SafetyOn

2021 Onshore Wind Health and Safety incident data report

SafetyOn

www.safetyon.com

About SafetyOn

SafetyOn is the health and safety organisation for the Onshore wind sector. Providing leadership in health and safety for a dynamic and innovative onshore wind industry, SafetyOn's work ensures transparency for the industry's Health and Safety performance, as well as assisting industry stakeholders to see that key emerging risks are mitigated through co-operation and shared learning

SafetyOn is working to:

- provide health and safety leadership across the onshore wind sector;
- seek participation of companies from across the onshore wind sector and partner with relevant trade organisations, consultancies and others;
- monitor and gather data on the health and safety performance of the sector;
- make use of and ensure effective communication of new and existing good practice and experience both from the UK and internationally;
- seek to share knowledge and good practice with associated sectors, including offshore wind, conventional generation and power networks, in the UK and beyond as appropriate

SafetyOn works in partnership with the Energy Institute (EI), which provides the secretariat and background support for all the work undertaken by SafetyOn. The EI is the chartered professional membership body bringing energy expertise together.

For more information, please visit www.safetyon.com

Contents

Glossary of terms

The following site type and incident area definitions have been used in the SafetyOn dataset:

Development site	development and consenting phase of the project
Construction site	construction and commissioning
Operational site	site in operation producing power
Windfarm	car park; civil works; office/office surroundings; road and tracks; turbine assembly, deliveries, borrow pits
Turbine	foundation external; foundation internal; hub and blades; nacelle; service lift; tower; yaw gear space
Substation	part of an electrical generation, transmission, and distribution system
Public space	an incident which occurs on a public space

The following work process definitions have been used in the SafetyOn dataset:

Access/egress	incidents related to accessing or egressing foundations, WTGs, substations
Borrow pit/explosives	mineral extraction and explosives
Cable termination/jointing	activities relating to termination and connection of cables
Cable pull/winching operation	laying down or removal of cables
Civil works including excavations	incidents that occur during construction, engineering and commissioning
Climbing/rope access	incidents that involve ascending/descending using a ladder or a rope
Chemical and hazardous substances	incidents that occur while working with hazardous chemicals or substances
Communications	incidents relating to sharing of information or loss of communication signals
Confined spaces	working in any place with limited or restricted means of entry or exit
Documentation and process failure	incidents relating to non-conformance of documents
Driving	an incident which is work-related when involving a vehicle whilst on business or arising out of, or in connection with work. This excludes: any regular commute to or from a normal place of work; or the first/last journey where employees are site based and contracted to travel to different sites and begin/end work at specified time(s)
Electrical systems	working on electrical equipment, machinery or installations. The system may or may not be electrically connected to a common source of electrical energy
Hand tools/power tools	incidents which occurred while utilizing hand and power tools due to misuse, lack of maintenance, not wearing PPE or not securing the work area
Lifting operations	an operation concerned with the lifting or lowering of a load'. A 'load' is the item or items being lifted, which includes a person or people
Manual handling	incidents related to activities which are undertaken requiring the use of force to be exerted by a person to lift, push, pull, carry or otherwise move, hold or restrain any object
Mechanical systems	incidents which involve working with mechanical systems
Office work	incidents occurring while performing tasks related to office/administrative work
Operating plant and machinery	incidents that occur while performing tasks related to operating plant and machinery
Replacing major components	incidents that occur during the replacement of major components, such as gearbox or the blades
Routine maintenance	incidents that occur while periodical inspections of assets take place
Security	incidents that involve trespassing onsite, i.e. break ins, vandalism, theft
Surveys	incidents relating to surveys during the whole life cycle of a windfarm project
Training/drills/team building events	incidents related to training exercises, drills and events, such as emergency response drills and team exercises
Vehicle movement on site	Vehicles being driven (cars/vans/trucks or any equipment not considered as machinery (i.e.: forklift truck)) on site

Working at heights	Work being performed in a situation where there is potential for a person or an object, including equipment, material, tools and debris, to fall to a lower level

The following incident consequence definitions have been used in the SafetyOn 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
Asset damage	An event where there is damage to plant, equipment, or facilities (no injury to persons)
Near hit/miss	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
No treatment required	An injury to a person which does not require first aid or above, i.e. bruise
First aid	An incident 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	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	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	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
High potential incident	High potential incidents are incidents or near misses that had the potential to cause a fatality/ lifechanging injury
Dropped object	The incident involved an object being dropped, i.e., a technician drops a drill.
Fallen object	The incident involved a fallen object, falling object (includes formed ice on structures)

The following body part definitions have been used in the SafetyOn dataset:

Abdomen	stomach
Ankle	
Arm	elbow, forearm, shoulder, upper arm
Back	upper back, lower back
Chest	ribcage, sternum, respiratory system
Foot	instep, toe, heel
Hand	fingers, thumb, palm
Head	chin, ear, face, nose, teeth
Eye	
Internal	internal organs
Leg	hip, knee, shin, thigh
Neck	throat
Pelvic	groin
Whole body	anaphylaxis, burns, electric shock, infections
Wrist	

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

Total recordable incident rate (TRIR)	The number of fatalities, lost work day incidents, restricted work day incidents and medical treatment incidents per 100,000 hours worked
Lost time incident frequency (LTIF)	The number of fatalities and lost work day incidents per 100,000 hours worked

Abbreviations and acronyms

EI	energy institute
ERME	emergency response or medical evacuation
ESQCR	electricity safety, quality and continuity regulations
GW	gigawatt
G+	global offshore wind health and safety organisation
HSE	health and safety executive
HV	high voltage
LLI	lower limb injury
LTIF	lost time incident frequency
MSD	musculoskeletal disorder
MW	megawatt
OSRG	operational safety rules group
RIDDOR	reporting of Injuries, diseases and dangerous occurrences regulations
SSoW	safe system of work
TAC	technical advisory committee
TRIR	total recordable incident rate
WTG	wind turbine generator
WTSR	wind turbine safety rules

List of figures

Executive summary

This is the second annual report analysing health and safety incidents within the UK onshore wind industry. In this report quarterly data, submitted by members throughout 2021 is analysed and presented. The report highlights the key risk areas that will inform SafetyOn's future work programme.

In this second annual report, 593 incidents were reported across a total of 7,083,375 worked hours. This is an increase of worked hours compared with 2020. Despite the increase in working hours, 2021 saw a decrease in lost work day incidents of 20 %, resulting in a lower Lost Time Incident Frequency (LTIF) compared to 2020.

The incident data has been reviewed and analysed across the following categories:

- Project status (i.e., development, construction, operation).
- Nature of work (i.e., routine maintenance, access and egress, electrical systems, etc.).
- Nature of response and actual consequence (i.e., emergency response medical evacuation, medical treatment, lost work day incident, etc.).
- By body part injured (i.e., hand, head, back, leg, foot, etc.).
- Dropped object and fallen object.

In 2021 SafetyOn added a separate category to the incident data reporting template for fallen objects and dropped objects. Fallen objects and dropped objects present a significant potential for fatality and major injury. The HSE report *Workplace fatal injuries in Great Britain, 2021* informed being struck by a moving (flying or falling) object continues to be one of the three main causes of fatal injury, and has been for each year since at least 2001/02. (*Work-related musculoskeletal disorders statistics in Great Britain, 2021*, 2022). Highlighting fallen and dropped objects in the data analysis will assist in identifying trends and in mitigating serious incidents that could easily be prevented. Analysis of fallen and dropped objects will also support the workstream on lifting operations which is looking at the development of industry good practise on coordinating crane lifting activities at site.

