


GLOBAL WIND ENERGY SHIPPING AND LOGISTICS

PHD RESEARCH PROJECT
4TH REFERENCE GROUP MEETING

MARCH 17, 2015, PER AARSLEFF A/S, HVIDOVRE, COPENHAGEN

Proprietary, private, and confidential

AALBORG UNIVERSITY
DENMARK

Today's program

12:30-13:00	**Working lunch**
13:00-14:00	**Meeting**
14:00-15:00	**Groups w/coffee break**
15.00-15:55	**Meeting** (continued)
15:55-16:00	**Transfer to "gå-hjem"**
16:00–17:30	**"Gå-hjem" meeting**

Opening and welcome

AALBORG UNIVERSITY
DENMARK

Department of
Mechanical and Manufacturing Engineering

Agenda – Reference Group

1. Meeting opening, welcome, and agenda review during working lunch
2. New / changed Reference Group member organizations / changed participants short introduction by new participants and brief PowerPoint update from Reference Group members attending for the first time (A. P. Møller-Mærsk)
3. Review of scoping of PhD research project efforts from first meetings
4. Key activities since last meeting with focus on ”speed boats” and government relations
5. Short workshop with group work on how shipping/logistics/SCM can get ahead of the continuous technological development especially driven by offshore wind
6. Update on academic progress, 11-month plan, and plans going forward
7. Wrap-up, preparation for gå-hjem meeting, and date/venue for next meeting

Brief introductions

(organizations, participants)

AALBORG UNIVERSITY
DENMARK

Department of
Mechanical and Manufacturing Engineering

Intro to new/changed Reference Group participants

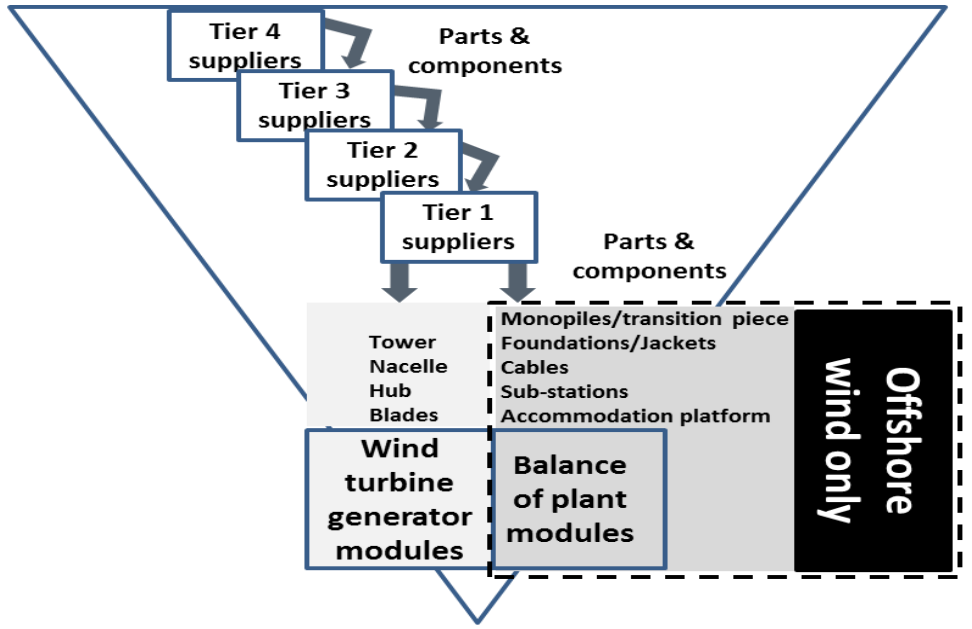
- Quick personal background
- Brief overview of the activities of your organization
- Expectations from participation in the Reference Group and research project

Scoping from first meetings

AALBORG UNIVERSITY
DENMARK

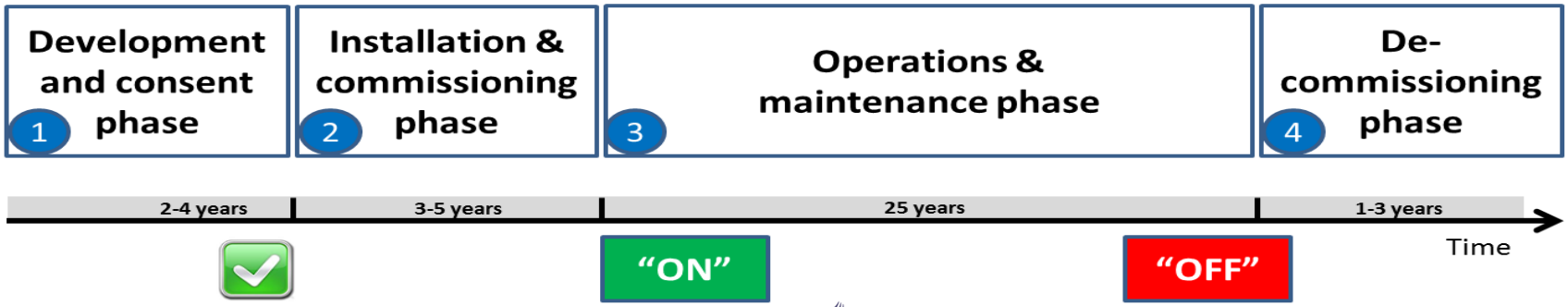
Department of
Mechanical and Manufacturing Engineering

End-to-end life-cycle focus



Shipping & logistics

Two different flows: Onshore and Offshore



AALBORG UNIVERSITY
DENMARK

Source: LogMS conference paper, 2013, Singapore 2013, Poulsen et.al.

