IKM Group

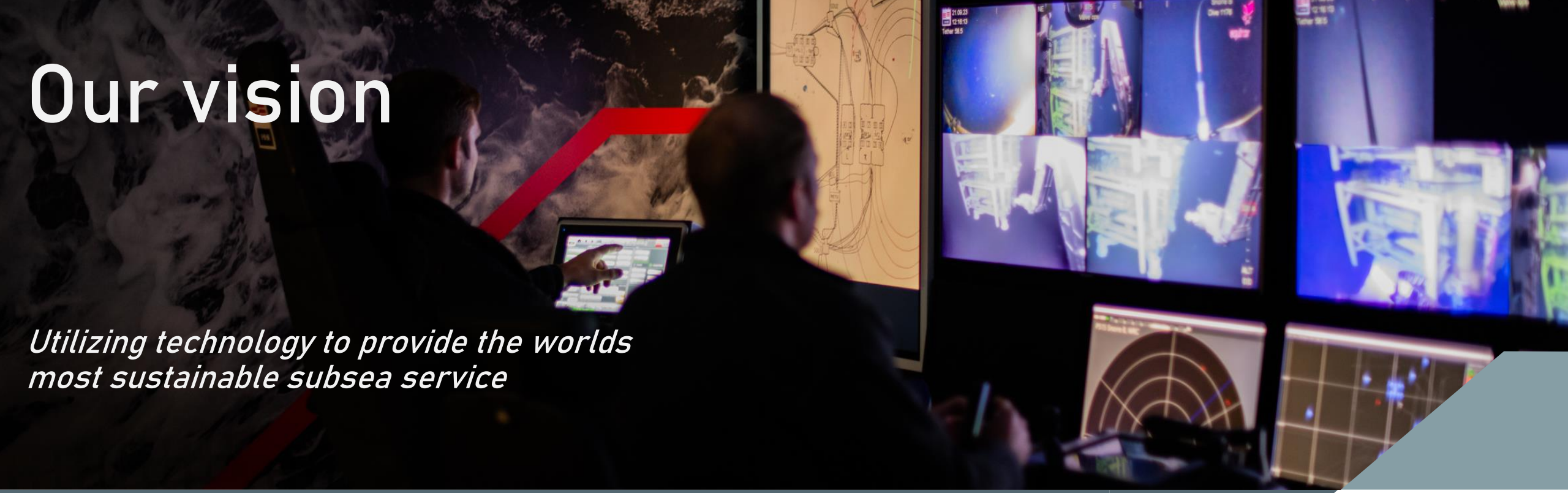
A complete service provider for the energy sector

Reducing Emissions With Technology

Hensikt med presentasjonen:

- ✓Skape grunnlag til diskusjon rundt bærekraft subsea
- ✓Vise underlag for beregninger og konkrete eksempler
- ✓Muliggjøre at andre kan benytte grunnlaget
- ✓Skråblikk på bærekraft som en business

Our vision



Utilizing technology to provide the worlds most sustainable subsea service

Our Values:

- Responsibility
- Courage
- Clarity
- Focus

Zero Injuries
– Our overall goal!

Our Frame Conditions:

Policies
- Purchasing
- Travel
- Sponsorship
- IT
- Reporting
- Branding

ESG
- Human rights
- Ethical guidelines
- Anti-corruption
- Code of Conduct
- Sustainability
- Corporate social responsibility

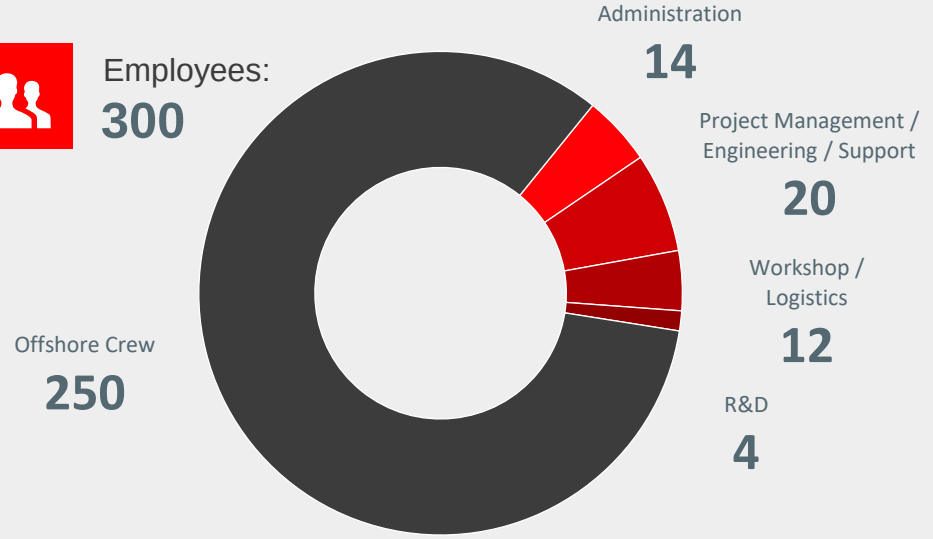
QHSE
- Environmental
- Work environment
- Safety
- Quality
- Health
- Security
- The companies processes
- Whistle blowing

