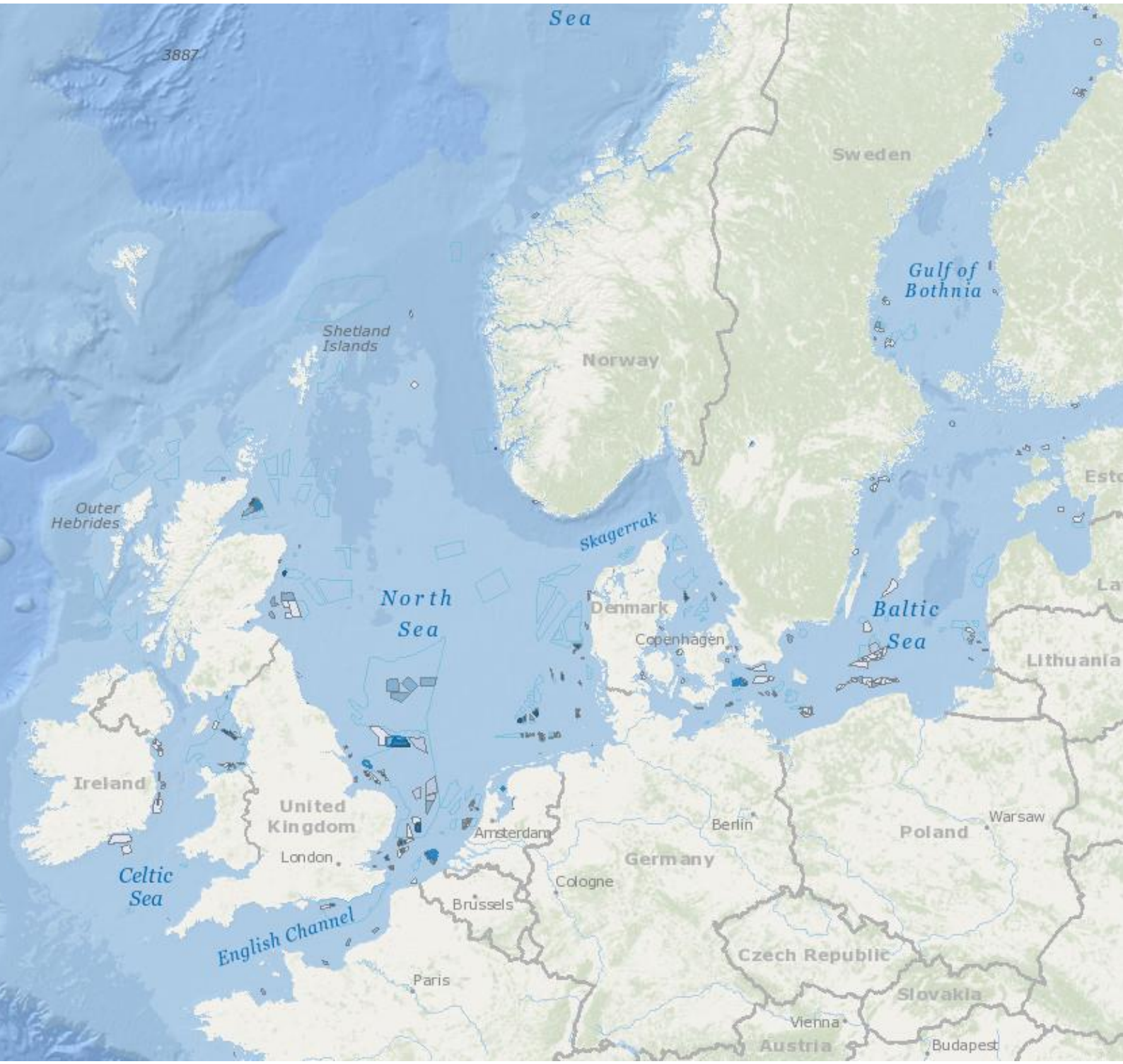
BVGassociates



Opportunities for Atlantic Canadian firms to penetrate the offshore wind supply chain based in Europe

December 2019

This document has been modified from its original version by NEIA (the client) for the purposes of distribution to its membership and participants in its international business development programming.

Note that the assessments undertaken and recommendations being made are done so relative to specific firms. While the intent of this study was to glean overarching information applicable to a broader audience (e.g. each study representing a category of local firms), in some cases the value of findings are limited to the subject.

As such, if you (the reader) have interest in how these findings may be relevant to your firm, it is recommended that you contact NEIA staff to discuss further.

