

European Cluster Observatory

REPORT

Priority Sector Report: Blue Growth

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European Cluster Observatory in Brief

The European Cluster Observatory is a single access point for statistical information, analysis and mapping of clusters and cluster policy in Europe. It is primarily aimed at European, national, regional and local policy-makers and cluster managers and representatives of SME intermediaries. It is an initiative run by the 'Clusters, Social Economy and Entrepreneurship' unit of the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs and aims to promote the development of more world-class clusters in Europe, notably with a view to promoting competitiveness and entrepreneurship in emerging industries and facilitating SMEs' access to clusters and internationalisation activities through clusters.

The ultimate objective is to help Member States and regions to design smart specialisation and cluster strategies that will help companies to develop new, globally competitive advantages in emerging industries through clusters, and in this way to strengthen the role of cluster policies in boosting Europe's industry as part of the Europe 2020 Strategy.

In order to support evidence-based policy-making and partnering, the European Cluster Observatory provides an EU-wide comparative cluster mapping with sectoral and cross-sectoral statistical analysis of the geographical concentration of economic activities and performance. The European Cluster Observatory provides the following services:

- a biannual **'European Cluster Panorama' (cluster mapping)** providing an update of and extension to the statistical mapping of clusters in Europe, including for ten related sectors (i.e. cross-sectoral) and a correlation analysis with key competitiveness indicators;
- a **'European Cluster Trends' report** analysing cross-sectoral clustering trends, cluster internationalisation and global mega trends in industrial transformation; identifying common interaction spaces; and providing a forecast for industrial and cluster opportunities;
- a **'Regional Ecosystem Scoreboard'** setting out strengths and weaknesses of regional and national ecosystems for clusters, and identifying cluster-specific framework conditions for three cross-sectoral collaboration areas;
- a **'European Stress Test for Cluster Policy'**, including a self-assessment tool accompanied by policy guidance for developing cluster policies in support of emerging industries;
- a **showcase of modern cluster policy practice, provided in the form of advisory support services to six selected model demonstrator regions**. The services offered include expert analysis, regional survey and benchmarking reports, peer review meetings and policy briefings in support of emerging industries. The policy advice also builds on the policy lessons from related initiatives in the area of emerging industries;
- the **European Cluster Conferences 2014 and 2016**, which bring together **Europe's cluster policy-makers and stakeholders** for a high-level cluster policy dialogue and policy learning, and facilitate exchange of information through, e.g. webpages, newsletters and videos.

More information about the European Cluster Observatory is available at the EU cluster portal at:

<http://ec.europa.eu/growth/smes/cluster/observatory/>.



This work has been carried out under a service contract for the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. It is financed under the Competitiveness and Innovation Framework programme (CIP) which aims to encourage the competitiveness of European enterprises. The views expressed in this document and the information included in it do not necessarily reflect the opinion or position of the European Commission.

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1. Introduction

Water resources in many parts of the world are pushed to their natural limits because of population growth and economic development. In turn, the ability of cities and countries to grow, attract investment, meet the fundamental needs of populations, and ensure environmental protection will be increasingly threatened if water resources are not smartly managed.

Unlike oil, there is no substitute to fresh water. Water is the finite resource that enables life and fuels all human activities. The second water-related source is the oceans. They are an inexhaustible source of life with a tremendous biodiversity, they are food source for animals and as well directly for humans, and they are a platform for global traffic and goods exchange.

Whereas land-based mining activities more and more reach their limits sub-marine mining activities - so far only common for oil and gas - can be expected to be a promising solution to overcome upcoming shortages of very specific raw materials.

Under 'Blue Growth' we refer to the development and use of the potential of oceans, seas, and related infrastructures as well as of any inland fresh-water sources and their exploitation. It is one of the key thematic orientations of applications and selected cluster projects for new industrial value chains (INNOSUP-1) under Horizon2020 and of the thematic priorities of regional smart specialisation strategies.

The 'Blue Growth' industries include all industries related to a maritime environment as well as industries producing, making use of, and treating fresh-water sources. The definition was built up using the Water Transportation and Fishing as the two base sectors and extending it with a variety of related industries from 13 other cluster categories (see Methodology and Findings Report for a Cluster Mapping of Related Sectors for more details).

