

DIS/CREADIS

THE FUTURE OF THE WIND VALUE CHAIN WITH
FOCUS ON SHIPPING AND LOGISTICS

- seen from an engineering company point of view





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- MD, CREADIS UK, Ltd.
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- Aircraft, Automotive, Wind, Aluminium, Food, Management Consulting

DIS/CREADIS

- Founded in 1997
- +500 employees
- 18 offices in Denmark, Germany, Poland, Spain, Ukraine, United Kingdom and USA
- In Denmark we are called DIS and internationally we are CREADIS
- Certified:
- 6x nominated for EY Entrepreneur Of The Year Award
- 7x nominated for Gazelle Company Award
- Awarded as:
 - One of Europe's Best Workplaces for engineers
 - Denmark's Best Workplace for engineers



WORLD OF DIS/CREADIS



DIS/CREADIS WIND ENERGY EXPERIENCE

NACELLE

- Cooling & Lubrication
- Drive train
- Machine frame
- Nacelle components
- Yaw system
- FEM

HUB

- Pitch control
- Hydraulics
- Power transfer
- FEM

LOADS & CONTROLS

- Load definition and calculations
- Load reduction strategies
- Control algoritmes

ELECTRICAL SYSTEMS

- Converter system
- Power electronics
- Converter software
- Controller PCB & Software
- Control system design
- Electrical system design
- Safety systems
- Transformer/Switch gear

TOWER

- Tower design
- Internals
- Cabling
- FEM

BLADES

- Production methods
- Production equipment
- Cost out redesign and implementation

AUXILIARY EQUIPMENT

- Transport equipment
- Logistics setup
- Port handling, Lifting & loading equipment
- Assembly rigs

ASSET MANAGEMENT

- Asset Register (RDS-PP)
- Failure Modes standardisation
- Documentation structure and ERP
- Maintenance strategy optimisation
- Condition Based Maintenance
- FMEA
- EoW and LTE analysis
- WTG retrofit solutions



DESIGN & ENGINEERING

PRODUCTION & EQUIPMENT

ASSET MANAGEMENT

SUPPLY CHAIN & COST OUT

SYSTEM ENGINEERING

PROJECT MANAGEMENT

WIND INDUSTRY TRENDS

➤ **GROWTH**

- Onshore wind still growing
- Offshore shows strong growth
- Increased globalisation (OS)

➤ **PROJECTS**

- Larger WTGs
- Further offshore and deeper waters (OS)
- Contracts changes (OS)