This report highlights the key risk areas for overall incidents and includes incidents during routine maintenance, incidents when working with electrical systems and incidents during access/egress with 71, 59 and 56 incidents reported respectively. These areas were also identified in the 2020 incident data as key risks.

A total of 6 incidents reported in 2021 required Emergency Response Medical Evacuation (EMRE), a decrease in comparison to the 2020 statistics on incidents requiring ERME. Guidance and information on developing site-specific plans and procedures to mitigate the consequence of incidents, and to help protect casualties until they can be delivered to an ultimate place of safety can be found in the SafetyOn *Onshore Emergency Response Good practice guidelines for onshore wind energy developments* published in 2020.

There were 90 incidents reported as high potential, this is an increase of 5% compared to high potential incidents reported in 2020. Incidents reported under the work process electrical systems accounted for 19 high potential incidents, followed jointly by incidents reported under lifting operations and working at heights with 8 high potential incidents reported across each work process. Eleven work processes recorded 3 or more high potential incidents in 2021.

There were 26 lost work day incidents reported in 2021, a decrease of 20% compared with the 2020 incident data. Lost work day incidents were reported across twelve work processes. Manual handling accounted for 6, followed by access/egress with 4 incidents. Manual handling was highlighted in the 2020 data report and is continuing to be monitored under the SafetyOn 2022 work programme.

134 (23 %) incidents caused direct injury to a person. Most incidents causing direct injury to a person resulted in first aid (58 %). Hand injuries remain the most frequent body part injured in 2021, thus SafetyOn has a dedicated workstream on injury trends, with phase 1 examining hand

Executive summary (continued)

injuries in greater depth. The 2022 work programme will also investigate manual handling and working with hand/tools power tools. Working with hand tools/ power tools is the work process with the second highest number of incidents within the Total Recordable Incident Rate (TRIR) calculation. There were 36 incidents causing injury to the lower limb ('Ankle', 'Foot', and 'Leg'). Injury to the lower limb account for the most Lost Time Incident Frequency (LTIF) equating to 9 lost work day cases.

The report provides readers with an overview, including additional analysis regarding medical treatment, lost time incidents, work processes including working with hand tools/power tools, lifting operations, and body parts injured, with a particular focus on lower limb injuries.

Introduction from the chair

As Chairperson I am delighted to introduce to you the second annual SafetyOn health and safety incident data report. Since its inception just over three years ago (April 2019) SafetyOn has quickly established itself as the leading organisation for addressing health and safety issues in the UK onshore wind industry. Working through the Energy Institute, and in partnership with HSE, RUK and a wide range of industry stakeholders, SafetyOn has already published 11 health and safety guidance documents, held a number of industry workshops and stakeholder events, and has provided health and safety leadership across the entire onshore wind sector in the UK. Our membership has also grown significantly, with 20 Tier 1 members and 44 Tier 2 members now collaborating and providing the energy and drive behind what we do.

Incident data gathering and reporting is an essential part of what we do as an organisation, enabling members to collate and share incident data in a unified format. This provides a comprehensive view of health and safety incidents in the industry, sharing learning and ensuring transparency across the membership and with stakeholders, and informing the development of good practice and our wider work programme.

Managing health and safety at all stages of the project lifecycle is key. Activity in onshore wind is expected to increase significantly as it is one of the most cost efficient forms of renewable generation and vital for reaching net zero. It is estimated that building new onshore wind farms needed to meet 30GW by 2030 would create 27,000 jobs. SafetyOn's aim is to ensure health and safety is at the core of every project, and that all employees in the UK's onshore wind industry stay safe and in good health.

In this second annual report, a total of 593 incidents were reported against over 7 million worked hours. Against a backdrop of increased working hours of 2 % on 2020, I am pleased to note a decrease in lost work day incidents by 20%, and a decrease of well over 50 % for incidents that required emergency response medical evacuation in 2021 compared to 2020. SafetyOn continues working with industry to produce good practice guidance and documents with the aim of reducing these figures even more and to continually improve the safety performance for our industry.

Routine maintenance, working with electrical systems and incidents during access/egress remain the top three work processes where incidents occurred in 2021. To address this trend and gather a deeper understanding of these incidents, where they are occurring and the underlying issues, further analysis has been undertaken and is reported here. I am pleased to see that the SafetyOn work programme is already targeting areas where high potential incidents were reported in 2021, for example 'lifting operations' and 'working with electrical systems'.

As with 2020, 2021 was an unprecedented year as the COVID-19 pandemic continued to bring challenges for us all. SafetyOn and RenewableUK took quick action and published guidance regarding procedures and protocols for COVID-19. SafetyOn encourages duty holders to remain cautious, pragmatic, and dynamic, and we will continue our support to organisations as they emerge from the pandemic in a safe way.

SafetyOn is continuing to collaborate with other organisations where it provides value to industry to avoid duplication. One example is the joint workstream with the G+ Global Offshore Wind Health and Safety Organisation in onshore civil construction works. This area both onshore and offshore has been highlighted as a key operational risk. I am immensely proud to hold the Chair for SafetyOn, and I look forward to leading the organisation over the next two years as we work in collaboration with others, and provide leadership and guidance on health and safety across the whole of a rapidly expanding and increasingly vital UK onshore wind sector.

Don Mackay
Chief Technical Officer,
EDF Renewables
Chair
SafetyOn

Methodology

SafetyOn member companies submit incident data on a quarterly basis, which are then anonymised for analysis by the Energy Institute (EI) and published for wider review and scrutiny. Throughout the year, quarterly reports are issued to the SafetyOn Leadership Board, the Technical Advisory Committee (TAC) and Data Champions (company representatives who submit the data for detailed review and interrogation), and key risk areas are identified and used to inform the SafetyOn work programme. Deep dive data meetings are also held quarterly, drawing on the expertise within member companies, to scrutinise the performance of the industry and to identify risk areas that need particular focus and attention. An annual data reporting review meeting is held to assess the whole process and implement improvements. Each year, the template used for data collectionwill be reviewed, streamlined, and enhanced in line with industry feedback and with the purpose of continually improving the process.

The SafetyOn incident data report includes information submitted by Tier 1 members. Tier 2 members have not submitted incident data in 2021 to avoid duplication.

Safety statistics for 2021

2021 Key facts and figures

Key facts

593	**reported incidents**
0	**fatalities**
26	total **lost work day** incidents
6	incidents resulting in an **emergency response or medical evacuation**
468	incidents occurred on **operational** sites
98	incidents occurred on **construction** sites
15	incidents occurred on **development** sites
12	incidents not applicable to above site types

Top three work processes

71	incidents during **routine maintenance**
59	incidents during **electrical systems**
56	incidents working with **access/egress**