In particular, the list of industries includes:

- Exploitation of water resources as an environment for fish and other water-based resources (fishery, aquaculture, ...)
- Water-based energy production (water power, off-shore wind energy, ...)
- Off-shore mining
- Deep sea drilling
- Marine biotechnology
- Tourism
- Water transport (ocean and in-land) and related civil engineering and infrastructures
- Water management

The European Commission has launched a wide-range of activities on blue growth, following up on the 2014 Communication from the Commission: Innovation in the Blue Economy: realising the potential of our seas and oceans for jobs and growth.¹ Blue Growth has also become an important concept within the context of smart specialization strategies, having been identified as a priority domain by more than

¹ https://ec.europa.eu/maritimeaffairs/policy/blue_growth_en

50 European regions.² Blue Growth has been identified as one of 10 emerging industries in the 2014 European Cluster Panorama.

² <http://s3platform.jrc.ec.europa.eu/-/blue-growth-and-smart-specialisation-how-to-catch-maritime-growth-through-value-nets-?inheritRedirect=true&redirect=%2Fblue-growth>

Figure 1: Blue Growth industry composition³



The key **products** of blue growth industries captured by this report include water, oil, gas, valuable minerals (massive sulphides, manganese nodules and cobalt rich ferromanganese crusts) and fish products. Core **services** include maritime transport of goods by shipping lines, port services and distribution services of related goods. Some basic facts are given in Table 1 and Table 2.

Table 1: Basic Facts on Blue Growth

Indicator	Level in 2014	Change since 2008	Share of overall economy
Employment	12 953 282	0.15%	4.44%
Establishments	2 753 047	9.66%	4.90%
Average Wage	32 320	-1.75%	100.55%
Gazelle Employment	276 650	N/A	6.58%

³ The size of the different boxes is proportional to industry employment

Table 2: Occupational profile of employment in Blue Growth

Occupation	Employment	Employment share	Overall employment share
Officials, Managers, Professionals, Technicians	3 915 100	40.4%	43.9%
Science and Engineering Professionals	1 011 600	10.4%	2.9%
Science and Engineering Associate Professionals	822 000	8.5%	3.6%
Business and Administration Associate Professionals	618 400	6.4%	6.7%
Other	1 463 000	15.1%	30.7%
Craft, Trade, Operators, Assemblers	3 673 600	37.9%	21.7%
Drivers and Mobile Plant Operators	2 284 400	23.6%	4.5%
Metal, Machinery and Related Trades Workers	582 700	6.0%	3.9%
Other	806 400	8.3%	13.3%
Clerks	1 209 300	12.5%	9.0%
Numerical and Material Recording Clerks	639 600	6.6%	3.3%
Other	569 700	5.9%	5.6%
Service, Sales, Elementary	893 200	9.2%	25.4%

2. Key Challenges of Blue Growth Industries

In the shipping and ports industry further consolidation is taking place through new mergers, acquisitions and strategic alliances, along with the transformation of logistics and supply chains in order to seize new opportunities. Drivers include the deregulated market and cost pressures enhancing competition as well as reinforcing strategic collaboration in order to share available resources and information. Shortened business cycles also put pressure on market players who must be quick and flexible (Deloitte, 2006). Moreover the European maritime transport industry will have to deal with the fluctuations of sea-borne trade, the dramatic fallout of the financial crisis, the probable risk of overcapacity in a few sub-sectors, the increasing protectionist pressures and the environmental issues regarding climate change, energy volatility, etc (Ecorys, 2009).

The private sector is progressively more and more involved in order to provide the industry with adequate capital and technical expertise (Deloitte, 2006). In this perspective, innovation and technological development has become a key factor for the competitiveness of the industry and progress in research and innovation as well as cross-industry linkages directly enables the industry to cope with environmental, energy and safety challenges. As a matter of fact, there is room for further products and services, related to energy efficiency, limiting the impact on environment, minimizing the rate of accidents, etc (Ecorys, 2009).

Deep sea drilling and offshore mining face beyond technical challenges, major safety and environmental challenges. Compared to the conventional offshore drilling, drilling in deep waters and deep wells under difficult conditions faces technical issues related to higher pressures and extreme temperatures with consequent safety and environmental implications. Related to that the insufficient knowledge on its impact on habitats, biodiversity, ecosystem structure and resilience poses a further challenge on environmental policy making and the need for it to be accordingly adjusted. Moreover the more advanced the technologies become like for example in the case of digital oilfield technology the more urgent the need for organisation changes in terms of new skills to handle big data and possibly new business models.

