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WIND POWER

PARTNERSHIPS  
IN THE DANISH  
WIND INDUSTRY  
SUPPLY CHAIN

**MEGAVIND**

PARTNERSHIPS IN THE DANISH WIND INDUSTRY SUPPLY CHAIN  
November 2020

Publisher: Wind Denmark // Megavind

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Download the electronic version at: [megavind.winddenmark.dk](http://megavind.winddenmark.dk)

ISBN 978-87-970265-5-7

EAN 9788797026557



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# PREFACE

## Background

The topic of partnerships and cooperation in the Danish supply chain was decided as part of the Megavind Annual Research and Innovation Agenda 2019. In this publication from November 2019 it was mentioned as one of three upcoming strategies and described as “Megavind will ...deliver recommendations to improve opportunities, conditions and cooperation between companies”.

The background for this topic to emerge on the strategic agenda is, that several players in the Megavind partnership believe, that partnerships can be one of the primary keys to create further value in the work for strengthening competitiveness of the Danish value chain companies.

This viewpoint is already backed up by some simple statistics. Wind Denmark has since 2014 made an annual publication<sup>1</sup> with focus on high-level statistics, analysis, and current topics from the suppliers of the wind energy industry. In the 2018 report version, Wind Denmark asked how the lifetime costs of wind energy could be reduced, where the option “Supplier cooperation, consolidation and / or partnerships” scored highest with 24 % and 56 % of respondents indicating “To a high degree” and “To some degree” respectively.

However, the underlying beliefs and ideas behind these scores have not previously been uncovered and detailed, which is what this project seeks to do.

The project was initiated in February 2020 and the final report and results will be published in an online session hosted by Wind Denmark in the autumn of 2020.

## Context

The Megavind partnership was established in 2006 in conjunction with the former Danish government presenting a report about promoting environmentally friendly technologies. The work resulted in establishing several innovative partnerships of which Megavind was one of them. Currently the partnership includes more than 30 different industry players.

Megavind’s vision is to retain and develop Denmark’s position as global wind energy hub and home for the world’s leading companies, and research institutions within wind energy. To this end it is the vision that these players are the first to deliver competitive wind energy on market terms to the largest markets. Concretely this means driving initiatives that can reduce the Levelized Cost of Energy (“LCOE”) for these companies as well as the whole sector.

Part of the intention with the Megavind partnership is to strengthen public-private cooperation between the state, the industry, and the universities to accelerate green innovation.

## Project organization

Megavind has established a working group consisting of Per Hesselund Lauritsen (Siemens Gamesa Renewable Energy), Torben A. Jørgensen (Fritz Schur Energy), Claus Vilhelmsen (Øglænd System), Edit Lulu Nielsen (Wind Denmark) and Rune Dal Andersen (Wind Denmark).

Implement Consulting Group have been chosen to lead the project in close collaboration with the working group.

<sup>1)</sup> See *reference nr. 5* in section *A.1 References* in the appendix



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# EXECUTIVE SUMMARY

For the Megavind Annual Research and Innovation Agenda 2019 it was decided to investigate the topic of partnerships and cooperation in the Danish wind supply chain. The background for this topic to emerge on the strategic agenda is, that several players in the Megavind partnership believe, that partnerships can be one of the primary keys to unlock further improvements to competitiveness for the Danish value chain companies. This is a new focus area for Megavind and this project sets out to investigate the topic in collaboration with a broad set of Danish sector players including wind farm owners, Original Equipment Manufacturers (OEMs) and suppliers.

The project assisted Megavind to obtain a deep understanding of partnerships in the Danish wind energy supply chain as well as how these can be used to grab opportunities and remove or alleviate barriers.

The project had the main hypothesis that there is a need for the Danish wind value chain companies to become more competitive and that this can be partly achieved from further potential within the sector by establishing more and better partnerships. This could

e.g. take the form of collaboration supplier-to-supplier, supplier-to-OEM, supplier-to-Wind farm owner and OEM-to-Wind farm owner.

To achieve real impact, the results and recommendations must lead to actions among the key sector stakeholders including private companies, partnerships, industry associations, innovation bodies, universities, and public funding institutions. The first step towards this is clear communication of the main messages from the report, where Wind Denmark and Megavind will take lead through a series of initiatives defined in the communication plan.

The project has resulted in 17 recommendations across the value chain.

This report shows that there are significant benefits from partnerships and that time spent investigating both opportunities and barriers is valuable. Megavind will continue to have high attention on the topic of partnerships for the coming years and looks forward to following the developments of new value creating and inspirational partnerships in the future.

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## RECOMMENDATIONS TO WIND DENMARK

- 1 Execute communication plan (jointly with Megavind)
- 2 Ensure continuous follow-up on key partnership questionnaire indicators from this survey e.g. annually
- 3 Initiate partnership success information campaign – to keep momentum – and integrate with current initiatives e.g. newsletter or “weekly guest”
- 4 Strengthen current sales networks across the sector

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## RECOMMENDATIONS TO MEGAVIND

- 5 Leverage this report to produce further operational strategies on selected partnership areas as well as defining related Research, Development and Demonstration (RD&D) projects
- 6 Initiate a structural effort to form new Research and Development (R&D) / technical networks across the sector
- 7 Initiate and facilitate technology implementation on digitalization and robotics: Hosting a series of inspirational events
- 8 Initiate work to seek inspiration about how adjacent industries conduct partnerships and cooperate

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## RECOMMENDATIONS TO PUBLIC FUNDING INSTITUTIONS E.G. ENERGITEKNOLOGISK UDVIKLINGS- OG DEMONSTRATIONSPROGRAM (“EUDP”) AND INNOVATIONSFONDEN

- 9 Broaden scope of Danish test facilities to strengthen testing partnerships and thereby joint product development

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## RECOMMENDATIONS TO OEMS AND SUPPLIERS

- 10 OEMs and suppliers to jointly drive further standardization of components, interfaces, processes, and equipment incl. modularization (also involving Energy Cluster Denmark (ECD))
- 11 OEMs keep closer to more suppliers to assist in pro-active transition and product development to match Wind Turbine Generator (WTG) roadmaps
- 12 OEMs and suppliers to further transition from transactional customer-supplier mindset to partnership mindset
- 13 OEMs start engaging in more long-term strategic supplier partnerships and commit to larger volumes
- 14 Suppliers offer their products as much as possible as a service solution to become better partners to OEMs
- 15 Suppliers engage in more horizontal cooperation around combining product portfolios and product aggregation

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## RECOMMENDATIONS FOR ENERGY CLUSTER DENMARK

- 16 Create better transparency about access to risk capital and funding for development projects
- 17 Create sector fund application task force to assist the supply chain in submitting high quality applications for development projects

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# INTRODUCTION

The project will assist Megavind to obtain a deep understanding of partnerships in the Danish wind energy supply chain as well as how these can be used to pursue opportunities and remove associated barriers.

The context is that the Danish supply chain currently experiences – among other things – increasing international competition and an explicit narrow focus on the product price from customers. At the same time the Danish supply chain has a strong foundation to grow and develop from: Apart from good prerequisites for producing at low cost, the national business environment is also known for a continuous flow of young talent from e.g. universities, a creative and innovative “muscle” within R&D and already close collaboration and clusters.

This project rests on *the main hypothesis that there is a need for the Danish wind value chain companies to become more competitive* and that part of this can come from *further potential within the sector by establishing more and better partnerships*. This could e.g. take the form of collaboration supplier-to-supplier, supplier-to-OEM, supplier-to-Wind farm owner and OEM-to-Wind farm owner. The aim is to give the industry extra tools to answer, “how can we do things smarter and cheaper together?” to help ensure a continued high degree of competitiveness in the Danish supply chain.

The value chain focus of the project is, especially on suppliers. However, to ensure a balanced perspective, other market players including OEMs, wind farm owners and industry and innovation organizations are also covered. The focus has been on the supply part rather than the installation part of the wind project supply chain.

The project set out with an expectation to deliver:

- A mapping of wind industry sector partnership characteristics
- Identification of opportunities and barriers associated with partnerships to improve competitiveness
- Recommendations for improving sector partnerships

To achieve real impact, the results and recommendations must lead to actions among the key sector stakeholders including private companies, partnerships, industry associations, innovation bodies, universities, and public funding institutions. The first step towards this is clear communication of the main messages from the report, where Megavind and Wind Denmark will take lead through a series of initiatives defined in the communication plan.





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# METHOD

## Key definitions

Some of the key terms used in the report are defined in the following way:

- ➔ Partnership: This study defines a partnership quite broadly. Any collaboration with 2 or more companies. The aim or purpose can be anything between a very tangible end-product (e.g. a co-development of product) or intangible end-product (e.g. better coordination of information for more efficient use of resources)
- ➔ Opportunities are to be seen in the context of partnerships. Think of it as any idea to a new product, process, matching of competencies etc. that can materialize into a benefit to your company or the industry, ultimately e.g. in the form of lower cost, less time or higher quality
- ➔ Barriers are to be seen in the context of partnerships. Think of it as anything that hinders or restricts the forming of or a partnership itself
- ➔ Partnerships growth and nurture is our wording for the possibility to initiate more partnerships as well as how to better maintain and get the most benefit out of existing partnerships

Other definitions related to the survey can be found in the appendix *A.2 Definitions*.

## The wind energy supply chain in Denmark

One of the initial steps of the project was to scope how the value chain landscape for the Danish wind energy supply chain is understood. For this purpose, the con-

ceptual value chain in *Figure 1* was created. It gave a direction as to where to look for information and learnings as well as where to target initiatives.

The company types involved in this project are described as follows:

- ➔ Wind farm owner: Company active in wind turbine project development (on- or offshore)
- ➔ Original Equipment Manufacturer: Company supplying finished products for wind farms such as wind turbines (tower, nacelle, blades), foundations, substations, cables etc.
- ➔ Tier 1 supplier: Companies that are direct suppliers to OEMs by supplying modules, assembled systems etc. and handle smaller suppliers towards OEMs
- ➔ Tier 2 supplier: Companies that are suppliers to Tier 1 companies by supplying sub-components, e.g. parts for gearboxes
- ➔ Further upstream: Companies that are suppliers to Tier 2 companies all the way to raw material suppliers

This framework was used to map Danish companies within each of these areas to the value chain. It gave a good overview of where the companies are concentrated in the value chain as well as confirmation of a good coverage. The gross list of companies was furthermore used to target our data collection in the form of interviews and survey.

FIGURE 1

## Wind energy value chain

Value chain	Raw materials	Components / systems / modules		Products	Construction
Company type	Mining / Tier“n”	Tier 1 / Tier 2 supplier		OEM	Wind Farm Owner
Scope of delivery		Blades	Pitch	WTG – Rotor	Wind Park
		Hub	Blade bearings		
		LEP & LPS			
		Electrical infrastruc.	Platform & Frame	WTG – Nacelle	
		Controller	SCADA & CMS		
		Cooling / Heating	Shaft		
		Gearbox	Transformer		
		Generator	Yaw		
		Bearings	Brake		
		Steel pipes	Internals & platforms	WTG – Tower	
		Steel pipes	Secondary steel	Foundation – MP/TP	
		Steel pipes	Secondary steel	Foundation – Jackets	
		Array cables	Export cables	Cables	
		Foundation	Topside	Substation	
		Aviation lights	Radar	Other	
	Coating & Protection				



### Conceptual framework

To address the main hypothesis and needed analysis, a theoretical framework was created to enable a breakdown of the tasks and to structure our data collection. It is illustrated in *Figure 2* and provides the following key analysis themes:

- ➔ Objectives: Achieving higher competitiveness as an enabler for further growth
- ➔ Partnership collaboration areas and partnership models: The area of partnerships is broad and to help the mapping, they have been broken down into several sub-elements
- ➔ Time perspective: Connecting information about the past, present and future to identify the key aspects of partnership opportunities and barriers

This was used as a frame of reference for the full project including data collection phases to answer key questions such as “what are the experiences with partnerships”, “which have been successful”, “what are the boundaries of possible partnerships” and “what would it take to engage in more value adding partnerships in the future”.

### Data collection

The project involved gathering a significant amount of new data through a three-step process. Firstly, **introductory interviews** were conducted to test the project scope and hypothesis as well as providing input to a survey. Secondly, a **survey** was designed and distributed to over 100 targeted wind energy value chain companies and organizations. Thirdly, we conducted deep-dive interviews based on the results of the survey. Each of the steps are explained in more detail below.

### Introductory interviews

The introductory interviews were partly used to test

the project’s main hypothesis as well as to customize some selected conceptual elements. They gave strong support to the main hypothesis and only minor adjustments to the project scope were made.

The following companies participated in the introductory interviews:

COMPANY NAME	COMPANY TYPE
KK Wind Solutions	Supplier
Liftra	Supplier
LM Wind Power	Supplier
Ymer Technology	Supplier
Weissenborn	Supplier
Vestas	OEM
Siemens Gamesa Re. Energy	OEM
Energy Innovation Cluster	Innovation organization
Wind Denmark / APQP4Wind	Industry organization / Partnership

Additionally, they involved discussions on the themes of market trends, key buying criteria, supplier requirements, partnership types, opportunities and barriers helped scope and design the survey with the end-users and readers in mind. A lot of insight was gained by probing for the knowns and unknowns related to partnerships, and the synthesized inputs and conclusions led to useful breakdowns of the themes.

