

G+ Global Offshore Wind Health & Safety Organisation

2018 incident data report



www.gplusoffshorewind.com

About the G+ Global Offshore Wind Health & Safety Organisation

Offshore wind power is a primary technology helping to meet the global low carbon challenge. With costs falling, deployment of offshore wind and employment in the sector are rising dramatically. This places an obligation on operators to observe the very highest standards of health and safety.

G+ is the global health and safety organisation for the offshore wind industry. The Energy Institute provides the secretariat and supports the ongoing work of the G+.

We bring together business leaders, health and safety experts and organisations operating in the offshore wind industry to drive good practice and promote world-class safety performance across the sector.

Through an evidence-based approach, we ensure key emerging risks are mitigated through co-operation and shared learnings, aiming for the highest levels of health and safety standards being pursued throughout the life cycle of offshore wind farms.

We engage on important industry matters by facilitating discussion and bringing together industry stakeholders to speak with one voice for the offshore wind industry.

The G+ has three main strands of work: incident data; good practice guidance, and a safe by design programme.

For more information, please visit www.gplusoffshorewind.com

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Introduction from the Chair

2018 has seen a continuing increase in installed capacity of offshore wind farms. Worldwide, installed capacity reached over 23 GW¹, 4.5GW more than in 2017. Currently, Europe is the leader in offshore wind, with 80%² of global offshore wind installed. New markets are opening in Asia and America, with local authorities and companies building their capability and capacity, and investing in and developing many offshore wind projects, such as the 605 MW Greater Changhua 1 project in Taiwan or the 800MW Vineyard Wind in the US, both being developed by G+ members among others.

Against this backdrop, it has been an important year for the G+. During the year we have cemented the collaboration across all G+ members, growing the number of associate members, and welcoming companies from a variety of backgrounds into the working groups and G+ activities. This has resulted in a number of successful outcomes, including the publication of second editions of *Good practice guideline on the safe management of small service vessels used in the offshore wind industry* and *Good practice guideline working at height in the offshore wind industry*. The G+ members have also worked to collaborate and engage more widely with others working in the global offshore industry, through initiatives such as the Dropped Objects Prevention Scheme (DROPS) and through chairing the Industry Collaboration Committee (ICC). The ICC brings together the key organisations working across the sector to ensure alignment of objectives, removal of duplication and see the industry move forward on health and safety in a cohesive and collaborative way. Our focus in 2018 has very much been to internationalise the work of the G+, ensuring others are able to benefit from the work carried out to date, transfer knowledge and support efforts to address health and safety issues in emerging areas.

The 2018 incident data report continues to provide an overview of the health and safety performance of the G+ members' offshore wind activities, including the holistic industry benchmarking metrics of lost time injury frequency (LTIF) and total recordable injury rate (TRIR), which have experienced a remarkable improvement in 2018. To enhance the value to industry we are continually looking to improve and develop the way we gather and present these data. This year, and for the first time, we have collected country-specific information. We have also made available anonymised data, and worked to ensure these can be accessed interactively through our website³. Through our routine Deep Dive meetings, and our first data champions workshop, we have also examined our incident data collection and reporting system allowing further harmonisation of definitions, looking to improve the quality of data as we move forward.

2018 has been a positive year for the G+, as our commitment to improve the health and safety in the offshore wind industry with programmes such as our two yearly Safe by Design workshops has contributed to our ever improving health and safety performance. In our 2018 Safe by Design workshops, technicians, engineers and relevant stakeholders, participated to discuss improvements in wind turbine generator (WTG) access and egress as well as WTG access to the transition piece below the airtight deck, for example.

2019 will be an exciting year for the G+, as our efforts continue to reduce injury frequency, further internationalise the G+ and increase collaboration with other organisations. We very much look forward to building our network of members and our partnerships across the sector, including those with regulators, in promoting our shared goal of improving the health and safety performance of the industry on a global level.



Paul Cowling

Chairman – G+ Global Offshore Wind Health and Safety Organisation
Managing Director Innogy Renewables UK Limited
Director of Offshore Wind



¹ GWEC, *Global wind report 2018*

² WindEurope, *Wind energy in Europe in 2018 – Trends and statistics*

³ www.gplusoffshorewind.com/work-programme/hse-statistics

Overview of 2018 incident data report: sites and method of work

Overview of G+ member sites

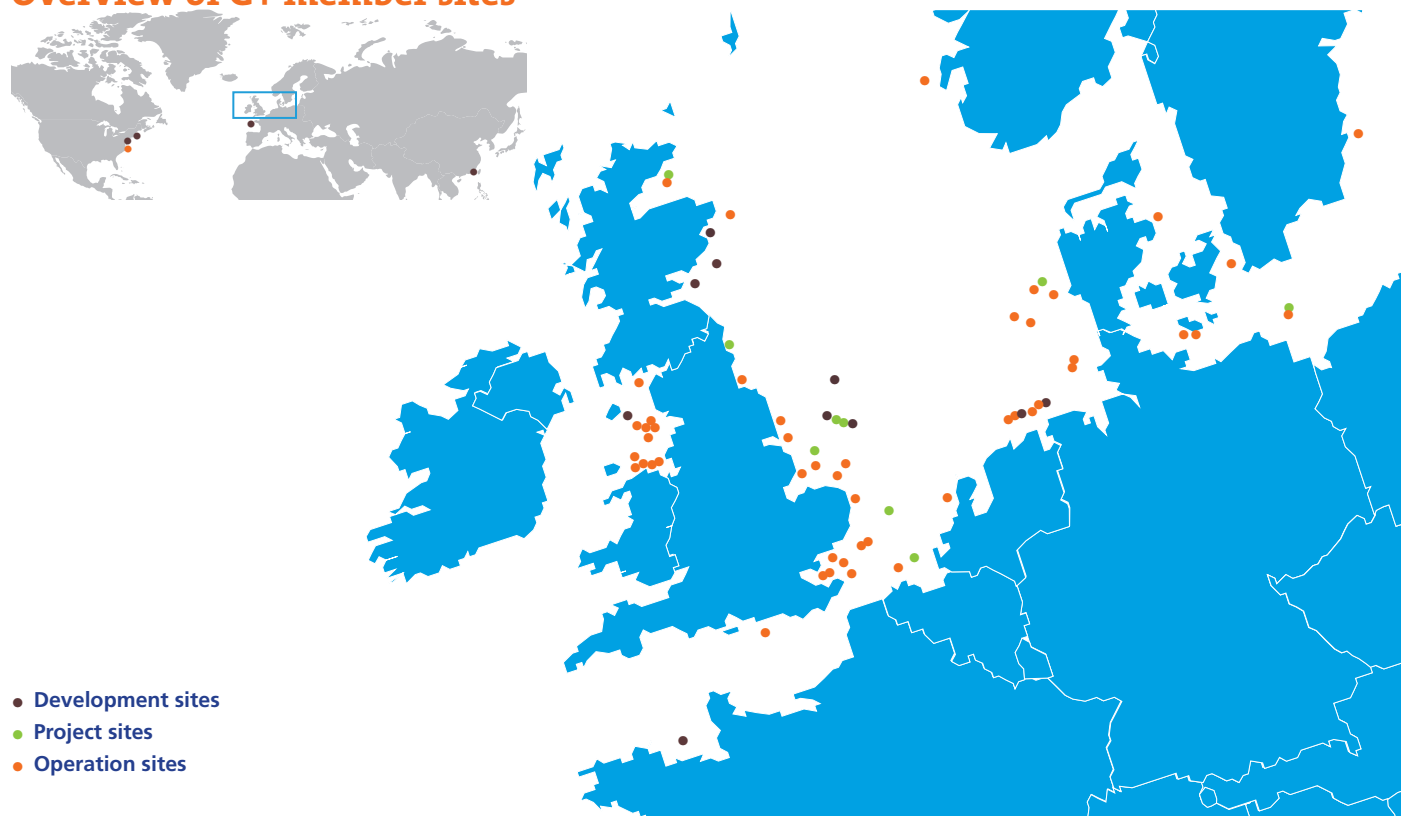


Figure 1: G+ member sites included in the incident data reporting

Method of work

G+ member companies submit incident data on a quarterly basis, which are then analysed by the Energy Institute secretariat. Quarterly reports are issued for G+ Board and Focal Group review. The G+ identify focus areas within the data and decide on a work programme to mitigate these risks. Each year, the data collection template is reviewed, streamlined and enhanced to reflect industry feedback. A full list of the incidents included in the G+ report is available on the G+ website. Deep Dive data meetings are held quarterly, with a few G+ member companies and there is an annual data reporting review meeting. All held to ensure the quality of the data reported and presented.

