( $\text{mg m}^{-3}$ ) | 2     |
| 10-20 $\mu\text{g L}^{-1}$ ( $\text{mg m}^{-3}$ ) | 3     |
| <5 $\mu\text{g L}^{-1}$ ( $\text{mg m}^{-3}$ )    | 4     |
| 5-10 $\mu\text{g L}^{-1}$ ( $\text{mg m}^{-3}$ )  | 5     |

| Country  | Score | Category ranking |   |   |   |   | All Score |
|----------|-------|------------------|---|---|---|---|-----------|
|          |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria  | 1.00  | 1                |   |   |   |   | 1         |
| Belgium  | 4.00  |                  |   |   | 4 |   | 4         |
| Bulgaria | 4.00  |                  |   |   | 4 |   | 4         |
| Croatia  | 3.11  |                  |   |   | 4 |   | 4         |



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|                |      |   |  |   |  |   |
|----------------|------|---|--|---|--|---|
| Cyprus         | 3.00 |   |  | 3 |  | 3 |
| Czech Republic | 1.00 | 1 |  |   |  | 1 |
| Denmark        | 4.00 |   |  | 4 |  | 4 |
| Estonia        | 4.00 |   |  | 4 |  | 4 |
| Finland        | 4.00 |   |  | 4 |  | 4 |
| France         | 3.80 |   |  | 4 |  | 4 |
| Germany        | 4.00 |   |  | 4 |  | 4 |
| Greece         | 3.00 |   |  | 3 |  | 3 |
| Hungary        | 1.00 | 1 |  |   |  | 1 |
| Ireland        | 4.00 |   |  | 4 |  | 4 |
| Italy          | 3.02 |   |  | 4 |  | 4 |
| Latvia         | 4.00 |   |  | 4 |  | 4 |
| Lithuania      | 4.00 |   |  | 4 |  | 4 |
| Luxembourg     | 1.00 | 1 |  |   |  | 1 |
| Malta          | 3.00 |   |  | 3 |  | 3 |
| Netherlands    | 4.00 |   |  | 4 |  | 4 |
| Norway         | 4.00 |   |  | 4 |  | 4 |
| Poland         | 4.00 |   |  | 4 |  | 4 |
| Portugal       | 3.90 |   |  | 4 |  | 4 |
| Romania        | 4.00 |   |  | 4 |  | 4 |
| Slovakia       | 1.00 | 1 |  |   |  | 1 |
| Slovenia       | 3.42 |   |  | 4 |  | 4 |
| Spain          | 3.53 |   |  | 4 |  | 4 |
| Sweden         | 4.00 |   |  | 4 |  | 4 |
| United Kingdom | 4.00 |   |  | 4 |  | 4 |

## Social scores

### S1 - Legal

| Rule of law | Score |
|-------------|-------|
| 60          | 1     |
| 70          | 2     |
| 80          | 3     |
| 90          | 4     |
| 100         | 5     |

| Country  | Score | Category ranking |   |   |   |   | All Score |
|----------|-------|------------------|---|---|---|---|-----------|
|          |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria  | 97.62 |                  |   |   |   | 5 | 5         |
| Belgium  | 88.81 |                  |   |   | 4 |   | 4         |
| Bulgaria | 51.48 | 1                |   |   |   |   | 1         |
| Croatia  | 58.33 | 1                |   |   |   |   | 1         |







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|                |       |   |   |   |   |   |   |
|----------------|-------|---|---|---|---|---|---|
| Cyprus         | 83.90 |   |   |   | 4 |   | 4 |
| Czech Republic | 78.80 |   |   | 3 |   |   | 3 |
| Denmark        | 99.10 |   |   |   |   | 5 | 5 |
| Estonia        | 84.57 |   |   |   | 4 |   | 4 |
| Finland        | 99.43 |   |   |   |   | 5 | 5 |
| France         | 89.86 |   |   |   | 4 |   | 4 |
| Germany        | 93.05 |   |   |   |   | 5 | 5 |
| Greece         | 69.07 |   | 2 |   |   |   | 2 |
| Hungary        | 73.88 |   |   | 3 |   |   | 3 |
| Ireland        | 94.18 |   |   |   |   | 5 | 5 |
| Italy          | 62.67 |   | 2 |   |   |   | 2 |
| Latvia         | 72.29 |   |   | 3 |   |   | 3 |
| Lithuania      | 71.81 |   |   | 3 |   |   | 3 |
| Luxembourg     | 96.14 |   |   |   |   | 5 | 5 |
| Malta          | 89.43 |   |   |   | 4 |   | 4 |
| Netherlands    | 96.42 |   |   |   |   | 5 | 5 |
| Norway         | 99.10 |   |   |   |   | 5 | 5 |
| Poland         | 67.89 |   | 2 |   |   |   | 2 |
| Portugal       | 82.91 |   |   |   | 4 |   | 4 |
| Romania        | 54.85 | 1 |   |   |   |   | 1 |
| Slovakia       | 65.57 |   | 2 |   |   |   | 2 |
| Slovenia       | 80.33 |   |   |   | 4 |   | 4 |
| Spain          | 83.90 |   |   |   | 4 |   | 4 |
| Sweden         | 98.52 |   |   |   |   | 5 | 5 |
| United Kingdom | 93.33 |   |   |   |   | 5 | 5 |