I·K·M

IKM Subsea Group of Companies

Turnover:
80 000 000 USD

Employees:
300



ROV

Norway
14 ROVs

- 4 x Onshore Control rooms
- Fully Equipped Workshop
- Test Facilities

Singapore
12 ROVs

Brazil
3 ROVs

Vitenskapelig rapport - fra Terraverra

Oppdrag:

- Hva er forskjellen i energieffektivitet mellom elektrisk og hydraulisk WROV?
- Hvor mye utslipp sparer vi med å plassere ROV personell på land vs offshore?

Kort om Terraverra:

- Non profit teknologistiftelse
- Samarbeider med forskningspartnere som samler, analyserer, verifiserer og strukturerer data om bærekraft fra næringslivet sine komplekse verdikjeder.
- https://www.terravera.world/

Rapporten:

- Alle data er dokumentert med referanse.
- Alle forutsetninger beskrevet.
- Videre arbeid nødvendig for å gjøre beregningen enda mer nøyaktig.
- **Full rapport kan leses her:** https://www.ikm.com/ikm-subsea/sustainability-report/

Hydraulisk vs Elektrisk WROV (200 hp)

- Hvor mye effekt må sendes fra topside for å få lik output(kW) subsea?

	Hydraulic ROV	Energy Loss
Input	**178 kW**	
Topside		
	Transformer 400VAC - 3000 VAC	3 %
Cables	Umbilical	
	2 x 10 mm 4.5 kV	Assumed similar
	2 x 0.82 mm 4,5 kV	
	Tether	
ROV	1 x Hoved elektromotor 160 kW	20 %
	Hydraulisk pumpe	10 %
	Ventil (approx. 50 bar at 56 lpm)	20 %
	Hydraulisk motor	7 %
	SA-300	Assumed similar
Output	**100 kW**	

Electric ROV	Energy Loss
137 kW	
Frekvensomformere	3,30 %
Sinusfilter	0,62 %
Transformer 400VAC - 3000 VAC	3 %
Umbilical	
2 x 1.5 mm 3.3 kV	Assumed similar
41 x 2mm 4.5 kV	
Tether	
7 x Elektro Motor 14 kW	20 %
SA-300	Assumed similar
100 kW	

Type	Rig	Vessel
Power supply	Gas Turbine	Diesel
Emission	0.212 kgCO2/kWh	0.713 kgCO2/kWh

Operational modes	From Rig	From Vessel
Survey	90 % continous flying	90 % continous flying
Drill support	On-off flying (25-50-25)	On-off flying (25-50-25)

- Avgrensninger – ikke tatt med
  - Drag koeffisient ROV
  - Kraft til tooling (aux)
  - Livssyklus effekter (fra produksjon, drift, vedlikehold til skrap)
  - Tap i umbilical, tether og SA-300 er antatt like

IKM Subsea Electric ROV

a smarter choice

As the first to develop electric ROVs, IKM's fleet delivers ROV operations with high uptime that increases operational efficiency, reduces cost and significantly cuts carbon emissions. With the Electric ROV, one can achieve a total emissions savings of 32-35% during Seabed surveys and Drill support operations respectively*.

Overall C02 emissions savings when using Electric ROV

Seabed survey operations

32%

emissions saved

200-690

kg c02/24h saved

Drill Support operations

35%

emissions saved

100-300

kg c02/24h saved

*Emissions are based on emissions released during a 24-hour period per operation. The emissions per operation shown is an average of emissions released from supplying ROV from Rig and Vessel. Vessel Supply releases higher emissions on average then from Rig.

Onshore vs Offshore kontrollrom

Reisevei tur/retur offshore rigg:

- Helikopter Florø-Snorre B: Sikorsky S-92
- Fly Bergen-Florø: De Havailland DHC-8 400 Series
- Fly Stavanger/Oslo-Bergen: Boeing 737-800
- Tog, buss og bil hvor nødvendig.