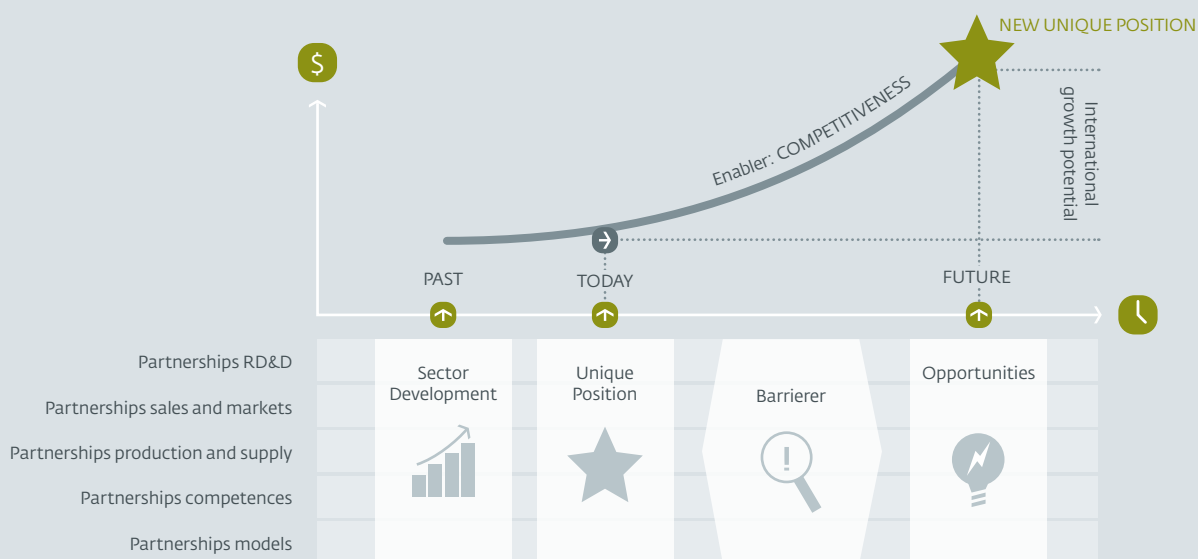
### Survey

The survey was designed primarily based on input from the introductory interviews and the working group. It had a quite big scope with the main themes being importance of partnerships, market trends, opportunities, barriers and partnership growth and nurture.

The survey was distributed to a select list of ~120 companies based on Wind Denmark and Megavind mem-

FIGURE 2

## Overall conceptual framework



bership status as well as the CVR. company registrations. Additionally, the survey was announced publicly through articles by Metal Supply and Wind Denmark which included a link with the possibility to participate for other companies.

After quality assurance of the survey registrations, a total of 55 persons from 50 different companies had submitted complete answers. Considering the big survey scope (estimated to take 20-30 minutes), the project team were very pleased with a response rate of more than 40 %. All parts of the value chain were represented as well, so that the survey results can be seen as representative of the market<sup>2</sup>.

### Deep-dive interviews

All interviewees had completed the survey. The interviews focused on getting a better understanding of the companies' view on partnerships, elaboration on their own survey answers and reactions to the aggregated survey results, as well as getting input on recommendations.

The following companies participated in the deep-dive interviews:

COMPANY NAME	COMPANY TYPE
Dafa	Supplier
Danwind Spare	Supplier / after-market
East Metal	Supplier
HydraSpecma	Supplier
Klingspor	Supplier
Niebuhr Gears	Supplier
Resolux	Supplier
Welcon	Supplier
MHI Vestas Offshore Wind	OEM
Siemens Gamesa Re. Energy	OEM
Vattenfall	Developer

The interviews provided valuable input to the detailing of the recommendations.

2) Note: In line with the project scope and focus, the coverage of the supplier and OEM value chain part is relatively high, while the developer part less so.

# SURVEY RESULTS

In this section the main (aggregated) results of the survey are reported and described. Some additional results are reported in the appendix *A.3 Survey results (additional)*.

## Respondent profiles

Figure 4 shows statistics about the respondent company profiles. The respondents cover different perspectives and functions within the companies with “management”, “sales” and “technology / development” having the highest response share. The companies are spread across the value chain, but with the majority being either a Tier 1 or Tier 2 supplier, or an OEM. All respondents except one (innovation organization) are

private companies and with over half of these being large enterprises, about a quarter being medium enterprises and 16 % being small enterprises. Above 90 % of all the respondent companies are both active within the on- and offshore segments. The revenue exposure to the wind sector varies a lot for these companies but has been quite stable in the period 2017-19. About 40 % are fully exposed to this sector, 17 % with very limited 0-10 % exposure and the remaining about 40 % of companies spread quite uniformly in the exposure interval.

The respondent company names and their place in the value chain can be seen in figure 3.

FIGURE 3

## Respondents distribution on value chain

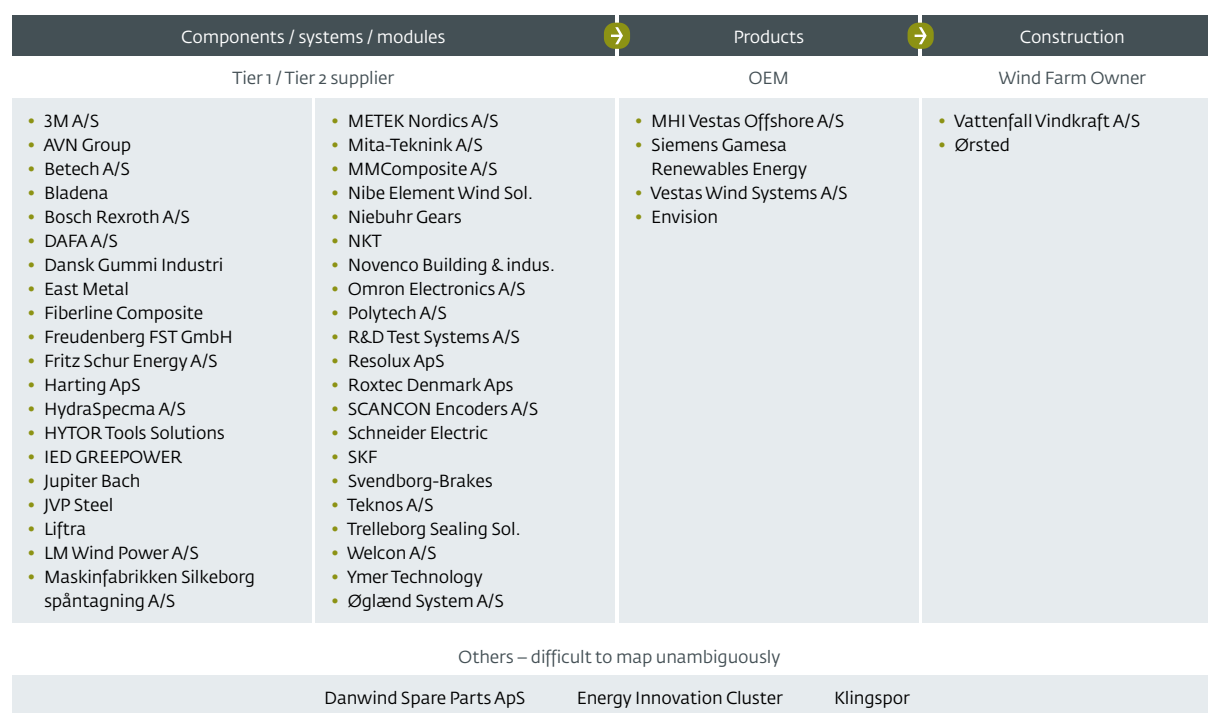
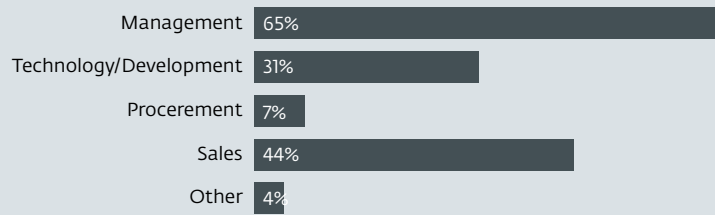


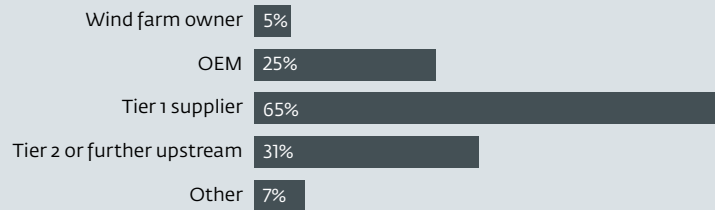
FIGURE 4

## Respondent profiles

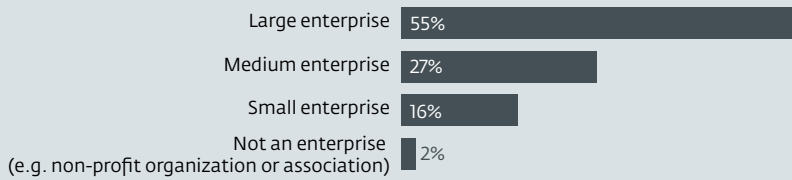
### Q1.2 Which department do you represent?



### Q1.3 Where in the value chain is your company positioned?



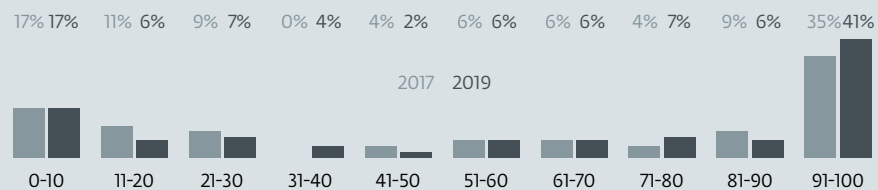
### Q1.4 What is the size of your company?



### Q1.5 Which wind sector segment(s) is your company active within?



### Q1.6 What share of your turnover came from the wind sector?



### Importance of partnerships

We set out to test the main hypothesis at high level in *Figure 5*. The first part of the main hypothesis, that there is a need for the Danish wind value chain companies to increase its competitiveness in the future, was tested in question 2.1. It shows that 50 % and 44 % of companies in 2019 perceived competition as “high” and “medium”, respectively. And that competition has become stronger in recent years – concretely the response rate of “high” increased from 30 % to 50 % from 2017 to 2019. The second part of the hypothesis, that there is further potential within the sector which can be captured by establishing more and better partnerships, is tested through questions 2.2-2.3. 87 % of companies report that they have been involved in value creating partnerships. At the same time 60 % of companies re-

port that they have been in partnerships, that did not create value. It shows that while many partnerships go well, a significant part end up not creating value. Of course, these partnerships were initially expected to create value, and so it shows the importance of initially screening the core idea and purpose and setting up the partnerships in a good way. Looking ahead 94 % and 100 % of respondents believe that there are opportunities for new or improved partnerships that create value for their own company or for the sector in general, respectively. 83 % of respondents report that their company has experienced partnership barriers, which shows how important it is for the sector to help address and alleviate these.