## S2 - Sectoral importance

| Rule of law | Score |
|-------------|-------|
| 0           | 1     |
| 5           | 2     |
| 10          | 3     |
| 25          | 4     |
| 40          | 5     |

| Country  | Score | Category ranking |   |   |   |   | All Score |
|----------|-------|------------------|---|---|---|---|-----------|
|          |       | 1                | 2 | 3 | 4 | 5 |           |
| Austria  | 3.10  | 1                |   |   |   |   | 1         |
| Belgium  | 0.10  | 1                |   |   |   |   | 1         |
| Bulgaria | 22.83 |                  |   | 3 |   |   | 3         |





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|                |       |   |   |   |   |   |   |
|----------------|-------|---|---|---|---|---|---|
| Croatia        | 19.58 |   |   | 3 |   |   | 3 |
| Cyprus         | 27.43 |   |   |   | 4 |   | 4 |
| Czech Republic | 15.62 |   |   | 3 |   |   | 3 |
| Denmark        | 2.00  | 1 |   |   |   |   | 1 |
| Estonia        | 0.91  | 1 |   |   |   |   | 1 |
| Finland        | 13.81 |   |   | 3 |   |   | 3 |
| France         | 10.25 |   |   | 3 |   |   | 3 |
| Germany        | 2.15  | 1 |   |   |   |   | 1 |
| Greece         | 36.92 |   |   |   | 4 |   | 4 |
| Hungary        | 30.24 |   |   |   | 4 |   | 4 |
| Ireland        | 16.46 |   |   | 3 |   |   | 3 |
| Italy          | 9.27  |   | 2 |   |   |   | 2 |
| Latvia         | 0.57  | 1 |   |   |   |   | 1 |
| Lithuania      | 1.23  | 1 |   |   |   |   | 1 |
| Luxembourg     | 0.00  | 1 |   |   |   |   | 1 |
| Malta          | 48.04 |   |   |   |   | 5 | 5 |
| Netherlands    | 2.09  | 1 |   |   |   |   | 1 |
| Norway         | 77.36 |   |   |   |   | 5 | 5 |
| Poland         | 4.40  | 1 |   |   |   |   | 1 |
| Portugal       | 2.27  | 1 |   |   |   |   | 1 |
| Romania        | 4.40  | 1 |   |   |   |   | 1 |
| Slovakia       | 2.61  | 1 |   |   |   |   | 1 |
| Slovenia       | 2.61  | 1 |   |   |   |   | 1 |
| Spain          | 5.33  |   | 2 |   |   |   | 2 |
| Sweden         | 0.65  | 1 |   |   |   |   | 1 |
| United Kingdom | 6.16  |   | 2 |   |   |   | 2 |

### S3 - Education & training

|   |   |   |   |
|---|---|---|---|
| 3 | 4 | 5 | 6 |
| 2 | 3 | 4 | 5 |
| 1 | 2 | 3 | 4 |
|   | 1 | 2 | 3 |

| Grants and other revenue<br>(% of revenue) | Score | Technicians in R&D<br>(per million people) | Score |
|--|-------|--|-------|
| 30   | 1     | 30   | 1     |
| 20   | 2     | 20   | 2     |
| 15   | 3     | 15   | 3     |