Aquaculture In many countries, is now aiming more on economic sustainability and overall competitiveness instead of high yield per unit area. One of the key areas considered is the improved management of health. As pathogens and diseases are causing significant losses in global aquaculture, the sector is now giving strong emphasis to reducing the mortalities and losses due to diseases. This trend does not only focus on production and practice, but also the issue of acquiring quality inputs like clean seed and quality feed, and sound advice to reduce risks of production failures. This is seen at the individual farm level as well as specific sub-sectoral levels. It has not occurred simultaneously throughout the aquaculture sector worldwide; although in the future it will materialize as different pressures are applied (these could be regulatory, market, environmental or social, etc.).

3. Current Patterns and Leading Regions

Blue growth **clusters** we find either segmented involving separately the maritime, oil and gas and fisheries clusters or integrated in one. When integrated they typically go under the heading Maritime clusters and may include some or all of the following players: shipping, inland shipping, ports, maritime services, shipbuilding, navy, marine equipment, yachting, dredging, offshore oil, gas extraction and fisheries.

Blue growth industries particularly the maritime and offshore drilling/mining show a high degree of **internationalisation** due to the international nature of the trade, availability of raw materials and the type of companies engaged in these industries – multinational companies operating in consolidated sectors. The fisheries industry is characterised by a few big and international players while the majority run small family fishing operations.

Table 3: Europe's top locations⁴ in Blue Growth

#	Re- gion	Region Name	Largest City	Employ- ment	LQ	Avg. Wage, PPP	Annual Growth	Ga- zelle Empl. Share	Star s
1	NO05	Vestlandet	Bergen	112 801	4.41	59 470	8.5%	5.2%	4
2	UKM5	NE Scotland	Aberdeen	45 646	3.57	60 220	20.0%	0.6%	3
3	NO04	Agder og Rogaland	Kristiansand	66 248	2.91	51 170	-8.4%	3.3%	3
4	NO01	Oslo og Akershus	Oslo	64 946	1.73	75 048	-0.1%	3.7%	3
5	NL33	Zuid-Holland	Rotterdam	95 617	1.34	49 930	-5.3%	0.4%	3
6	LV00	Latvija	Riga	77 249	1.28	16 368	6.6%	4.5%	3
7	LT00	Lietuva	Vilnius	99 918	1.24	22 378	1.5%	8.9%	3

⁴ We sort locations here and in all following sections by the number of stars, followed by LQ