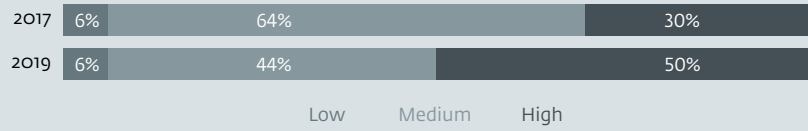




FIGURE 5

## Responses to main hypotheses

### Q2.1 How does your company perceive competition for your products/services in the wind sector?



### Q2.2 Overall indicators

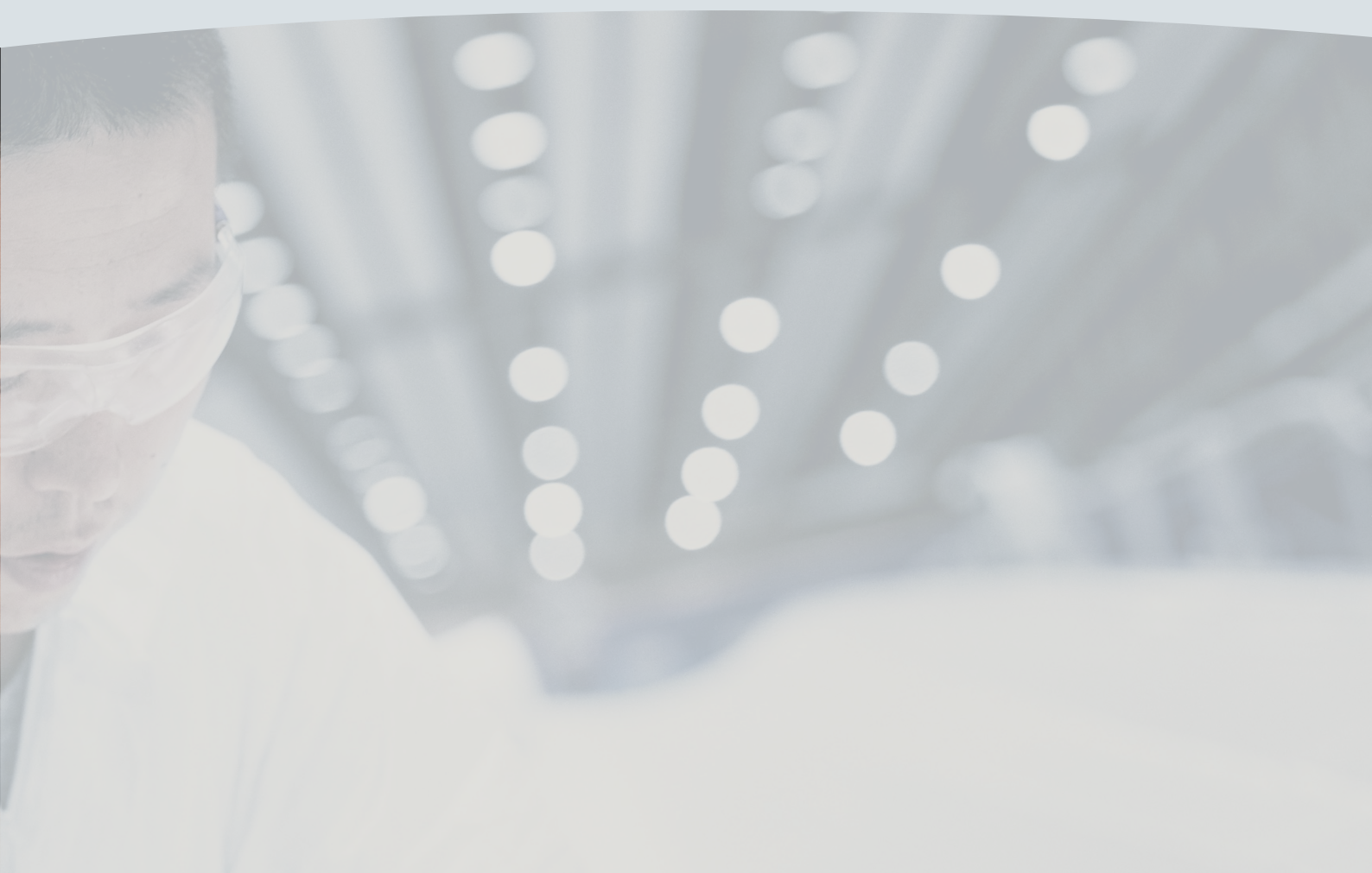
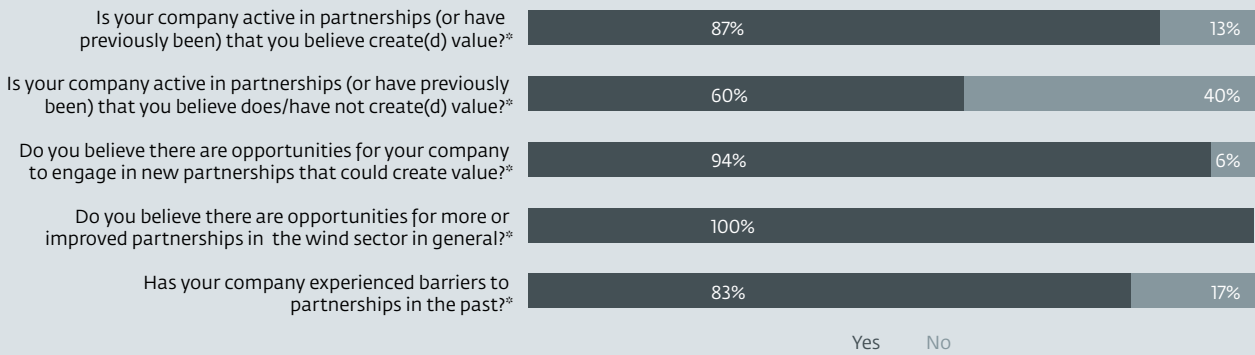
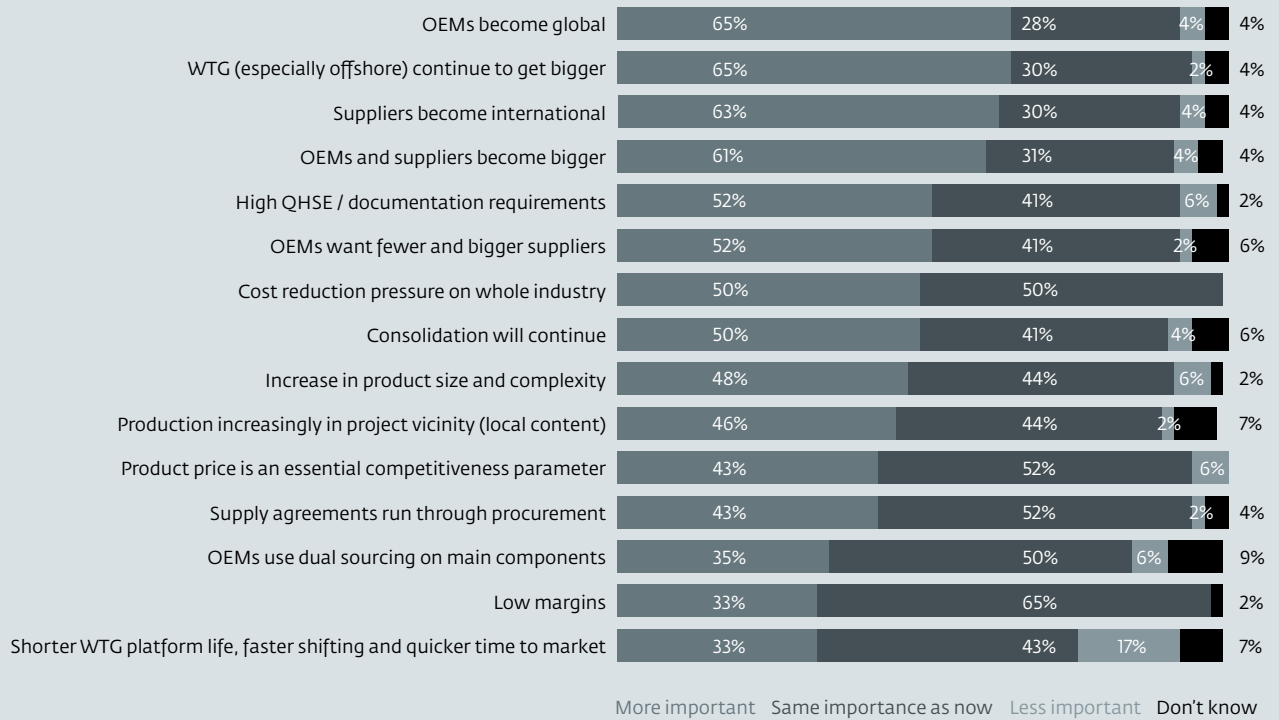


FIGURE 6

## Market trends – Future outlook

### Q3.2 How significant do you think each of the listed market trends will be within 3 years?



### Q3.3 What do you think will be the 3 most significant market trends within the next 3 years (important for partnerships) from the list above?

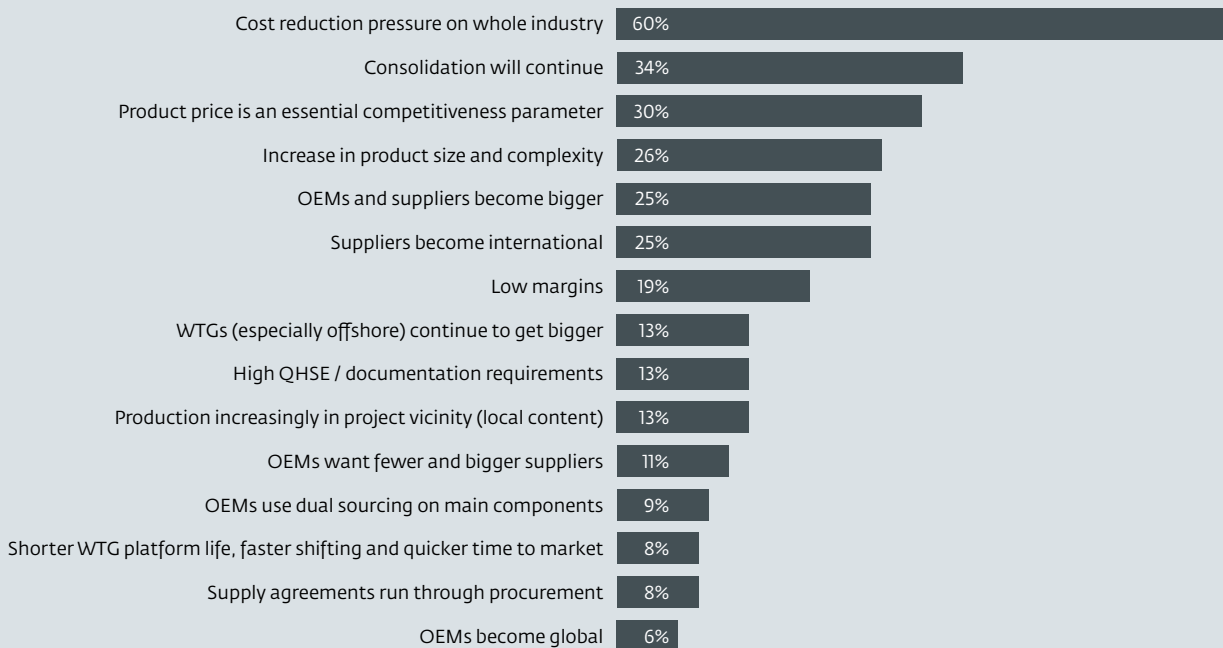


FIGURE 7

## Market trends – Key buying criteria

### Q3.4 Please indicate your company's top 5 buying decision factors



PHOTO: LM WIND POWER

### Market trends

The respondent feedback on relevant market trends for partnerships is well represented in *Figure 6*. The clear top scorer of most significant trends is “cost reduction pressure on whole industry” and during interviews a common perspective was that being cost competitive on product price is a must in the industry and is expected to remain so going forward. Other reported main market trends from the survey are:

- OEMs become (even more) global and suppliers follow suit by also getting a more international profile
- Sector companies will get bigger – both OEMs and suppliers – and on top of organic growth, consolidation is expected to be a key driver for this
- The WTGs continue to get bigger as well as input products and parts becoming more complex and aggregated
- Quality, Health, Safety, and Environment (QHSE) requirements on products will become higher

These market trends are generally well in line with other market reports.

The question of how to stay competitive is addressed in *Figure 7*, where respondents are asked for their company’s top 5 buying criteria. It provides an understanding of which evaluation criteria currently are most important in the sector. The two main parameters are “product quality, reliability and lifetime” and “product price”, which gets 83 % and 76 % response share, respectively. Runners up are “security of supply”, “product functionality” and “delivery speed & scale” with 44 %, 41 % and 41 % respectively. “Operation- and Maintenance (O&M) costs” receive 24 % response share, which might reflect, that it is a smaller part of the lifetime cost of products, and that it is the full costs that represent the key price evaluation parameter. Highest risk categories are “business risk” and “technology risk” that get 24 % and 22 % respectively. The newer topics of “geographic characteristics (e.g. local content)” and “sustainability” currently receive 20 % and 19 % respectively and they are expected to increase in the future.

## Opportunities

Before going into the content of partnership opportunities, respondents were asked about opportunities in relation to value chain placement and type of partnerships – the results are summarized in *Figure 8*.

Respondents believe that there exist partnership opportunities that create value throughout the value chain from Tier 2 suppliers to wind farm owners with a minimum response rate of 47 % at any place. The two highest scoring places are Tier 1 supplier and OEM with 84 % and 76 % respectively.

In terms of what partnership counterparty combinations have the highest value creation potential, there were several options categorized by vertical, horizontal, and other. The highest scoring option for each category is supplier-OEM (vertical) with 93 % score, supplier-supplier (horizontal) with 69 % score and multi-direction partnership (other) with 58 % score.

For indication of partnership opportunities, the respondents were given the option to choose from a list of pre-defined opportunity ideas or mark “other” with possibility to specify the idea. The results can be seen in *Figure 9* on page 22. The opportunity list was split into 5 categories: “park optimization area”, “standardization”, “test facilities”, “sales” and “production / manufacturing”. Only very few respondents used the “other” category, so the list is interpreted to cover the most significant opportunities. As a supplement question 2.4 in *Figure 18* in the appendix *A.3 Survey results (additional)* gives respondents’ view on opportunities at the category level.

Within the category “park optimization area”, the opportunities “service & maintenance” and “installation” – areas surrounding the WTG delivery – comes in first at 44 % and 35 % response shares, respectively. This could be a consequence of many years’ focus on WTG

optimizations and thus getting closer to a saturation point here. Associated with opportunity “service & maintenance” it should also be mentioned that “efficient exchange of main components” comes in quite high at 29 %. However, the key WTG area opportunities of “tower”, “nacelle” and “blades” follow right after with 35 %, 35 % and 31 %, respectively. During interviews it became clear that while some respondents believe in restricted opportunities on WTG optimization (due to recent years’ big improvements), others firmly believe that innovation within materials and new processes will continue to enable significant optimization here.