BVG Associates, with Caron Hawco

BVG Associates (BVGA) is an independent renewable energy consultancy focussing on wind, wave and tidal, and energy systems. Our clients choose us when they want to do new things, think in new ways and solve tough problems. Our expertise covers the business, economics and technology of renewable energy generation systems. We're dedicated to helping our clients establish renewable energy generation as a major, responsible and cost-effective part of a sustainable global energy mix. Our knowledge, hands-on experience and industry understanding enables us to deliver you excellence in guiding your business and technologies to meet market needs.

- BVG Associates was formed in 2006 at the start of the offshore wind industry.
- We have a global client base, including customers of all sizes in Europe, North America, South America, Asia and Australia.
- Our highly experienced team has an average of over 10 years' experience in renewable energy.
- Most of our work is advising private clients investing in manufacturing, technology and renewable energy projects.
- We've also published many landmark reports on the future of the industry, cost of energy and supply chain.

Caron Hawco (CH) is a consultant offering international trade and business development services, project management, market research, and communication services based in St. Johns, Newfoundland. She specializes in understanding and accessing new markets, strategic messaging and making connections. She has extensive experience of working in the Canadian Oil and Gas industry and has previously worked with NEIA.

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Front cover image: 4C Offshore.

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1. Introduction and objectives

The offshore wind (OW) energy industry is primed to grow steadily through to 2030 on a global scale. Figure 1 shows the Global Wind Energy Council's (GWEC) forecast from September 2019[1]. Annual global installation rates are expected to triple between 2020 and 2030. Higher rates are possible if countries accelerate the transition to low carbon energy systems as a result of climate change. This growth presents significant and immediate opportunities for new entrants into international supply chains, particularly for firms already involved in related activities that are easily transferrable.

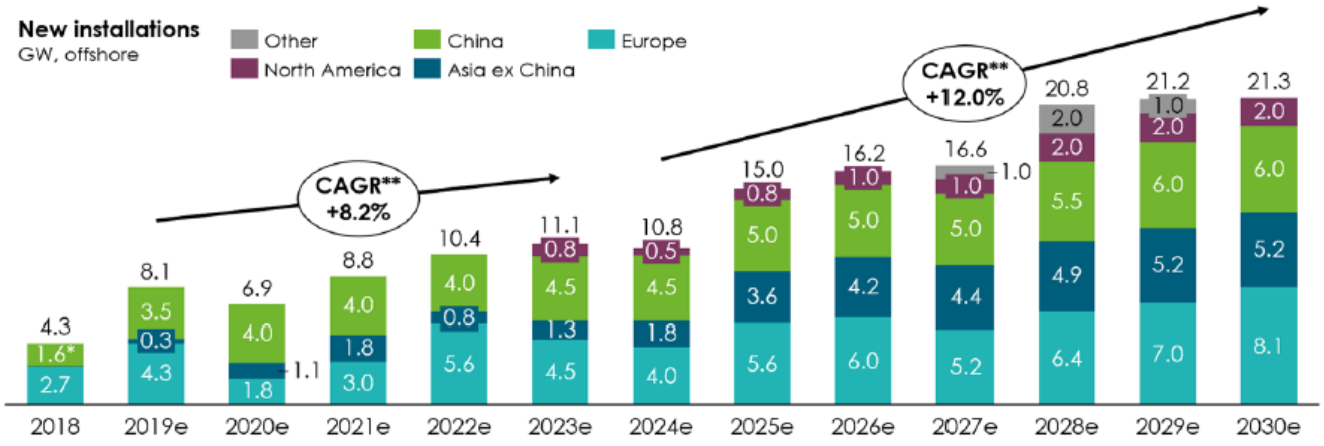

Figure 1 Global offshore wind growth to 2030, business as usual scenario.

In this regard, opportunities exist for Atlantic Canadian firms traditionally providing technologies and services to domestic oceans industries (such as oil and gas) to become new exporters, or for firms already engaged in international business to diversify into a new industry. This opportunity was highlighted in a 2017 report commissioned be NEIA *Offshore Wind Energy Development: Supply chain identification and capacity within Newfoundland and Labrador*.[2]

While projects are emerging worldwide, many of the major project proponents and supply chain decision-makers are in Northern Europe. Atlantic Canadian firms need strategic and targeted guidance on how they can penetrate existing offshore wind supply chains in order to capture work on European projects, which the majority of supply chain activity is taking place. They should also be aware of the opportunities opening up in the Americas and the rest of the world.

The RFP for this project identified two requirements:

- Determine and describe with specificity the genuine prospects for five firms to penetrate offshore wind energy supply chains in Europe.
- Identify the pathway(s) likely to provide the greatest opportunity for success (e.g. through strategic partnerships, joint-ventures, responses to RFPs / EOIs, etc.).

