



BLUE LEGASEA™

Norwegian Biomarine Resources

REVIEW

2016



A three kilo Barents Sea cod gives two kilos of headed / gutted fish and one kilo of trimmings providing half a desilitre of oil and 200 grams of protein, plus calcium. Three kilos of cod consists of five dinner servings of cod filets, three daily servings of high value protein, ten daily doses of oil and 13-14 daily doses of calcium. Today we throw away 150 million kilos of this raw material from norwegian fishing vessels. We can build a new industry in need of new vessels.

TORE ROALDSNES
Nordic Wildfish


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BUSINESSES:

Aker Biomarine, Arctic Nutrition, Berg Lipidtech, Brødrene Sperre, Calanus, FMC/Epax Norway, Eros/Ramoen, Eurofins, Firmenich Bjørge Biomarin, GC Rieber Oils, Havfisk, Innolipid, Marine Harvest, Marine Ingredients, Nordic Wildfish, Orkla Health div. Denomega, Pharma Marine, Rimfrost, Sparebanken Møre, Strand Sea Service, Vedde, Vital Seafood.

R&D AND SIMILAR:

GOED, Helse Møre og Romsdal, Norwegian University of Science and Technology (NTNU Ålesund), Møreforskning, Sintef Fiskeri og Havbruk, ÅKP.



Blue Legasea's aim is to become a global hub for the production of sustainable, healthy marine ingredients, based on the refining of trimmings from fish processing and biomass that is not destined to become food. Such use of residual raw materials will increase sustainability and value creation throughout the seafood industry.

Within a geographically very restricted area, the Møre region represents one of the world's most comprehensive marine clusters. The cluster covers all of the important functions in the value chain, from fish resource to customer, and a close collaboration has developed between the industry, suppliers, education and research institutions. In 2013, Blue Legasea acquired the status of «Norwegian Innovation Cluster» through the Arena programme. ÅKP is facilitating the project. Some results of the collaboration were achieved quicker than most of us expected.

Blue Legasea currently comprises 28 selected partners, of which 22 are businesses and 6 are R&D organisations. Over the last 2 years the businesses have seen 30 per cent growth in sales. Blue Legasea has now reached the point where it is natural to take the next step, and would like to acquire more members in 2016. Møre has around 500 businesses related to seafood, and they represent in total annual sales of at least NOK 36 billion.



BLUE LEGASEA™

Norwegian Biomarine Resources

BLUE LEGASEA INDUSTRY MEMBERS:

HC OMEGA 3

- Calanus
- GC Rieber Oils
- Pharma Marine
- Marine Ingredients
- Orkla Health/Denomega
- FMC/Epax
- Rimfrost
- Arctic Nutrition
- Aker Biomarine

FISH OIL / FISH MEAL:

- Vedde
- Strand Sea Service
- Eros/Ramoen
- Havfisk
- Vital Seafood
- Marine Harvest
- Nordic Wildfish
- Br. Sperre



**Norwegian
Biomarine
Resources**



HC PROTEIN INGREDIENTS:

- Firmenich Bjørge Biomarine
- Arctic Nutrition

MØRE – A GLOBAL MARINE SPEARHEAD

The region's most advantageous natural resource is a rich marine biomass. This is connected to the shape of the continental shelf and marine currents that ensure a high nutrient content in the ocean. These conditions are only present in a few other locations across the globe, for example off the coast of West Africa and in South America.

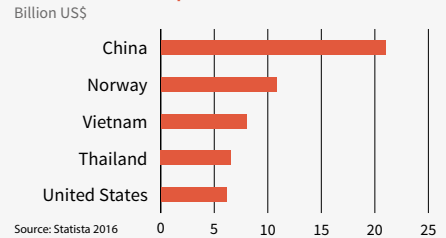
Furthermore, Norway and Møre enjoy certain structural advantages in well-developed and sustainable management systems and a world-leading maritime industry. These circumstances have made Møre a unique marine region on the global scale, as shown below:

- Norway is the world's second-largest seafood exporter (see top figure on the right). Norway is also renowned for its marine

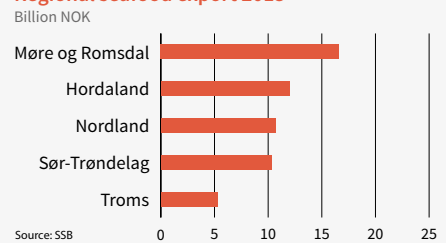
biomass management systems, which add credibility to the Norwegian reputation in documentable sustainability.

- Møre and Romsdal is the most important county in Norway when it comes to the export of seafood (see bottom figure on the right). It is also the region with the highest level of processing activity, and consequently the largest producer of trimmings. The expertise in this value chain is another important reason why this region is the centre of the country's marine ingredient industry (see map at the top).
- These facts also explain why large international corporations such as Firmenich, FMC and KD Pharma establish themselves in the region.

Global seafood export 2015



Regional seafood export 2015





LEFT: HRH Crown Prince Haakon and HRH Crown Princess Mette-Marit tasting marine peptides in juice, together with Director Gary Smith (left), Director André Pometta (partly hidden) both from Firmenich SA, and CEO Tormod Thomsen, Firmenich Bjørge Biomarín.
OVER: Vinita Bali, Chair of the Board of GAIN.