Shipping, logistics, SCM, end-to-end: *What does it really mean?*

Conclusion:

"The inbound to manufacturing assembly supply chain consists of "standard transportation" mainly by ocean and some air. This part of the end-to-end supply chain was therefore considered less interesting for the project to review than installation & commissioning, operations & maintenance, and decommissioning"

Theory / Practice linkage	Support / Lobby	Challenges /Solutions
Learn biz	Convey info	Practical and relevant / correct
Chinese market network sharing	Investments going forward (vessels, financing, etc.)	Practical background → tools
Reducing LCoE	Project timelines	Academia vs. consulting
Applied research	Offshore wind knowledge	Capture change
Good quality research	Case studies	Look at change in future
Scope: Narrow, realistic, big, complex, crystalize, etc.	Continuous "smart" goals: Concrete, specific, look ahead, value	Moving research target (in time)
On-time project	E2E wind supply chain	Bridge more industries

Source: First Reference Group meeting

Case study efforts

Number of companies

Time spent

Extent of case study scope

Depth

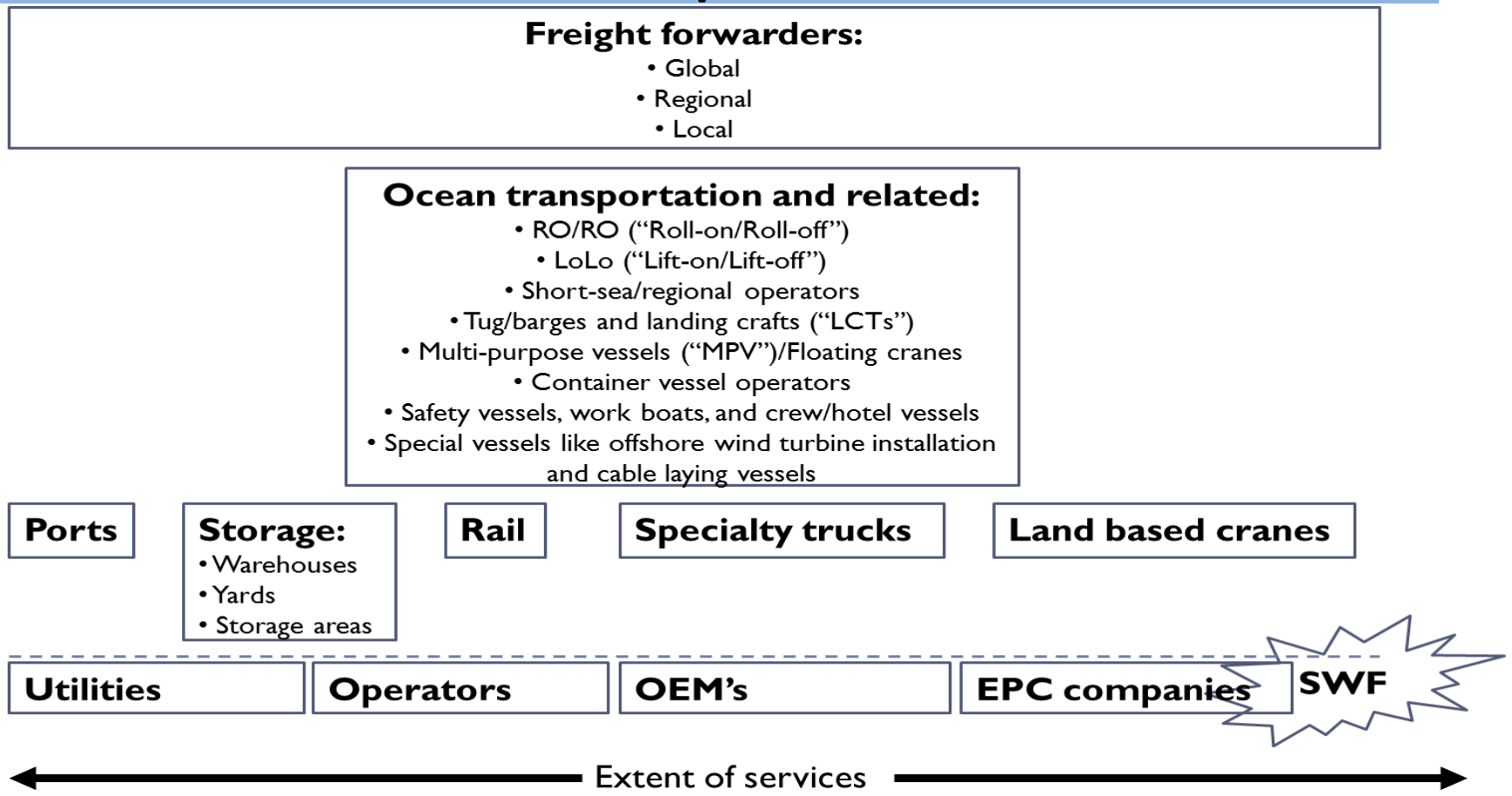
Width

Europe — *Offshore, simple and easy cases*

Asia — *Offshore, one case*

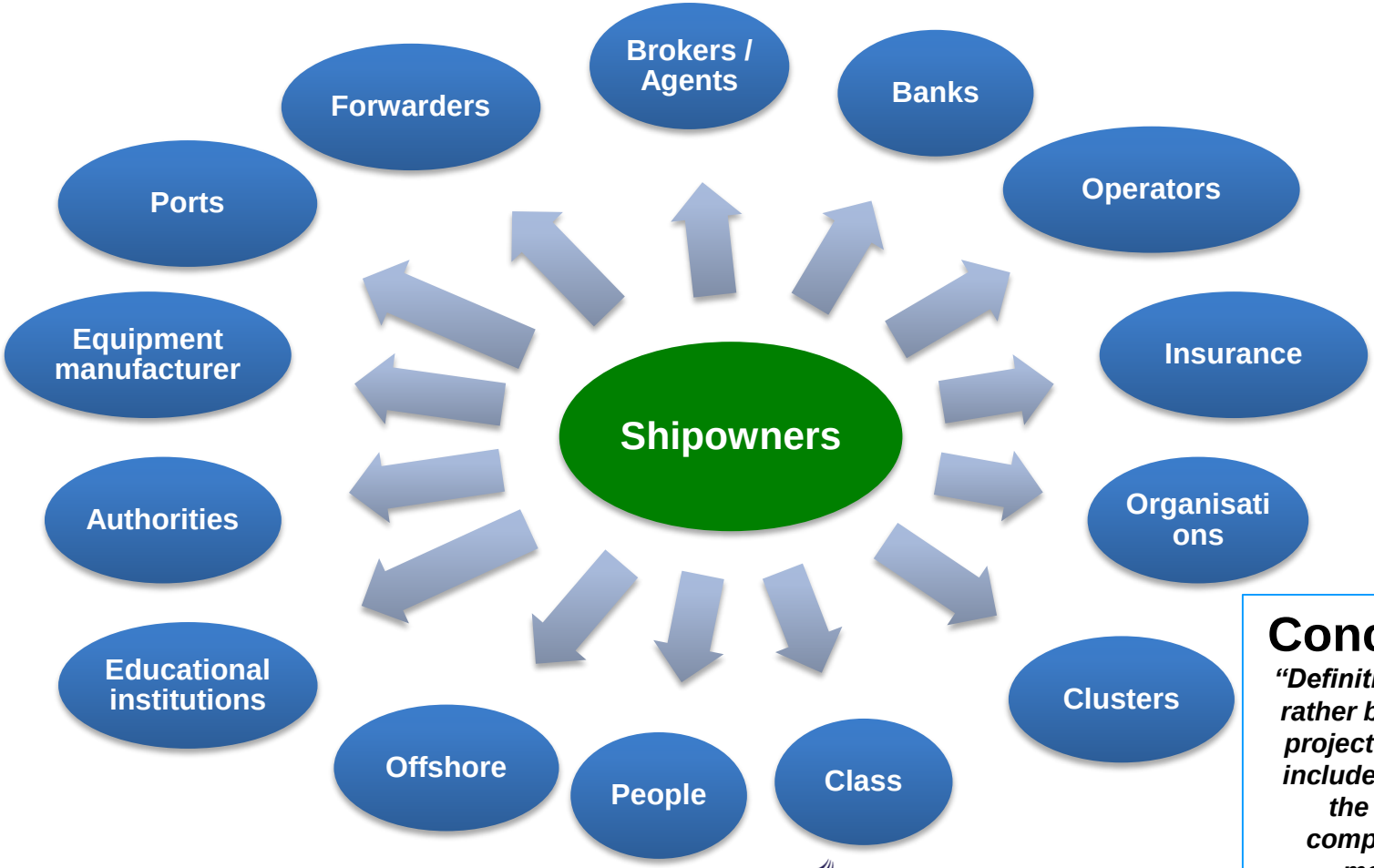
Americas — *Onhore, rail focus*

Wind energy shipping and logistics: Involved parties...



Source: LogMS conference paper, 2013, Singapore 2013, Poulsen et.al.

Definition of “The blue Denmark”