To deliver the project BVG Associates (BVGA) has brought its experience of the global offshore wind industry and teamed with Caron Hawco (CH), local business consultant and energy market specialist, to add local knowledge and presence The approach undertaken, prescribed by the client, was to explore opportunities specific to four (4) types of firms which were intended to represent a category of potentially transferrable strength within Newfoundland and Labrador's offshore oil and gas supply chain: education and training, niche/targeted engineering services, 'general' engineering services, and leading edge or 'world class' technology.

Section 2 summarises the interview process used to assess the prospects of these firms and build an understand in order to offer pathways to success. Section 3 summarises responses gathered and our assessment of firms' prospects

[1] Source: GWEC's Global Wind Market Outlook Update Q3 2019

[2] http://neia.org/wp-content/uploads/2017/06/NEIA_Offshore_Wind_Supply_Chain_FINAL.pdf

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2. The interviews

A questionnaire was created to act as an aide memoir to guide the interviews and ensure that during a broad conversation, a number of specific questions were asked. These questions align with the areas we believe are important to assess the likelihood of success for firms to break into the OW market and have been adapted for this project from questions used on other similar projects. These areas are:

1. Size of the **opportunity**, what it is potentially worth? *Is there a big addressable market for the business?*
2. Potential for levelised cost of energy (**LCOE**) benefit? *Does this firm's product or service offer a strong value proposition?*
3. What is the **track record** of the company in the offshore wind market? *Does it know the OW market?*
4. **Synergies** between the European offshore wind and the company's current supply chain activity? *How much will it need to change its supply chain?*
5. Size and timing of **investments** by the company to successfully enter the European offshore wind market? *How large will the barrier to entry be?*
6. What is the experience and level of ambition of the company's senior **management** for successfully targeting and entering new markets in the last 2 years? *Do they have the experience and commitment to be successful?*

After the interviews, each response was assessed using a scale of: very low, low, moderate, high and very high, with associated score one to five, giving a maximum possible score of 30. The scale has to be interpreted with respect to the question, for example question relates to high/medium/low etc. size of opportunity, whereas question two refers to high/medium/low etc. potential for LCOE benefit.

The scale for question one, the size of the opportunity, has been assessed using the lifecycle expenditure values in Appendix B. Moderate opportunity has been equated to a total addressable market of 0.1% of the wind farm's expenditure over its lifecycle, which is €4.6 million. The scale that has been used for the remaining questions is a subjective one, which has nevertheless been applied consistently across the interviewees. Note, that the scale used for question 5 is the reverse of the other questions, so that a low investment barrier gets a high score as it is a good thing in context of entering a new market.

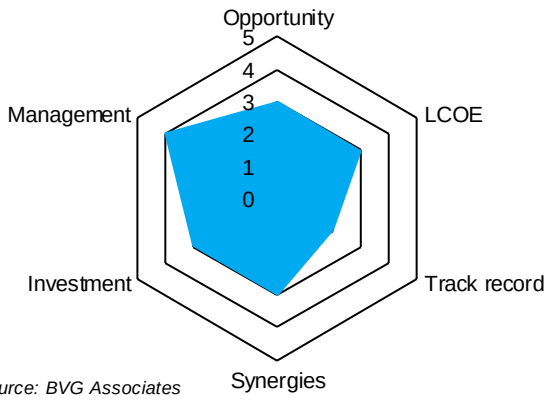
The interviews were conducted by Caron Hawco. Each interview lasted approximately 1.5 hours and the interview responses were written up shortly afterwards. The questionnaire is included as Appendix A.

3. Scoring of responses

The interview responses have been scored, with justification for the scoring provided alongside. A rating of "moderate" to all questions would result in a score of 15.

Please note that this should be read as our view of the current potential for these firms to win business in the European OW industry. By looking carefully at the justification for the scores, each firm may see how to increase the value of their opportunities and probability of success. These scores should not be read as an assessment of the firms in any other way.

3.1. Education and Training, score: 18/30



Source: BVG Associates

- The service considered here is to deliver a variety of education and training courses specific to OW, and those relevant but not specific to OW, by a combinate of remote and local delivery.
- Moderate scores are given for the size of the opportunity and LCOE as the industry spends a large amount on training staff, driven by steady growth and the need to maintain training accreditation. We see potential for cost saving if some of this can be delivered effectively online.
- Service providers in NL have been given a low score for track record as they has not been involved in OW and the limited onshore wind experience is not considered relevant. We have increased the score to a low, rather than very low, to take into account work providing training for the oil and gas industry, which has some similarities.
- We see moderate synergies as providers already deliver remote training, but partnerships would be needed to deliver any local training and to create OW training materials without having in-house or local expertise in the OW industry.
- Investment to find a partner and develop new training materials is seen as moderate relative to the size of the opportunity.
- We have given a high score for management on the basis of some providers running international programmes across many countries today.

