



Finnish Offshore Industry 2015

This study describes Finnish offshore industry, its structure and business volumes as well as future outlook. This report is a continuum to the Finnish Offshore Industry -reports conducted in 2012, 2013 and 2014. The project team is commissioned by Prizztech Oy (www.prizz.fi) and the report is also supporting the work of Ministry of Employment and the Economy (MEE) Maritime industry operational environment development programme. Financially the study is supported by MEE.

Forewords



Finland has always had to cope with demanding maritime conditions – Finland’s foreign trade has and still is relying on sea routes, which have to be kept open throughout the year, regardless of the prevailing weather conditions. Location near the Arctic has led us to develop solutions which enable operating even in the most challenging of conditions, be it in thick ice or winter’s storms. Also, the Baltic Sea, with its highly sensitive and interdependent ecosystem has challenged us to create sophisticated cleantech solutions for marine operations in order to ensure the durable preservation of the Baltic Sea and its unique nature. We know that ecological sustainability in maritime technology and services does not exclude economical development.

Finnish industry has earned a reputation as a reliable supplier of high quality offshore products since the early days of the North Sea economic development. Today, offshore industry remains a major business for Finnish technology companies. The competitiveness of the Finnish industry is based on the combination of innovative products and services, high level of safety and quality of those products, their punctual deliveries and long experience and references in the business. Finnish companies are committed to serving their customers across the globe. These qualities make the Finnish technology and service companies excellent partners for the investors and operators in the global offshore market.

Prime Minister Sipilä’s Government has recently approved programs outlining a broad set of measures aiming to enhance the competitiveness of the Finnish export industries. Amongst these measures is strengthening of the international cooperation in the Arctic region, additional measures in export and innovation financing and development of marine and offshore know-how in Finland. As a part of this, the Finnish Funding Agency for Innovation (TEKES) launched in 2014 a 100 million euro “Arctic Seas” -programme which will speed up the development and introduction of new technology and services in the markets of harsh conditions such as Arctic maritime transport and offshore industry. In addition, the Ministry of Employment and the Economy has a marine industry programme e.g. helping Finnish SMEs to identify opportunities in offshore industry.

By investing in new capabilities and strengthening existing know-how, the Finnish offshore industry will continue as a forerunner in multitude of business areas, which are outlined in this report. With the advanced Finnish know-how of the Arctic conditions and its requirements, the international customers are offered a great opportunity to develop sustainable partnerships in cleantech marine technology, communications, new energy and power solutions and other areas of technology, and to improve their position in the global competition.

Dr Olli Rehn
Minister of Economic Affairs

Move on to Offshore markets, Momentum for Finnish Marine Industry



Strong Competitive Network for the offshore market deliveries is the key for the Finnish offshore industry, an integral and growing part of the Finnish marine industry. Statistics reveal that offshore marine industry employs some five thousand people, one fourth of the whole marine industry.

This cooperation and networking is essential in delivering competitive parts and larger entities for oil & gas production fields. Due to the low oil price, investors are looking for cost

savings for the next investments. There are more than 500 marine industry companies in Finland, and they can join forces to provide bigger concepts and larger entities with competitive price level.



Co-operation is needed also in RDI in order to develop smart, safe, effective, environmental friendly and profitable vessels and solutions for offshore extreme conditions, like those in the freezing cold Arctic Ocean. This is the competence what Finland has. Tekes – the Finnish Funding Agency for Innovation - supports research, development and innovation projects that create the greatest benefits for the economy and society in the long-term. The Arctic region is one of the key focus areas for Tekes at the moment.

Offshore is one of the six major marine industry sectors in Finland. According to the report by Prizztech, offshore export reached over 1.6 billion Euros in 2014, a large proportion of the total export of some six billion Euros of the Finnish marine industries. This emphasizes the importance of offshore to the whole maritime industry.

Shipyards build the most visible products: many types of vessels such as the biggest and most luxurious cruise ships, most of the world's icebreakers and many types of special vessels for offshore support, supply and rescue operations such as oil spill recovery, firefighting and towing operations. Repair yards provide life-cycle services for ships. Material and system suppliers manufacture many famous products such as environmentally friendly LNG fuelled engines aimed at conserving environment, and the most advanced propulsion systems for energy efficiency and water mist fire-protection systems.

Finnish turn-key companies are able to deliver complete spaces for vessels, such as fully equipped kitchens and cabin modules. Design offices offer concept design, research and development services. Software and system providers offers design software to the offshore industry, customers include owners, operators, and the drilling and production platform designers.

These six sectors are not separate but interconnected as Competitive Network for the offshore market deliveries. The Finnish marine industry is known for networking, innovation, ability to solve complex engineering problems and on time deliveries with competitive price level.

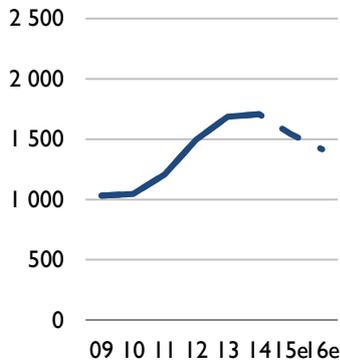
Merja Salmi-Lindgren
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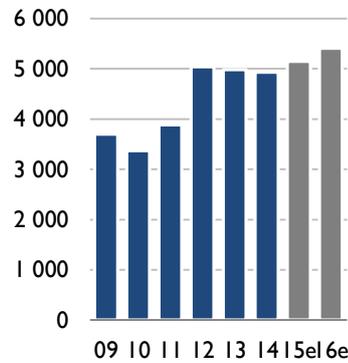
Key figures

Overview of the Finnish offshore industry

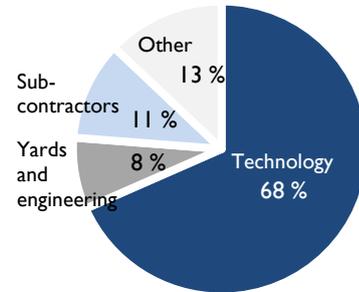
Value of exports 2009-2016e, M€



Number of employees 2009-2016e

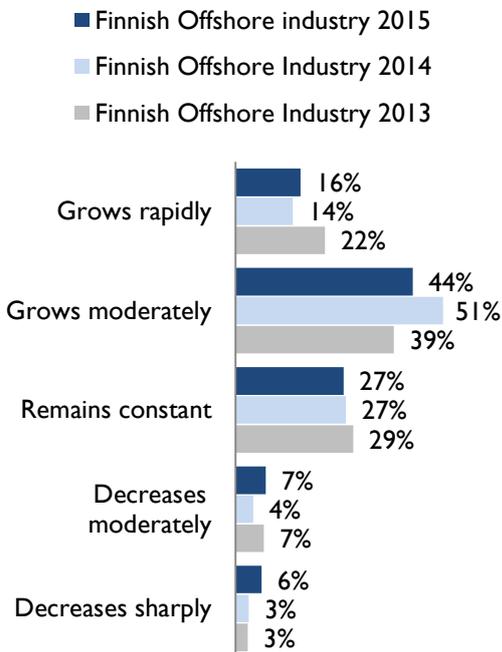


Revenue by industry segment 2014



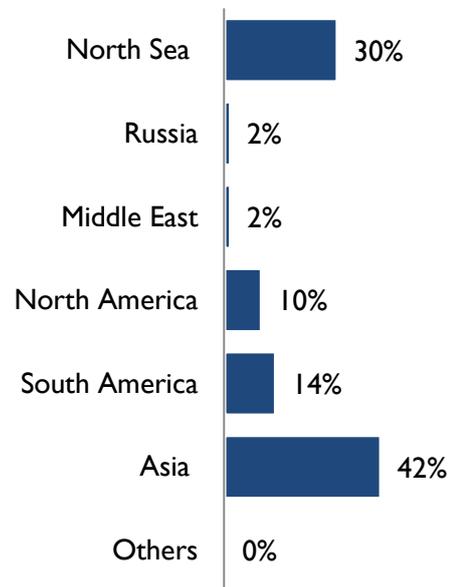
Sources: information provided by the companies, VALOR analysis

Companies' outlook for their offshore businesses



Sources: information provided by the companies, VALOR analysis

Exports of the Finnish offshore industry in 2015

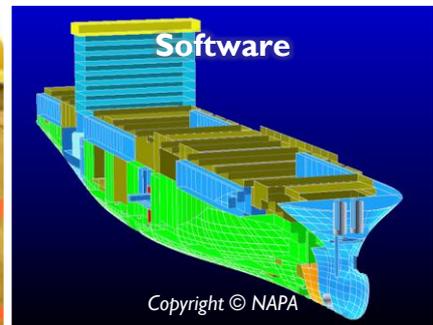
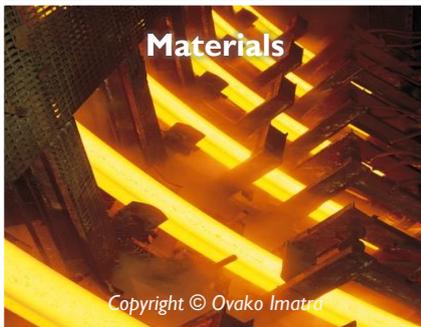
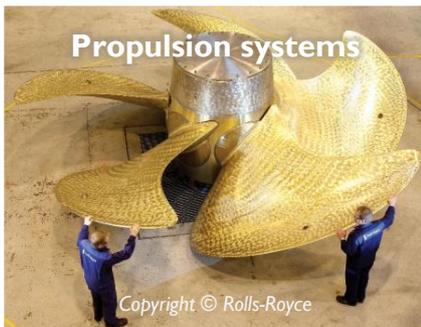


Sources: information provided by the companies, VALOR analysis

Finnish offshore industry business areas

Finnish companies possess world-class competence and knowledge in the offshore industry. The knowhow originates to a large extent from the strong shipbuilding industry as well as from the competitive high technology cluster in Finland. These have created strong requisites for innovative and high quality products and services in the Finnish offshore industry.

Examples of offshore business areas where Finnish know-how is recognized globally



Executive Summary

Today, the Finnish offshore industry comprises of approximately 150 active companies, for which the offshore business is of increasing importance as part of the Finnish Marine Industries. The industry employs approximately 5 000 persons in Finland. The Finnish offshore industry experienced substantial growth in exports in the years between 2010 and 2014, but declined slightly in 2015 due to the global oil and gas investment slowdown. The total exports of the industry were around 1.7 billion euros in 2014 and are expected to decline to 1.6 billion euros in 2015.

Technology is the most important offshore industry segment in Finland constituting approximately 1.3 billion euros, or around 70 % of the industry's total revenues. Strong Finnish players in this segment include companies such as Wärtsilä, Rolls-Royce, ABB, and Steerprop, specializing in propulsion, power and engine technologies.

Finnish companies are known for their deep technological expertise and uncompromising quality in offshore. Companies emphasize that quality is viewed holistically, covering not only traditional aspect of product quality, e.g. technical properties and durability, but also reliability of delivery, and communication and cooperation through the entire supply chain. Other important competitive strengths of the Finnish offshore industry include Arctic knowhow, geographical location near Norway and Russia, expertise in engineering work and project management as well as supporting political environment. Also the strong marine cluster with competitive network of suppliers is a key asset for the Finnish offshore industry.

Norway is regarded as one of the leading offshore markets and Finnish companies often quote Norway as their home country in their offshore business. Norwegian offshore companies are some of the most technologically demanding and savviest customers and their decision-making criteria is based more on managing risk than on low purchase price. Russia is also considered important for the Finnish offshore industry due to the country's large share in Arctic offshore and proximity to Finland. Other important markets include Brazil, Asia, Gulf of Mexico and West-Africa.

Finnish offshore companies emphasize that they invest robustly in technological innovativeness and quality, aspects on which they will continue to build their competitiveness. Specifically, companies regard advanced service concepts, such as preventive maintenance, HSEQ, subsea and project management – even by assuming EPCM (engineering, procurement and construction management) projects – as crucial success factors in the future.

In this report, the offshore industry is defined to include business activities that directly engage in- or indirectly support offshore oil & gas exploration and production as well as other production and related activity at sea (e.g. offshore wind and wave energy and seabed mining).