MARINE PROTEINS AND PEPTIDES IN FUNCTIONAL NUTRITION SYMPOSIUM

It is a basic principle of the Blue Legasea biomarine cluster that products are based on scientifically documented health benefits. The companies compete in a global market, and it is therefore essential to develop cutting edge expertise in the region. For this reason, we planned a conference, which would highlight the cluster and the region's position.

Following an initiative proposed by the international Firmenich organisation, the first Symposium was held on 20-21 April 2016, entitled: MARINE PROTEINS AND PEPTIDES IN FUNCTIONAL NUTRITION SYMPOSIUM.

The conference was officially opened by HRH Crown Prince Haakon, whose speech included the following statement:

"Our time is a time for change. Blue Legasea is a good example of innovative clusters that redefine global challenges into national opportunities. It also shows that close cooperation between the private sector and public institutions, such as hospitals and universities, can lead to important and rapid results."

The first conference included 14 profiled speakers from three different continents, thanks to the professional network of Firmenich. The CEO of Britannia Industries, Vinita Bali, gave a fantastic opening lecture on «The double burden of malnutrition», which really defined the perspective of the conference. Mrs. Bali is also Chair of the Board of Global Alliance for Improved Nutrition (GAIN).



THE IMPACT OF DOCUMENTED HEALTH EFFECTS

Norwegian health authorities would yearly save NOK 154 billion if public advises of diet were upheld.
NORWEGIAN INSTITUTE OF PUBLIC HEALTH

The world is faced with enormous challenges, two of the most significant being climate change and population growth. OECD states the world population will increase from the current 7 billion to 9.5 billion by 2050. Today 2-3 percent of the world's food comes from the sea. This figure must increase substantially, to meet demands of proteins and environmental measures.

From a global perspective, health problems caused by lifestyle are increasing dramatically. According to the World Health Organization 38 million people die of lifestyle diseases every year. Blue Legasea is certain that Norway can contribute to solving some of these global challenges by further developing our position as a superpower within seafood and marine nutraceuticals.

DOCUMENTED HEALTH BENEFITS

Health benefits from omega-3 are documented in more than 24,000 published articles. The fatty acids are e.g. important for the development of the brain and sight, and prevent cardiac and vascular diseases. Documentation for further health benefits is still presented.

With regards to marine proteins, research has shown that they will be highly significant for human health and the world's health budgets. Blue Legasea is currently cooperating with companies and trusts concerned with research and documentation to obtain public approved health claims.



“I am incredibly excited about this merger and the opportunities it allows the collective organization to bring to the market”

OSCAR GROET
KD PHARMA CEO



PHARMACEUTICAL

NUTRACEUTICAL

FUNCTIONAL FOOD

FOOD

FEED

RAW MATERIAL

OWNERSHIP, INNOVATIONS AND GLOBALISATION

Marine ingredients is a relatively young and rapidly growing industry. A natural development in a young industry is frequent changes of ownership. In growing industries, we often find that financial investors see opportunities for further developing young companies and then selling them for a profit. In our cluster we recently saw this when Epax was sold to FMC. After three years of ownership, Aker BioMarine was able to post a profit of NOK 250 million in 2013, according to the financial newspaper, Finansavisen.

Another aspect of the dynamic is that when companies reach a certain size, with sought-after products they attract the interest of globally positioned industrial companies, which, in this instance, was also the case.

At the end of 2014, BASF sold their omega-3 plant in Brattvåg to US-based Marine Ingredients. In October 2016, Marine Ingredients announced a merger with the German company KD Pharma, who by their own admission possess «one of the largest manufacturing capacities of concentrated omega-3 oils».

«Merging with KD-Pharma enables Marine Ingredients to enlarge our company's dedication to superior quality, operational excellence, and innovation, while also expanding our manufacturing technologies, which provides even greater benefits for our customers; the synergies allow both companies to extend competitive advantage to our customers. This is a win-win for the brands and customers we work with,» said Olav Sandnes, President of Marine Ingredients.

«I am incredibly excited about this merger and the opportunities it allows the collective organisation to bring to the market,» said KD CEO Oscar Groet. «Marine's products, customers and finished goods manufacturing capabilities combined with the technology and global presence of KD will allow us to serve a much broader segment of the market.»

The cluster Blue Legasea consists of an optimal mix of businesses with local ownership and placement, and large global players providing the cluster with market expertise and other qualities. Both Epax and KD Pharma now have FDA (US Food and Drug Administration) approval to produce APIs (active pharmaceutical ingredients). This opens up new possibilities in respect of pharmaceutical innovations.

BENEFITING FROM THE NORWEGIAN ADVANTAGES

The demand for omega-3 oils seems insatiable, but if you want to be in the premier league the quality requirements are extremely tough. This suits the CEO of GC Rieber Oils in Kristiansund very well. Their production facilities are located in Norway, which gives more advantages than disadvantages.

Jan Roger Bjerkestrand and GC Rieber Oils are optimistic about the future. The products are full of the essential fatty acids EPA and DHA, which have a positive effect on e.g. the heart and vascular systems, vision, the brain's development, and mental health. People are living longer and realize that they have an increasing responsibility for their own health. Today the Norwegian biomarine industry delivers primarily to the rapidly increasing middle class in the USA, Europe and Asia. Eastern Europe, South America and the Middle East are markets that are yet to be developed.