Recommendations:

The European market is growing steadily and there is a strong demand for education and training. The rest of the world does not have Europe or North American safe and disciplined work practices and the industry needs it, especially as goes into Asia.

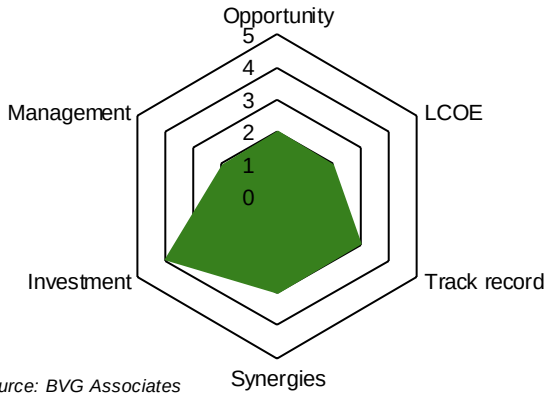
First, investigate the opportunity for the delivery of remote education and training further, looking at who is currently providing services. We are aware of academic organisations (often providing a regional service) and commercial working internationally, often with local partners. Education is required for new entrants to the OW industry. Training is required for technicians in a variety of areas: marine installation activities, health and safety, wind turbine maintenance technicians, working at heights. As a first step it is important to check how many of these could be fully or partly delivered remotely, as all training certified by the Global Wind Organisation (GWO) needs to be delivered in person.

Next, find a European training company to partner that delivers training via in-person courses. Together you could have a new more flexible and lower cost route to deliver remote training, and if that is successful in Europe, you can take it to other countries too.

Another avenue would be to provide both in-person and remote OW training to experienced offshore Canadian O&G workers and send them over to Europe for month-on month-off type contracts.

Although this study is focused on entering the European market the needs of the emerging US market should not be forgotten, which could be addressed in conjunction with an experienced European partner.

3.2. Niche Engineering Services, score: 15/30



Source: BVG Associates

- The services considered here are a combination of engineering, consulting and project management for niche activities, based on the competencies built up in oil and gas. We have assessed the scale of the opportunity as low, because the majority of offshore services are delivered by large, experienced and very heavily capitalised contractors.
- We have assessed the LCOE value proposition as low, because we do not see what unique capabilities may be provided.
- We see it as offering capacity to deliver offshore services and experience, with a track record of having done so with competence.
- We see that much of the engineering, consulting and project management could be done locally, with some travel for local sales and delivery coordination, resulting in a synergies assessment of moderate.
- We consider the investment to deliver services in Europe to be low, as much could be delivered remotely, depending on the what service was sold.
- Capacity to engage in international market development has been marked as fair to low and the level of ambition as moderate, but these would be firm-dependent.

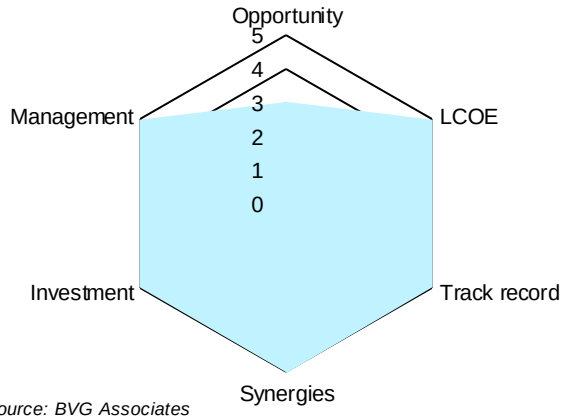
Recommendations

We suggest engaging with the purchasing and engineering managers of developers and EPCI contractors responsible for the category of purchases in question to understand what is bought and where there could be opportunities to involve newcomers, whether in new markets or helping to solve existing problems.

Focus on a subset of these, to develop specific expertise and have a clear value proposition.

Consider partnering with a local organisation which has experience of the European OW market in a non-competing area who does not yet have presence in the North American market.

3.3. ‘World-Class’ Technologies, score: 28/30



Source: BVG Associates

- Opportunity: Would be firm-dependent, in this case it has been assessed as being moderate, relative to the scale described in section 2.
- The scoring of this category assumes that a compelling value proposition exist for the company.
- This case assumes the company is already delivering successfully in the OW market in Europe, hence has a track record in the industry, has offices and a supply chain in Europe, and has no need of investment to enter the European OW industry. This foundation in European OW should give the company further opportunities as the industry expands into new markets.
- The management in this case has shown a significant capacity to grow the business in Europe.

