

## Accident prevention – Helicopter offshore vs onshore?

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### Number of accidents per million flight hours – helicopter operations

- Offshore Norwegian sector 1999-2009: 2
- Offshore Norwegian sector 1990-1998:11.2
- Ambulance/police 1990-2012: 24.4
- AW/PAX 1990-2012: 150.1

## Outline

- Background for the presentation
- Helicopter operations in Norway - An overview
- Some findings from the inland helicopter study (onshore)
- Comparing accident frequencies - offshore, ambulance (onshore) and aerial work (onshore)
- Comparing possible risk influencing factors
- Conclusions

## Background

- Previous and ongoing studies:
  - Safety study inland helicopters (Safetec. Flight Safety Forum Norway/ Ministry of Transport and Communication, 2012-2013)
  - Work-related accidents in road, sea and air transport: prevalence, causes and measures. (TØI, Safetec and SINTEF. TRANSIKK-Norwegian Research Council, Ongoing)
- Reports:
  - Helicopter Safety Study 3, (HSS-3) Main report (SINTEF 2010)
  - Helicopter Safety Study 2, Main report (SINTEF 1999)

## Offshore and onshore helicopter operations

Offshore helicopter transportation includes:

- 1) Transport service between onshore bases and offshore installations
- 2) Shuttle traffic between installations



Onshore (civil) helicopter operations in Norway may be divided into 3 main segments:

- 1) Ambulance and police operations,
- 2) AW/PAX operations
- 3) Non-commercial activity

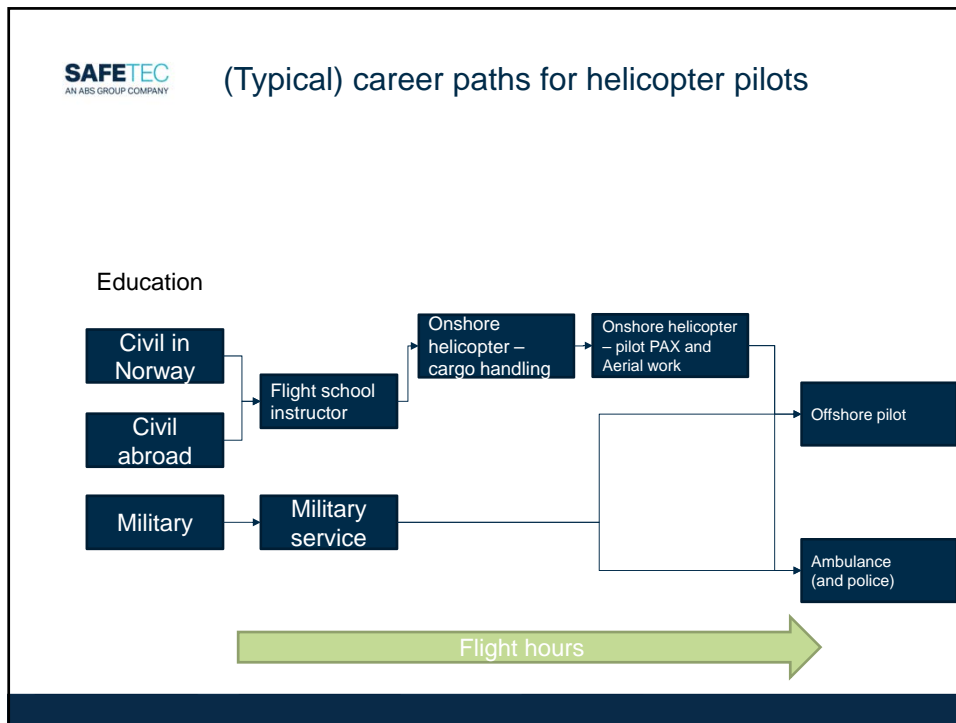


## The variety of onshore helicopter operations

Onshore operations:

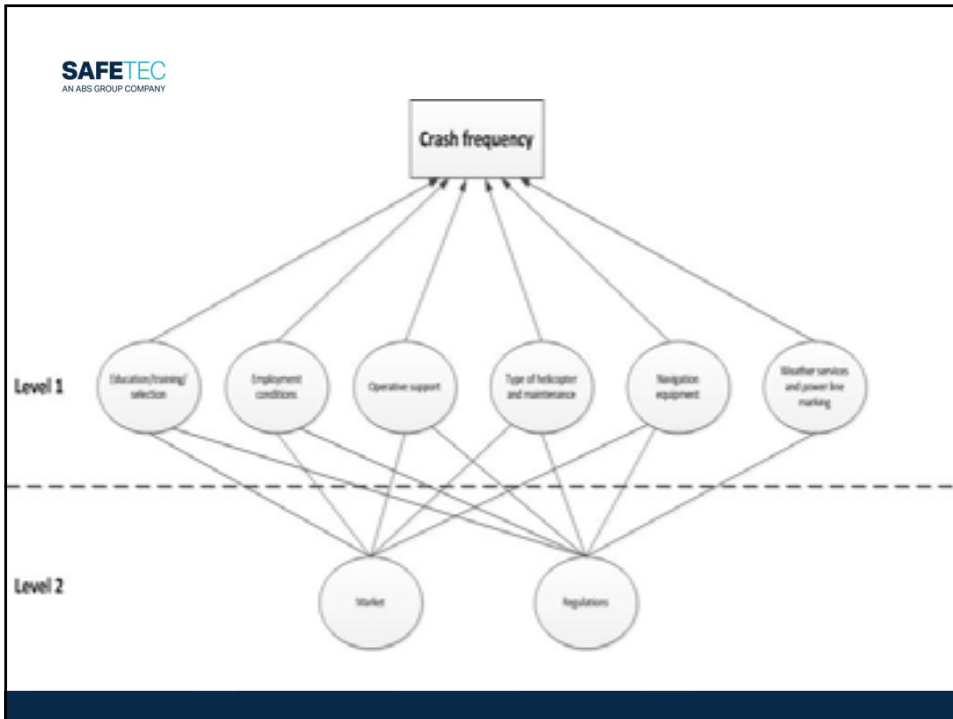
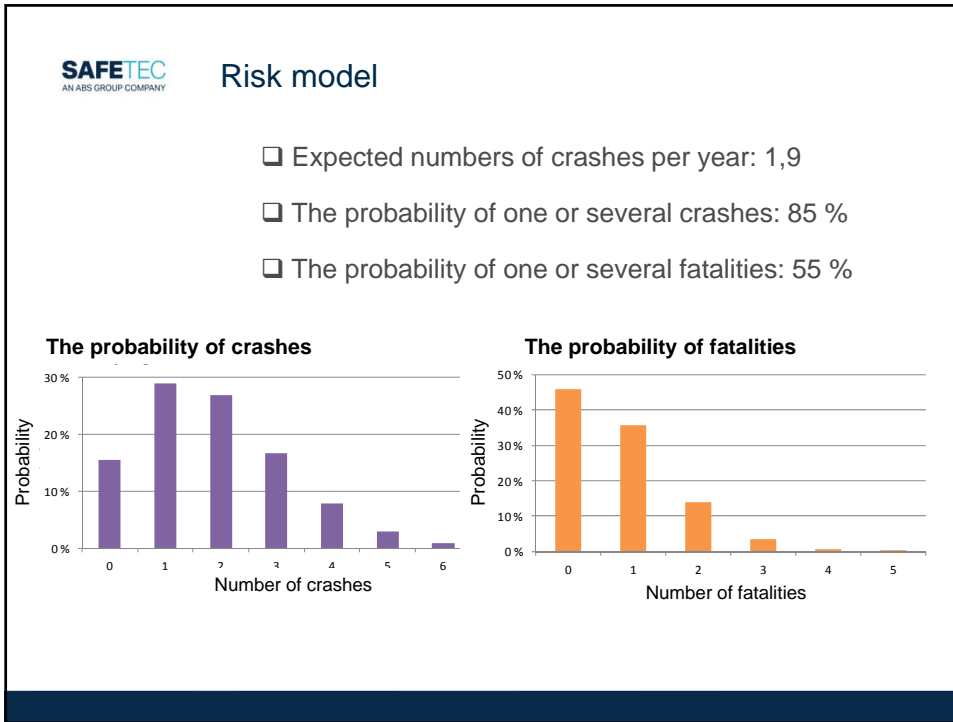
1. Transportation of passengers from A to B
2. Transportation of passengers from A to A
3. Parachuting
4. Ambulance/SAR
5. Educational and training flights
6. Police missions (contacted)
7. Line Inspection/thermography/top control/ radio noise measurement etc.
8. Reindeer herding/game counting/animal tagging etc.
9. Tower installation/power-line construction
10. Firefighting/lime treatments of waterways/ice crushing/avalanche protection/geophysical measurements (flying with external structures at low altitude)
11. Logging
12. Film photo
13. Advertising banner
14. Other flights with external load
15. Other flights (technical, transfer etc.)





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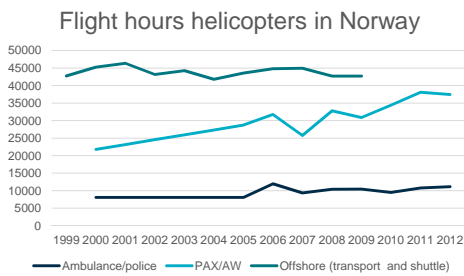
*Some findings from the inland helicopter study (onshore)*