– But is there a connection between rising living standards and healthier diets? – There is a change in the direction towards a more Western diet, i.e. more meat. Furthermore, 50% of all fish consumed is farmed and raised on soy, and contains very limited omega-3. These two factors contribute to an increased need for supplements. The body needs omega-3 fatty acids, but they cannot be manufactured by the human body and must be added.

QUALITY, SUSTAINABILITY AND TRACEABILITY

Gone are the days when people indiscriminately stuffed themselves with whatever they were served. Today, they want to know the origin of the products, how they were harvested and how production was carried out. GC Rieber Oils supply their oils in bulk to large distributors who encapsulate or tap it into small bottles under their own brand. These businesses are aware of their responsibilities, and require documentation and tracking information back to the fishing boat, including regulatory systems.

«Here comes the first of the advantages being located in Norway», says Bjerkestrand. «The strict regulatory framework in Norway is well known abroad and gives us credibility. Although we buy much of our raw material today overseas, we can document sustainable fisheries and recognised certifications just as well as for Norwegian catches. We can also show that the raw material in its original form is not suitable for human consumption, and that nothing is wasted. Our by-products are used in animal feed, or as fertiliser or energy sources in our own factory.»

THE NORWEGIAN WORK CULTURE IS TOP LEVEL

The kind of production dealing with high-grade concentrates is advanced and automated. The two reasons includes high quality requirements and Norwegian cost levels. «Here we actually score an extra point», says Bjerkestrand. «A Norwegian operator who discovers a discrepancy doesn't allow a few thousand litres of expensive oil reach a too high temperature or go into the sewer while he or she waits for the boss. That operator assumes responsibility, takes action and reports afterwards. It's no wonder that the Norwegian level of competence and work

culture also has positive effect on quality. We want to raise the value of our products to a level that very few can match. We have operators who have delt with marine oils for decades. They're an invaluable resource.»

BRANDING TAKES ON A GREATER SIGNIFICANCE

The majority share of Norwegian biomarine oils and lipids is sold in bulk to big players who put their own brand name on the final products. GC Rieber Oils pay a lot of attention to build their own brand, which is important also in the B2B segment.

«We call our omega-3 products VivoMega™ and notice that some of our customers are starting to put this name on their packaging as a guarantee of quality and as a tracking reference. For us, this is important for two reasons. Other large customers want to copy this, which build a certain threshold to replace us as supplier. It is also significant that it makes it even easier for discerning consumers and consumer organisations to separate the wheat from the chaff. Internally, branding makes us even more conscious of the quality of everything we supply. This is especially important, simply because we have to deliver the very best at any given time.»

BLUE LEGASEA IS THE FACILITATOR

Currently, Blue Legasea has member companies representing the entire supply chain from harvesting to processed products. What is the impact?

«Firstly, I'd say that this is another of our Norwegian advantages. We're close to one another and see the whole value chain as a shared good. Here is one telling example: Norwegian whitefish are harvested on sustainable resources and maintain a very high quality standard. The problem is that people only eat the pure white meat. What about the trimmings? We, the ingredients industry, will gladly apply this biomass as raw material, and the fishermen will gladly sell them. So we get together to work out how a trawler should be built and equipped to manufacture raw oil and fish meal so that we are able to create high-quality health products.» Don't these new value chains take a long time to build? «The first such trawlers have already been built.»

A LONG WAY FROM MAJOR MARKETS

The disadvantages Bjerkestrand points at by manufacturing in Norway are the distances.

«We're a long way from the major markets, and for those companies who obtain their raw materials from South America and North Africa, this also brings challenges. But the benefits of staying in Norway far outweigh the disadvantages. If we are successful in obtaining a greater proportion of the raw materials from Norwegian whitefish, we will become even stronger.»



BLUE LEGASEA CONNECT

In connection with the extension of Blue Legasea's Arena status in the autumn of 2016, it was decided to initiate a project focussing on affiliation and stronger formation of clusters. One of the reasons behind the project was to further anchor Blue Legasea in the industry prior to renewing its NCE status in 2018.

NCE cluster status has been decided as the correct direction to take and is considered an essential tool for elevating the biomarine industry with its natural centre of gravity in Møre and the entire associated value chain to the position which the industry ought to have nationally and internationally.

As a member-driven industrial cluster, it is important for those of us working in the programme to know what is going on amongst the members of the cluster, to get a grasp on the projects in progress and to contribute to the smooth running of collaborative efforts between the companies and other players in the cluster project. We also need to be aware of which players who potentially could be recruited as members of Blue Legasea.

Blue Legasea Connect is a two-stage project. We have conducted interviews with each of the cluster's members with the primary goal of embedding and clarifying expectations. This will be followed by a recruitment process to increase the number of members in the cluster.



BRONZE LABEL APPROVAL FOR BLUE LEGASEA

As part of the EU efforts to create more world-class clusters across the EU by strengthening cluster excellence, the Commission launched the European Cluster Excellence Initiative in 2009.