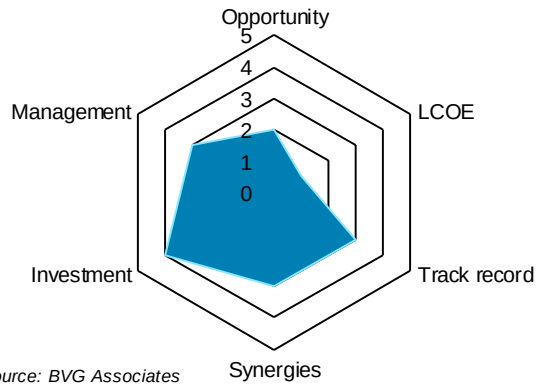
Recommendations:

As the nature of the technology being considered could differ substantially, it is difficult to outline a general blanket series of recommendations. Firm-specific investigation and strategy development would be required.

Beyond specific market-entry approaches, firms should keep close to the requirements of the developer, in order to understand what they are trying to do, as there may be material differences in other countries.

Continue innovating to increase the value of your offering and maintain your competitive advantage.

3.4. General Engineering Services, score: 16/30



Source: BVG Associates

- The services considered here are civil design and the delivery of offshore maintenance services. The opportunity has been scored as low, because there is not much civil work involved, other than at ports and related to onshore grid connection, and the non-routine offshore services which are not part of regular turbine installation and maintenance are limited.
- Impact on LCOE has been scored at very low as it is not clear what advantage a company would have over a local firm, let alone one that is already experienced in similar design and build work.
- Synergies has been scored as moderate. Engineering design can be done remotely, and any offshore skills and equipment for maintenance services will be relevant, however, it is not scored more highly as the people and equipment would need to be moved to Europe to deliver any on-site services.
- The investment required should be relatively low as civil design services can be delivered remotely, and people and equipment exist to deliver offshore maintenance services but would need to be moved to Europe.

  In this case, it is assumed management appears ambitious and has considered a range of international expansion opportunities, demonstration of successful international growth would be required for a higher score.

Recommendations

Team up with an experienced European partner for OW services, who does not directly compete. They could provide experience in European OW in return for a local partner to help them enter the North American market for their services.

4. Challenges for different types of firms

The key challenges we see for firms entering offshore wind from other sectors and especially from a remote location are:

4.1. There are critical differences from offshore oil and gas

- Offshore oil and gas shares many of the design, delivery and operation of multi-billion dollar projects into extremely harsh environments. However, key differences need to be appreciated:
    - In OW, there is less site-specific project engineering, developers will want to re-use as much proven balance of plant design and installation processes as possible, and turbines are almost completely standard.
    - A mindset of continuously improving a series product is required. Within a typical wind far there are typically 50-80 wind turbines. This is a level of series production not seen in offshore oil and gas projects.
    - The project values are high, but the level of contingencies and profit have decreased in recent years, so are lower, typically, than those in the oil and gas industry. A continuous “cost out” mentality is needed.
    - The recent growth in the offshore wind industry is much faster, fuelled by a strong “can-do” attitude. Often the lack of experience / precedent and clarity about forward plans worries firms coming from other sectors.

4.2. Delivery from a remote location

- To have an advantage over a local firm, a remote firm must have a service which can be delivered just as well remotely, such as providing engineering design services. Even here, they would need to demonstrate that the service does not suffer from being delivered remotely and there is sufficient overlap with European workdays to allow effective communication with clients.
- To make a product remotely requires it to have a strong enough value proposition to support the additional cost of delivering it from the remote location where it is made. Given that a small number of suppliers in Europe supply most of the European market, and beyond, logistics is already a cost for these European suppliers.

4.3. Delivery assurance is key for tier 1 and 2 suppliers

- The most expensive part of a project is when the major equipment is delivered and is installed. This is expensive as the value of the work in progress has become very high proportion of the total CAPEX by this stage and the cost of the delays to installation can be upwards of $0.5m per day. Developers, therefore, are very concerned to avoid delays at this stage.
- Tier one suppliers need to be able to assure developer customers of their experience, previous levels of performance and be prepared to back that up with financial guarantees, and in turn they will place high demands on their tier 2 suppliers, such as suppliers of foundations, cables and design services.
- The offshore wind industry is often seen by outsiders as quite closed and risk averse. We would argue, however, that it is taking very significant, calculated risks and seeks not to add unnecessary additional risks on top of these. This is why the need to show significant cost (or cost of energy) benefit in adopting a new supplier or approach is so important.
- This means that it is almost impossible to break in at this level to deliver these roles on a large offshore wind project. Most firms need to start at a lower level and on smaller OW projects, or packages with less time critical scopes, and demonstrate competence before being given larger roles.