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| Country        | Grants (X) | R&D (Y) | X <sub>1</sub> | X <sub>2</sub> | X <sub>3</sub> | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>3</sub> | All Score |
|----------------|------------|---------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| Austria        | 9.19       | 47.16   | 1              |                |                |                |                | 3              | 4         |
| Belgium        | 0.00       | 16.63   | 1              |                |                |                | 2              |                | 3         |
| Bulgaria       | 17.64      | 20.53   |                | 2              |                |                | 2              |                | 4         |
| Croatia        | 8.45       | 7.25    | 1              |                |                | 1              |                |                | 2         |
| Cyprus         | 19.62      | 50.40   |                | 2              |                |                |                | 3              | 5         |
| Czech Republic | 9.81       | 72.13   | 1              |                |                |                |                | 3              | 4         |
| Denmark        | 16.34      | 21.22   |                | 2              |                |                | 2              |                | 4         |
| Estonia        | 0.00       | 0.00    | 1              |                |                | 1              |                |                | 2         |
| Finland        | 11.09      | 0.00    | 1              |                |                | 1              |                |                | 2         |
| France         | 8.40       | 49.15   | 1              |                |                |                |                | 3              | 4         |
| Germany        | 4.51       | 19.20   | 1              |                |                |                | 2              |                | 3         |
| Greece         | 12.99      | 19.94   | 1              |                |                |                | 2              |                | 3         |
| Hungary        | 15.53      | 23.82   |                | 2              |                |                | 2              |                | 4         |
| Ireland        | 10.93      | 0.00    | 1              |                |                | 1              |                |                | 2         |
| Italy          | 6.00       | 16.64   | 1              |                |                |                | 2              |                | 3         |
| Latvia         | 21.77      | 16.38   |                | 2              |                |                | 2              |                | 4         |
| Lithuania      | 12.11      | 100.00  | 1              |                |                |                |                | 3              | 4         |
| Luxembourg     | 8.53       | 26.14   | 1              |                |                |                |                | 3              | 4         |
| Malta          | 34.67      | 47.16   |                |                | 3              |                |                | 3              | 6         |
| Netherlands    | 10.21      | 0.00    | 1              |                |                | 1              |                |                | 2         |
| Norway         | 25.37      | 9.83    |                |                | 3              | 1              |                |                | 4         |
| Poland         | 9.52       | 12.63   | 1              |                |                | 1              |                |                | 2         |
| Portugal       | 16.89      | 7.69    |                | 2              |                | 1              |                |                | 3         |
| Romania        | 11.95      | 13.90   | 1              |                |                | 1              |                |                | 2         |
| Slovakia       | 17.11      | 65.13   |                | 2              |                |                |                | 3              | 5         |
| Slovenia       | 11.88      | 38.13   | 1              |                |                |                |                | 3              | 4         |
| Spain          | 11.67      | 67.99   | 1              |                |                |                |                | 3              | 4         |
| Sweden         | 9.71       | 32.48   | 1              |                |                |                |                | 3              | 4         |
| United Kingdom | 6.53       | 29.95   | 1              |                |                |                |                | 3              | 4         |

## S4 - Corruption

| Control of corruption (percentile rank) | Score |
|---|-------|
| 60                                      | 1     |
| 70                                      | 2     |
| 80                                      | 3     |
| 90                                      | 4     |
| 100                                     | 5     |

| Country | Score | Category ranking |
|---------|-------|------------------|
|---------|-------|------------------|





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|                | Bribery | 1 | 2 | 3 | 4 | 5 | All Score |
|----------------|---------|---|---|---|---|---|-----------|
| Austria        | 92.51   |   |   |   |   | 5 | 5         |
| Belgium        | 89.49   |   |   |   | 4 |   | 4         |
| Bulgaria       | 51.93   | 1 |   |   |   |   | 1         |
| Croatia        | 58.86   | 1 |   |   |   |   | 1         |
| Cyprus         | 82.30   |   |   |   | 4 |   | 4         |
| Czech Republic | 65.40   |   | 2 |   |   |   | 2         |
| Denmark        | 99.81   |   |   |   |   | 5 | 5         |
| Estonia        | 80.46   |   |   |   | 4 |   | 4         |
| Finland        | 98.85   |   |   |   |   | 5 | 5         |
| France         | 90.05   |   |   |   |   | 5 | 5         |
| Germany        | 93.31   |   |   |   |   | 5 | 5         |
| Greece         | 58.76   | 1 |   |   |   |   | 1         |
| Hungary        | 67.69   |   | 2 |   |   |   | 2         |
| Ireland        | 92.16   |   |   |   |   | 5 | 5         |
| Italy          | 62.17   |   | 2 |   |   |   | 2         |
| Latvia         | 63.67   |   | 2 |   |   |   | 2         |
| Lithuania      | 63.31   |   | 2 |   |   |   | 2         |
| Luxembourg     | 95.56   |   |   |   |   | 5 | 5         |
| Malta          | 79.66   |   |   | 3 |   |   | 3         |
| Netherlands    | 96.63   |   |   |   |   | 5 | 5         |
| Norway         | 96.86   |   |   |   |   | 5 | 5         |
| Poland         | 67.48   |   | 2 |   |   |   | 2         |
| Portugal       | 80.75   |   |   |   | 4 |   | 4         |
| Romania        | 52.74   | 1 |   |   |   |   | 1         |
| Slovakia       | 64.70   |   | 2 |   |   |   | 2         |
| Slovenia       | 78.36   |   |   | 3 |   |   | 3         |
| Spain          | 80.72   |   |   |   | 4 |   | 4         |
| Sweden         | 98.21   |   |   |   |   | 5 | 5         |
| United Kingdom | 92.59   |   |   |   |   | 5 | 5         |