Figure 2: Leading regions in Blue Growth

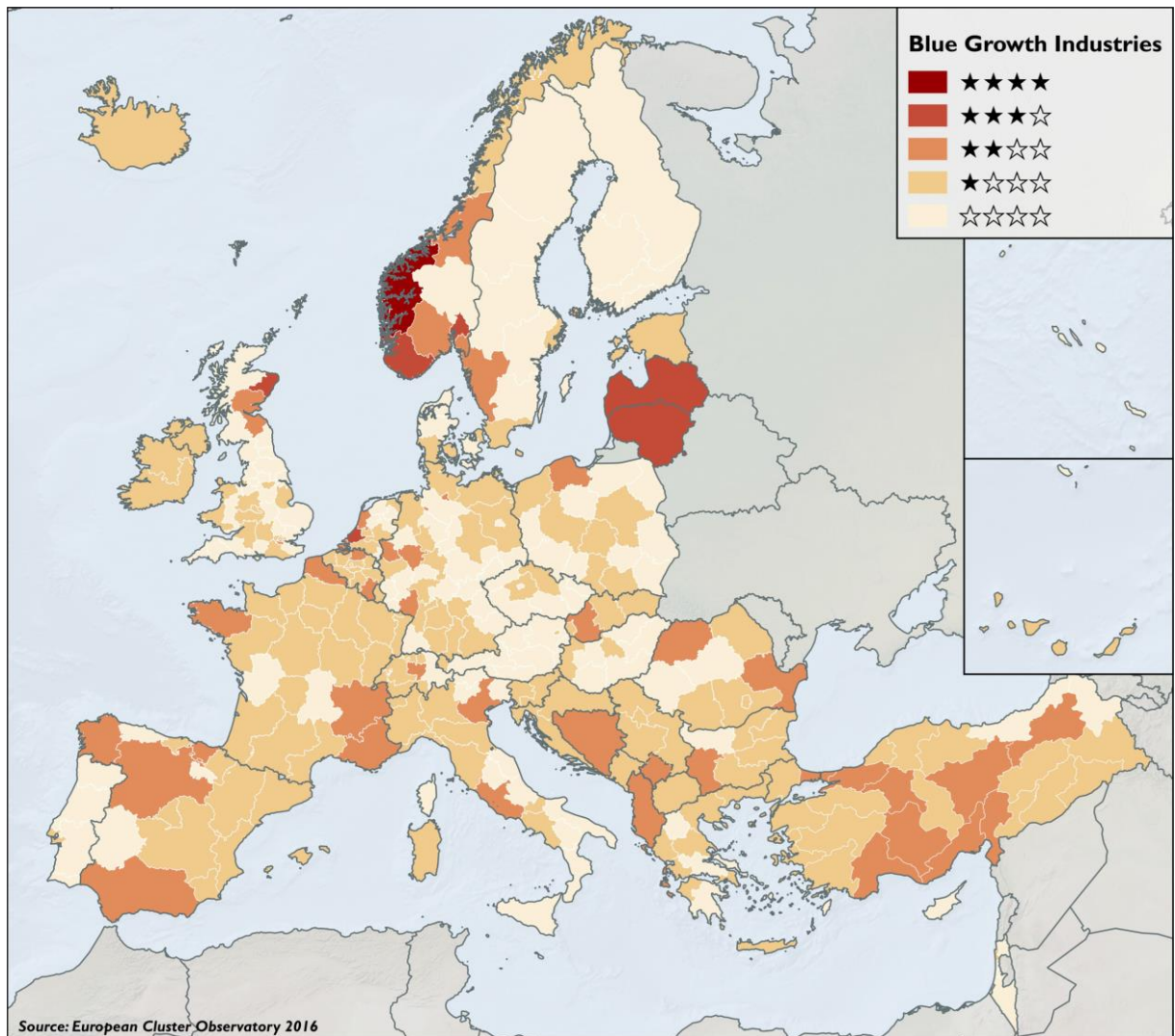
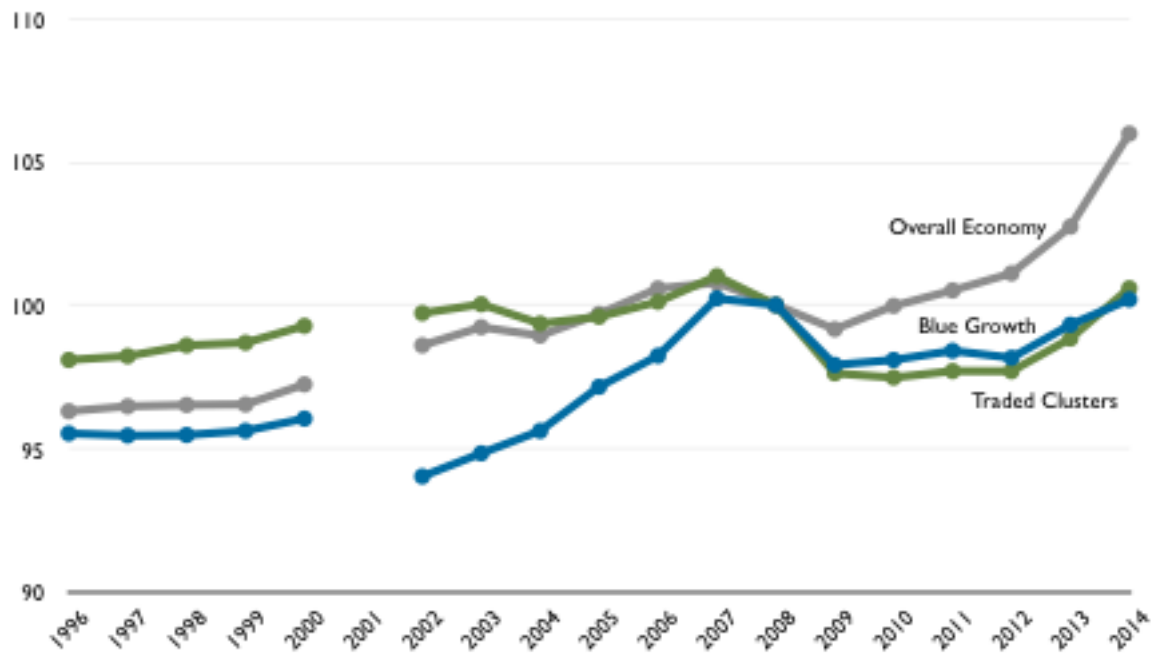