2018 highlights

2018: key facts and figures

Key facts

854	reported incidents
0	fatalities
39	total lost work day incidents
31	incidents resulting in an emergency response or medical evacuation
510	incidents occurred on operational sites ⁶
314	incidents occurred on project sites ⁸
30	incidents occurred on development sites ¹⁰

Work process

155	incidents during marine operations ⁴
99	incidents during access/egress
79	incidents during lifting operations ⁵

Incident area

288	incidents occurred in the turbine ⁷
278	incidents occurred on vessels ⁹
223	incidents occurred onshore ¹¹

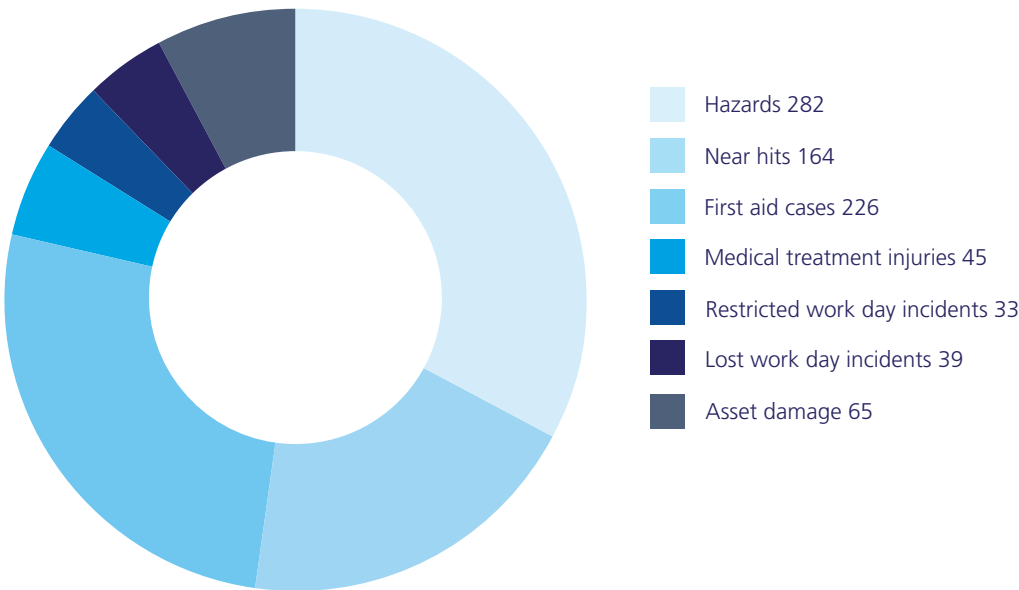


Figure 2: 2018 incident consequence summary

4, 5, 6, 7, 8, 9, 10, 11 See Annex A for the definitions of these terms.

Safety statistics for 2018

	2017	2018	Interannual variation
Hours worked*	26 815 000	25 709 000	- 4 %
Fatalities	0	0	No change
Lost work day incidents	49	39	- 20 %
Restricted work day incidents	30	33	+ 10 %
Medical treatment injuries	78	45	- 42 %
Total	157	117	- 25 %
Total recordable injury rate (TRIR)	5,85	4,55	- 22 %
Lost time injury frequency (LTIF)	1,83	1,52	- 17 %

There has been a decrease in the number of incidents from 2017 to 2018. This decrease has occurred as the result of the maturing of the offshore wind industry driven by:

- An improving safety culture led by sharing lessons learned among stakeholders.
- Improved technologies.
- A focus of attention across the G+ membership on high potential hazards.
- Continuous improvement of working methods.

Lost work day incidents have decreased significantly, even after the reduction in hours worked has been accounted for.

Injuries requiring medical treatment have also reduced significantly. However, it should be noted that in 2017 the G+ experienced an increase in reporting of medical treatment injuries due to definition misalignment among G+ members. This issue has been resolved in 2018 and could also account for the sharp reduction in the number of incidents.

Overall, there has been a decrease in incidents included in TRIR and LTIF as the total number of incidents reported fell more sharply than the total number of hours worked. There are a number of potential drivers behind this, including the increase in awareness of issues and the focus given by G+ members to key areas, particularly vessel transfers and manual handling, where the G+ has put its efforts into updating good practice guidelines.

TRIR

The number of recordable injuries (fatalities + lost work day incidents + restricted work day incidents + medical treatment injuries) per 1 000 000 hours worked.

LTIF

The number of recordable injuries (fatalities + lost work day incidents) per 1 000 000 hours worked.

* Hours worked rounded up to nearest 10 000.

High potential incidents

Summary – breakdown by incident area, consequence and work process

In 2018 there were 256 high potential incidents; this constitutes a 13 % decrease in the number of high potential incidents from 2017. These incidents are defined by G+ as incidents that had the potential to cause a fatality or a life-changing injury. Lifting operations and marine operations remain as the main high potential work processes. However, high potential incidents in these work processes have decreased by 24 % and 7 % respectively in comparison to 2017. The main incident areas where high potential incidents occurred were vessels and on turbines.