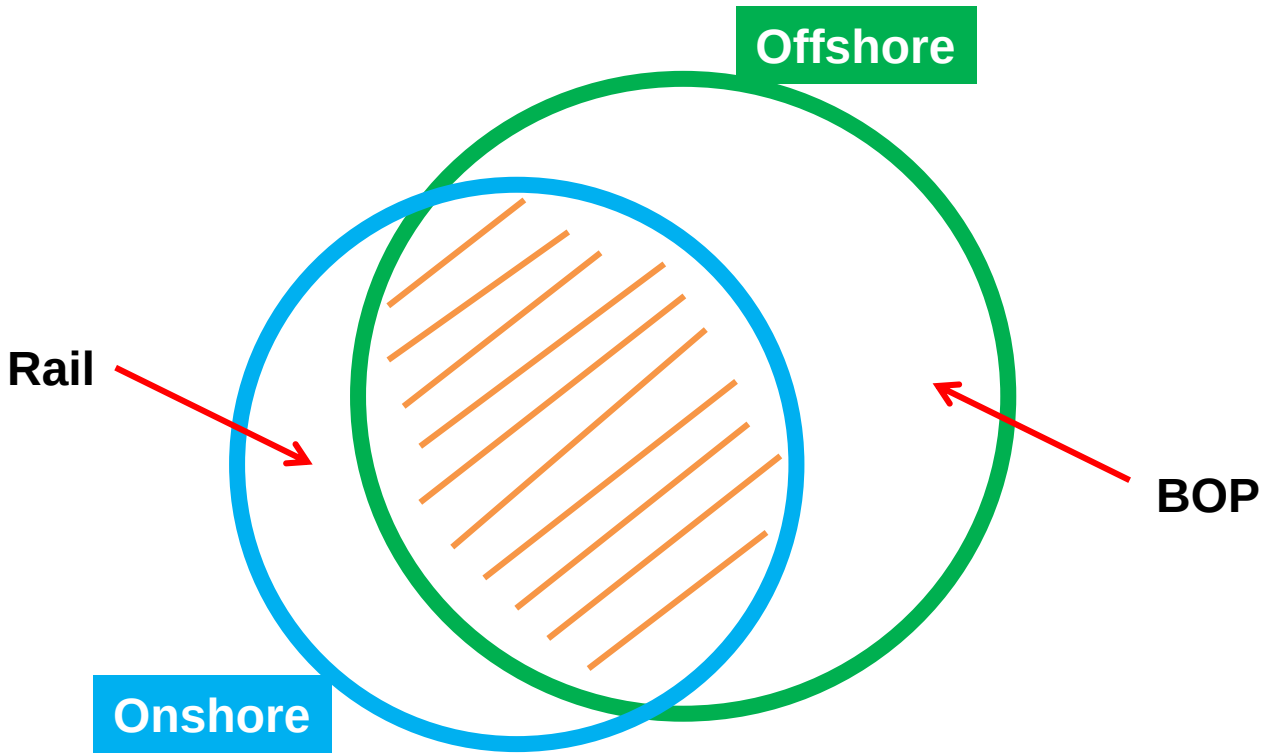


Conclusion:

“Definition should be rather broad for this project and not just include for example the shipping companies/DSA members”

Source: First Reference Group meeting

Onshore and offshore SCM



Onshore and offshore wind – Differences and similarities

Conclusion:

"Whereas both similarities and differences exist between the onshore and offshore wind farm supply chains, the offshore wind supply chain is more complex in terms of shipping and logistics"

Similarities	Differences
Inland: - Same trucks / Equipment - Daytime - Infrastructure	Sea carriage: - Assembly to site (outbound)
Port storage: - Temp. storage	Infrastructure: - Quayside loading / logistics - Diff. equipment (vertical) - Area / space (buffer) - Seamen education (outbound) - BOP - Installation / equipment / skills
Actual maintenance	Maintenance - Certificates - Transportation - Equipment

Source: First Reference Group meeting

Scoping of the Ph.d. research

First Reference Group meeting scoping conclusion:

Wind energy supply chains						
Wind farm phase	***Development & Consent (D&C)***	***Installation & Commissioning (I&C)***		***Operations & Maintenance (O&M)***		***De-commissioning (De-comm)***
Supply chains	D&C chain	I&C chain - Inbound	I&C chain - Outbound	O&M - Preventive	O&M - Breakdown	De-comm chain
Description	Site surveys, birds, wildlife, sea, seabed	Inbound assembly parts and components	Outbound wind modules for wind farm site	Personnel, parts, and components	Personnel, parts, components, and modules	Restoration of site for new wind farm or to original condition
Characteristics	Specialized vehicles (onshore) and vessels (offshore)	Mainly a homogenous flow using ocean containers and air; some project cargo	Project cargo/break-bulk	Mainly service boats, crew transfer vessels and some larger vessels	Service boats and helicopters, some larger vessels like MPV, tug&barge, WTIV	Project cargo/break-bulk

Assumed to have the largest possible impact on potential reductions of levelized cost of energy

Today's program

12:30-13:00	**Working lunch**
13:00-14:00	**Meeting**
14:00-15:00	**Groups w/coffee break**
15.00-15:55	**Meeting** (continued)
15:55-16:00	**Transfer to "gå-hjem"**
16:00–17:30	**"Gå-hjem" meeting**

Achievements since last meeting

AALBORG UNIVERSITY
DENMARK

Department of
Mechanical and Manufacturing Engineering

Speed boats – ECOWindS project

EU project combining industry and academia

- UK, Germany, Denmark, and Norway scope
  - ✓From point of manufacturing to site
    - ➢Installation
    - ➢O&M

Speed boats – ReCoE project

- Academic project
- Objective is to generate academic journal articles
- Industry involvement through interviews only

Speed boats – wind port

Blue Water Shipping student project

- Review of export and import processes for wind energy components with focus on receiving, storing, and loading
- Review of supporting administrative processes
- Review of related pricing/billing processes
  - ✓Use of LEAN/VRIO/SWOT tools
  - ✓Recommendation on optimization opportunities

Speed boats - CRF

offshoreenergy.dk “Cost Reduction Forum”, part I

- Initial CRF meeting to kick off project
- Follow-up meeting about Anholt offshore wind farm as base case
- Second CRF meeting
  - ✓5 possible work streams
  - ✓Process for going forward

Speed boats – RM5 Logistics

DONG Energy logistics R&D project, part I

- Establish R&D strategy for DONG Energy Wind Power, RM5 Logistics
  - ✓Theoretical framework and supporting academic literature
  - ✓15 interviews to represent entire organization of 1900 people
  - ✓Pilot survey
- RM5 Logistics Reference Group inauguration

Speed boats - ongoing

offshoreenergy.dk “Cost Reduction Forum”, part II

- Focus on Logistics O&M work stream

DONG Energy RM5 Logistics project, part II

- Pilot survey
- Survey inside DONG Energy and externally
- Strategy crafting for R&D within logistics

Government relations - DMD

Energy & Transport Summit, October 10, 2014, Copenhagen, Danish Maritime Days

- 2 keynote speakers
  - ✓MEP Bendt Bendtsen
  - ✓DMD Secretary General Flemming Jacobs

- 3 panel sessions
  - ✓3 panel moderators
  - ✓3x3 speakers
    - ➢Bottlenecks
    - ➢Examples of innovation/R&D
    - ➢Emergence of China offshore wind