## Annex 2 – Table of equations

|             |  |          |   |
|-------------|--|----------|---|
| M1 – Prices | $ P_c = 0, a = 0 $                           | (Eq. 45) | P – production of species;<br>V – average EU species price (value);<br>B – aquatic production (biomass);<br>T – total aquatic production (biomass);<br>W – % price deviation from mean (weighted);<br>M – production-weighted EU percent price deviation;<br>Q – double-weighted (production and proportion) percent price deviation;<br>C = country;<br>S = species. |
|             | $ P_c = 1, a = 1 $                           | (Eq. 46) |   |
|             | $V_s = \frac{1}{c} \sum_{i=c}^{i=1} V_{i,s}$ | (Eq. 47) |   |
|             | $T_c = \sum_{i=1}^s C_{s,i}$                 | (Eq. 48) |   |
|             | $T_s = \sum_{i=1}^c S_{c,i}$                 | (Eq. 49) |   |
|             | $W_{c,s} = \frac{V_{c,s} - V_s}{V_s} * 100$  | (Eq. 50) |   |
|             | $M_{c,s} = \frac{W_{c,s} * B_{c,s}}{T_s}$    | (Eq. 51) |   |



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|                           |  |  |
|---------------------------|--|--|
|                           | $Q_{c,s} = \frac{M_{c,s} * B_{c,s}}{T_c} \quad (\text{Eq. 52})$ $Q_c = \sum_{i=1}^{i=s} Q_{c,i} \quad (\text{Eq. 53})$   | <ol style="list-style-type: none"> <li>1) Binary production</li> <li>2) EU arithmetic species price average</li> <li>3) Sum of country production</li> <li>4) % species price deviation from EU average</li> <li>5) Production weighted % species price deviation from EU average</li> <li>6) Double weighted (production and proportion) % price deviation</li> </ol> <p>Sum of country double weighted % price deviation</p> |
| M2 – Consumption          | $F_{Y,L} = \frac{1}{Y} \sum_{i=1}^{i=Y} F_{Y,L} \quad (\text{Eq. 54})$   | <p>F = consumption per capita<br/>Y = year<br/>L = class</p> <p>The time-series average sum of consumption per capita across all classes of fish (freshwater, demersal, pelagic, marine, crustacean, cephalopod, mollusc, and others) per EU country and Norway</p>  |
| M3 – Economy              | $F(GBP)_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} F_{Y,C} \quad (\text{Eq. 55})$ $F(CUR)_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} F_{Y,C} \quad (\text{Eq. 56})$  | <p>F(GDP) = result<br/>F(CUR) = result<br/>Y = year<br/>C = country</p> <p>The time-series average sum of GDP per capita and current account balance per EU country and Norway</p>   |
| M4 – Infrastructure       | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \quad (\text{Eq. 57})$ $V(RAIL) = \frac{T_c}{T_{max}} \quad (\text{Eq. 58})$ $V(CAR) = \frac{T_c}{T_{max}} \quad (\text{Eq. 59})$ $V(AIR) = \frac{T_c}{T_{max}} \quad (\text{Eq. 60})$ | <p>T = mean annual values<br/>V(RAIL) = value<br/>V(CAR) = value<br/>V(AIR) = value<br/>C = country<br/>Y = year</p> <p>The mean annual value for rail lines, air transport, and container port traffic per EU country and Norway, followed by value of each country as a proportion of the maximum value</p>  |
| P1 – Hatchery and nursery | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \quad (\text{Eq. 61})$ $V(HAT) = \frac{T_c}{T_{max}} \quad (\text{Eq. 62})$ $V(NUR) = \frac{T_c}{T_{max}} \quad (\text{Eq. 63})$   | <p>T = mean annual values<br/>V(HAT) = hatchery value<br/>V(NUR) = nursery value<br/>C = country<br/>Y = year</p> <p>The mean annual value for hatchery and nursery production per EU country and Norway, followed by value of each country as a proportion of the maximum value</p>   |
| P2 – Coastline            | $R_c = \frac{A_c}{M_c} \quad (\text{Eq. 64})$ $S_c = \frac{R_c}{R_{max}} * 100 \quad (\text{Eq. 65})$  | <p>S = normalised score<br/>R = ratio of absolute vs measured<br/>A = absolute coastline<br/>M = measured coastline<br/>C = country</p> <p>The ratio of the absolute coastline against the measured coastline, followed by the value for each country as a proportion of the maximum value</p>   |



