Final Symposium of the research project

SeeOff – Strategieentwicklung zum effizienten Rückbau von Offshore-Windparks

Development of efficient strategies for offshore wind farm decommissioning

March 30th 2022

SeeOff - Strategieentwicklung zum effizienten Rückbau von Offshore Windparks

(Development of strategies for sustainable offshore wind farm decommissioning)

Project duration:

November 2018 – April 2022

Projekt coordination:

City University of Applied Sciences Bremen

Prof. Dr.-Ing. Silke Eckardt

Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

Website:

www.seeoff.de

09.00	Welcome and introduction (Prof. Dr.-Ing. Silke Eckardt, City University of Applied Sciences Bremen)
09.20	Dismantling of offshore wind farms at sea (Bernd Köhler, Deutsche Windtechnik)
09.40	Comminution of offshore wind farm components and recovery of materials at land (Dr. Sven Rausch, Nehlsen AG)
10.00	Q & A Session
10.20	*Coffee Break and Networking in Lounge-Area*
10.35	Economic efficiency of offshore wind farm decommissioning (Janina Bösche, City University of Applied Sciences Bremen)
10.50	Environmental impacts of offshore wind farm decommissioning (Vanessa Spielmann, City University of Applied Sciences Bremen)
11.10	Occupational safety of offshore wind farm decommissioning (Mandy Ebojie, City University of Applied Sciences Bremen)
11.25	Q & A Session
11.45	*Lunch Break and Networking in virtual Lounge-Area*
12.15	Bringing economic efficiency, environmental impacts and occupational safety together: Multi criteria decision making for offshore wind farm decommissioning (Vanessa Spielmann, City University of Applied Sciences Bremen)
12.30	Public acceptance of offshore wind farm decommissioning (Philipp Tremer, German Offshore Wind Energy Foundation)
12.45	Q & A Session
13.05	*Goodbye and subsequent Networking in Lounge-Area*
13.45	Closing of conference platform

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Occupational safety of offshore wind farm decommissioning

Mandy Ebojie
City University of Applied Sciences Bremen

Objectives for sustainable offshore wind farm decommissioning

Sustainable decommissioning of offshore wind farms					
Category	Economy	Environment			Health and safety
Aspect	Economic efficiency	GHG-Emission	Biodiversity	Resource efficiency	Safety at work
Objective	Economic efficient	Low GHG-Emission	Minor local impact	High resource efficiency	Few hazards
Attribute	(Present) value of costs/ decommis-sioned MW	CO_2-Equivalent	Fraction of species richness maintained	Recovery rate	Hazard measure

Introduction

Some facts from G+ Global Health & Safety Organisation in 2020:

- 743 reported incidents and injuries
- 0 fatalities
- 95 injuries over ~25 Mill hours worked, Total Recordable Injury Rate (TRIR) 3,75 ↓

Top 3 work process high potential incidents:

1) Working at heights
2) Lifting operations
3) Working with electrical systems

High potential incidents location:

	2017	2018	2019	2020
n	294	256	252	198
Offshore total	70 %	78 %	72 %	61 %
- Turbine	35 %	32 %	34 %	30 %
- Ship	28 %	38 %	33 %	24 %
- Other	7 %	8 %	5 %	7 %
Onshore	30 %	21 %	27 %	37 %