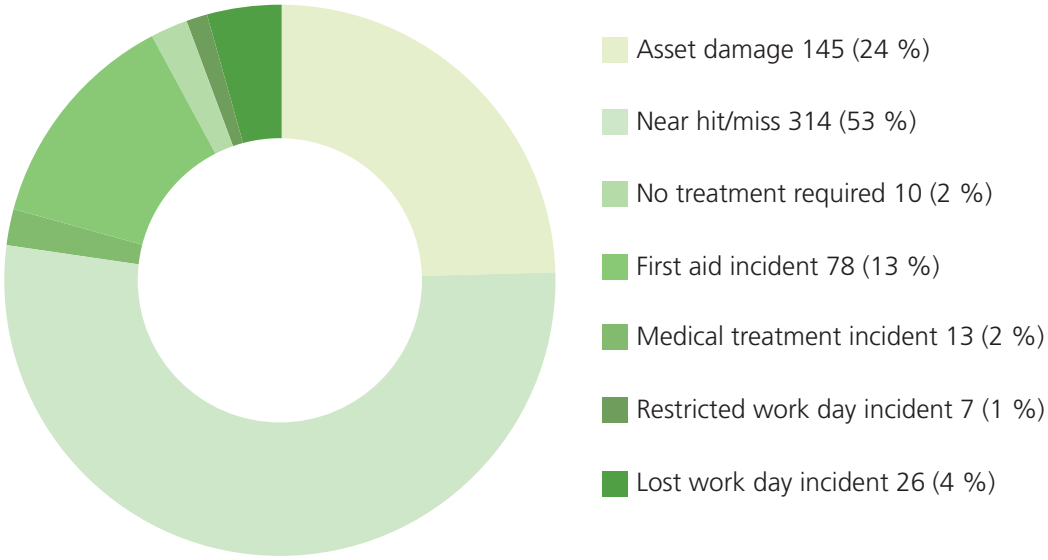


Figure 1: 2021 incident consequence summary

Safety statistics for 2021 (continued)

Year 2021	2020	2021
Hours	6 971 142	7 083 375
Actual consequence		
Fatalities	0	0
Lost work day incidents	29	26
Restricted work day incidents	8	7
Medical treatment incidents	6	13
First aid incidents	68	78
No treatment required	16	10
Near hit/miss	405	314
Asset damage	n/a	145
Total	532	593
Total recordable incident rate (TRIR)	0,61	0,65
Lost time incident frequency (LTIF)	0,41	0,37

SafetyOn members submit incident data for UK onshore wind operations, as well as total working hours. Each SafetyOn member reportstheir own employees and direct contractors who are not SafetyOn Tier One members.

TRIR

The number of recordable incidents (fatalities + lost work day incidents + restricted work day incidents + medical treatment incidents) per 100,000 hours worked.

LTIF

The number of recordable incidents (fatalities + lost work day incidents) per 100,000 hours worked.

High potential incidents

High potential incidents are incidents or near misses that had the potential to cause a fatality/lifechanging injury. 90 (15 %) incidents were reported as high potential in 2021, an increase of 5% compared with 2020 statistics. 50 (56 %) incidents reported as high potential occurred on a turbine, 29 (32 %) occurred on a windfarm, 6 (7 %) in the substation and 5 (6 %) in a public space. 17 of the high potential incidents were reported as having involved a fallen object, 8 involved a dropped object. 52 of the incidents reported as high potential were near hit/miss. 19 high potential incidents were reported under the work process working with electrical systems, 8 high potential incidents occurred during lifting operations and 8 occurred when working at height.

SafetyOn is aware of the risks in these areas. In 2020, SafetyOn Research report: 'An investigation into the root causes of fires in MW scale wind turbines' was published which focuses on the root cause of fires based on data received from HSE (RIDDOR; ESQCR), industry and other sources. Following this work, SafetyOn recognise that there are other risks associated with HV electrical systems. There is significant work being undertaken by SafetyOn and its members on these topics.

Further resources for a Safe System of Work (SSoW) include the fourth edition of the *Wind Turbine Safety Rules* (WTSR) which were published in 2021. SafetyOn, together with the G+ Global Offshore wind health and safety organisation, holds ownership of the WTSR, which are hosted by the Energy Institute.

Furthermore in 2019 a dedicated Safe by Design workshop was held to address compliance focused solutions for major component exchange. The workshop report was published in 2020, and a follow-up workstream is looking at the development of industry good practise to coordinate crane lifting activities at site.

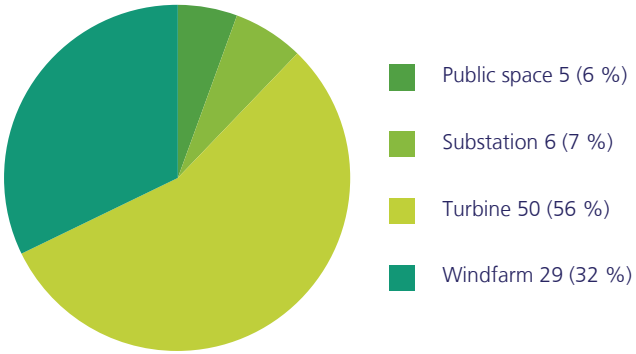


Figure 2: High potential incident area summary

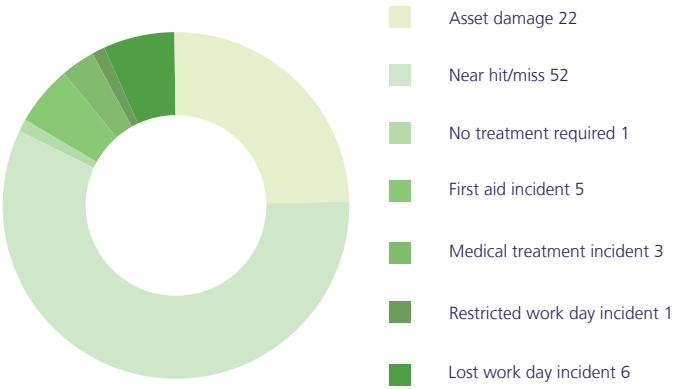
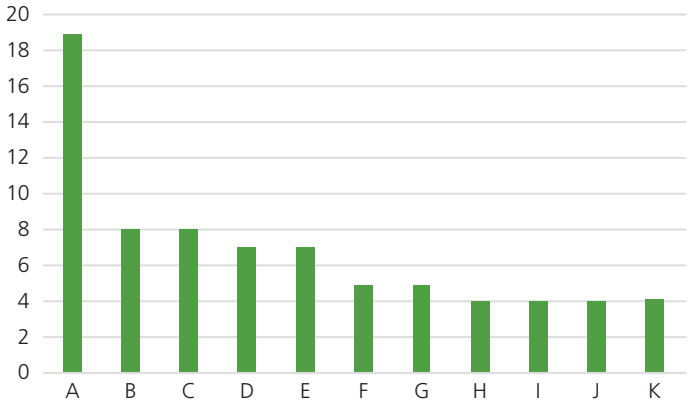


Figure 3: High potential incident consequence

High potential incidents (continued)



Key

A	Electrical systems (working with)
B	Lifting operations
C	Working at heights
D	Climbing/rope access
E	Routine maintenance
F	Access/egress
G	Civil works including excavations
H	Communications
I	Driving
J	Mechanical systems (working with)
K	Vehicle movement onsite

Figure 4: Work processes with 3 or more incidents identified as high potential

Emergency response or medical evacuation (ERME)

A total of 6 (1 %) incidents were reported which required ERME, this is a decrease of more than half in comparison to the 2020 statistics of incidents requiring ERME. 67 % incidents requiring ERME occurred on the windfarm, 1 % occurred in the turbine and 1 % in a public space. 4 of these incidents were reported as high potential, 3 caused a direct injury to a person (2 incidents injured ankle, 1 incident injured arm) and 1 reported a fallen object. Incidents requiring ERME were reported across 6 work processes as can be seen in Figure 7. Further information on developing site-specific plans and procedures to mitigate the consequence of incidents and help protect casualties until they can be delivered to an ultimate place of safety can be found in the SafetyOn *Onshore Emergency Response Good practice guidelines for onshore wind energy developments*.