Residence	Description	Emissions [$kgCO_2$/tour]
Bergen	Train to Flesland, flight to Florø, helicopter ride to rig	**214.94**
Stavanger	Bus to Sola, flight to Bergen, flight to Florø, helicopter ride to rig	**240.37**
Oslo	Train to Gardermoen, flight to Bergen, flight to Florø, helicopter ride to rig	**254.14**
Bergen	Car to Flesland, flight to Florø, helicopter ride to rig	**218.99**
Stavanger	Car to Sola, flight to Bergen, flight to Florø, helicopter ride to rig	**244.87**
Oslo	Car to Gardermoen, flight to Bergen, flight to Florø, helicopter ride to rig	**264.20**

Reisevei tur/retur onshore kontrollrom:

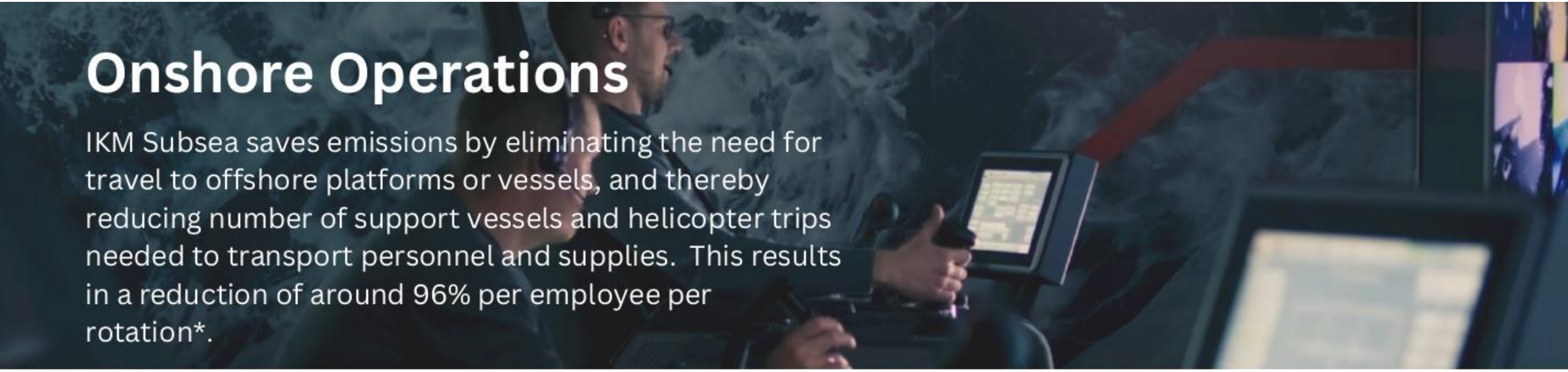
- Fly Bergen/Oslo-Stavanger: Boeing 737-800 (SAS, Norwegian)
- Tog, buss og bil hvor nødvendig

Residence	Description	Emission [$kgCO_2$/tour]
Bergen	Flight to Sola, bus to Stavanger, train to Bryne	**25.56**
Stavanger	Car to Bryne	**6.71**
Oslo	Flight to Sola, bus to Stavanger, train to Bryne	**42.0**

Energi til kost og losji:

- Norsk Energi Miks (onshore)
- Gass turbin platform (offshore)
- Mattransport til rigg (offshore)

Energy for living per person	Rig Gas Turbine	Norwegian Energy Mix
Emissions	0.21 kg CO2/kWh	0.01 kgCO2/kwH
Average energy use for living 2 weeks	301 kWh	301 kWh
Sum	**63 kgCO2**	**3 kgCO2**



Onshore Operations

IKM Subsea saves emissions by eliminating the need for travel to offshore platforms or vessels, and thereby reducing number of support vessels and helicopter trips needed to transport personnel and supplies. This results in a reduction of around 96% per employee per rotation*.

Overall C02 emission reduction of

96%

per employee per rotation

Onshore and Offshore emissions per rotation from Stavanger

Onshore Control Room (Bryne)	Difference	Offshore Rig (SnorreB)
10	294	305
kg c02	kg c02	kg c02

**A rotation is regarded as 14 days. Emissions are calculated based on average emissions from travel and energy and food consumption during the rotation. Stavanger is used here has the example, as this is the most common travel route.*

Miljøbesparelser 2024 - Norge

Onshore vs Offshore kontrollrom	Elektrisk vs Hydraulisk WROV
34 872 timer = 22 årsverk 61 026 kg Co2	23 908 aktive dykketimer 290 507 kg Co2