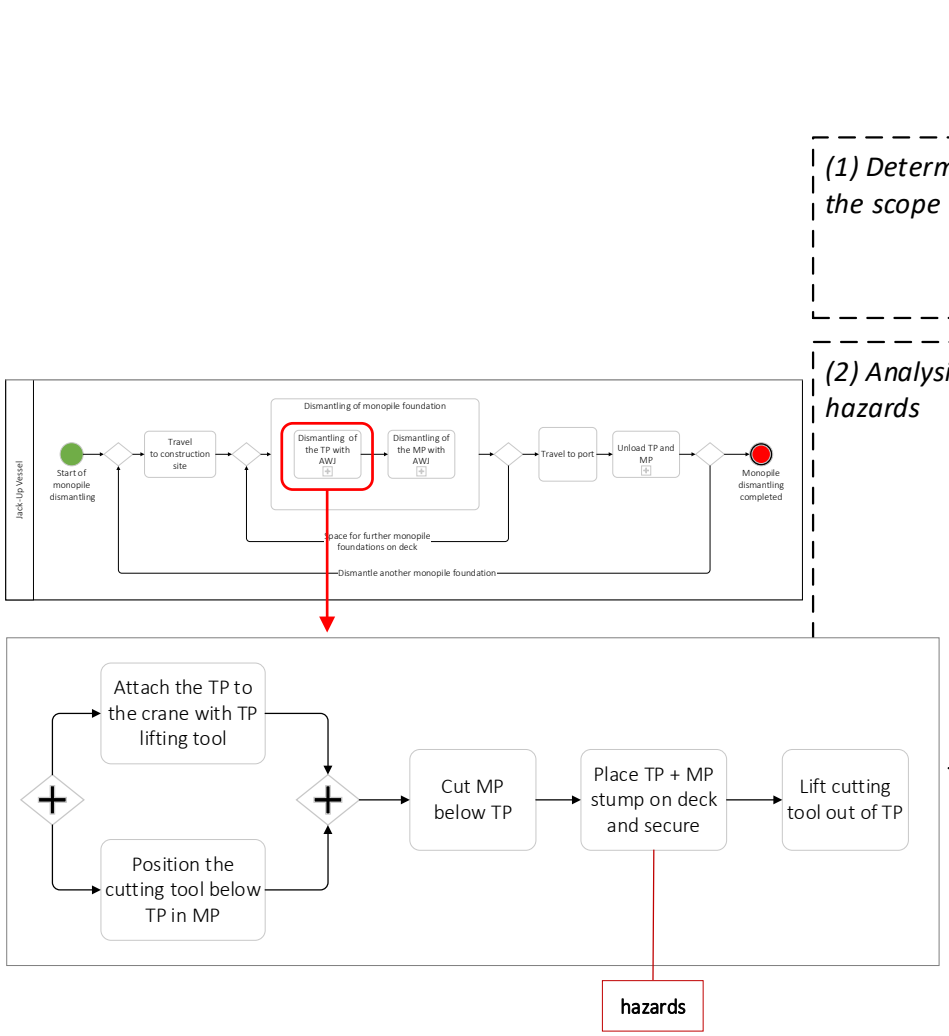
(Source: G+ Global Offshore Wind Health & Safety Organisation Incident Report of the years 2017-2020 (G+ Global Offshore Wind Health & Safety Organisation 2020, 2019, 2018, 2017)

focus within system boundary on:

- offshore processes
- decommissioning related/specific activities
- occupational safety

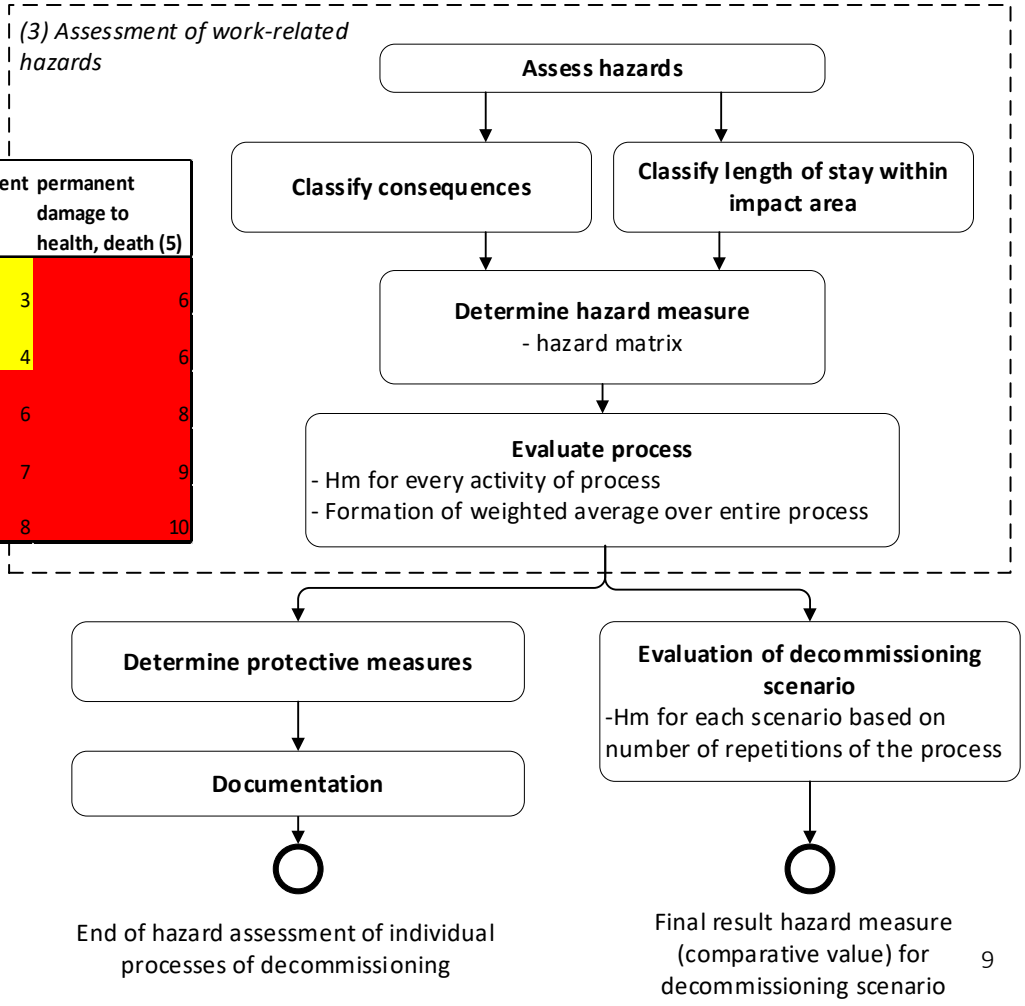
- Prospective, qualitative analysis
- Process based
- Information provided by experts from service companies