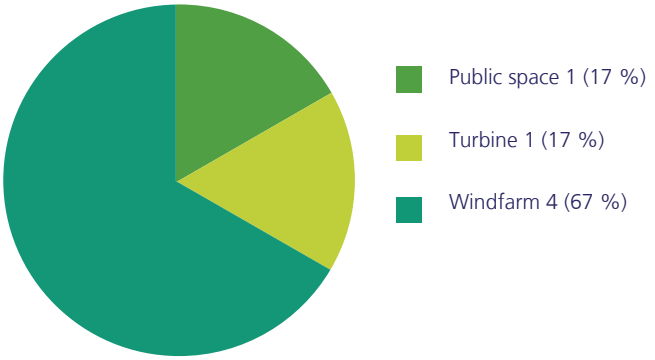


Figure 5: ERME per incident area

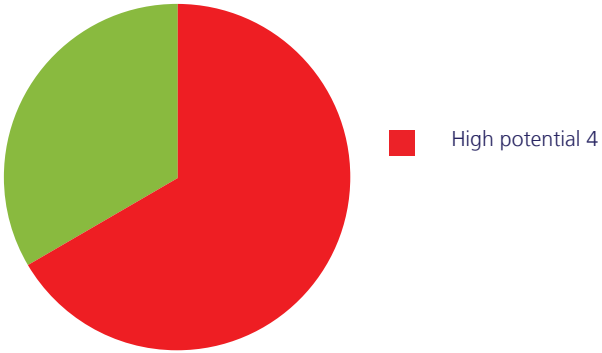
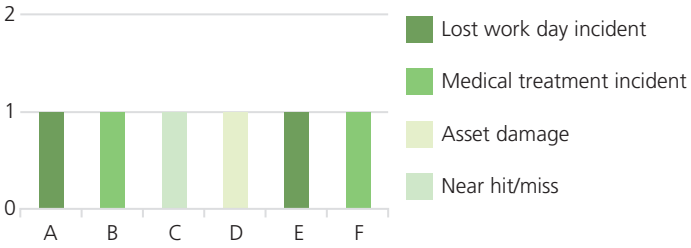


Figure 6: ERME incidents identified as high potential



Key

- **A** Access/egress
- **B** Borrow pit/explosives
- **C** Cable termination/jointing
- **D** Chemicals and hazardous substances (working with)
- **E** Civil works including excavations
- **F** Working at heights

Figure 7: ERME incidents breakdown by work process and incident consequence

Lost work day incidents

A total of 26 lost work day incidents were reported in 2021. This is a decrease of 20 % in comparison to lost work day incidents reported in 2020. Figure 8 shows lost work day incidents per incident area- 46 % of lost work day incidents occurred on a windfarm, 35 % occurred in the turbine, 15 % occurred in a public space and 4 % occurred in a substation. Lost work day incidents were reported across twelve work processes. Manual handling accounted for 6 lost work day incidents, followed by access/egress with 4 incidents reported. Manual handling was a work process highlighted in the 2020 data report and continues to be monitored under the SafetyOn 2022 work programme. Furthermore, manual handling has also consistently shown high incident numbers in offshore wind thus G+ are developing a video campaign that highlights the risks of manual handling and demonstrates best operating procedures for manual handling tasks. Once available this campaign can also be used to support onshore wind and adapted where needed.

SafetyOn recognise that accessing and egressing a windfarm and assets within a windfarm is something that needs additional analysis, thus from 2022 the incident data submission template breaks down incident areas further to include turbine foundation external and internal, hub and blades, nacelle, service lift, tower, and yaw gear space. The breakdown of these areas will allow for statistics to be presented on where exactly access/egress incidents are occurring onsite.

Of the 26 lost work day incidents, 6 were recorded as high potential- a breakdown is provided in Figure 9.

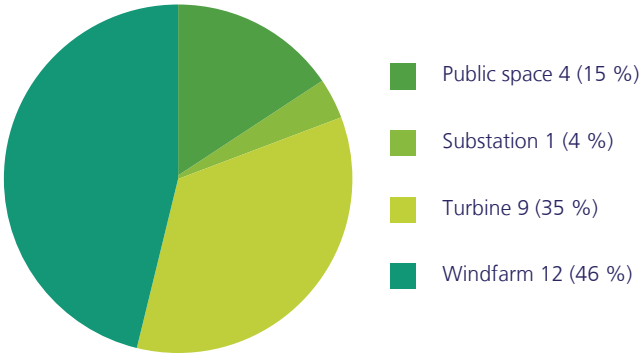


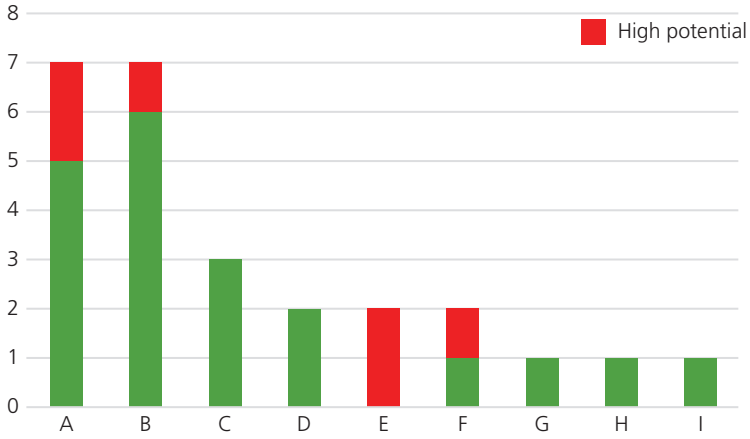
Figure 8: Lost work day incidents by incident area

Lost work day incidents (continued)

Key

- **A** Manual handling
- **B** Access/egress
- **C** Hand tools/power tools (working with)
- **D** Lifting operations
- **E** Driving
- **F** Operating plant & machinery
- **G** Civil works including excavations
- **H** Training/drills/team building events
- **I** Surveys (geophysical, environmental, meteorological)
- **J** Vehicle movement onsite
- **K** Routine maintenance
- **L** Office work

Figure 9: Lost work day incidents – breakdown per work process and identified as high potential



Key

- **A** Hand
- **B** Ankle
- **C** Back
- **D** Arm
- **E** Head
- **F** Chest
- **G** Foot
- **H** Leg
- **I** Neck

Figure 10: Lost work day incidents by body part injured and identified as high potential

Incident data summary: Body part injured

In 2021, 134 (23 %) incidents caused direct injury to a person, this is an increase of 5 % compared to the 2020 incident data. Just over half of incidents causing a direct injury occurred in a turbine, 32 % occurred on a windfarm, 10% occurred in a public space and 4 % in a substation. Most incidents causing direct injury to a person resulted in first aid (58 %). 26 resulted in lost work day incidents, 10 were reported as an injury to a person which did not require treatment, 7 resulted in restricted work day and 13 required medical treatment.

As with the 2020 incident data, manual handling accounted for the highest number of incidents (19 %) resulting in a direct injury to a person, followed closely by working with hand tools/power tools (16 %). Incidents resulting in a direct injury were reported across 19 work processes as can be seen in figure 13. Overall the top three body parts injured remain as hand, leg and back, and hand injuries (33 %) remain the most frequent body part injured in 2021. As a result SafetyOn has a dedicated workstream on injury trends, with phase 1 examining hand injuries in greater depth. The workstream on injury trends will also investigate manual handling and working with hand/tools power tools. Furthermore SafetyOn published a *Human factors in renewables* eBook in 2021 which outlines ten factors influencing human performance- some of the factors are seen as a contributing cause of hand injuries.