4.4. Breaking into an existing supply chain

- This point is related to the point on delivery assurance, in that the supply chain is risk averse, and so needs a good reason to choose a new supplier who does not already have experience.
- The most likely reasons to consider a new supplier are to reduce costs through a compelling value proposition, or to shake up the incumbent suppliers by increasing the level of competition, so firms need to play to these points.
- Another strong reason to consider new suppliers is to increase local content, which is sometimes mandated according to competitions for lease areas or power purchase agreements. Firms can only play to this requirement if they are prepared to set up local entities and invest in some local activity.

5. Pathways – typical "on ramps"

5.1. The Ansoff model

The Ansoff model describes the challenges of new business development by considering both new product development and new market development on a two by two matrix. This is a useful way to look at the challenges of breaking into the OW industry, with diversification (breaking into a new market with a new product simultaneously) being the hardest strategy for growth.

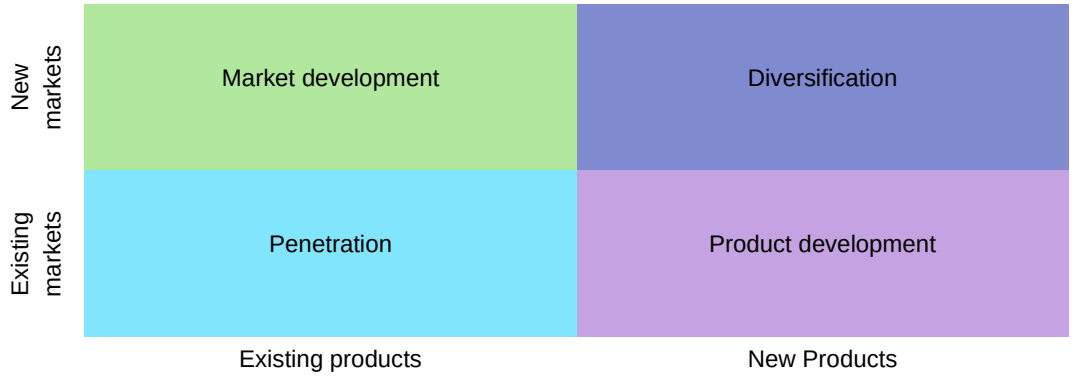


Figure 2 Ansoff's product / market grid.

Market development

Options, ordered by increasing effort, include:

- Start with a small and safe scope at a low tier in the supply chain. This may be relating to repair or rework during operation of a wind farm.
- Use relationships with existing clients in North America who have businesses active in OW. Many larger O&G businesses have started a transition to serving offshore wind.
- Team up with a European partner who is already active in OW which does not directly compete. They could provide experience in Europe in return for a partner to help enter the North American market for their services.
- Acquire a firm already active in the OW market and then grow it.

Product development

Options, ordered by increasing effort, include:

- Seek part-public funding to develop, test and demonstrate your new product, especially if highly innovative.
- Get involved in a small project which is actively seeking to demonstrate new innovation e.g. a pre-commercial demonstration project supported by R&D funding with only a handful of turbines, or a single turbine on a large project which the developer has selected for innovation purposes.
- Offer to de-risk, more than usual, for an early customer.
- JV with a firm that is already established in this area that has the capability to deploy and support the product or service. Consider what you can offer collaborator in return for a way in, based on your geographical or other market knowledge or presence.
- If you have new technology which you could have a big impact in OW then progress it to a position to be acquired by a firm already active in OW.

Diversification (market development and product development)

If trying to both enter the OW market and introduce a new product or service at the same time, then a combination of the strategies identified above will be required. The larger the scope involved and/or the closer to scope is to causing installation delays, the more the firm will need to be provide confidence to clients.

6. Recommendations for the region

We think the development of an OW in Canada is unlikely, except as export to the US, as Canada already has a lot of low carbon energy, both hydro-electric and onshore wind. These recommendations, therefore, are focused on entry into the European OW market as a pre-cursor for entry into US north east Atlantic States and the Great Lakes, where developers will be looking for more local capabilities. The US Bureau of Ocean Energy Management (BOEM) is expected to offer seabed leases in the Gulf of Maine shortly, which will bring the industry even closer to Newfoundland.