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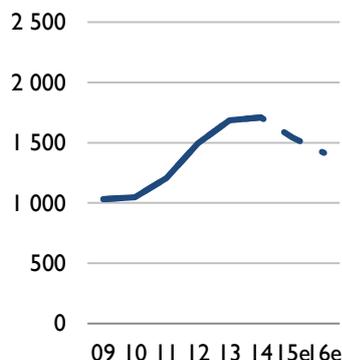
I. Finnish offshore industry

I.1. Overview of the industry in Finland

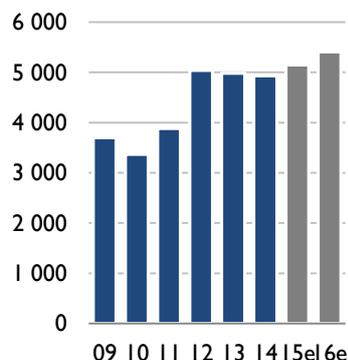
The offshore business is today of significant importance to Finland in terms of exports and employment effects. In 2015, over 150 companies operate actively in the industry, according to the results of the Finnish Offshore Industry study. Total revenues of the Finnish offshore cluster are expected to amount to approximately 1.8 billion euros, of which export accounts for 1.6 billion euros. The offshore industry employs directly over 5 000 employees and, according to the results of the study, Finnish companies are seeking to recruit additional 340 employees within the next two years.

Overview of the Finnish offshore industry

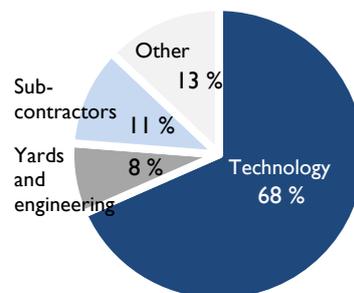
**Value of exports
2009-2016e, M€**



**Number of employees
2009-2016e**



**Revenue by industry segment
2014**



Sources: information provided by the companies, VALOR analysis

The results of this study reveal that Finnish companies regard offshore as an attractive industry with substantial growth prospects and new business opportunities, despite the current low oil and gas prices, which has put pressure on the short and mid-term offshore investments. The industry has experienced a rapid growth in Finland with an annual growth rate of around 10 % between the years 2009 and 2014. However, the industry is expecting a decline of around 4 % in turnover during 2015. A majority of the companies, especially small and medium sized companies, also believe that the industry will grow rapidly or moderately in Finland within the next few years. However, based on the study, the total exports of the Finnish offshore industry are expected to decrease by 8 % in 2016 as larger companies are expecting lower oil & gas prices to affect their sales.

The largest sub-sector of the Finnish offshore industry is the technology segment, constituting approximately 65 - 70 per cent of the total revenue of the Finnish offshore industry. In 2015, the total offshore exports of Finnish technology companies amounted to 1.3 billion euros. The convergence between the traditional marine industry and the offshore industry has been one of the key underlying factors driving technology companies, particularly in the propulsion- and motor

technology sector, to become the single largest product and service area in the Finnish offshore industry.

The rest of the technology sector in Finland comprises of both marine technology companies and of companies with a background in other industries than marine or offshore. These companies possess strong technological expertise in a variety of technologies and businesses such as design and engineering, cranes and lifting, living and wellbeing, automation solutions, electrical solutions, process technology, or HSEQ technologies.

The Finnish shipbuilding industry has been active in finding new growth opportunities. Technip's Mäntyluoto shipyard has developed most of world's spar platforms and is actively seeking opportunities to construct other platforms as well. Meyer Werft investment in Turku Shipyard has led to a positive impact on the Finnish shipbuilding industry and the shipyard has already accumulated approximately 4 billion worth of cruise ship orders since the ownership change in 2014. Arctech Helsinki shipyard is gaining momentum in a specialized niche segment of the shipyard industry. Through continuous innovations the company was awarded with 4 offshore ice-breaker contracts in 2014. In addition, new offshore yard Rauma Marine Construction (RMC) is creating future growth opportunities for the Finnish offshore shipyard sector.

Similarly, Finnish engineering companies have in recent years been active in seeking growth outside of their traditional core business. Engineering companies have set their sights on opportunities abroad, and created international business both organically and through acquisitions and strategic partnerships. For example, Elomatic and Wellquip merged their offshore business and Citec established itself in the Norwegian offshore markets by taking over the local M7 Offshore player in 2014. On the other hand, Deltamarin's owners and management found a new partner to fuel the company's growth by selling the majority of its shares to AVIC International Investments Ltd., also creating robust prerequisites for future expansion in the offshore business. Besides growth in the offshore industry, deepwater operations, with operational needs similar to those of the maritime industry, has provided Finnish maritime engineering companies a new opportunity to expand the scope of their business. This all has enabled Finnish engineering companies to expand their customer base and taking advantage of growth opportunities in the offshore industry. Consequently, today many marine focused engineering companies regard offshore business as one of their key business areas.

Subcontractors that have traditionally been focused on the domestic shipyard and technology sector, have also been able to penetrate international markets and in 2015 little over half of their revenues are expected to come from export. Finnish subcontractors are typically engineering workshop companies specialising in a product area or in a material treatment method, such as casting or coating. The companies are particularly competitive in highly customised deliveries with short lead-times and small batch size, or in a specific product area such as gears or casting.

In addition to the abovementioned sectors, Finnish companies are also providing materials and other services in the offshore industry. The offshore sector is one of the few potential growth segments for many metal and chemical goods producers and suppliers, and they are investing in the segment heavily. Within other services for the offshore industry, one of the most prominent actors is Arctia

Shipping, a state-owned company pioneering in ice-management operations in the arctic offshore fields.

The relative importance of the offshore business for companies operating in the industry is slightly decreasing. The share of revenue stemming from the offshore business is decreasing from 10 % in 2014 to 9 % in 2015. This is explained by the increase of the cruise ship industry, especially Turku shipyard, which has led to growth in other businesses for the companies operating in offshore segment. However, in the longer term Finnish companies believe that the offshore business is growing in importance as the industry is moving towards more challenging environments such as deeper waters and the arctic.

1.2. Competitiveness and strengths of the Finnish offshore industry

One of the most prominent strengths of the Finnish offshore cluster is technological expertise and innovativeness. Numerous companies in the Finnish offshore cluster are in a strong position globally in providing technology solutions within selected areas. The single largest product area, in which technological know-how has accumulated and expanded broadly during the past decades, is propulsion systems. In this product area, Wärtsilä, Rolls-Royce, ABB and Steerprop are major global players within specific sub-segments of the market. Particularly Rolls-Royce Finland and Wärtsilä have been able to deliver a large share of propulsion systems for advanced solutions in offshore platforms and vessels used e.g. in drilling, production and supporting activities in the offshore industry worldwide. Steerprop and ABB are instead renowned for their solutions in powerful propulsion systems. Moreover, it is important to note an internationally unique cluster of expertise that has evolved within the supply chain to support the development of this unique cluster of propulsion systems in Finland.

Finnish offshore industry strengths and areas of competitiveness



Source: VALOR analysis

The rest of the technology sector includes companies that are specialised in selected applications where they maintain a leading role internationally. Typically these companies have a background in the maritime industry as well as in other industries. For example, Kemira is a well-known chemicals supplier, GS-Hydro is a globally established company supplying non-welded piping systems, Marioff provides fire protection systems to customers worldwide and Vaisala is the producer of one of the

most renowned high-end environmental measurement systems. Vacon (part of Danfoss since 2014) and ABB instead provide customers with drives and other frequency convertors. These companies have strong references in providing offshore oil & gas exploration and production solutions as well.

Finnish shipyards are players which have earned a strong reference base in specific product areas where they are particularly competitive. For example, a majority of spar platforms ever build has been constructed in Mäntyluoto shipyard in Pori - a shipyard that is nowadays owned by Technip, which is one of the largest global offshore corporations. Mäntyluoto shipyard has been awarded many other offshore projects as well, and has the capability to construct e.g. subsea structures and semi-submersible along with FPSO platforms. Arctech Helsinki Shipyard Oy, a company owned by United Shipbuilding Corporation, is specialised in Arctic shipbuilding technology and has constructed approximately 60 % of currently operational icebreakers in the world. These icebreakers and other special vessels are also operating in offshore and have become an essential part of the global offshore cluster.

It is equally important to notice that icebreaker and Arctic project deliveries have been backed by the expertise of numerous Finnish engineering and subcontracting companies. This has laid the ground for the development of a global Arctic maritime technology centre of excellence in Finland, which has also enabled knowledge spillovers. As an illustration, the government owned icebreaking and special purpose vessel service provider Arctia Shipping Oy, has taken advantage of its ice management know-how and is providing customers with related services in Arctic offshore projects. Aker Arctic Technology, on the other hand, is a company specialising in engineering services for the ice going vessels, icebreakers and the offshore industry. Based on the company comments for this study, Finnish knowledge in Arctic solutions is viewed as a highly important area of competence for the offshore cluster in Finland particularly in the future when offshore investments actuate in the Arctic region.

In addition to the technological know-how and innovativeness, Finnish companies are known for their uncompromising quality in products and services, which stems from the fact that the Finnish offshore cluster is particularly advanced in project management. According to the company comments, quality is viewed as a holistic concept covering traditional aspect of product quality, such as technical properties and product durability as well as delivery reliability, vertical communication and cooperation both with customers and suppliers. This is a very important consideration in the offshore industry, especially in advanced solutions where high and rigid standards and quality requirements as well as full traceability are requirements throughout the value chain. Customers in the offshore industry also emphasize that Finnish companies do not base their competitiveness on price, e.g. if comparing to players from Asia and other low cost countries, but rather on the highest level of quality.

Many companies also note that Finnish engineering work is of a high standard. Finnish firm stand out in providing tailored and advanced engineering solutions, yet at a competitive price. Price competitiveness is particularly well-grounded if compared to other developed countries. For example, according to the Union of Professional Engineers in Finland (IL), Finnish engineering work costs, on average, slightly over 4 000 €/month (median 2 692 €/month) in 2014. This is a level far below the corresponding figure in e.g. Norway where according to NITO's, The Norwegian Society

of Engineers and Technologists, the corresponding figure is approximately 5 800 €/month for local engineering work¹. Finnish engineers are also highly qualified. According to the study results, Finnish engineers in offshore are with a few exceptions graduates with a diploma from a university- or a university of applied sciences.

Another advantage for the Finnish offshore industry stems from geographical location near two large offshore markets Norway and Russia. Geographical proximity reduces costs associated with logistics and delivery time but also enhances customer communication between the Finnish companies and customers. Reduced response time is particularly important in the offshore industry where problems and issues may escalate rapidly to a massive scale. In addition, time zone and cultural differences are all adding complexity in communication. Therefore, geographical proximity is regarded as an important aspect of product and service quality, creating a solid advantage for Finnish companies in relation to markets in Norway and Russia.

The Finnish political atmosphere has also become increasingly supportive of the development of the offshore industry. The objective of the new MEE² development programme for the maritime industry's operational environment is to increase the competitiveness of- and renew the Finnish maritime industry so that the top level expertise remains in Finland. The programme is based on the assumption that Finland has opportunities especially in the offshore industry and arctic business. The programme supports activities of Finnish companies and other market participants developing new- and leveraging existing know-how, products and services that create new opportunities in the offshore industry and arctic business for Finnish companies. Furthermore, the Finnish government has also shown its intention to support the maritime and offshore industry through ownership arrangements in e.g. engineering and shipyard sectors.

¹ According to the salary calculator at <http://www.nito.no/Lonn/Hva-tjener-en-ingenior/Lonnskalkulator>, a Norwegian engineer earns 606 988 NOK per year on average.

² Ministry of Employment and the Economy



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1.3. SHIPYARDS

Finnish shipyards active in offshore:

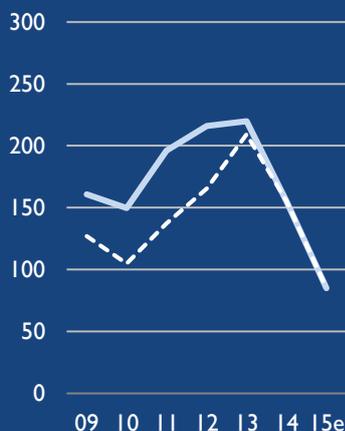


Offshore shipyards employ in total approximately 900 persons in 2015 in offshore business in Finland. In 2014 the combined offshore revenue was approximately 155 million euros of which almost all was exports, increasing from 70-80 % in 2009-2012. The share of exports has increased rapidly due to low activity in the Finnish multipurpose ice-breaker investments and other offshore supply vessels. The export share is expected to stay high in the coming years as well.

