Norwegian Ocean Clusters' Preliminary Positions on the EUs next Framework Programme for Research and Innovation ("FP9")

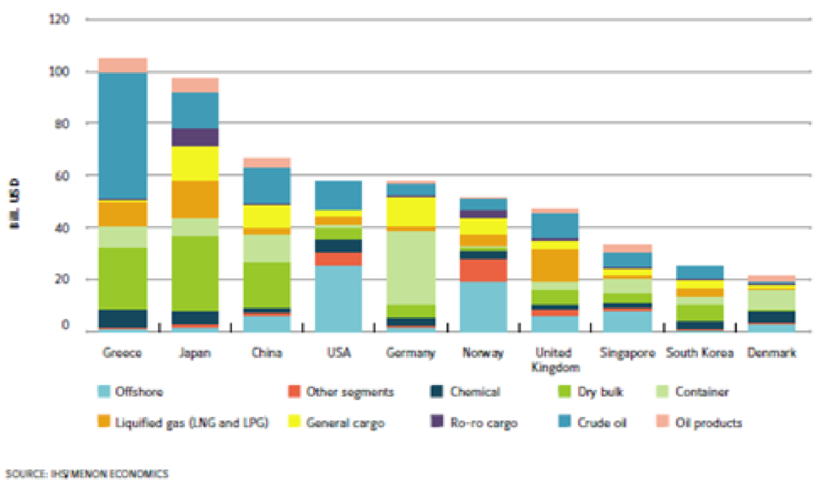
"Mission Oceans – the next frontier"

North Sea coast areas of:	Maritime jobs	Enterprises	GVA	Main Blue Growth activities
Belgium	37000		€4bn	Deep and short-sea shipping coastal tourism and protection, offshore wind.
Denmark (part)	12,000			Offshore oil & gas, wind, short-sea shipping and coastal tourism
Germany (part)	170,000	4000	€14bn	Shipping (including ship-building), fishing, offshore wind,
Netherlands	140,000	9000	€13bn	Deep and short-sea shipping, offshore oil & gas, water projects, shipbuilding (incl. small craft) and inland waterways (yachting)
France (Nord-Pas de Calais only)			€2bn	Inland waterways, passenger transport.
Norway	150,000	14,000	€80bn	Offshore oil & gas, fishing, shipbuilding, aquaculture
Sweden (Västsverige)	12,000		€2.2bn	Shipbuilding and repairs, inland waterway
UK	330,000		€43bn	Offshore oil & gas, coastal tourism

Source: Ecorys et al (2014)

Context

In its 2016 report, "The Ocean Economy in 2030" the OECD estimates the output of the global ocean economy at €1.3 trillion[1] and this could more than double by 2030. In a 2015 report, the European Cluster Observatory classified Blue Growth as one of Europe's key 'emerging industries', corresponding to between 6-7% of the European economy. The report found that Blue Growth industries had grown consistently faster than the overall economy, though they were hit rather strongly by the low oil price as employment declined during 2008-13. While the wage levels are the same as in traded industries, value added is substantially higher, suggesting a productivity advantage.



According to the 2014 Ecorys report [2] on Blue Growth and Maritime Policy within the North Sea and Atlantic Sea Regions, Norway is the leading ocean economy in Europe in terms of Gross Value Added (GVA) and productivity. IHS/Menon Economics ranks Norway as the world's sixth largest shipping fleet in terms of value being particularly strong on coastal, deep sea and offshore shipping. In addition, coastal cruise tourism is an established and growing industry targeting the Norwegian Fjords as destination. Looking to 2030, many ocean-based industries have the potential to outperform the global economy, both in terms of value creation and employment. However, the ocean-based industries have so far lacked the political facilitation and funding infrastructure that has been granted to the land-based economy. FP9 should help in realising this potential by anchoring its thematic priorities on SDGs 2, 3, 7, 12, 13, 14 and 17 and COP21 through