The European Cluster Excellence Initiative developed methodologies and tools to support cluster organizations to improve their capacities and capabilities in the management of clusters and networks.

Results are presented by an individual report to the cluster management and include also recommendations for further improvement in line with the requirements of the cluster quality label.

The European Cluster Excellence Initiative has awarded the cluster organisation Blue Legasea with the quality label "Cluster Organisation Management Excellence Label Bronze".

We have been very well received during the visits and have experienced great involvement associated with profiling relevant issues and topics such as:

What is the most important motive for member companies in cluster collaboration projects? And what will it take for companies to become involved and to ensure that collaborative efforts become a component of competitiveness?

How can Blue Legasea perform our best for the members? How can we together increase the cluster's visibility and enhance its reputation? How do we achieve the position the industry deserves, nationally and internationally?



R&D AND CLUSTER COOPERATION

A major goal for industrial clusters is to create added value and sustainable innovation. In order to succeed, cooperation at several R&D levels is needed. In recent years companies connected to Blue Legasea have been increasingly engaged in research, and a number of R&D projects, both large and small have been accomplished. An overview by Møreforsking Ålesund revealed a large number of projects related to raw materials, new omega-3 sources, fishing methods, catch issues, on-board processing and the sensory and health effects of marine ingredients. It is estimated that the total value of the projects exceed NOK 150 million, with significant contributions being made by the participating companies themselves. External funding sources are many: including Research Council of Norway, FHF - The Norwegian Fishery and Aquaculture Industry Research Fund, VRI (instruments for regional R&D and innova-

tion), the Directorate of Fisheries, and private sources.

The need for further research and documentation is huge in the marine industry and not least the ingredient industry. Raw material quality and efficient production throughout the supply chain is essential when supplying nutritional products, and a prerequisite for achieving good food safety and healthful products.

The companies are facing an increasing number of regulatory requirements, nationally and internationally. In order to succeed, it is important to be active and at the forefront of development. The ingredients industry, in both the lipids and proteins sectors, needs documentation pertaining to product efficacy. The commitment of Blue Legasea members shows that the industry takes this seriously and wants

to help strengthen its own position and that of Norway in this respect.

R&D projects dealing with issues throughout the marine supply chain are expected to yield exciting results in the coming years. We believe that the results and the advances being made in marine research and R&D projects will definitely help to create added value for the companies, as well as new jobs; and that they will strengthen corporate competitiveness and release the huge potential that marine resources and raw materials will have in the future.

This will assist us in attaining our goal of becoming the world's leading seafood nation. Blue Legasea will thus be an important player in putting the Norwegian marine industry on the map, both at home and abroad.

SIZE MATTERS

When herring disappeared in the 1960s, Vedde AS had been producing fish meal and fish oil for 40 years. Ever since then, the company's owner, Koppernæs AS in Ålesund, has been concerned about three things: proximity to raw materials, production of a wide range of fish species, and the importance of being a major player.

VEDDE AS

Produces 110,000 tons of raw material from blue whiting, sand eel, herring, capelin, sprat and trimmings from other fishing industries.

LOTA PROTEIN SA

Produces 70,000 tons of raw material from anchovies, sardines, squid and horse mackerel

TRIPLE NINE FISH PROTEIN AS

Produces 440,000 tons of raw material from sand eel, sprat, Norway pout, blue whiting and trimmings from the fishing industries.



To solve the «lack of herring» problem, half the factory was dismantled and re-assembled in Peru, with access to its huge resources of anchovy. Ten years later, this industry was nationalised by the Peruvian authorities, and Koppernæs was left with the factory in Langevåg only. The raw material was now the Norwegian industry fish – except herring.

«It's important that our production includes a wide range of fish», says Koppernæs AS' CEO, Kenneth Lande Klokk. «Quotas and catches can have big fluctuations, but it never happens that all the species are 'down' at the same time. If production is on-going in several countries and on several continents, you're far less vulnerable with regard to stocks, quotas and catches.»

Why is this so important?

For two reasons. The first is that we are working in a global industrial market. Our customers are mainly manufacturers of animal feed for land-based use and fish feed for the aquaculture industry. We are talking about large companies in Europe, USA and Asia. They need to have a regular supply of meal and oil for their own production. If we are unable to deliver, they go elsewhere.

The second reason is that this is a process industry. The systems have required huge investments, and they cannot be turned off and on. They have to go on, around the clock for long periods of time.

PRODUCTION IN THREE COUNTRIES SO FAR

After many years of production in Norway alone, in 2000 Koppernæs was back in South America.

«We'd never given up thoughts of South America», says Klokk. «We knew the area and the resource situation well. In 2000 we bought a Chilean plant, Lota Protein, which we upgraded to become a state-of-the-art facility.

Later, we entered into a partnership with a major Danish manufacturer, Triple Nine, and formed the Triple Nine Group,

of which now, in 2016, we have become the majority owner. Together, we now produce 620,000 tons of raw material. Nonetheless, we have a growth strategy. So, we're not likely to stop here.»

THE STRUGGLE FOR RAW MATERIAL

«The world's demand for marine meal and oil for fish and animal feed is large and increasing. The competition for raw materials is fierce.