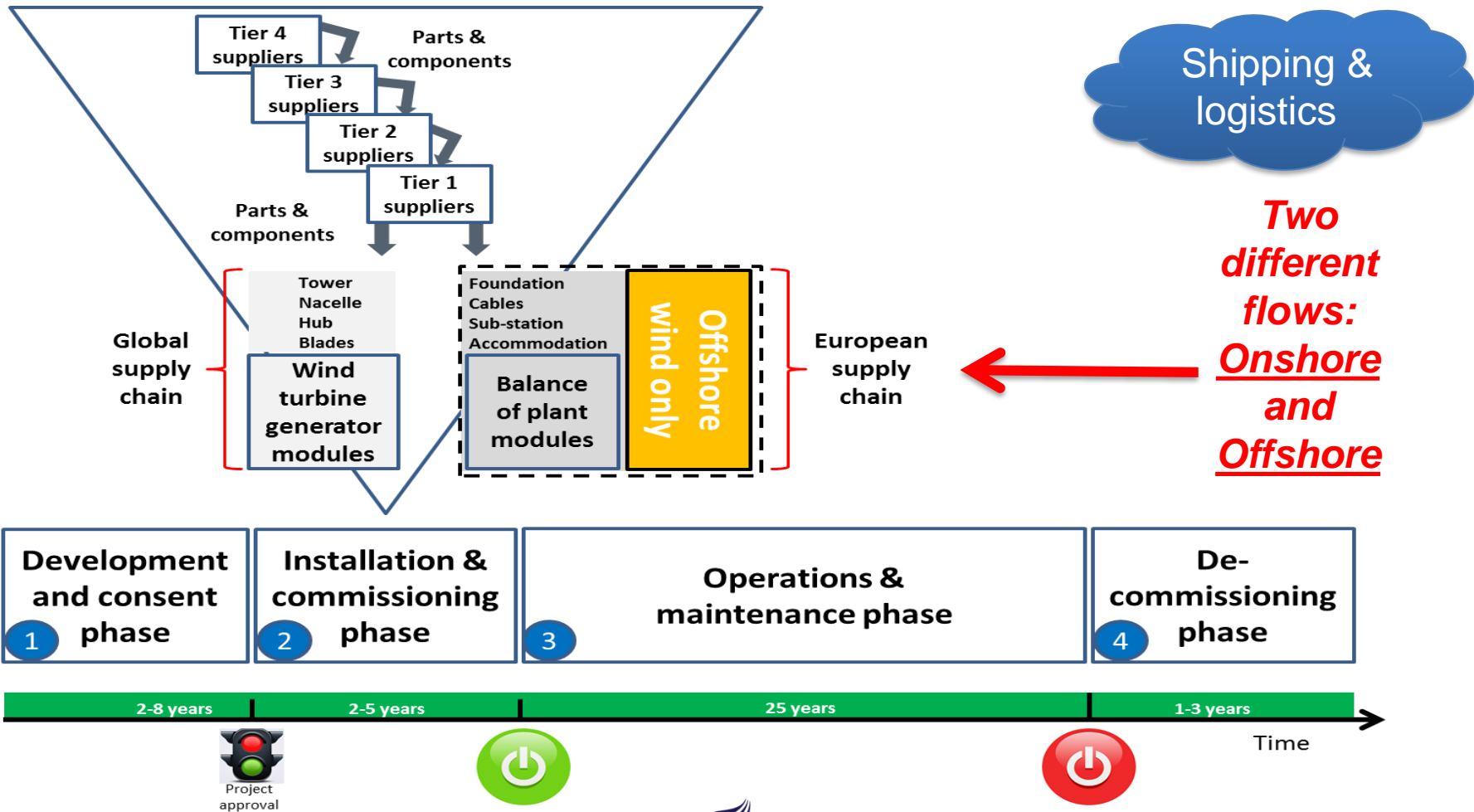
➤ **COST**

- Life cycle cost decreases
- Logistic cost share increases
- Shift away from WTG (OS)
- Logistic cost increases in all four life cycle phases (OS)

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End-to-end life-cycle focus



IMPACT ON THE WIND VALUE CHAIN

- **CONSOLIDATION**
 - Turn-key capability
 - EPC contracts
 - Asset sharing
 - Size matters
- **MATURING AND STANDARDISATION**
 - Plug and Play Solutions
 - Standard tooling and equipment
 - Enhance existing supply chain
 - Outsourcing and new business models