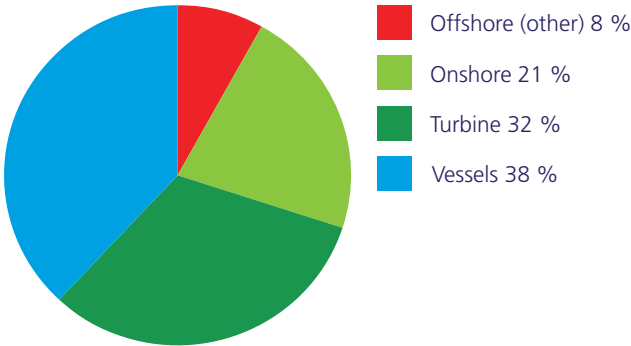


Figure 3: High potential – incident area summary

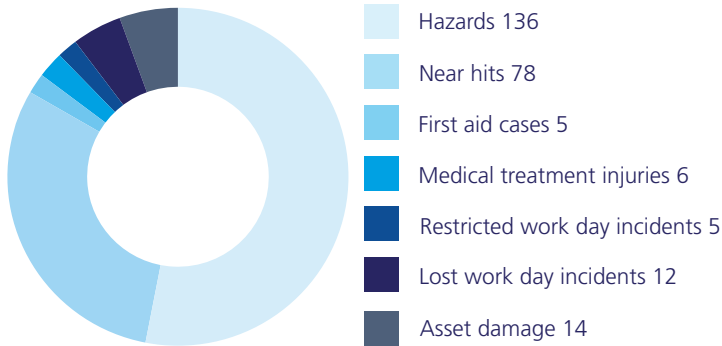


Figure 4: High potential – actual incident consequence

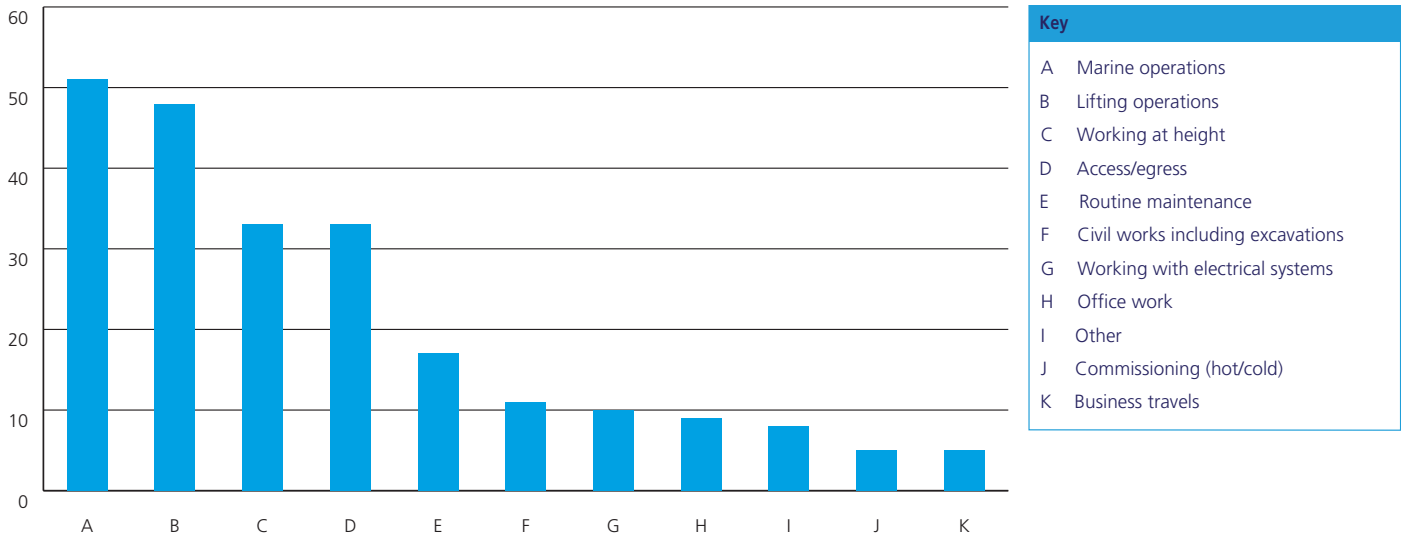


Figure 5: High potential – work process breakdown

Incident area analysis: Vessels

Vessels can carry large numbers of passengers at a given time. Therefore, an incident involving a vessel has the potential to impact a number of individuals. In January 2018, the G+ published the second edition of *Good practice guideline the safe management of small service vessels used in the offshore wind industry*, recognising the need for continuous improvement to safety on board vessels. In 2018, there was a total of 278 incidents and hazards involving vessels; 34 % of these were high potential incidents. The work carried out by G+ members on improving safety through good practice guidelines, wider improvements in vessel technology, as well as increased vessel crew competence, has contributed to the reduction of crew transfer vessels incidents, which have halved, decreasing from 196 incidents in 2017 to 98 in 2018. In Figure 7 the profile of vessels and site type is presented, where it can be seen that incidents occurring in vessels working on operational sites (128) narrowly surpass those of vessels working on project sites (123).

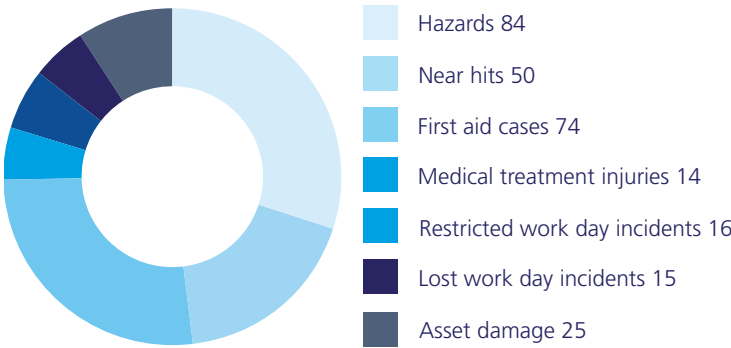


Figure 6: Vessels – actual incident consequence

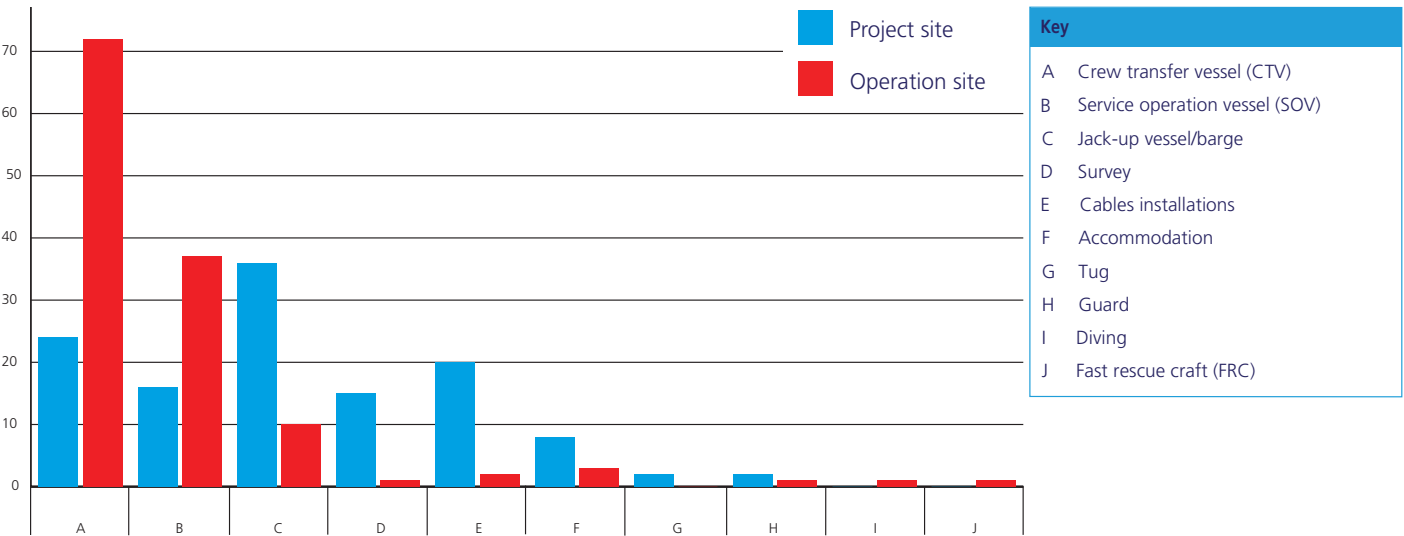


Figure 7: Vessels – site type breakdown

Emergency response or medical evacuation incidents

Summary – breakdown by incident area and work process

In 2018 there were 31 emergency response or medical evacuation incidents. The highest number of ERME incidents occurred on board vessels (36 %) and on turbines (35%), which is a reduction on the previous year, where 56 % of ERME incidents occurred in vessels, and led the G+ to a focus on improving vessel safety. In 2018, 39 % of ERME incidents were classified as high potential incidents, representing an improvement over the previous year. Most ERME incidents occurred during marine operations, accessing and egressing assets or were manual handling issues, with the most common consequence of these being a lost work day incident. 42 % of ERME incidents occurred in project sites, 52 % of incidents occurred in operational sites and 6 % in development sites.