The category “standardization” is overall seen by respondents to have the highest opportunity potential. The best rated opportunities are “components, modules, systems, products” and “modularization (more bundling)” with 84 % and 56 % respectively. A lot more can be done here even though there are also good examples of successful sector standardization initiatives such as APQP4Wind, which is featured as a case in the section Successful partnership case stories. Many suppliers describe how every WTG is unique and requires a different product from them even though functionality is similar. Modularization is a chance for the suppliers to help OEMs by providing more finished or assembled products. It is also worth to note that the opportunities “transport processes” and “transport equipment” receive 36 % and 33 % response rate respectively, which represents a good potential.

For the category “testing facilities” the opportunity “WTG test facility” scored highest at 55 %. Still noticeable was also the “service test facility” and “virtual simulation environments” with 33 % and 31 % respectively. It is an area that has been worked a lot with by Megavind in the past and so these results sparked a special interest into the underlying respondent ideas. Thus, this was a specific topic in the deep-dive inter-

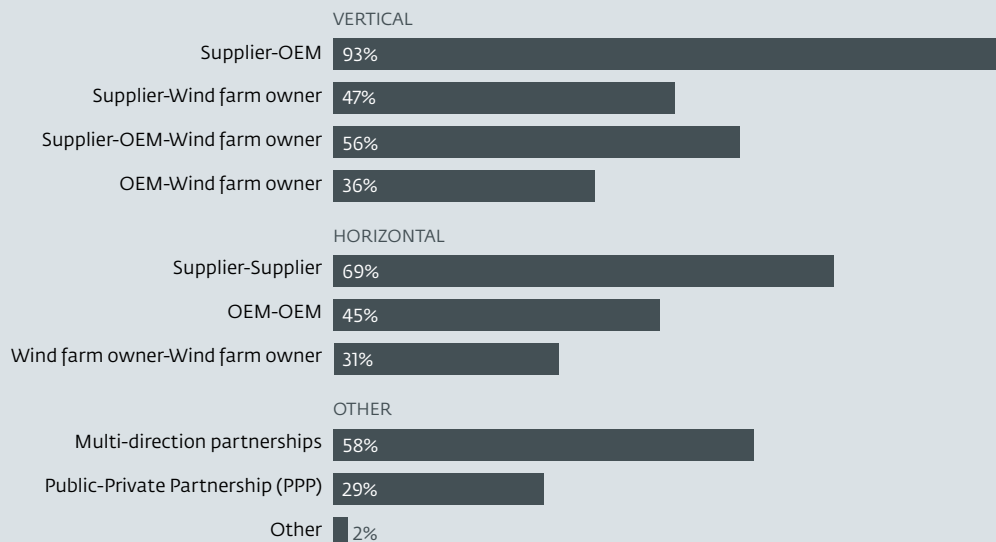
FIGURE 8

## Opportunities' placement in value chain and counterparty combinations

**Q2.5** Where in the value chain do you see opportunity for partnerships that create value for companies in the wind sector?



**Q2.6** Which of the following partnership counterparty combinations have potential for value creation for companies in the wind sector?



views and inputs are reflected in the recommendations.

The category “sales” represents significant potential with the opportunities “suppliers can have several OEMs as customers”, “expand sales into new markets” and “Chinese OEMs as customers” all getting high scores of 58 %, 55 % and 38 % respectively. Interviews also showed how much sector companies are already working together to leverage each other’s networks and collaborate to jointly offer broader product portfolios. There are several examples of especially

the SMEs having geographically bounded strategies to e.g. Europe only, which represents a big potential.

The category “production / manufacturing” also comes in with high potential with the opportunities “strategic cooperation on manufacturing”, “outsource production to Low Cost Countries” and “temporary / movable facilities” receiving scores of 47 %, 33 % and 33 % respectively. There are some suppliers that are already far on these opportunities, but also some that have not worked much with the topic yet.

FIGURE 9

## Opportunities – Areas with potential for partnerships

**Q4.1** Which of the following opportunity areas do you believe are suitable to develop through partnerships?

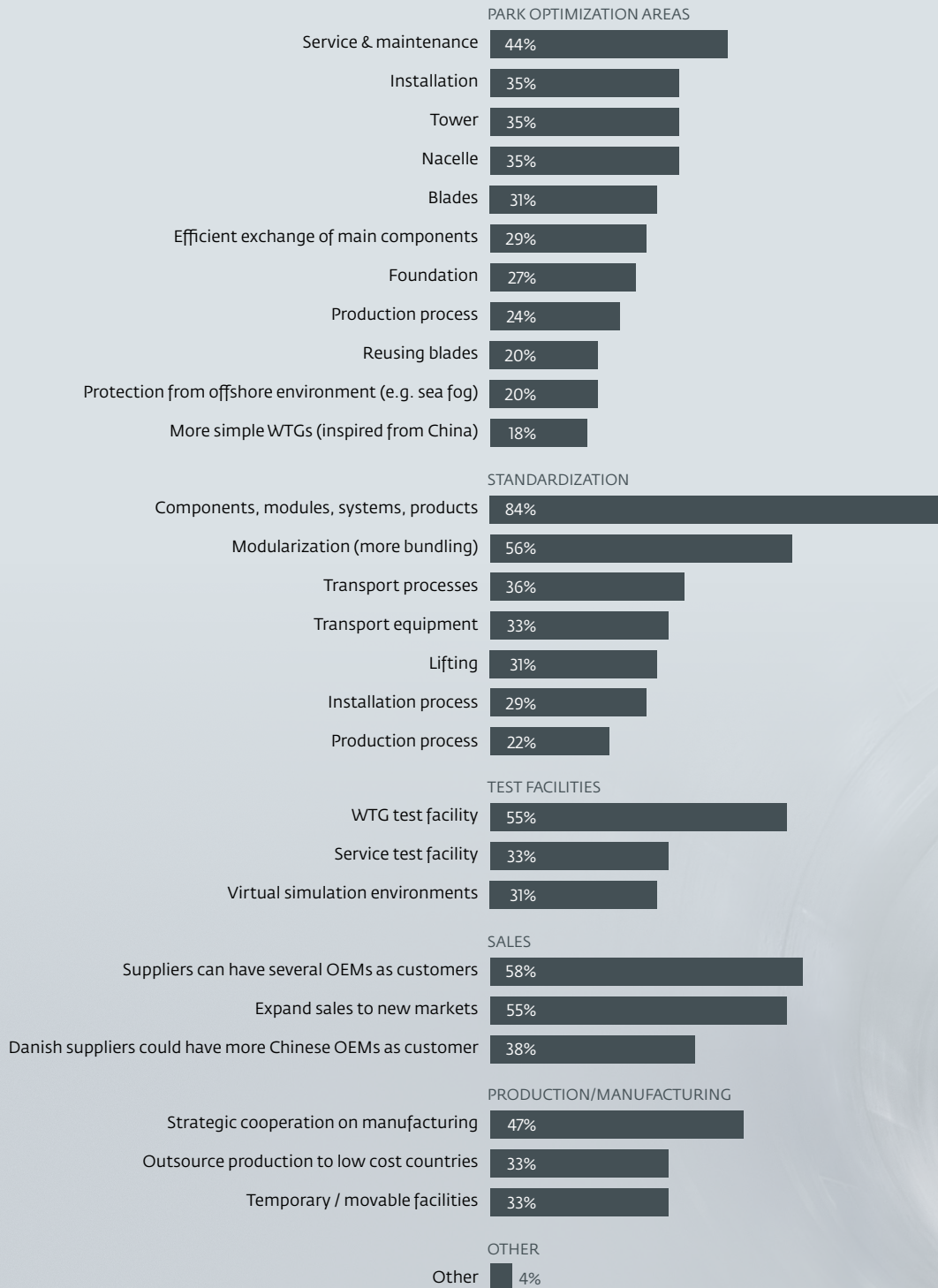
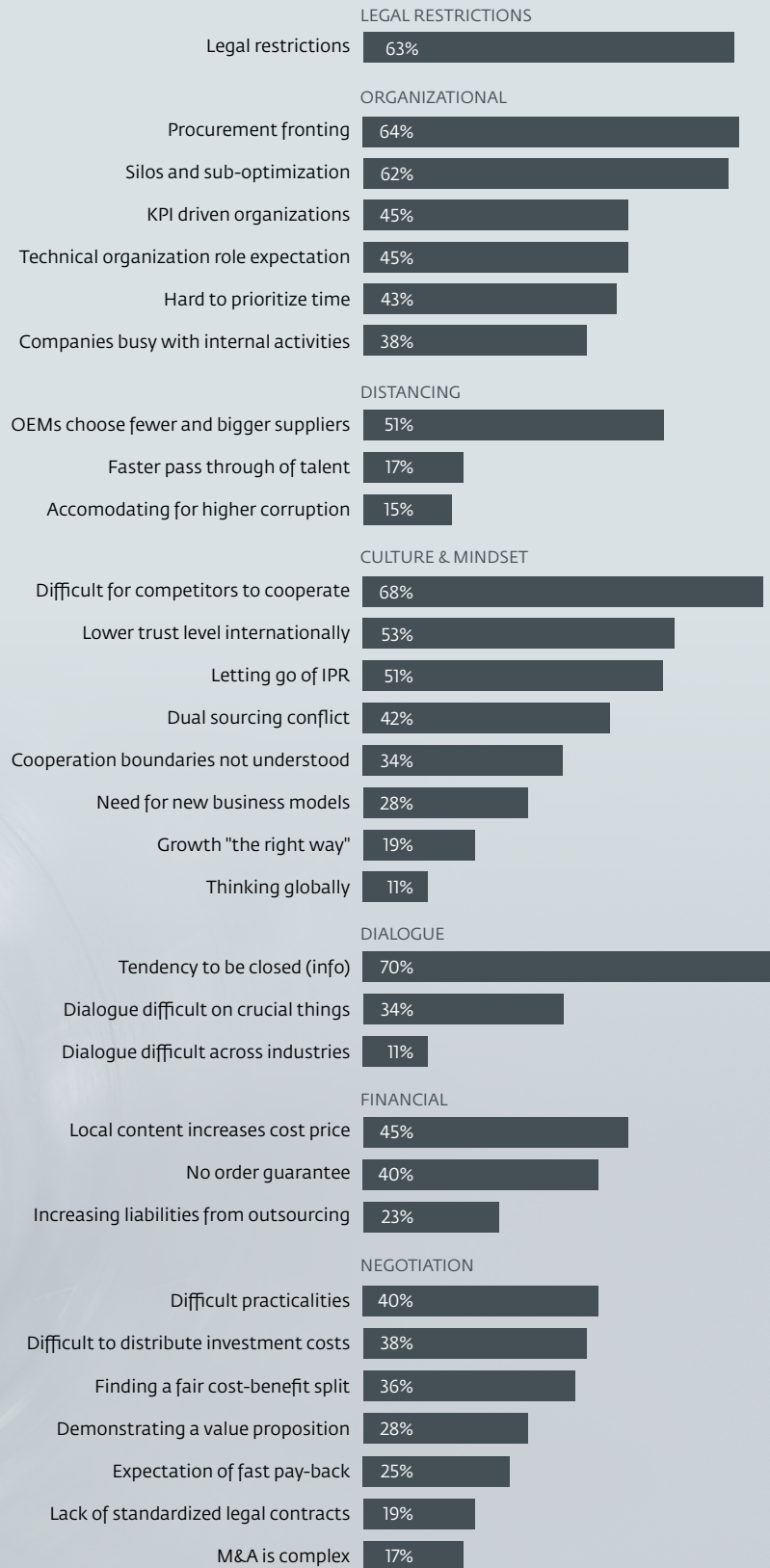


FIGURE 10

## Barriers – Areas presenting challenges for partnerships

**Q5.1** Which of the following barriers do you believe are significant, when it comes to engaging in partnerships?



## Barriers – Potential to alleviate or remove

## Q5.4 Could your company benefit from help on removing barriers for partnerships?



## Barriers

The list of pre-defined barriers had been split into the 6 categories: “organizational”, “distancing”, “culture & mindset”, “dialogue”, “financial” and “negotiation”, as seen in *Figure 10* on page 23. Again, the “others” option scored so low that it has been removed and again interpreted to cover the most significant barriers.

There are of course some restrictions due to legal conditions such as antitrust and competition law that needs to be respected and maneuvered within. This is represented in the “legal restrictions” score of 63 %. It cannot be changed, but more knowledge and transparency on do’s and don’ts would be beneficial.

The barriers within the category “organizational” are a big challenge for suppliers. The primary barrier options are “procurement fronting”, “silos and sub-optimization” and “Key Performance Indicator (“KPI”) driven organizations” with scores of 64 %, 62 % and 45 % respectively. These received a lot of attention during interviews and seem also to be correlated with size of enterprise – the larger the enterprise the more likely it is for other companies to meet this barrier in partnerships.