A lot is bought at auction, but more and more raw material is locked in by large corporate structures that control the entire value chain», Klokk says. «For us, it means that, for example, we have to get involved in the financing of boats and land-based fillet production facilities with delivery obligations for the catch and the processed product. On top of this, in Chile, in addition to running our own fleet, we've also entered into financing agreements with a number of local boat owners.

IN IT FOR THE LONG RUN

Lande Klokk pauses, before going on to establish that this industry is not something you enter to make a quick return.

«Major investments in processing plants, and natural fluctuations in production and raw material prices means that it's a roller-coaster we're on. The only thing we never know is when it will go up or down. You have to be in it for the long term, and that in turn requires that you're stable.

This also explains why this industry is a strong supporter of resource management and regulation. Regulated fishing of sustainable resources is essential to ensure the stability we need in both the short and long term.

The Triple Nine Group wants to be ahead of its customers, and invests significant resources in R&D aimed at ingredients and human consumption. This is long-term work with future profits that requires size and a solid balance sheet.»



From problem
to resource thanks to
new technology

MARINE INGREDIENTS «MADE IN NORWAY»

– FROM PROBLEM TO RESOURCE THANKS TO NEW TECHNOLOGY

Residual raw material from white fish trawlers with onboard production remains a problem for most countries. In Norway, some 250 thousand tonnes are still being discharged back to the sea. In 2013 and 2014 the shipping companies Havfisk and Strand acquired new trawlers capable of capturing and storing the residual raw material.

In 2016, the Møre trawler fleet received two new additions equipped with state-of-the-art technology that, each in its own way, pave the way for increased sustainability with regard to finances, the environment and reputation.

M/TR MOLNES – 1/3 REST RAW MATERIAL

The Nordic Wildfish shipping company invested approximately NOK 100 million in the Molnes trawler. This is the first trawler capable of hydrolysing the trimmings. In

practice, this means that the proteins can be treated at low temperatures and used in illness-preventing products for human consumption. The fat is transformed into crude oil which is refined further by the ingredients industry on-shore to produce valuable Omega-3 supplements. Molnes produces white fish that has been gutted and the heads removed, meaning that a third of the biomass caught is rest raw material.

M/TR RAMOEN – 2/3 REST RAW MATERIAL

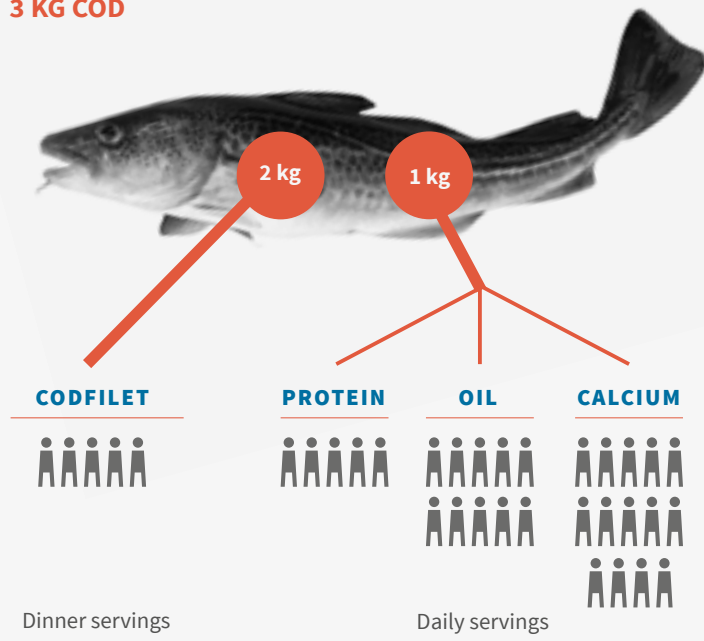
The trawler Ramoen, costing about NOK 340 million, was delivered to the shipping company Eros in October 2016. Ramoen is a factory trawler that produces skin and boneless fillets of the highest quality. It is also the world's first vessel to remove bones from the fillets using water jets. The result of this production is that approximately two thirds of the biomass caught is rest raw material. The protein is turned into fish meal for high-quality feed while the crude oil and

fat is further refined for the Omega-3 industry on-shore in the same way as on board Molnes.

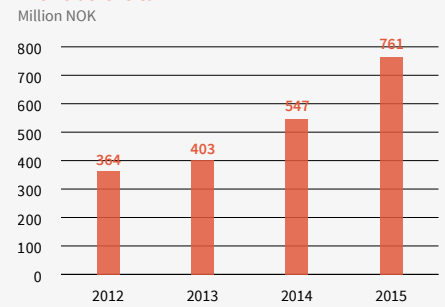
NEW AND TRACEABLE NORWEGIAN VALUE CHAINS

The result of this collaboration between sea and land is the creation of value chains based on sustainable fish stocks that are traceable, entirely Norwegian and capable of documenting a small carbon footprint. These three factors all contribute to competitive advantages on a global scale. The Omega-3 oil could replace imported products from South America and proteins derived from hydrolysis open up for new products with high value-creation potential. The new value chains are created by visionary leaders in a thriving industry and create huge opportunities for the region and for Norway as a whole, with Blue Legasea as a platform for the collaboration.