## Comparing production and incident data

- Offshore helicopter
- Police/ ambulance
- Aerial work/PAX

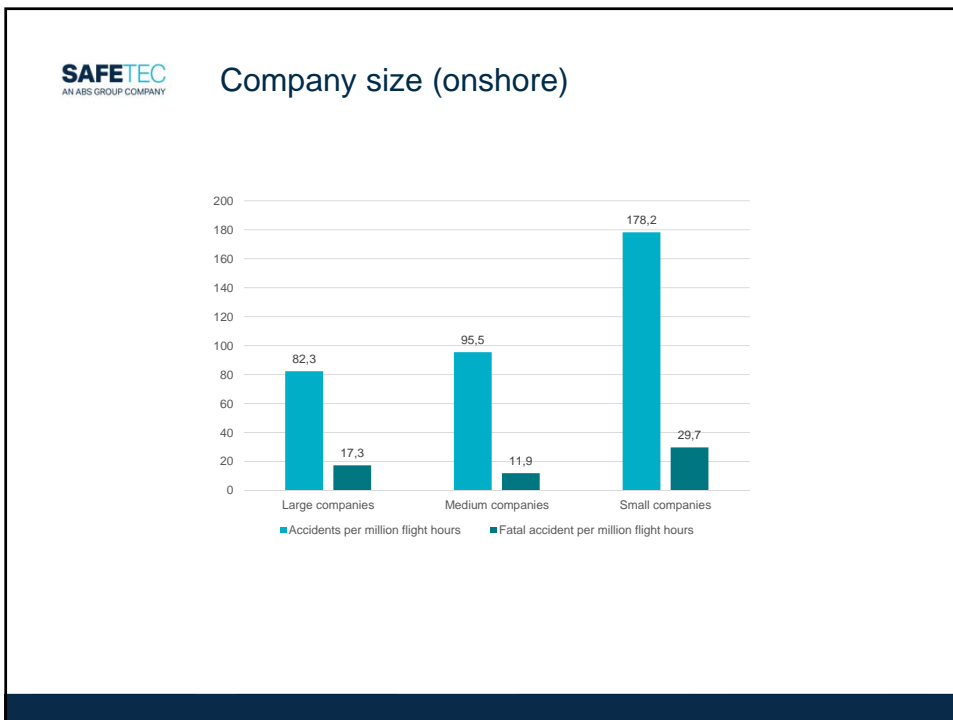
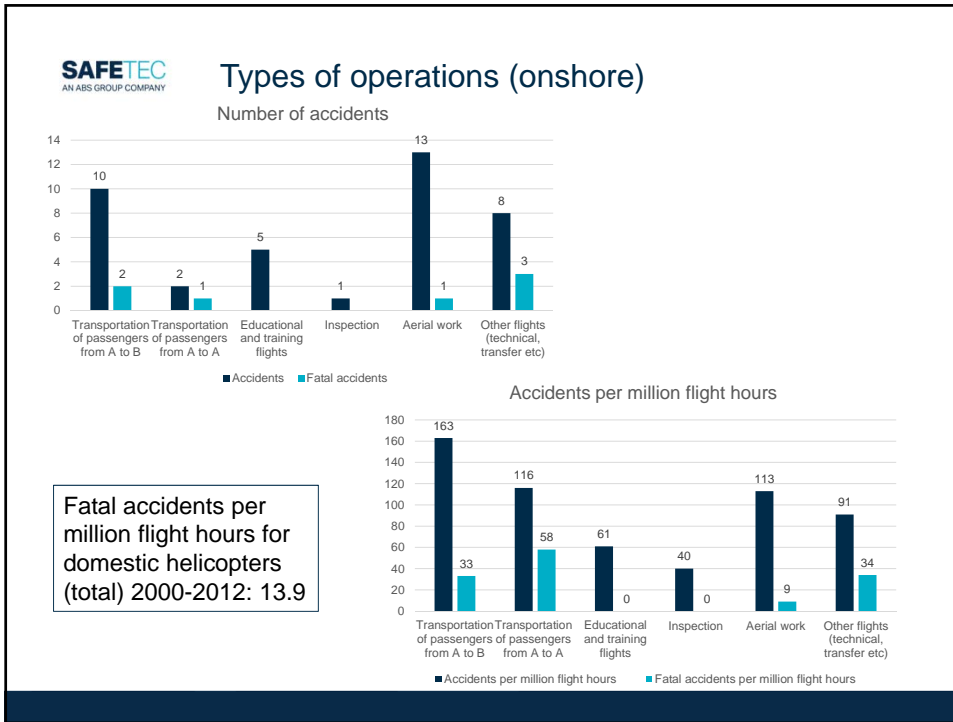
## Traffic volume