Generally, we suggest interested firms should:

1. Review our *Guide to an Offshore Wind Farm* (https://guidetoanoffshorewindfarm.com/), and investigate the products and services currently offered by competitors, to understand in moderate detail the products and services which the offshore wind industry uses and therefore what they might offer.
2. Share expertise between local firms, by involving more experienced Canadian firms with less experienced firms.
3. If still interested, firms should then meet with engineers and buyers at developers and EPCIs and understand their needs at the next level of detail. This could be achieved through open “meet the buyer” supply chain events for particularly large wind farm projects, trade shows (there are a good number of these, but of varying quality as the numbers trade shows increases), Wind Europe’s event in Copenhagen in November will be a strong event. There is no substitute for travelling and meeting potential clients to learn quickly about what is needed in terms of both technical requirements, commercial requirements and the culture of this new industry.
4. Attend any specially organised events by developers and EPCIs who are looking to increase local content in Canada, although we do not expect these to progress with nearly as much urgency as the industry in the US north east Atlantic States.
5. Update sales and marketing materials including websites, to incorporate learning about what is critical for OW. Consider getting third party support to provide an objective view.
6. Review literature from industry funding bodies such as InnoEnergy, the UK’s Carbon Trust and ORE Catapult, to gain insight into industry-wide challenges and hence focus on opportunities which can impact LCOE in a material way.

To support and enable local industry progress, we suggest:

7. NEIA should attend international conference and exhibitions, to both understand more about the industry and to promote the local businesses, as many other countries and regions do, and encourage their members to attend too. The Norwegian, Danish and Dutch trade associations are normally seen at these events. NORWEP is an organisation which spans both O&G and offshore wind energy very effectively, reflecting the overlap between the two industries.
8. Review what is being done in other countries by trade associations, together with commerce departments and embassy support to drive new business development.
9. Use experience from these activities to synthesise a plan, at the NEIA and Canadian government levels, to support growth in the growing offshore wind industry. Firms with existing offshore oil, gas and other maritime experience have a great start in understanding what is required but should not be the only candidates.

Appendix A: Opportunities for Atlantic Canadian firms to penetrate the offshore wind energy supply chain based in Europe - Questionnaire

Guidance for use

This questionnaire is to be used for interviews with five agreed companies. The ideal interviewee will be a senior person within the business development function, who has knowledge of the company's recent history and plans for business development in this area.

The interview is intended to last between 30 and 60 minutes to provide sufficient time to get to allow sufficient time for probing beyond the headline answers and to capture specifics and examples.

The questionnaire is based on a supply chain assessment which has been used a number of times with Norwegian firms. The questions have previously been used at a market segment level have been adapted here for use at an individual company level. Supporting detail and possible follow up questions are provided in italics.

It is intended that both a score of 1-5 and supporting notes are captured for each question, with a score of 5 being the strongest or highest score with respect to the potential for export success, whereas a score of 1 is the lowest.

Questions should be asked and answered from the perspective of the parent company of the interviewed company, provided that the parent company is one which has an active or interventionist corporate centre. If operating companies are managed at arm's length, then it should be answered from the perspective of the interviewed company level.

Questions should be asked and answered from the perspective of the potential to enter the European offshore wind market, as opposed to any other national or regional offshore wind market.

Questionnaire

1. Basic information

Name and position of interviewee:

Name of company for which the questions are being answered:

Name of interviewer:

Date of interview:

2. Company information

What are the company's products, services, assets or capabilities which are relevant to the European offshore wind market?

What is the current operational footprint of the company e.g. offices, factories, ports, other assets?

What is the current delivery footprint of the company i.e. where has it sold, delivered and supported business in the last couple of years?

3. Questions

3.1 What area or areas of the supply chain are considered to be the most relevant for market entry?

Areas are the same as the supply chain areas defined in the Guide to an Offshore Windfarm. Select one or more. If more than one area is chosen then the answers to some of the following questions will need to be for each area separately, so it might be easier to focus on the most promising supply chain area.

1. Development and project management	2. Wind turbine	3. Balance of plant	4. Installation and commissioning	5. Operation, maintenance and service	6. Decommissioning
P.1 Development and consenting services P.2 Environmental surveys P.3 Resource and metocean assessment P.4 Geological and hydrographical surveys P.5 Engineering and consultancy	T.1 Nacelle T.2 Rotor T.3 Tower	B.1 Cables B.2 Turbine foundation B.3 Offshore substation B.4 Onshore substation B.5 Operations base	I.1 Foundation installation I.2 Offshore substation installation I.3 Onshore substation construction I.4 Onshore export cable installation I.5 Offshore cable installation I.6 Turbine installation I.7 Construction port I.8 Offshore logistics	O.1 Operations O.2 Maintenance and service	D.1 Turbine decommissioning D.2 Foundation decommissioning D.3 Cable decommissioning D.4 Substation decommissioning D.5 Decommissioning port D.6 Reuse, recycling or disposal

3.2 What is the track record of the company in the offshore wind market?

Has the company assessed or tried to enter the market in the last couple of years? If so, what was done, who was behind it, how did it go? What legacy has that left in terms of willingness to try again or to go further next time?