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|                        |   |  |        |   |        |   |         |   |           |   |          |   |
|------------------------|---|--|--------|---|--------|---|---------|---|-----------|---|----------|---|
| P3 – Digital capacity  | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C}$ <p>(Eq. 66)</p>  | <p>T = mean annual values<br/>C = country<br/>Y = year</p> <p>The mean annual value for mobile subscription and internet users (per 100 people) per EU country and Norway, capped at a value of 100.</p>   |        |   |        |   |         |   |           |   |          |   |
| P4 – Insurance         |   | <p>Heuristic survey from aquaculture underwriters about the perception of the availability of aquaculture insurance per EU country and Norway</p>  |        |   |        |   |         |   |           |   |          |   |
| R1 – Institutional     | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C}$ <p>(Eq. 67)</p>  | <p>T = mean annual values<br/>C = country<br/>Y = year</p> <p>The mean annual value for government effectiveness, political stability, regulatory quality, voice and accountability per EU country and Norway</p>  |        |   |        |   |         |   |           |   |          |   |
| R2 – Business friendly | $V(TIME) = \frac{T_c}{T_{max}}$ <p>(Eq. 68)</p> $V(TIME) = \frac{T_c}{T_{max}}$ <p>(Eq. 69)</p> $V(COST) = \frac{T_c}{T_{max}}$ <p>(Eq. 70)</p>       | <p>T = mean annual values<br/>V(TIME) = Time to start a new business<br/>V(COST) = Cost of business start-up<br/>V(BURD) = Burden of customs procedure<br/>C = country<br/>Y = year</p> <p>The average yearly value for the time to start a new business, cost of business start-up, and burden of customs per EU country and Norway, followed by value of each country as a proportion of the maximum value.</p>                              |        |   |        |   |         |   |           |   |          |   |
| R3 – Licensing         | -   | <p>Heuristic survey from various aquaculture regulators about the licensing time per EU country and Norway</p>   |        |   |        |   |         |   |           |   |          |   |
| R4 – Fiscal            | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C}$ <p>(Eq. 71)</p>  | <p>T = mean annual values<br/>C = country<br/>Y = year</p> <p>The mean annual value for tax revenue (% of GDP), and Labour tax and contributions per EU country and Norway</p>   |        |   |        |   |         |   |           |   |          |   |
| E1 – Water depth       | $E_d = \sum_{i=1}^{i=N_d} \frac{D_c D_s}{100}$ <p>(Eq. 72)</p>  | <p><math>E_d</math> = Environmental depth category score<br/><math>D_c</math> = EEZ area in depth class (%)<br/><math>N_d</math> = Number of depth classes</p> <p>Depth class scores (<math>D_s</math>)</p> <table border="0"> <tr> <td>0-10 m</td> <td>1</td> </tr> <tr> <td>&gt;300 m</td> <td>2</td> </tr> <tr> <td>10-40 m</td> <td>3</td> </tr> <tr> <td>150-300 m</td> <td>4</td> </tr> <tr> <td>40-150 m</td> <td>5</td> </tr> </table> | 0-10 m | 1 | >300 m | 2 | 10-40 m | 3 | 150-300 m | 4 | 40-150 m | 5 |
| 0-10 m                 | 1   |  |        |   |        |   |         |   |           |   |          |   |
| >300 m                 | 2   |  |        |   |        |   |         |   |           |   |          |   |
| 10-40 m                | 3   |  |        |   |        |   |         |   |           |   |          |   |
| 150-300 m              | 4   |  |        |   |        |   |         |   |           |   |          |   |
| 40-150 m               | 5   |  |        |   |        |   |         |   |           |   |          |   |
| E2 – Water temperature | $E_{t,s} = \sum_{i=1}^{i=N_t} \frac{T_{c,s} D_{c,s}}{100}$ <p>(Eq. 73)</p> $E_{t,b} = \sum_{i=1}^{i=N_t} \frac{T_{c,b} D_{c,b}}{100}$ <p>(Eq. 74)</p> | <p><math>E_{t,s}</math> = Temperature category score (salmon)<br/><math>E_{t,b}</math> = Temperature category score (seabass)<br/><math>E_{t,g}</math> = Temperature category score (gilthead)<br/><math>T_{c,s}</math> = EEZ area in temperature class salmon (%)<br/><math>T_{c,g}</math> = EEZ area in temperature class gilthead (%)<br/><math>T_{c,b}</math> = EEZ area in temperature class bass (%)</p>                                 |        |   |        |   |         |   |           |   |          |   |