The “distancing” barriers concerns mainly the stretching of the supply chain from effects of OEMs requesting more aggregated products and concentrating their orders with fewer suppliers (e.g. dual sourcing strategy). It represents a significant issue for the suppliers that are pushed further back in the value chain. The option “OEMs choose fewer and bigger suppliers” received a score of 51 %.

The barriers within the category “culture & mindset” also received high scores. The key words of competition, trust, and Intellectual Property Rights (IPRs) appear to be central. The barriers “difficult for competitors to cooperate”, “lower trust level internationally” and “letting go of IPR” got highest scores of 68 %, 53 % and 51 % respectively. It is one of the “softer” behavioral areas. The barrier “tendency to be closed” in the following category backs up these results.

The barriers in the categories “financial” and “negotiation” receive relatively lower scores. However, a few of the barrier options do stand out. For the first category the barriers “local content increases cost price” and “no order guarantee” receive 45 % and 40 % respectively. And for the second category the barriers “difficult practicalities”, “difficult to distribute investment costs” and “finding a fair cost-benefit split” receive 40 %, 38 % and 36 % respectively.

Respondents were also asked – see *Figure 11* – whether they could benefit from assistance on removing barriers for partnerships. 77 % answered “yes” and only 5 % “no”. This shows that there is a clear potential role to play across the sector to help ease these barriers.

## Partnership growth and nurture

The final theme of the survey was about important elements to consider when forming new partnerships or trying to improve current partnerships. These results are shown in *Figure 12* and *Figure 13*.

In forming new partnerships what stands out is that partnerships often come out of personal relations, so it is of high importance for employees to build and maintain their external network. A mindset that seems to work well is characterized by being innovative on ideas, being very open and honest and seeking win-win opportunities. At the same time, a new partnership should clearly be able to formulate a value proposition and have allocated clear roles and responsibilities in the team.

For improving existing partnerships all parties need to be fully committed to the cause all the way from start to end, ensure good communication and insist on getting allocated the right (= competent) resources and team that are aligned with the partnership objective. Also, it is essential for success to keep the end-user (if it is a product) in mind and possibly get soft or full commitment on an order under certain conditions. The option “original idea is great” only receives 11 %, which indicates that other factors play a much bigger role for success.



FIGURE 12

## Partnerships growth and nurture – New partnerships

**Q6.1** Which of the following elements do you believe are significant, when it comes to forming new partnerships?

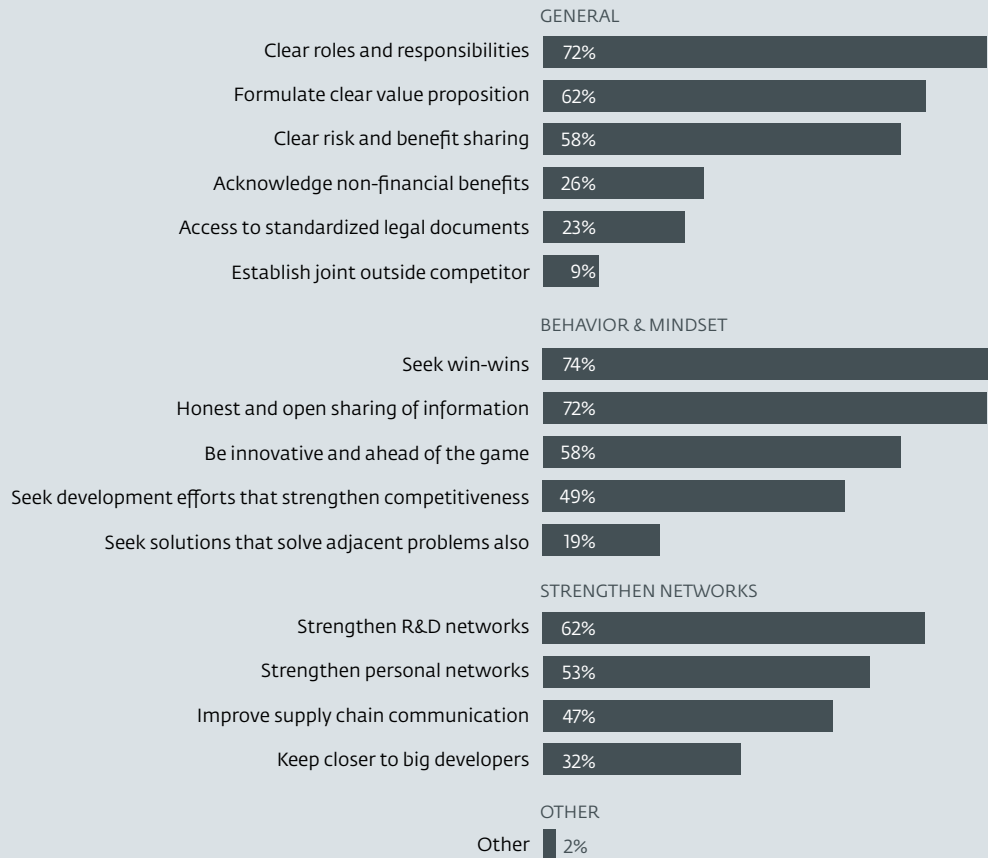


FIGURE 13

## Partnerships growth and nurture – Improve existing

**Q6.3** Which of the following elements do you believe are significant, when it comes to nurture (maintain and get the most benefit from) existing partnerships?



# SUCCESSFUL PARTNERSHIP CASE STORIES

Even though the focus of this report is on creating new and improving existing partnerships it is also clear that the wind industry sector already has engaged in many partnerships – luckily many good and valuable, while others less successful. With this experience base the concept of lessons learnt becomes very important.

One approach is to focus on the strongest and most successful partnerships to generate inspiration and optimism. For this to happen it is essential that these cases are identified and that the drivers for success become well known.

Another approach is to focus on the failures and installing mechanisms that prevent making the same mistakes again. This is also a very valid way to optimize but comes with a risk of focusing too much on restrictions rather than thinking in opportunities.

During several of the interviews the topic of “learning from past or current partnerships” was discussed and there was a significant belief that the sector would benefit more from knowledge sharing from successful partnerships. Therefore, it was decided to include three of these in the report as a start: One on standardization, one on production collaboration and one on innovation projects.

FIGURE 14

## Case 1 (standardization): APQP4Wind

Background	How it works? ...and what is done?	Achievements
<ul style="list-style-type: none"> <li>• APQP4Wind started in 2015 as a project initiated by Wind Denmark and associated members due to a common wish to simplify and strengthen the processes of product quality assurance demands (APQP) and product release (PPAP)</li> <li>• The project was funded by the Danish Industry Foundation for a project period from 2014-2018</li> <li>• APQP is a well-known concept within the automotive industry and has been driving quality performance maturity at OEMs and suppliers for decades</li> <li>• It should support the industry's drive for reduced Levelized Cost of Energy</li> </ul>	<ul style="list-style-type: none"> <li>• In the context of APQP4Wind, the concept of APQP is adapted to the business areas and special conditions differentiating wind from automotive</li> <li>• The standards made available in APQP4Wind have been created to substitute company-specific procedures and set aligned methods and procedures for all suppliers</li> <li>• The APQP4Wind Manual and Toolbox defines the framework for quality requirements and provides recommended formats and templates</li> <li>• Personal certification is possible through various training courses held by approved Training Providers</li> </ul>	<ul style="list-style-type: none"> <li>• APQP4Wind is now the common frame of reference for the industry to strengthen the cooperation between manufacturers and suppliers and to ensure that parties on all levels communicate at eye level on quality assurance processes</li> <li>• In 2018 APQP4Wind went from being a project initiative to an organization</li> <li>• APQP4Wind training has been completed in more than 40 countries</li> <li>• Today, the APQP4Wind Community includes Country Ambassadors from 4 different continents and more than 30 global Company Members including 6 OEMs</li> </ul>
<p><b>Board members</b> Vestas, KK Wind Solution, GE Renewable Energy, Siemens Games Renewable Energy, LM Wind Power, Goldwind and ZF</p> <p><b>Member companies include</b> MHI Vestas, Baettr, Nordex, Winergy, and TPI Composites</p>	<p><b>How it can help you?</b></p> <ul style="list-style-type: none"> <li>• Preventive approach to quality and represents a shift from quality control to quality assurance</li> <li>• Standardizes and simplifies processes</li> <li>• Enables the maturing of the supplier base globally and both supports profitable growth and risk reduction</li> <li>• Calibrates APQP4Wind vocabulary</li> </ul>	<p><b>Want to know more?</b> Visit website: <a href="https://apqp4wind.org/">https://apqp4wind.org/</a> for more information and contact details</p>

FIGURE 15

## Case 2 (production): China production collaboration

Background	How it works? ...and what is done?	Achievements
<ul style="list-style-type: none"> <li>In 2008, 5 supplier companies and a couple of OEMs decided to collaborate about setting up physical facilities in China</li> <li>The companies are not competitors, but they all deliver products into the wind sector and specifically OEMs</li> <li>Companies encouraged each other to go to China initiated by OEMs</li> <li>A Danish advisor China Consult was used as expert in local regulation and conditions</li> </ul>	<ul style="list-style-type: none"> <li>The companies shared the same production (Wuqing, Tianjing province) and office facilities (Beijing) and divided the space</li> <li>Shared other fixed costs such as administrative staff</li> <li>Focused on finding win-win opportunities. It could be an agreement supplier-OEM on prices going forward incl. fair sharing of any cost reductions at some point in the future</li> <li>Today most of the companies have grown out of the original facilities and have set up own facilities</li> </ul>	<ul style="list-style-type: none"> <li>Managed to keep start-up costs low by share risks and fixed costs</li> <li>Big advantage to be close to customers production facilities (OEMs) as well as the local Asian wind markets (developers)</li> <li>Joint signal between partners that "we are in it together", which strengthens the partnerships</li> <li>Gain in production flexibility and shortening delivery time</li> <li>Easier communication with customers through being in same time zone and local employees (culture &amp; language)</li> </ul>
<p><b>Member companies</b>                      Resolux Group, DAFA, HydraSpecma, Lund &amp; Sørensen and C.C. Jensen</p>	<p><b>How it can help you?</b></p> <ul style="list-style-type: none"> <li>As inspiration for both suppliers and OEMs in setting up a collaborative production and office partnership in a new location</li> <li>Relevant if you want to share resources, knowledge, risks and fixed costs</li> </ul>	<p><b>Want to know more?</b></p> <ul style="list-style-type: none"> <li>Contact Wind Denmark for more information</li> <li>Alternatively contact the member companies directly</li> </ul>

FIGURE 16

## Case 3 (projects): Energy Innovation Cluster (as of 1 July 2020 merged into Energy Cluster Denmark)

Background	How it works? ...and what is done?	Achievements
<ul style="list-style-type: none"> <li>Energy Innovation Cluster ("EIC") was established in 2018 and initiated from a changed Offshoreenergy.dk with a focus on execution of innovation and cluster activities</li> <li>EIC was formed as the industry and the Danish public regions decided to develop one united cluster and innovation initiative for energy production, energy storage and other energy production technologies</li> <li>Effective 1 July 2020, it was further decided that the three energy cluster organizations EIC, House of Energy and CLEAN Energi should merge into one national cluster organization for the entire energy sector</li> </ul>	<ul style="list-style-type: none"> <li>Drives and fundraises innovation projects for the Danish energy system</li> <li>Fosters collaboration between research institutions and the players in the Danish energy sector</li> <li>The innovation projects are based on the CRIF-model, where industry challenges are matched with a team of innovative problem solvers. Thereby, the model matches problem owners (end-users) with problem solvers (technology-developers).</li> <li>Focus areas are on- and offshore wind, effective oil and gas extraction, integration of renewable energy in the energy system, energy storage and new energy production technologies</li> </ul>	<ul style="list-style-type: none"> <li>Since 2017 a total of 29 innovation projects have been started of which 7 are completed and 22 still active</li> <li>The completed projects primarily relate to standardization of design, fabrication and handling of large components of wind turbines</li> <li>Another 11 projects are expected to be completed by end 2020</li> <li>EIC have in H1 of 2020 sent 12 innovation project funding applications – requesting a total of 200 mio. DKK – to research funds such as EUFP, Nordic Innovation and Den Danske Maritime Fond</li> </ul>
<p><b>Member companies examples</b>                      More than 270 member companies</p> <p><b>Board member companies</b>                      Bladt Industries, DTU Elektro, EMS/ Global Gravity, FORCE Technology, Liftra, MHI Vestas, Ocean Team Group, Semco Maritime, Siemens Gamesa, TOTAL E&amp;P Danmark, Vestas, Ørsted and Aalborg University</p>	<p><b>How it can help you?</b></p> <ul style="list-style-type: none"> <li>Offers a common platform for innovation on energy production</li> <li>Gives access to innovation projects</li> <li>Matchmaking on collaboration with companies, universities etc.</li> <li>Fundraising assistance on innovation</li> <li>Inspirational events</li> </ul>	<p><b>Want to know more?</b></p> <ul style="list-style-type: none"> <li>Visit the website <a href="http://www.eiccluster.dk">www.eiccluster.dk</a> for more information and contact details</li> <li>As of 1 July 2020, please visit <a href="http://www.energycluster.dk">www.energycluster.dk</a></li> </ul>

# RECOMMENDATIONS

The synthesis of all survey data and the many dialogues with sector stakeholders has given rise to 17 recommendations that are summarized in *Figure 17*. They are categorized by which kind of market players they are

targeted towards: Wind Denmark, Megavind, public funding institutions, OEMs and suppliers, and Energy Cluster Denmark. Each recommendation is explained in more detail in the following sections.