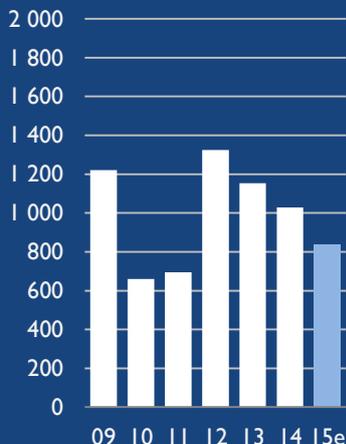
Offshore shipyard companies are large and employ directly hundreds of employees and indirectly even thousands when business and construction activity is peaking. This indirect influence applies particularly in material and subcontracting sectors. In total, 6 Finnish offshore shipyard companies were identified in this study. These companies include 2 large, 3 mid-

Finnish yard and engineering sector offshore business

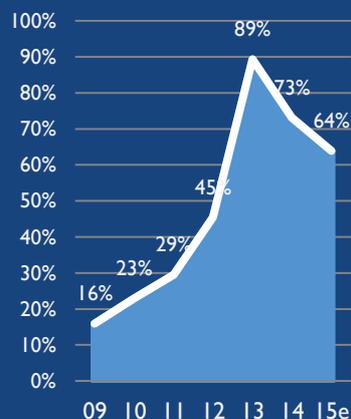
Offshore revenues and exports 2009-2015e, M€



Number of offshore employees 2009-2015e



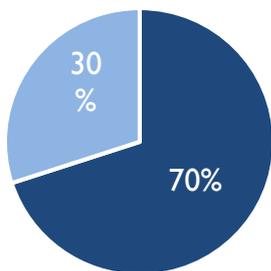
Offshore share of total revenues* 2009-2015e



Sources: Company information and forecast, VALOR analysis

*) Companies involved in the study

Global share of Spar platform hulls deliveries



Finnish companies' share 70 % of global spar platforms

sized and 1 small company. The smaller shipyards are only capable of doing ship repairs whereas the larger shipyards are also doing larger floating structures, especially newbuild OSV's and spars. In total, 4 yards participated in the study in 2015.

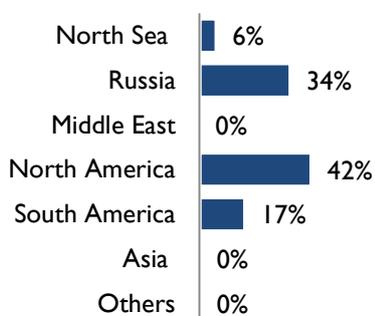
The Finnish shipyard sector is actively finding ways to increase the scope of its business. Arctech Helsinki Shipyard has been highly successful in providing icebreaking supply vessels and is demonstrating a viable business model specialising in a niche segment. In 2014, the company was awarded agreements to construct 4 ice-breakers to arctic offshore fields.

Technip's Mäntyluoto shipyard has mainly been focusing on Spar platforms during the 2000s. In addition to Spars, it has an over decade long experience of constructing Semi-Submersible platforms. Additionally, the Mäntyluoto shipyard has capabilities in subsea undertakings and it is actively developing offshore wind solutions.

Rauma Marine Construction (RMC), a recently reorganized shipyard, on the other hand is seeking growth through entering the offshore market with a new operating model based on flexibility and a strong network of partners. The RMC facilities enable construction of ice-going offshore service and construction vessels.

In 2015, all revenues of shipyards are expected to come from exports, as there is a limited number of domestic end-customers. Key export markets for the Finnish shipyards include the North Sea, Northern Europe, Russia and North America, all of which are markets where arctic conditions are applicable.

Exports



Source: Company forecasts, VALOR analysis

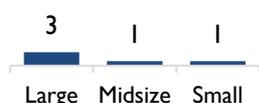
Location of companies



Source: VALOR analysis

Structure of the segment

no. companies in each size category



Source: VALOR analysis

- Finnish shipyards are world-class in both arctic ships and arctic floating structures and most of the modern offshore ice-management fleet and many of the arctic OSV's have been constructed in Finland
- Technip's Mäntyluoto yard has produced most of world's spar platforms and has capabilities to construct other floating offshore structures
- Finnish shipyard industry is currently growing rapidly as Turku shipyard has won several cruise ship orders



I.4. DESIGN & ENGINEERING

Finnish design & engineering companies active in offshore:



Design and engineering companies employ in total almost 700 persons in 2015 in offshore business in Finland. In 2015, the combined offshore revenue will be over 50 million euros of which most will be exports. The share of exports decreased slightly in 2014 due to increasing activity in the Finnish multipurpose ice-breaker investments and other offshore supply vessels. However, the export share is expected to grow in 2015 and in the coming years.

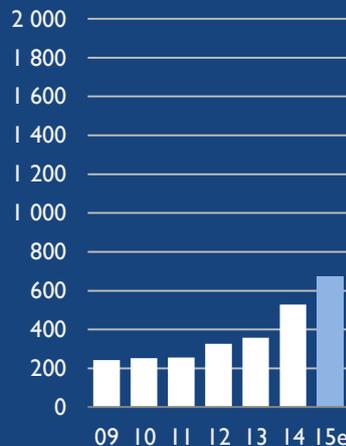
The size of the offshore design and engineering companies varies from small engineering boutiques to large corporations. In total 25 Finnish offshore design and engineering companies were identified in this study. These companies include 7 large, 5 mid-sized and 13 small companies. A total of 20 design and engineering companies participated the study in 2015.

Finnish design and engineering sector offshore business

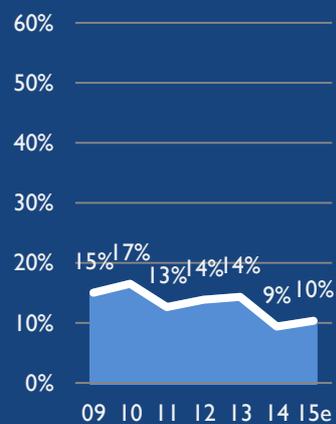
Offshore revenues and exports 2009-2015e, M€



Number of offshore employees 2009-2015e



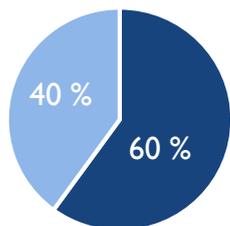
Offshore share of total revenues* 2009-2015e



Sources: Company information and forecast, VALOR analysis

*) Companies involved in the study

Arctic ship deliveries



Finnish companies' share 60 % of arctic ships deliveries

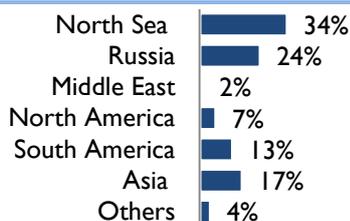
INFOBOX

Aker Arctic has the world's largest Arctic reference for icebreakers, past references include 60 % of all the world's icebreakers, many Arctic or Antarctic research vessels, and a large variety of cargo vessels and concepts for offshore structures. Aker Arctic operates a special ice test facility in Helsinki – world's only pri-vately owned ice model testing facility.

Finnish offshore design and engineering companies have built their capabilities and references through a strong history with the Finnish shipbuilding industry and by providing solutions for related industries such as the chemical and the oil & gas industry. The Finnish design and engineering companies offer a broad portfolio of design and engineering solutions for the offshore industry. References include a number of new-build and conversion projects. Conversion projects have typically been modernisation work or modification work related to ice-going or arctic requirements.

Design companies provide design solutions for their speciality areas that can cover for example the entire life cycle of shipbuilding and offshore projects, i.e. from concept design to installations, commissioning and maintenance. Engineering companies provide engineering solutions from single discipline to turnkey solutions including concept design to, basic- and detailed engineering. Speciality areas include for example electrical-, automation-, energy and power engineering.

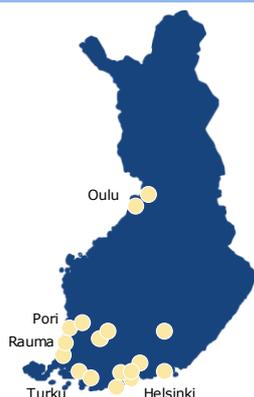
Exports



Source: Company forecasts, VALOR analysis

Finnish offshore design companies include for example Deltamarin that focuses on designing different types of offshore vessels. Elomatic that is specialized on arctic offshore design and engineering, and Citec which offers multi-discipline engineering, information and project management services for the offshore industry. Aker Arctic designs arctic solutions & tests them.

Location of companies

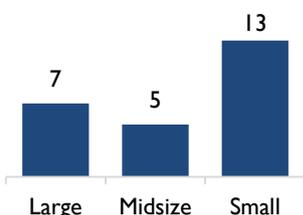


Source: VALOR analysis

The markets for the Finnish engineering sector are international due to a limited number of end-customers in Finland. Key export markets to Finnish design and engineering companies include the North Sea, Northern Europe, Russia and North America, which all are markets where arctic conditions are applicable. Recently also Asian markets have grown in importance.

Structure of the segment

no. companies in each size category



Source: VALOR analysis

- Finland has been forerunner in ice model testing and icebreaking technologies due to long tradition and use of icebreakers in our near waters and strong investments in R&D
- The first ice breaking modelling test facilities was up and running over 45 years ago in 1969
- Finnish design & engineering offering include turnkey solutions and more specialized solutions for both newbuild and conversion projects



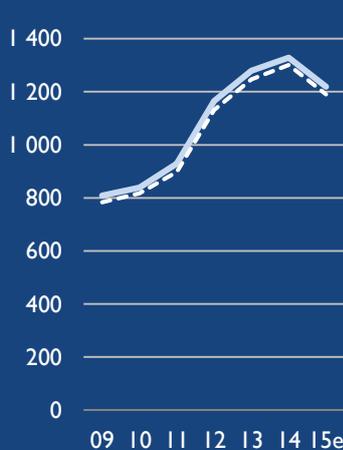
1.5. TECHNOLOGY

Finnish offshore technology companies are expected to employ approximately 2 000 persons in 2015 compared to 1 800 in 2014. Companies are expected to generate about 1.2 billion euros in revenues annually in their offshore business in 2015, down from 1.3 billion euros in 2014. Finnish technology companies are exporting on average over 95 % of their offshore products and services, resulting in total exports of around 1.2 billion euros in in 2015.

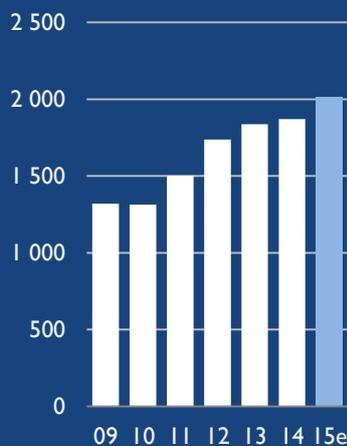
The share of revenue for technology companies stemming from the offshore industry has increased steadily in the 2000's, although the share declined 2014-2015 due to a global offshore market slowdown. Today offshore equals approximately 11 % of the total revenue of Finnish technology companies.

Finnish offshore technology in numbers

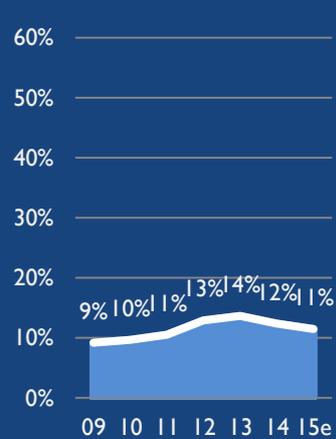
Offshore revenues and exports 2009-2015e, M€



Number of offshore employees 2009-2015e



Offshore share of total revenues* 2009-2015e



Sources: Company information and forecast, VALOR analysis

*) Companies involved in the study

Offshore provides one of the most promising growth areas for traditional marine technology companies. Finnish technology companies have typically built their business strongly on their core competencies and specific product areas with globally leading technology. These companies have a diverse background. Globally the most well-established companies with strong marine industry background include Rolls-Royce, Wärtsilä, ABB Finland, Steerprop and Cargotec. Specifically, Rolls-Royce and Wärtsilä are today global market leaders in providing advanced propulsion and power transmission solutions to drilling and OSV vessels. Other traditionally strong marine industry companies in the sector include Vaisala, GS-Hydro, Vacon and Napa. Finally, the technology sector also includes companies that have a firm background in other industries but have been able to leverage their expertise in offshore. These companies typically have a proven technology with major competence and reference in a specific product area.



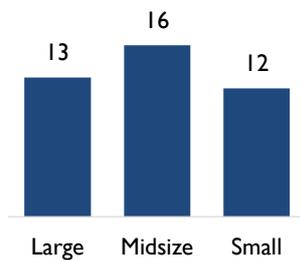
Source: Company forecasts, VALOR analysis

The most important export market to the Finnish offshore technology sector is Asia. Of the Asian countries especially China, Singapore and South Korea were mentioned by the companies as significant markets due to their role in offshore platform and vessel manufacturing. Other key markets include Norway, United States and Brazil. The share of Asia in the total Finnish technology companies' offshore export revenues has been growing and was in 2014 44 %. Other important regions include the North Sea and Northern Europe with 28 % and the Americas with 24 % of the total export revenues. Middle East, Russia and Africa's share of total export revenues is small, amounting to 7 %, 2 % and 1 % each.