Government relations - EU

EU Commission H2020 WP Energy 2016-2017 lobby meeting, Brussels, March 3, 2015

- Hosted by AAU
- Company participation (Siemens Wind Power, Maersk Broker, DHL Global Forwarding Industrial Projects)
- SME organization participation (offshoreenergy.dk)
  - ✓ Upcoming EU Commission decision making about Energy WP grant structure for 2016 and 2017
  - ✓ 4 proposed grants within area of wind power
  - ✓ None about support industries
    - ➢ Shipping/logistics/SCM pitched as sample to illustrate need for grants to support industries
    - ➢ Balanced point of view from academia and industry

Government relations - ongoing

EU Comm follow-up:

- 3 specific text additions proposed to EU Comm meeting representatives
  - ✓For H2020 grant 2016-2017 policy document
- Follow-up meetings at EWEA Offshore 2015 on March 11, 2015
- 3 specific H2020 additions also brought up to Danish Government represenatives

Today's program

12:30-13:00	**Working lunch**
13:00-14:15	**Meeting**
14:15-14:30	**Coffee break**
14.30-15:40	**Meeting (continued)**
15:40-16:00	**Transfer to BWS**
16:00–17:30	**"Gå-hjem" meeting**

Short presentation and Q&A: A.P. Møller-Mærsk

AALBORG UNIVERSITY
DENMARK

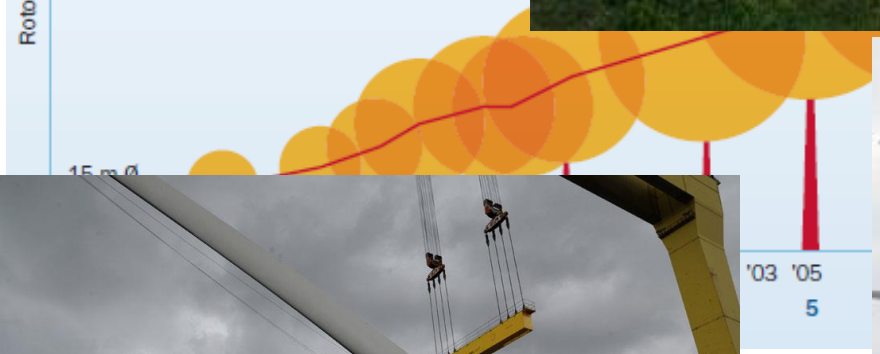
Department of
Mechanical and Manufacturing Engineering

Introduction of short workshop

AALBORG UNIVERSITY
DENMARK

Department of
Mechanical and Manufacturing Engineering

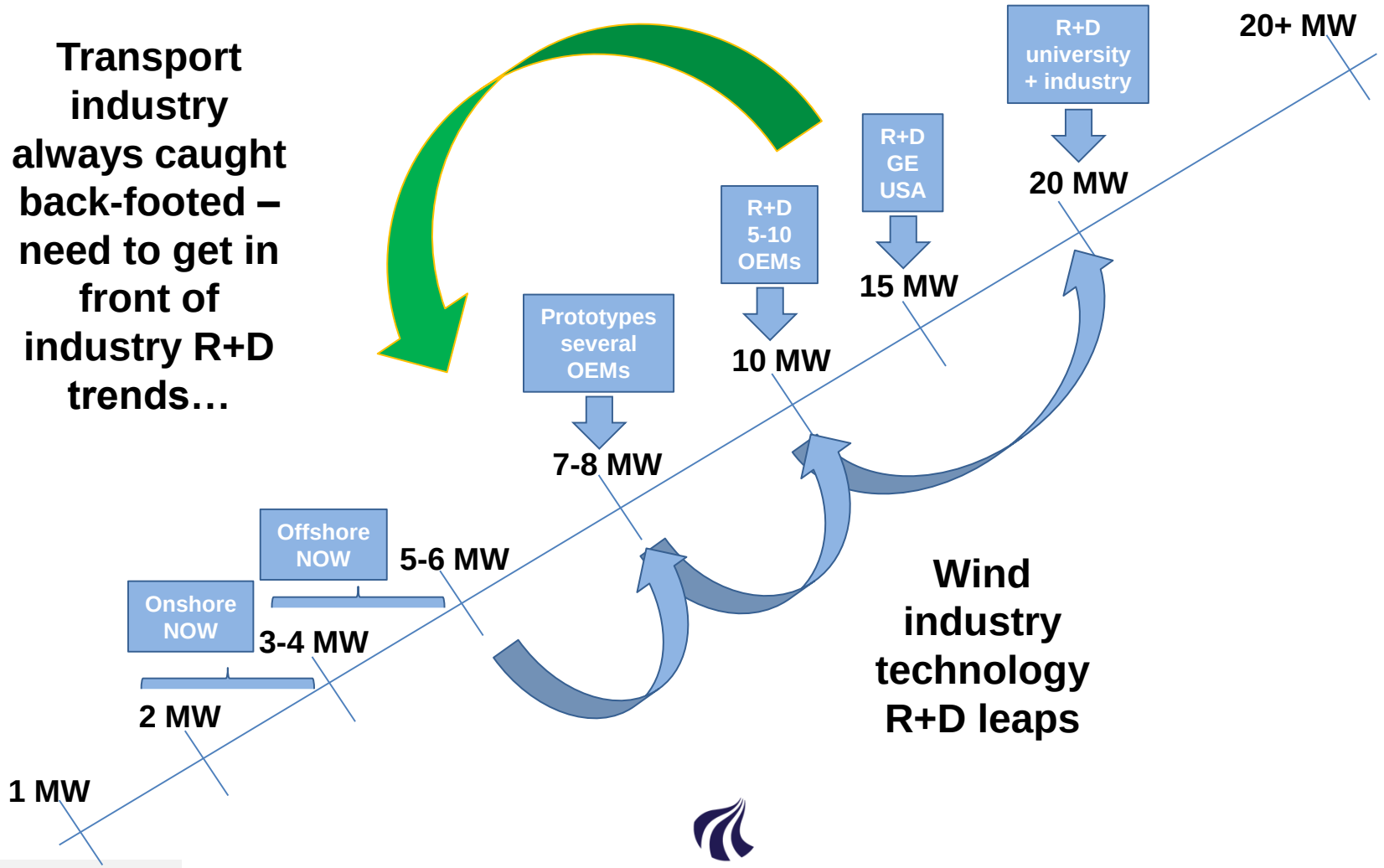
Race for larger WTG output
- and importance of shipping/logistics/SCM