FIGURE 17

## Overview of recommendations

Recommendations for Wind Denmark	Recommendations for Megavind	Recommendations for OEMs and suppliers	Recommendations for Energy Cluster Denmark
<p><b>R1</b></p> <p>Execute communication plan</p>		<p><b>R10</b></p> <p>OEMs and suppliers to jointly drive further standardization of components, interfaces, processes and equipment incl. modularization</p>	
<p><b>R2</b></p> <p>Ensure continuous follow-up on key partnership KPIs from this survey e.g. annually</p>	<p><b>R5</b></p> <p>Leverage this report to produce further operational strategies on selected partnership areas as well as defining related RD&amp;D projects</p>	<p><b>R11</b></p> <p>OEMs keep closer to more suppliers to assist in pro-active transition and product development to match WTG roadmaps</p>	<p><b>R16</b></p> <p>Create better transparency about access to risk capital and / funding for development projects</p>
<p><b>R3</b></p> <p>Initiate partnership success information campaign – to keep momentum – and integrate with current initiatives e.g. newsletter or “weekly guest”</p>	<p><b>R6</b></p> <p>Initiate a structural effort to form new R&amp;D / technical networks across the sector</p>	<p><b>R12</b></p> <p>OEMs to further transition from transactional customer-supplier mindset to partnership mindset</p>	<p><b>R17</b></p> <p>Create sector fund application task force to assist the supply chain in submitting high quality applications for development projects</p>
<p><b>R4</b></p> <p>Strengthen current sales networks across the sector</p>	<p><b>R7</b></p> <p>Initiate and facilitate technology implementation on digitalization and robotics: Hosting a series of inspirational events</p>	<p><b>R13</b></p> <p>OEMs start engaging in more long-term strategic supplier partnerships and commit to larger volumes</p>	
	<p><b>R8</b></p> <p>Initiate work to seek inspiration about how adjacent industries conduct partnerships and cooperate</p>	<p><b>R14</b></p> <p>Suppliers offer their products as much as possible as a solution to become better partners to OEMs</p>	
	<p>Recommendations to public funding institutions e.g. EUDP and Innovationsfonden</p>	<p><b>R15</b></p> <p>Suppliers cooperate around combining product portfolios and product aggregation</p>	
	<p><b>R9</b></p> <p>Broaden scope of Danish test facilities to strengthen testing partnerships and thereby joint product development</p>		

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## RECOMMENDATIONS FOR WIND DENMARK

### 1 Execute communication plan (jointly with Megavind)

To ensure that the findings and recommendations of this report become easily accessible and well known to the various sector stakeholders a communication plan has been made. It contains activities such as conference presentations, networking events, press, social media etc.

This should help make the recommendation come alive by initiating concrete actions within the sector companies and organizations. This process will be initiated by Wind Denmark and Megavind, but many other sector players will then need to act to realize the opportunities.

### 2 Ensure continuous follow-up on key partnership questionnaire indicators from this survey e.g. annually

During the design of the conducted survey, several partnerships related indicators were defined. The survey data has now provided a baseline for these indicators that can be used to evaluate future changes with.

It is recommended that Wind Denmark carries out the survey (possibly in a reduced version) at regular intervals e.g. annually to monitor how the partnership environment evolves. It should be considered if these regular surveys can be bundled with other Wind Denmark data collection processes to make it as time efficient as possible.

### 3 Initiate partnership success information campaign – to keep momentum – and integrate with current initiatives e.g. newsletter or “weekly guest”

Due to the strong belief that the sector can greatly benefit from sharing the past and current partnership success stories and experience due to its high inspirational value, Wind Denmark is encouraged to integrate this theme into its current communication activities.

It is recommended for Wind Denmark to feature a partnership success story at regular intervals and have a mechanism for nominating a new company to tell a story each time. This could be integrated into either

the newsletter to “Production” members (possibly also other) or the “weekly guest” concept.

### 4 Strengthen current sales networks across the sector

Current networks within several functional fields such as marketing, sales, R&D, supply chain etc. have already shown their worth. Wind Denmark (earlier Danish Wind Industry Association) runs a range of networks and has done this since “Midt Vind” was established in 2008. Often each network has a specific focus, which could be a concrete market or region e.g. China, US and Taiwan/Asia. Another example is Danish Wind Export’s (“DWE”, formerly known as DWEA) concept “Pavilion of Denmark”. During the years, several types and formats of networks has been in place and today Wind Denmark runs 6 networks with more than 160 participants. More resources should be used to ensure a continued effort in setting up networking groups, because they are important forums from which partnerships are started. The survey results and interviews suggest that sales networks already exist at a reasonable level, but there is still potential for significantly more, while R&D or technical networks currently only exist at a low level and thereby exhibit even higher potential.

The umbrella network “Midt Vind” was established around mid-00’s that eventually included people from 14 suppliers divided on 6 ERFA groups that met 5 times per year. It started as a recruiting and talent network but evolved into sub-groups of quality, sales and more. It was an open network but primarily targeted towards Tier 1 and Tier 2 suppliers. Some constraints in relation to whether competitors were part of it had to be established (mainly on a first come, first serve basis). It formally lived for 3.5 years and was closed when funding (from Region Midt, Region Nord and EUDP) ran out. The participating companies got a broader knowledge of other specialties and helped market and sell each other as well as to keep in touch with market developments. Even though the networks are formally stopped the personal relations established back then are still active but at a more informal level. Hub North is a currently active network that has been mentioned to have some of the same characteristics as Midt Vind.

The Pavillion of Denmark is a well-known platform for export activities and DWE runs this for the entire wind sector. DWE is partly owned by Wind Denmark, with Danish Export Association as the other owner. It has been mentioned several times during interviews especially with suppliers to have had a very valuable effect on sales growth abroad. This is well in line with DWE's purpose to offer networking, market intelligence and joint export drives for Danish companies who wish to

strengthen their international sales to the global wind industry.

It is recommended for Wind Denmark together with DWE to further strengthen existing sales networks and initiatives within the sector to bring companies closer together on the challenge of increasing their customer base and market share.

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## RECOMMENDATIONS FOR MEGAVIND

### 5 Leverage this report to produce further operational strategies on selected partnership areas as well as defining related RD&D projects

Partnerships is an extensive topic and the intent with this project has been to create an overview as well as to get insight from the sector players on status, outlook, and beliefs. Therefore, there are many sub-topics to strategically dig deeper into based on the results of this report. Examples could be standardization partnerships, removing organizational barriers, partnerships to learn from adjacent sectors and best-practice partnership setup.

The priorities on partnership sub-strategies will be determined in the process leading to the Megavind Annual Research and Innovation agenda and future Megavind work program.

### 6 Initiate a structural effort to form new R&D / technical networks across the sector

Regarding professional networks it was generally reported from interviews that there is a demand for such networks across a series of functions including sales and R&D / technical. It was acknowledged that both these types of networks exist today, but the scale and maturity is not at the same level. As explained in recommendation 4, sales networks have and still do exist on a fair level, yet there is potential for further strengthening. On the other hand, R&D / technical networks have only been established at a significantly lower level (or at least that is the perception), and thus the maturity of R&D networks is seen as low with a quite high potential.

It is recommended that Megavind – together with an operator, that needs to be identified – initiate a structural effort to form new R&D / technical networks across the sector.

### 7 Initiate and facilitate technology implementation on digitalization and robotics: Hosting a series of inspirational events

Digitalization and robotics scored highest among technologies believed to be beneficial among the survey companies. At the same time, the current knowledge level on these technologies do not seem too high:

- For digitalization 15 % and 22 % indicated knowledge level to be “very high” and “high” respectively
- The corresponding statistics for robotics were 13 % and 19 %

In both cases this leaves 60-65 % of companies only having a low to medium knowledge level. Thus, there seems to be a clear potential for knowledge sharing within the sector with few very advanced companies that could act as role models for companies that are still at an early stage with implementing these technologies.

It is recommended that Megavind further define a suitable initiative to address this and allocate responsibility to another organization to execute it. One possible initiative could be to stage a series of events with the topic being “Digitalization and robotics in the wind sector”, which could involve case stories from some of the advanced companies as well as other external inspirational content.

## 8 Initiate work to seek inspiration about how adjacent industries conduct partnerships and cooperate

Survey results show that the top 3 adjacent industries with believed potential to learn from partnerships is automotive (cars), automotive (trucks) and maritime. However, among the pre-defined list of adjacent industry options the interviews have shown that there are opposing views about which of these industries are even applicable (or comparable) to the wind industry. Several interviewees mention such factors to be e.g. number of produced units and cycle time or product complexity and size.

With respondent scores to the 3 adjacent industries of 46 %, 41 % and 41 %, there is however overall support to a potential for looking further into this.

As was the case for the technologies, the general knowledge level of all adjacent industries is not particularly high. Similarly, there is a range of 4-15 % indicating a very high knowledge level across the options. Interviews revealed that the more advanced companies in this field make use of initiatives such as systematic bilateral contact to companies like Boeing, Volkswagen (“VW”), Toyota etc. as well as contact to independent industry experts.

It is recommended that Megavind together with universities further prioritize between the adjacent industries and identifying exactly how the most value related to their experiences on forming partnerships could be extracted. There are also indications that the significance of a specific adjacent industry might very well differ depending on company or product characteristics, so the result is not expected to be “one-size-fits-all”.

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## RECOMMENDATIONS FOR PUBLIC FUNDING INSTITUTIONS E.G. ENERGITEKNOLOGISK UDVIKLINGS- OG DEMONSTRATIONSPROGRAM (“EUDP”) AND INNOVATIONSFONDEN

## 9 Broaden scope of Danish test facilities to strengthen testing partnerships and thereby joint product development

Denmark has historically been leading in creating test facilities for the wind sector including WTG test facilities in Østerild, Høvsøre and Risø. There are also currently still unoccupied pads at these sites. But nonetheless the survey results showed many respondent companies indicating a potential for further testing facilities within WTG, service, and virtual environments. It is also an area that Megavind has previously been very active and are very interested in understanding demands. As such this was a topic for deep-dive interviews.

Currently the lack of adequate testing facilities is making some OEMs move more testing abroad to e.g. Germany, UK, and US. The location of testing is important for the supply chain: Feedback and involvement is generally improved the closer geographically it is.

Benefits of improved testing was discussed. Some companies claim that a significant over-engineering

takes place on WTG platforms and increased testing can take out material, loads and cost from the WTGs. This would enable better circular development. Also, it can lead to better understanding of failure rates for increased predictability on service operations and costs.

Interviews revealed that even though there are still available WTG pads in Denmark, the way the pad allocation mechanism works with respect to cost and timing could be improved.

The notion of accelerated tests was believed to have a big potential – this so on all aggregation levels from component to WTG. One example is Lindø Offshore Renewables Center (“LORC”) where some tests can be accelerated significantly. With very long asset lifetime it becomes very valuable to be able to simulate a 25-year horizon in a much shorter time.

The following types of testing facilities were requested:

- Energy System testing playgrounds. Parts of the offering from GreenLab in Skive can be used as inspira-

tion. If a new energy system environment is being set up from scratch by a private company at a reasonable scale the estimate is it could cost 2-3-digit amount in mio. DKK, so there is big advantage from having access to such publicly controlled environments

- Testing for WTG grid interconnection (related to energy systems) to higher voltage, e.g. moving boundaries from 66 kV to 132 kV
- “Fake offshore” WTG test facility. Like Østerild but the pads located in the offshore environment combined with driving access. This could be on an isthmus or long pier
- More service test environments and organized by independent sector organizations instead of OEMs. Should involve testing of QHSE difficult situations,

an aim to make service easier and possible cross-OEM service certifications, possibilities of service robots

- More aggregated system / module tests such as whole nacelle, whole rotor, blade bearings
- Establish a “generic” WTG platform by a research institution e.g. Danmarks Tekniske Universitet (“DTU”), where suppliers can be allocated spots to test various components or systems

Also, a lack of enough competencies incl. test engineers was mentioned.

It is recommended that public funding institutions (e.g. EUDP and Innovationsfonden) further subsidize and extend the current testing facilities in line with the above ideas.

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## RECOMMENDATIONS FOR OEMS AND SUPPLIERS

10

**OEMs and suppliers to jointly drive further standardization of components, interfaces, processes, and equipment incl. modularization (also involving ECD)**

Work is already ongoing on standardization by primarily a group of OEMs including Vestas, MHI Vestas, and Siemens Gamesa Renewable Energy. The partnership is actively working on a long list of accepted collaboration areas. The main criteria for “accepted areas” is that it is seen as a non-core part of products and thus being non-competitive.