[1] http://www.oecd.org/sti/futures/the-ocean-economy-in-2030-9789264251724-en.htm
[2] http://www.ecorys.com/news/blue-growth-and-maritime-policy-within-north-sea-and-atlantic-sea-regions

promoting blue growth cluster partnerships and innovation platforms. GCE Subsea[3], GCE Blue Maritime, NCE Seafood, NCE Maritime Cleantech and Blue Legasea, together promote innovation in both growth stage and pre-development activities of Blue Growth with high potential to create the jobs of tomorrow: maritime monitoring and surveillance, ocean renewable energy including offshore wind, seafood innovation, maritime clean energy technology, blue biotechnology, coastal tourism and marine mineral mining.

The Norwegian Ocean Innovation Clusters

GCE Subsea, GCE Blue Maritime, NCE Seafood, NCE Maritime Cleantech and Blue Legasea, in collaboration with their research partners UiB, UniResearch and Møreforskning, are the innovation and research clusters representing the three traditional ocean industries of Norway - subsea, seafood and maritime innovation - as well as the marine ingredients industry that will enable the blue biotechnology industries of tomorrow. These Ocean Clusters represent Europe's largest marine research- and industry consortium. Our mission is to capitalise on the resources available through this powerful ocean partnership, which will allow us to unite and consolidate shared interests in science and industry to create value from our oceans. According to Menon Business Economics, in 2014 the traditional Norwegian ocean industries accounted for total value creation of NOK 760 bn (approx. €77,7 bn) EBITDA and direct employment of 256,000 persons. As Ecorys (2013) show, the western and southern regions (Agder, Rogaland and Vestlandet) have a dominant position in the marine and maritime economy, notably in offshore oil and gas, deep-sea shipping, shipbuilding and aquaculture. GCE Subsea, GCE Blue Maritime and NCE Maritime Cleantech have been awarded the gold label while NCE Seafood and Blue Legasea have been awarded the bronze label by the European Secretariat for Cluster Analysis[4] acknowledging cluster organisations that demonstrate highly sophisticated cluster management and that are committed to further improve their organisational structures and routines for the benefit of an even higher performance.

Our common position is firmly anchored in the Norwegian government's new Ocean Strategy "New Growth, Proud History" announced on 23 March 2017[5] and recognising the ocean as the new economic frontier. The Clusters have a common commitment to solve some of our most pressing global challenges including:

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[3] **Norwegian Innovation Clusters** is a government supported cluster program. The program aims to trigger and enhance collaborative development activities in clusters. The goal is to increase the cluster dynamics and attractiveness, the individual company's innovativeness and competitiveness. The program is organised by Innovation Norway, and supported by Siva (The Industrial Development Corporation of Norway) and the Norwegian Research Council. http://www.innovationclusters.no/english/ **Global Centres of Expertise (GCE)**: Mature clusters with a global position: Clusters that have already established systematic collaboration and that have developed dynamic relations with high interaction and a broad strategic action area. The clusters have considerable potential for growth in national and international markets: http://www.gcesubsea.no/, http://www.bluemaritimecluster.no/gce **Norwegian Centres of Expertise (NCE)**: Mature clusters with a national position: Clusters that have established a systematic collaboration and that have developed dynamic relations with high interaction and a broad strategic action area. The participants in the clusters have considerable potential for growth in national and international markets: http://www.seafoodinnovation.no/ , https://maritimecleantech.no/. **Arena**: Immature clusters in an early phase of organised cluster collaboration. They can be clusters with different preconditions and potential: they can be small or large, and the participants can be in a regional, national or international position: http://www.legasea.no/legasea

[4] http://www.cluster-analysis.org/gold-label-new

[5] https://www.regjeringen.no/contentassets/0942063f7496484090ecf0c32e80221c/nfd_havstrategi_uu.pdf

- Meeting the world's growing energy needs through making the booming offshore wind energy industry cost-effective, securing technical feasibility and commercial viability of deep geothermal systems and accelerating market penetration of tidal and wave energy;
- Bridging the 2050 food gap challenge, which requires food production to increase by 70% to provide healthy and nutritious food for 9.1 billion people, through sustainable fishing and aquaculture;
- Contributing towards climate action through the development and demonstration of sustainable ocean energy technologies;
- Providing access to more natural resources through safe and cost-efficient seabed mining;
- Promoting new economic growth through a value chain perspective on ocean resources and underutilized fish by-products and it's processing into high value ocean ingredients;
- Using key enabling technologies, including subsea engineering innovation, maritime and digitalisation to harness the full potential across all new ocean economy sectors.