For technology companies the offshore industry represents a market where competition has not eroded price levels significantly. Rather it is a market where customers are willing to pay for quality and the best possible solutions, i.e. an area where a premium for high-quality is paid. The key decision-making criteria for offshore customers include not only health, security, environment and quality (HSEQ) considerations but also aspects such as life-cycle costs, product reliability, traceability and innovativeness. This is why the offshore industry is seen as an attractive market for Finnish companies as they represent globally renowned high-end technology solutions and leading innovations.

Structure of the segment

no. companies in each size category



Source: VALOR analysis

Location of companies



Source: VALOR analysis

In the study, a total of 41 Finnish technology companies were identified operating in the offshore industry. The companies include 13 large, 16 mid-sized and 12 small companies. Of the 41 identified companies, 31 companies also participated in the study. These 31 companies represent 95 % of the estimated total technology sector revenues. Most offshore technology companies are either large or mid-sized companies. The tendency for them to be relatively large in size is explained by the fact that companies need to be internationally recognised and credible in order to be included in supplier short-lists for the offshore projects and deliveries. For example, earlier references, especially in offshore projects, are considered essential for technology companies in order to show they have proven solutions available for the offshore sector. In addition, it is becoming more and more important to have a service network world-wide in order to increase product availability in offshore.

A few Finnish offshore technology companies are established almost entirely on a global basis and do not have almost any operations in offshore in Finland. For example, Cagrotec's offshore business is entirely based abroad and employees, assets and service networks are located in markets near offshore markets in e.g. Norway, the Americas and Asia. Accordingly, by definition these companies are excluded from the figures of this study and the corresponding business abroad is not included in the Finnish offshore industry numbers. These born global companies, however, support the development of offshore knowledge and expertise in Finland.

- Finnish technology companies provide the offshore industry with a number of services i.e. propulsion systems, design and engineering, cranes & lifting, living & wellbeing, automation, HSEQ equipment and systems, process technology solutions
- Finnish technology companies represent 68 % of the total Finnish offshore exports and the high-tech share of exports is constantly growing

I.5. TECHNOLOGY

I.5.1. Finnish propulsion systems providers lead the way in offshore



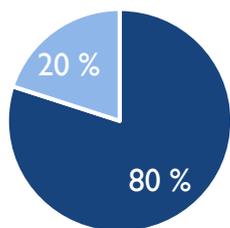
Finnish propulsion systems providers:



Many of the world’s leading propulsion systems companies have their centre of excellence and production located in Finland. Rolls-Royce and Steerprop have operative facilities in Rauma. Wärtsilä has operative facilities in Vaasa and ABB has a operative plant in Helsinki. Propulsion systems technological expertise and innovativeness is one of the most prominent strengths of the Finnish offshore cluster. Numerous companies in the Finnish offshore cluster are in a strong position globally in providing technology solutions within selected areas, but the single largest product area in which technological know-how has accumulated and expanded broadly during the past decades is propulsion systems.

In this product area, the Finnish operations of Wärtsilä, Rolls-Royce, ABB and Steerprop are major global players in their specific applications. Particularly Rolls-Royce Finland and Wärtsilä have been able to deliver a large share of propulsion systems for advanced solutions in offshore platforms and vessels used e.g. in drilling, production and supporting activities in offshore worldwide. Steerprop and ABB are instead renowned for their solutions in powerful propulsion systems. Moreover, it is important to note that an internationally unique cluster of expertise has evolved within the supply chain to support the development of this unique cluster of propulsion systems in Finland. In addition, Finnish propulsion systems providers have a strong focus on R&D in-house and in co-operation with Finnish research organizations such as the Technical Research Centre of Finland Ltd and Aalto University.

Finnish azimuth thrusters are installed in over 80% of offshore ships and rigs



Source: Rolls-Royce, Wärtsilä, Steerprop, VALOR analysis

- Finland has been pioneering the azimuth thruster and propulsion market since 1965 when first azimuth thrusters were made in Rauma
- The world’s most powerful azimuth thrusters are built by the Finns: the largest delivered individual thrusters have surpassed 10 MW and largest azimuth thruster systems have been over 21 MW in total power
- Finland continues to innovate and lead the azimuth propulsion market with new, more powerful and cost-effective solutions

1.5. TECHNOLOGY

1.5.2. Living and wellbeing solutions – luxury to even the remotest of places



Finnish living and wellbeing companies have been successful in serving the offshore and marine industry with wide range of solutions. Many of these companies have built their capabilities as a subcontractor for the Finnish shipbuilding industry. These companies have proven solutions with a number of offshore and marine references in new building as well as in conversion projects in their specific living and wellbeing solution areas.

The offerings of Finnish living and wellbeing companies include the following product areas: heating, ventilating, and air condition systems (HVAC), interior solutions for accommodation, public spaces and food handling areas, complete customized kitchen solutions, freshwater, waste collection and treatment solutions for the offshore rigs and vessels. Most of the companies in this sub-segment are able to provide turnkey solutions from design, equipment, installation, training to after-sales services.

This sub-segment includes for example companies such as Almaco Group that is focusing on accommodation and food handling areas and Evac that provides environmentally friendly freshwater, dry and wet waste collection and treatment solutions, and Koja, which designs and manufactures air conditioning solutions for the marine industry. Almaco Group and Evac have already built a wide presence in all major ship building countries.

Finnish living & wellbeing companies:



- Finnish living and wellbeing solutions typically have a strong history with the Finnish shipyard industry which has led to a long list of references from the marine industry
- Offering portfolio includes turnkey solutions for example in areas of HVAC, accommodation and public spaces, kitchen, and waste solutions.

1.5. TECHNOLOGY

1.5.3. Cranes & lifting – state-of-the-art technology from Finland



Copyright © Konecranes

Finnish cranes & lifting companies:

 CARGOTEC

 KAPLAAKI Oy

 HAVATOR

 KONECRANES
Lifting Businesses

 JANNENISKA
Safe Lifting of People

 KONE

INFOBOX

Konecranes has supplied the world's largest Goliath Cantry crane to a Brazilian shipyard. The crane has a lifting capability up to 2000 tons and a railspan of 210 meters.

Finnish companies are globally leading providers of cranes and lifting solutions for industrial companies. Global players such as Konecranes, Cargotec and Kone are well known for their capability to offer competitive and reliable solutions for the offshore industry. These companies base their competitive strength on high quality, technical expertise and innovative solutions.

Cranes & lifting sub-segment solutions have a variety of applications in the offshore industry. Konecranes provides lifting equipment for industrial purposes, heavy-duty industrial cranes for shipyards to ensure efficient operations and handling of heavy components. Industrial cranes are assembled and installed on location, but Konecranes designs and manufactures key components of the cranes, such as gearboxes, in Hyvinkää, Finland. Cargotec's MacGregor business division produces integrated solutions for load handling, anchor handling, towing and mooring operations for offshore ships and vessels and for subsea load handling. In addition, Cargotec provides leading deck machinery solutions for oil and gas carriers. Kone is well-known for its elevator solutions in the marine industry. Even though it represents a relatively small part of their total revenue, the offshore industry represents an attractive segment for the above mentioned companies as they are able to effectively leverage their core expertise.

- Finnish cranes & lifting companies offer solutions for shipyards, vessels deck machinery and subsea operations
- Finnish cranes & lifting companies have over 80 years of experience in industrial solutions and over 50 years' experience in working with shipyards
- Cranes & lifting solutions are pivotal for efficient ship building processes in shipyards by enabling moving of heavy components

I.5. TECHNOLOGY

I.5.4. HSEQ – ensuring continuous operations without compromises

Finnish HSEQ companies:



Health, safety, environment and quality (HSEQ) requirements are an utmost priority to companies throughout the offshore industry. Based on the company interviews, HSEQ awareness and requirements have been increasing throughout the industry in recent years. In addition, environmental organizations, media and public opinion put increasing pressure on the offshore companies to avoid any risks of environmental hazards. Finnish HSEQ sub-segment companies are well placed to address some of the HSEQ challenges that offshore companies are facing by offering specialized products and solutions in their field of HSEQ.

Finnish HSEQ companies are specialized in areas such as oil spill recovery, weather monitoring systems, speciality safety products and solutions. Speciality safety products and solutions include for example safety doors and fire rated glass structures.

Finnish HSEQ offshore companies include for example Vaisala which is known for its environmental measurement systems that are used for example in offshore helidecks to ensure safe and operationally efficient decision making, Frictape is the world's largest manufacturer of helideck safety nets, Lamor Corporation focuses on oil spill response solutions and equipment. In addition, based on the company interviews with all offshore related companies HSEQ is seen as a key factor for success in the offshore industry.

INFOBOX

Vaisala's weather monitoring systems are used for offshore helideck operations globally. Interestingly, also NASA's Mars exploration vehicle uses instruments based on Vaisala's technology

Frictape is the world's largest manufacturer of safety nets on offshore structures and vessels

Lamor corporations is a market leader in providing state-of-the-art oil spill response solutions, service and equipment

- Finnish HSEQ companies serve the offshore industry with a wide portfolio of solutions that are key for safe and efficient offshore operations
- HSEQ is a vital part of offshore operations and its importance is increasing, especially as the offshore operations are moving to deep waters and to the arctic
- Finnish companies are experienced in the challenging environments of arctic and deep water offshore fields, providing state-of-the-art HSEQ solutions

I.5. TECHNOLOGY

I.5.5. Automation systems – smart vessels and processes



Finnish automation systems providers:



Automation systems play a key role in offshore vessels and rigs to ensure safe, reliable and efficient operations. Automation systems are used for a number of functions, from small monitor and control systems to more advanced systems that integrate most of the systems needed to operate the vessel. Automation systems can focus on e.g. propulsion power management, processes, electricity or alarm systems.

Automation systems have an important role in increasing operational efficiency of the vessels and thus enabling life-cycle cost efficiency and lower emissions. Finnish companies have been able to build innovative automation solutions that have resulted in improvements in the abovementioned areas.

Finnish offshore companies providing automation systems include for example ABB that offers a broad portfolio of automation solutions for the marine and offshore industry, Wärtsilä which offers integrated automation systems for the offshore and marine industry and Satmatic that provides more specialized automation solutions and equipment focusing on electricity and pneumatics.

INFOBOX

Wärtsilä automation systems was part of world's first hybrid platform supply vessel Viking Lady. Hybrid power generation system enables 15 % savings on fuel costs and 25 % lower nitrogen oxide emissions. Wärtsilä is one of the largest providers of navigation and automation in the world with an estimated 40-60% market share in many of the largest ship and vessel categories.

Valmet provides automation and navigation systems for most types of vessels in offshore.

ABB is one of the leading global power and automation solutions providers for the offshore industry – recent references include FPSO for the coast of Angola.

- Finnish automation systems providers offer integrated and specialized solutions for offshore vessels and production
- Automation systems have been a natural step for Finnish marine technology providers, which has led into more integrated automation systems offering
- Wärtsilä acquired L-3 Marine Systems International in late 2014 which strengthened Wärtsilä's offering in automation, especially in the area of electric solutions and dynamic positioning systems

I.5. TECHNOLOGY

I.5.6. Electric solutions – greener offshore solutions



Example of Finnish electricity solutions providers:



The centre of Finnish electricity solutions is located in the city of Vaasa in western Finland. Companies such as ABB and Vacon, which was recently acquired by Danish Danfoss, have a long tradition and accumulated knowledge of electricity solutions in this region. The Vaasa area is recognized as the leading energy cluster in the Nordics.

ABB offers a wide range of electricity solutions for the offshore industry, for example ABB provides energy efficient electrical motors and generators for industrial use which have a number of applications in the offshore industry. ABB Finland has also pioneered in subsea electrical solutions since 1984 and remains the world’s leading manufacturer of subsea transformers.

Vacon’s AC drivers have high power and torque capabilities which are necessary for offshore processes in demanding environments. Vacon’s products have a proven track record of usage on offshore platforms, drill ships, drill barges and land rigs.

Trafotek offers a wide range of solutions for the offshore industry, where applications can vary from power production for lightning and instruments to heavy-duty winches, lifts and pumps.

INFOBOX

Finnish frequency converters made by ABB, Vacon or Wärtsilä are used in a majority of offshore drilling and production platforms.

Additionally ABB’s subsea electrical solutions have been installed in a majority of subsea projects.

- Finnish electric solutions are used in offshore production solutions for example in integrated electrical distribution, control, safety and power management, and low and medium drives.
- Vaasa area energy cluster has more than 140 companies with total business turnover around 4.4 billion euros and export rate of over 80 %

I.5. TECHNOLOGY

I.5.7. Process technology solutions – ensuring continuous operations

Example of Finnish process technology solutions providers:



The offshore operating environment sets high standards and requirements for process technology solutions. Finnish companies have been able to address this challenge by providing reliable, safe and efficient solutions in this sub-segment. Process technology solutions are one of the key areas of Finnish offshore technology subcontractors. These companies typically serve a number of other industries. However, based on the company interviews offshore industry is seen as a priority market where Finnish companies have many advantages.