Table 4: Strategic profiles of top locations in Blue Growth

Region	Region Name	Largest City	Top 3 Occupations
NO05	Vestlandet	Bergen	31 Science and Engineering Associate Professionals 81 Stationary Plant and Machine Operators 72 Metal, Machinery and Related Trades Workers
UKM5	NE Scotland	Aberdeen	21 Science and Engineering Professionals 81 Stationary Plant and Machine Operators 72 Metal, Machinery and Related Trades Workers
NO04	Agder og Rogaland	Kristiansand	31 Science and Engineering Associate Professionals 72 Metal, Machinery and Related Trades Workers 81 Stationary Plant and Machine Operators
NO01	Oslo og Akershus	Oslo	21 Science and Engineering Professionals 33 Business and Administration Associate Professionals 31 Science and Engineering Associate Professionals
NL33	Zuid-Holland	Rotterdam	21 Science and Engineering Professionals 83 Drivers and Mobile Plant Operators 31 Science and Engineering Associate Professionals
LV00	Latvija	Riga	75 Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers 31 Science and Engineering Associate Professionals
LT00	Lietuva	Vilnius	42 Customer Services Clerks 83 Drivers and Mobile Plant Operators 33 Business and Administration Associate Professionals 72 Metal, Machinery and Related Trades Workers

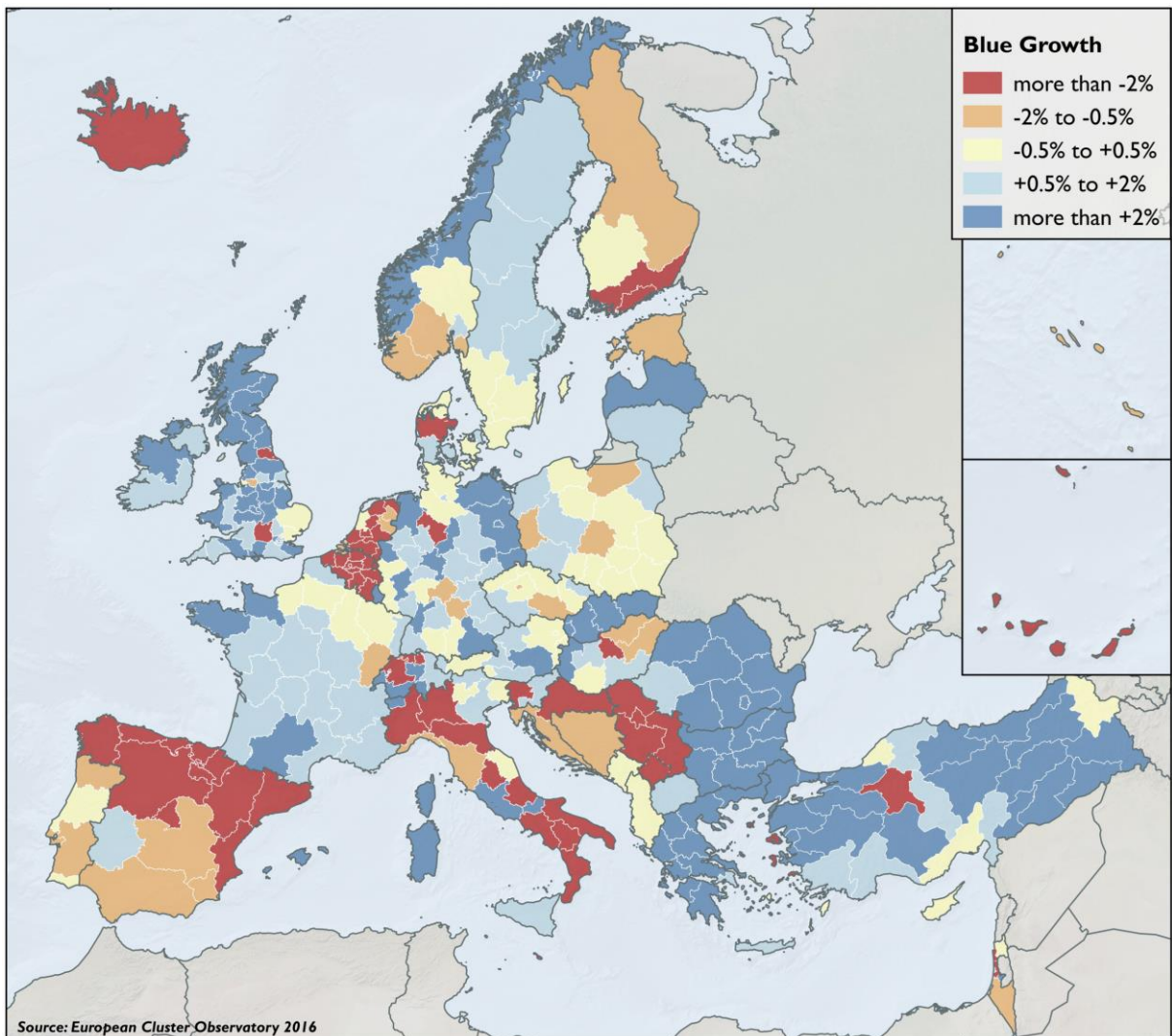
4. Evolution

Figure 3: Employment over time, 1996-2014 (2008=100)