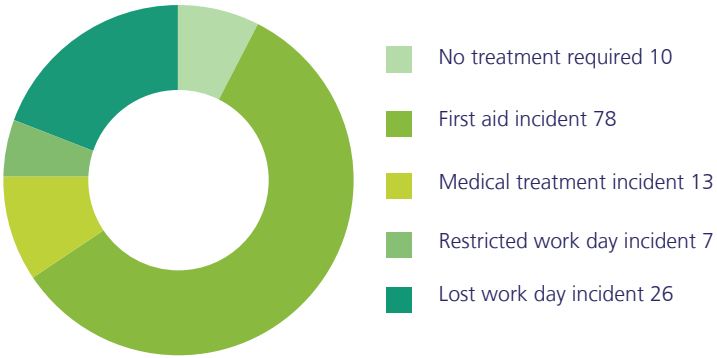


Figure 11: Incident consequence of direct injury to person

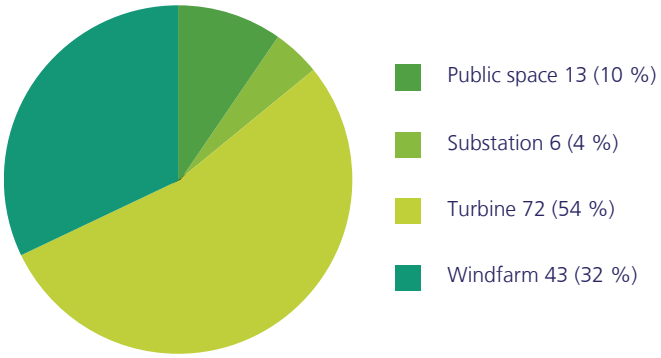


Figure 12: Direct injury to person per incident area

Incident data summary: Body part injured (continued)

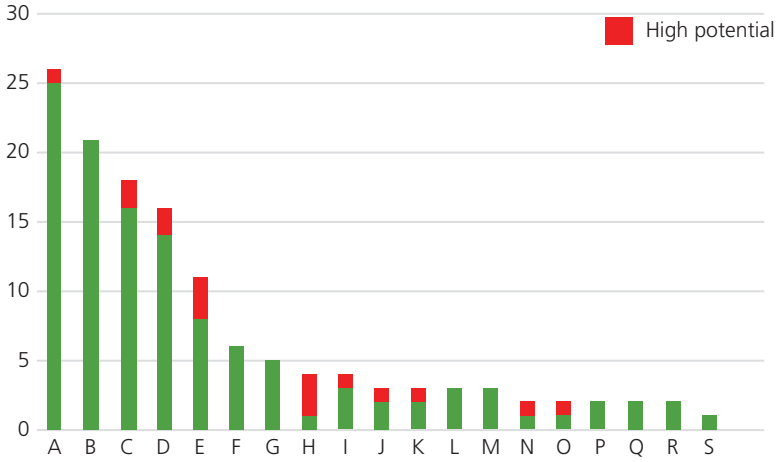


Figure 13: Direct injury per work process and identified as high potential

Key	
A	Manual handling
B	Hand tools/power tools (working with)
C	Access/egress
D	Routine maintenance
E	Climbing/rope access
F	Surveys (geographical, environmental, meteorological)
G	Operating plant & machinery
H	Driving
I	Mechanical systems (working with)
J	Lifting operations
K	Vehicle movement onsite
L	Chemicals and hazardous substances (working with)
M	Office work
N	Cable termination/jointing
O	Civil works including excavations
P	Borrow pit/explosives
Q	Training/drills/team building events
R	Replacing major components
S	Confined space

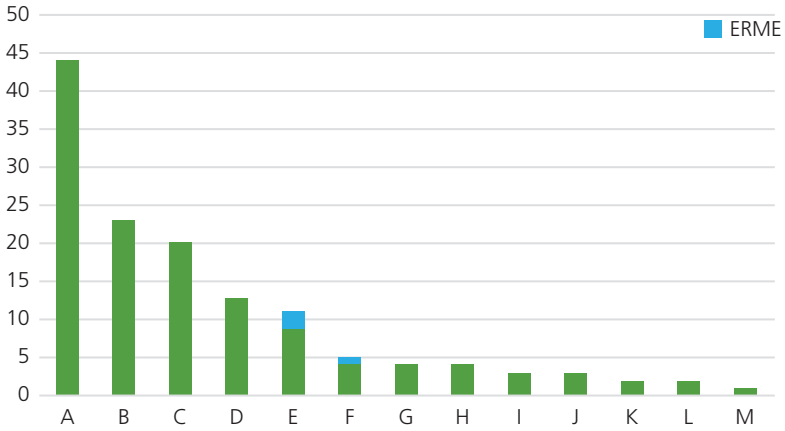


Figure 14: Body part injured and identified as requiring ERME
(Note one incident accounted for two body parts injured- leg and wrist)

Key	
A	Hand
B	Leg
C	Back
D	Head
E	Ankle
F	Arm
G	Chest
H	Internal
I	Eye
J	Neck
K	Foot
L	Whole body
M	Wrist

Lower limb injury

This section focusses on Lower Limb Injuries (LLI) which includes the 'Ankle', 'Foot', and 'Leg'. There were 36 incidents that caused injury to lower limbs. LLI account for the most lost work day incidents (9). Ankle injuries accounted for 7 lost work day incidents. 61 % of incidents involving LLI's occurred on a windfarm, 33 % occurred in a turbine, 3 % occurred in a substation, and 3 % in a public space. Most LLI's were reported under the work process access/egress (33 %), and a total of 61% were treated as a first aid incident. LLIs are a problem in many workplaces, and although rarely life threatening, they can adversely affect quality of life. In Great Britain in 2020/21 there were an estimated 470,000 workers affected by work-related musculoskeletal disorders (MSD), 76,000 of which were attributed to lower limbs. (*Work-related musculoskeletal disorders statistics in Great Britain, 2021*, 2022).

From the SafetyOn data available contributing cause and route cause of incidents are not clear and it would require further analysis against each incident to identify these and the preventative measures. However, in 2009 the HSE commissioned a report to examine more closely the nature and extent of workplace lower limb musculoskeletal disorders and injuries. The findings proposed various interventions for controlling the risks and preventing MSDs in the workplace. 'Those that have been shown to be useful include implementing protective equipment, changing work surfaces (flooring), redesign and modification of work methods, training and retraining, and participatory programmes. Work redesign and/or modification along human factors principles proved most effective for encouraging behaviour change, rehabilitation and return to work of injured workers' (Okunribido, 2009).

SafetyOn recognise that organisational and human factors can be major contributing factors to lower limb injuries, as well as all incidents and injuries that occur, and has therefore established a specific workstream to address human and organisational factors.

As can be seen in Figures 17 and 18, 2 LLI's were both reported as high potential and requiring ERME. These were reported to have occurred under work processes civil works including excavations and cable termination/jointing.