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|                          |   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
|--------------------------|---|--|------------------------|---|--------------------------|---|--------------------------|---|-------------------------|---|--------------------------|---|
|                          | $E_{t,g} = \sum_{i=1}^{i=N_t} \frac{T_{c,g} D_{c,g}}{100} \quad (\text{Eq. 75})$ $E_t = \max(E_{t,s}, E_{t,b}, E_{t,g}) \quad (\text{Eq. 76})$  | <p><math>N_t</math> = Number of temperature classes<br/> <math>E_t</math> = Environmental temperature category score</p> <p>Temperature category ranges per species - score 5 for 12 months:<br/>           6-15 °C (<math>D_{c,s}</math>: salmon),<br/>           11-26 °C (<math>D_{c,g}</math>: gilthead bream);<br/>           8-22 °C (<math>D_{c,b}</math>: bass)</p> <p>If compliant period is:</p> <table> <tr> <td>4 months or less</td> <td>1</td> </tr> <tr> <td>6 months</td> <td>2</td> </tr> <tr> <td>8 months</td> <td>3</td> </tr> <tr> <td>10 months</td> <td>4</td> </tr> </table> | 4 months or less       | 1 | 6 months                 | 2 | 8 months                 | 3 | 10 months               | 4 |                          |   |
| 4 months or less         | 1   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 6 months                 | 2   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 8 months                 | 3   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 10 months                | 4   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| E3 – Current speed       | $E_s = \sum_{i=1}^{i=N_s} \frac{S_c S_s}{100} \quad (\text{Eq. 77})$  | <p><math>E_s</math> = Environmental current speed category score<br/> <math>S_c</math> = EEZ area in current speed class (%)<br/> <math>N_s</math> = Number of current speed classes</p> <p>Current speed class scores (<math>S_s</math>)</p> <table> <tr> <td>0-3 cm s<sup>-1</sup></td> <td>1</td> </tr> <tr> <td>50-80 cm s<sup>-1</sup></td> <td>2</td> </tr> <tr> <td>25-50 cm s<sup>-1</sup></td> <td>3</td> </tr> <tr> <td>3-10 cm s<sup>-1</sup></td> <td>4</td> </tr> <tr> <td>10-25 cm s<sup>-1</sup></td> <td>5</td> </tr> </table>   | 0-3 cm s <sup>-1</sup> | 1 | 50-80 cm s <sup>-1</sup> | 2 | 25-50 cm s <sup>-1</sup> | 3 | 3-10 cm s <sup>-1</sup> | 4 | 10-25 cm s <sup>-1</sup> | 5 |
| 0-3 cm s <sup>-1</sup>   | 1   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 50-80 cm s <sup>-1</sup> | 2   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 25-50 cm s <sup>-1</sup> | 3   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 3-10 cm s <sup>-1</sup>  | 4   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 10-25 cm s <sup>-1</sup> | 5   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| E4 – Dissolved oxygen    | $E_o = \sum_{i=1}^{i=N_o} \frac{O_c O_s}{100} \quad (\text{Eq. 78})$  | <p><math>E_o</math> = Environmental depth category score<br/> <math>O_c</math> = EEZ area in depth class<br/> <math>N_o</math> = number of depth classes</p> <p>Dissolved oxygen class scores (<math>O_s</math>) – <i>note there is no score 3</i></p> <table> <tr> <td>≤ 2 mg L<sup>-1</sup></td> <td>1</td> </tr> <tr> <td>2-5 mg L<sup>-1</sup></td> <td>2</td> </tr> <tr> <td>5-7 mg L<sup>-1</sup></td> <td>4</td> </tr> <tr> <td>&gt; 7 mg L<sup>-1</sup></td> <td>5</td> </tr> </table>   | ≤ 2 mg L <sup>-1</sup> | 1 | 2-5 mg L <sup>-1</sup>   | 2 | 5-7 mg L <sup>-1</sup>   | 4 | > 7 mg L <sup>-1</sup>  | 5 |                          |   |
| ≤ 2 mg L <sup>-1</sup>   | 1   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 2-5 mg L <sup>-1</sup>   | 2   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| 5-7 mg L <sup>-1</sup>   | 4   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| > 7 mg L <sup>-1</sup>   | 5   |  |                        |   |                          |   |                          |   |                         |   |                          |   |
| S1 – Legal               | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C} \quad (\text{Eq. 79})$  | <p>T = mean annual values<br/>           C = country<br/>           Y = year</p> <p>The mean annual value the rule of law (percentile rank) per EU country and Norway</p>  |                        |   |                          |   |                          |   |                         |   |                          |   |
| S2 – Sectoral importance | $T_{A,C,Y} = \sum_{i=1}^{i=Y} A_{C,i} \quad (\text{Eq. 80})$ $T_{F,C,Y} = \sum_{i=1}^{i=Y} F_{C,i} \quad (\text{Eq. 81})$ $T_{W,C,Y} = \sum_{i=1}^{i=Y} W_{C,i} \quad (\text{Eq. 82})$ $T_{total} = \sum T_A, T_F, T_W \quad (\text{Eq. 83})$ $R = \frac{T_A}{T_{total}} \quad (\text{Eq. 84})$ | <p>R – ratio value<br/>           T – Total value<br/>           A – aquaculture value<br/>           F – first landings sale<br/>           W – import and export values</p> <p>C = country<br/>           Y = year</p> <p>The sectoral importance of aquaculture is calculated by summing the annual value of aquaculture, first sale and landings, and export/import per EU country and Norway, and</p>   |                        |   |                          |   |                          |   |                         |   |                          |   |