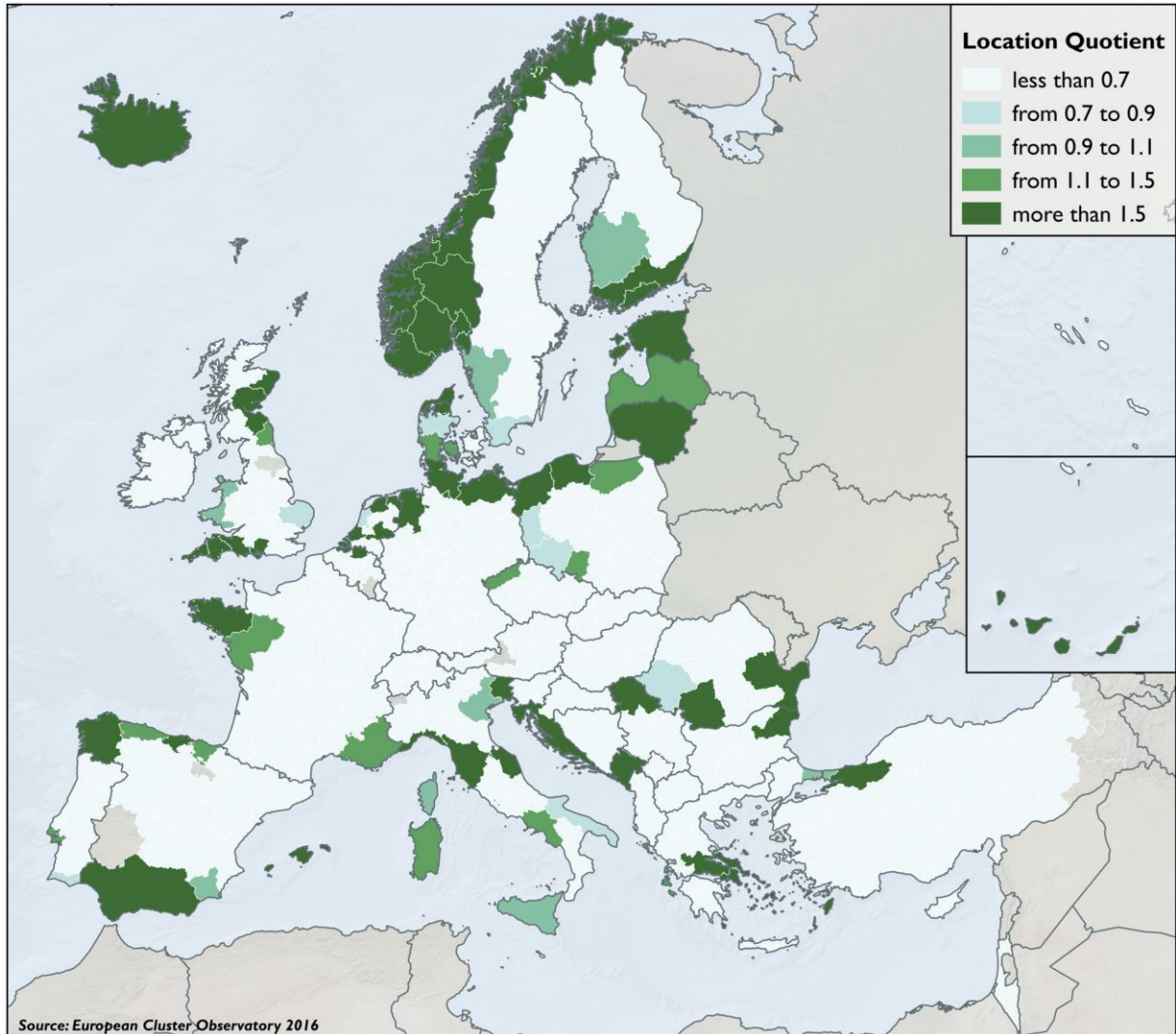
Note that there is a break in time series in 2008: all data prior to this date was sourced from the dataset in prior version of the European Cluster Observatory and adjusted to be compatible with the current dataset.