To succeed with sustainable and long-term development of the ocean economy we promote:
- Cluster to cluster collaboration to ensure learning across the various ocean industries;
- Accelerated commercialisation through technology and business model demonstrators;
- Digitalisation of all ocean sectors to exploit the new business models that will emerge from merging the physical with the virtual;
- Public-private partnerships to build capacity to realise the ocean economy's vast potential;
- International partnerships.

Thematic priorities

The transition to Blue Growth and a sustainable ocean economy requires a paradigm shift in education, research and innovation and therefore we believe that it merits being one of the main missions of FP9. The current design of the Blue Growth H2020 call as a small part of SC2 falls short. A mission-oriented FP9 will be flexible enough to allow collaboration across clusters and industries but firmly anchored to a 2030 mission to create a sustainable ocean economy by capitalising on five 2030 targets to be agreed at EU level:

- Enabling technologies for the 2030 ocean economy;
- Share of clean energy from the oceans in the 2030 energy mix;
- Share of food from the oceans as part of the 2030 Food Systems;
- Ocean climate and environment knowledge - by 2030 we will know more about the oceans that we know about the moon;
- A legal and regulatory framework fit for Blue Growth, including public acceptance.

Overall, we expect much of the market-creating innovations to emerge through crossovers between the marine and the maritime, through merging the virtual and the physical. It is therefore important to further develop and articulate the concept of "ocean innovation" at EU level and make it clear that silo thinking will not support us in our transition to a sustainable ocean economy. We will therefore use the term "ocean" in this section to mean both marine and maritime and look forward to contribute in building a European consensus.

Enabling technologies for the 2030 ocean economy

Across ocean minerals, ocean renewable energy (including offshore wind) and food from the oceans, there is a need for ocean and subsea operations including ship transport, anchor handling, mooring, lifting operations, service ships and subsea welding and mounting. The focus should be on knowledge and technology transfer between sectors underpinning a broader Blue Growth potential. Relevant challenges could include:

- How can we develop new value chains for minerals through responsible subsea mining? Technology for extracting minerals with the minimum ecological disturbance is too large a task for individual EU countries to develop and test on their own.

- How can we develop clean energy stations at sea for ship energy loading? Such stations could be co-located with offshore wind farms.

Digitalisation of production technology, operations and manufacturing will be a game changer for Blue Growth. The new business models emerging from merging the physical with the virtual should also be understood and exploited. A relevant challenge could include:

- How can we make ocean operations in remote areas clean and autonomous?
- How can we control harsh environments operations for more robust aquaculture?

Share of clean energy from the oceans in the 2030 energy mix

Relevant challenges in this context should include:

- How can we make ocean energy (including offshore wind) cost-effective? OPEX and value chain cost optimisation should be in focus;
- New ocean energy technologies – hydrogen, batteries, LNG, methanol in hybrid energy systems;
- How can we use excess or stranded power (deep geothermal, offshore wind, hydro power, etc.) to produce hydrogen or load battery banks?
- How can we electrify ocean operations?
- What are the environmental and health impacts of ocean energy on the ocean space and ecosystem?