AALBORG UNIVERSITY
DENMARK

Source: Upwind Project (design limits and solutions for very large wind turbines) and Aalborg University Copenhagen photos

Research and development (R+D)



AALBORG UNIVERSITY
DENMARK

Weight & Dimensions	Nacelle weight (t)	Blade Length (m)
Siemens 2.3 MW	82	45
Repower 6.15 MW	325	61
Siemens 6 MW	364	75
Samsung 7.5 MW		83
Vestas 8 MW	390	80

Wind R+D

Implications on:

- **Transport equipment**
- **Assets**
- **HSSEQ**

Transport Equipment

Trucks, trains, roads, bridges, storage facilities, lifting equipment, ports, vessels…

Makers of wind turbines (OEMs):

The pioneers

NEG MICON Powerful Simplicity Vestas

NASA

BONUS Energy A/S SIEMENS

GE

The "other" Europeans

ENERCON ENERGY FOR THE WORLD

AREVA

NORDEX We've got the power.

ALSTOM

Gamesa

Examples of the Asian "newcomers"

金风科技 GOLDWIND

SINOVEL 华锐风电

联合动力 United Power

HYUNDAI HEAVY INDUSTRIES CO.,LTD.

SAMSUNG

UNISON

SENVION wind energy solutions

SUZLON POWERING A GREENER TOMORROW

Source: AAU research, DHL Global Forwarding, Renewable Energy Solutions

AALBORG UNIVERSITY DENMARK

Dimensions – Logistics challenges

Source: Danish Shipowners' Association, courtesy Siemens Wind Power

5 critical offshore wind factors

1. Distance to shore
2. Water depth
3. Number of wind farm turbine positions
4. Weight and dimensions of WTG and foundation
5. Seabed conditions

- ✓ Near shore
- ✓ Offshore
- ✓ Far offshore

Groups
- impact on the supply chain

Group #1	**How big and heavy?** - About getting ”in front”
Group #2	**How far away and how deep?** - About the new era of OW
Group #3	**Globalizing market and winners** - Country of origin: Example DK

3 groups

Please nominate:

- Captain
- Time-keeper
- White board note taker
- Presenter

Please be ready to:

- Provide an answer
- Explain your discussions
- Review your findings on the flip-chart

The groups

#1 Thomas (SWP), Christina, Carsten

#2 Chris, Thomas (DSA), Tim

#3 Jesper, Søren, Christian

Please be back at...

15:15 PM

(include the coffee break)

Today's program

12:30-13:00	**Working lunch**
13:00-14:00	**Meeting**
14:00-15:00	**Groups w/coffee break**
15.00-15:55	**Meeting** (continued)
15:55-16:00	**Transfer to "gå-hjem"**
16:00–17:30	**"Gå-hjem" meeting**

Today's program

12:30-13:00	**Working lunch**
13:00-14:00	**Meeting**
14:00-15:00	**Groups w/coffee break**
15.00-15:55	**Meeting** (continued)
15:55-16:00	**Transfer to "gå-hjem"**
16:00–17:30	**"Gå-hjem" meeting**