Figure 4: Annual Growth in Blue Growth (2008-14)



5. Sub-cluster Profile: Shipbuilding

Figure 5: Regions most specialised in Shipbuilding



Shipbuilding is one of the traditional cornerstones of the blue economy. It has, however, also been an industry that has been exposed to dramatic structural change and strong competition from other countries. New dynamism has been found where locations have specialized in specific niches, or where they have been able to link their expertise in ship building with the needs in emerging related sectors, like wind energy and offshore oil & gas services.

6. Selected Cluster Initiatives in Blue Growth

Advanced cluster policies conducive to successfully implement regional innovation strategies do not only provide funding to cluster initiatives or cluster organisations but rather offer a broad set of policy choices to support the entire framework conditions of the actors in given regions. Such a policy approach aims to improve cluster-specific business environments that provide optimal conditions for companies in related industries to raise their productivity and innovation. Creating platforms for collective action within clusters through cluster organisations can help companies from different sectors to innovate better and exploit their business opportunities. Cluster organisations can in turn also be a major partner for the government to design and implement effective policies for upgrading cluster-specific business environments. However, strong cluster organisations are necessary, managing their cluster in an excellent manner and being able not only to take up but to proactively influence the regional social and economic development, fully integrated in all relevant communities, the policy making, the industrial, the academic, and other relevant ones.

Being awarded with a quality label of the European Cluster Excellence Initiative⁵ is a justification for strengths. In the following sector-related cluster initiatives are listed where the cluster organisation is holding such a label. Furthermore, two of the GOLD-labelled cluster initiatives are shortly described to give an idea of their set-up and interesting activities and their effects.



Cluster Management Excellence Label GOLD – Proven for Cluster Excellence

Name	Country	www
Blue Maritime Cluster	Norway	http://www.blumaritimecluster.no
CREA Hydro & Energy	Czech Republic	http://www.creacz.com
GCE NODE - Global Centre of Expertise	Norway	http://www.gcenode.no
GCE Subsea	Norway	http://www.gcesubsea.no/
Offshoreenergy.dk	Denmark	http://www.offshoreenergy.dk/

⁵ More information can be found under www.cluster-analysis.org, the webpage of the European Secretariat for Cluster Analysis (ESCA)



Cluster Management Excellence Label SILVER – Dedicated to Cluster Excellence

Name	Country	www
Marcod - Maritime Industries for Operations	Denmark	http://en.marcod.dk/
Maritime Technology Cluster FVG S.c.a.r.l.	Italy	http://www.marefvg.it
Water in Urban Areas	Denmark	http://www.vandibyer.dk/
WindenergieAgentur Bremerhaven e. V.	Germany	http://www.wab.net/

GCE Subsea – strengthening innovation and internationalisation of the Norwegian subsea cluster

	Website	www.gcesubsea.no
	Established	2010 (2006 for NCE Subsea, predecessor of GCE Subsea)
	Cluster participants (2015)	Industry 110, R&D 10, Others 12
	Region	Vestlandet/Norway (West Norway)
	Cluster Manager	Owe Hagsaether

NCE Subsea (NCE = National Centre of Expertise) was nominated as one of the currently three Global Centre of Expertise (GCE Subsea) in Norway in 2010. The cluster in the Bergen region consists of more than 100 enterprises that are developing and supplying expertise and technology for engineering, installation, operations and maintenance of subsea installations globally. The cluster has one of the world's strongest specialist environments within subsea technology. GCE Subsea is contributing with meeting places and competence transfer, in addition to initiating collaborative projects within research, innovation, expertise development, and international business development.

In December 2015 ten years of NCE Subsea being a huge success was awarded the exclusive status of Global Centres of Expertise based on the strategy developed for the Norwegian subsea industry. An essential part of the strategy is to capitalise on the subsea competence from Oil & Gas exploration into an broader Ocean industry context.

First Subsea Specific Education: The Subsea Bachelor Programme at Bergen University College that NCE Subsea participated in establishing has been a huge success with the highest admission requirements through many consecutive years. The programme has a proportion of female entrants that approaches 40 % and the study has also been established in Florø and Kristiansund. In addition, new master programmes have been established within subsea innovation and entrepreneurship.