Shipping & logistics



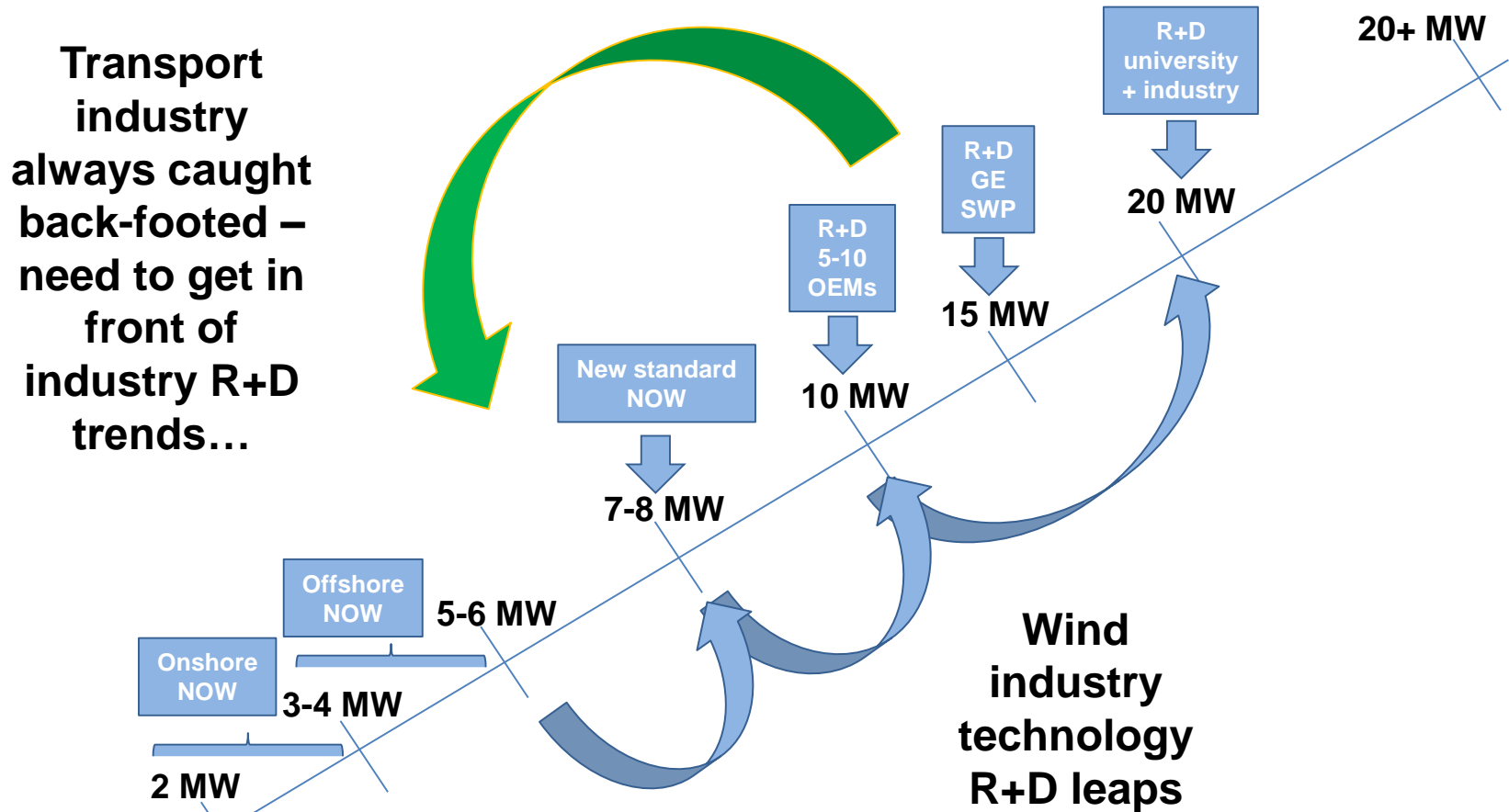
➤ LOGISTICS INNOVATION

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Research and development (R+D)

Transport industry always caught back-footed – need to get in front of industry R+D trends...