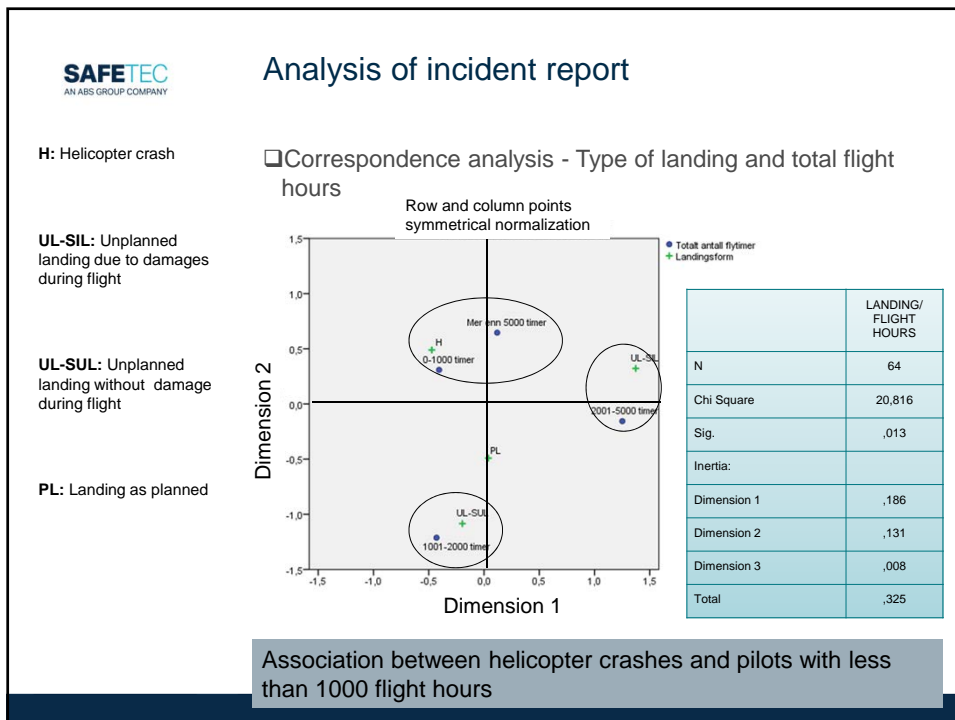
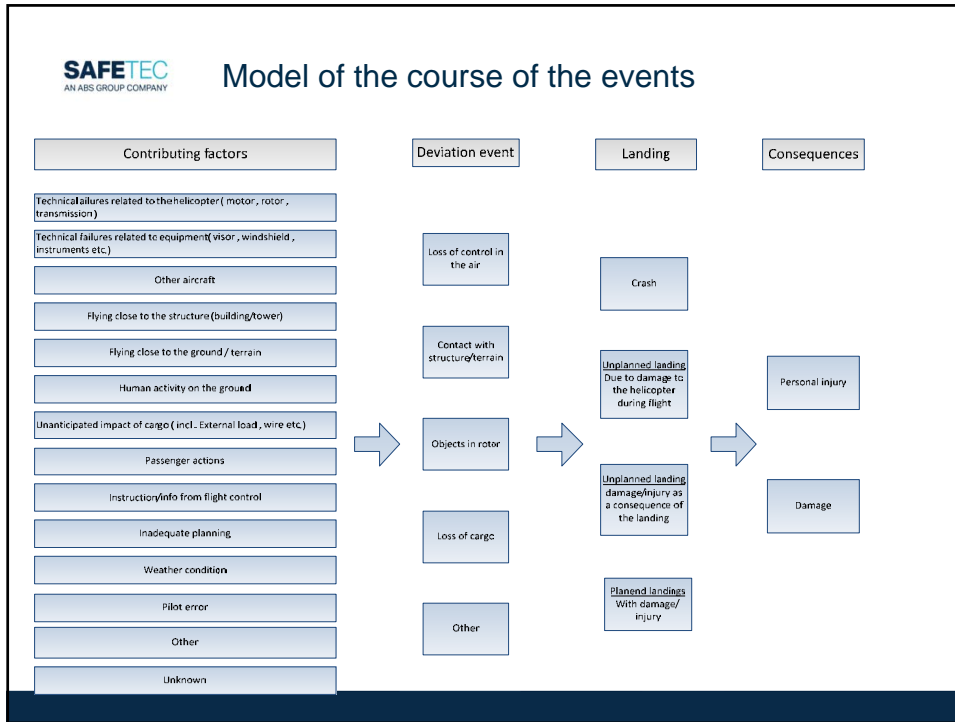


Fatal accidents per million flight hours for offshore helicopters  
1990-1998: 2.8  
2000-2008: 0

Fatal accidents per million flight hours for domestic helicopters  
2000-2012: 13.9

	Offshore N 1990-2008	Ambulance/police	PAX/Arial work	Offshore N 1990-1998	Offshore UK 1990-2008
Flight hours	482204	81747	259721	355760	-
Number of accidents	1	2	39	4	11
Helicopter crash	0	0	23	-	-
Accidents with personal injuries	-	1	20	-	-
Fatal accidents	0	0	7	1	3
Fatalities	0	0	16	12	34