Increased Innovation: Throughout a decade, GCE Subsea has supported more than 60 innovation projects resulting in more than 600 million Norwegian Kroner (more than 66 million EUR) in external funding. Cluster participants Techni (<http://www.techni.no/>) and WiSub (www.wisub.com) were awarded the prestigious "OTC Spotlight on New Technology Award" (OTC = Offshore Technology Conference, world largest event for the oil and gas industry taking place yearly in Houston, USA), based on innovations supported by GCE Subsea. With GCE Subsea support the Lofoten Vesterålen cable based observatory has been set-up allowing integrated environmental monitoring in various underwater locations.

Guiding Entrepreneurs: In 2011, GCE Subsea, Bergen Teknologioverføring (BTO) and Bergen University College established the Subsea First Step entrepreneurship programme. After the great success in 2011, the programme was adapted into a Subsea Next Step programme targeting established companies. Both programmes have received very good feedback and several innovations have been realised. The execution of the programmes is sponsored by Aker Solutions, DNB, Statoil and Innovation Norway who also provide mentor services to the participants.

Increased International Focus: The cluster participants' international ambitions and engagement have grown considerable over the last ten years. Through the years, more and more companies have taken part in the various international activities. The NCE Subsea breakfast seminar at OTC in Houston was one of our most visited events in 2015. Furthermore, collaboration with other Norwegian clusters targeting the international market was strengthened.

CREA Hydro & Energy – Czech Renewable Energy Alliance

	Website	www.creacz.com
	Established	2008
	Cluster participants (2015)	Industry 22, R&D 4, Others 4
	Region	Jihovýchod (Southeast), Czech Republic
	Cluster Manager	Břetislav Skácel

CREA Hydro&Energy is a cluster of companies, research institutions and universities active in the technologies for water and waste treatment and renewable energy sources. Water management is considered as one important aspect for securing the sufficient availability of fresh water for various purposes: drinking water, industrial water, irrigation, energy, etc. This includes water works, dam construction and maintenance as well as hydraulic constructions in all its forms. This sector is strongly connected with the field of renewable energy in the form of hydropower as well as with the field of waste management and environmental issues, considering pollution problems of water resources.

Members of the cluster initiative collectively participate in research, product innovations and development, promotion of the sector as well as the presentation and realisation of projects in the Czech Republic and abroad. CREA Hydro&Energy brings SMEs and researchers together with big Czech and international companies, using modern technologies and know-how for conducting such infrastructure projects. The cluster initiative furthermore provides expert studies, training of foreign experts, and consultations for Czech and foreign ministries and other institutions being involved in development cooperation, Aid for Trade programmes, or own infrastructure projects.

One success story of the cluster initiative is a cooperation in design and construction of new dams in Northern Iraq. 16 cluster members participated in the supervision and inspection of extensive dam constructions as well as in the establishment of the Czech-Kurdish Chamber of Commerce with CREA Hydro&Energy as a founding member. By this a successful entry into the Middle-East market was prepared.

Appendix: Industry Definition

Industry Code	Industry Name
03.11	Marine fishing
03.12	Freshwater fishing
09.10	Support activities for petroleum and natural gas extraction
10.20	Processing and preserving of fish, crustaceans and molluscs
22.19	Manufacture of other rubber products
25.99	Manufacture of other fabricated metal products n.e.c.
28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
28.22	Manufacture of lifting and handling equipment
30.11	Building of ships and floating structures
30.12	Building of pleasure and sporting boats
33.15	Repair and maintenance of ships and boats
35.11	Production of electricity
35.12	Transmission of electricity
36.00	Water collection, treatment and supply
42.91	Construction of water projects
46.14	Agents involved in the sale of machinery, industrial equipment, ships and aircraft
49.41	Freight transport by road
50.10	Sea and coastal passenger water transport
50.20	Sea and coastal freight water transport
50.30	Inland passenger water transport
50.40	Inland freight water transport
52.10	Warehousing and storage
52.22	Service activities incidental to water transportation
52.23	Service activities incidental to air transportation
52.24	Cargo handling
52.29	Other transportation support activities
71.12	Engineering activities and related technical consultancy
71.20	Technical testing and analysis
72.19	Other research and experimental development on natural sciences and engineering
73.11	Advertising agencies
77.32	Renting and leasing of construction and civil engineering machinery and equipment
77.34	Renting and leasing of water transport equipment
79.11	Travel agency activities

For further information, please consult the European Cluster Observatory Website:

<http://ec.europa.eu/growth/smes/cluster/observatory/>



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