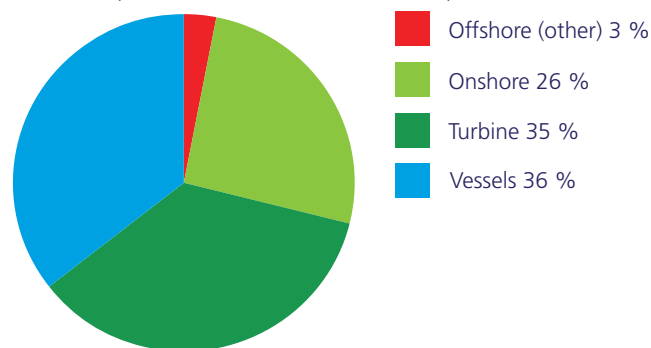


Figure 8: Incident area from which the ERME took place

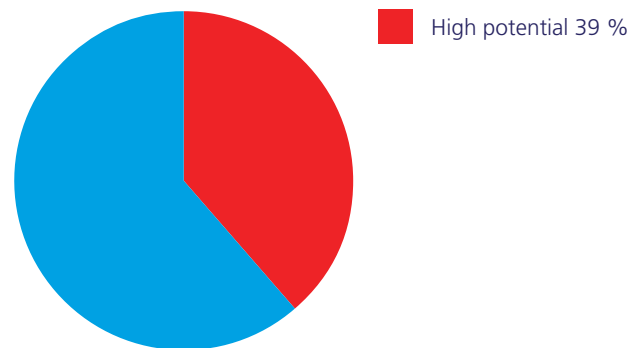


Figure 9: Percentage of ERME incidents that were classified as high potential

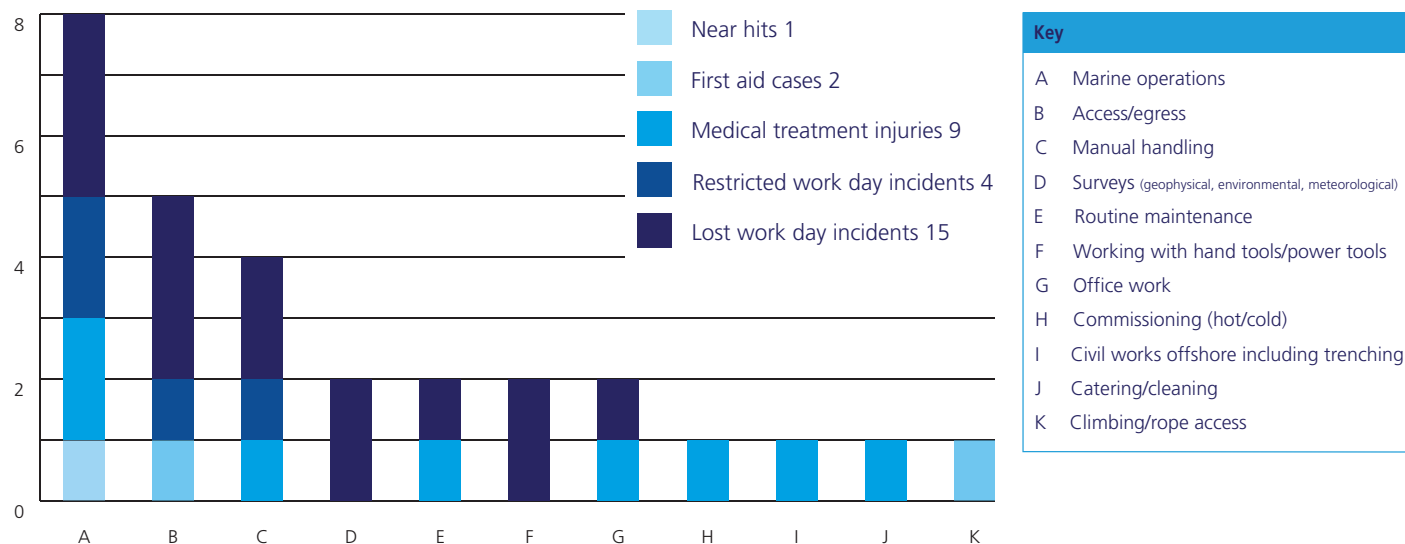


Figure 10: Work process breakdown of ERME incidents by the actual consequence of the incident

Lost work day incidents

In 2018 there were 39 lost work day incidents: 25 of these were reported on vessels and turbines, 13 onshore and 1 offshore. 31 % of lost work day incidents were categorised as high potential. The main work processes where lost work day incidents happened were: marine operations, manual handling and access/egress. The main injuries that can be associated with lost work day incidents are finger and back injuries, which represent 23 % and 18 % of lost work day incidents respectively.

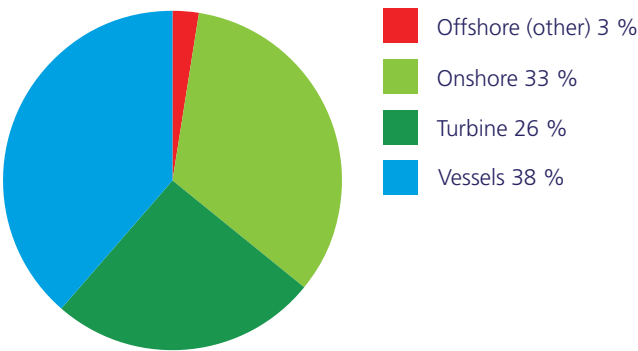


Figure 11: Lost work day incidents – incident area breakdown

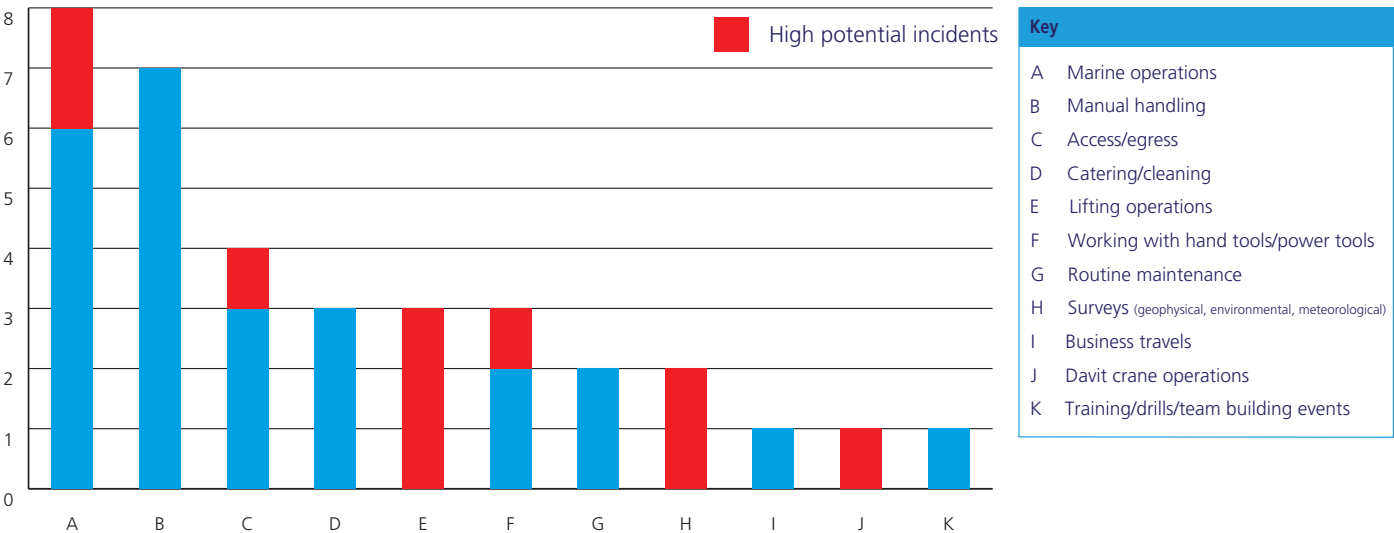


Figure 12: Lost work day incidents – work process breakdown with high potential incidents identified

Incident data summary: work process

37 work process categories were available for selection by the G+ members when reporting incident data in 2018. Figure 13 shows the top 10 work processes with the proportion of high potential incidents identified. Marine operations, access/egress and lifting operations are the top three work processes where incidents occurred, following a similar pattern to 2017. However, the number of incidents that were classified as TRIR during access/egress has almost halved, due in part to a reduction in turbine incidents driven by turbine design and procedural improvements. TRIR incidents during lifting operations, on the other hand, have seen a 29 % increase in 2018, although of those, the number of high potential incidents fell to 48 in 2018 from 63 in 2017, as a result of continuous technological improvements among others. In Figure 13 it can be seen that high potential incidents comprise an important share of the incidents that occurred during lifting operations (61 %), working at height (69 %), marine operations (33 %) and access/egress (33 %).