Hazard Assessment Method

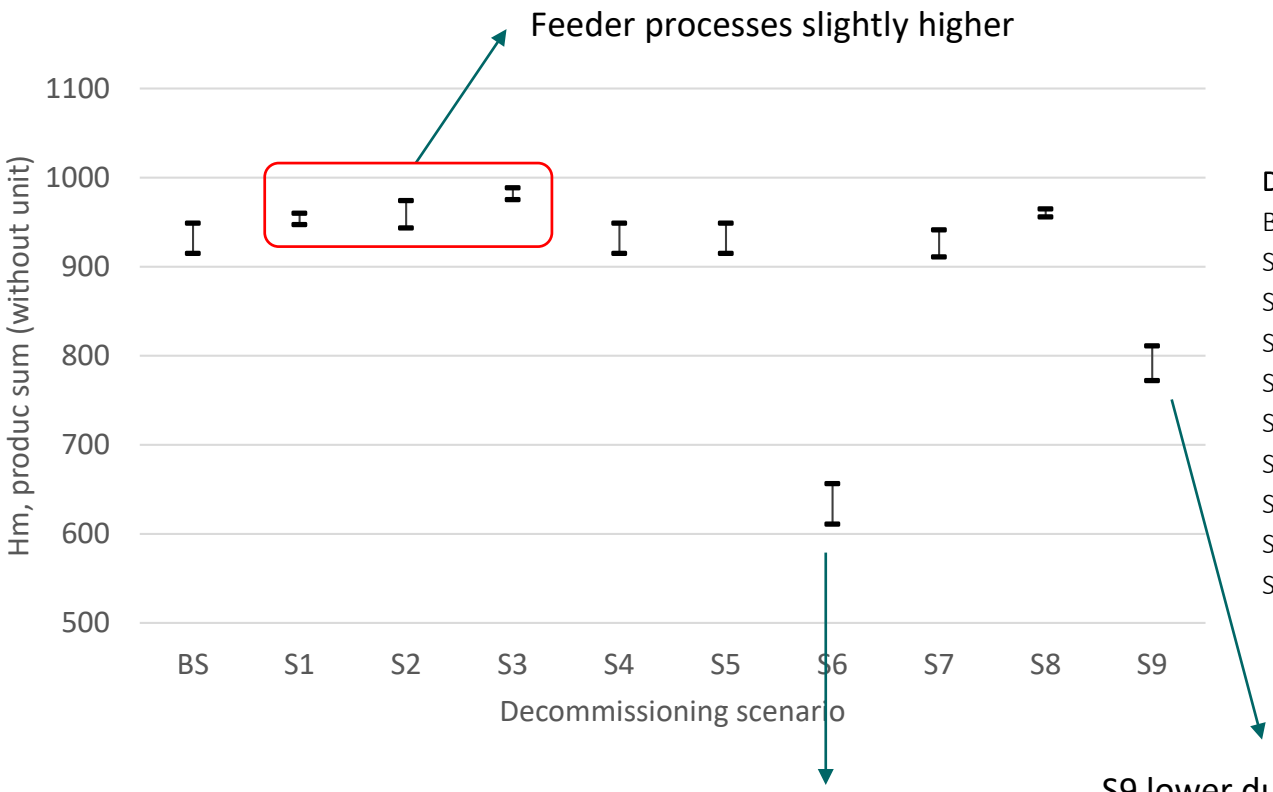


Hazard Assessment Method (2)

Consequence / Duration	no consequences (1)	Minor injury (2)	Injury/ Illness (3)	slight permanent damage to health (4)	permanent damage to health, death (5)
<5 Min (1)	0	0	2	3	6
5-30 Min (2)	0	1	3	4	6
30 min-2h (3)	0	1	4	6	8
>2h (4)	0	2	5	7	9
continuously (5)	0	3	6	8	10