OEMs play an important role for standardization because they are the end users and make the decisions of what technologies and components goes into their WTG platforms. Any new standards will need to be anyway approved by them and actively substituted into the technology roadmaps. Suppliers also play an important role via e.g. expert knowledge on production processes, materials, cost structures.

As soon as an area of the wind farm (e.g. component, interface, process, equipment) has been decided to have

adequate standardization potential to begin a project, then a wide part of the value chain including both OEMs and suppliers should be included in the working group to get a holistic perspective on possible solutions. Usually only a limited (relative) number of supplier(s) within a specific product type will become involved in a standardization project. But such an opportunity is likely to create a positive competitive advantage for the supplier by being closer to the latest sector developments. As a supplier you can improve your chances of such opportunities by helping to generate good ideas at the early stages together with, especially the OEMs.

It is recommended that the OEMs related to the above-mentioned standardization group keep working actively on it – and if possible, try to accelerate it. Suppliers in the Danish wind value chain are encouraged to work on similar initiatives in parallel and should proactively seek to get involved in as much standardization work as possible. A concrete suggested action is to frequently have it on the agenda for joint supplier-OEM meetings and encourage Energy Cluster Denmark to facilitate supplier standardization initiatives.



11

### OEMs keep closer to more suppliers to assist in pro-active transition and product development to match WTG roadmaps

Most OEMs are already hosting quarterly, semi-annual, or annual technology events for their main suppliers, where part of the program involves looking ahead and discussing the product and technology roadmap. Talking to the suppliers these events receive great feedback. They are great help to guide early transition of supplier product portfolios and enable suppliers to become better sparring partners to the OEMs on the product and technology development.

There has been a trend over recent years that the OEMs have reduced the number of direct (Tier 1) suppliers. This is partly caused by new sourcing strategies such as “dual sourcing”, that suppliers on average have broadened their product portfolio and that OEMs prefer to source more aggregated products (modules and systems as opposed to components). This has also meant that the value chain has become longer in some places and that some suppliers have moved back in the chain from e.g. Tier 1 to Tier 2 status. The information from the OEM supplier events is not systematically passed on to the companies further back in the value chain, which can place them in a relatively more vulnerable position in terms of “staying ahead of the curve” on technology.

As the survey data shows about half of the respondent companies are either small or medium sized enterprises (SMEs). The Danish supply chain still consists of a significant number of SMEs, which makes this issue very relevant.

It is recommended that the OEMs extend or supplement the current technology events to also cover more SMEs.

12

### OEMs and suppliers to further transition from transactional customer-supplier mindset to partnership mindset

It is clear from the survey data and interviews that there are numerous partnership issues between suppliers and OEMs stemming from internal organizational setups and mindsets – a definitive improvement area. The most frequently mentioned root causes are silo formation (e.g. creating risk of business unit decision not being fully aligned with whole company), KPI structure (e.g. when personal incentives are not fully aligned with

company incentives), and how partnerships are fronted (via procurement, technology, QHSE or a combination).

These issues are not only observed between OEMs and suppliers but can also be relevant supplier-to-supplier. It is reported that there is a tendency for larger companies to possess these challenging characteristics.

These are complex issues to solve especially for large enterprises and solutions need to come from within the companies. A starting point is just accepting that the issues exist and that there is significant value for the companies themselves as well as their partners if they can improve these areas. The topic discussed in many of the interviews but very few solution ideas came up. However, there were some signs of acknowledgement of the issues and attempts to solve them – e.g. one OEM mentioned that they have started to work actively on aligning procurement KPIs with company performance and less on indicators relating to specific product parameters.

It is recommended that suppliers and OEMs – especially the larger enterprises – look closer into whether any of their existing partnerships are affected by any of these organizational and mindset issues and if so seek to find solutions. An initial step is to establish a feedback mechanism that includes this type of information towards both suppliers and customers to systematically be able to monitor the situation.

13

### OEMs start engaging in more long-term strategic supplier partnerships and commit to larger volumes

Looking specifically on supplier contract partnerships there are issues relating to contract volumes that have come up in several supplier interviews. It concerns both order volume commitments as well as rolling volume forecasts.

Some suppliers do have multi-year strategic contracts (or frame agreements) with the OEMs that include target volumes. However, no matter whether this is the case, actual committed order volumes rarely reach beyond 1 year ahead. At the same time there can turn out to be significant variations to the original interim volume profile that are often communicated on short notice.

If OEMs could commit to longer (>1 year) volume horizon as well as improve volume profile forecast quality, that could greatly help suppliers through the following effects:

- Better foundation to make investment decisions into e.g. improved production. Many such investments are CAPEX heavy and assets are depreciated over many years. This means that some degree of product demand certainty is needed to be able to receive financing and make the investment decision
- Higher likelihood of supplier product partnerships or consolidation being possible. Mergers and acquisitions often need to rest on a minimum of revenue certainty for the consolidated company and here 1 year is often not enough
- Lower production costs through improved production planning. It is possible to keep unit prices lower through better production planning if the product demand time profile experienced less unexpected changes

The possibilities for OEMs extending order volume commitments are to some extent limited to their own WTG orders from wind farm owners and developers. And here there will probably be a significant difference between on- and offshore given their different typical sales roadmap horizon (with time between order and delivery being shorter for onshore).

It is recommended that the OEMs investigate possibilities for extending volume commitments as well as improve their capabilities on product demand forecasting incl. keeping high level of transparency towards their suppliers.

#### 14 Suppliers offer their products as much as possible as a solution to become better partners to OEMs

It seems that one successful product strategy is to view your product not only as a physical component, but as a solution to the OEM or customer. This requires becoming an expert into your customers application: How your product is used, by whom it is used, when it is used, for which platforms it is used, what other products it engages with, whether it requires changes in the future, what the user feedback is and more. Being concerned about the users of your product to have easy access to documentation on installation and maintenance, being

offered adequate training, knowing what health issues and personal protective equipment is recommended in the production environment etc. For this to become reality suppliers need to install mechanisms for direct communication to both management level and operational level personnel at the customers' organization.

Another trending successful product strategy is to embrace the movement towards OEMs having an increased preference for more aggregated products: Systems or modules instead of single components. This gives an opportunity to make the product more advanced and more valuable to the customer.

It is recommended that suppliers frequently review their product strategy including looking into possibilities of offering products more as a solution as well as taking part in the path towards adding more value towards the customers through e.g. offering more integrated products.

#### 15 Suppliers engage in more horizontal cooperation around combining product portfolios and product aggregation

As the wind industry grows globally coupled with OEMs demanding more aggregated products and higher guarantee levels, the requirement to the financial and operational strength of suppliers also increase. This can be addressed by suppliers by collaborating around their joint product portfolios to either merging them into a broader offering or collaborating on jointly making more aggregated and finished products.

This form of partnership can also have the effect of testing for synergies between the partners and possibly being an early stage of a merger or acquisition. Most sector players in the Danish supply chain agree that there has been much talk about consolidation in the past, but that only limited mergers and acquisitions activity has in fact taken place. Several players see it as important to increase the level of sector supplier consolidation to remain relevant for the OEMs and reach better economies of scale. And this initiative could be one way of starting on that path.

It is recommended that suppliers seek to engage in more horizontal cooperation around combining product portfolios and product aggregation to stay relevant to the OEMs and investigate possibilities for consolidation.

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## RECOMMENDATIONS FOR ENERGY CLUSTER DENMARK

### 16 Create better transparency about access to risk capital and funding for development projects

There are already significant funding opportunities available in Denmark and internationally. As mentioned in recommendation 8 examples are national programs EUDP and Innovationsfonden as well as international programs such as Horizon Europe and LIFE. There is a potential for more Danish projects receiving funding if awareness for the possibilities was higher. This can help increase the innovation and collaboration level in the value chain which in turn increases the chances of more products of the future to be developed among Danish sector players.

It is recommended that ECD help to create better transparency about available funding opportunities towards the sector players.

### 17 Create sector fund application task force to assist the supply chain in submitting high quality applications for development projects

Luckily, there are some current large funding possibilities for projects relating to R&D and test & demonstration as mentioned in recommendation 16. These innovation funds are often applied to by partnerships or consortiums (as opposed to single companies). This so because to satisfy the required competencies for R&D projects it is often meaningful for several players to join forces. It is not only enough to have a brilliant project idea and team that fits within the fund objective. Often the application process can be challenging with a long list of formal requirements and a small misunderstanding can lead to disqualification or significant loss of points in the evaluation. As such the application process is best managed by an experienced person or team, who knows all the ins and outs of this practice.

It is recommended that ECD establishes a central team that can act as sector advisor on whether a specific project is suitable for funding as well as practically assisting with the application process.

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## CLOSING REMARKS

This report shows that there are significant benefits from partnerships and that time spent investigating both opportunities and barriers is valuable. The findings and recommendations are backed up by data in the form of survey answers and interviews from big part of the Danish wind value chain. It hopefully encourages companies and organizations in the value chain to more and better partnerships. The type of partnership that will be most relevant depends on several factors such as value chain position, company size and organizational culture.

The first step of communicating the findings and recommendations is when this report will be published in an online session hosted by Wind Denmark in the autumn of 2020. For the industry to harvest full potential it is important that all market players take responsibility and act on the recommendations put forward. Megavind will continue to have high attention on the topic of partnerships for the coming years and looks forward to following the developments of new value creating and inspirational partnerships in the future.

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# APPENDIX

## A.1 References

1. Megavind. (2012). Strategy for wind turbine components and subsystems. <https://megavind.winddenmark.dk/publications>
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5. Vindmølleindustrien. (2018). Analyse af leverandører til vindmølleindustrien. <https://winddenmark.dk/udgivelser/analyse-leverandorer-til-vindmoeleindustrien-2018>
6. Wind Denmark / Damvad (2019). Kompetencer i vindmølleindustrien.

## A.2 Definitions (additional)

Company size:

- Small enterprise: Less than 50 employees and annual turnover is less than or equal to € 10 million.
- Medium enterprise: Less than 250 employees but more than 49 and annual turnover less than or equal to € 50 million but greater than € 10 million
- Large enterprise: At least 250 employees and annual turnover greater than € 50 million.
- Not an enterprise: Other types of legal entities e.g. non-profit organization or association

Local Content Requirements (“LCRs”):

Policy measures that typically require a certain percentage of intermediate goods used in the production processes to be sourced from domestic manufacturer.

Knowledge level definitions (Survey questions 4.4 and 4.7):

- Very low: Heard of it but no knowledge
- Medium: Have been in contact with experts, considering application, possibly experimenting with it
- Very high: Internal expert(s) and actively using the technology