3 KG COD

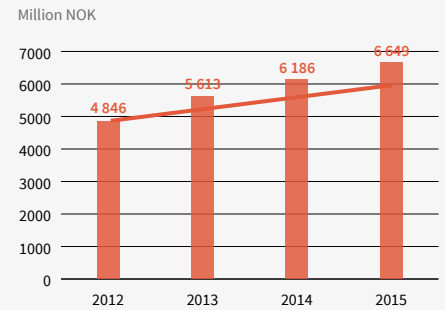


Profit before tax



Source: SSB

Turnover



VALUE CREATION AND GROWTH

Since export accounts for 40 per cent of GDP, export activity is crucial to Norwegian prosperity. In order to succeed in export markets, companies must be leaders within their fields, not just nationally but internationally. International competition is tough, meaning that organisations need to be highly productive in order to survive. Value creation per employee in export companies is 80 per cent higher than in other Norwegian business sectors. (Source: Menon-Publikasjon 9/2015).

The Menon report defines an export company as a company where exports account for 25 per cent of turnover or more. For most members in Blue Legasea, export accounts for more than 90 per cent of their business.

TURNOVER

The term value creation has various meanings. In the SINTEF report from 2012 titled 'Value created from productive oceans in 2050' (Verdiskaping basert på produktive hav 2050), the term is used synonymously

with turnover. The report estimates a turnover value for the Norwegian marine ingredients industry of NOK 70 billion in 2050, corresponding to an annual increase of 7 per cent per year (= red line in the bottom figure on the right).

The 13 ingredients companies and 6 suppliers of rest raw material that have been members of Blue Legasea since the start in 2013 have seen an average turnover increase of more than 11 per cent (= red bars in the bottom figure on the right). Even though many factors impact turnover and profits, such as currency fluctuations, raw material prices, etc., these even out over the years. The figures seem to support the 2012 SINTEF report and indicate that the marine ingredients industry may, by 2050, match total seafood exports in 2015.

PROFITABLE AND SUSTAINABLE

Some have been sceptical of the ingredients industry's profitability. The figure on

the right shows that the aforementioned 19 companies have experienced highly positive development in the last three years, with an average annual growth of almost 30 per cent. Between the 2014 and the 2015 accounting years, the growth was nearly 40 per cent.

In addition to creating much needed value and jobs in these changing times, there are many other important aspects to the marine ingredients industry.

For example, by utilising rest raw material from the white fish trawler fleet instead of discharging it back to the sea, a reputation problem is turned into a practice that is sustainable from an environmental, financial and social point of view. Creating high-value products from seafood industry residual increases profitability across the entire marine value chain. Another unique characteristic of this industry is that it employs a large number of women with higher education.



VITAFOODS GENEVA 2016



**GOED and
Blue Legasea
membership
exchange**

Vitafoods in Geneva is referred to as the global nutraceutical event and brings together almost 20,000 visitors annually from around the world. Representatives of the entire value chain in the ingredients industry are present – including ingredient manufacturers and suppliers of finished products to the health and nutrition market. A number of Blue Legasea members participate in the exhibition; with their own stands, as visitors or as delegates at conferences and seminars.

One of Blue Legasea’s major initiatives in 2016 was to set up a stand at the Geneva fair. This gave our members the opportunity to exhibit for the first time as a unique Norwegian biomarine cluster. Joint effort will help to strengthen the Norwegian biomarine industry’s position nationally and internationally and raise the profile of innovative Norwegian companies in a global and highly competitive market.

A lot of effort and resources created an appealing pavilion for the Norwegian organisations, and three of Blue Legasea’s members chose to participate with an integrated profile. In addition, some of the other members who did not exhibit at the stand made use of common areas and meeting rooms. We invited our members to an informal kick-off on the first day to strengthen relationships with one another and external invitees.

One highlight of the trade show was the exchange of membership between Blue Legasea and GOED (Global Organization for EPA and DHA Omega-3*). GOED defines themselves as «a proactive and accountable association of the finest manufacturers, marketers, and supporters of EPA and DHA omega-3 fatty acids, working to educate consumers and work with government groups, the healthcare community and the industry, while setting high ethical and quality

standards for our business sector.» GOED is already well-acquainted with several of Blue Legasea’s member companies, and we look forward to our continued cooperation in working for the common good.

Feedback has been good, and we received many suggestions and new ideas from our first major international initiative. The value of showcasing our unique biomarine industry nationally and internationally is important – as there are many players challenging the Norwegian position.

* EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) are essential fatty acids. The human body is unable to produce EPA or DHA, and the only source is through diet.



LEFT: Marine ingredients course – Spring 2016, NTNU Ålesund
Group picture of participants

BELOW: Lecturer Oddrun Gudbrandsen and Øyvind Sætre and Kim Thorup from Marine Harvest



COMPETENCE BUILDING

An important prerequisite for success in value creation through cluster cooperation is the development of relevant competencies and training opportunities. Cooperation between businesses, educational institutions and research environments in Blue Legasea provides a unique backdrop for assessing needs and creating appropriate and timely training opportunities.