Process technology solutions include valves, pumps and hydraulic solutions. Valves and pumps have a wide array of applications in offshore industry processes. Similarly, hydraulic solutions have many applications in the offshore industry from production to transportation related processes or operations.

INFOBOX

Metso is the world's fifth largest provider of valves control systems for the oil and gas industry.

Finnish offshore companies in this sub-segment include for example GS-hydro that offers non-welded piping systems that are used on different types of offshore drilling and production installations, Metso that is one of the leading producers of valve systems globally including equipment and control systems which enable monitoring of valve functionality in the offshore environment.

- Finnish process technology solutions are used for example in valves, pumps and hydraulics in the offshore industry
- The offshore environment is challenging for technology solutions due to high safety requirements and harsh conditions. It is also demanding to access process area locations which emphasize life-cycle management solutions

1.5. TECHNOLOGY

1.5.8. Other technology – new enabling technology simplifying manufacturing processes and design & engineering

Example of other Finnish technology solutions providers:



Finland is also providing various other technological solutions for offshore markets. A few of these are worth mentioning in detail:

In engineering software, Tekla and NAPA have been pioneers in structural design software since several decades ago. Both companies have solutions that support offshore structure and vessel design, enabling engineering companies to create more robust and cost-effective offshore structures, but also enabling maintainability and energy efficiency of offshore platform & vessel operations.

Finnish companies are also forerunners in welding automation. Together PEMA, Kemppi and other welding companies have created unique solutions for offshore markets which enable yards to significantly improve their welding processes, both in terms of throughput and quality. Kemppi for example has invested in Industrial Internet (IoT) solutions that enable automatic documentation of the welding process and PEMA equipment can automate welding processes in shipyards.

In offshore energy, Finnish companies are pioneering in wave energy. Some of the most advanced wave energy technology is developed by the Finns and large scale pilots are currently in operations in Portugal and Nordics.

INFOBOX

Kemppi's IoT-solutions in welding technology enable high-quality, continuous documentation of the welding.

PEMA's knowledge of the mechanization and automation of modern shipbuilding and offshore industry welding processes has a 40 year history and is currently a leader in automating the welding processes.

Wello's and AW energy's wave power plants are very promising wave power plant technologies currently piloting in larger scale.

- Finnish other technology sub-segment includes companies offering state-of-art software solutions and welding automation systems for the offshore industry
- These solutions have the potential to dramatically improve ship design and fabrication processes to ensure cost-efficiency and shorter throughput times
- Additionally, Finnish companies are forerunners in wave energy technology, which is one of the most prominent renewable energy technologies



1.6. SUBCONTRACTING

Finnish subcontracting companies active in offshore:

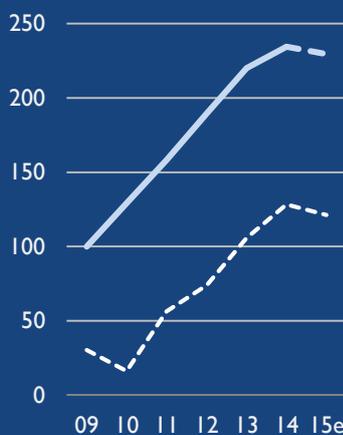


In 2015 subcontractors are expected to employ approximately 1 200 employees, according to the study. The total offshore revenues of the subcontracting sector are expected to amount to 230 million euros, of which 120 million euros is exports.

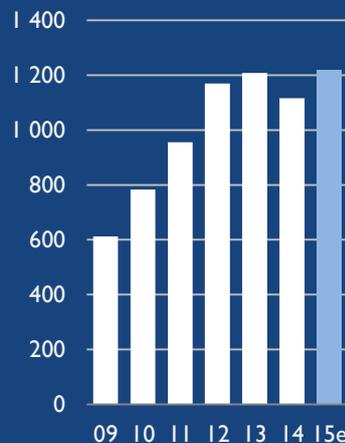
Historically, subcontractors have mostly relied on serving domestic customers, particularly Finnish shipyards and technology sectors, and hence export revenues have been modest. In 2010 exports amounted to some 30 % of the offshore revenues, while the corresponding figure was over 50 % in 2015. This implies that Finnish subcontractors have been able to build international business based on their competence by finding their market and customers abroad. Based on interviews and questionnaire comments, Finnish subcontractors regard specifically Norway as a very attractive market and are actively looking for growth opportunities in that

Finnish subcontracting sector offshore business

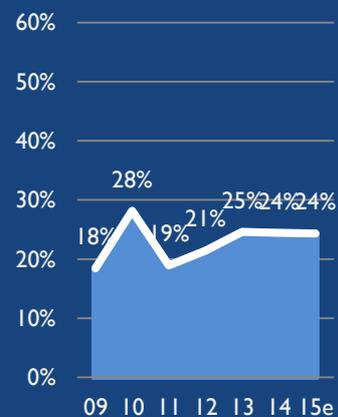
Offshore revenues and exports 2009-2015e, M€



Number of offshore employees 2009-2015e



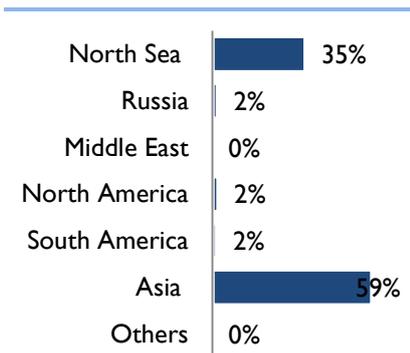
Offshore share of total revenues* 2009-2015e



Sources: Company information and forecast, VALOR analysis

*) Companies involved in the study

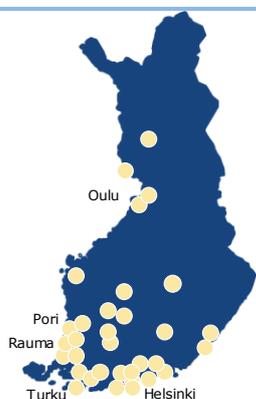
Exports



Source: Company forecasts, VALOR analysis

market. Some companies have been developing new value added services to Norwegian customers. Finnish manufacturing subcontractors are especially competitive in offshore in heavy workshop engineering, welding, assembly, machining, material coating and heat treatment work, providing labour hire for projects, and supplying components all the way from engineering to assembly, including for example special metal components, electrical equipment and other product as comprehensive project deliveries. The main export market for subcontractors is Norway. The revenues of the subcontractors reflect strongly their customers' growth opportunities and sales volumes in offshore business. Finnish offshore subcontractor segment is expected to remain stable during the next years.

Location of companies

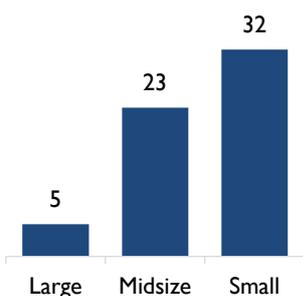


Source: VALOR analysis

The majority of subcontractors' deliveries include projects with detailed specifications and a blueprint from the customer. Additionally, subcontractors have been able to further commercialise their advanced products and services so that in practice they have moved up in the hierarchy of the supply chain and become a company resembling a technology provider. For example, in hydraulic heavy workshop engineering, casted propellers are products in which Finnish subcontractors have become strategic partners to selected technology companies not only domestically but also internationally.

Structure of the segment

no. companies in each size category



Source: VALOR analysis

Many subcontractors are very important partners to large companies. Often large companies have their own networks of trusted subcontractors backing them in offshore undertakings. For example, Technip has cooperated actively with over 100 subcontractors during the offshore undertakings in the Mäntyluoto shipyard and shipyards in Turku whereas Rauma has its own network of subcontractors with marine based background. Also technology companies, including Wärtsilä and Rolls-Royce Finland, have their own network of proven workshops as partners. Often technology companies are willing to invest in their subcontractor partners in order to support their own business.

Subcontractors are significant employers by employing 22 % of the total offshore employees in Finland making the sector the third largest employer in the industry alongside the technology and the shipyard sectors. A majority of the offshore subcontractors are SME companies. Typically these companies operate and are located near shipyards or technology companies and employ some dozens of employees. In this study,

a total of 61 subcontractors were identified in the offshore business. These companies include 5 large, 23 mid-sized and 32 small companies. Of these, 40 companies also contributed to the study this year through offshore industry survey and interviews.

- Finnish subcontractors offer a wide portfolio of services to the offshore industry ranging from heavy workshop manufacturing to finish treatment for metals
- Subcontractor segment has been broadening its offshore business successfully during the last years – currently over 50 % of their offshore business is export
- Norway is considered as a home market in offshore and companies are willing to increase their offshore business in Norway



I.7. MATERIALS

Finnish companies providing materials for offshore:

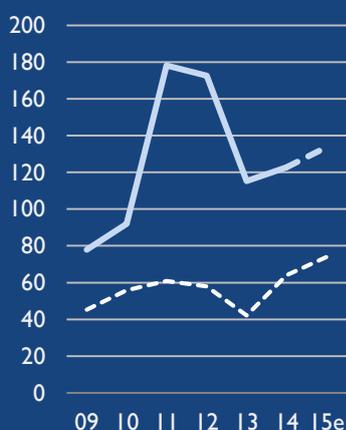


In 2015, material suppliers employed approximately 275 persons in total in the offshore business. The aggregate revenue of the material companies is expected to be 135 million euros, of which approximately 75 million euros is exports.

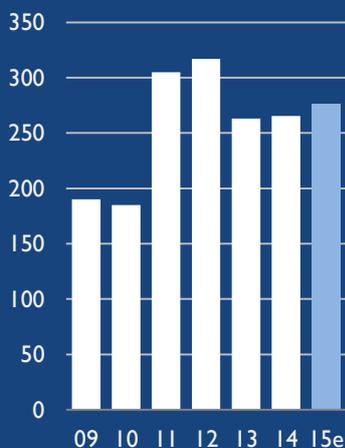
The offshore business of material providers is typically highly dependent on the Finnish shipyards' business volumes as material suppliers typically are domestic in their offshore specific business. This is because most of the bulk and basic material is sourced locally, as elements delivered to offshore platforms and vessels are very heavy - weighting tens of thousands of tons - and consisting of substantial amount of metal, steel and other materials. As an illustration, in 2011 the material sector's offshore revenues were twice as large compared to 2010 due to the large offshore projects in Technip's and STX's Finnish shipyards. On the other hand,

Finnish materials sector offshore business

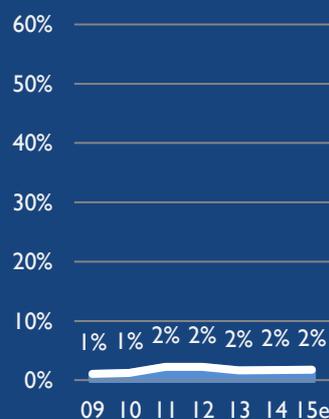
Offshore revenues and exports 2009-2015e, M€



Number of offshore employees 2009-2015e



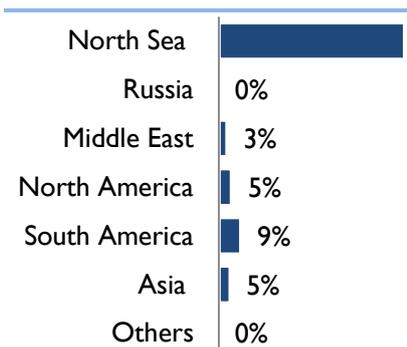
Offshore share of total revenues* 2009-2015e



Sources: Company information and forecast, VALOR analysis

*) Companies involved in the study

Exports



Source: Company forecasts, VALOR analysis

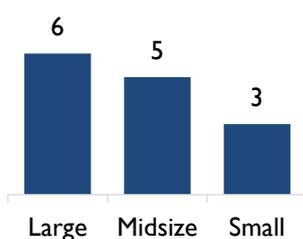
Location of companies



Source: VALOR analysis

Structure of the segment

no. companies in each size category



Source: VALOR analysis

some material providers, particularly those who are specialized in some specific offshore product, are also globally established in offshore business and their offshore business volume is less correlated with domestic demand.