### A.3 Survey results (additional)

FIGURE 18

## Importance of partnerships – respondents' active partnerships vs. opportunities

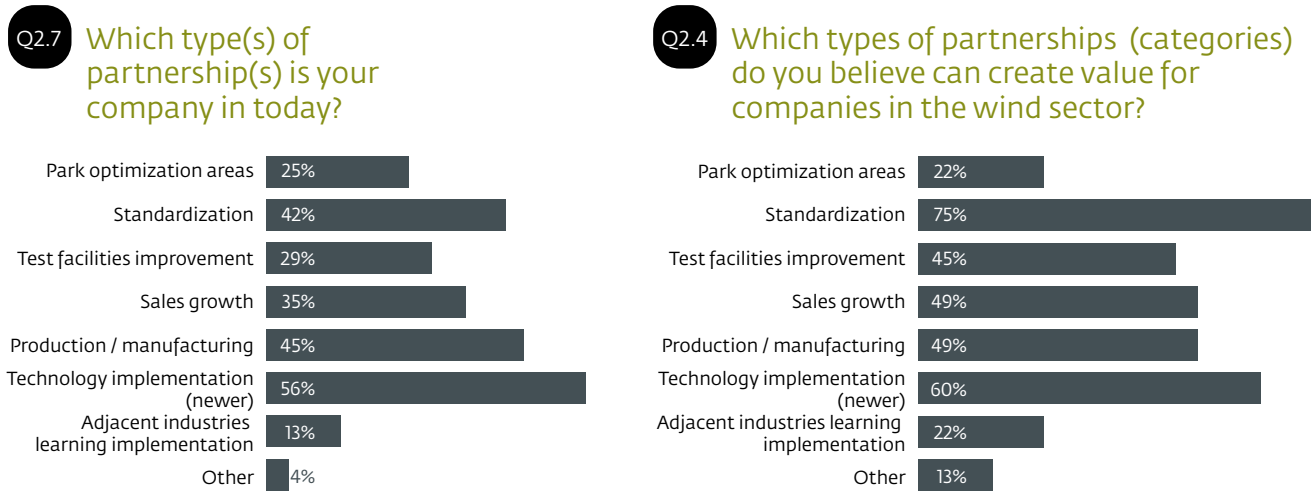


FIGURE 19

## Market trends – Key market trends

### Q3.1 Which of the following market trends do you see?

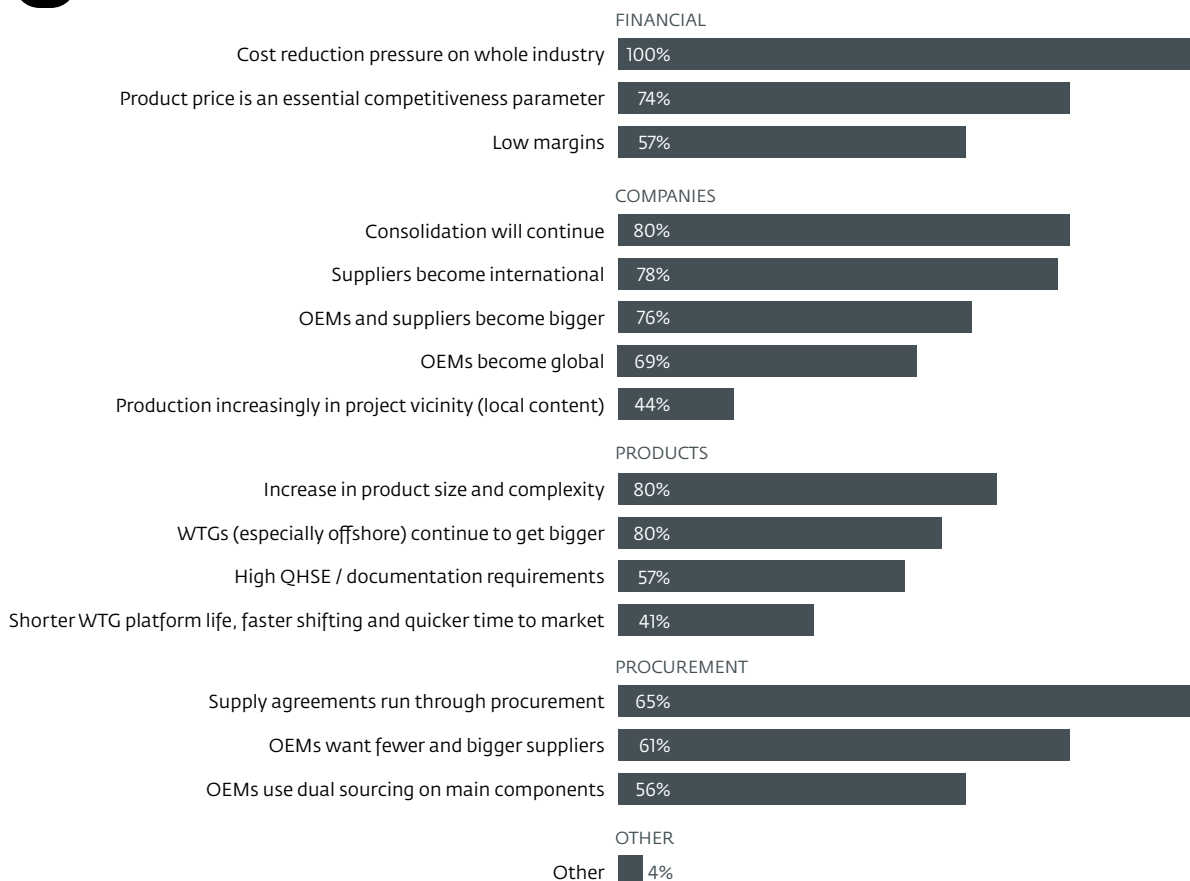
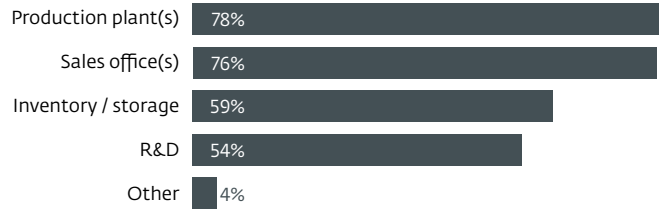


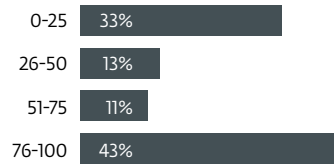
FIGURE 20

Market trends – international presence

**Q3.5** Local content requirements are becoming quite common: Which type(s) of facilities do you currently have outside Denmark?



**Q3.6** What share of employees are based in facilities outside Denmark?



**Q3.7** Has your company planned and decided to open additional facilities (new or extensions) outside Denmark within the next 3 years?

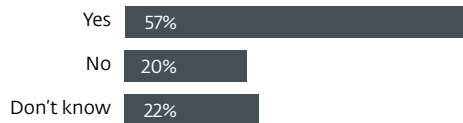
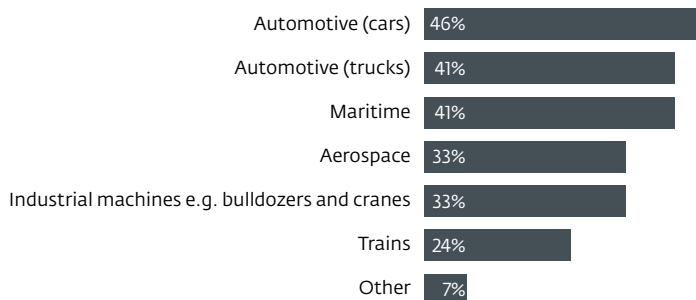


FIGURE 21

Opportunities – Adjacent industry areas for partnerships

**Q4.6** My company could benefit from learnings from the following industries



**Q4.7** What is your level of knowledge about learnings in the following industries?

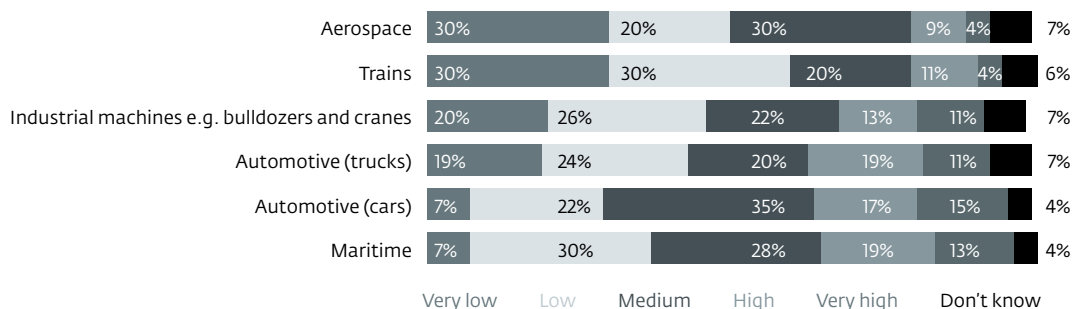
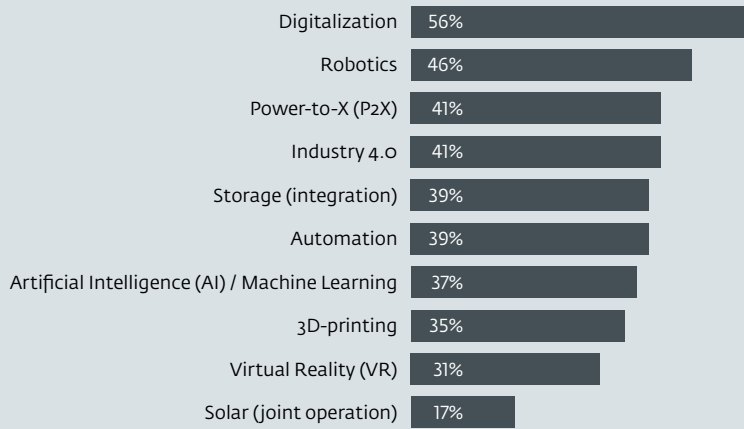


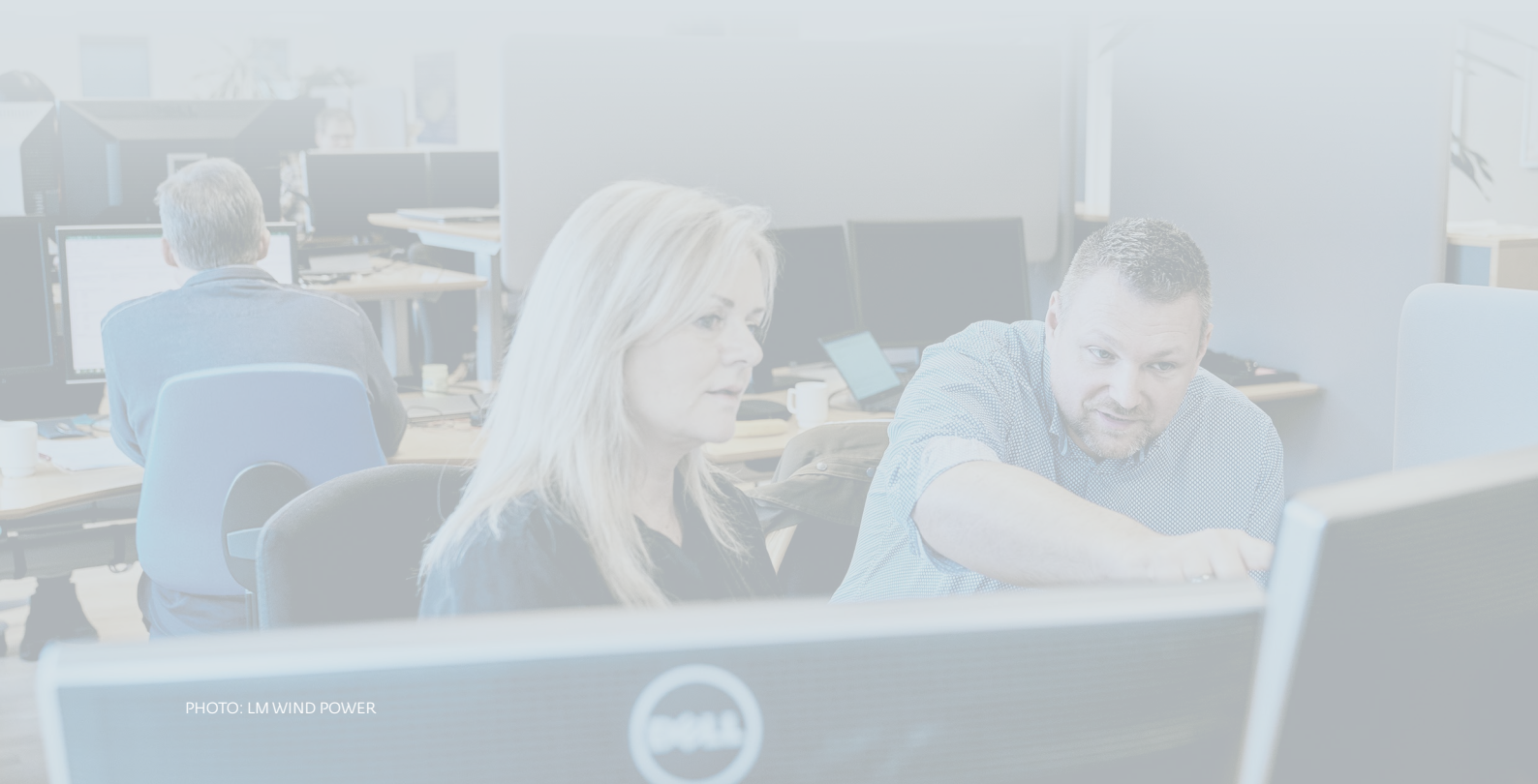
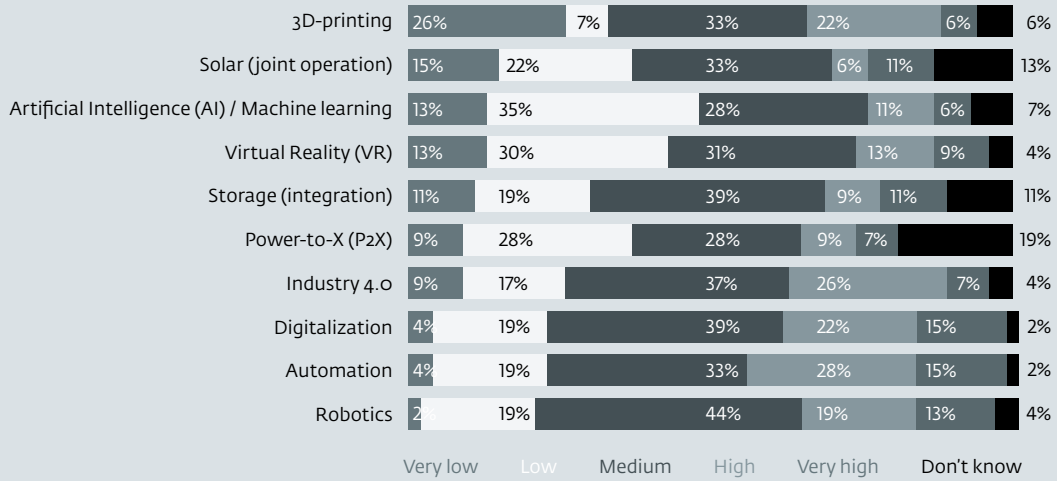
FIGURE 22

## Opportunities – Technology areas for partnerships

**Q4.3** My company could benefit more from the following newer technologies?



**Q4.4** What is your level of knowledge about the following newer technologies?





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