During 2014 Blue Legasea was awarded a NOK 2,5 million funding from Innovation Norway to work systematically on competence building within the field of marine ingredients, together with Sintef and NTNU. Norwegian University of Science and Technology (NTNU Ålesund) now offers a Bachelor programme in biomarine innovation that qualifies for a Master at NTNU in Trondheim. Post graduate courses on raw materials, process technology, analysis and

methodology, marine ingredients and international markets are also on offer, and there are now several commercial Ph.Ds involved with member companies of the cluster.

Strong involvement and commitment have been provided by cluster companies during the process of identifying needs and knowledge areas. This will be of great benefit to the industry in both short and long term. Blue Legasea is also a participant in the Norwegian Rooms development project, «Global Branding and business model innovation», which in 2016 was awarded a NOK 2.8 million funding over a two year period by the Norwegian Ministry of Local Government and Modernisation. Herein, we expect more exciting competence building with cross-cluster relevance for the development of international competitive advantage, branding and new business models.

"The course has been very useful and definitely fulfilled my expectations of learning more about marine ingredients. In addition to enlightening more of the market opportunities, this factor along with great relationship-building with new business contacts has opened up exciting possibilities."

KATRINE FLORVAAG
Sales Manager, RAMOEN AS



BLUE LEGASEA PRESS TOUR

In May 2016, Blue Legasea and Blue-C arranged a press tour for the first time, visiting member companies together with domestic and international journalists. Press tours have been successfully undertaken in the maritime cluster for several years – and the response from member companies was good, also in the biomarine industry.

Three days of company visits throughout the county resulted in several articles in national and international magazines, and on several websites. The Blue Legasea member companies were presented both individually and as part of a strong cluster with huge international potential.

The well-established collaboration between business players and academia – and focus on sustainable management, harvesting and processing within the cluster created great interest among journalists. Optimising usage of traditional marine resources and residual raw materials from the whitefish industry caused media representatives to listen very intently.

Blue Legasea members in Møre and Romsdal may be holding the key to solving some of the world's major health challenges with high quality Norwegian marine ingredients. This made a substantial impact on many of

Pure, sustainable, premium-quality omega-3 products from the west coast of Norway
Pharma Marine

the journalists who gained new insight and understanding of the potential.

Increased international awareness of innovations and value-creating projects are important to the Norwegian biomarine industry in general and to Blue Legasea members in particular.

The contact that was established between the companies and the participating journalists will be able to bear fruit in many contexts in the future, and we encourage all our members to nurture these contacts by sharing industry news on a regular basis.



“By most accounts, Norway leads the world in marine industry sustainability. In the process they are demonstrating that management of a limited resource does not mean shrinking the supply to the point where it can't meet demand. Sustainability, true to its name, can indeed mean continuous supply.”

BILL GIEBLER
Newhope.com

“The Ramoen will also have a fish meal factory that can take out fish oil for heads, tails, and trimmings. In recent years, the group has upped fishmeal sales to Norway and China, and is also looking at the ingredients sector, revealed Eggesbø”

ROSS DAVIES
Undercurrent News

“CodMarine in many ways reflects a grandmothers love and care. Our love for wild nature and care for people and resources are important aspects of our company's philosophy of sustainable production. Like a grandmother, we take pride in utilizing 100 % of the fish, so that none of these important resources go to waste. Leif Kjetil Gjendemsjø, Pharma Marine.”

MARTIN UHLENFELDT
Fiskerforum

“They didn't know why, but our grandparents were in no doubt that a daily spoonful of cod liver oil was good for us.”

QUENTIN BATES
Fishing News International

“Norwegian producer Rimfrost has launched new krill oil products onto the European market, giving the European supplement market access to opportunities to develop krill oil products with authorized health claims.”