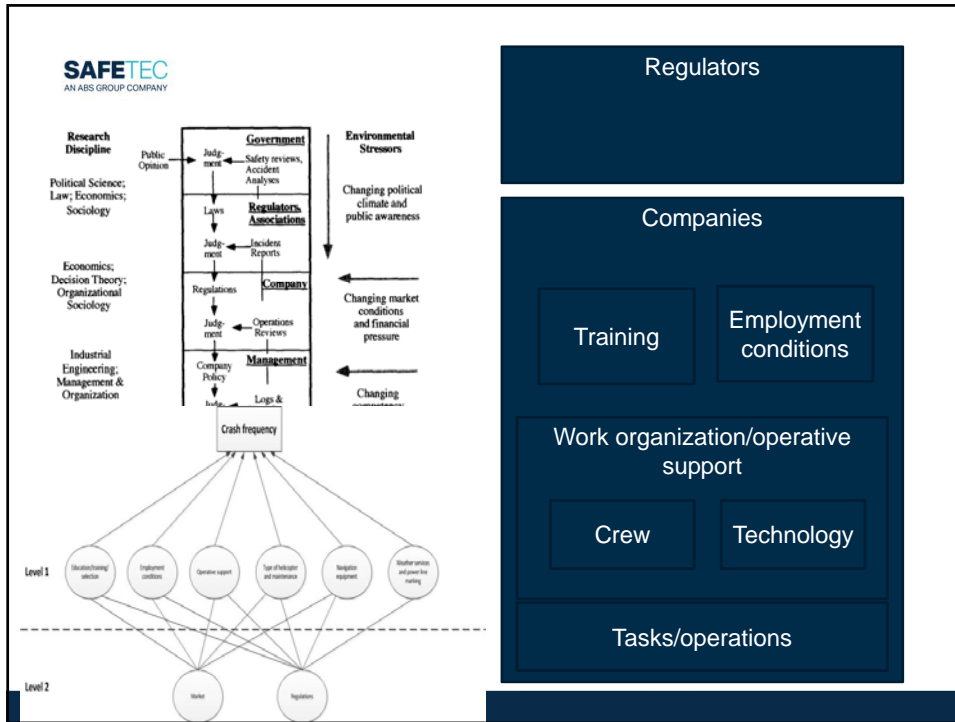


## Conditions associated with helicopter crashes


*All fatal accidents have occurred in crashes. In order to identify root causes of helicopter crashes, a binary logistic regression analysis and correspondence analysis of incident data was performed (Asprang & Bye 2013).*


- PAX operations
- Weather conditions
- Loss of control in the air ("loss of control in flight" LOC-I)
- Inadequate planning
- Pilot's age (younger pilots were more involved in crashes)
- Pilot's total number of flight hours (i.e. fewer than 1000 flight hours)
- Types of operators (small aerial work/PAX operators, foreign operators, and private pilots)

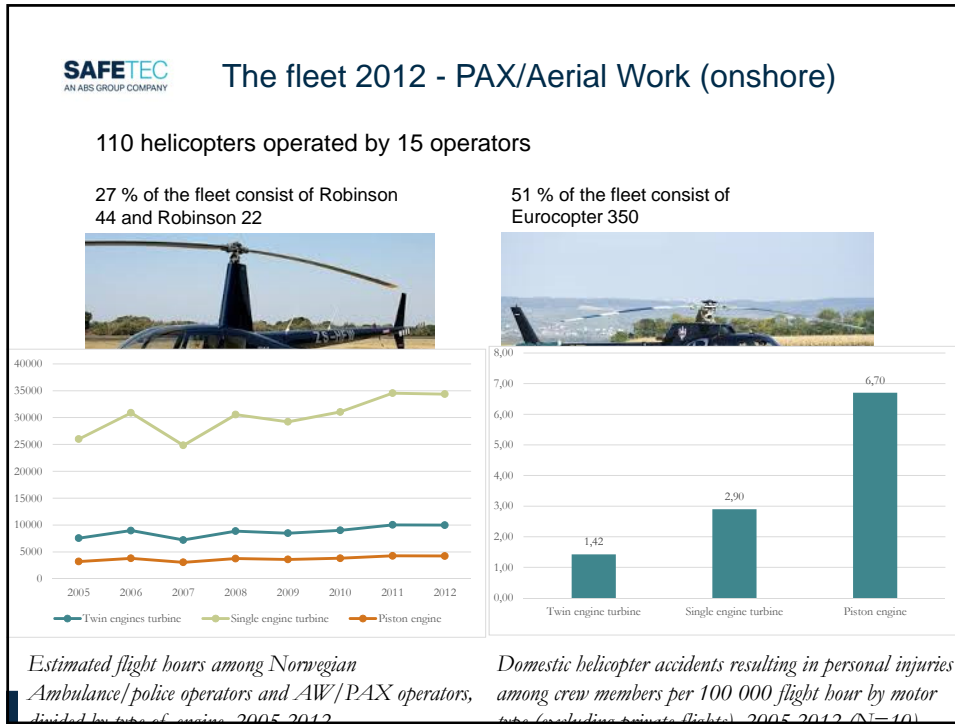
# Why?