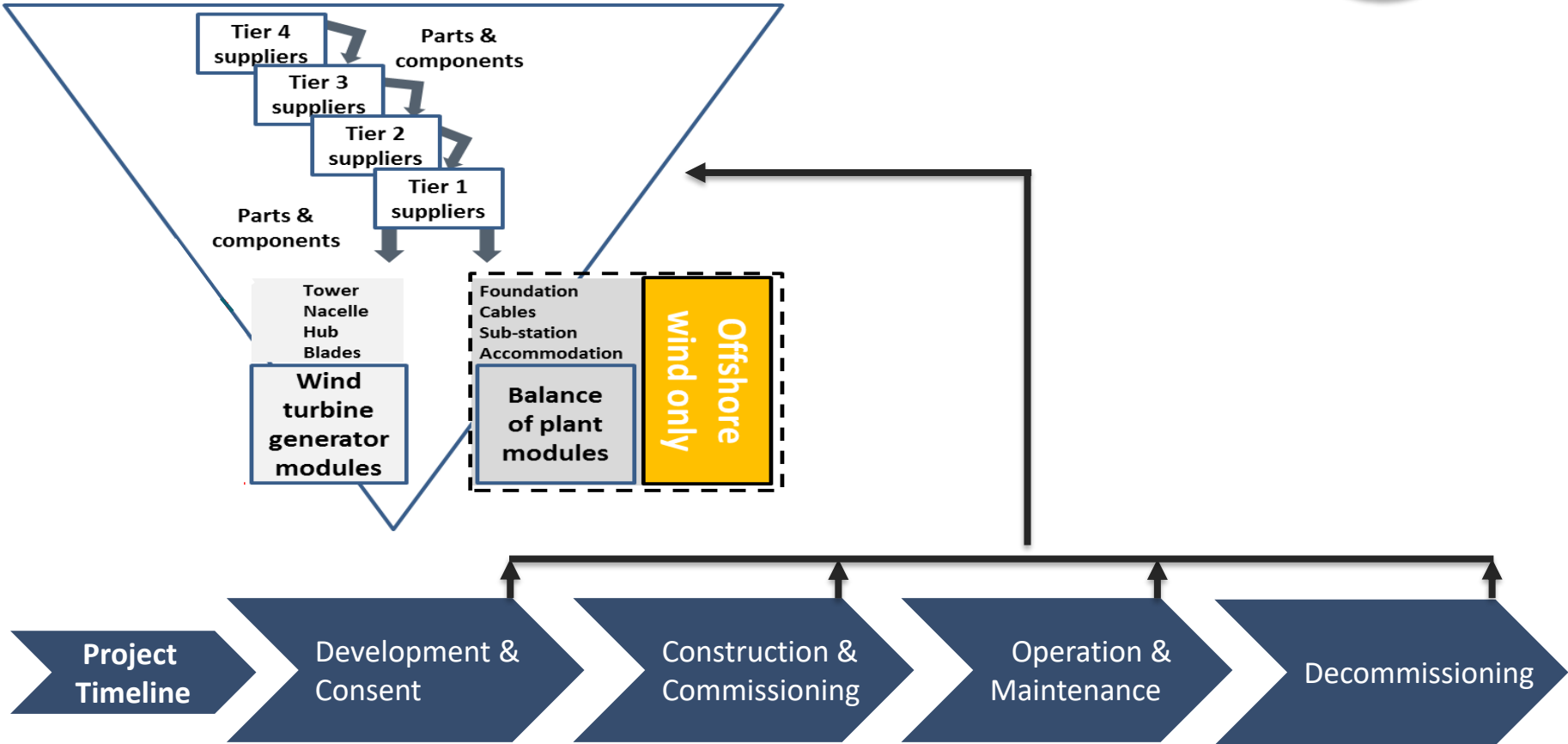


First WTG serial production 1979

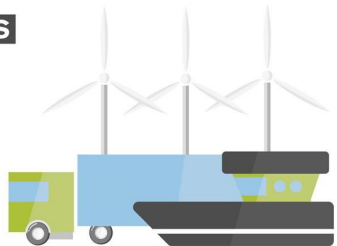


FRONT-END ENGINEERING – design for

Shipping & logistics



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Logistical chains: Readiness?

Wind energy supply chains													
Wind farm phase	Development & Consent (D&C)		Installation & Commissioning (I&C)		Operations & Maintenance (O&M)		De-commissioning (De-comm)						
The wind farm supply chains	D&C chain		I&C - Inbound	I&C - Outbound	O&M - Preventive	O&M - Unscheduled	O&M - Contingency	De-commissioning chain					
Activities & Firms	Supply chain I		Supply chain II		Supply chain III		Supply chain IV						
	<ul style="list-style-type: none"> Seabed surveys Animal surveys Port surveys 	<ul style="list-style-type: none"> Geo Energinet.dk Geo Energinet.dk DNV-GL WSS Blue Water Shipping 	<ul style="list-style-type: none"> Nacelle assembly Blade production Tower manufacturing BOP components 	<ul style="list-style-type: none"> DHL DB Schenker Goldwind Give Goodwind Mammoet Jutlandia Give Goodwind Mammoet Blue Water Shipping Combi-Lift DHL Van Oord Longyuan/Zhenhua 	<ul style="list-style-type: none"> Foundation installation Cable laying Offshore Subst. Inst. WTG erection 	<ul style="list-style-type: none"> MPI Van Oord Swire Blue Ocean Global Marine Systems SBSS CT Offshore (A2SEA) Semco Marine Swire Blue Ocean Longyuan/Zhenhua A2SEA Longyuan/Zhenhua Fred Olsen Windcarrier Longyuan/Profundo 	<ul style="list-style-type: none"> BOP servicing WTG servicing Landside support servicing 	<ul style="list-style-type: none"> Bilfinger DONG Energy Bladt Industries World Marine Offshore DONG Energy N-O-S 	<ul style="list-style-type: none"> WTG break-down 	<ul style="list-style-type: none"> DBB Jack-Up Total Wind 	<ul style="list-style-type: none"> BOP break-down Grid break-down 	<ul style="list-style-type: none"> Semco Marine ABB Siemens Energy 	<ul style="list-style-type: none"> WTG de-commissioning BOP de-commissioning Site restoration
Preparation chain			Manufacturing chain		Deployment chain			Re-Deployment					
CapEx					OpEx			AbEx					



SUMMING UP

➤ INDUSTRY

- Organisations must facilitate cross industry collaboration
- Organisations must facilitate standardisation projects

➤ COMPANIES

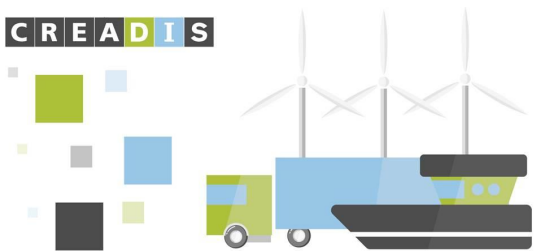
- Operators and OEM must encourage development standard solutions and products through procurement
- Suppliers must invest in development of standard solutions and products
- New business models for logistic solutions must follow

➤ SUPPLY CHAIN

- Optimisation across the logistical supply chains needed
- Development and use of the existing supply chains



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// THANK YOU FOR YOUR ATTENTION