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|                 |   |  |
|-----------------|---|--|
|                 |   | diving the total values of aquaculture against the total value of seafood to obtain a proportion   |
| S3 – Education  | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C}$ (Eq. 85)<br>$E_c = \frac{T_c}{T_{max}}$ (Eq. 86) | <p>T = mean annual values<br/>           C = country<br/>           Y = year<br/>           E = Enrolment value</p> <p>The mean annual value for grants and other revenue, gross enrolment ratio (tertiary sector) per EU country and Norway, and the mean annual number of technicians in research and development as a proportion of the maximum value</p> |
| S4 – Corruption | $T_{Y,C} = \frac{1}{Y} \sum_{i=1}^{i=Y} T_{Y,C}$ (Eq. 87)   | <p>T = average of annual values<br/>           C = country<br/>           Y = year</p> <p>The mean annual value for control of corruption per EU country and Norway</p>  |





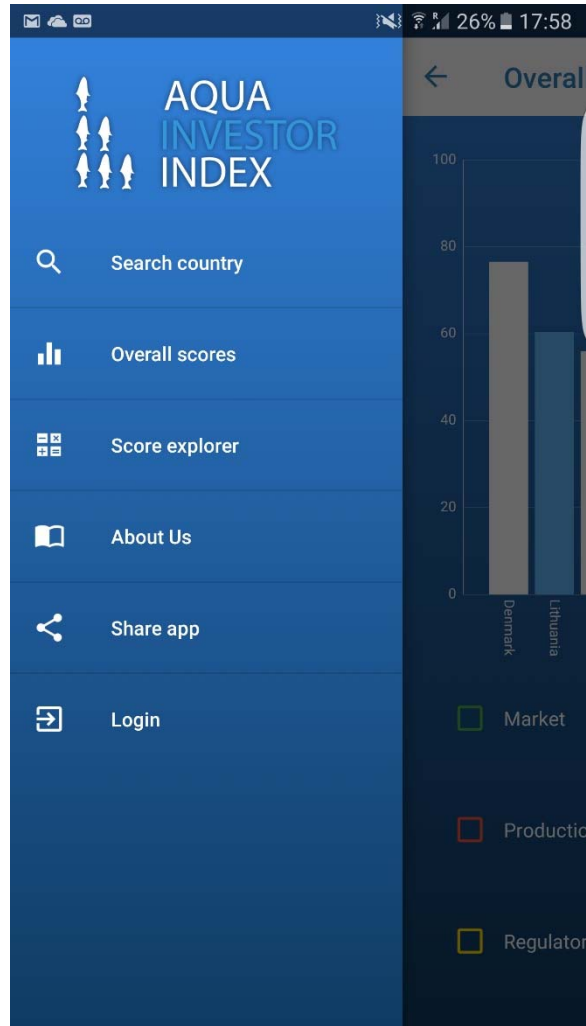
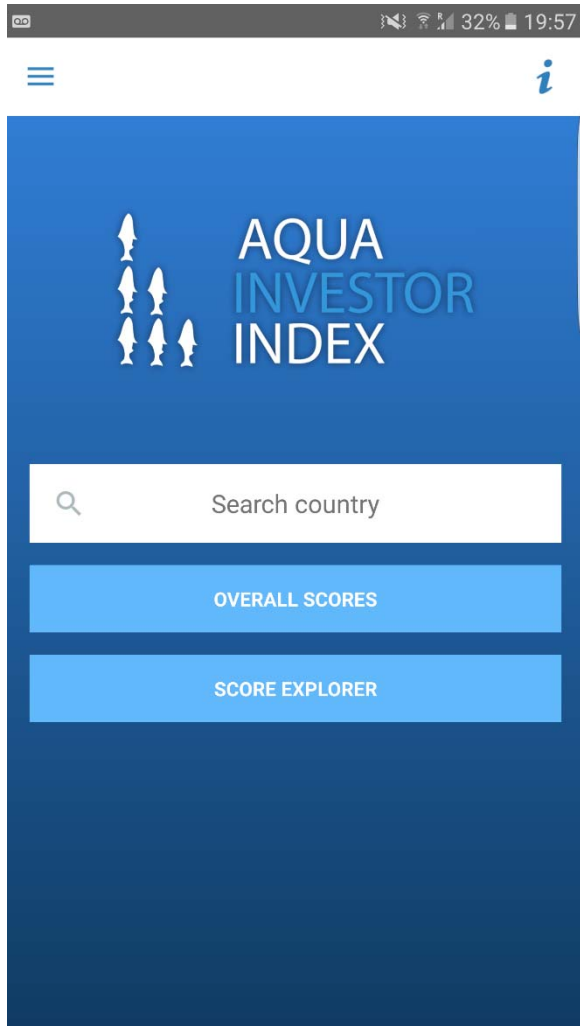
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## Annex 2 - Mobile application





**Annex 4 – Aquaculture Investor Index countries**

Table 18 provides a generic identification of the aquaculture potential of the EU countries in respect of coastal and inland considerations.

**Table 18 - List of EU countries and their aquaculture potential**

| Number | Countries      | Aquaculture potential |
|--------|----------------|-----------------------|