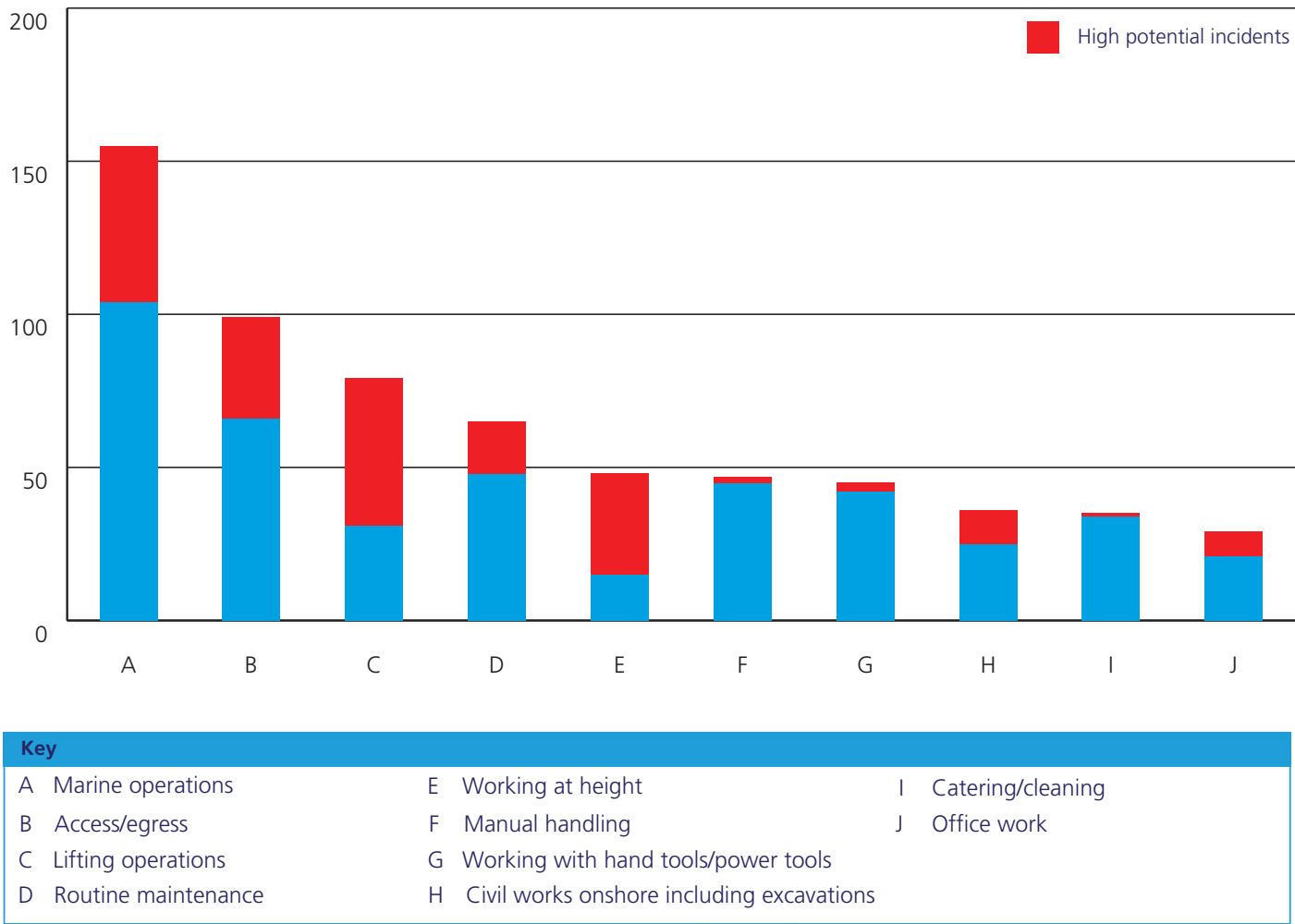


Figure 13: Work process – top 10 work processes with the highest number of incidents reported, with high potential incidents identified

Work process analysis: Manual handling

2018 saw a considerable improvement in manual handling incidents from the previous year, decreasing from 86 incidents in 2017 to 47 incidents in 2018. Despite this, manual handling is the work process with the second highest number of lost work day incidents and the third most ERME incidents. Consequently, manual handling and ergonomics have remained areas on which the G+ has focused its attention in recent years, delivering good practice guidelines, and a focus of much discussion. The majority of the reported manual handling incidents occurred inside the turbine area, where the most common consequence was a first aid injury.

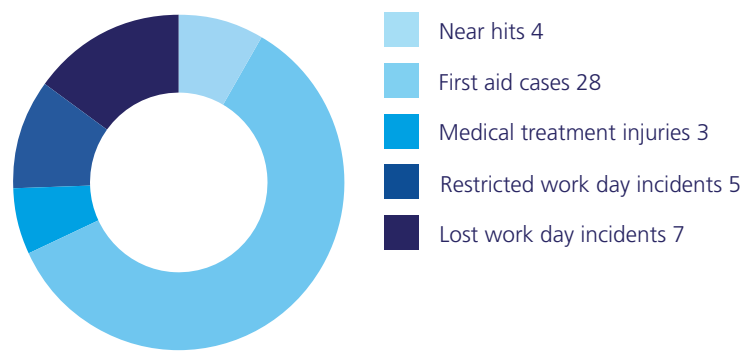


Figure 14: Manual handling – incident consequence

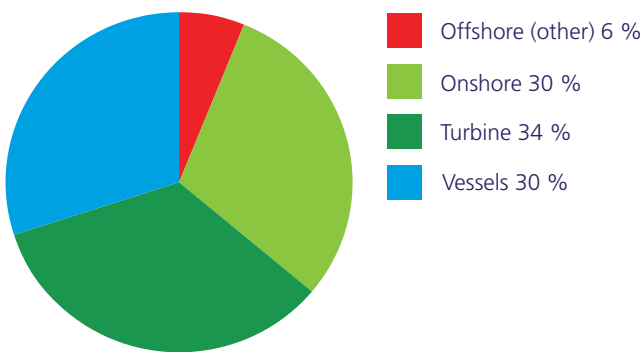


Figure 15: Manual handling – incident area summary

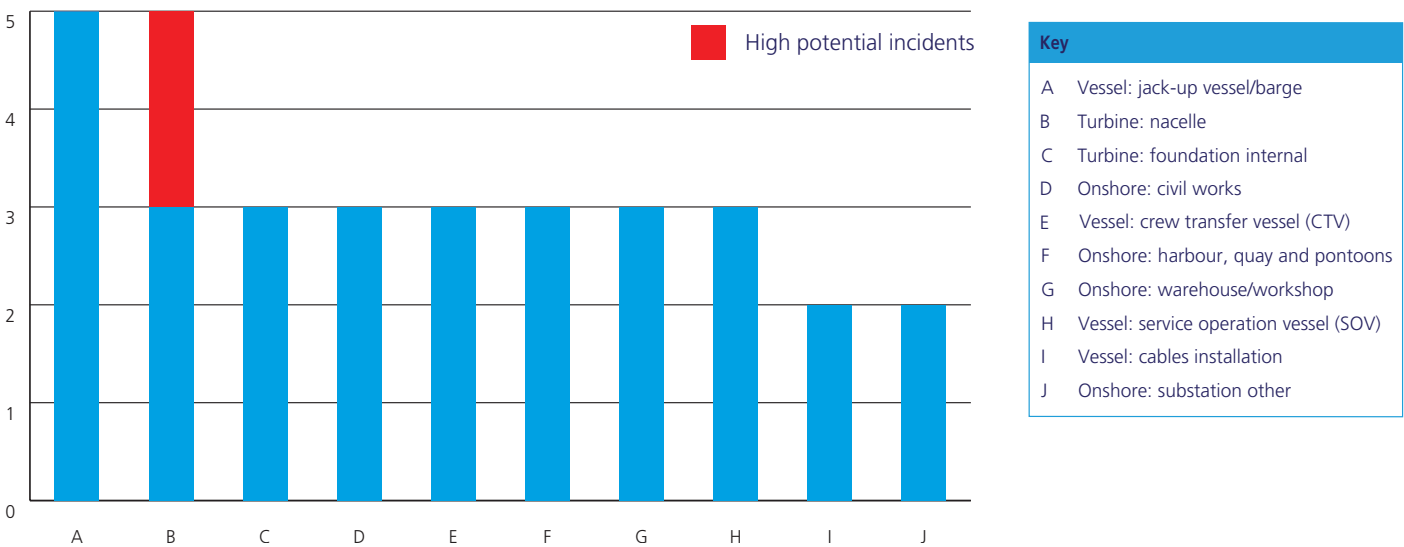


Figure 16: Manual handling – incident area breakdown with high potential incidents identified

Working at height

Working at height is the work process with proportionally the greatest share of high potential incidents. From 48 incidents submitted by G+ members on work at height, 69 % were categorised as high potential, representing an increase in the share of high potential incidents reported in this work process over 2017 (22 %). Despite this increase in the share of high potential incidents working at height, in comparison with 2017 there has been an overall decrease of 59 % in working at height incidents and hazards reported. In Figure 17 it can be seen that most of the reported incidents were hazards, yet, due to the nature of the work process, 87 % of reported hazards were high potential. Over 90 % of the reported working at height incidents occurred on vessels or within turbines.