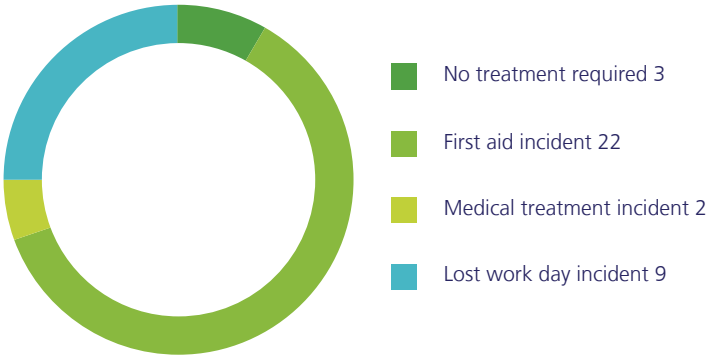


Figure 15: Incident consequence of lower limb injuries

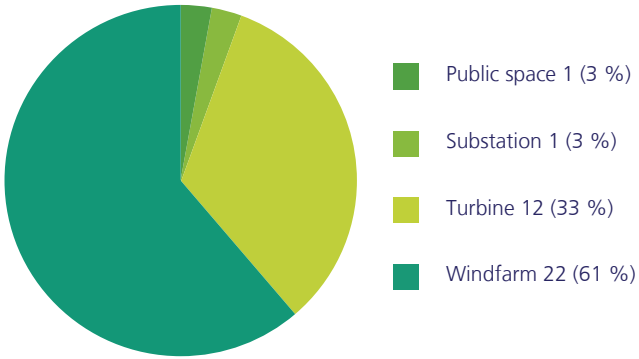


Figure 16: Lower limb injuries per incident area

Lower limb injury (continued)

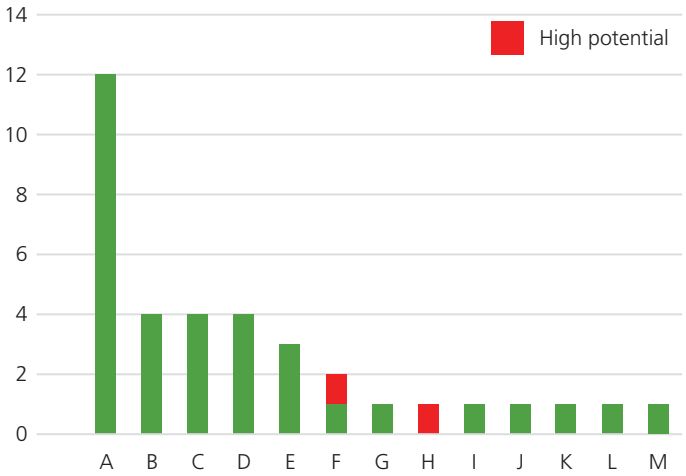


Figure 17: Lower limb injuries per work process and identified as high potential

Key	
A	Access/egress
B	Climbing/rope access
C	Manual handling
D	Routine maintenance
E	Surveys (geophysical, environmental, meteorological)
F	Civil works including excavations
G	Borrow pit/explosives
H	Cable termination/jointing
I	Confined space
J	Hand tools/power tools
K	Mechanical systems (working with)
L	Office work
M	Operating plant & machinery

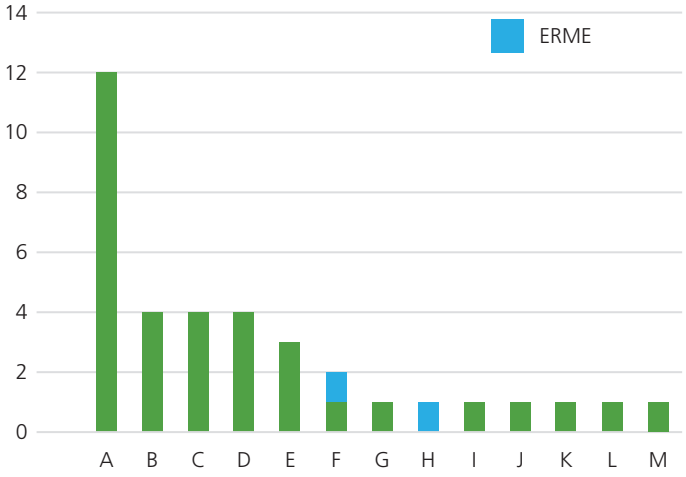


Figure 18: Lower limb injuries per work process and identified as requiring ERME

Key	
A	Access/egress
B	Climbing/rope access
C	Manual handling
D	Routine maintenance
E	Surveys (geophysical, environmental, meteorological)
F	Civil works including excavations
G	Borrow pit/explosives
H	Cable termination/jointing
I	Confined space
J	Hand tools/power tools (working with)
K	Mechanical systems (working with)
L	Office work
M	Operating plant and machinery

Incident data summary: work process

There are 28 work processes classified in the SafetyOn reporting template. Figure 19 shows the top 10 work processes where incidents were reported, with high potential incidents identified. A similar trend to 2020 incident data, Routine maintenance, working with electrical systems, and access/egress remain within the top three work processes where incidents occurred. Incidents in these areas have been examined at quarterly deep dive meetings, however there are no visible trends in incidents reported under these categories.

SafetyOn have redefined the definition of routine maintenance for 2021 and recognise that accessing and egressing a windfarm and assets within a windfarm is something that needs additional analysis. Work processes vehicle movement onsite and security were added to the incident template in 2021 to allow for more accurate reporting under these categories. The HSE report *Workplace fatal injuries in Great Britain, 2021* being struck by a moving vehicle continues to be one of the three main causes of fatal injury each year since at least 2001/02. SafetyOn recognise driving is one of the most hazardous work activities that many people undertake, and all too often, a vehicular-related incident results in an accidental death or a serious injury on a UK onshore wind farm site, thus in 2021 SafetyOn published *Good practice guidelines- Traffic management for onshore wind farms*.

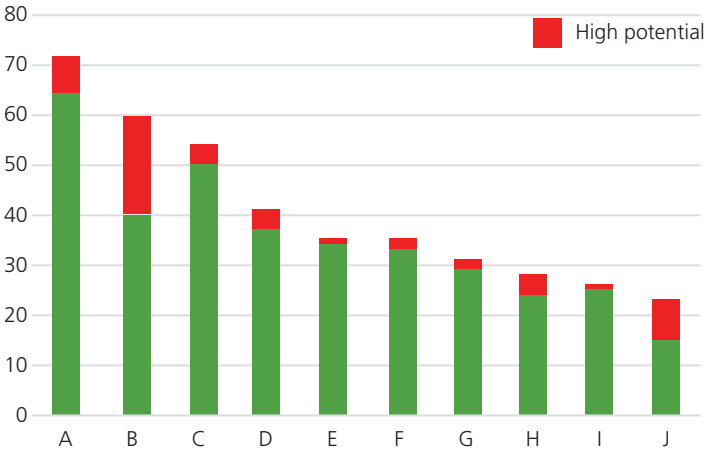


Figure 19: Top 10 work processes with the highest number of incidents and high potential incidents identified

Key	
A	Routine maintenance
B	Electrical systems (working with)
C	Access/egress
D	Vehicle movement onsite
E	Security
F	Documentation and process failure
G	Manual handling
H	Communications
I	Hand tools/power tools (working with)
J	Lifting operations

Hand tools/power tools (working with)

A total of 26 incidents were reported to have occurred whilst working with hand tools/power tools. Of the 26 incidents reported, 21 incidents caused a direct injury to a person attributing to second highest number of incidents within the total recordable incident rate (TRIR) calculation. 69 % of incidents reported during working with hand tools/power tools occurred in the turbine, 15% occurred in the substation, 12 % on the windfarm and 4 % in public space. Working with hand tools/power tools injured five different body parts as can be seen in Figure 22. 16 incidents caused injury to hand. The SafetyOn workstream on injury trends will incorporate this work process into the analysis. The aim is to develop an output that reduces and mitigates these types of incidents as far as possible.