| 1      | Austria        | Onshore               |
| 2      | Belgium        | Onshore/Offshore      |
| 3      | Bulgaria       | Onshore/Offshore      |
| 4      | Croatia        | Onshore/Offshore      |
| 5      | Cyprus         | Onshore/Offshore      |
| 6      | Czech Republic | Onshore               |
| 7      | Denmark        | Onshore/Offshore      |
| 8      | Estonia        | Onshore/Offshore      |



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|    |                |                  |
|----|----------------|------------------|
| 9  | Finland        | Onshore/Offshore |
| 10 | France         | Onshore/Offshore |
| 11 | Germany        | Onshore/Offshore |
| 12 | Greece         | Onshore/Offshore |
| 13 | Hungary        | Onshore          |
| 14 | Ireland        | Onshore/Offshore |
| 15 | Italy          | Onshore/Offshore |
| 16 | Latvia         | Onshore/Offshore |
| 17 | Lithuania      | Onshore/Offshore |
| 18 | Luxembourg     | Onshore          |
| 19 | Malta          | Onshore/Offshore |
| 20 | Netherlands    | Onshore/Offshore |
| 21 | Norway         | Onshore/Offshore |
| 22 | Poland         | Onshore/Offshore |
| 23 | Portugal       | Onshore/Offshore |
| 24 | Romania        | Onshore/Offshore |
| 25 | Slovakia       | Onshore          |
| 26 | Slovenia       | Onshore/Offshore |
| 27 | Spain          | Onshore/Offshore |
| 28 | Sweden         | Onshore/Offshore |
| 29 | United Kingdom | Onshore/Offshore |