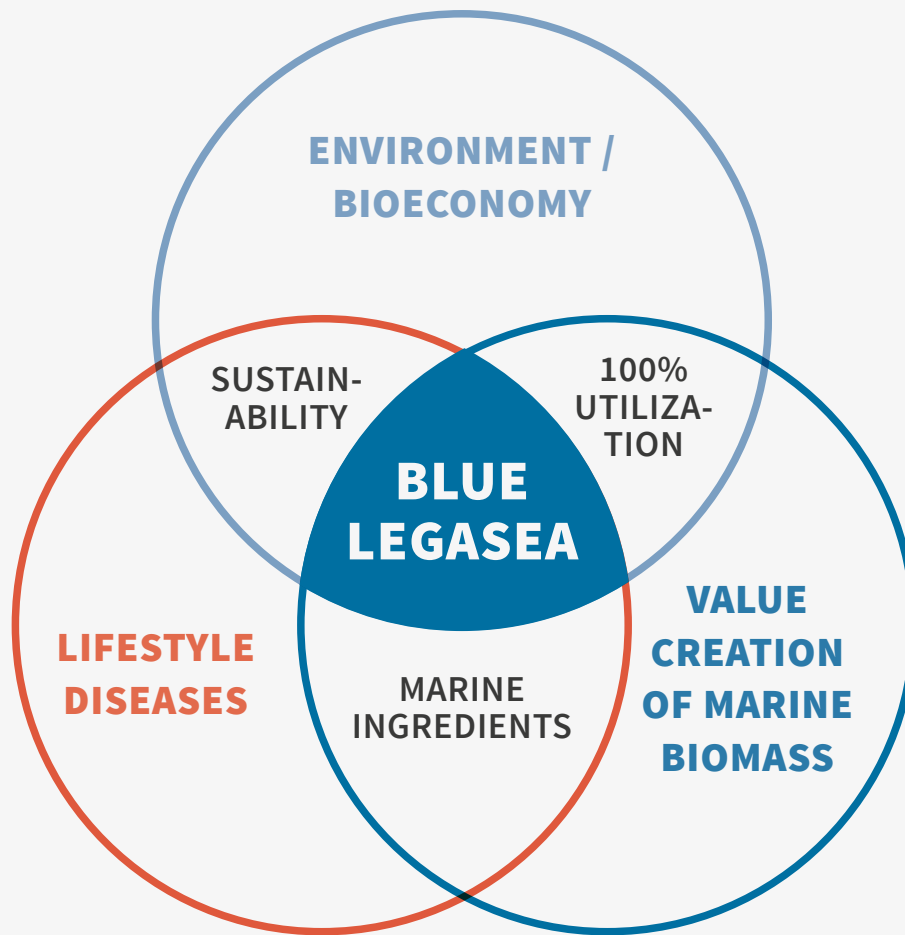
MARTIN UHLENFELDT
Fiskerforum

“Taking omega-3 a step further.”

MARTIN UHLENFELDT
Fiskerforum

“En Norvege, la navire usine du future transforme 100 % des captures en mer pour la consommation humaine: decoupes surgelees, farines et huiles, concentres de proteines.”

BRUNO VAUDOUR
Produits de la Mer



GLOBAL CHALLENGES, NATIONAL POSSIBILITIES

FOCUS AREAS:

1 DEVELOP COMPLETE, COMPLEMENTARY AND MARKET DRIVEN VALUE CHAINS

- MARINE LIPIDS
- MARINE PROTEINS AND PEPTIDES

2 COLLABORATION WITH LEADING ACTORS IN THE MARKET

3 STRENGTHENING THE CLUSTER MECHANISMS

4 TO BECOME KNOWN AS A LEADING MARINE INGREDIENTS CLUSTER

DID YOU KNOW...

- Møre and Romsdal county is the most important export region in Norway, representing some 23 % of the national export value.
- More than 500 seafood companies are active in the Møre region.
- More than one million tons of seafood were transported from Alesund harbour in 2015.
- One million tons of fish represent some 3 billion fish fillets dinners.
- The ocean cover 70% of the earth surface. Equal primary biological production ocean/land, but food consumption from the ocean is only 2 %.
- Protein products from Firmenich Bjørge Biomarin made of trimmings are included in more than one billion servings.
- SINTEF expects some 4 million tons of trimmings from the seafood production in Norway in 2050

SUMMARY:

- **From oil economy to bio economy**
- **Sustainable production of Norwegian marine ingredients**
- **100 % utilization – high value products**
- **Knowledge based industry**
- **Basic needs globally: Nutrition & Health**

ÅKP

THE REGIONAL INNOVATION COMPANY



The core activity of the innovation company ÅKP is to stimulate the creation of future jobs and create an attractive region in which to live and work.

ÅKP is a regional centre for innovation and industrial development and facilitates, amongst other things, one of Norway's most complete incubator systems, the cluster programmes Blue Maritime Cluster – Global Centre of Expertise, Blue Legasea, Norwegian Rooms, and several other national and international projects. Today, the county of Møre and Romsdal is the host for world-class ocean-based industrial clusters. Many of ÅKP's activities are linked to these important industries, but ÅKP also works actively to transfer knowledge and experiences within innovation processes, organisations and cultures to other industrial environments and public activities. ÅKP assists with the creation of new growth businesses and the development of existing businesses through a fully integrated

and synchronised innovations system. In close collaboration with industry and R&D and funding agencies, ÅKP has established a model in which innovation activities and cluster programmes benefit from one another. Newly established businesses require networks, financial muscles, strong innovation environments and cluster programmes as support to be able to succeed. For their part, industrial clusters require new ideas, innovations and new businesses in order to grow and strengthen their competitiveness on the global market. This is a dynamic that ÅKP amplifies. Such network thinking and a seamless innovations model are unique in a Norwegian context. This is to stimulate and develop the basis for future value creation in the region.

BUSINESS IDEA:

ÅKP is to be a regional center with national importance that contributes to innovation, economic growth and regional development in global competition.

MAIN STRATEGY:

Innovative interplay in practice - Be a driving force for innovation connecting industry, academia and the public sector in processes that create sustainable value creation.

VALUES: VISIONARY FEARLESS COMPETENT GENEROUS RELIABLE

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Follow us on:



Blue Legasea is a complete business cluster project within marine ingredients. Blue Legasea started out with 23 members in 2013, to sort out the strategic important elements to establish new value chains. The cluster has now reached a point where it is natural to move to the next level. In Møre there are around 500 companies associated with marine biomass, representing a turnover of some 38 billion NOK. Blue Legasea is part of the governmental program «Norwegian Innovation Clusters», financed by Innovation Norway, The Research Council of Norway and SIVA. The project is facilitated by ÅKP (AAKP). Møre and Romsdal County is another important partner, including partial financing.