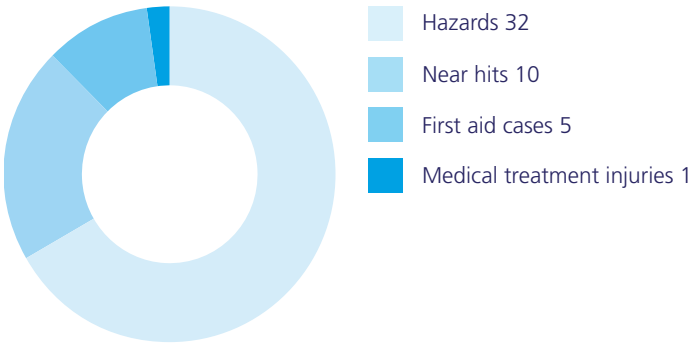


Figure 17: Working at height – incident consequence

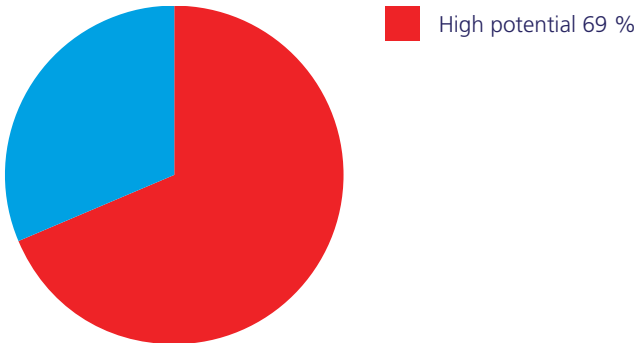


Figure 18: Working at height –percentage of incidents classified as high potential

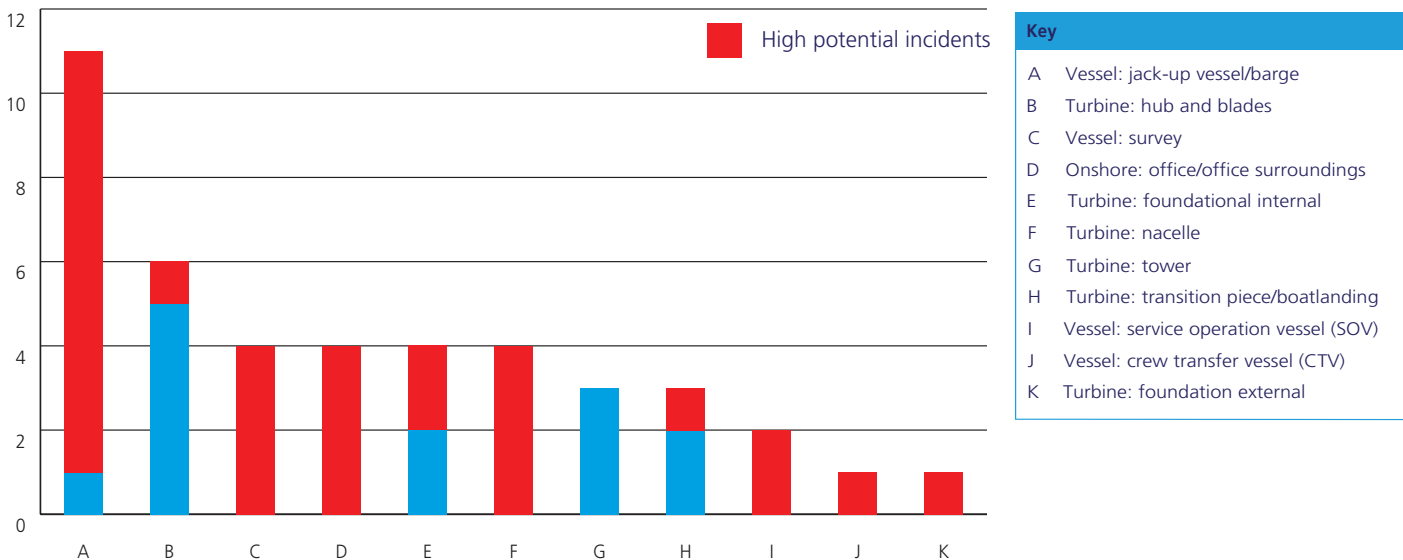


Figure 19: Working at height – incident area breakdown with high potential incidents identified

Dropped object incidents

In 2018, there were 66 dropped object incidents, representing a reduction of over 60 % compared to 2017. This improvement can be attributed to design upgrades in turbines which decrease the opportunities for potential falling objects, as well as ever-improving tool attachment to belts and holsters. 61 % of dropped object incidents were near misses, 15 % caused a first aid injury, 5 % caused a medical treatment injury, 2 % caused a restricted work day incident and 2 % caused a lost work day incident. 59 % of dropped object incidents were classified as high potential, meaning that dropped objects in the offshore wind industry represent an important threat to safety. Therefore, the G+ members, working in partnership with DROPS, have just released *G+/DROPS Reliable securing booklet for offshore wind*, to help eliminate the risk of dropped objects.

Focusing on incident areas, 56% of dropped object incidents occurred in turbines, 26 % in vessels, 15 % occurred onshore and 3 % offshore. The main work process where objects were dropped was marine operations, followed by lifting operations.

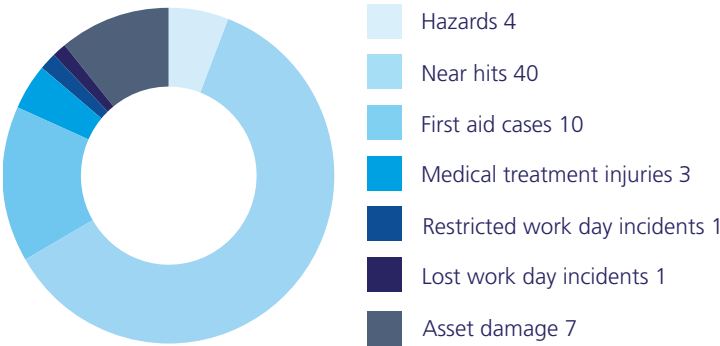


Figure 20: Dropped objects – incident consequence

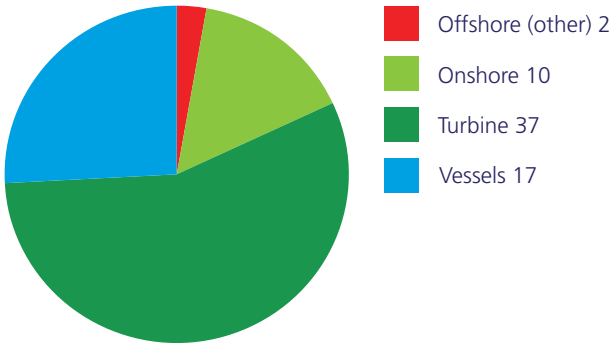


Figure 21: Dropped objects – incident area summary

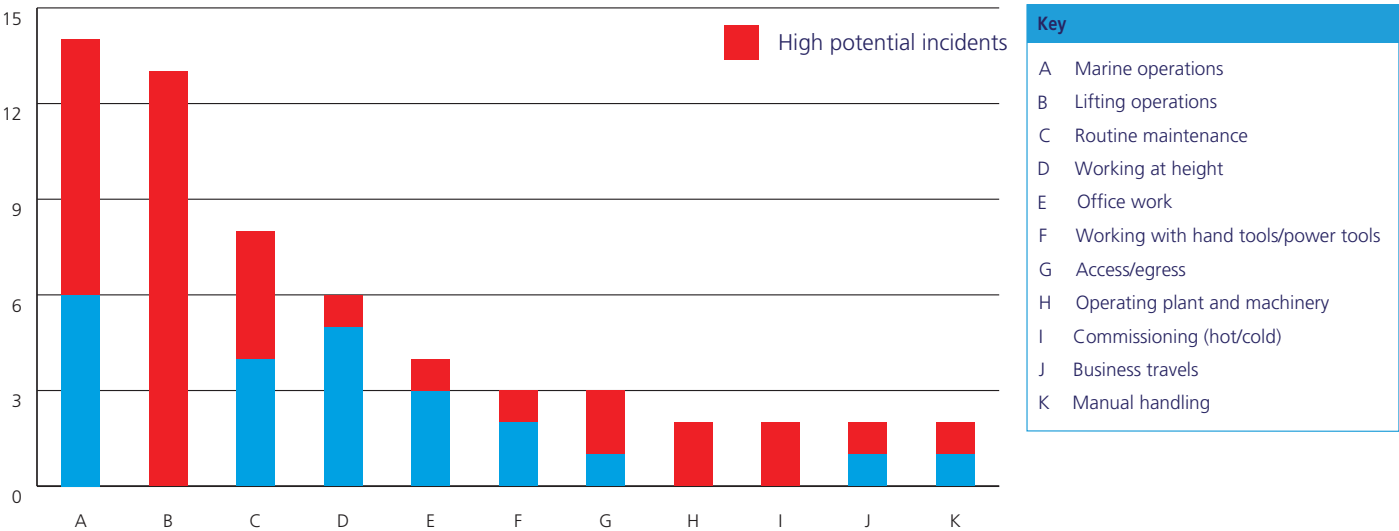


Figure 22: Dropped objects – work process breakdown with high potential incidents identified

Project and operation sites

G+ member offshore wind farms comprise projects that are either in the development, projects (construction), operation or decommissioning phases. These are defined as:

- **Development site:** Development and consenting phase of the project.
- **Project site:** Construction and commissioning.
- **Operation site:** Site in operation producing power. (Note: Turbines will often be commissioned and handed over to operations as soon as they are built. In case a site has both project and operational activities the incident should be evaluated to determine what activity was performed and classified accordingly.)
- **Decommissioning:** Wind farm decommissioning activity.