Tasks/operations		
<p><b>Offshore helicopter transportation</b></p> <ul style="list-style-type: none"> <li>Two main operation</li> <li>Instrument flight</li> </ul>	<p><b>Police/Ambulance</b></p> <ul style="list-style-type: none"> <li>One main operation</li> <li>Time pressure as a part of the operation</li> <li>Instrument flight</li> </ul>	<p><b>PAX/Aerial work</b></p> <ul style="list-style-type: none"> <li>A variety of different types of operations (and different SOPs)</li> <li>Some operation are highly «skilled based» and less «rule based»</li> <li>Some of the operations are regarded by the pilots as very challenging</li> <li>Visual flight</li> </ul>


																		
<b>Crew</b>																		
<b>Offshore helicopter transportation</b>	<b>Police/Ambulance</b>	<b>PAX/Aerial work</b>																
<p>Required certificates:</p> <ul style="list-style-type: none"> <li>- EASA CPL</li> <li>- EASA IR</li> <li>- EASA ATPL</li> <li>- 800 - 1 000 flight hours (CHC HS and Bristow Norway)</li> </ul>	<p>Certificates:</p> <p style="padding-left: 20px;">80 % with IR 55 % with ATPL</p> <p>Average number of flight hours: 5 647 timer</p> <p>Average years of experience: 19</p>	<p>Certificates:</p> <p style="padding-left: 20px;">27 % with IR 13 % with ATPL</p> <p>Average number of flight hours: 3 230 timer</p> <p>Average years of experience: 10</p>																
	<table border="1"> <thead> <tr> <th></th> <th>Ambulance/Police</th> </tr> </thead> <tbody> <tr> <td>Military</td> <td>28 %</td> </tr> <tr> <td>Civil in Norway</td> <td>30 %</td> </tr> <tr> <td>Civil abroad</td> <td>42 %</td> </tr> </tbody> </table>		Ambulance/Police	Military	28 %	Civil in Norway	30 %	Civil abroad	42 %	<table border="1"> <thead> <tr> <th></th> <th>AW/PAX</th> </tr> </thead> <tbody> <tr> <td>Military</td> <td>1 %</td> </tr> <tr> <td>Civil in Norway</td> <td>64 %</td> </tr> <tr> <td>Civil abroad</td> <td>35 %</td> </tr> </tbody> </table>		AW/PAX	Military	1 %	Civil in Norway	64 %	Civil abroad	35 %
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<p><i>Educational background and type of helicopter operator (AW/PAX and Ambulance/police) N=147</i></p>																		


		
<b>Technology</b>		
<b>Offshore helicopter transportation</b>	<b>Police/Ambulance</b>	<b>PAX/Aerial work</b>
<ul style="list-style-type: none"> <li>• Only twin engine turbine (mainly Sikorsky S-92A and Eurocopter EC225)</li> <li>• Navigation instruments</li> <li>• Major equipment upgrades (e.g. monitoring systems HUMS, VHM etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Only twin engine turbine</li> <li>• Navigation instruments</li> <li>• Average age of the fleet: 7</li> </ul>	<ul style="list-style-type: none"> <li>• Mainly helicopters with single engine turbine</li> <li>• 27 % with piston engines</li> <li>• No instruments</li> <li>• Limited use of protective equipment (e.g. floats)</li> <li>• Limited impact absorption/protection</li> <li>• Average age of the fleet: 9</li> </ul>