It is important to notice that for some of the largest material companies, offshore represents only a small fraction of their total revenues. Thus, large volatility in offshore business does not critically impact on total volumes: offshore amounted to some 2 % of company total revenues based to the results of the survey in 2015. On the other hand, many material suppliers consider offshore as an interesting opportunity as many other industries are experiencing a downturn in Europe. This is why also many companies are investing in their offshore business and developing new solutions. Finnish companies have actively developed e.g. new offshore wind basement solutions and more advanced materials to the needs of offshore solutions. Particularly solutions developed to the Arctic area are seen as a long-term opportunity. Material companies' products also differ from each other, and product overlaps are rare and therefore material companies typically do not closely cooperate with each other.

In total, 14 Finnish offshore material suppliers were identified. Companies include 6 large, 5 mid-sized and 3 small companies. 8 companies contributed to the study this year. Many material suppliers are large international companies with significant business world-wide. Medium-sized and small companies are typically specialized in niche products, like welding consumables, assorted electrical products or treated metal products. A differentiation strategy enables them to build their competitive advantage on specific solutions and therefore increasing their credibility and significance not only domestically but also internationally.

- Finnish material suppliers in the offshore industry offer e.g. steels in either normalized or thermomechanically rolled condition, steel bars and rolled and forged ring products, high performance stainless steels and alloys, stainless hollow sections, chemicals to the oil & gas industry and paints for offshore applications
- Additionally, a number of other Finnish companies supply the offshore industry with materials ranging from welding consumables to plastics



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I.8. OTHER OFFSHORE SERVICES

INFOBOX

Arctia Shipping provides pioneering ice management solutions for Shell's offshore production in northern Alaska.

Ice management enables safe oil drilling in icy conditions by keeping ice formations at a safe distance from the drilling zone. Safeguarding traffic in the drilling zone is also an important part of the Ice Management service.

Other identified offshore business in Finland is mostly related to shipping, ice management services and offshore wind. The total volume of the sector is modest compared to other sectors identified in this study, partly because this sector includes segments that are still in a development phase. More specifically, the revenues of the 'other offshore services' are expected to amount to 60 million euros in 2015.

Offshore wind and wave energy are promising businesses but currently only at a development phase from an investor perspective and, based on the interview comments, are not economically viable businesses yet at a large scale given the current political climate in Finland. Instead, shipping services and other service operations at sea is regarded as an interesting segment having great potential to grow rapidly in the near future. Companies consider services related to the Arctic area a particularly interesting market as Finland is one of the world's key hubs for Arctic knowledge and R&D. For example, Finnish companies have robust experience in ice-breaking and ice management operations which can be leveraged in providing critical services to the offshore sector in the Arctic area.

For example, Finnish company Arctia Shipping, a state owned company specialised in providing ice management operations, is an example of a Finnish company leveraging its ice-breaking expertise in the offshore business. The company is especially competitive in the Arctic area supporting oil & gas exploration and production activities from ice management to oil recovery services with their multipurpose vessels. However, their vessels have also been serving customers in the North Sea, the Gulf of Mexico, West Africa and the Mediterranean.



Copyright © Hentec

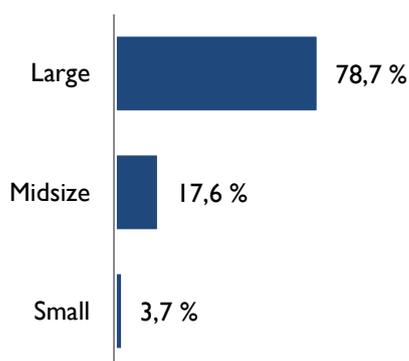
2. Finnish offshore cluster composition

2.1. Finnish offshore company size & employment

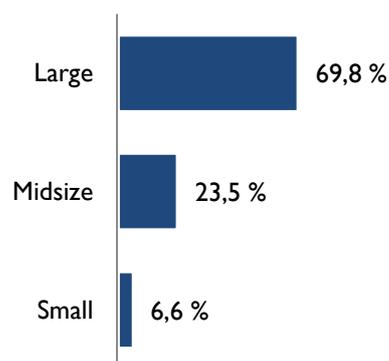
Offshore companies in Finland include many established global large corporations having well-known products and services, and significant business volumes in the offshore industry. In addition to these key international companies, offshore industry includes many mid-sized and small companies. According to the results of the study, large companies create 79 %, and small and mid-sized (SME) companies constitute the remaining 21 % of the total industry revenues. However, the importance of SMEs in terms of employment effects is relatively larger as those employ approximately 30 % of the total employees in the offshore industry in Finland – the rest, i.e. 70 % of the employees are working in large companies. SMEs are typically more labour-intensive companies especially in the subcontracting sector.

Offshore industry by size of company*

Offshore industry revenues
by size of company 2015



Offshore industry employment by size of
company 2015



Sources: Company information and forecast, VALOR analysis

*) Companies involved in the study

Offshore specific stringent requirements and the global nature of the business provide large companies increased opportunities as they have the capability to make the required investments to comply with the requirements. For example, maintaining a global network of offices and service operations, and building international networks of customers, suppliers and other stakeholders in the offshore industry require resources and long-term commitment to the business. Equally important is to have proven references in the oil & gas industry and to be a credible solution provider. However, SMEs are also able to benefit from being part of the supply chain network of a large corporation. This is because, according to company comments, SMEs are often given the opportunity to assume an increased role & responsibilities in the supply chain of large companies, e.g. by specializing in a specific product- or service area.

2.2. Finnish offshore industry organizations

Offshore markets are considered as a natural extension to Finnish marine industry expertise. The annual turnover of the Finnish marine industry is around 5.4 billion euros and it employs approximately 20 000 persons in Finland.

Offshore industry is a significant part of Finnish marine industries, having revenues of over 1.5 billion euros. Since 2012, the Finnish Offshore Industry –reports have documented the Finnish offshore industry. During 2012-2014 offshore industry was the quickest growing part of Finnish marine industries. Technology products and services are the single most significant business in the Finnish offshore industry, corresponding to approximately 70 % of the total industry revenues. The total revenues of the technology companies in offshore are expected to rise to a level of 1.3 billion euros, of which exports are expected to amount to 1.2 billion euros in 2015. Much of the offshore technology is based on the strong Finnish marine industry know-how.

Finnish Marine Industries is the organization that coordinates Finnish offshore industry cooperation and other activities. The picture below illustrates the Finnish Offshore Industry as a part of Confederation of Finnish Industries (EK).

Finnish offshore industry as a part of Confederation of Finnish Industries (EK)

Confederation of Finnish Industries (EK)

Confederation of Finnish Industries (EK) is the leading business organization in Finland. EK's main task is to create an internationally attractive and competitive business environment for companies operating in Finland.

The Federation of Finnish Technology Industries

As a Member Association of Confederation of Finnish Industries (EK), the mission of the Federation of Finnish Technology Industries is to ensure that the Finnish technology industry has the preconditions for success in the global marketplace.

Finnish Marine Industries

As a Branch Association of The Federation of Finnish Technology Industries, the association coordinates cooperation in industrial and economic policy between the companies in the sector.

Finnish Offshore Industry (coordinated inside Finnish Marine Industries)

Total industry exports are expected to exceed 1.6 billion EUR in 2015. Technology is the most important segment accounting to 70 % of the industry's revenues.

2.3. Finnish offshore industry key initiatives

There are a number of offshore related initiatives and projects supporting the Finnish offshore industry to find new opportunities and to build networks internationally and nationally. Initiatives and projects can be categorized by their scope to national or regional.

2.3.1. Marine industry development initiative

The Ministry of Employment and Economy has started the Marine Industry Development initiative for the years 2014-2016. The aim of the initiative is to improve the competitiveness of the Finnish marine industry. Additionally, the initiative aims to increase cooperation between research facilities, universities and companies in the marine and offshore industry, support Finnish companies' growth and increase R&D and product and service innovations in the sector.

The initiative includes 10 projects. Examples include Team Arctic, an initiative that brings Finnish companies operating in the Arctic region together, and Marine and Technology Industries' Customer Centric Growth program that is focusing on enabling market opportunities in oil and gas and offshore in the arctic areas, especially in Norway and Russia.

2.3.2. Tekes Arctic Seas program

Tekes Arctic Seas program for the years 2014-2017 aims at turning Finland into an internationally attractive centre of Arctic know-how. Arctic Seas program offers financing for research, development and innovation to internationalizing companies. Tekes is the Finnish Funding Agency for Innovation.

Goals of the Arctic Seas program

- Finland is an internationally recognized Arctic know-how hub
- Creating new Arctic business activities
- Networking Finnish actors into internationally significant investment projects

Budget

- Total: € 100M
- Tekes funding € 45M + companies € 55M
- Tekes funding for research institutes c.€ 12M

2.3.3. Finland Maritime and Offshore program

Finland Maritime and Offshore program is targeted to Finnish companies operating in shipbuilding, in offshore, in maritime technologies and in building. The internationalization program is carried out by Finpro in cooperation with Team Finland players.

Program targets

The target of the Finland Maritime and Offshore program is to increase the business related to the program at least with 500 million euros in 2015-2017. This will be carried out by activating Finnish

companies to internationalize and by helping them to get involved in to major shipbuilding, oil and gas projects in international markets. The goal of the program is to network Finnish companies and to enable common offering, which increases the efficiency in internationalization and the visibility of Finnish companies. The program increases also the visibility of Finnish maritime know-how and the flow of investments to Finland.

2.3.4. ArcMaTe

Arctic Marine Training and Testing Center (ArcMaTe) is international network initiative that focuses on the development of coordinated international arctic marine know-how and supporting Finnish exports on this area.

The ArcMaTe business concept is a development platform for Nordic enterprises and agencies and aims offering services for international demand. It includes currently the following areas:

- Arctic search and rescue (SAR)
- R& D in oil and chemical spill prevention, preparedness and combatting in ice
- Maritime education, simulation of demanding operations
- Design and construction of polar vessels
- Tailored arctic weather forecasting and ice management
- Cold climate research

Foundation of ArcMaTe is based on the Finnish arctic strategy which was completed in 2013. Currently the initiative is coordinated by the Finnish Ministry of Transportation and Communications and owned by the cities of Kemi, Oulu and Pori in collaboration with cities of Kokkola, Raahе, Kalajoki, Rauma, Turku, Kotka and Helsinki. In Norway the initiative is coordinated by Maritimt Forum Nord. At the moment ArcMaTe is in the planning phase which includes market study and business case analysis for different possible business models.

ArcMaTe's idea is to offer training and testing with facilities, standardizing and research, and consulting services for Finnish and international clients in the following areas; safe winter marine operations, search and rescue activities, customized weather forecast and icebreaking solutions in the arctic areas, preventing and recovery solutions for oil and chemical spills, and environmental studies. Initial discussion of the training and testing center location notes that Bothnian bay has a number of competitive advantages as a location such as the fact that sea is frozen throughout the winter, good logistics and existing infrastructure.

2.3.5. Other key initiatives

Finland Maritime and Offshore program, run by Finpro, is targeting to increase exports of the industry. Program includes focuses on exporting activities and networking opportunities for Finnish companies inside the offshore industry in Finland and internationally.

In addition, there are a number of projects linked directly or indirectly to the offshore industry that are typically coordinated by regional commercial development organizations.

Key offshore industry initiatives and projects

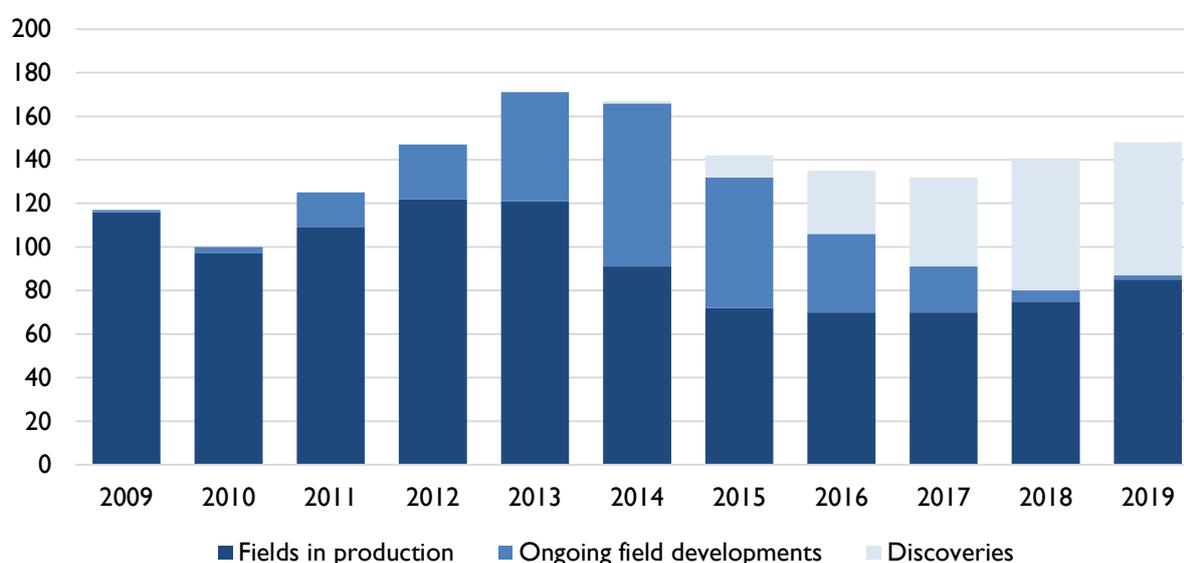
- Marine Industry Development program by the Ministry of Employment and Development
- Arctic Marine Training and Testing Centre by the Ministry of Transportation and Communications
- Several projects by regional commercial development organizations and offshore companies

3. Finnish offshore companies' offering for global offshore market

3.1. Finnish companies offering for the Norwegian offshore market

The Norwegian Continental Shelf future expectations look bright, despite turmoil in oil and gas prices. The Norwegian Petroleum Directorate's forecasts indicate that high level of activity will continue for many decades to come. A large number of fields are being developed, and large new discoveries have been made. Norway being one of the largest offshore markets in the world make it attractive for any offshore sector company.