351 533 kg Co2

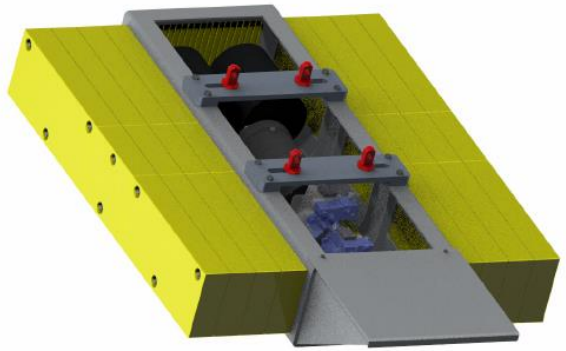
Tooling – High Power

- Fartøysbasert brønnhode fjerning = økte krav fra ROV:
  - 95 kW @ 3000 VAC (evt. 150 lpm @ 220 bar)
  - Opp mot 24 timer kontinuerlig kuttetid
- Løsning IKM elektrisk WROV:
  - Parallellkjøring av to-frekvensomformere (topside)
  - Tilgjengelige individuelle linjer gjennom dekkskabel, tether og umbilical.
  - Levering av direkte effekt til subsea motor.
- Fordeler med løsningen:
  - Energieffektiv løsning (høy virkningsgrad) = mindre utslipp fra fartøy
  - Manipulatorer, thrusterer og en mindre ventilpakke operative **samtidig** som kuttet foregår.
- Veien videre
  - Trend på mer og mer elektrisk tooling subsea
  - Åpnet opp potensialet til elektriske WROV for å levere betydelig høyere effekt til AUX(Tooling).

Electrical DWP

Main Data	
Max Power	95KW
Voltage	3000v AC (2400v and 4200v on request)
Main pump	140cc
Aux pump	45cc
Rated Working Pressure	0-350bar
Compencator	32liter 0,25-0,5bar
Filtration	Particle and water
Flow main outlet	Adjustable 120-240lpm (60Hz)
Flow aux pump	Max 75lpm
Weight in air	1200kg (TBC.)
Weight in water	Neutral and balanced
Depth rating	2000m (limited by buoyancy 3000m on request)
Control	24vDC and Ethernet
Oil	Panoline HLP (others on request)

- Electrical power to mimimize hydraulic power loss.
- Supply of high power demanding tooling
- One seperate 140cc pump for Terminator motor outlet 240lpm avilable thru hot-stab.