A breakdown of the incident data by top 10 work processes in project and operational phases of a wind farm is shown in Figure 23, where it can be seen that both site types follow different incident profiles, due to the nature of the work carried out in the different site types. Marine operations, access/egress, lifting operations and routine maintenance are the main work processes with the highest number of incidents in operational sites, while in project sites most incidents have occurred in marine operations, lifting operations, civil works onshore and during access/egress.

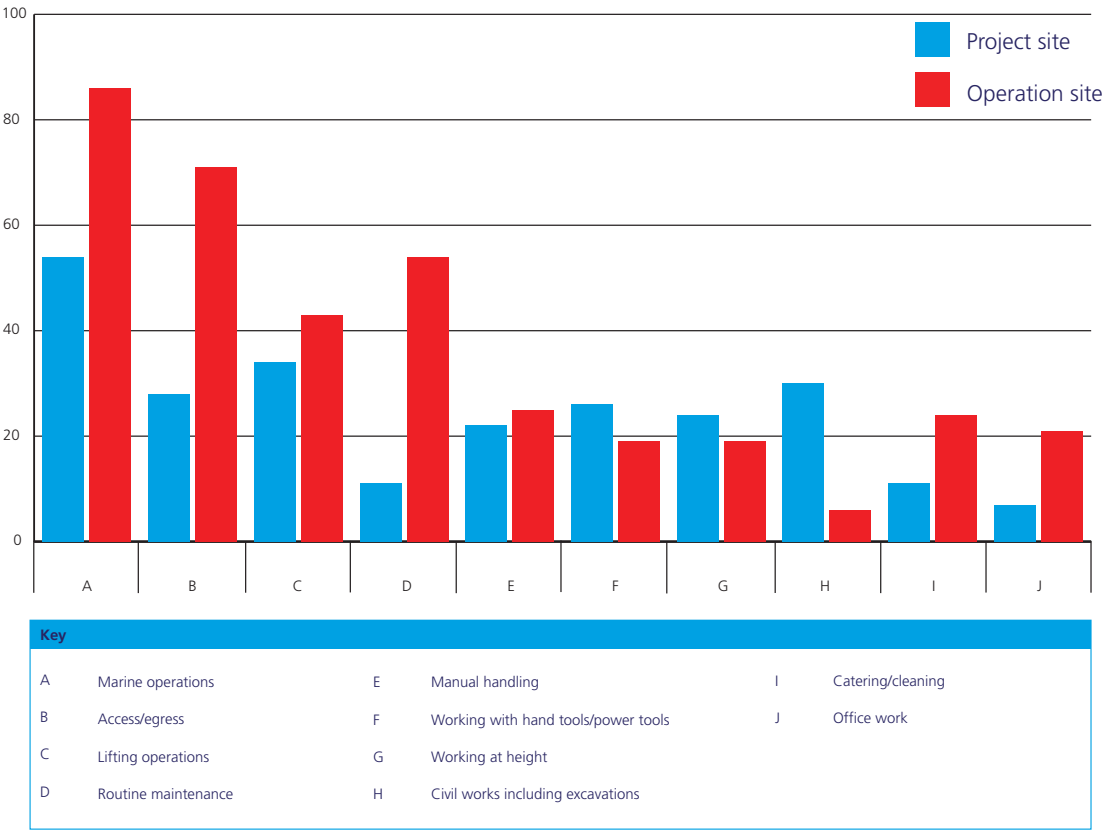


Figure 23: Work process – project/operation site breakdown

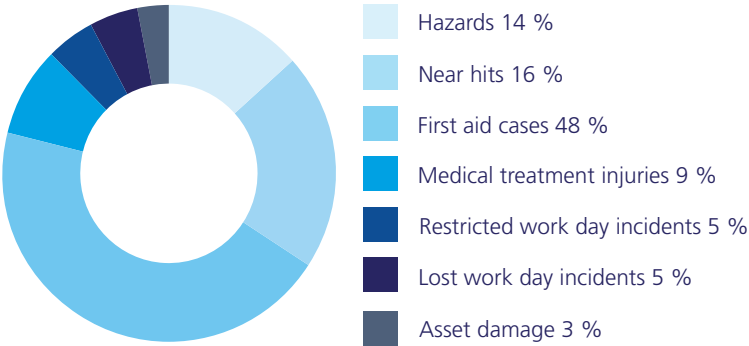
Country profiles

In 2017 the G+ committed to record incident data from countries where the G+ members operate and to provide country-specific feedback. The G+ collates incident data from sites situated in Denmark, France, Germany, The Netherlands, Sweden, Taiwan, United Kingdom and the United States.

As Figures 24 to 28 demonstrate, each country follows a different incident profile. For instance, in Denmark and The Netherlands, a high percentage of incidents required first aid treatment, while in the UK, Taiwan and Sweden most reported incidents were classed as hazards. These different profiles suggest the need to further explore each country to extract learnings from each nation. Exploring the top three work processes with the highest number of incidents per country, as well as the TRIR and LTIF per country, enables us to present the different incident dynamics that have unfolded within the countries in which G+ members operate¹².

Examining Figure 24 to Figure 28, it can be seen that incidents during access/egress and the composite work process marine operations, are a common denominator across most countries. To further analyse these country profiles, please explore our dataset on the G+ website³.

Country	No. of sites	Hazardous observations	Near hits	First aid cases	Medical treatment injuries	Restricted work day incidents	Lost work day incidents	Asset damage	Total	Hours (million)	LTIF/ TRIR
Denmark	6	14	15	47	9	5	5	3	98	1.7*	2.88/10.96
France	1		2						2	0.5	NA/NA
Germany	14	40	27	31	8	8	12	4	130	4.9*	2.46/5.75
The Netherlands	3	2	2	6	1				11	0.1*	NA/9.94
Sweden	2	2	1			1			4	0.03*	NA/31.07
Taiwan	1	3	2						5	0.3	NA/NA
United Kingdom	40	216	111	137	26	18	22	58	588	14.9	1.48/4.43
United States	3	5	4	5	1	1			16	0.6	NA/3.3

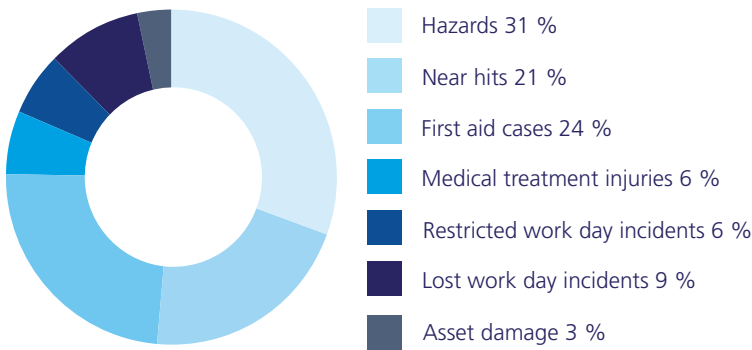


Denmark 98 incidents	
Office work	12 %
Catering/cleaning	9 %
Access/egress	8 %
Manual handling	8 %

Figure 24. Denmark's incident consequence profile and top three work processes

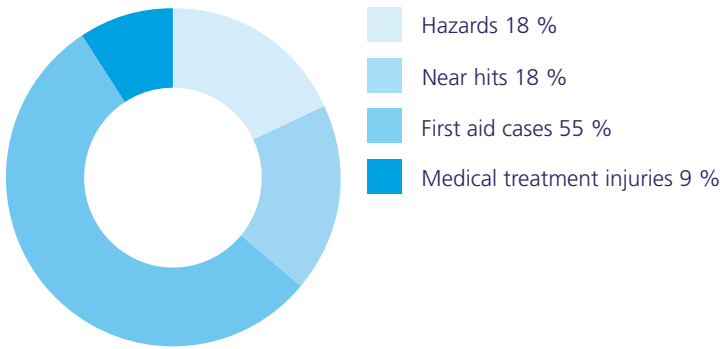
¹² Due to the number of countries in which the G+ operates, only individual country profiles of countries with over 10 incidents will be shown.