Norwegian offshore sector investments 2009-2019, billion NOK



Source: <http://www.norskipetroleum.no/>

Attractiveness combined with geographic proximity to Finland make Norway the most important market for majority of Finnish offshore sector companies. Finland has a lot to offer when it comes to knowledge needed in the Arctic conditions, technological competence, highly educated work force, and ability to perform and deliver. Finnish offshore companies are well prepared to enter the Norwegian offshore market as technology providers, engineers, subcontractors, and as material and service providers. Additionally Finnish and Norwegian cultural background is common and makes cooperation easy; business cultures and practices are very similar between the countries.

The drop in oil and gas price has increased cost-awareness of Norwegian offshore companies. Investments have been postponed and new operation models are considered. Recently CEO of Statoil has called for more standardisation, simplification and cooperation as a means to cut costs in the long-term. As Norwegian oil and gas industry is doing its best looking for opportunities to cut costs to stay competitive, Finnish companies' are one element which could be used for increase in competitiveness without sacrifices in quality. Increasing cooperation could mean establishing partnerships and joint ventures with companies from Finland.

Many major Norwegian offshore players have laid off their staff to cut fixed costs and are looking to outsource labour to low-cost countries, especially regarding newbuild offshore platforms. However, outsourcing to remote locations possesses risks, especially in terms of project delivery reliability. Due to risks involved in procurement and outsourcing from low-cost countries, oil operators such as Statoil prefer giving strategic orders only for major Norwegian players (e.g. “Johan Svendrup”, Aibel, Apply and Kvaerner) and these players are finding new ways to accommodate both cost-savings needs and quality of work in lower project budgets.

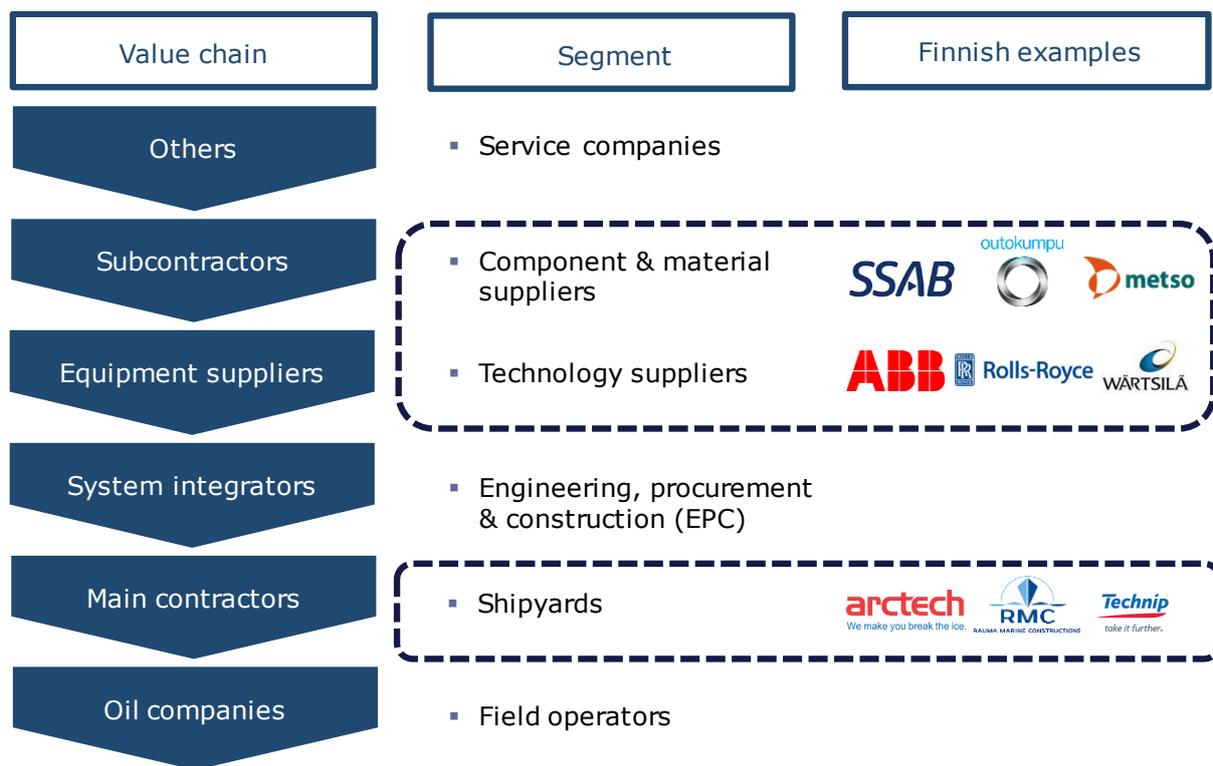
Finnish companies are ready to partner with Norwegian offshore industry system integrators and main contractors and to offer cost-efficient solutions combined with high quality and proven delivery reliability. Finland offers an alternative for low-cost countries, as Finland is located near Norway and Finnish work force has the qualities needed for high-quality offshore deliveries, both in terms of engineering, manufacturing work and project management. Finnish offshore companies consider Norway as their “home market” in offshore and see a lot of potential in co-operation with Norwegian offshore industry in the mid- and long-term based on the company interviews, and many would be willing to invest in long term relationships with the Norwegian offshore companies.

As Norwegian offshore industry requirements are getting tighter (e.g. demands for environmentally friendly and zero exhaust emission vessels serving coastal traffic), Finland’s technological know-how would be valuable for the Norwegian market. For example, Finnish propulsion system manufacturers have been forerunners in developing environmentally friendly technologies for both the offshore industry and marine industry and have already accommodated even the tightest regulations.

Additionally, the cooperation between Norwegian and Finnish universities, research organizations and companies in the arctic region is increasingly active. Finland’s experience in arctic marine solutions combined with Norwegian offshore and marine know-how enable the countries to create sustainable business in the High North. Also authorities in Finland, Sweden and Norway are working together to find cooperation possibilities in the High North in order to tap the opportunities that future arctic region offers.

In summary, Finland can offer reliable partners, highly qualified work force, good solutions, and world-class expertise for Norwegian offshore companies. Finnish companies have the will and the know-how, and companies are ready to deliver.

Finnish companies key offering in relation to the Norwegian offshore industry



In addition to newbuilds, existing rigs and platforms form one of the major business opportunities for Finnish technology companies in Norway. Due to low oil prices, rig and platform operators are continuously looking for savings e.g. by upgrading their existing rigs and platforms, as well as, outsourcing production and manufacturing. In practice, business opportunities in repair, conversions and maintenance exist. Furthermore, old rigs and platforms needed in the Northern waters have to be “winterized”, which creates additional business opportunities for Finnish offshore companies that have the capabilities and references in ice-going modifying projects.

Further business opportunities in Norway stem from decommissioning of rigs and platforms. As the first rigs and platforms built in the 1970s are entering the end of their life cycles, decommissioning services becomes a lucrative business. Since Norwegian environmental and safety laws are stringent, the capability to offer proper decommissioning services is in demand. For instance, decommissioning cannot be done abroad where environmental regulation is inadequate. At the moment there are only a handful of companies capable of providing a sufficient level of decommissioning services in the Norwegian market.

Although, there are several identified business opportunities for Finnish offshore companies to enter the Norwegian market, medium and small-sized companies tend to operate domestically. According to company interviews, Finnish companies are interested to operate internationally in order to deepen their offshore industry knowledge and to stay competitive. As Norway is the world’s seventh largest exporter of oil, the third largest exporter of natural gas and one of the largest offshore markets, it becomes evident that, Norway is a gateway to the global offshore markets for the Finnish

companies. Number of Finnish companies have recognized this and are actively taking actions to find ways to partner with Norwegian offshore industry players.

The most successful approach for Finnish companies to enter the Norwegian market is not to challenge the Norwegian rivals, but to join them. Strategic cooperation and mergers and acquisitions have led to good results. For example Citec acquisition of M7 or joint-venture (later acquisition) between Finnish Dovre and Norwegian consultant companies have been successful.

3.2. The offshore industry in Russia

The Russian oil and gas industry is facing serious challenges due to economic sanctions and decreasing energy prices. To overcome these challenges Russia has been investing heavily in the oil and gas sector and has taken measures to lessen its dependency on imported oil and gas products. These measures include, decreasing the imports of products within the shipbuilding segment to 50 % of current levels. Russia is also planning on investing in its own shipbuilding capabilities, with the aim of building up to 80 % of large ships on Russian soil. Currently, no such ships are being built in Russia.

In order to become self-sufficient in the offshore industry, Russia has particularly focused its capabilities on the Arctic waters. Russia has continued its exploration endeavours in the Arctic and granted licenses for private companies to start field works in the Barents Sea. Given the abovementioned actions, it is not, however, realistic to assume Russia can be totally independent of requisite technology by 2020. It takes time and money for Russian machinery shops to acquire sufficient level of resources and knowledge of high tech products. Finnish offshore companies are well known for they state-of-the-art knowledge of ice-breaking applications in marine and offshore industry, which creates great opportunities for Finnish companies as Russia moves forwards with it plans for the Arctic area oil and gas fields.

Finnish suppliers may have some advantages in promoting their products and services for the Russian shipbuilding industry through Arctech Helsinki Shipyard Inc. that is considered as a pioneering yard in developing Russian shipbuilding.

Due to sanctions in place for arctic and offshore technology, no significant business potential is seen in Russian arctic offshore markets before the end of the decade. While obeying sanctions, Finnish industry players have, however, stayed in touch with Russian counterparts in order to have good opportunities to continue their business in Russia after the sanctions are lifted. Despite challenges today, Russia remains to be very potential market for the Finnish offshore companies in the longer term.

4. Background, methodology and reliability of the study

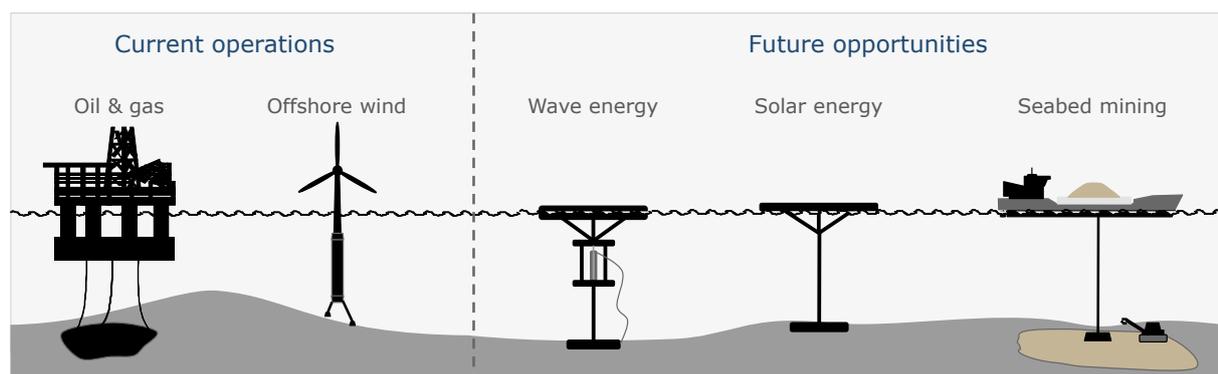
4.1. Background

The Finnish offshore industry 2015 –study describes the Finnish offshore industry, its structure and business volumes as well as the future industry outlook. This report is a continuation to the Finnish Offshore Industry -reports conducted between 2012 and 2014. The project is commissioned by Prizztech Oy (www.prizz.fi) and Finnish Marine Industries. The report supports the work of the Finnish Ministry of Employment and the Economy (MEE) Maritime industry operational environment development programme. Financially the study is supported by MEE in co-operation with Finnish Marine Industries.