Presentation of group results

AALBORG UNIVERSITY
DENMARK

Department of
Mechanical and Manufacturing Engineering

Presentations

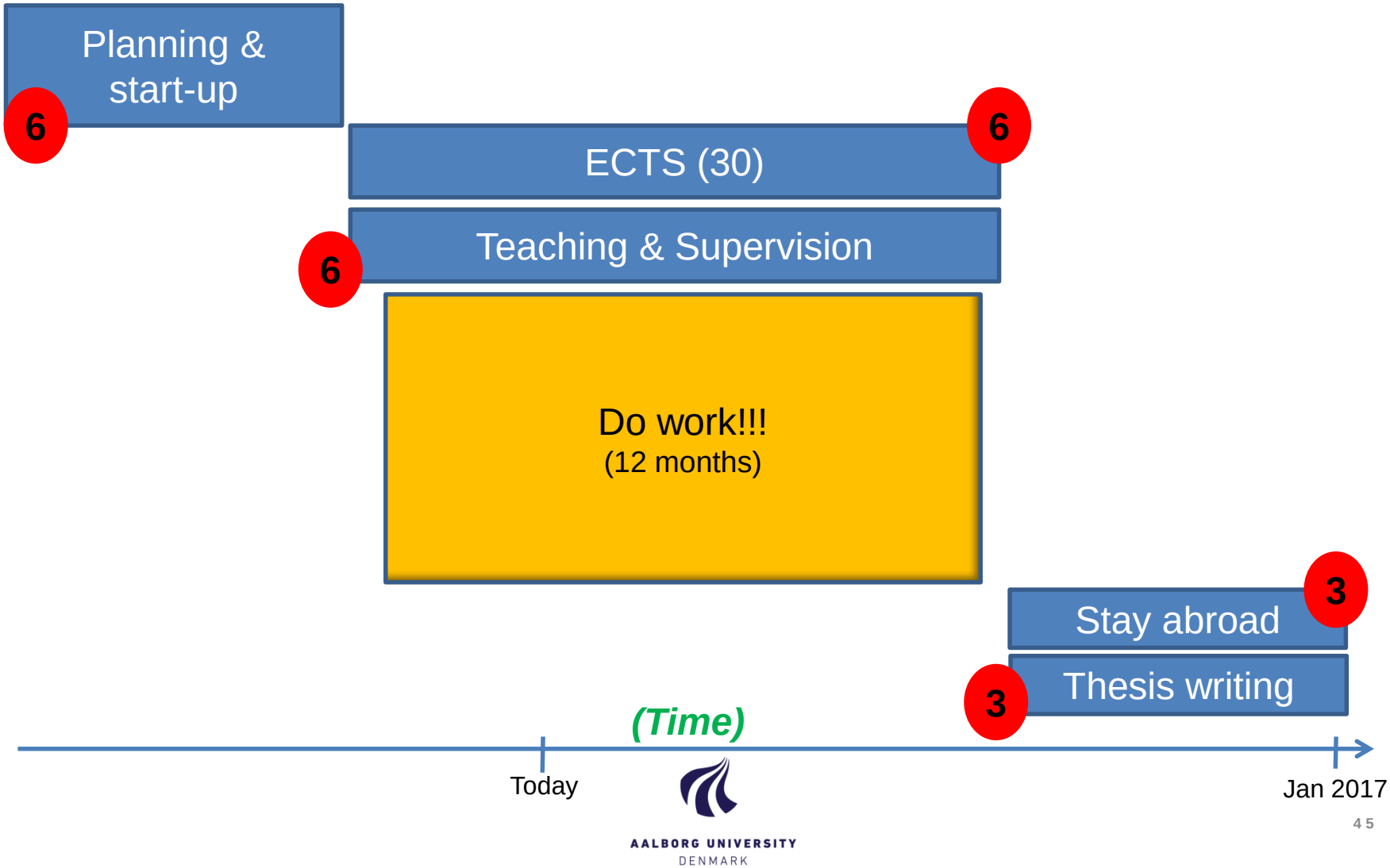
- Flip-chart presentations from the 3 groups

Academic update

AALBORG UNIVERSITY
DENMARK

Department of
Mechanical and Manufacturing Engineering

Time blocks of Ph.d. (3 years)



3 scientific research questions

I. Wind energy product technology development, market, and supply chains:

How do development in products technology (size, weight, structure/modularization), life cycles and market features (geographies, sizes, segments, national regulation, etc.) determine targets, strategies, and configurations of wind energy supply chains?

3 scientific research questions (cont.)

II. Strategic role of shipping and logistics in the supply chain:

How can shipping, logistics, and SCM activities contribute to the realization of targets and strategies for wind energy supply chains, and what is their share of LCoE?

3 scientific research questions (Cont.)

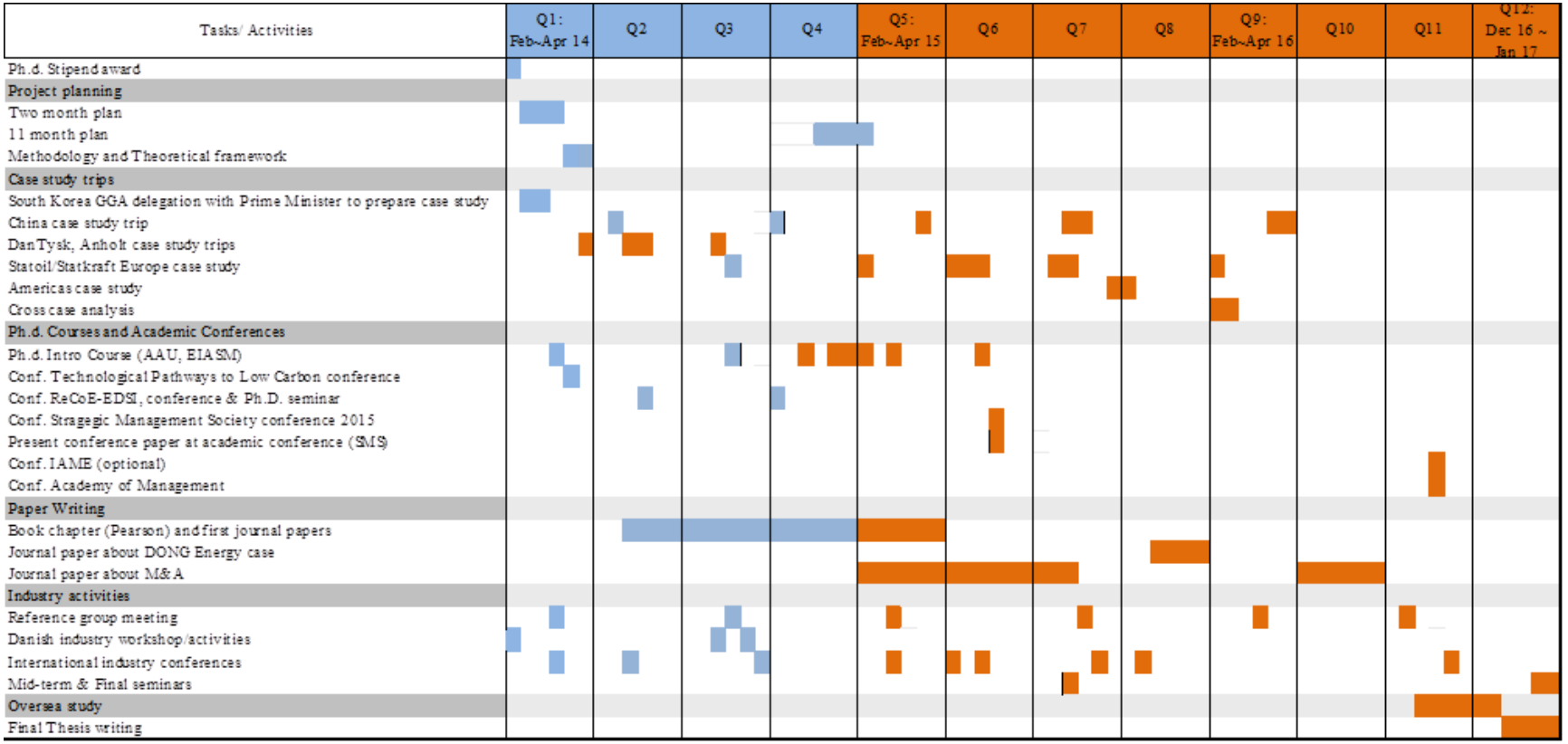
III. Wind shipping, logistics, and SCM competitive leadership:

What competitive-, partner-, and operational strategies are viable for supply chain constituencies to attain a leadership position in local, regional and/or global wind energy shipping, logistics, and SCM markets?

Approved 11-month plan: Dissemination summary (year 1)

Date	Activity	Summary	Comments
March 6, 2014	Presentation	Trade delegation to South Korea. Presentation to Danish and South Korean companies as organized by the Danish Foreign Ministry	
March 13, 2014	Presentation	Danish Foreign Ministry Chinese Embassy Danish Trade Council. Presentation to Danish companies about the Strategic Sales Alliance Offshore Wind China	
March 20, 2014	"Gå-hjem" meeting	Hosted at DONG Energy, Gentofte, Copenhagen, Denmark. Organized Reference Group meeting in PhD project followed by go-home meeting open to public	40 participants
April 3, 2014	Presentation	Hubnorth/Netværksgruppen Offshore Nordjylland/EnergiWatch/offshoreenergy.dk meeting in Aalborg. Presentation about shipping and logistics in offshore wind	
April 4, 2014	Article	Søfart. Front page mention and article in the magazine (hardcopy and online versions)	
April 7, 2014	Conference presentation	Technological pathways to low carbon: Competition and collaboration between Europe and emerging Asia. Presentation about research in Bonn, Germany	
April 8, 2014	Article	The Danish Maritime Foundation annual report, 2013: Article about the donation of funds to the global wind energy shipping and logistics PhD project	
May 2, 2014	Expert comment	Hav & Kaj magazine of the Port of Esbjerg vol 1, 2014: Expert comments to article on page 8 about local content requirements	
May 2, 2014	Article	Hav & Kaj magazine of the Port of Esbjerg vol 1, 2014: 3-page article about how shipping and logistics needs to be at the forefront of the R&D development	
May 15, 2014	Lecture	Global Systems Design, AAU Copenhagen: Half-day lecture on "Project cargo logistics. With wind energy shipping/logistics/SCM examples" followed by written exam	
Spring 2014	Supervision	Student project and exam about wind turbine port and storage operations in Esbjerg for Blue Water Shipping	
June 6, 2014	Presentation	Danish Foreign Ministry Chinese Embassy Danish Trade Council. Presentation to Danish companies about the Strategic Sales Alliance Offshore Wind China	
June 27, , 2014	Article	shippingwatch.dk. Online magazine article with frontpage mention	
June 27, , 2014	Article	energywatch.dk. Online magazine article with frontpage mention	
July 1, 2014	Conference presentation	European Decision Sciences Institute, 5th annual conference, Kolding, Denmark: Conference paper presentation	
September 2, 2014	"Gå-hjem" meeting	Hosted at offshoreenergy.dk, Esbjerg, Denmark. Organized Reference Group meeting in PhD project followed by go-home meeting open to public	60 participants
September 4, 2014	Article	ON/OFF magazine of offshoreenergy.dk Q3, 2014: Article as part of feature on supply chain. Published at the OWIB conference	
October 2, 2014	Promotion feature	shippingwatch.dk. Online magazine editorial that featured the upcoming wind conference as one in five only "must attend" events during Danish Maritime Days	
October 10, 2014	Conference	Danish Maritime Days. Organized conference. Self, 2 keynote speakers, and 12 companies presented key topics about bottlenecks, R&D/innovation, and China	80 participants
November 4, 2014	Article	Danish Maritime November, 2014: 4-page article about the shipping and logistics conference organized in connection with Danish Maritime Days	
Autumn, 2014	Supervision	Student project and exam about offshore wind energy R+D within logistics for DONG Energy	
Autumn, 2014	Supervision	Student project and exam about offshore wind cost reductions through the socalled "Cost Reduction Forum" for offshoreenergy.dk	

Updated academic timing



Legend:

= Completed

= Forthcoming

Wrap-up and close

AALBORG UNIVERSITY
DENMARK

Department of
Mechanical and Manufacturing Engineering

Closing of today

- Date
- Hosting company
- City

✓Wrap-up

Next Reference Group meeting

Date suggestion: September, 2015

Any volunteers?

Today's program

12:30-13:00	**Working lunch**
13:00-14:00	**Meeting**
14:00-15:00	**Groups w/coffee break**
15.00-15:55	**Meeting** (continued)
15:55-16:00	**Transfer to "gå-hjem"**
16:00–17:30	**"Gå-hjem" meeting**