* Estimated hours



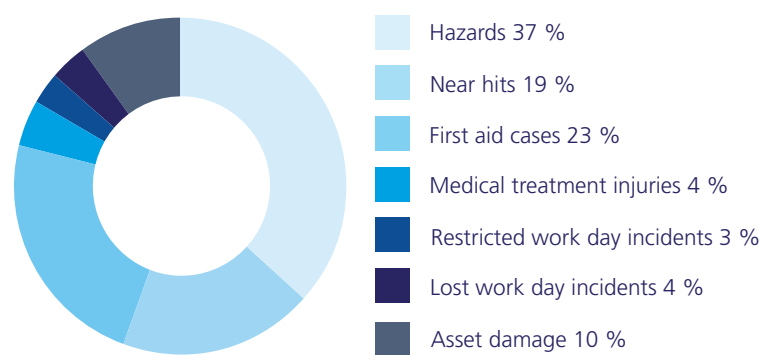
Germany 130 incidents	
Marine operations	15 %
Lifting operations	12 %
Access/egress	11 %
Working at height	11 %

Figure 25. Germany's incident consequence profile and top three work processes



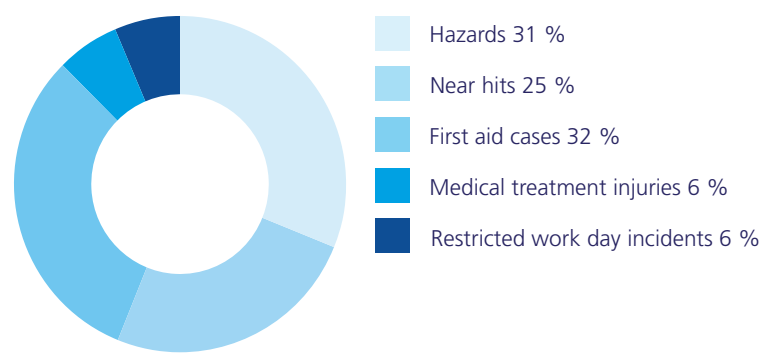
The Netherlands 11 incidents	
Access/egress	45 %
Marine operations	18 %
Business travels	9 %
Training/drills/team building events	9 %
Lifting operations	9 %

Figure 26. The Netherlands' incident consequence profile and top three work processes



United Kingdom 588 incidents	
Marine operations	19 %
Access/egress	12 %
Lifting operations	10 %

Figure 27. United Kingdom's incident consequence profile and top three work processes



United States 16 incidents	
Marine operations	69 %
Working at height	13 %
Catering/cleaning	6 %
Surveys (geophysical, environmental, meteorological)	6 %

Figure 28. United States' incident consequence profile and top three work processes

Conclusions and next steps

The publication of the G+ incident data is a crucial step in ensuring information is provided in a transparent and open way. With this approach, genuine improvements can be made to the offshore wind industry's health and safety performance. Whilst the key headlines from these data are presented in this report, the G+ encourages further analysis of the data and welcomes queries from interested stakeholders.

Learnings from this report are shared across G+ member companies to contribute to the evolution of G+ work programmes. For the presentation of the 2018 data, we introduced an interactive platform to enable others to explore the data held on our website, which will allow health and safety professionals to look in more detail, interact with the data and increases G+ transparency and information sharing.

For the first time we have recorded incidents by their country of occurrence, enabling us to provide country-specific feedback. Furthermore, we have worked to harmonise definitions, increasing the quality of the data submission process. In 2019 we will continue to improve and harmonise our process by updating our guidelines, building on the experiences learned from 2018.

2019 will be an important year for G+; we will endeavour to continue our efforts to collaborate with international stakeholders and regulators to provide world class health and safety performance. Our workstreams will continue to focus on improving occupational health and safety through looking at the use of immersion suits offshore and through developing recommended medical and fitness standards and guidelines for offshore wind technicians. In addition, the mental health and well-being of our workforce will take central stage in our efforts to improve as an industry. These work programmes will continue to demonstrate the G+'s leadership in offshore wind health and safety.

Annex A – Glossary

Throughout the report some terms are used to mean a group of work processes or incident areas. The definitions to these terms are as follows:

Marine operations⁴	Marine operations comprise the following work processes: diving operations, maritime operations, transfer by vessel, transit by vessel, vessel operation and vessel mobilisation.
Lifting operations⁵	Lifting operations comprise the following work processes: lifting operations and rigging/slinging/banking. They do not include davit crane lifting operations or cable pull/winching operations.
Operational site⁶	Site in operation producing power.
Turbine⁷	The turbine includes: internal and external foundations, hub and blades, nacelle, service lift, tower, transition piece/boatlanding areas, external and internal foundations, helicopter area and yaw gear space.
Project site⁸	Site under construction and commissioning.
Vessels⁹	Vessels include: accommodation vessels, cable installation vessels, crew transfer vessels (CTVs), diving vessels, fast rescue crafts (FRCs), guard vessels, jack-up vessel/barge, service operation vessels (SOVs), survey vessels and tugs.
Development site¹⁰	Development and consenting phase of the project.
Onshore¹¹	Onshore areas include: public roads/areas, car parks, harbour/quay/pontoons, excavations and civil works, administration, offices, warehouses and workshops, substations and turbine assembly.
Offshore	Offshore areas include: offshore accommodation platform, offshore meteorological mast and offshore substation areas.

The following incident consequence definitions have been used in the G+ dataset:

Fatality	An incident that involves death as a result of a work-related incident or occupational illness. Deaths that occur after an incident but are a direct consequence of an incident are to be included.
Hazard	A hazard is a condition or a situation where there is a potential to cause an incident. It is important to remember that nothing has happened, and no impact/harm has occurred.
Near hit	A near hit or miss is any incident which could have resulted in a work-related accident but did not, either by chance or timely intervention.
First aid	An injury which requires simple treatment that is self-administered or by a first aider, doctor or nurse but does not result in lost time or long-term medical care.
Medical treatment injury	An incident not severe enough to be reported as a fatality, lost work day incident or restricted work day incident, but which is more severe than requiring simple first aid treatment.
Restricted work day incident	An incident that does not result in a fatality or a lost work day but does result in a person being unfit for the full performance of the regular job on any work on any day after the occurrence of the occupational injury.
Lost work day incident	Non-fatal incident that involves a person being unfit to perform any work on any day after the occurrence of the occupational injury. 'Any day' includes rest days, weekend days, leave days, public holidays or days after ceasing employment.
Asset damage	An event where there is damage to plant, equipment or facilities (no injury to persons).
High potential incident	High potential incidents are incidents or near misses that had the potential to cause a fatality/life-changing injury.

The following statistical definitions have been used in the G+ incident data analysis:

Total recordable injury rate (TRIR)	The number of fatalities, lost work day incidents, restricted work day incidents and medical treatment injuries per million hours worked.
Lost time injury frequency (LTIF)	The number of fatalities and lost work day incidents per million hours worked.

The following abbreviations have been used throughout the report:

ICC	Industry Collaboration Committee
CTV	crew transfer vessel
DROPS	Dropped Objects Prevention Scheme
ERME	emergency response or medical evacuation
FRC	fast rescue craft
G+	G+ Global Offshore Wind Health and Safety Organisation
LTIF	lost time injury frequency
SOV	service operation vessel
TRIR	total recordable injury rate
WTG	wind turbine generator

Become a G+ Associate member

G+ ASSOCIATE MEMBERSHIP

- Become part of an open network of health and safety experts, professionals and stakeholders and help to provide health and safety leadership and direction to the industry.
- Attend the G+ Annual General Meeting with members of the G+ Board of Directors.
- Attend G+ Focal Group meetings and propose agenda items for discussion.
- Contribute to G+ work programme.
- Actively participate in G+ working groups to deliver health and safety products for the industry.
- Contribute suggestions for topics and presentations to be included in the G+ "Safe by Design" workshop programme.
- Gain industry recognition as an Associate Member on the G+ website.
- Includes Technical Company Membership of the EI (see overleaf).
- Discounted access to the EI's good practice resources.

Membership Fee

- The annual membership fee for G+ Associate Membership is GBP15K.
- It includes EI Technical Company Membership (see overleaf).

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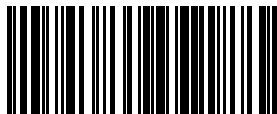
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