This study is conducted by VALOR Partners Oy (www.valor.fi) and it was completed between May and June 2015 and written in June and July 2015. The focus of the study is on Finland, and Finnish products and services within the offshore industry.

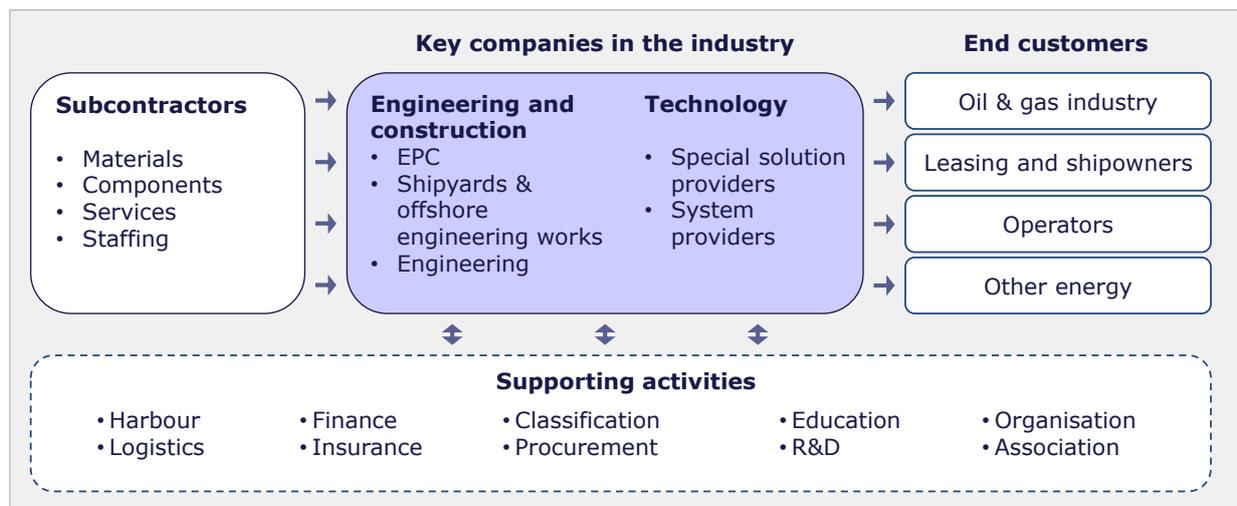
Offshore as a term refers regularly to the production and exploration of oil & gas at sea. A key characteristics describing the offshore industry is the high quality requirements being imposed throughout the supply chain and on other companies and stakeholders being part of the offshore industry. This is why, in this report, offshore industry is regarded comprehensively by taking into account a wide array of functions that satisfy the conditions of the stringent quality requirements. Figure below illustrates examples of the offshore end-customer industries. Also the structure of the offshore cluster in Finland is illustrated.

Offshore end-customer industries



Source: VALOR analysis

The structure of the offshore cluster



Source: VALOR analysis

Based on the discussion above, in this report the offshore industry is defined as including businesses conducting or supporting offshore oil & gas exploration and production as well as other production and related activity at sea (for example, offshore wind and wave energy and seabed mining). However, the offshore industry does not include oil & gas logistics related tanker or harbour activities since quality requirements are not strictly shared with the offshore industry.

4.2. Report objectives

The purpose of the Finnish Offshore Industry 2015 study is to increase the understanding of the Finnish offshore industry and its companies, the structure and volume of the industry in Finland, and Finnish companies' future prospects in the offshore industry. In this year's report, special attention was directed at marketing Finnish offshore industry players to the world and especially to Norway.

4.3. Methodology

As the main methodology of the study, both a web-based questionnaire and semi-structured interviews with selected companies as well as other financial data publicly available were used in creating the data for understanding the Finnish offshore industry. Therefore, this study uses a unique dataset that is collected only for the purpose of this study.

The questionnaire was sent to each identified company potentially having business in the offshore industry, within shipyards and technology sector as well as in their identified supply chains. The base list of companies was recognized using the list of offshore companies in the offshore studies conducted in 2012, 2013 and 2014. The base list was then supplemented systematically utilising information from Finnish Marine Industries' and Prizztech Oy's databases of potential offshore companies as well as by searching for companies in public databases using industry association codes. The list was then updated by using a systematic internet search strategy. The strategy included entering search words like "offshore", "oil", "gas", "wind", "references", "FPSO", "jack up",

”semisub”, ”spar”, ”statoil” and ”norsok” among others. Moreover, .fi –domains or company websites with a word”Finland” were prioritized. In addition, interviews and questionnaire results served their purpose in identifying offshore companies in Finland. The final list of potential offshore companies included 276 companies, i.e. 10 additional companies compared to the list in 2014.

In total, 254 companies were invited to take part in the questionnaire and 22 key companies were interviewed. The questionnaire was internet-based and the invitations were sent through e-mail to each identified offshore company. In the SME sector, the questionnaire was sent to the CEO of the company, if no other offshore specific contact person was recognized in earlier studies. In large companies, the respondent was the director/vice president of marine/offshore business or alternatively the person responsible for oil & gas or offshore industry sales in Finland/Nordics. However, in order to increase the rate of response, reminder messages were sent to those companies that did not answer the invitation message. In addition, the project team tried to reach 223 companies who did not answer the reminder messages by phone calls. Phone calls were prioritized to companies with the largest offshore revenues based on project team assessment.

Selected offshore companies were interviewed. The selection of companies was based on project team’s proposition of a list of the most relevant offshore companies in Finland for this year’s study and then the final list was agreed on together with the customer steering group in a project meeting. Interviews were conducted either face-to-face or by phone. Face-to-face interviews were prioritized, however. Typically, the duration of interviews was between 30 and 120 minutes. Interviewees were e.g. CEOs, offshore/marine directors, technical directors, sales managers, country managers or project managers. The list of companies interviewed is attached.

4.4. Reliability of the study

In total, 142 companies participated in the study, of which 22 companies were interviewed. In addition, 32 companies reported that they do not anymore/yet operate in the offshore business. Thus, the rate of respond was 51 % (142 companies). The list of companies is attached. Compared to the study in 2014, 40 new companies responded with an estimation of their offshore business. A few companies did not estimate their offshore business as they did not know their offshore business volumes as they did not have close interface with end-customer. This was mostly related to companies having no offshore specific products in their offering or companies without direct interface with offshore business in their operations.

In order to increase the validity of the study, the questionnaire and interview structure was similar to that of reports conducted in 2012, 2013 and 2014. This increases the comparability of the questionnaire and interview results to those of in 2012, 2013 and 2014. Additionally, in order to increase the reliability of the study, each step of the study was documented to a database designed for this study. Because of this, the report may be conducted with similar methods also in the future.

The total Finland-based revenues of the companies involved in this study amounted to approximately 20 billion euros in 2015 based on the latest revenues figures. The interview and questionnaire results in 2015 represent 94 % of the total offshore revenues in Finland. This is why the reliability and coverage of the study may be considered high. Also this year’s report is highly comparable to reports conducted in 2013 and 2014.

Nevertheless, it is important to notice that some companies do not separate offshore business in their bookkeeping or they do not have precise information otherwise available of their offshore business. In these cases their figures are based on company estimations by the person interviewed or the respondent of the questionnaire. Based on VALOR experience, in these kinds of cases the inaccuracy is not often related to the volume of the business but rather on the timing of the offshore business. This is typically because offshore projects are also significant in size and value. However, the problem was minimized by carefully selecting the person or persons interviewed and the respondent of the questionnaire. The persons with the best knowledge of the company's offshore business were prioritized.

Industry revenue of the identified companies that did not answer the questionnaire was estimated using the results of earlier years' offshore reports, or qualitatively with company profiles and using benchmark information.

The conclusions and inferences drawn in the study are formed objectively using company interviews and questionnaire answers. The results are based on a syntheses created by VALOR based on interview discussions and questionnaire results, and do not specifically represent company or industry association opinions.

Appendix: Finnish Offshore Industry links

FinOffshore Directory

www.finoffshore.fi

The Finnish Offshore Directory, FinOffshore, contains information about the Finnish companies operating in the Offshore Industry. The Directory is updated continuously online and published annually as the "FinOffshore Directory" -publication.

FinOffshore-website also contains an online version of this report and additional reports as well as links to information about the Finnish offshore industry and its key markets.

Prizztech

www.prizz.fi

Finnish Marine Industries

www.marineindustries.fi

Ministry of Employment and the Economy (MEE)

www.tem.fi

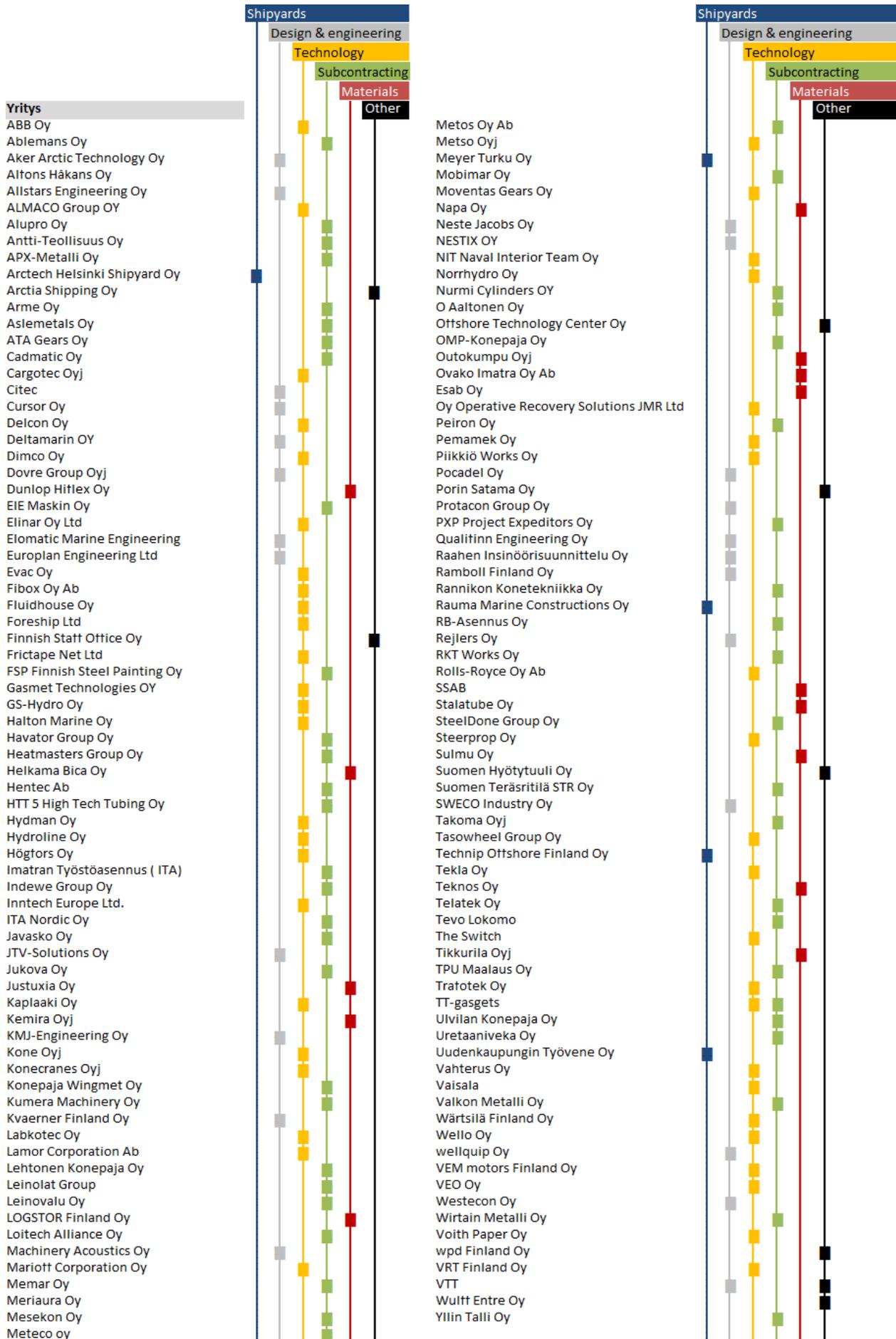
Tekes – the Finnish Funding Agency for Innovation

<http://www.tekes.fi/en/programmes-and-services/tekes-programmes/arctic-seas/>

Team Finland / Finpro – Maritime and Offshore growth

<http://team.finland.fi/en/frontpage>

Appendix: List of Finnish offshore companies





Prizztech

 **MERITEOLLISUUS**
Finnish Marine Industries

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