Results - Scenarios



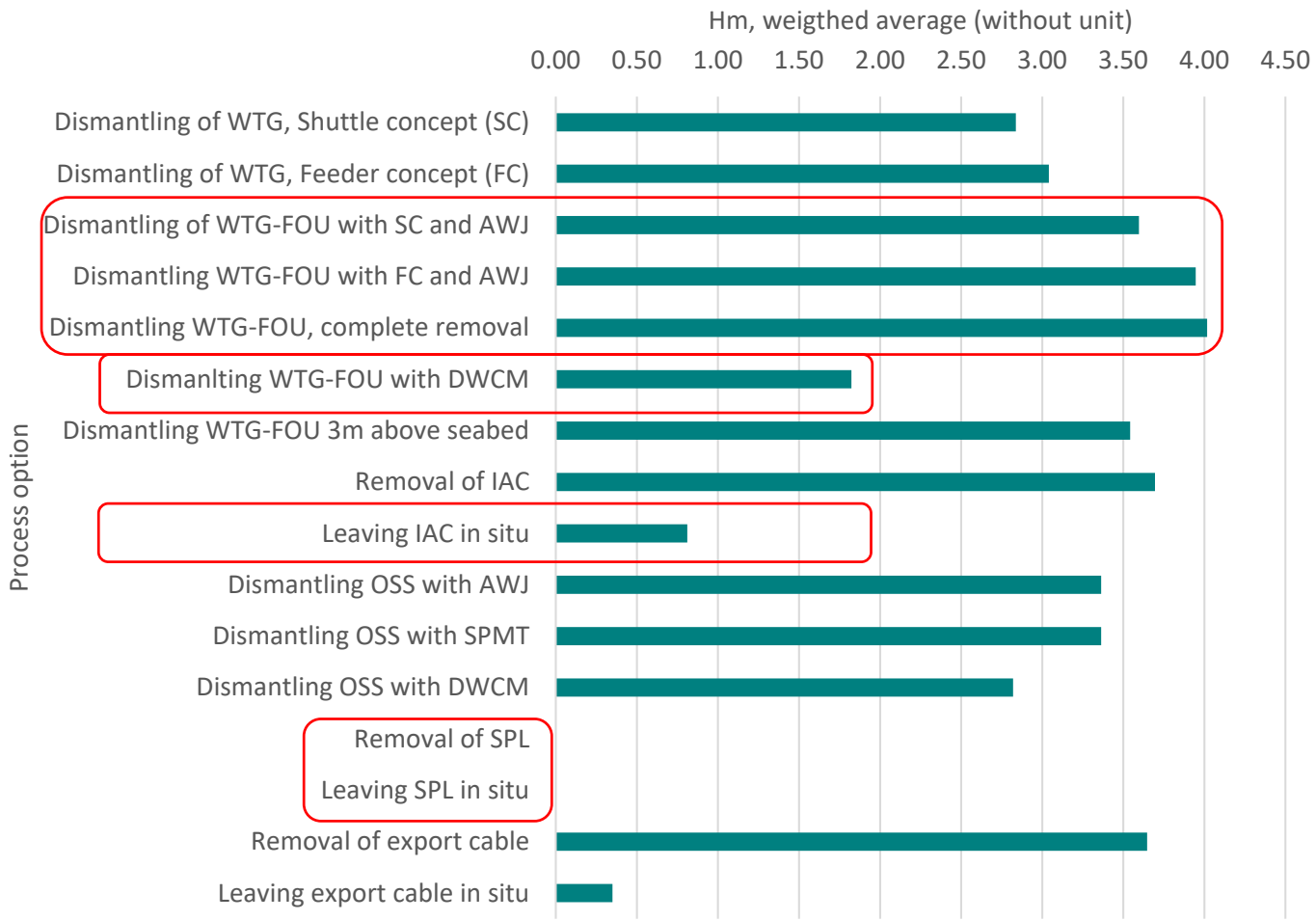
Decommissioning scenarios

BS	Baseline scenario
S1	Feeder concept WTG
S2	Feeder concept WTG-FOU
S3	Feeder concept WTG and WTG-FOU
S4	Load-off OSS with SPMT
S5	SPL left in situ
S6	Sea cables left in situ
S7	WTG-FOU: cut above seabed
S8	WTG-FOU: complete removal
S9	FOU: cut with diamond wire machine

S6 low due to less cable spooling works

S9 lower due to lesser preparatory manual work and higher automation

Results - process options



Conclusion

- Duration of activity-related hazards important parameter
- Prospective method for first selection and identification of processes that need further focus
- Results show that feeder concepts are estimated to be related with higher hazard measure compared to base scenario
- Level of automation and unmanned operation has a positive effect
- Yet few experiences and many non-standard processes

→ safety is an important factor to consider even at the start of decommissioning concept

→ Further analysis should stress on process risks with the help of FMEA e.g.

Thank you for your attention!

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