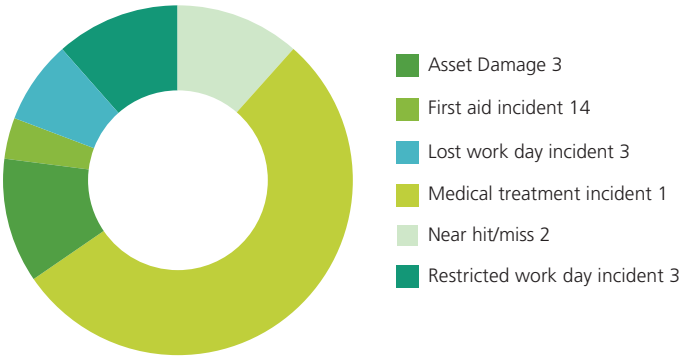


Figure 20: Hand tools/power tools – incident consequence

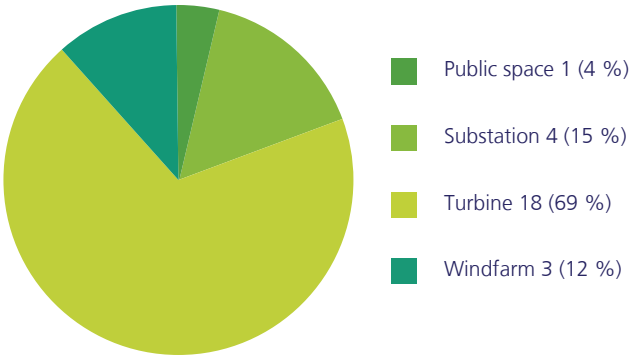
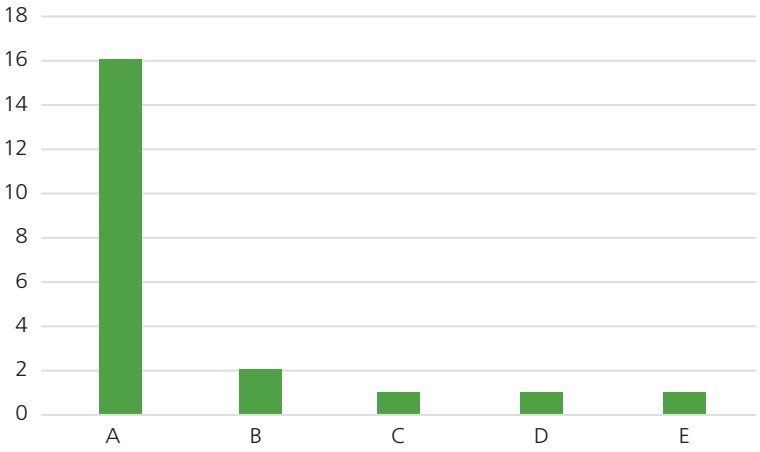


Figure 21: Hand tools/power tools – incident area summary



Key

A	Hand
B	Head
C	Arm
D	Back
E	Leg

Figure 22: Hand tools/power tools – body part injured summary

Lifting operations

A total of 23 (4 %) incidents were reported under the work process lifting operations. 8 (35 %) of these incidents were identified as high potential. 57 % of incidents that occurred under lifting operations were reported as near hit/miss, 30 % resulted in asset damage, 4 % caused a direct injury however no treatment was required, and 9 % of incidents were recorded as lost work day incidents. The 3 incidents which caused direct injury to a person injured the hand. SafetyOn recognise that the failure or misuse of lifting equipment can have catastrophic consequences, and that the failure or misuse of lifting equipment is to a great degree avoidable. The Onshore wind industry's compliance with the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), specifically with regard to personnel working under suspended loads, has been one of the heading topics in SafetyOn's work programme, and in 2019 a dedicated Safe by Design workshop was held to address compliance focused solutions for major component exchange. The workshop report was published in 2020, and a follow-up workstream has been agreed looking at the development of good practise industry guidance to coordinate crane lifting activities at site.

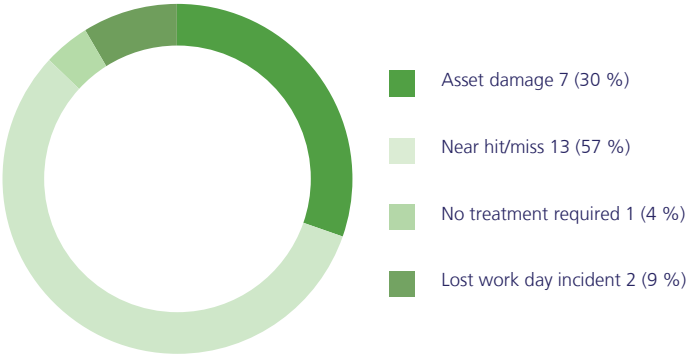


Figure 23: Lifting operations – incident consequence

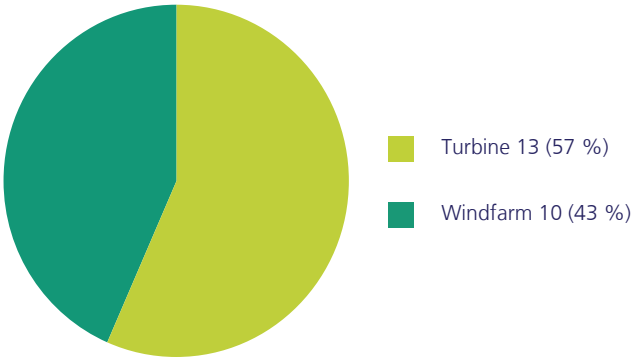


Figure 24: Lifting operations – incident area summary

Dropped objects and fallen objects

In 2021 SafetyOn added a separate category to the incident data reporting template for fallen objects and dropped objects. Fallen objects and dropped objects present a significant potential for fatality and major injury. The HSE report *Workplace fatal injuries in Great Britain, 2021* informed being struck by a moving (flying or falling) object continues to be one of the three main causes of fatal injury each year since at least 2001/02. Highlighting fallen and dropped objects in the data analysis will assist in identifying trends and mitigating incidents that could easily be prevented.

Fallen object is defined as an incident that involves a fallen object, falling object includes formed ice on structures. A dropped object is defined as an incident involving an object being dropped, i.e., a technician drops a drill.

Data indicates there were 54 incidents which reported a fallen object, and 17 incidents reported an object being dropped.

8 incidents involving a dropped object were reported as high potential, 17 fallen objects were reported as high potential.