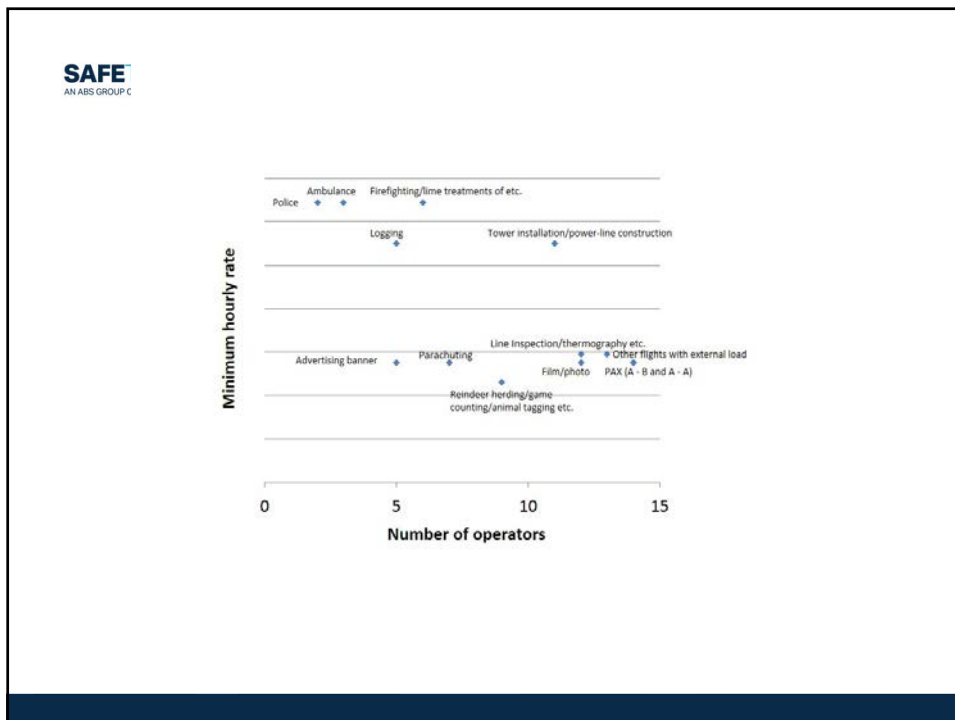



Work organization/operative support		
Offshore helicopter transportation	Police/Ambulance	PAX/Aerial work
<p>Crew:</p> <ul style="list-style-type: none"> <li>Two pilots</li> </ul>	<p>Crew (ambulance):</p> <ul style="list-style-type: none"> <li>One pilot</li> <li>Rescuer</li> <li>Medical doctor</li> </ul> <p>45 % of the aerial work/PAX pilots claim that they always follow the SOP</p>	<p>Crew:</p> <ul style="list-style-type: none"> <li>One pilot</li> <li>Use of «cargo handler»</li> <li>Non controlled airspace</li> <li>A variety of additional responsibilities</li> </ul> <p>25 % of the aerial work/PAX pilots claim that they always follow the SOP</p>

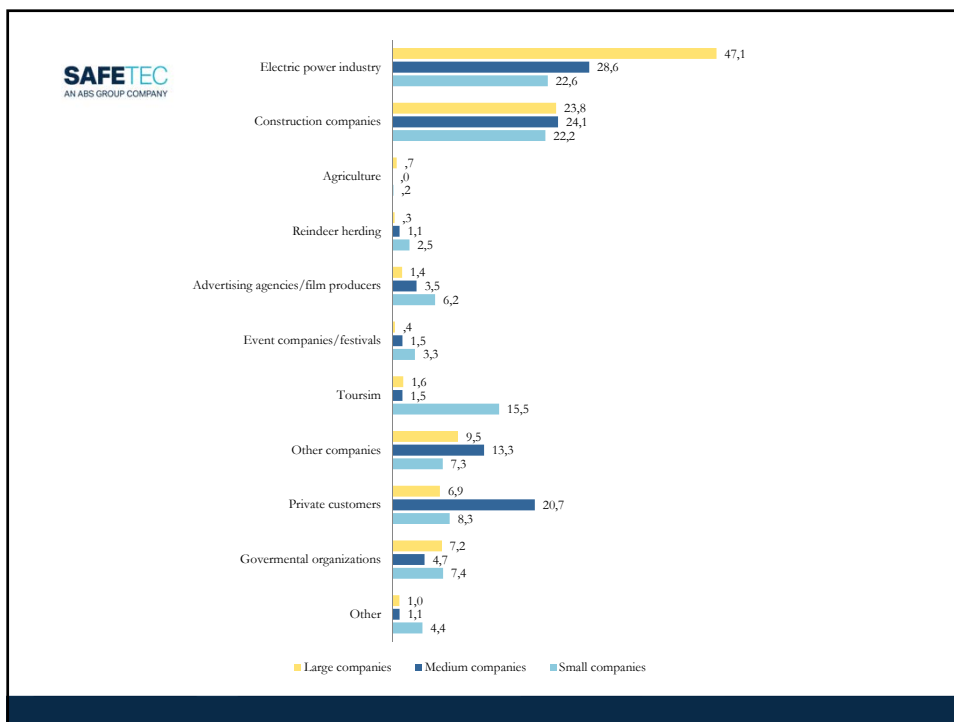
 <div style="text-align: center;"><b>Training</b></div>		
Offshore helicopter transportation	Police/Ambulance	PAX/Aerial work
<ul style="list-style-type: none"> <li>12 hours per year with simulator training (reduced from 16 hours) (HSS-3)</li> </ul>	<ul style="list-style-type: none"> <li>The extent of training is included in the contracts (ambulances)</li> </ul> <div style="background-color: #d9ead3; padding: 5px;"> <ul style="list-style-type: none"> <li>91% of the ambulance/police pilots agree that they receive retraining if they have not conducted a specific operation in a while (N=48)</li> <li>With the exception of one respondent, all ambulance/police pilots agreed that they have received sufficient training in handling critical situations (N=45)</li> </ul> </div>	<ul style="list-style-type: none"> <li>No simulator training</li> <li>Training as a part transfer operations</li> <li>Some pilots have to pay for the use of the helicopters when conducting e.g. recertification</li> </ul> <div style="background-color: #d9ead3; padding: 5px;"> <ul style="list-style-type: none"> <li>48 % of the aerial work/PAX pilots agree that they receive retraining if they have not conducted a specific operation in a while (N=97).</li> <li>62 % of the AW/PAX pilots claimed that they have received sufficient training in handling critical situations (N=95)</li> </ul> </div>