There are no current and likely no future offshore wind farms off Newfoundland and Labrador, meaning that offshore wind developers will not be seeking local suppliers to meet local content requirements. On the other hand, N&L has a strong track record in cold climate offshore engineering and operations. Therefore, if offshore wind energy has this challenge, it could be expected that the offshore wind sector will seek solutions and services from organisations based here. Are there any other reasons the European offshore wind industry will be looking to N&L firms?

3.3 Synergies between the European offshore wind and the company's current supply chain, considering how well parallel sectors match the requirements of the offshore wind sector (this includes companies with the potential to enter offshore wind but have not yet done so)?

For example, does the company currently work in the oil in gas sector in Europe, so having a geographical synergy, or does it provide a product or service that could be readily sold into offshore wind?

3.4 Potential for levelised cost of energy (LCOE) benefit from new involvement by the company, considering to what extent their products or services have a new application in offshore wind?

European developers competing to win offshore wind auctions in European countries will not buy from N&L for the sake of it. Rather, they need a good financial case which could be an increase in annual energy production, a decrease in CAPEX or a decrease in OPEX. Specifically, what is or could be the value proposition on offer?

3.5 Size and timing of investments by the company to successfully enter the European offshore wind market, considering to what extent this represents a barrier to entry?

How much would need to be invested in potential market entry in terms, including: business development, new product/service development, new assets, new infrastructure, new certifications, and over what timescale? How forthcoming would this level of investment be from the company (or its parent)? Are there any other non-investment barriers to entry?

3.6 Size of the opportunity, what it is potentially worth?

Capture the company's estimate of market size if they have one, otherwise this will be provided by BVGA.

3.7 What is the experience and level of ambition of the company's senior management for successfully targeting and entering new markets in the last 2 years?

Consider both introduction of markets for products/services that are new to the company, and entry into new geographical markets?

3.8 Anything else of relevance?

Appendix B: Costs for a 1 GW offshore wind farm

Costs have been included here for a typical wind farm, against which the answers to the question in the questionnaire “Size of the opportunity, what it is potentially worth?” have been judged.

The following is taken from https://guidetoanoffshorewindfarm.com/wind-farm-costs. Projects vary considerably in their size and their distance from shore. This source uses a UK 1GW project of 100 10MW turbines located 60km from shore in 30m water depth and commencing operation in 2022.

A £4.6m spend on a 1 GW wind farm is considered to be “moderate” for the purposes of scoring for this study, which is 1% of the lifecycle expenditure.

Table 1 Costs for a 1 GW wind farm built in the UK in 2022.

Category	Rounded cost (£ millions) for a 1 GW OWF	Notes
Development and project management	£ 120	
Development and consenting services	£ 50	
Environmental surveys	£ 4	
Resource and metocean assessment	£ 4	
Geological and hydrological surveys	£ 4	
Engineering and consultancy	£ 4	
Other	£ 54	Includes lost projects that incur development expenditure
Turbine	£ 1,000	
Nacelle	£ 400	
Rotor	£ 190	
Tower	£ 70	
Other	£ 340	Includes assembly, wind turbine supplier aspects of installation and commissioning, profit and warranty
Balance of plant	£ 600	
Cables	£ 170	
Turbine foundation	£ 280	
Offshore substation	£ 120	
Onshore substation	£ 30	
Operations base	£ 3	
Installation and commissioning	£ 650	
Foundation installation	£ 100	
Offshore substation installation	£ 35	
Onshore substation construction	£ 25	
Onshore export cable installation	£ 5	
Offshore cable installation	£ 220	
Turbine installation	£ 50	
Offshore logistics	£ 4	
Other	£ 212	Insurance, contingency (spent) and construction project management
Operation, maintenance and service (per annum)	£ 75	
Operations	£ 25	
Maintenance and service	£ 50	
Decommissioning	£ 330	
Turbine decommissioning	£ 45	
Foundation decommissioning	£ 75	
Cable decommissioning	£ 140	
Substation decommissioning	£ 65	
Total expenditure	£ 4,574	For a 25 year operating life