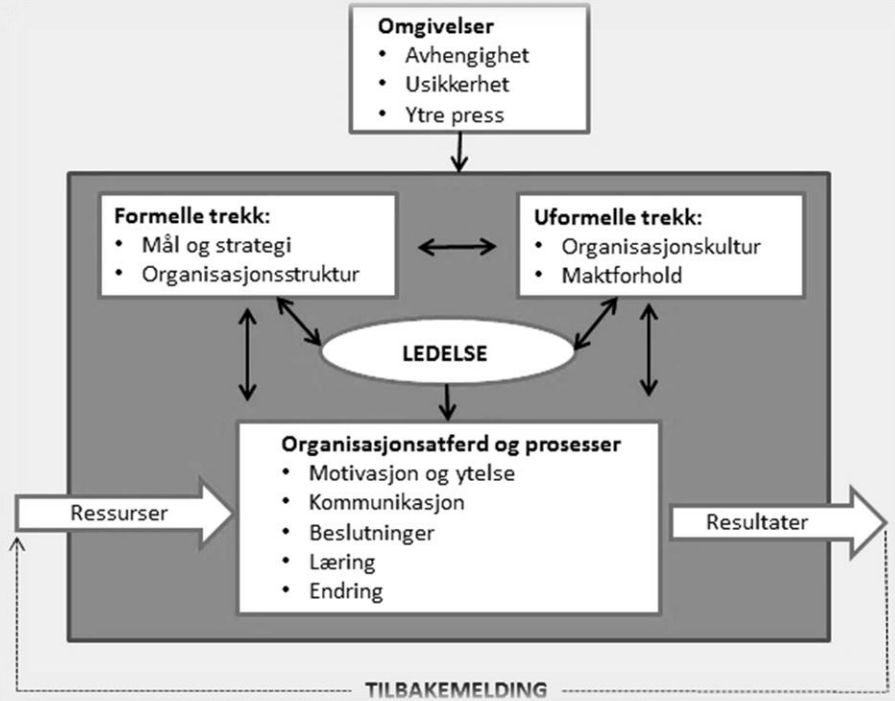


Baker Hughes

Sustainability

Frame conditions

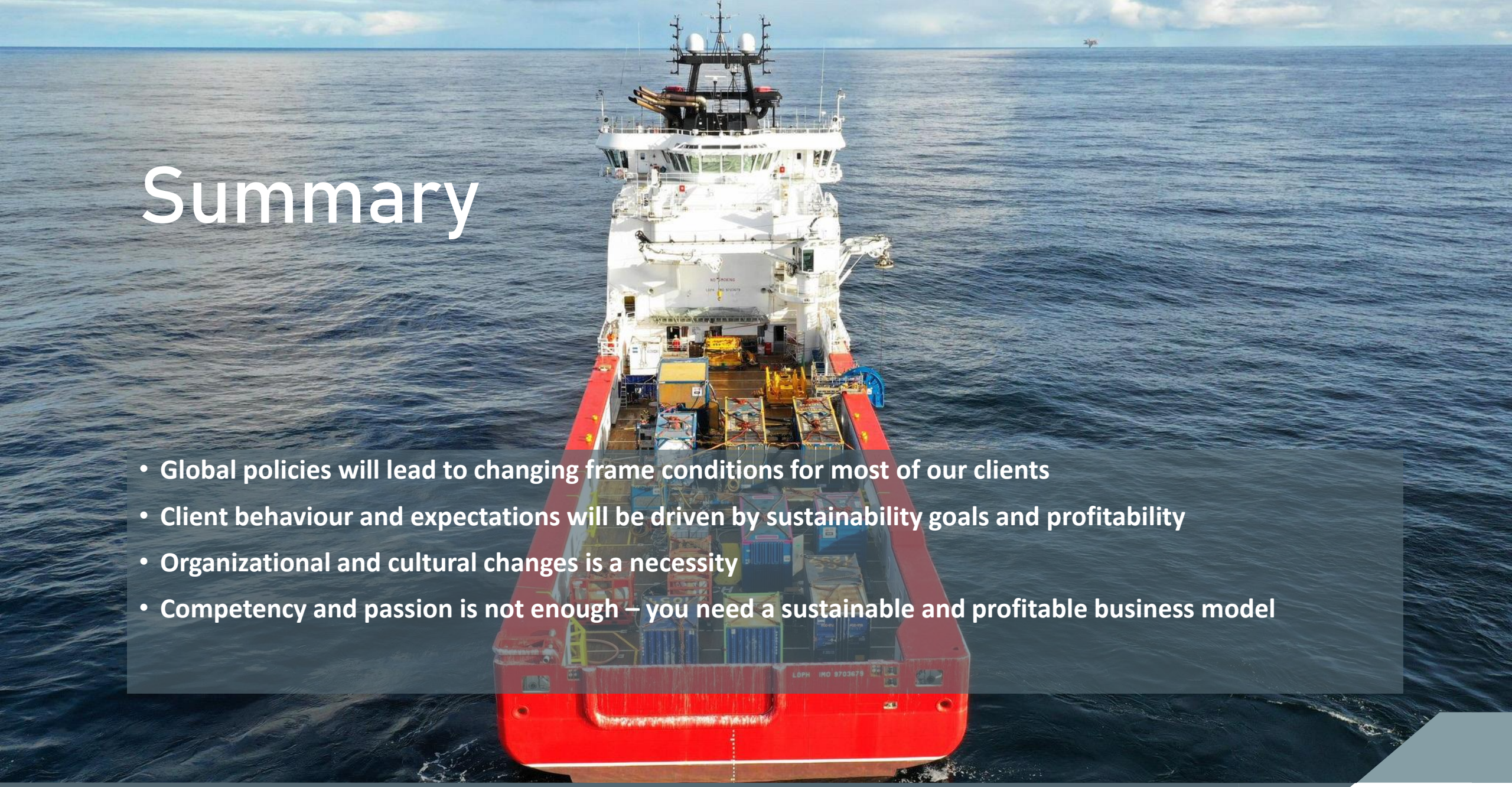
- Client Ambitions
- Technology
- **European Union Emmission Directive (CO2)**
- **Cultural change**



Source: Aker BP (https://akerbp.com/derfor-bygger-aker-bp-olje-og-gassfelt-for-fremtiden/)


Kodak
400
PROCESS C-41
Kodacolor
200
36 EXP.
KODAK 200 • 36
for Color Prints
Kodacolor
35mm Film
for Color Prints

Summary



- Global policies will lead to changing frame conditions for most of our clients
- Client behaviour and expectations will be driven by sustainability goals and profitability
- Organizational and cultural changes is a necessity
- Competency and passion is not enough – you need a sustainable and profitable business model

Thank You