 <div style="text-align: center;"><b>Employment condition</b></div>										
Offshore helicopter transportation	Police/Ambulance	PAX/Aerial work								
<ul style="list-style-type: none"> <li>All pilots employed by the offshore operators are full time employed</li> </ul>	<ul style="list-style-type: none"> <li>All pilots employed by the ambulance/police operators are full time employed</li> <li>12 % of the pilots employed ambulance/police operators have additional employment outside the helicopter company</li> </ul>	<ul style="list-style-type: none"> <li>22 % of the pilots employed by the AW/PAX operators only work part time</li> <li>40 % of the pilots employed by AW/PAX have additional employment outside the helicopter company.</li> <li>27 % of the pilots employed by AW/PAX have been temporary laid off once or several times by their present employer</li> <li>An assumed extensive use of freelance pilots in some companies</li> <li>«Fly for food» agreements</li> </ul> <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>AW/PAX operators</th> <th>The proportion of part time employed pilots</th> </tr> </thead> <tbody> <tr> <td>Small</td> <td>46 %</td> </tr> <tr> <td>Medium</td> <td>11 %</td> </tr> <tr> <td>Large</td> <td>2 %</td> </tr> </tbody> </table>	AW/PAX operators	The proportion of part time employed pilots	Small	46 %	Medium	11 %	Large	2 %
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 <b>Organizations (Suppliers)</b>		
Offshore helicopter transportation	Police/Ambulance	PAX/Aerial work
<ul style="list-style-type: none"> <li>The largest helicopter companies in Scandinavia are within offshore flights in Norway: CHC Helicopter and Bristow Norway.</li> <li>In 2015 CHC has about 200 pilots, while Bristow Norway has about 155 pilots.</li> <li>Non-norewegian owners</li> </ul>	<ul style="list-style-type: none"> <li>Two ambulance operators: "Norsk Luftambulanse and "Luftransport"</li> <li>"Luftransport" is also a provider of Aerial work and Scheduled flight with helicopters</li> <li>The police operator is integrated part of the police agency</li> </ul>	<ul style="list-style-type: none"> <li>15 operators</li> <li>Analysis of company data shows that the majority of the aerial work/PAX companies have had negative operating profit over the past 5 years (Asprang &amp; Bye 2013b)</li> <li>Foreign competitors (Swedish)</li> <li>Private pilots competes in some market segments, e.g. film/photo, Reindeer herding</li> </ul>
	<ul style="list-style-type: none"> <li>94% of the ambulance/police pilots claimed that the manning situation was sufficient in order to maintain the safety in the organization. The corresponding percentage among AW/PAX pilots is 63 %.</li> <li>None of the ambulance/police pilots experienced pressure from the management to conduct a flight, even though they experience that the safety is in jeopardy.</li> </ul>	<ul style="list-style-type: none"> <li>63 % of the AW/PAX pilots claimed that the manning situation was sufficient in order to maintain the safety in the organization.</li> <li>28 % of the AW/PAX pilots experience a pressure from the management to conduct a flight, even though they experience that the safety is in jeopardy. None of the ambulance/police pilots experienced such pressure.</li> </ul>



 <div style="background-color: #003366; color: white; padding: 5px; text-align: center; font-weight: bold;">Customers and Regulators</div>		
Offshore helicopter transportation	Police/Ambulance	PAX/Aerial work
<ul style="list-style-type: none"> <li>PSA as additional regulator</li> <li>Oil and gas companies as customers are considered as responsible party in terms of helicopter safety and may impose stricter safety requirements in their contracts</li> <li>2 main suppliers</li> <li>Additional requirements set by the oil companies</li> <li>Fixed day rate plus hourly compensation</li> <li>Strong labour unions, both among the pilots and the users of the helicopter services</li> <li>High media attention</li> </ul>	<ul style="list-style-type: none"> <li>Only one customer</li> <li>Police: a part of the agency</li> <li>Ambulance: «Luftambulansetjenesten ANS»</li> <li>Additional requirements set by the customer</li> <li>Inadequate supervision</li> <li>Strong trade unions</li> <li>Other professions (and unions) involved in the operations</li> <li>High media attention</li> </ul>	<ul style="list-style-type: none"> <li>Many customer within different industries</li> <li>Price is often the only criteria for an assignment</li> <li>Predominately single assignments</li> <li>Inadequate supervision</li> <li>Weak trade unions</li> <li>Low media attention</li> </ul>



*Some concluding remarks*