Share of food from the oceans as part of the 2030 Food Systems

Although 70% of the Earth's surface is covered by water, only 2% of food intake and 6.5% of the protein sources for human consumption comes from the oceans. The UN estimates that the global population will grow to approximately 9.7 billion by 2050. Assuming consumption per capita stays constant, this implies a 40% increase in demand for protein. The UN however, estimates actual demand to double. The World Bank developed a scenario analysis in their report Fish to 2030 (2013) projecting that aquaculture will continue to fill the supply-demand gap, and that by 2030, 62% of fish for human consumption will come from this industry. Relevant challenges in this context will include:

- How can science and innovation assure sustainable harvest from both known and unknown ocean resources?
- Knowing that resources for increased land based protein production will be scarce, a key question is how can protein production in sea be expanded?
- How can the oceans account for more than the current 2% of human food intake in a sustainable way?
- What are the future scenarios to ensure delivery of the SDGs' biosphere objectives through seafood?
- How can future food systems meet social needs better (healthy, secure, nutritious)?
- How can aquaculture contribute to more resilient food systems?

- How can optimised use of ocean resources and ocean discards and processing technology onshore and offshore increase value creation in healthy ocean ingredients for human nutrition?
- What are the environmental and health impacts of increased ocean-based food production (farming and fishing) on ocean ecosystems?

Ocean climate and environment knowledge

We know more about space than we do about our oceans. To harvest the potential of the oceans in a sustainable way, relevant challenges will include:

- How can we ensure quick and internationally coordinated responses to current and future ocean environmental challenges (e.g. ocean pollution and littering, ocean acidification, sea level rise, ocean warming)?
- How can we develop robust methodologies to consider all new technology in terms of life cycle emissions / as a system?
- How can we measure manufacturing footprint and food production footprint?
- How can we use digitalisation to develop low CO_2 work processes and logistics systems?
- How can we use ocean surveillance and monitoring technologies for enabling sustainable use of ocean resources?
- How can we improve ocean and terrestrial-based waste management technologies?
- How can we manage biological risks from algae blooms?

A legal and regulatory framework fit for Blue Growth, including public acceptance

The risk profile of many innovative ocean projects is high also because of the legal and regulatory uncertainty. To encourage real market – creating innovation the following challenges should be addressed?

- What are the legal barriers to deep offshore operations?
- What are the legal risks for autonomous ocean operations?
- Can mesopelagic fish and subsea mining happen with existing law?
- How does current law and regulation influence our understanding of the oceans and complex ecosystems' impact on biosphere?
- How does current law and regulation affect the type of innovation? Risk-reducing innovation vs. opportunity and market creating innovation?

Instruments and partnerships of FP9

On 31 March 2017, the European Commission published an evaluation report on Blue Growth[6]. Our preliminary feedback to this is that the strategy has worked well in pushing Blue Growth higher up the political agenda and in building the fundaments of a blue ocean economy. However, to deliver on its ambition, funding and investment should become less fragmented and incoherent. In the period 2014-2020 € 6,4 billion has been set aside for the European Maritime and Fisheries Fund, €5,5 billion to promote cohesion under the ERDF but only €800 million invested in Blue Growth innovation under H2020. The Commission's report remains inconclusive as to how these funding arrangements, especially ERDF, have delivered growth through the right type of partnerships.

[6] https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/swd-2017-128_en.pdf

By lifting Blue Growth to one of FP9's main missions, the impact will be significant for new technologies, new products and new services through radical, first-of-a-kind innovation activities. Our large industry partners are very focused on improving production technology and operations and therefore keen to take responsibility for testing, demonstration and technology integration, primarily through participating in industry-led consortia but also through research projects. Our SME partners will mostly develop technology either through the SME Instrument or as partners to collaborative projects. We hope that FP9 will continue to strengthen commercialisation of research-based, market creating innovation. Norway has a long tradition as a first user country, which is vital to commercialisation of innovation. FP9 should promote this first user mindset.

Sincerely,

Managing Director,
GCE Subsea

Managing Director
GCE Blue Maritime

Managing Director,
NCE Seafood

Managing Director,
NCE Maritime Cleantech

Managing Director,
Blue Legasea

Marine Director,
University of Bergen

Managing Director,
Møreforskning