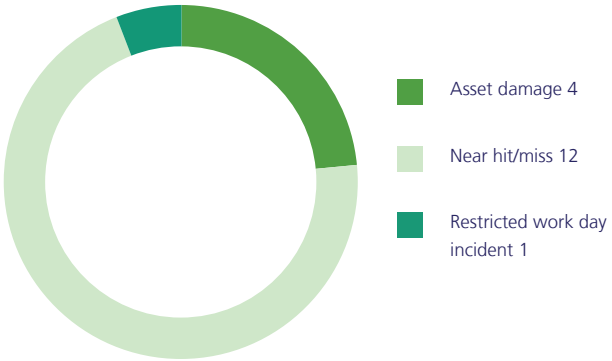


Figure 25: Dropped objects – incident consequence

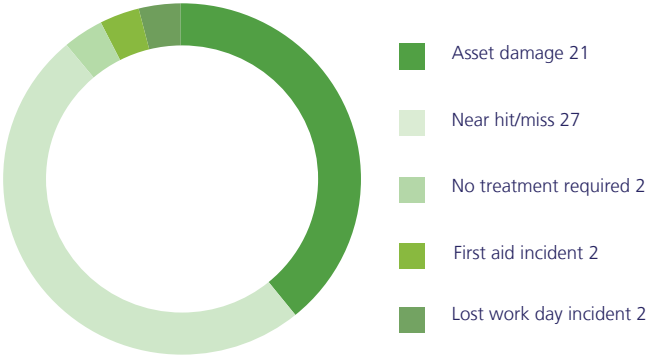
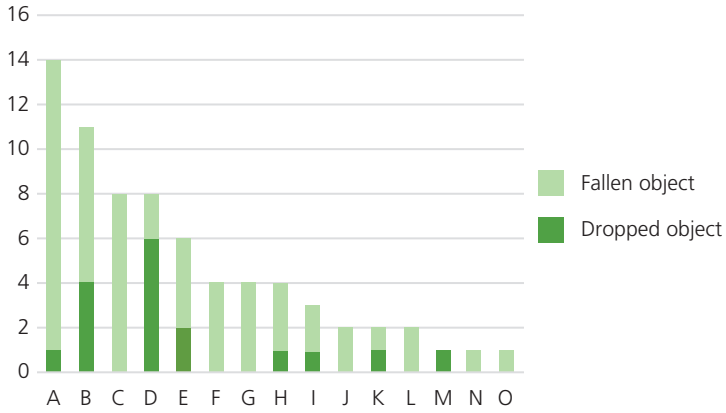


Figure 26: Fallen objects – incident consequence

Dropped objects and fallen objects (continued)



Key	
A	Routine maintenance
B	Working at heights
C	Access/egress
D	Climbing/rope access
E	Lifting operations
F	Civil works including excavations
G	Mechanical systems (working with)
H	Replacing major components
I	Manual handling
J	Driving
K	Hand tools/power tools
L	Operating plant & machinery
M	Cable pull/winching operation
N	Electrical systems (working with)
O	Surveys (geophysical, environmental, meteorological)

Figure 27: Dropped object and fallen object breakdown per work process

Development, construction and operational sites

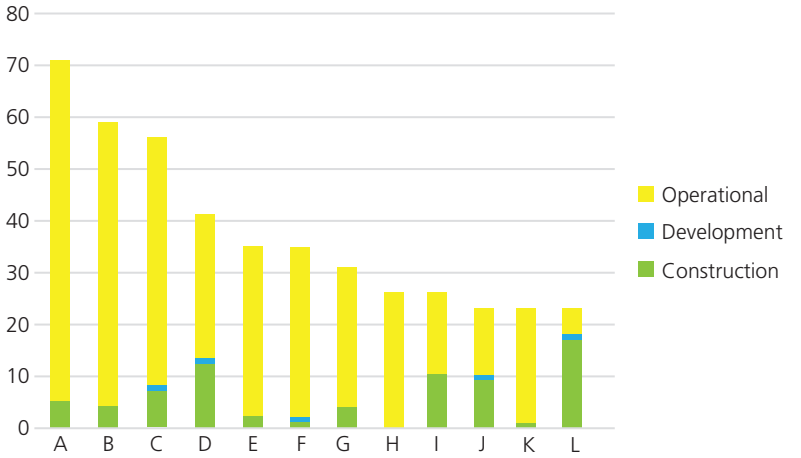
SafetyOn member onshore wind farms comprise projects that are in either the development, construction, operational or decommissioning phases. These are defined as:

- Development site: Development and consenting phase of the project.
- Construction site: Construction and commissioning.
- Operation site: Site in operation producing power.
- Decommissioning/repowering: Wind farm decommissioning activity/repowering activity.

Figure 28 provides a breakdown of the top 12 work processes where incidents occurred by the stage the project is at, i.e., construction, development and operational. Most incidents continue to occur on operational windfarms, followed by construction sites and development sites.

Activity in these areas is expected to increase as onshore wind is one of the cheapest forms of renewable generation and is essential in achieving net zero emissions. It is estimated that building new onshore wind farms needed to meet 30GW by 2030 would create 27,000 jobs, and development activity would see jobs peaking at 36,000 in the 2020s.

Furthermore, the phasing out of a wind turbine at the end of its standard lifetime faces the question of decommissioning or repowering- a trend which is expected to rise as increased planning for new sites refocuses the industry on redeveloping sites where turbines have already been situated. SafetyOn recognise that at each stage of the project lifecycle there are health and safety risks to risk assess and mitigate thus SafetyOn published guidance in 2021 on Post-incident decommissioning of onshore wind turbines and Planned decommissioning framework for onshore wind turbines . Furthermore, SafetyOn also have a working group for operators of life extended wind turbines. This working group brings together owners and operators of ageing wind turbines in the UK and Ireland, to share experience and improve knowledge of 'good practice' management of safety and integrity concerns to improve the safety of the industry as a whole.



Key	
A	Routine maintenance
B	Electrical systems (working with)
C	Access/egress
D	Vehicle movement onsite
E	Security
F	Documentation and process failure
G	Manual handling
H	Communications
I	Hand tools/power tools
J	Lifting operations
K	Climbing/rope access
L	Civil works including excavations

Figure 28: Work process - development, construction, operational site breakdown

Conclusion and next steps

The sharing and analysis of health and safety incident data for the UK onshore wind sector is the cornerstone of the work of SafetyOn. The collation of incident data in a unified format, and the collaborative effort to interrogate and understand that data provides SafetyOn with the knowledge and insight that informs a risk-based work programme that helps improve health and safety performance across the entire UK onshore wind industry.

Whilst SafetyOn continues to monitor and gather data on the health and safety performance of the sector, feedback is always valued and helps inform our regular review of the data collection and reporting process. If you do have any feedback on the content of this report please email your comments to emcivor@energyinst.org

Please do feel free to share this report across your organisation, supply chain and with other stakeholders – by discussing incidents openly we all take steps to improve risk awareness and learning.

References

Health and Safety Executive (HSE) (https://www.hse.gov.uk/)

Workplace fatal injuries in Great Britain, 2021

Work-related musculoskeletal disorders statistics in Great Britain, 2021

Lower limb MSD Scoping work to help inform advice and research planning

RenewableUK (https://www.renewableuk.com/)

The onshore wind industry prospectus, How a partnership between industry and Government can maximise the benefits of the clean power we need

SafetyOn (https://safetyon.com/)

2020 Onshore Wind Health and Safety incident data report

Good practice guidelines: Planned decommissioning framework for onshore wind turbines

Good practice guidelines: Post-incident decommissioning of onshore wind turbines

Good practice guidelines: Traffic management for onshore wind farms

Human Factors in renewables

Onshore Emergency Response Good practice guidelines for onshore wind energy developments

Research report: an investigation into the root causes of fires in MW scale wind turbines

Safe by design workshop report: Working under suspended loads- major component exchange

Please note all the documents above are freely available to download via the hyperlinks provided. Please click on the title to view.

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61 New Cavendish Street
London W1G 7AR, UK

+44 (0)20 7467 7100
info@energyinst.org

www.energyinst.org

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